WILDCAT TO PINE CREEK I-IR-15-3(18)121
Northbound Lanes Construction Data 1980
40% Recycled 60% New Material

Sample No.	Viscosity At 140°F	Viscosity At 275°F	Penetration	Ductility At 39.2°F	Percent Air Voids	Stability	Flow	Percent Asphalt Cement	Density
80-8	734	210	152	50	4.2	3071	23	5.51	94%
80-9	964	241	120	50	3.7	2778	21	5.61	94%
80-10	708	196	157	50	1.8	2424	21	6.26	97%
80-11	822	206	167	50	2.1	2940	18	5.81	95%
80-12	873	205	137	50	4.1	2818	20	5.15	98%
80*15	687	200	147	50	2.2	2823	20	6.35	95%
80-16	714	195	145	50	1.7	2771	26	5.72	98%
80-17	810	223	122	50	2.3	2849	21	5.65	97%
80-18	855	215	114	50	2.3	2971	18	6.38	98%
80-19	959	222	123	50	2.9	2970	20	5.39	97%
80-20	964	226	114	50	2.9	3542	18	6.19	96%
80-21	887	235	115	50	3.4	3800	16	5.62	96%
80-22	932	225	104	50	3.9	3031	16	5.86	94%
80-23	1014	236	111	50	4.5	2960	20	5.94	94%
80-24	1025	236	102	50	1.8	2803	21	6.38	94%
80-25	1083	234	102	50	2.1	2945	20	5.77	96%
80-26	1107	242	94	50	3.4	2884	18	5.90	96%
80-27	1276	260	102	50	3.5	2940	20	5.40	96%
80-28	1240	255	102	50	3.1	3212	22	6.02	93%
80-29	1044	232	91	50	2.5	3377	21	5.74	93%
80-30	1053	236	98	50	4.5	3044	21	5.74	95%
80-31	976	232	118	50	1.8	2677	22	5.64	94%
80-32	925	232	116	50	2.9	2692	19	5.33	96%
80-33	948	236	120	50	2.0	2833	19	5.64	94%
80-34	1050	238	96	50	2.0	2817	20	6.17	95%
80-35	990	236	117	50	2.0	2975	20	6.03	96%
80-36	864	231	119	50	2.3	2975	20	6.48	95%
80-37	939	232	130	50	1.6	2646	19	5.98	95%
$\bar{X}$	953	228	118	50	2.86	2949	20	5.85	95%

* Samples 13 & 14 Did Not Have Recycling Agent In Them.

WILDCAT TO PINE CREEK I-IR-15-3(18)121
Northbound Lanes Construction Data 1980
40% Recycled 60% New Material

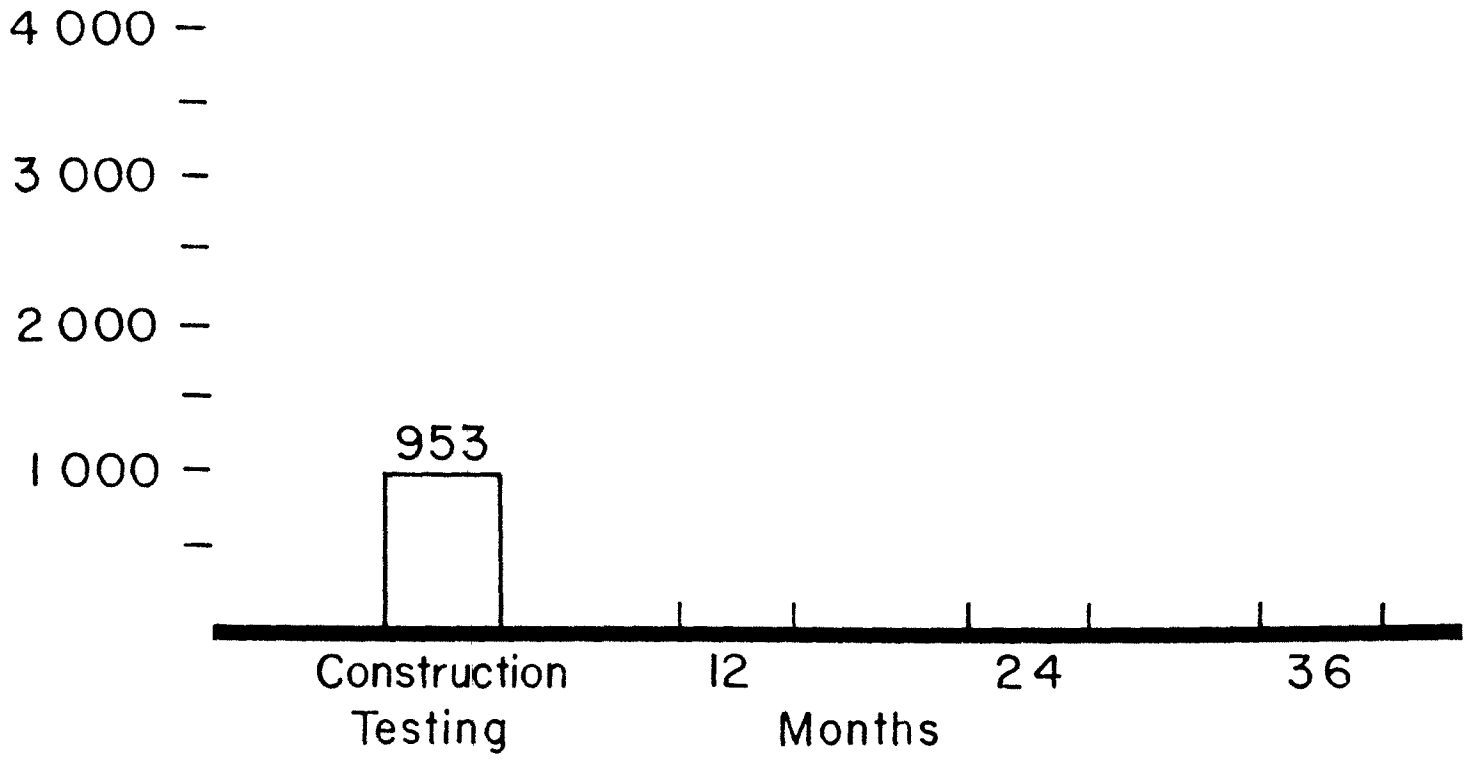
Sample No.	3/4	1/2	3/8	# 4	# 8	# 16	#50	#200
80-8	100	92.4	82.4	59.5	44.4	33.7	20.1	11.9
80-9	100	88.4	76.5	49.6	37.5	29.4	18.6	11.8
80-10	100	91.4	80.6	56.4	42.0	32.5	19.7	12.0
80-11	100	91.5	80.2	56.8	41.6	31.6	19.2	12.1
80-12	100	89.2	72.9	48.3	35.4	27.5	16.4	9.5
80-13	100	90.6	76.3	48.8	35.3	24.7	17.0	10.1
80-14	100	88.0	73.0	47.2	34.1	26.3	15.9	8.7
80-15	100	88.6	77.6	55.4	41.9	32.2	19.3	11.6
80-16	100	86.9	70.4	44.5	33.5	26.1	16.7	10.9
80-17	100	85.6	71.9	51.1	38.3	29.8	18.5	11.5
80-18	100	88.8	77.2	54.4	39.0	29.2	16.7	9.2
80-19	100	90.1	75.7	53.3	39.3	29.9	18.2	11.2
80-20	100	92.1	83.7	62.1	45.9	34.5	19.9	11.8
80-21	100	93.5	83.9	63.8	43.6	32.7	18.4	9.6
80-22	100	88.9	75.9	54.8	39.8	30.2	17.6	9.9
80-23	100	87.9	72.0	51.4	37.7	29.0	17.7	10.5
80-24	100	89.6	79.6	57.6	43.4	32.7	19.0	11.0
80-25	100	89.2	79.1	58.8	44.0	33.2	19.1	10.8
80-26	100	88.7	75.2	54.5	40.2	30.3	17.3	9.4
80-27	100	88.8	75.5	54.8	40.1	30.2	17.5	10.1
80-28	100	91.0	80.0	59.1	43.9	33.2	19.4	11.1
80-29	100	91.2	82.2	58.6	42.8	32.0	18.0	10.1
80-30	100	90.1	76.9	54.5	40.2	30.8	18.4	10.6
80-31	100	90.4	78.3	54.3	39.6	30.1	17.4	9.8
80-32	100	90.5	77.9	54.1	38.9	29.1	17.2	10.1
80-33	100	90.8	82.1	61.7	45.3	34.2	19.7	11.3
80-34	100	91.8	81.0	58.9	43.3	32.7	19.5	11.5
80-35	100	91.4	80.4	59.6	43.6	32.6	19.3	11.5
80-36	100	91.2	80.9	58.3	43.1	32.6	19.0	11.0
80-37	100	90.0	78.0	56.6	42.1	32.4	19.4	11.3
$\bar{X}$	100	89.9	77.8	55.3	40.6	30.9	18.3	10.7

