

Research Project No. 24(8)

TEST DATA

INVESTIGATION OF CRACKING

IN

FLEXIBLE PAVEMENTS

II5-1(5)17
Deep Creek-Colton Lane

Pavement Performance - Project completed 1963 and looked good during spring and summer 1965. During spring of 1966 some cracking appeared in wheel paths. Some in between wheel paths. Project appears about the same as those north of Pocatello did two years ago.

Analysis of Data - The excessive moisture contents indicate excessive voids and this is verified by testing. Evidence indicates that cracking should begin and this was verified in March 1966.

Conclusions - Compaction during construction was inadequate. Lab asphalt content appears to be essentially okay but might have been higher. Field asphalt extractions indicate the lower course was less than lab design. Top course was okay.

I-15-1(5)17
Deep Creek-Colton Lane

Construction Information

Subgrade - Constructed during 1962. Very little of subgrade left uncovered during winter of 1962-63.

Base - Base placed during fall 1962. Some left uncompacted until spring of 1963. Base recompactd during spring 1963 using pneumatic and vibratory rollers.

Asphalt Pavement - First course placed during warm weather, average temperatures 88°F., with a low of 40°F. Top course placed during October 16-29 with colder temperatures. Average 65°F. with low of 28°F. Used two cedar rapids pavers but production of mix insufficient to keep both in operation. Placed first lay during first half shift and adjoining lay during second half. During warm weather left 0.1 ft. of first lay unrolled but rolled the edge during cold weather.

FIELD INVESTIGATION DATA

I-15-1(5)17

2 Test Pits (1) Station 160+00 NBTL, IWP
(2) Station 163+00 SBTL, IWP

Thicknesses, Ft.	Measured			Design		
	Hi	Lo	Mean			
Plant mix Surf.						
"D"	0.11	0.10	0.105			0.10
"B"	0.23	0.23	0.23			0.20
Moistures, %	Hi		Lo			Mean
Plant mix Surf.						
"D"	2.2		1.7			2.0
"B"	2.7		2.5			2.6
Rut Depths, Ft.	Hi	<u>IWP</u> Lo	Mean	Hi	<u>OWP</u> Lo	Mean
Traffic Lane						
10 ft. edge	0.04	0.015	0.03	0.04	0.015	0.03
4 ft. edge	0.02	0.005	0.01	0.03	0.005	0.02
Passing Lane						
10 ft.	0.01	0.005	0.01	0.01	0.005	0.01
4 ft.	0.00	0.00	0.00	0.00	0.00	0.00

LAB TESTS ON PLANTMIX SURFACING

I-15-1(5)17

Gradation % Passing	Class "D"			Class "B"		
	Hi	Lo	Mean	Hi	Lo	Mean
3/4	100	100	100	100	100	100
4	71	69	70	61	60	60
10	46	45	46	41	38	40
40	25	21	23	18	18	18
200	15	10	12	9	8	8
Surface Area			46.67			34.48
% Asph.*	5.98	4.42	5.20	6.06	6.00	6.03
Wt/CF, Field	133.8	129.6	131.7	135.2	131.0	133.1
Wt/CF, Lab.	137.2	136.0	136.6	136.7	136.0	136.4
% Comp.	98.4	94.5	96.4	98.9	96.3	97.6
% Air Voids, Field	--	--	11.3	9.1	7.0	8.0
% Air Voids, Lab.	6.0	5.6	5.8	6.0	5.6	5.8
Stability	30	25	28	32	30	31
Abson						
Penetration	78	66	72	76	51	64
Ductility	139	138	138	140+	133	136
Voids - Bitumen						
Index Ratio (Mean)						
Field Voids			10.1			4.6
Lab. Voids			5.2			3.3
Grade Asph.			120 - 150			
Source Asph.			American			
Source Aggr.			On-55			

* % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-15-1(5)17

Plantmix Surfacing*

Class "B"

Gradation % Passing	Lab Tests			1225's		
	Hi	Lo	Mean	Hi	Lo	Mean
4	66	41	56	57	47	52
10	41	27	35	39	25	33
40	19	10	16	18	10	14
200	10	4	7	8	5	6
% Asph.**	7.22	4.56	5.71	6.4	5.5	6.1

Class "D"

4	72	60	68	65	60	63
10	46	37	42	45	36	40
40	23	16	20	28	12	16
200	11	7	8	11	6	7
% Asph.	7.12	5.09	6.06	6.4	6.0	6.2

% Asph.