WILDCAT TO PINE CREEK I-IR-15-3(18)121

Northbound Lanes

VISCOSITY AT 140°F

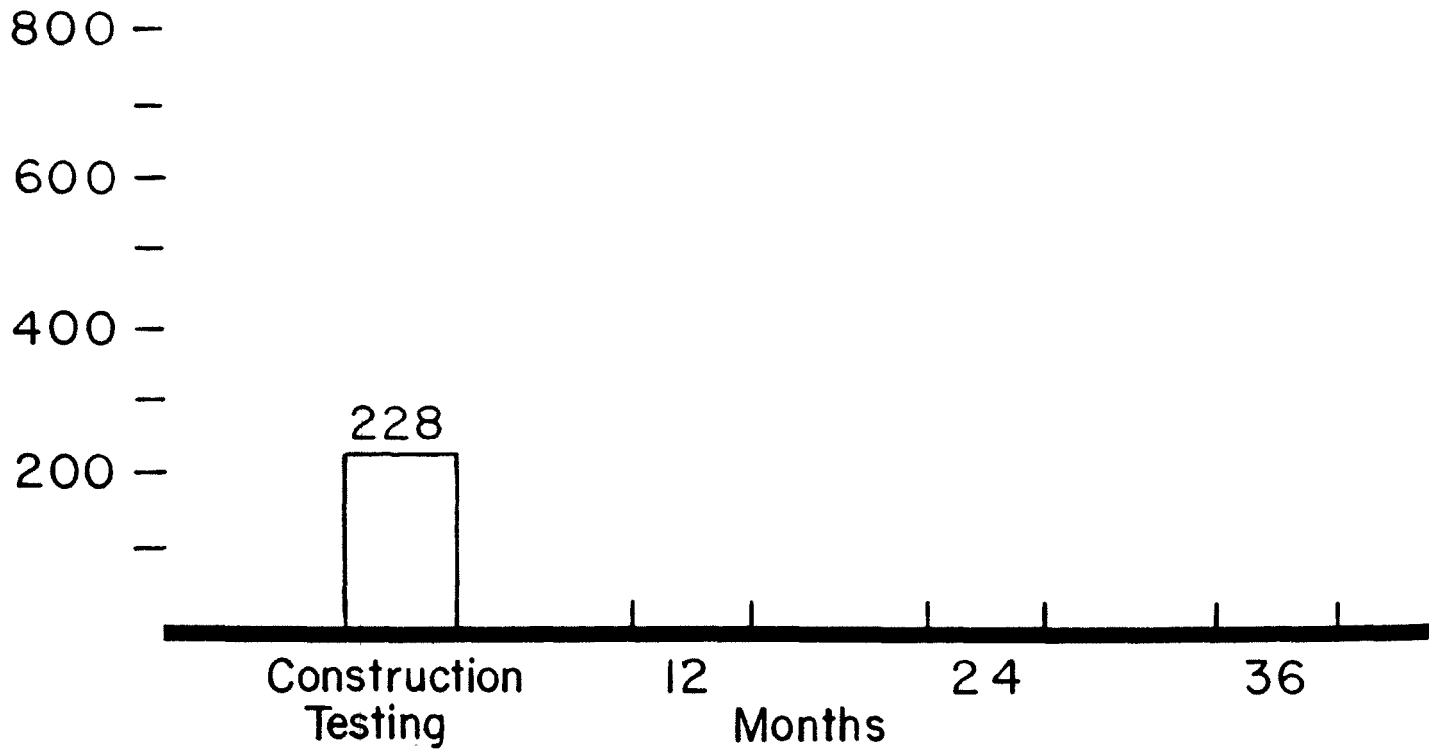
40% Recycled 60% New Material



Northbound Lane

VISCOSITY AT 275°F

40% Recycled 60% New Material

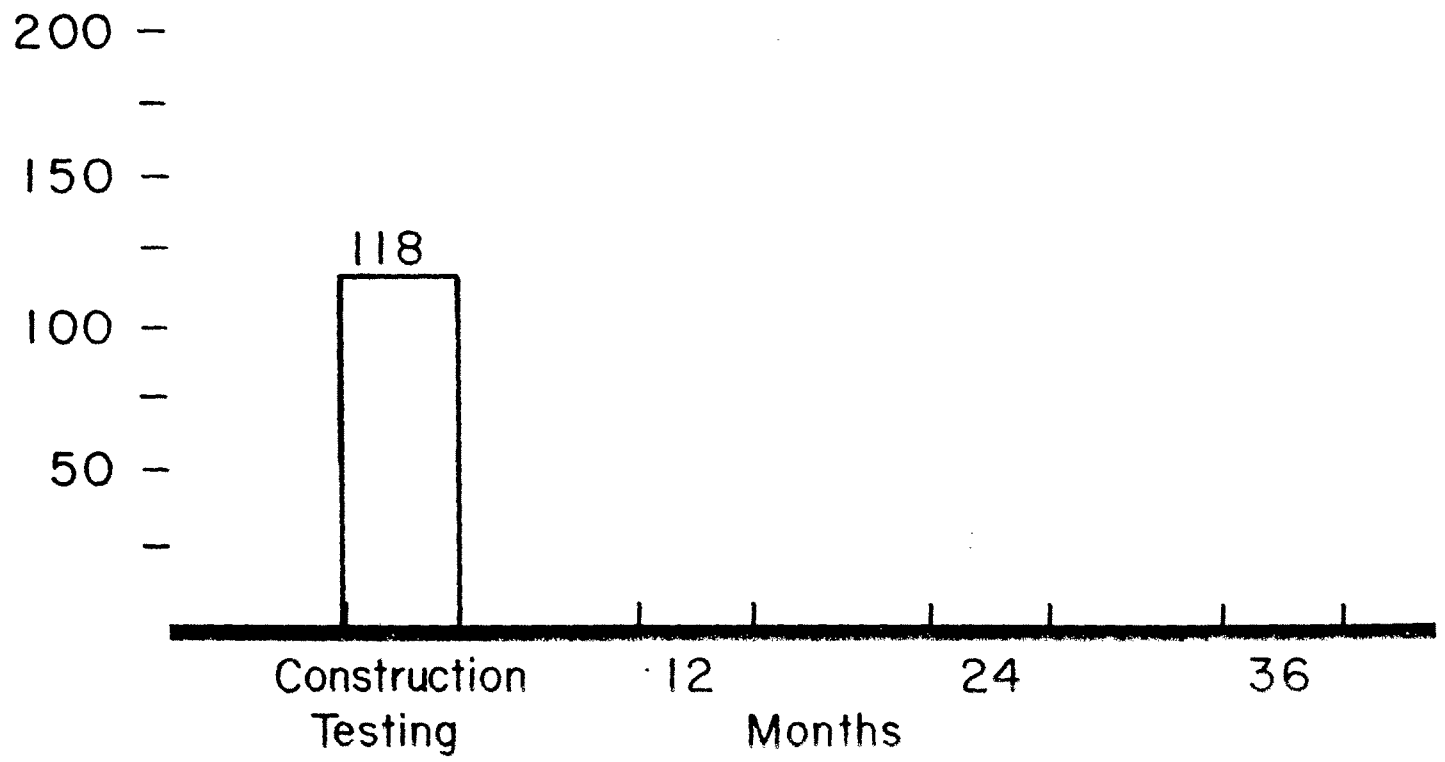


WILDCAT TO PINE CREEK I-IR-15-3(18)121

Northbound Lane

PENETRATION

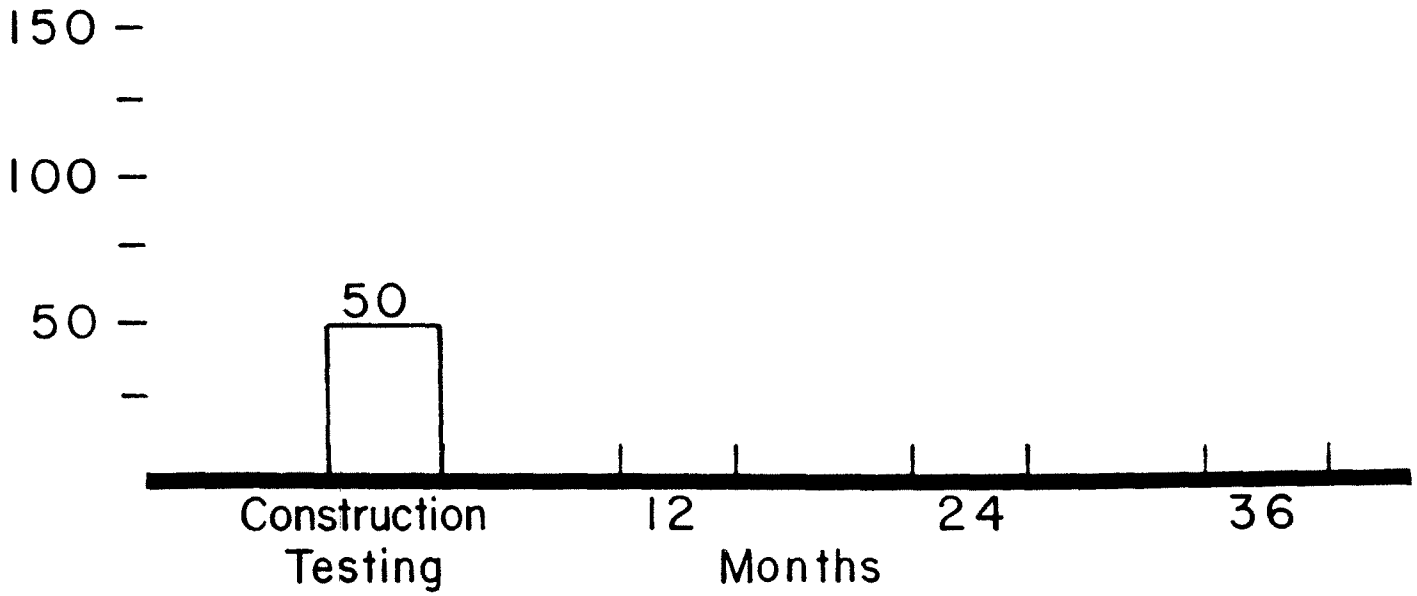
40 % Recycled 60 % New Material



Northbound Lanes

DUCTILITY AT 39.2° F

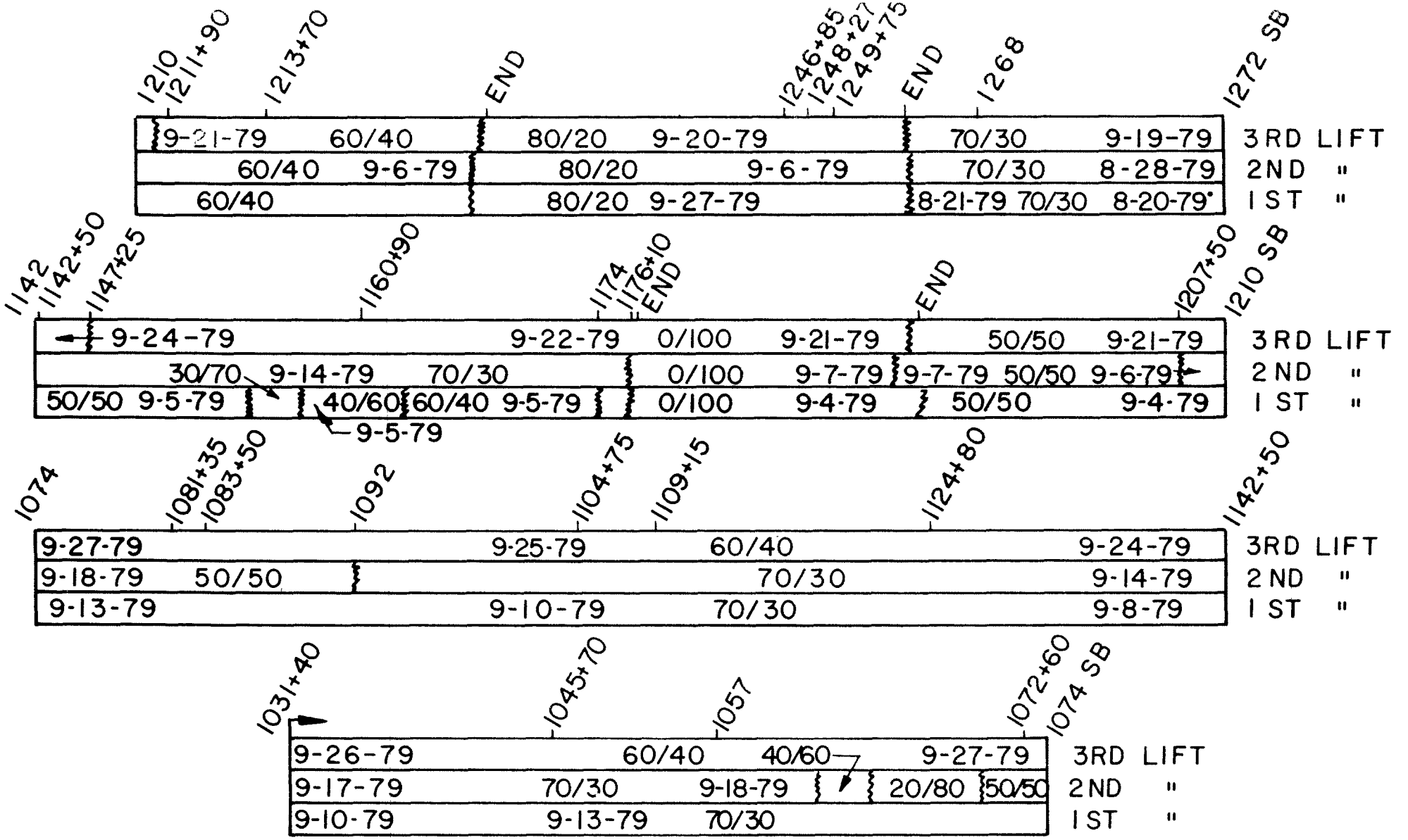
40 % Recycled 60 % New Material



WILDCAT TO PINE CREEK
I-IR-15-3(18)121

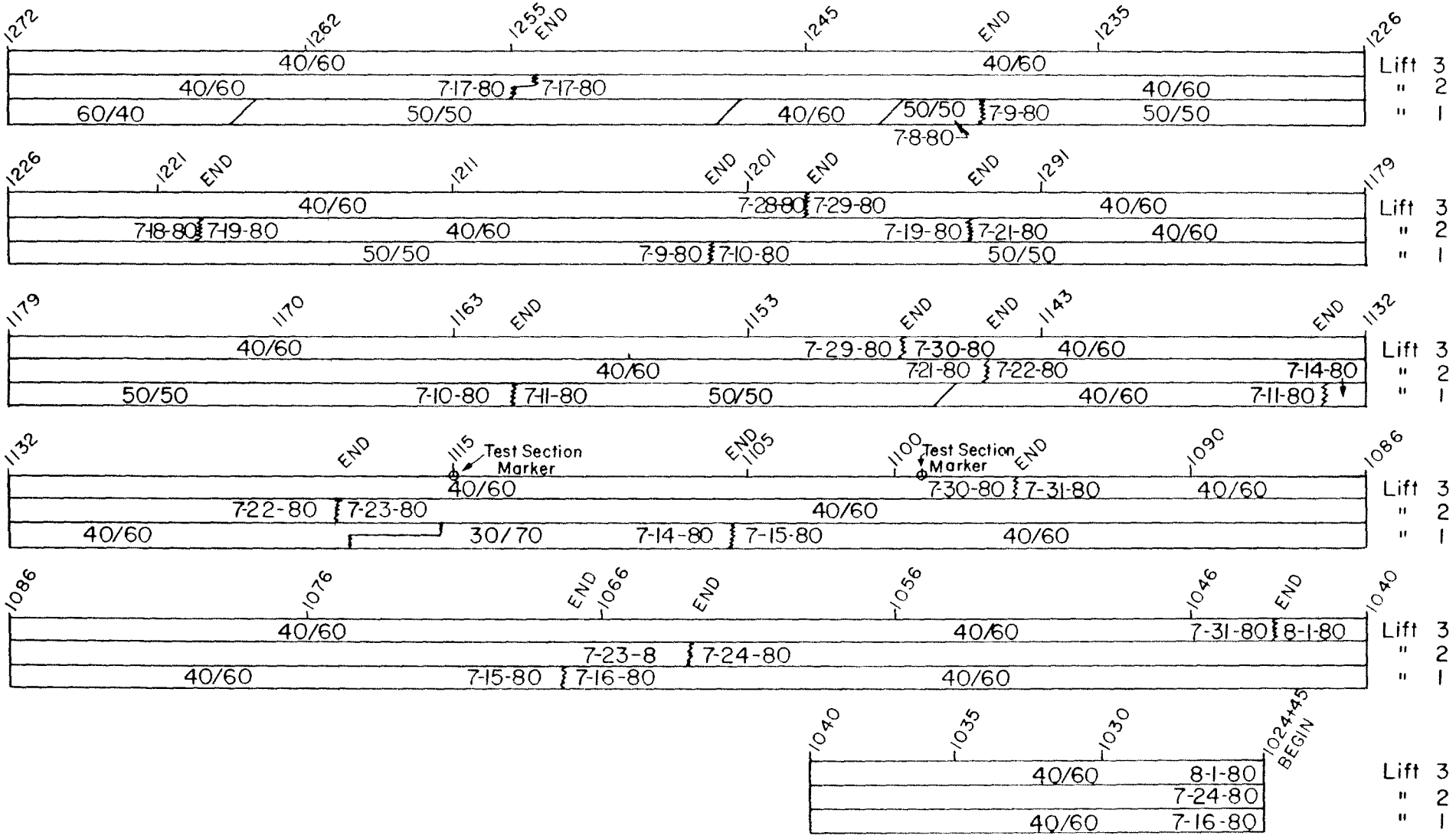
RECYCLED ASPHALT CONCRETE PAVEMENT

RECYCLED MIX TYPE		CREEP COMPLIANCE (PSI^{-1}) $\times 10^{-5}$-YEARS				RESILIENT MODULUS YEARS			
		Construction	1	2	3	Construction	1	2	3
0/100	Southbound	3.9	21.6			7.65×10^5	4.29×10^5		
80/20	Southbound	4.1	7.8			5.96×10^5	5.99×10^5		
70/30	Southbound	4.7	9.3			5.73×10^5	6.61×10^5		
60/40	Southbound	3.2	10.9			5.75×10^5	5.05×10^5		
50/50	Southbound	4.2	11.3			6.91×10^5	5.23×10^5		
40/60	Northbound	8.3				5.38×10^5			


1210
1211+90
1213+70
END
1246+85
1248+27
1249+75
END
1268
1272 SB
9-21-79 60/40
80/20 9-20-79
70/30 9-19-79
3RD LIFT
60/40 9-6-79
80/20 9-6-79
70/30 8-28-79
2ND "
60/40
80/20 9-27-79
8-21-79 70/30 8-20-79
1ST "
1142
1142+50
1147+25
1160+90
1174
1176+10
END
END
1207+50
1210 SB
9-24-79
9-22-79 0/100 9-21-79
50/50 9-21-79
3RD LIFT
30/70 9-14-79 70/30
0/100 9-7-79
9-7-79 50/50 9-6-79
2ND "
50/50 9-5-79
40/60 60/40 9-5-79
0/100 9-4-79
50/50 9-4-79
1ST "
9-5-79
1074
1081+35
1083+50
1092
1104+75
1109+15
1124+80
1142+50
9-27-79
9-25-79 60/40
9-24-79
3RD LIFT
9-18-79 50/50
70/30
9-14-79
2ND "
9-13-79
9-10-79 70/30
9-8-79
1ST "
1031+40
1045+70
1057
1072+60
1074 SB
9-26-79
60/40 40/60
9-27-79
3RD LIFT
9-17-79 70/30 9-18-79
20/80 50/50
2ND "
9-10-79 9-13-79 70/30
1ST "

WILDCAT TO PINE CREEK I-IR-15-3(18)121

Northbound Lanes



APPENDIX D

AIR QUALITY

	Page
Review Recycle Concept with Air Quality Bureau	1
Revocation of Permit to Operate	11
Intent to Approve CMI Model UDM-1900 Portable Asphalt Plant	13
Approval Order	15
Stack Tests SB & NB Lanes	18

March 9, 1978

Mr. Alvin Rickers
Executive Secretary
Air Conservation Committee
150 West, North Temple
Box 2500
Salt Lake City, Utah 84110

Dear Sir:

Transmitted herewith is the Special Provision on Air Quality Experiment for the IR-15-3(8)121, Wildcat Interchange to Sulphurdale Interchange. We are looking forward to discussing the total concept of this project March 13, 1978 at 1:30 PM.

Very truly yours,

Edwin E. Lovelace
Engineer of Materials and Research

Enclosure
WBBetenson/ljm

SPECIAL PROVISION
IR-15-3(8)121 Wildcat Interchange to Sulphurdale Interchange
Air Quality Requirement for Stationary Sources

Description

The required Dryer Drum Plant will be adequately designed to meet the Federal Standards of Performance for new stationary sources. These emission requirements, which are administered by the State of Utah, are a maximum of 20 percent opacity and particulate emissions not to exceed 0.04 grains per dry standard cubic foot.

Visual Emission Experiment

The Executive Secretary of the Utah Air Conservation Committee has granted an experimental permit from the visible emissions regulation, Section 2.2 of the Utah Air Conservation Regulations with the following restrictions:

1. A requirement of the Executive Secretary of the Utah Air Conservation Committee will be, before the award of the contract, that the contractor must present an experimental test plan to the Executive Secretary of the Committee and have the plant approved before a special experimantal permit would be issued.
2. Fifty three hundred (5300) cubic yards of recycled material will be allowed to be produced for adjustments and plant calibrations with allowable visual emission above 40 percent opacity. The emission controls must be properly maintained and operated at all times.
3. Forty thousand (40,000) cubic yards of recycled material will be allowed to be produced with visual emission at maximum of 40 percent and particulate not to exceed 0.10 grains per day standard cubic foot.

4. The remaining cubic yards of recycled material to be produced will meet the Federal Standards of Performance for new stationary sources. These emission requirements, are a maximum of 20 percent opacity and particulate emissions not to exceed 0.04 grains per dry standard cubic foot.
5. Stack tests must be conducted at the two levels of opacity (20 and 40 opacity) and must be arranged by the contractor and witnessed by the State (Bureau of Air Quality). Tests must be conducted by an approved stack testing firm.

Number of Stack Tests

1. One test is to be conducted at 40 percent opacity or less and one test is to be conducted at 20 percent opacity or less. These tests are to be conducted on a schedule agreed to be the Executive Secretary, Utah Air Conservation Committee and the Pavement Design Engineer of the Materials and Research Section. Three copies of the source emission tests will be required. The reports must be ledgeable and photocopies of computer data will not be exceptable.

Method of Measurement

The completed and accepted "Stack Tests" shall be reviewed and authorized by the Executive Secretary of Air Conservation Committee. Method 5, described in 40CFR part 60.

Basis of Payment

This item will be paid for in other items, which pavement shall be full compensation for all work, equipment, materials, reports and mobilization necessary to complete the item.

3/6/78/MR

Social Services

Scott M. Matheson, Governor, State of Utah
Anthony W. Mitchell, Ph.D., Executive Director

533-6108

March 21, 1978

WFF 3/22/78

Edwin E. Lovelace
Engineer of Materials and Research
Utah Department of Transportation
Materials and Research Section
757 West 2nd South
Salt Lake City, Utah 84104

Dear Mr. Lovelace:

Receipt of your letter (and enclosure) concerning the Special Provision on Air Quality Experiment for the IR-15-3(8)121, Wildcat Interchange to Sulphurdale Interchange, is acknowledged.

The DOT proposal was discussed in a joint meeting on March 13, 1978 between DOT and Bureau of Air Quality personnel.

The Bureau of Air Quality could not support the DOT proposal as submitted, because of the following reasons:

1. Both Federal and State review procedures require new air pollution sources to use best air cleaning techniques. The State's new source review criteria includes evaluation to assure meeting the Federal New Source Performance Standards (NSPS) and assuring that the National Ambient Air Quality Standards are not exceeded.

2. The State administers the NSPS testing which requires demonstration, within 180 days of initial start-up of the source or within 60 days of achieving the maximum production rate, whichever is earliest, that the asphalt plant emissions not exceed 0.04 grains particulate/day standard cubic foot and that visible emissions not exceed 20 % opacity.

3. The Assistant Attorney General (assigned to the Division of Health) has determined that variances may not be granted to operators of new air pollution sources.

Division of Health
Environmental Health Services Branch
Lynn M. Thatcher
Deputy Director of Health

150 West North Temple, Suite 426
P.O. Box 2500, Salt Lake City, Utah 84110
801-533-6121

The Bureau of Air Quality suggested that an alternative could be
o:

1. Establish a rate of asphaltic concrete production at which the NSPS would be achieved. This would be verified by stack testing.

2. Allow, at the Executive Secretary's (Air Conservation Committee) discretion, the increase of the production rate so long as the 20% opacity requirement is achieved. At the maximum production rate at which the 20% opacity requirement is met, stack testing will be required.

3. Incentives could be established, proportional to the production (over basic) which will be achieved within the requirements of both DOT and the Bureau of Air Quality.

4. 5300 cubic yards of asphaltic concrete would be allowed for tuning the system.

Sincerely,

Alvin E. Rickers
Executive Secretary
Utah Air Conservation Committee

ER:il

Social Services

Scott M. Matheson, Governor, State of Utah
Anthony W. Mitchell, Ph.D., Executive Director

533-6108
April 19, 1978

Mr. William D. Hurley, Director
Utah Department of Transportation
State Office Building
Salt Lake City, Utah

Dear Mr. Hurley:

On November 18, 1976, the Utah Air Conservation Committee granted a variance from the provisions of the Visible Emissions Regulation, Section 2.2, Air Conservation Regulations to DOT to allow an experimental project involving the recycling of asphaltic concrete on SR-26 between SR-100 and Holden, Utah. The letter from the Executive Secretary, Utah Air Conservation Committee dated November 5, 1976 (should have been December 5, 1976) (copy attached) outlines the provisions of that variance. Those provisions were not followed. Consequently the plant operated in violation of the Utah Air Conservation Regulations.

The Department of Transportation is now planning another recycling project IR-15-3(8)121, Wildcat Interchange to Sulfurdale Interchange. Representatives of the Bureau of Air Quality and DOT met on several occasions to discuss the proposed project and the associated air quality requirements. At each of these meetings representatives of DOT have presented a different proposal. The only formal proposal submitted was in a letter dated from Mr. Edwin E. Lovelace, Engineer of Materials and Research. On March 13, 1978, staff members of the Bureau of Air Quality again met with representatives of DOT to discuss this proposal. In a letter dated March 21, 1978, the Executive Secretary, Utah Air Conservation Committee, detailed the problems with the proposal as discussed at the March 13, 1978 meeting and suggested an alternative plan that, while conforming with basic concept of the DOT proposal, provided for maintenance of applicable air quality requirements. (The alternative plan is also outlined in the Executive Secretary's March 21, 1978 letter).

In a meeting held April 5, 1978 between representatives of Peter Kewitt and Sons Company, Astec Company, DOT and the Bureau of Air Quality, it was stated that DOT is considering yet another approach to the air quality provisions of the project.

Division of Health
Lyman J. Olsen, M.D., M.P.H.
Director of Health

150 West North Temple, Suite 474
P.O. Box 2500, Salt Lake City, Utah 84110
801-533-6111

Before any exemption to the provisions of the applicable regulations can be considered, it will be necessary for DOT to finalize plans concerning the recycling project and submit a written proposal to the Utah Air Conservation Committee.

At this time we do not have a pending written proposal and therefore, no formal consideration can be given.

Sincerely,

Lyman J. Olsen
Director of Health

cs

Director
William D. Hurley, P.E

Assistant Director
C.V. Anderson, P.E.

UTAH DEPARTMENT OF TRANSPORTATION

State Office Building
Salt Lake City, Utah 84114

(801) 533-5695

May 3, 1978

Dr. Lyman J. Olsen
Director of Health
Social Services
P. O. Box 2500
Salt Lake City, Utah 84110

Dear Dr. Olsen:

Thank you for your letter of April 19, 1978 and for the help that your staff has given us on our Holden recycling project. As noted in your letter, our representatives have met on several occasions to discuss our upcoming project IR-15-3(8)121, Wildcat to Pine Creek.

At the March 13, 1978 meeting, we concluded that air quality regulations would not allow your office to grant special experimental variances or exemptions for an asphalt pavement recycling project. We feel the state of the art is now sufficiently advanced to make a project feasible without them.

In his letter of March 21, 1978, the Executive Secretary, Utah Air Conservation Committee, advised that a contractor would be allowed production of 5,300 cu. yds. of recycled asphalt concrete for plant tune up. Accordingly, we are designing the Wildcat project to clearly indicate to prospective bidders that, except for the 5,300 cu. yds. (10,000 tons), there will be no variances allowed. We assume and will caution bidders that you will follow normal procedures for certifying equipment and policing their operations. I am advised that it was this approach which was discussed in the meeting with Peter Kiewit to which you made reference.

We believe air quality standards can be met with a mix of 70% and perhaps 80% recycled material. For our research we propose construction of six 600-foot (about 3,300 tons each) test sections made with 100%, 80%, 70%, 60%, 50%, and 0% recycled material combined with new material. Specifications will require that the 100% and 80% mixes be produced as part of the 5,300 cu. yd. tune up quantity. The remainder of the job can be at any mix proportions the contractor may select from the attached Appendix "A"

table which will be part of the specifications. The bid item for recycled material will include asphaltic cement, softening agents, new materials, recycled material, mixing, placing and compacting. We have developed the table to provide a variety of combinations meeting pavement serviceability requirements while allowing the contractor to vary the mix proportions as necessary to meet air quality requirements. We hope to let the contract by mid-summer and will furnish your staff copies of our plans and specifications when they are ready.

Since we are not asking for any exemptions or variances for the major portion of the project, we would assume that you would not require a written proposal regarding any aspect, except perhaps the 5,300 cu. yd. tune up amount. By copy of this letter I am requesting that our staff make further contact to clarify this point. Our goal is to design a project which will provide for the economies of recycling while meeting all applicable air quality regulations. Thank you for your cooperation and interest.

Sincerely,

W. D. Hurley
Director

c: E. E. Lovelace
Wade B. Betenson
Alex E. Mansour

I-IR-15-3(18)121

WILDCAT TO PINE CREEK

Recycled Asphalt Concrete Pavement-Mix Proportion Chart

% Reclaimed Material	Reclaimed Material	Softening Agent	Coarse Aggregate	Fine Aggregate	Asphalt Cement
0	.0000	.0000	.4688	.4688	.0625
50	.4845	.0060	.3246	.1599	.0250
51	.4942	.0061	.3198	.1551	.0248
52	.5040	.0062	.3150	.1502	.0246
53	.5137	.0063	.3102	.1454	.0244
54	.5235	.0064	.3054	.1406	.0242
55	.5332	.0065	.3005	.1357	.0240
56	.5430	.0066	.2957	.1309	.0238
57	.5527	.0067	.2909	.1261	.0236
58	.5625	.0068	.2861	.1212	.0234
59	.5722	.0069	.2813	.1164	.0232
60	.5820	.0070	.2765	.1116	.0230
61	.5918	.0071	.2717	.1067	.0227
62	.6016	.0072	.2669	.1019	.0224
63	.6115	.0073	.2621	.0971	.0221
64	.6213	.0074	.2573	.0922	.0218
65	.6312	.0075	.2525	.0874	.0215
66	.6410	.0076	.2477	.0826	.0212
67	.6508	.0077	.2429	.0777	.0209
68	.6606	.0079	.2380	.0729	.0206
69	.6705	.0080	.2332	.0680	.0203
70	.6804	.0080	.2284	.0632	.0200
71	.6905	.0080	.2237	.0584	.0195
72	.7006	.0080	.2189	.0535	.0190
73	.7107	.0080	.2142	.0487	.0185
74	.7208	.0080	.2094	.0438	.0180
75	.7309	.0080	.2046	.0390	.0175
76	.7410	.0080	.1999	.0341	.0170
77	.7511	.0080	.1951	.0293	.0165
78	.7613	.0080	.1903	.0244	.0160
79	.7714	.0080	.1855	.0195	.0155
80	.7816	.0080	.1807	.0147	.0150
100	.9875	.0075	.0000	.0000	.0050

7/18/79
WBB

STATE OF UTAH
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH
150 West North Temple, P.O. Box 2500, Salt Lake City, Utah 84110

533-6108

November 9, 1979

CERTIFIED MAIL

Mr. Michael I. Sinclair
Jack B. Parson Construction Company
P.O. Box 3429
Ogden, Utah 84403

Re: Revocation of Permit to Operate CMI-UMD-1900 Hot Plant for Recycling of Asphalt

Dear Mr. Sinclair:

On June 22, 1979, the approval order issued on June 8, 1979, allowing J. B. Parson Construction Company to install and operate its CMI Model UMD-1900 asphaltic concrete plant using virgin materials only was modified to allow the use of a mixture of virgin and recycled materials.

Violations of the conditions of the modified approval order, when the plant was used on the Utah Department of Transportation (UDOT) I-IR-15-3(18)121, led to the issuing of an order to immediately decease and desist from the operation of the plant on September 14, 1979.

The UDOT was vitally concerned with potential safety problems if the second lift were not completed. As the result, a stipulation was arranged, allowing your company to operate the plant for a limited time to complete the lift. The stipulation included the provision that violation of the air quality requirements on any day of operation would result in a fine of $1,000.00 for that day. The second lift and the final lift were both completed under the stipulation and the company subsequently paid a fine of $11,000.00.

Although stack tests were performed, the data have not yet been presented to us; the visible emissions were badly out of tolerance. Based on the findings of excessive visible emissions, the portion of the modified approval order (issued on June 22, 1979) allowing use of the CMI Model 1900 drum-dryer asphalt concrete plant in producing recycled or a combination of virgin and recycled material is revoked.

Modifications to bring the plant into compliance with both emission limitations (gravimetric limit of 0.04 grains/dry standard cubic foot or visible emissions of 20% or less opacity) may be submitted for evaluation and, if approved, may be installed to allow use of recycled material. Until such approval order is issued, the CMI-UMD-1900 plant may not be used for recycling operations anyplace in Utah.

The approval order (as modified by the order issued on June 22, 1979) to install the CMI plant for use in processing virgin materials is unaffected.

Sincerely,

Alvin E. Rickers
Executive Secretary
Utah Air Conservation Committee

AER:ii

cc: EPA Region VIII
Utah Department of Transportation
Weber-Morgan District Health Dept.

Governor

STATE OF UTAH
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH
150 West North Temple, P.O. Box 2500, Salt Lake City, Utah 84110

DIVISIONS

OFFICES

533-6108
April 30, 1980

Mr. Duane Kearn
Jack B. Parsons Construction Co.
Box 3429
Ogden, UT 84409

RE: Intent to Approve a CMI Model UDM - 1900 Portable Asphalt Plant and HPD 936 Venturi Scrubber with an Afterburner

Dear Mr. Kearn:

Plans and specifications for your proposal to erect and operate your CMI UDM-1900 with a HPD 936 venturi scrubber and after-burner have been evaluated and have been found to be consistent with the requirements of the Utah Air Conservation Regulations and the Air Conservation Act.

The Executive Secretary published notice of intent to issue an approval order in the Salt Lake Tribune and Deseret News on April 21, 1980. A thirty-day period following the publishing date will be allowed during which your proposal and the Executive Secretary's evaluation of the impact on air quality will be available for review and comment. If within 15 days of publication of notice anyone so requests, a hearing will be held in the area of the proposed operation. After that time, any comments received must be evaluated and a final determination will be made by the Executive Secretary.

You may not proceed with any of the proposed operation of the air pollution sources or control facilities until you have received an approval from the Executive Secretary. The conditions upon which the approval will be given are:

1. Stack gas outlet grain loading shall not exceed 0.04 gr/dscf for any recycle/virgin mix used.

2. Visible emissions shall not exceed 20% opacity for any mix used.

3. The afterburner is part of the air quality control facilities.

4. A compliance stack test will be conducted per EPA methods 1-5 and be done with all control facilities in operation. The test will be run with the plant at maximum proposed production rate and at the highest proposed recycle/virgin

material ratio. Limitations on maximum allowable production rate (TPH) and maximum recycle/virgin material mix, which shall be applicable throughout the State, shall be based on results of the stack test. These limitations shall be added to this air quality order as an addendum. Each future temporary relocation shall be per regulations, Section 3.1.9.

5. A maximum of six (6) working days or 10,000 tons of production will be allowed for equipment tune-up before the stack test shall be conducted.

6. For the purposes of the stack testing and future operations, instrumentation shall show: a) water flow to venturi, b) pressure drop across scrubber unit and c) water supply line pressure to venturi.

7. The back half condensibles of the stack test data shall also be submitted to the Bureau of Air Quality (BAQ), but as a separate item.

8. Test results on grain loadings shall be submitted to the BAQ no later than two working days after completion of the test. Operations will be permitted during this time subject to visible emissions regulations (maximum of 20% opacity).

9. If additional stack test results demonstrate that the plant can meet the required emission limitations stated in conditions 1 and 2 without the afterburner in operation, use of the afterburner may be suspended at the option of the Executive Secretary.

10. If the company desires to operate the plant at other locations at higher production rates or at higher recycle/virgin material ratios than those defined in the air quality order, the company shall so notify the BAQ and arrange for an inspection of the operation at the higher rate or higher ratio. The higher operating conditions may be allowed at the option of the Executive Secretary if the plant does not violate condition 2. He may require a new stack test if he has reason to believe conditions so warrant.

Sincerely,

Alvin E. Rickers
Executive Secretary
Utah Air Conservation Committee

LCB:jw

cc: Dept. of Transportation

. Matheson
vernor

STATE OF UTAH
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH
150 West North Temple, P.O. Box 2500, Salt Lake City, Utah 84110

Alvin E. Rickers, Director
Room 426 801-533-6121

533-6108

July 23, 1980

ason, M.D., Dr.P.H.
tive Director
-533-6111

VISIONS
Health Services
tal Health
lth Services
Financing
dards

FICES
ive Services
ning and
velopment
miner
Laboratory

Duane Kern
Jack B. Parson Construction Co.
P.O. Box 3429
Ogden, UT 84409

Re: CMI UDM 1900 Asphalt Plant,
Conditional Compliance

Dear Mr. Kern:

Based on the results of the stack test performed on Parson's CMI UDM 1900 asphalt plant on July 15, 1980, the air quality approval order for the plant is amended as follows:

1. The production rate shall not exceed 300 tons/hr.

2. Stack gas outlet grain loading shall not exceed 0.04 gr/dscf for any recycle/virgin mix used.

3. Visible emissions shall not exceed 20% opacity for any mix used.

4. The percent of the recycle material in the total mix may not exceed 40% by weight.

5. The afterburner shall be part of the air quality control facilities.

6. Instrumentation to show water flow to venturi, pressure drop across the scrubber unit and water supply line pressure to venturi must be installed and operational at all times the plant is in operation.

7. If additional stack test results demonstrate that the plant can meet the required emission limitations stated in conditions 1 and 2 without the afterburner in operation, use of the afterburner may be suspended at the option of the Executive Secretary.

8. If the company desires to operate the plant at other locations at higher production rates or at higher recycle/virgin material ratios than those defined in the air quality order, the company shall notify the Executive Secretary and arrange for an inspection of the operation at the higher production rate and/or higher recycle ratio. The higher operating conditions may be allowed at the option of the Executive Secretary if the plant does not violate condition 2. He may require a new stack test if he has reason to believe conditions so warrant.

Sincerely,

Brent C. Bradford
Executive Secretary
Utah Air Conservation Committee

LRM:il

cc: Southwestern District Health Dept.
Utah Department of Transportation (Wade Betenson)

ott M. Matheson
Governor

STATE OF UTAH
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH
150 West North Temple, P.O. Box 2500, Salt Lake City, Utah 84110

Alvin E. Rickers, Director
Room 426 801-533-6121

533-6108
July 29, 1980

D. Mason, M.D., Dr.P.H.
Executive Director
801-533-6111

MEMORANDUM TO: Brent C. Bradford, Director, Bureau of Air Quality

FROM: Lynn R. Menlove, Public Health Engineer

THROUGH: George R. Chlarson, Air Quality Specialist

SUBJECT: Parson's Asphalt, CMI 1900 UDM Asphalt Plant, Stack Test

On July 15, 1980 American Chemical Research performed a Method 1 through 5 stack test on Parson's Asphalt CMI 1900, UDM drum-mix recycle asphalt plant located near Beaver, Utah. The test was performed with the plant operating under the following parameters:

1. After burner in operation.
2. Production Rate: 290 ton/hr
3. Recycle/virgin ratio: 40%/60%
4. Venturi ΔP (in/ H_2O): 6.97 in.
5. Venturi H_2O: 267 gal/min @ 132 psi
6. Mid Drum Temp.: 410°F
7. Opacity readings taken: First test 14%, 14%, second test 10%, 12%, third test 15%, 14%, without afterburner 15%, 14%.