Lab. Mix Design "B" - 5.8%

Field Mix Design "B" - 5.8 - 6.2%, "D" - 6.2%

Grade Asph. 120 - 150

Brand Asph. American

Source Aggr. On-44

Type Plant Cedar Rapids Batch

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

I-15-2(9)88 "A"
So. Blackfoot I.C.-West Blackfoot I.C.

Pavement Performance - Project opened to traffic late 1962. Project shows extensive flushing and bleeding in both wheel paths of outer lane. Some longitudinal cracking between wheel paths.

Analysis of Data - The data shows that compaction was high as was the asphalt content on the project. Compaction was 101 per cent and asphalt contents 5.6. Voids and the Voids Bitumen Index Ratio are both low; in fact, lower than on any other project investigated with values for voids as low as 2.2 and V/BI of 1.1. These values are lower than desired.

Conclusions - This project has asphalt flushing to the surface due to excessive asphalt content.

I-15-2(9)88 "B"
So. Blackfoot I.C.-West Blackfoot I.C.

Construction Information

Subgrade - Constructed same season as base and pavement.

Base - Constructed same season as pavement.

Asphalt Pavement - Pavement was placed during mid-October 10-12 and 10-18, temperatures moderate lowest 43°F. Rolling was noted as being completed before temperature dropped to 140°F. Used a Blaw Knox paver placing first lay $\frac{1}{2}$ day and returning to make adjoining lay second $\frac{1}{2}$ day. Hot joints were rolled leaving 0.1 ft. unrolled to be rolled with adjoining lay. Cold joints were rolled flat.

FIELD INVESTIGATION DATA

I-15-2(9)88 "A"

2 Test Pits (1) Station 1125+00 NBTL, IWP
 (2) Station 1140+00 SBTL, IWP

Thicknesses, Ft.	Hi	Measured Lo	Mean		Design	
Plantmix Surf.	0.36	0.30	0.33		0.30	
Moistures, %	Hi	Lo			Mean	
Plantmix Surf.	0.7	0.3			0.5	
Rut Depths, Ft.	Hi	IWP Lo	Mean	Hi	OWP Lo	Mean
Traffic Lane						
10 ft. edge	0.035	0.02	0.03	0.03	0.02	0.025
4 ft. edge	0.030	0.015	0.02	0.02	0.015	0.02
Passing Lane						
10 ft.	0.01	0.01	0.01	0.01	0.01	0.01
4 ft.	0.005	0.00	0.00	0.01	0.00	0.015
Benkelman Beam Deflections, In.						
Alt. Rt. & Lt. of CL		NBL			SBL	
	IWP		OWP	IWP		OWP
Hi	0.009		0.011	0.013		0.015
Lo	0.004		0.005	0.007		0.007
Mean	0.006		0.007	0.010		0.011

LAB TESTS ON PLANTMIX SURFACING

I-15-2(9)88 "A"

2 Samples

Composite of Class "B" & "D"

Gradation % Passing	HI	LO	MEAN
3/4	100	100	100
4	51	48	50
8	40	37	38
40	21	17	19
200	6	4	5
Surface Area			28.09
% Asph.*	5.64	5.62	5.63
Wt/CF, Field			143.5
Wt/CF, Lab.	145.0	142.0	143.5
% Comp.			101.1
% Air Voids, Field			2.2
% Air Voids, Lab.	3.3	2.5	2.9
Stability	31	18	24
Abson			
Penetration	68	64	66
Ductility	140+	140+	140+
Voids - Bitumen			
Index Ratio (Mean)	Field		1.1
	Lab.		1.4
Grade Asph.	120 - 150		
Source Asph.	Phillips		
Source Aggr.	Bg-89		

* % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-15-2(9)88 "A"

Plantmix Surfacing*

Class "B"

Gradation % Passing	Lab Tests			1225's		
	Hi	Lo	Mean	Hi	Lo	Mean
4	53	39	46	52	43	48
10	40	31	36	38	26	33
40	20	13	17	18	13	15
200	9	2	4	4	1	2
% Asph.**	5.71	4.34	5.21	5.9	5.2	5.6

Class "D"

4	59	49	54	58	53	56
10	48	33	42	46	30	42
40	24	18	22	24	18	21
200	6	2	5	4	3	4
% Asph.	6.91	5.07	5.74	6.1	5.5	5.8

% Asph.

Lab. Mix Design

Field Mix Design "B" - 5.6%, "D" - 5.7%

Grade Asph. 120 - 150

Brand Asph. Phillips

Source Aggr. Bg-89

Type Plant Cedar Rapids Batch

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

F-1381(10)
Blackfoot Connection to Interstate

Pavement Performance - Project constructed and opened to traffic in late 1964. During first winter raveling was very severe with top course raveling completely away in many areas. Appearance of pavement indicate lack of compaction with probably low asphalt content as contributing factor.

Analysis of Data - Samples taken during late spring indicates that a lack of compaction existed. Portions of pavement remaining indicates that the mixture ranged from 5.7 to 12.4 lbs. per cubic foot less than laboratory compacted densities. The air voids in the field cores ranged from 9.1 to 15.4 per cent. Noting that sections of the pavement had raveled completely away it is possible that air voids may have exceeded 15 per cent in some areas. The asphalt had not hardened during the winter with penetrations ranging from 76 to 107. Asphalt contents from extractions give an average of 4.84 in the Class D mix and 4.96 in the Class B mix.

Conclusions - The pavement on this project, at least the top course, had not been compacted adequately.

F-1381(10)
Blackfoot Connection to Interstate

Construction Information

Subgrade - Constructed same season as pavement.

Base - Constructed same season as pavement.

Asphalt Pavement - Pavement was constructed during September and October completed 10/4/64. Temperatures were normal averaging 60°F. and coldest about 40-45°F. No rain occurred. The paver was a "Track Lay" paver pulled by a Farmall tractor attempting a full width pavement daily. Hot joints and cold joints were rolled flat on each lay.

FIELD INVESTIGATION DATA

F-1381(10)

No tests made

LAB TESTS ON PLANTMIX SURFACING

F-1381(10)

11 Samples

Composite of Class "B" & Class "D"

Gradation % Passing	Hi	Lo	Mean
3/4	100	100	100
4	63	54	57
10	49	37	43
40	32	19	24
200	9	4	5
Surface Area			32.08
% Asph.*	5.27	4.11	4.75
Wt/CF, Field	137.3	130.9	134.1
Wt/CF, Lab.	144.2	139.0	140.3
% Comp.	95.2	91.3	93.2
% Air Voids, Field	13.5	9.1	11.3
% Air Voids, Lab.	15.1	4.1	7.7
Stability	53	39	44
Abson			
Penetration	107	76	91
Ductility	140+	140+	140+
Voids - Bitumen			
Index Ratio (Mean)			
Field Voids			7.6
Lab. Voids			5.2
Grade Asph.	120 - 150		
Source Asph.	Empire State		
Source Aggr.	Bg-51		

* % Asph. by wt. of aggr.

LAB TESTS ON PLANTMIX SURFACING

F-1381(10)