:job

STACK TESTS

Test Date	9/19/79	9/20/79	9/20/79	9/21/79	9/21/79	7/15/80
Test #	1	2	3	4	5	6
Recycle -Virgin	70-30	80-20	60-40	50-50	0-100	40-60
BP"Hq	24.09	24.09	24.02	24.04	24.04	29.92
Stack Temperature °F	139	133	125	125	124	182
Stack Static Pressure "H_2O	-.25	-.25	-.25	-.25	-.25	+0.15
% H_2O Vol.	24.1%	18.8%	20.8%	23.2%	20.0%	--
% CO_2 Vol.	7.5	7.5	6.3	6.5	6.2	5.3
% O_2 Vol.	13.0	14.0	14.0	12.5	12.3	14.5
Excess Air %	162.7%	208.2%	198.8%	140.7%	133.5%	--
ACFM	29,250	35,663	36,578	32,048	31,125	--
SCFM	20,742	25,545	26,481	23,221	22,591	--
DSCFM	15,743	20,743	20,973	17,834	18,073	--
Gr/DSCF	0.47	0.92	0.47	0.27	0.04	0.0217
GR/ACF	0.25	0.54	0.27	0.15	0.02	--
Lb/Hr Emissions	64.0	164.3	4.9	41.2	6.6	4.01
Isokinetic %	102%	93.9%	94.2%	95.8%	92.5%	100.9%
Venturi Pressure Drop "H_2O	11-12	7-8	8-9	10-11	10-11	6.97
Feed Rate Ton/Hr.	275	300	300	275	295	290
Opacity	99%	100%	63%	42%	10%	13%
Mid Drum Temp.	-	-	-	-	-	-410°F
Roadway	SB	SB	SB	SB	SB	NB

APPENDIX E

COST COMPARISON

	Page
Wildcat to Pine Creek Revised Cost Comparison	1
Abstract of Bids	8

Memorandum · **UTAH DEPARTMENT OF TRANSPORTATION**

DATE: October 3, 1978

: Bert L. Taylor, Engineer for Construction

: Edwin E. Lovelace, Engineer of Materials and Research

: I-IR-15-3(18)121 - Wildcat to Pine Creek
Revised Cost Comparison

Reference is made to the FHWA memorandum dated September 25, 1978 HFA-UT(1), in which they question the revised engineer's estimate on recycling in comparison with the four other design concepts.

Their memorandum lists a cost figure of $233,679 per mile, plus other costs for safety improvement; however, if one analyzes the abstract of bids for the subject project, the cost figure is $226,927, which includes all items of the contract. If one uses the bid items that were agreed upon in the revised design study report dated April 25, 1978, the cost figure is $178,632.00 (see attachment for comparison of revised Engr. estimate and low bid). We believe the cost comparison should be based on the items used in the original design study report.

The reason for the revised engineer's estimate was caused by three factors: (1) delay in advertisement, (2) the uncertainty of being able to scarify and reconstruct the existing CTB, and (3) inflation. Mr. Jerry Fenn tells us the construction cost trends for the second quarter of 1977 to second quarter of 1978 has increased 21 percent.

It is very difficult to estimate costs for various items. We have reviewed three overlay projects for cost comparison, two will be completed this year and one will be a hold over for next year. It appears that asphalt will increase seven percent and the bituminous mix will increase 14 percent. If these two factors are added to designs two and three, then design one is slightly less expensive.

I think we all agree that on the first few projects that are recycled the costs are going to be high. This is because new hot-plants have to be purchased to meet the air quality standards. A new plant costs about $590,000 with a down payment of 25 to 50 percent depending on the manufacturer.

COST COMPARISON	CONSTRUCTION COST PER TWO-LANE MILE	ANNUAL COST PER TWO-LANE MILE
Design		
1. Recycling	$178,632.00	$8,912.00
2. Bituminous Overlay	$187,466.00	$9,133.00
3. Bituminous Overlay/SAMI	$189,132.00	$9,174.00
4. Rigid Pavement	$318,893.00	$9,772.00
5. Rigid Pavement (FHWA)	$352,930.00	$10,623.00

With the corrections to Design one, two and three, we believe we have made a fair estimate based on construction cost trends and the review of several resurfacing projects. Also, design one accomplishes the lowest costs, with a maximum conservation of raw materials and the goal of developing the recycling technology is accomplished at the lowest costs. Designs four and five are considered conservative estimate because quality concrete aggregate is not available at the project.

Attachments
WBBetenson/ljm
cc: J. Q. Adair

Revised

Design #1 - Revrla

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

CRS-2 $\frac{37 \times 5280 \times .25}{9 \times 237}$ = 22.9 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 T/M at 6.50 = 68,978.00

AC-10 10,612 x .02 = 212 T/M at $102.00 = 21,624.00

Softening Agent .008 x 10,612 - 85 T/M at $180.00 (19.19 cu/yd) = 15,300.00

U.B.C.

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

Scarifying & Recycling C.T.B.

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

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

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

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

.025 x $136,168.00

Annual Construction Cost $ 3,404.00

Annual Maintenance Cost $ 1,200.00

RESURFACING COST

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

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

Annual Resurfacing cost = (Conversion Factor)(Cost) = .025x $117,730.00

Annual Resurfacing Cost $ 2,943.00

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	$178,632.00	.025 x	$175,578.00
	$ 4,466.00		$ 4,389.00
	$ 1,200.00		$ 1,200.00
	$ 3,246.00		$ 3,246.00
	$ 8,912.00		$ 8,835.00

*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 T/M at $12.00 = $ 2,604.00

CRS-2

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

Overlay

$\frac{7.5 \times 39.5 \times 5280 \times 142}{12 \times 2000}$ = 9255 T/M at 7.11 (14% increase) = 65,803.00

AC-10 9255 x .06 = 555 T/M at 109.00 (7% increase) = 60,495.00

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

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

Widening

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

AC-10

820 x .06 - 49 T/M at 102.00 = 4,998.00

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

Slope Widening $30,000 per mile = 30,000.00

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

.025 x $187,466.00

Annual Construction Cost 4,687.00

Annual Maintenance Costs $ 1,200.00

Resurfacing Cost

Seal 5 times in 40 years w/chip seal at $5,724 $ 28,620.00

Resurface 2 Times w/3" BSC at 50,600 101,200.00

Annual Resurfacing cost = (Conversion Factor)(Total Cost) =

.025 x $129,820.00

Annual Resurfacing Cost $ 3,246.00

Annual Cost of Design $ 9,133.00

esign #3 - Overlay with SAMI & fabric

Two-Lane Mile

Same items as Design 2		$187,466.00
ack filling every 50 ft./gal. transverse		
106 C/M at 8.00	=	848.00
bric $\frac{1.5 \times 38}{9}$ = 6.33 x 106 = 671 x 1.15 sq. yd.	=	772.00
ck $\frac{1.5 \times 38 \times .08 \times 106}{9 \times 237}$ = .23 T/M at 204.00	=	46.00
nual Construction Cost (Conversion Factor)(Total Cost)	=	
.025 x		$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 sq. yd./M

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

	21,707 x (9.65 + 2.06)		= $254,146.00
BSC	$\frac{6 \times 7.3 \times 5280 \times 142}{12 \times 2000}$ = 1368 T/M @ 12.50		= 17,100.00
AC-10	1368 x .06 = 82 T/M @ 109.00		= 8,364.00
TACK	$\frac{11.3 \times 5280 \times .08}{9 \times 237}$ = 2.2 T/M @ 146.00		= 321.00
PRIME	$\frac{9.8 \times 5280 \times .3}{9 \times 249}$ = 6.9 T/M @ 121.00		= 835.00
UBC	$\frac{12 \times 4.8 \times 5280 \times 135}{12 \times 2000}$ = 1711 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 sq. yds./mi x 9.50		
Elsinore Pit 39 mi. @ .10/TM = $2.28/sq. yds.		
21,707 x (11.40 + 2.28)		= 296,952.00
JBC $\frac{9.5 \times 5.7 \times 5280 \times 135}{12 \times 2000}$ = 1610 T/M x $4.75		= 7,650.00
CTB		
rotto-mill CTB for gradeline		
$\frac{42.5 \times 5280}{9}$ = 24,933 sq. yd./M x .50		= 12,467.00
PRIME CTB		
$\frac{42.5 \times 5280 \times .2}{9 \times 249}$ = 20 T/M @ $121.00		= 2,423.00
	.025 x	$352,930.00
		8,823.00
Annual Maintenance Cost		400.00
Annual Resurfacing Cost		1,400.00
		$ 10,623.00

UTAH DEPARTMENT OF TRANSPORTATION

ABSTRACT OF BIDS

PROJECT NO. I-IR-15-3(118)121 — COUNTY NO. I-15

NAME OF LOCATION: INTERSTATE HIGHWAY NO. 15 FROM WILDCAT TO PINECREEK — COUNTY: BEAVER — DATE OPENING: SEPT 26, 1978

NO. OF CONSTRUCTION: A RECYCLED ASPHALT CONCRETE PAVEMENT ROADWAY — WIDTH OF ROADWAY — SURFACING

SHEET 1 OF 1 SHEETS

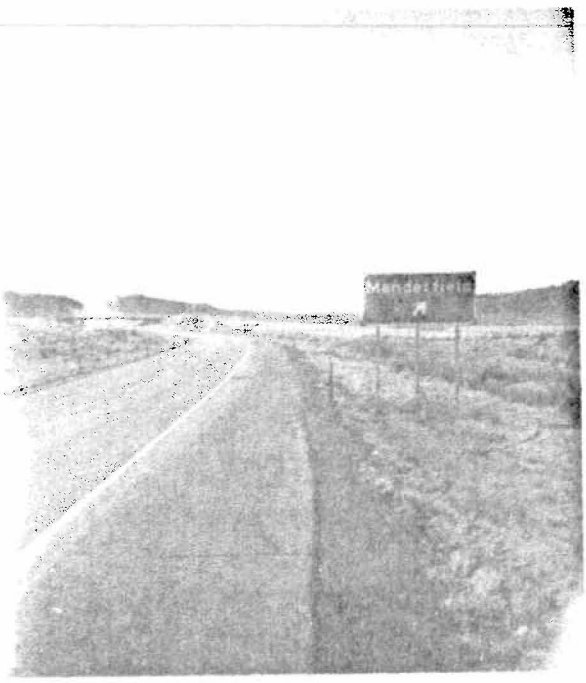
NO.	ITEMS / DESCRIPTION	QUANTITY	UNIT	ENGINEER'S ESTIMATE		JACK B. PARSON CONSTRUCTION CO. P. O. BOX 3429 OGDEN, UTAH 84409		PETER KIEWIT SONS CO. P. O. BOX 7780 MURRAY, UTAH 84107		GIBBONS & REED CO. P.O. BOX 30429 SALT LAKE CITY, UTAH 84125		NORTHERN IMPROVEMENT COMPANY P. O. BOX 2846 FARGO, ND 58108		CORN CONSTRUCTION CO. P. O. BOX 1240 GRAND JUNCTION, COLO 81501		LEGRAND JOHNSON CONSTRUCTION CO. 1000 SOUTH MAIN ST. LOGAN, UTAH 84321	
				UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT
1	MOBILIZATION	1	LUMP	150,000.0000	150,000.00	147,566.0000	147,566.00	136,737.0000	136,737.00	86,740.0000	86,740.00	146,000.0000	146,000.00	225,000.0000	225,000.00	211,000.0000	211,000.00
2	FLAGGING	4,000	DAY	7.0000	28,000.00	7.0000	28,000.00	7.0000	28,000.00	7.0000	28,000.00	7.0000	28,000.00	7.0000	28,000.00	7.0000	28,000.00
3	PILOT CAR OPERATION	500	HOUR	14.0000	7,000.00	19.0000	9,500.00	20.0000	10,000.00	22.0000	11,000.00	7.5000	3,537.75	12.0000	6,000.00	17.0000	8,500.00
4	BORROW	10,600	CU YD	1.7000	15,900.00	2.1000	22,260.00	1.5400	16,430.00	2.0000	21,800.00	7.2500	76,850.00	2.1000	22,260.00	3.4000	36,040.00
5	ROADWAY EXCAVATION	8,400	CU YD	1.5000	12,600.00	1.4000	11,760.00	2.0000	16,800.00	4.5000	37,800.00	2.6000	21,840.00	2.2000	18,480.00	2.2000	18,480.00
6	COVER MATERIAL TYPE "A" (IN STOCKPILE)	1,930	TON	8.0000	15,200.00	8.0000	15,700.00	10.0000	19,000.00	4.5000	8,550.00	8.0000	15,200.00	11.0000	20,900.00	10.5000	19,950.00
7	REMOVE, CRUSH & STOCKPILE EXISTING BITUMINOUS PAVEMENT	236,000	SQ YD	1.5000	354,000.00	1.4700	346,920.00	1.3800	325,680.00	2.0000	472,000.00	2.4800	585,280.00	1.9500	460,200.00	1.9500	460,200.00
8	UNTREATED BASE COURSE 3/4" MAXIMUM	29,800	TON	4.0000	111,200.00	4.0500	112,590.00	4.0000	111,200.00	5.0000	139,000.00	5.4000	150,120.00	6.5000	180,700.00	7.2000	200,160.00
9	BITUMINOUS MATERIAL GRADE MC-70 OR MC-250	300	TON	105.0000	31,500.00	130.0000	39,000.00	115.0000	34,500.00	140.0000	42,000.00	148.0000	44,400.00	128.0000	38,400.00	131.0000	39,300.00
10	BITUMINOUS MATERIAL GRADE MC-800	95	TON	125.0000	11,875.00	130.0000	12,350.00	115.0000	10,925.00	140.0000	13,300.00	148.0000	14,060.00	128.0000	12,160.00	133.0000	12,635.00
11	BITUMINOUS MATERIAL GRADE CSS-1 OR SS-1 EMULSION	165	TON	110.0000	15,950.00	100.0000	14,500.00	165.0000	23,925.00	120.0000	17,400.00	168.0000	23,200.00	120.0000	17,400.00	250.0000	36,250.00
12	RECYCLED ASPHALT CONCRETE PAVEMENT	51,400	CU YD	21.0000	1,079,400.00	19.5500	1,010,010.00	23.0000	1,182,200.00	26.0000	1,336,400.00	23.7500	1,220,750.00	26.0000	1,336,400.00	24.9330	1,281,460.00
13	ROAD MIX MINERAL AGGREGATE 3/4" MAXIMUM	1,800	TON	7.0000	12,600.00	6.3500	10,800.00	7.0000	12,600.00	8.0000	14,400.00	6.7500	15,750.00	16.0000	28,800.00	9.0000	16,200.00
14	SCARIFYING AND RECONSTRUCTING EXISTING BASE COURSE	243,900	SQ YD	.3700	90,930.00	.3800	92,968.00	.2200	53,592.00	.1100	26,800.00	.8500	207,060.00	.9000	219,240.00	.7900	192,644.00
15	STICK TEST	6	EACH	500.0000	3,000.00	1,800.0000	10,800.00	900.0000	5,400.00	5,000.0000	30,000.00	1,600.0000	9,600.00	2,000.0000	12,000.00	1,500.0000	9,000.00
16	RECONSTRUCTING EXISTING GUARD RAIL	12,165	LIN FT	10.0000	121,650.00	6.0000	72,990.00	6.0000	72,990.00	6.4000	77,856.00	6.0000	72,990.00	5.0000	60,825.00	5.7500	69,948.75
17	ADVANCE WARNING DEVICES TYPE "A" STATIONARY	500	HOUR	5.0000	2,500.00	5.0000	2,500.00	5.0000	2,500.00	5.0000	2,500.00	5.0000	2,500.00	5.0000	2,500.00	5.0000	2,500.00
18	ADVANCE WARNING DEVICES TYPE "A" MOVING	40	HOUR	14.0000	560.00	14.0000	560.00	14.0000	560.00	14.0000	560.00	14.0000	560.00	14.0000	560.00	14.0000	560.00
19	REMOVAL OF DELINEATORS	428	EACH	2.5000	1,065.00	2.2000	937.20	2.5000	1,065.00	2.0000	852.00	2.2500	958.50	5.5000	1,491.00	2.1000	894.60
20	RESET DELINEATORS	345	EACH	6.0000	2,070.00	5.5000	1,897.50	6.0000	2,070.00	7.0000	2,415.00	5.5000	1,897.50	5.5000	1,897.50	5.2500	1,811.25
21	END ANCHOR	10	EACH	100.0000	1,000.00	260.0000	2,600.00	250.0000	2,500.00	230.0000	2,300.00	250.0000	2,500.00	300.0000	3,000.00	250.0000	2,500.00
22	REMOVAL OF EXISTING SIGN	2	EACH	80.0000	160.00	165.0000	330.00	160.0000	320.00	250.0000	500.00	165.0000	330.00	200.0000	400.00	165.0000	330.00
23	BREAKAWAY SIGN POST ASSEMBLY	3	EACH	196.0000	576.00	270.0000	690.30	220.0000	660.00	375.0000	1,125.00	225.0000	675.00	300.0000	900.00	225.0000	675.00
24	CONCRETE SIGN FOUNDATION	3	EACH	160.0000	480.00	275.0000	825.00	260.0000	780.00	300.0000	900.00	275.0000	825.00	300.0000	900.00	275.0000	825.00
25	REMOVAL OF HIGHWAY TRAFFIC PAINT	112,600	LIN FT	.4000	45,040.00	.3100	34,906.00	.2800	31,528.00	.3500	39,410.00	.3100	34,906.00	.3500	39,410.00	.3100	34,906.00
26	HIGHWAY TRAFFIC PAINT	240	GAL	17.0000	5,780.00	12.0000	2,880.00	18.0000	4,320.00	12.5000	4,250.00	13.2500	4,305.00	11.5000	3,910.00	11.5000	3,910.00
27	HIGHWAY TRAFFIC PAINT (TEMPORARY)	700	GAL	17.0000	11,900.00	12.0000	8,400.00	13.0000	9,100.00	12.5000	8,750.00	13.7500	9,625.00	11.5000	8,050.00	11.5000	8,050.00
28	EQUAL OPPORTUNITY TRAINING	1,000	HOUR	.8000	800.00	.8000	800.00	.8000	800.00	.8000	800.00	.8000	800.00	.8000	800.00	.8000	800.00
29	CONTINGENT SUM PAY ITEM	1		5,000.0000	5,000.00	5,000.0000	5,000.00	5,000.0000	5,000.00	5,000.0000	5,000.00	5,000.0000	5,000.00	5,000.0000	5,000.00	5,000.0000	5,000.00
	TOTAL				2,107,700.00		2,071,179.70		2,116,242.00		2,662,568.00		2,715,642.00		2,758,643.50		2,800,729.60
						1.0827		1.0041		1.2633		1.2884		1.3088		1.3288	
								LOW									

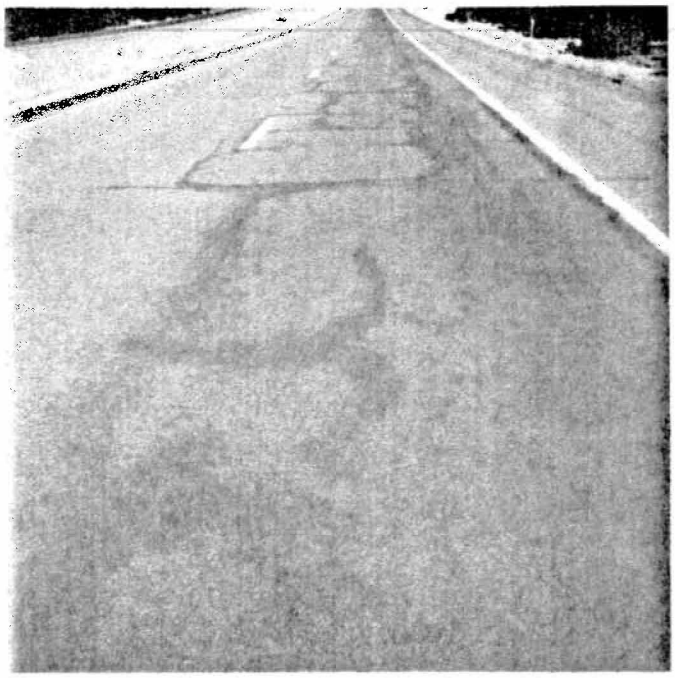
I HEREBY CERTIFY THAT THE ABOVE FOREGOING IS A FULL, TRUE AND CORRECT TABULATION OF THE BIDS AS SUBMITTED IN THE BID OPENING OF SEPT 26, 1978 ON THE ABOVE PROJECT.