Gradation % Passing	Class "B" 3 Samples			Class "D" 3 Samples		
	Hi	Lo	Mean	Hi	Lo	Mean
3/4	100	100	100	100	100	100
4	53	49	52	63	60	62
10	39	36	38	49	45	47
40	21	19	20	27	24	26
200	5	5	5	6	6	6
Surface Area			29.30			36.01
% Asph.*	5.23	4.82	4.96	5.51	4.43	4.99
Wt/CF, Field	134.9	133.6	134.2	135.6	130.8	133.2
Wt/CF, Lab.	144.5	139.9	142.6	145.5	142.6	143.7
% Comp.	95.9	93.2	94.2	93.4	91.5	92.7
% Air Voids, Field	11.0	9.8	10.5	15.4	9.5	12.5
% Air Voids, Lab.	7.2	4.7	5.7	7.6	2.9	5.3
Stability	44	39	42	41	38	39
Abson						
Penetration	106	83	97	86	82	84
Ductility	140+	140+	140+	140+	140+	140+
Voids - Bitumen						
Index Ratio (Mean)						
Field Voids			6.2			9.0
Lab. Voids			3.4			3.8
Grade Asph.			120 - 150			
Source Asph.			Empire State			
Source Aggr.			Bg-51			

* % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

F-1381(10)

Plant mix Surfacing*

Class "B"

Lab Tests

1225's

Gradation % Passing	Hi	Lo	Mean	Hi	Lo	Mean
4	56	41	49	42	40	41
10	44	28	37	34	26	30
40	27	14	20	18	10	15
200	7	3	5	5	2	3
% Asph.**	4.97	4.08	4.56	None run		

Class "D"

4	63	52	56	54	51	53
10	50	40	44	50	37	42
40	29	21	24	29	20	23
200	7	5	6	6	4	4
% Asph.	5.27	3.83	4.54	None run		

% Asph.

Lab. Mix Design
Field Mix Design

"B" - 5.46% "D" - 5.46%

Grade Asph.

120 - 150

Brand Asph.

Empire State

Source Aggr.

Bg-51

Type Plant

Barber Greene Continuous

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

I-15-2(11)96
Porter Bridge G.S.-Gr. Western Canal

Pavement Performance - This project was opened to traffic late in 1962 and when inspected in the spring of 1965 showed no evidence of any distress.

Analysis of Data - The data obtained from this project indicates slight rutting, 0.02' Max. on 4 ft. and 0.035' on 10 ft. The deflections obtained with the Benkelman Beam are low with 0.012 in. maximum. Design thickness were met in the south bound lanes and 0.05 ft. shy in the north bound lanes. The average asphalt content is very close to the designed amount varying less than 0.1 per cent. Pavement core densities are all better than 95 per cent with the mean 98 per cent. The voids bitumen index ratio on field compacted cores is 2.6 indicating adequate compaction and asphalt content for the mixture used. The asphalt recovered had penetrations average 57 and a low of 41.

Conclusions - This project obtained adequate compaction and had sufficient asphalt in the mixture. The asphalt had not hardened excessively at the time the cores were taken.

I-15-2(11)96
Porter Bridge G.S.-Gr. Western Canal

Construction Information

Subgrade - Project was constructed from a sand gravel borrow source. The subgrade lay over one winter unprotected but was recompactd with vibratory and pneumatic tired rollers at rate 40 hours per mile.

Base - Base course placed same season as pavement.

Plantmix - Plantmix placed July, August, weather warm. Occasional short shower. Two barber greene pavers on job, one held in reserve. Dump truck and Kocal used to supply mix to paver. Paver placed lane $\frac{1}{2}$ day and re-turned to place adjacent lane. Both hot and cold joints left 0.1 ft. un-rolled to be rolled with adjacent lay.

FIELD INVESTIGATION DATA

I-15-2(7)96
or I-15-2(11)96 "A"

- 3 Test Pits (1) Station 1546+00 NBTL, IWP
(2) Station 1619+00 SBTL, IWP
(3) Station 1820+00 NBTL, BWP & OWP

Thicknesses, Ft.	Hi	Measured Lo	Mean	Design
Plantmix Surf.	0.30	0.30	0.30	0.30
Plantmix Surf.			0.35	0.40
3/4" Base Composite			0.80	0.80

Densities	Hi	Measured Lo	Mean	Hi	% Lab. Std. Lo	Mean
3/4" Base Composite	131.8	130.2	131.0	96.6	95.4	96.0

Moistures, %	Hi	Lo	Mean
Plantmix Surf.	0.8	0.4	0.6
3/4" Base	4.3	4.2	4.2
Subgrade	5.6	4.3	5.0