DAN B. NELSON
DATA PROCESSING MANAGER

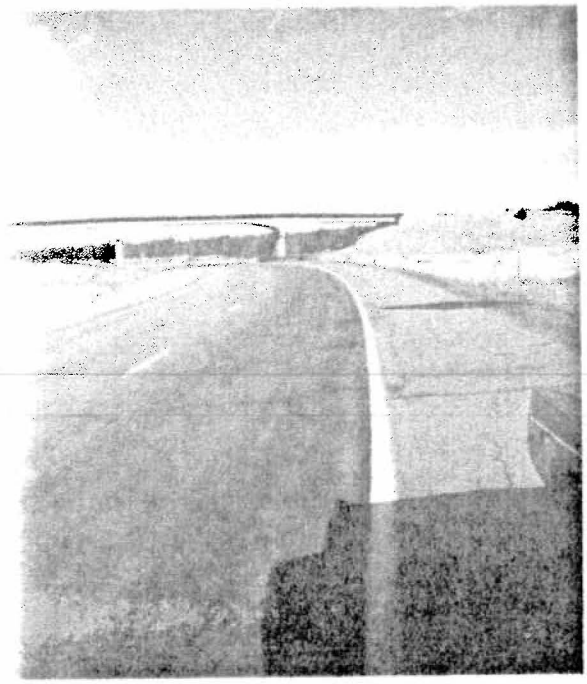
APPENDIX F

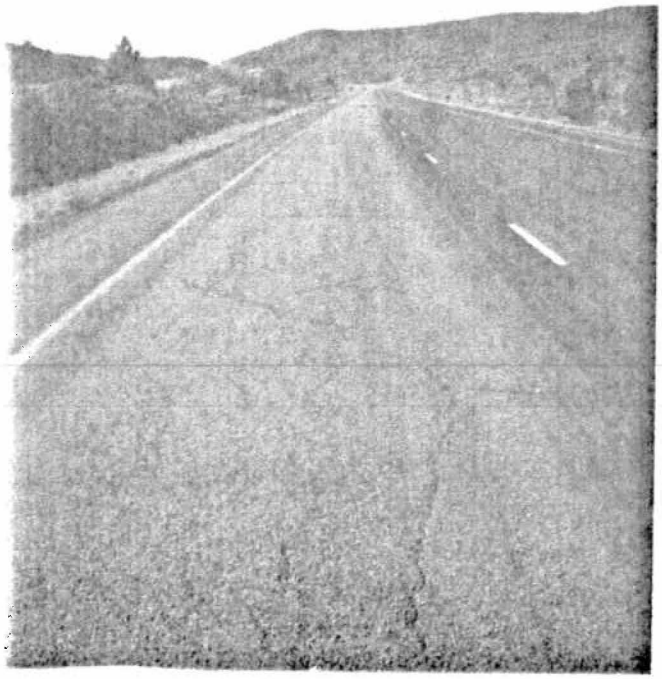
PHOTOGRAPHS

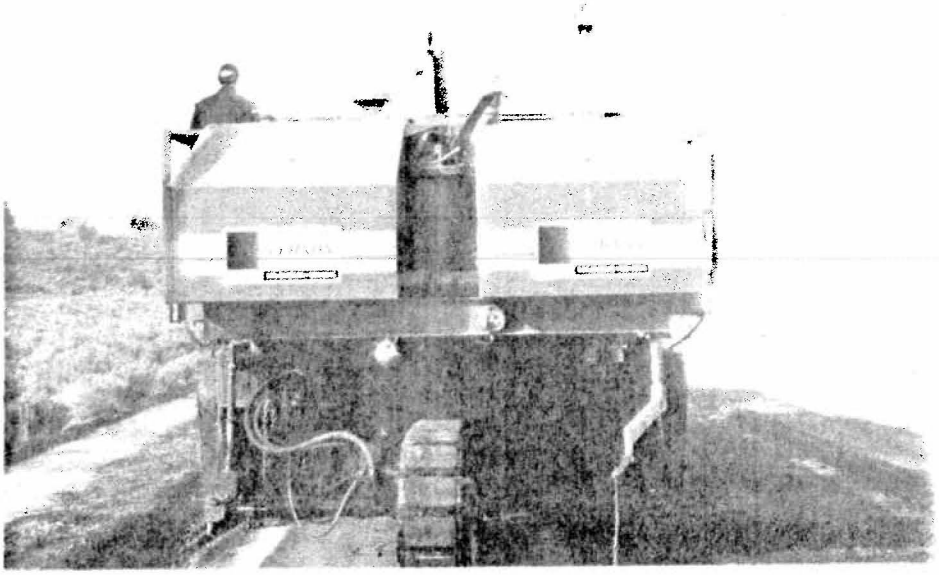




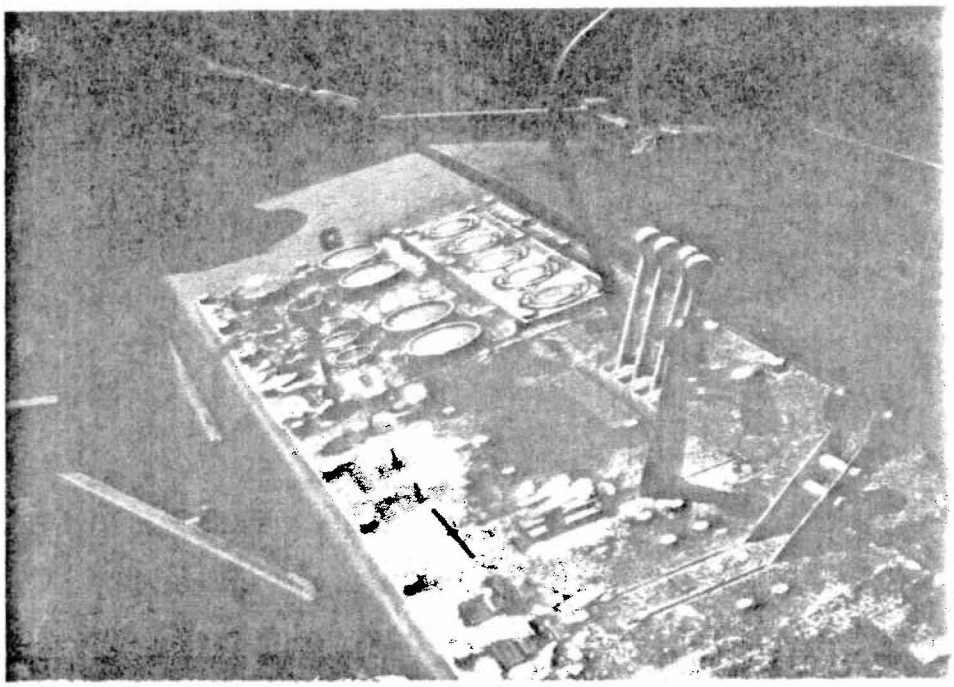
ROAD CONDITIONS PRIOR TO RECYCLING





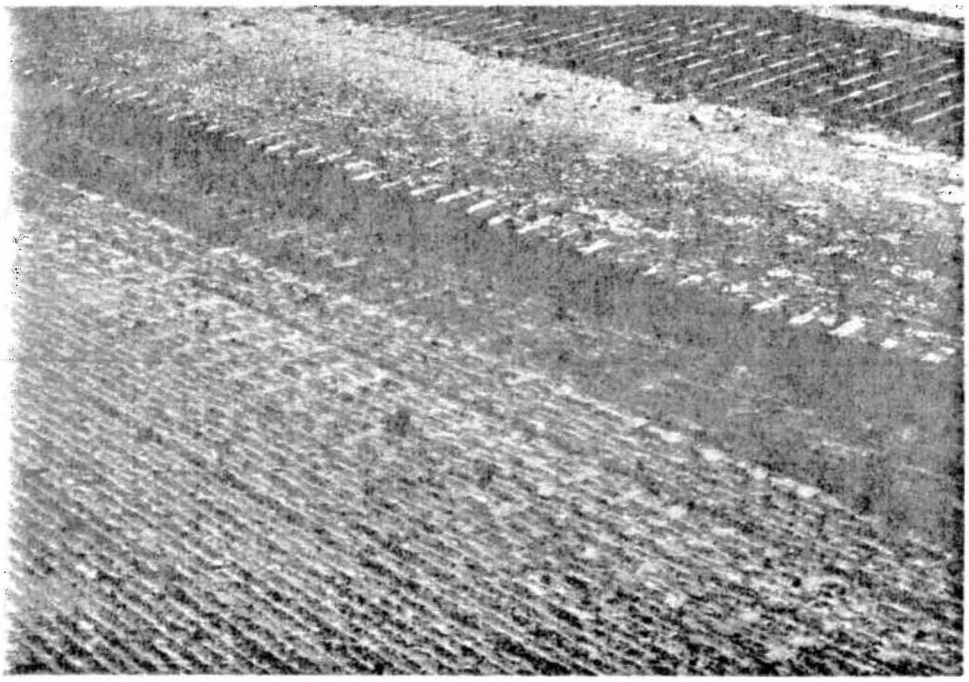


RX-75 DYNAPLANE

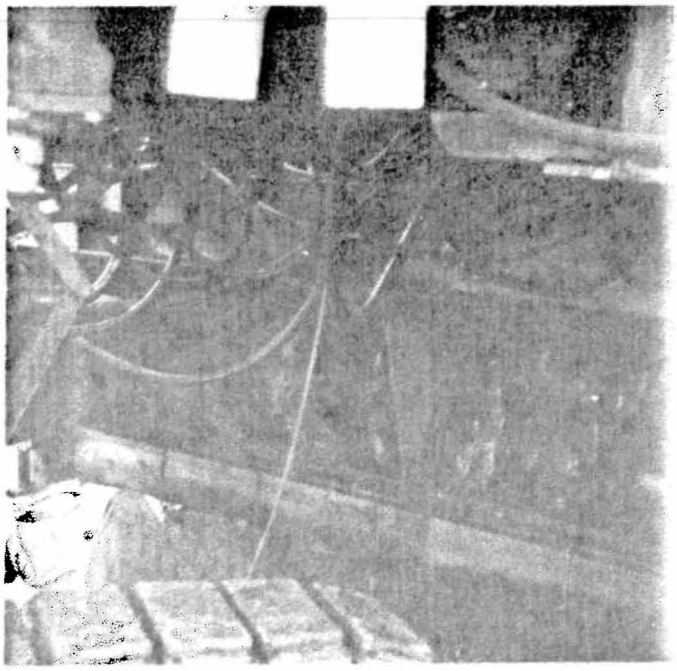


DYNAPLANE CONTROLS

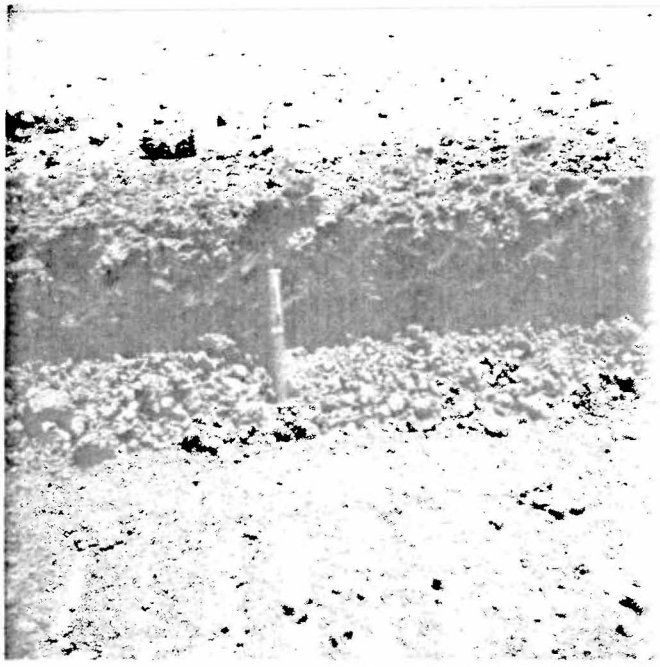
DIRECT LOADING FROM DYNAPLANE



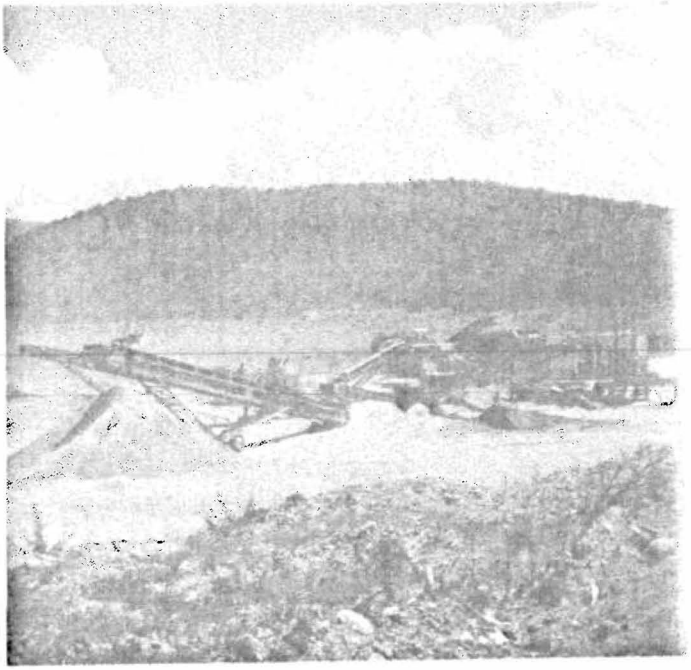
PROFILED PAVEMENT

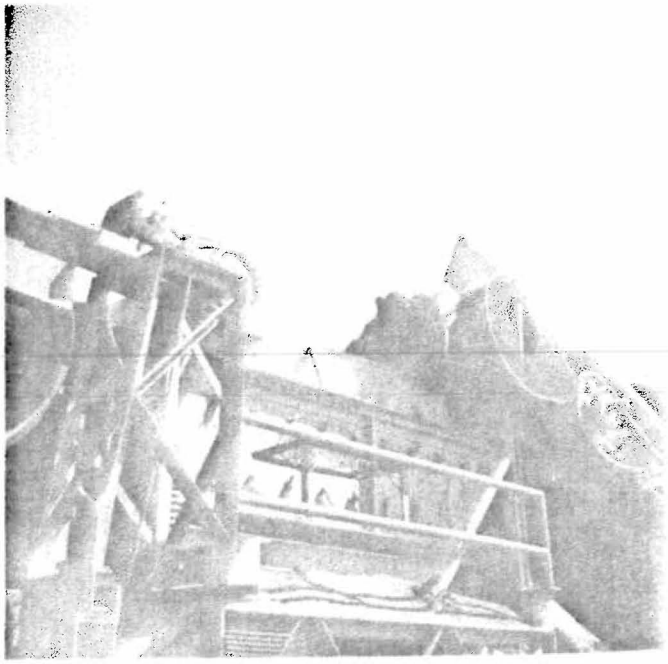


CUTTING MANDREL ON DYNAPLANE

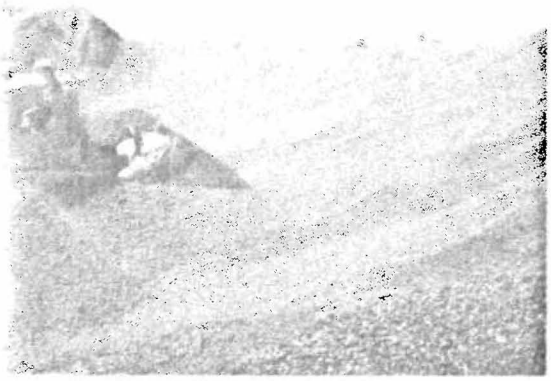


FULL DEPTH PROFILING

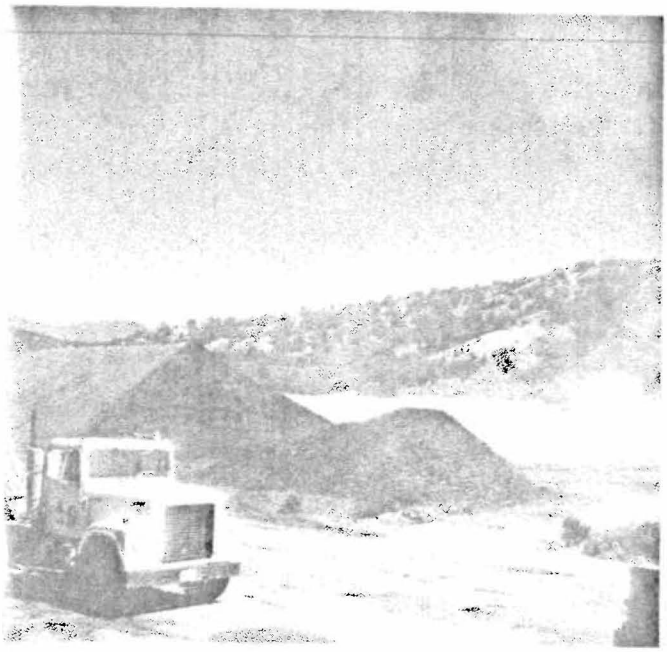




CRUSHING OPERATION (New Aggregate)

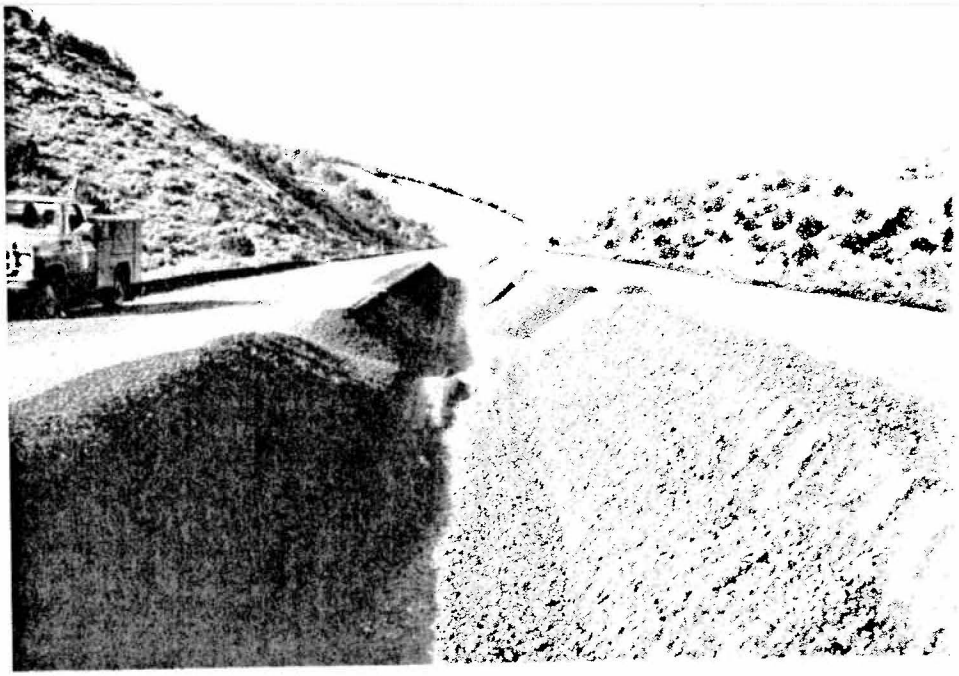


CRUSHED AGGREGATE

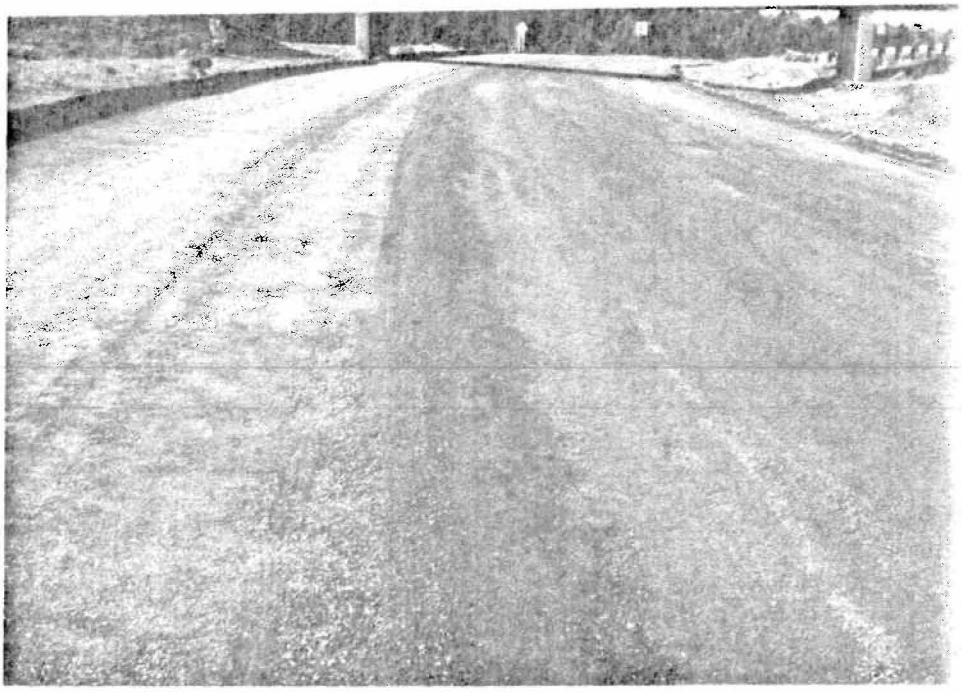


RECLAIMED PAVEMENT STOCKPILE

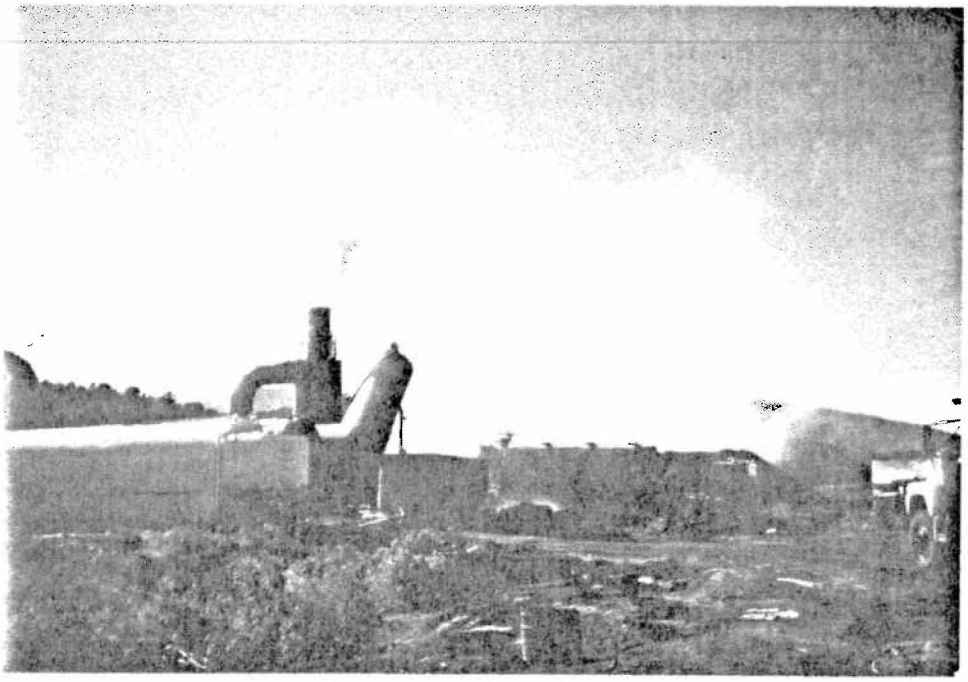
RECLAIMED PAVEMENT AND NEW AGGREGATE STOCKPILES



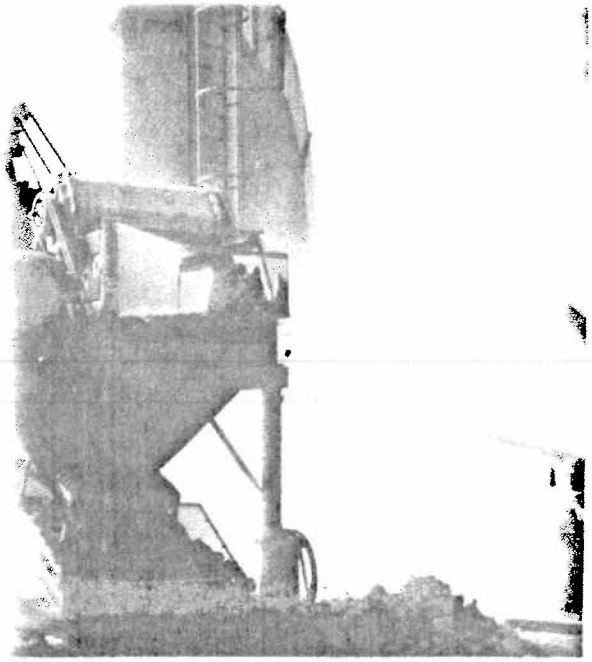
UNTREATED BASE MATERIAL



FINISHED BASE GRAVEL

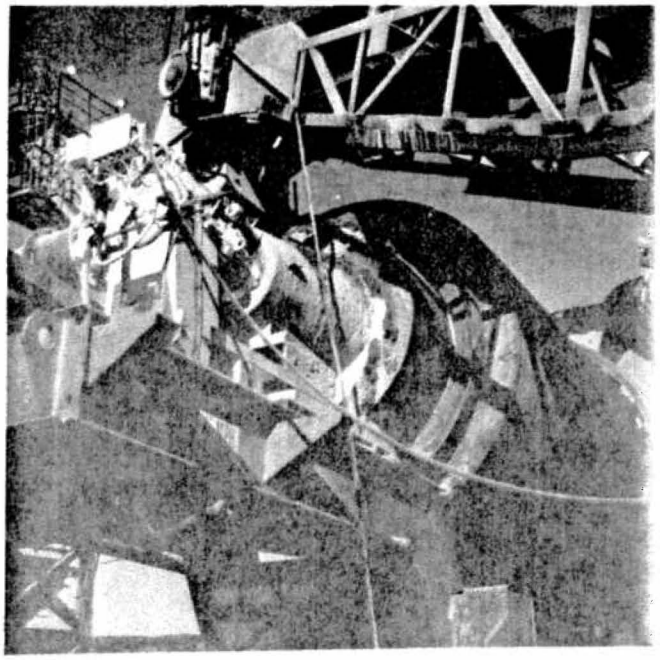


PLANT OPERATIONS BEGIN

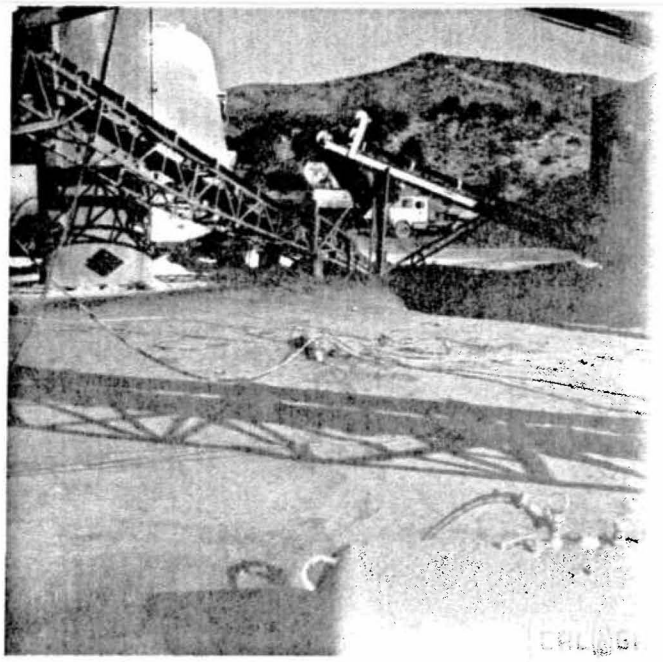


SCALPING OVERSIZE MATERIAL

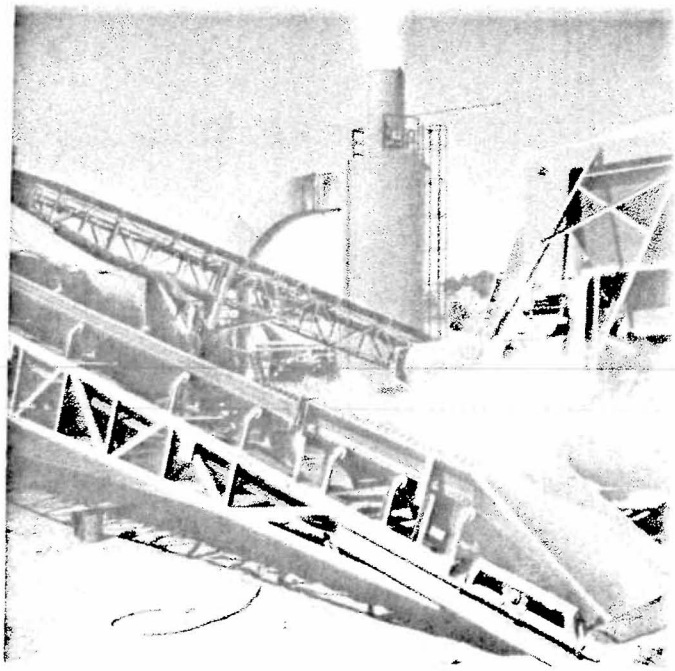
OVERSIZED MATERIAL



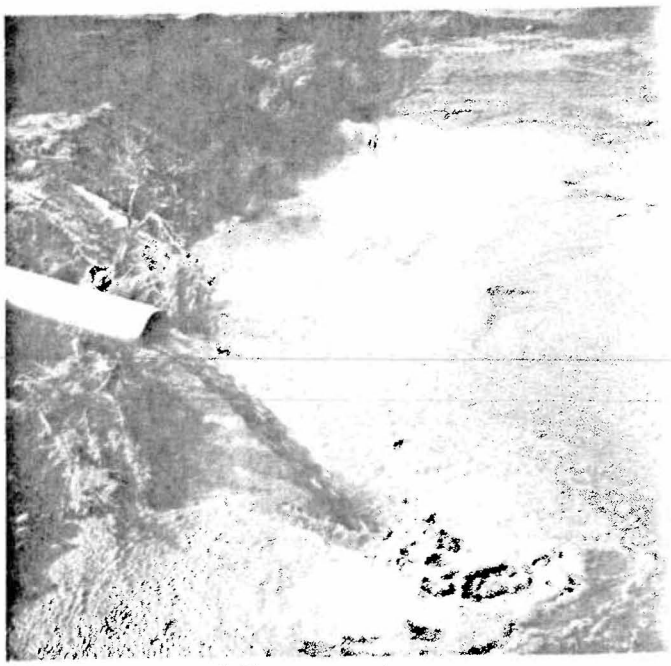
WATER FEED



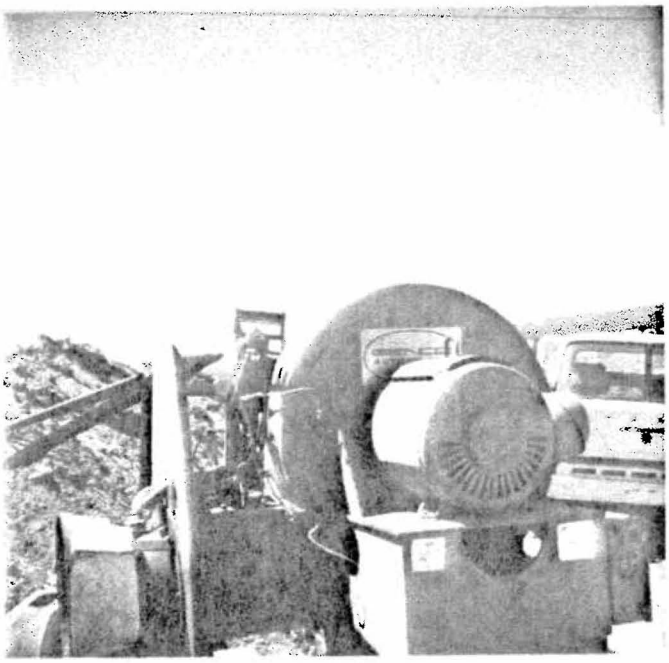
WATER FEED MANIFOLD



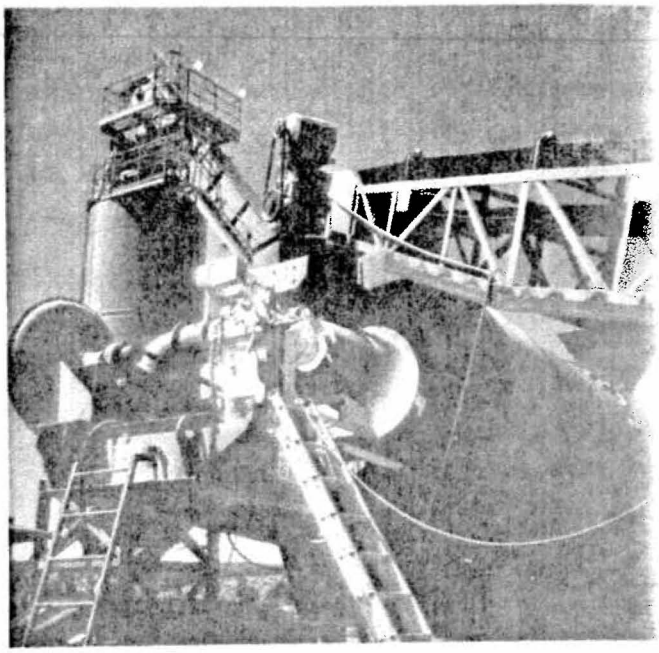
NEW AGGREGATE FEED



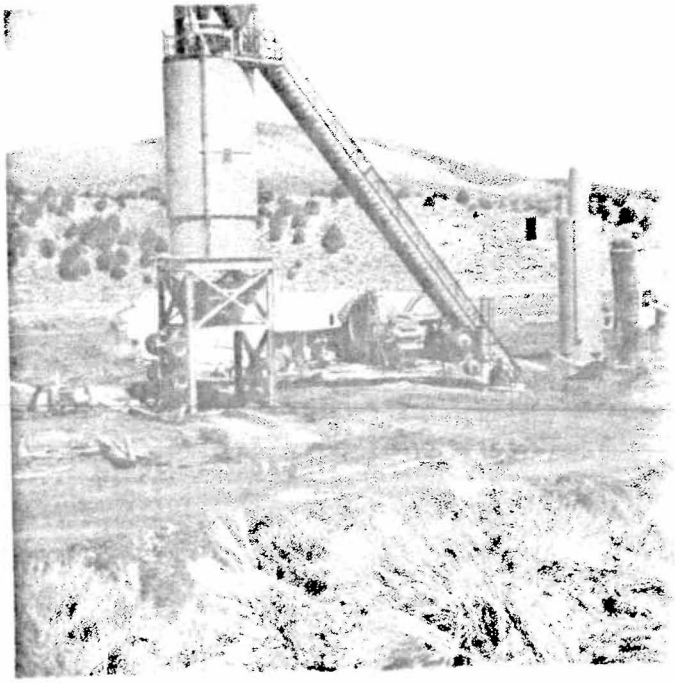
SCRUBBER WATER



DRYER DRUM BURNERS
1979

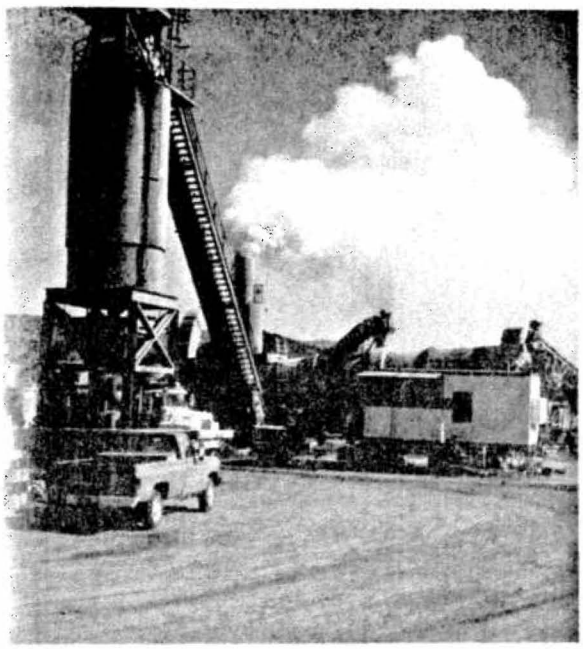


BURNERS IN USE DURING 1979 CONSTRUCTION SEASON

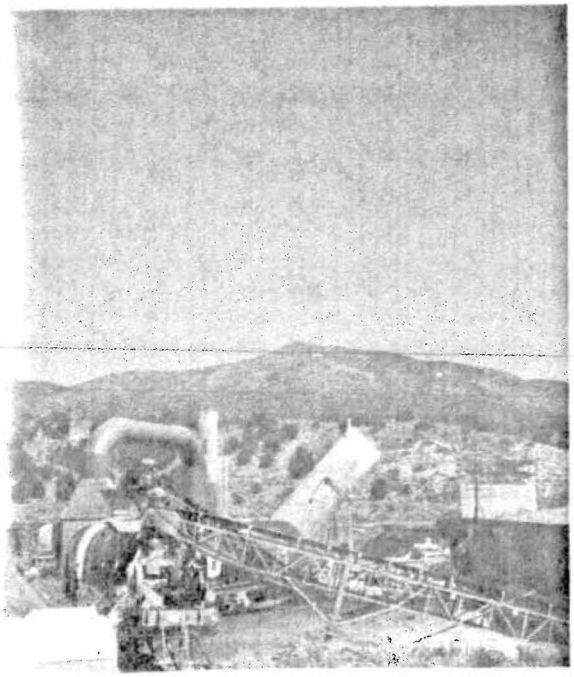


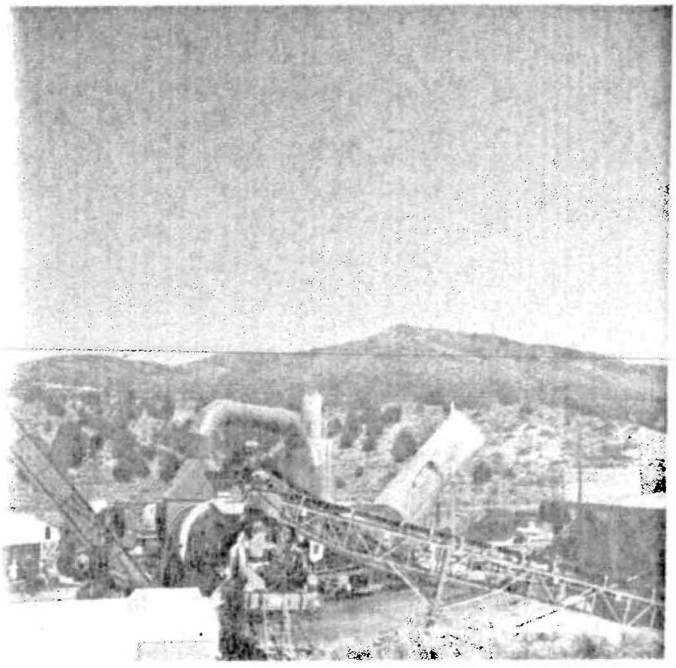
DRUM OF ASPHALT PLANT WAS SENT TO MANUFACTURER DURING WINTER OF 1979-1980

AIR POLLUTION DURING TUNE-UP PERIOD 1980

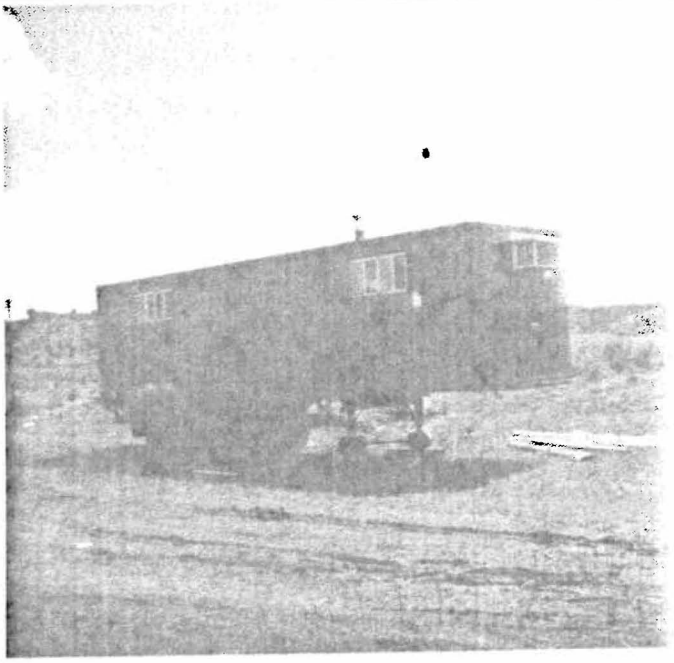


AIR POLLUTION DURING 1979 CONSTRUCTION



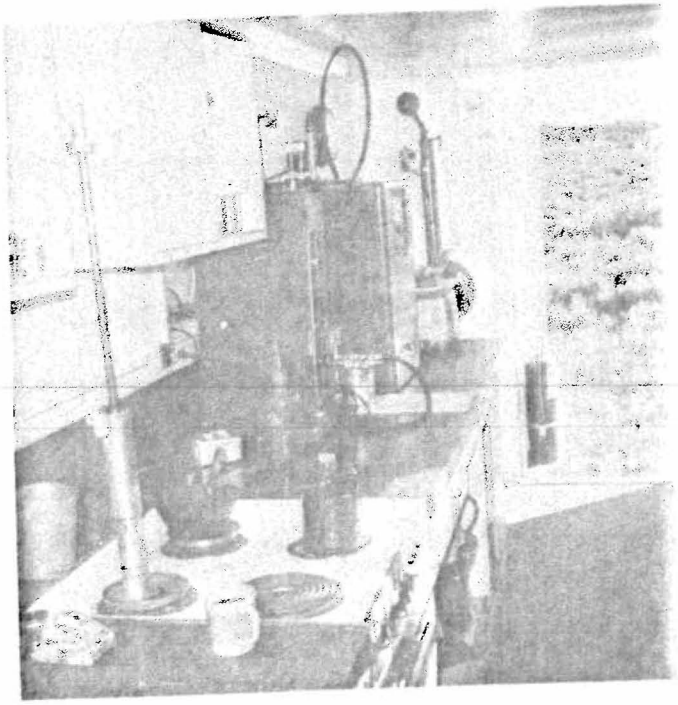


MEETING AIR QUALITY DURING 1980 CONSTRUCTION

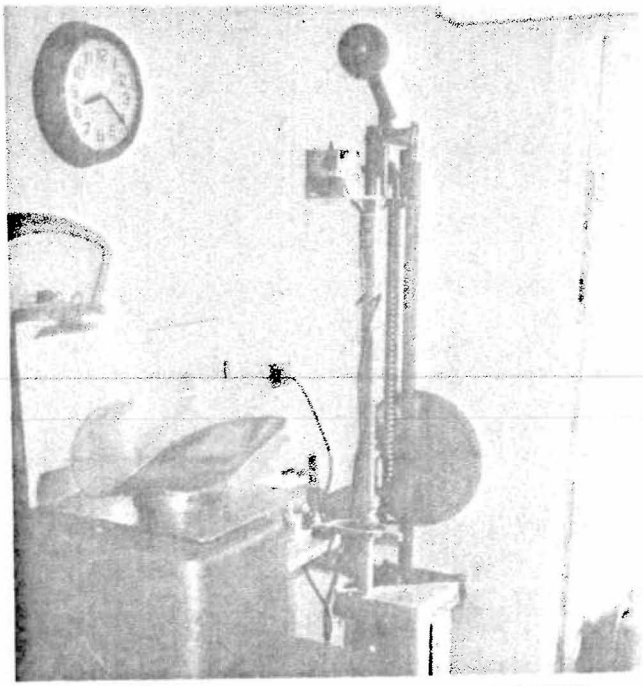


FIELD LABORATORY

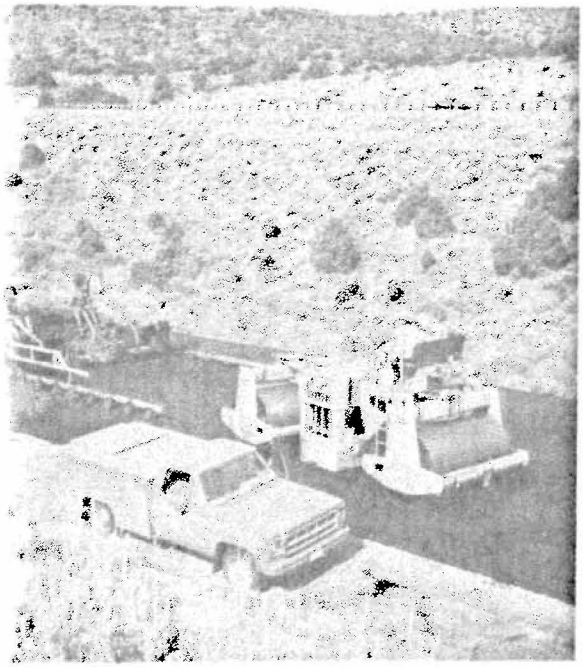
VACUUM EXTRACTOR



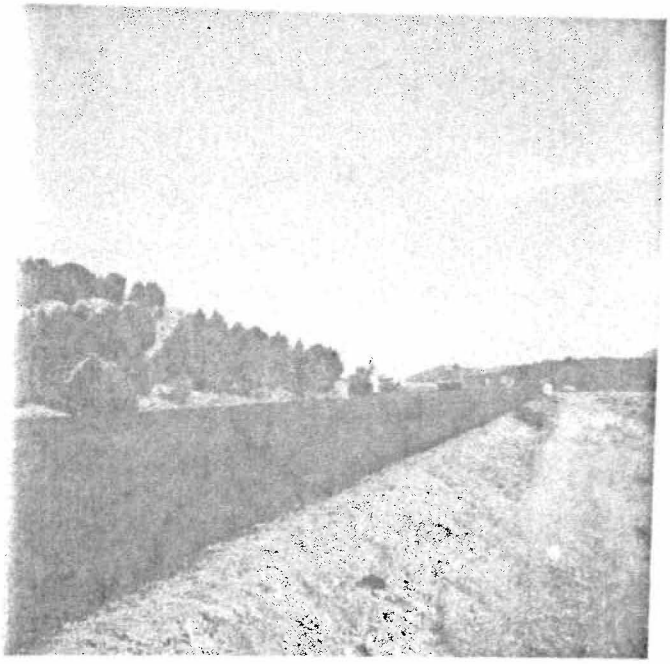
MANOMETER AND VISCOMETER



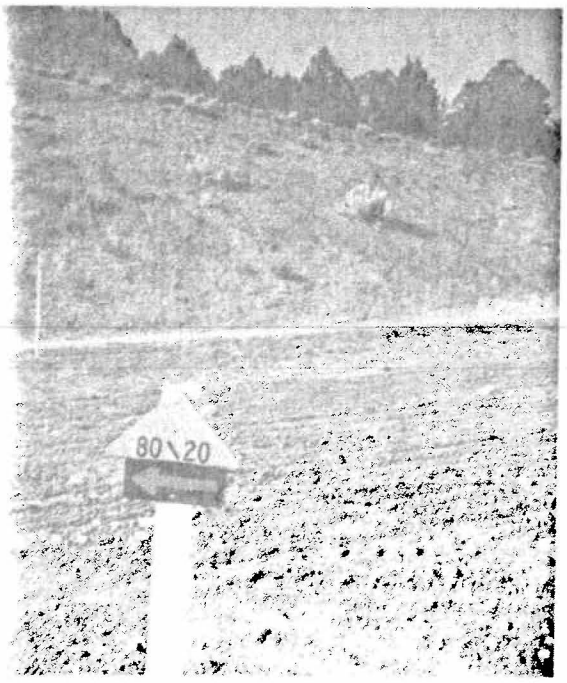
FAN SCALE AND MARSHALL COMPACTOR

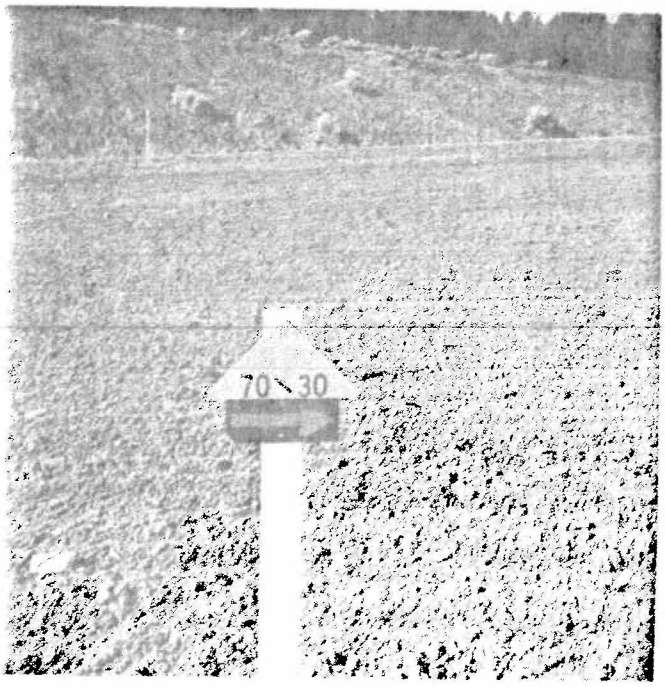


79 ROLLING SOUTHBOUND LANES

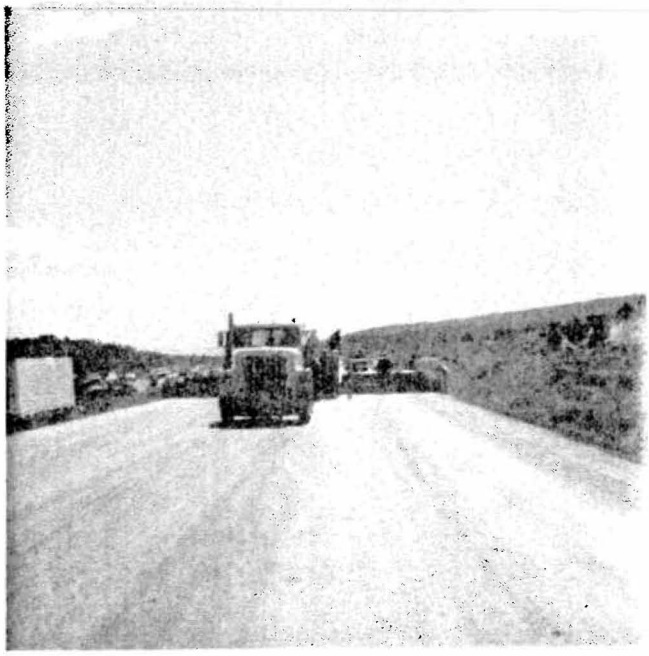


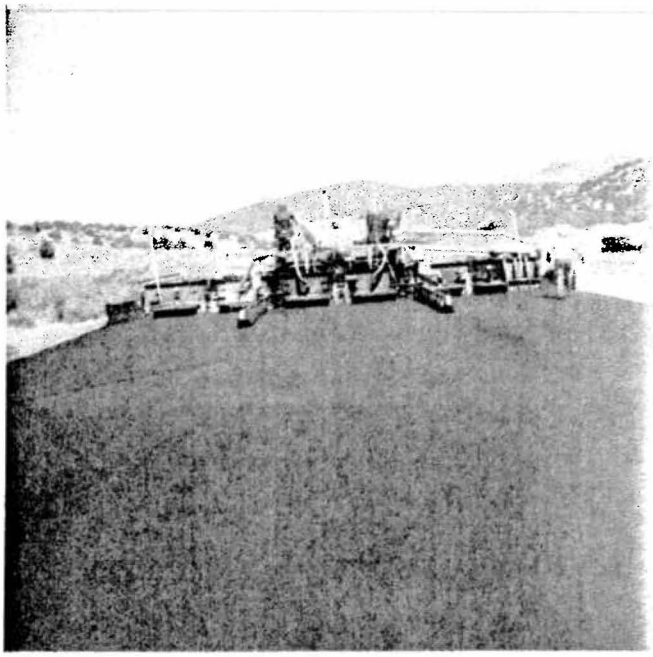
1980 ROLLING NORTHBOUND LANES



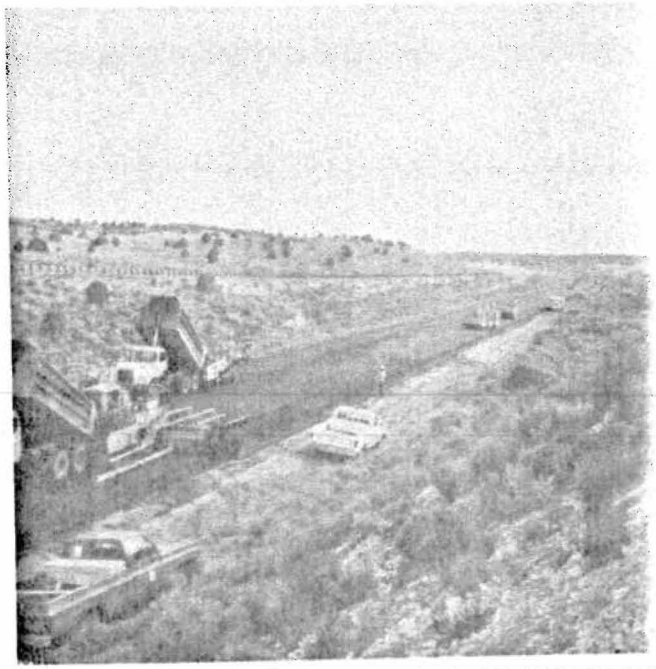


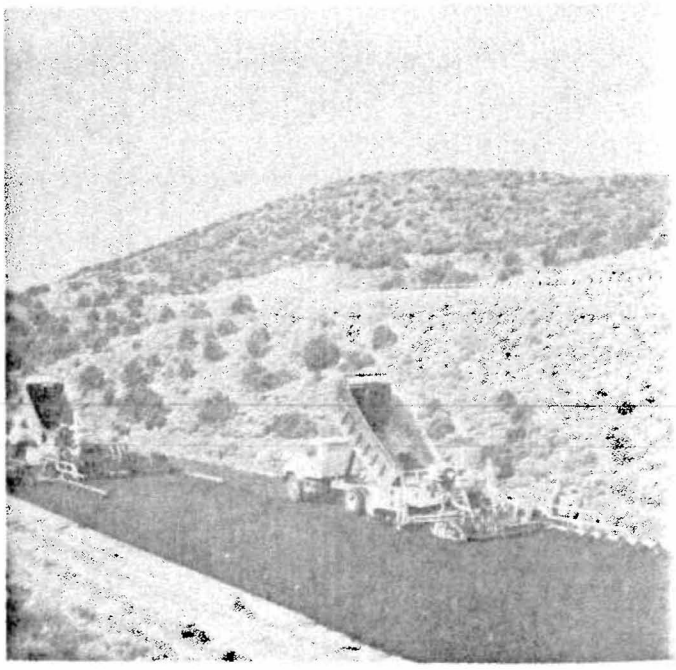
TYPICAL TEST SECTION MARKERS



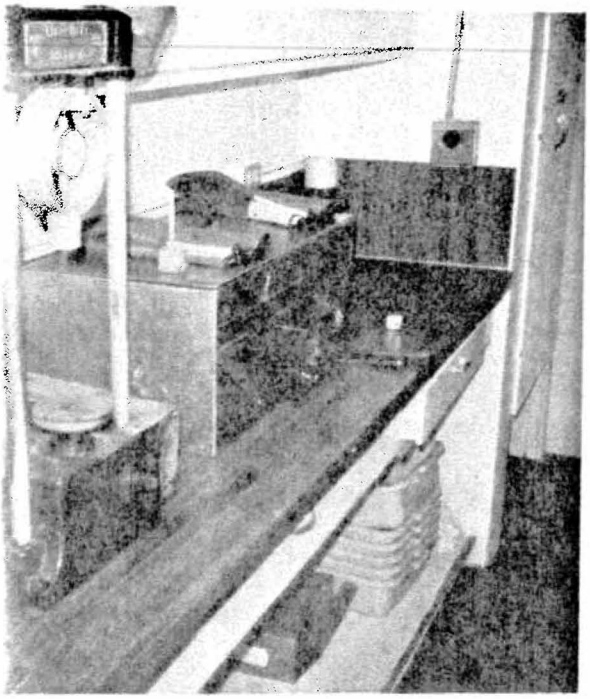


1979 LAYDOWN ON SOUTHBOUND LANES, NOTE FULL WIDTH PAVING

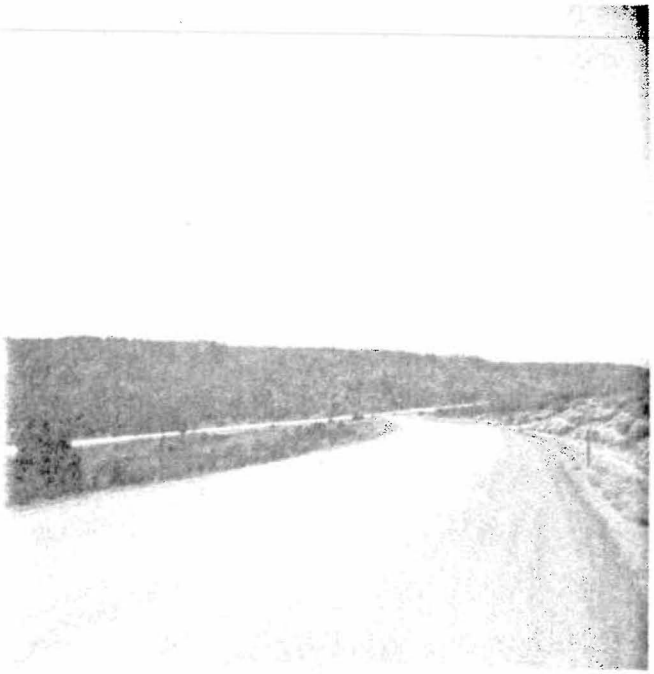




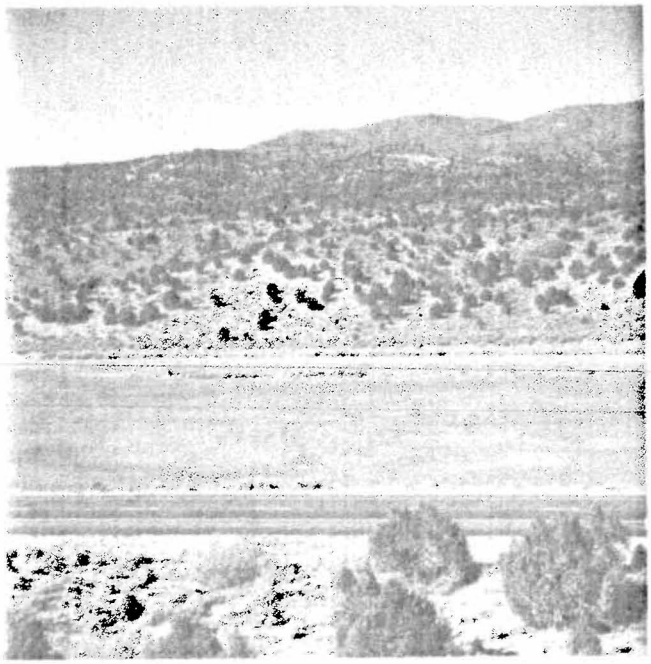
1980 LAYDOWN ON NORTHBOUND LANES USING TWO PAVERS



MARSHALL STABILITY APPARATUS
AND WATER BATH



CHIP SEAL ON SOUTHBOUND LANES



TYPICAL OF NORTHBOUND AND SOUTHBOUND LANES AFTER CONSTRUCTION

APPENDIX G

POST CONSTRUCTION EVALUATION

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

Dynaflect

NBL

*Test	Spreadability	DMD	Min.	Max.	Reg.
#1	59	0.793	0.538	1.156	0.479
#2	59	0.783	0.520	0.941	0.479
#3	60	1.011	0.591	1.371	0.479
#4	62	1.075	0.887	1.317	0.479
#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

	Spreadability	Equivalent Thickness
Old Pavement	53	5.5" BSC
New Recycled Pav.	60	7.5" BSC

PAVEMENT SERVICEABILITY INDEX

P.S.I.

SBL			NBL		
1	=	3.39	1	=	3.65
2	=	3.77	2	=	3.72
3	=	3.71	3	=	3.67
4	=	3.67	4	=	3.68
5	=	3.74	5	=	3.61
AVE	=	3.65	AVE	=	3.67

Mu.Meter SKID#

SBL			NBL		
1	=	68	1	=	67
2	=	72	2	=	68
3	=	70	3	=	70
4	=	70	4	=	71
5	=	69	5	=	71
Ave	=	69	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	

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

S

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	

WILDCAT TO PINE CREEK I-IR-15-3(18)121 CORE DATA Gradation and Asphalt Content 1 Year						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^{-1}) $\times 10^{-5}$-YEARS				RESILIENT MODULUS YEARS			
		Construction	1	2	3	Construction	1	2	3
0/100	Southbound	3.9	21.6			7.65×10^5	4.29×10^5		
80/20	Southbound	4.1	7.8			5.96×10^5	5.99×10^5		
70/30	Southbound	4.7	9.3			5.73×10^5	6.61×10^5		
60/40	Southbound	3.2	10.9			5.75×10^5	5.05×10^5		
50/50	Southbound	4.2	11.3			6.91×10^5	5.23×10^5		
40/60	Northbound	8.3				5.38×10^5			

☆ U.S. GOVERNMENT PRINTING OFFICE: 1981 — 724-166/832 REGION 3-1