Rut Depths, Ft.	Hi	IWP Lo	Mean	Hi	OWP Lo	Mean
Traffic Lane						
10 Ft. edge	0.03	0.03	0.03	0.035	0.025	0.03
4 Ft. edge	0.02	0.02	0.02	0.02	0.015	0.02
Passing Lane						
10 ft.	0.015	0.01	0.01	0.02	0.02	0.02
4 ft.	0.01	0.005	0.01	0.015	0.01	0.01

Benkelman Beam Deflections, In. Alt. Rt. & Lt. of CL

	IWP	NBL	OWP	IWP	SEL	OWP
Hi	0.010		0.011	0.011		0.012
Lo	0.005		0.005	0.007		0.006
Mean	0.008		0.008	0.009		0.009

LAB TESTS ON PLANTMIX SURFACING

I-15-2(7)96

3 Samples

Composite of Class "B" and Class "D"

Gradation % Passing	Hi	Lo	Mean
3/4	100	100	100
4	52	47	50
8	43	38	40
40	23	20	22
200	7	6	6
Surf. Area			33.11
% Asph.*	5.47	4.71	5.17
Wt/CF, Field	144.1	138.0	142.0
Wt/CF, Lab.	145.1	144.1	144.7
% Comp.	100.0	95.2	98.1
% Air Voids, Field	6.7	2.5	4.1
% Air Voids, Lab.	3.4	2.1	2.6
Stability	30	17	24
Abson			
Penetration	68	41	57
Ductility	140+	89	123
Voids - Bitumen			
Index Ratio (Mean)			
Field			2.6
Lab.			1.7
Grade Asph.	120 - 150		
Source Asph.	American		
Source Aggr.	Bg-75		

* % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-15-2(7)96
or I-15-2(11)96 "A"

Plantmix Surfacing*

Class "D"
Lab Tests

Gradation % Passing	Hi	Lo	Mean	Hi	1225's Lo	Mean
4	59	45	53	62	55	57
10	46	36	41	50	42	45
40	24	18	21	25	22	23
200	7	4	5	6	4	4
% Asph.**	6.24	4.87	5.72	6.0	5.2	5.4

Class "B"

4	51	41	47	46	41	43
10	42	35	38	40	32	35
40	24	17	21	20	16	18
200	8	5	6	6	3	4
% Asph.	6.01	4.23	5.09	6.7	4.2	5.1

% Asph.

Lab. Mix Design "B" - 5.0%

Field Mix Design "B" - 5.0-5.1%, 5.2-5.4%

Grade Asph. 120 - 150

Brand Asph. American

Source Aggr. Bg-75

Type Plant Pioneer Continuous

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

LAB TESTS ON BASE AND SUBGRADE

I-15-2(7)96

1 Test Pit

Gradation % Passing	3/4" Composite	
	Base	Subgrade
3/4	99	62
4	42	38
10	33	35
50	16	15
200	6	5
Sand Equiv.	50	47
Liquid Limit	NV	NV
Plastic Limit	NP	NP
Plastic Index	NP	NP
"R" Value		
Vibrator density, Wt/CF	136.5	

I-15-2(8)104
Lava Beds-Bonneville Co. Line

Pavement Performance - This project was opened to traffic in the late fall of 1962. The project showed evidence of distress in the outer lanes early in 1964 with opening of longitudinal cracks which appeared to be from cold joints. During the fall and winter of 1964-65 more cracking occurred with a large amount of longitudinal cracking and cracking occurring in the outer lane wheel paths.

Analysis of Data - The data indicates design thicknesses and base densities were obtained. Benkelman Beam deflections are very low, 0.011 Max. and the Max. rut depth is 0.01 ft. in 4 ft. and 0.02 ft. in 10 ft. The bottom course of plantmix was well compacted, 98 per cent, at an asphalt content within tolerances of the design amount although the single core gives a slightly high value. Penetrations of the recovered asphalt is high in this instance with a value of 58. The top course was less well compacted, 94.8 per cent, but the asphalt content is satisfactory very near that of the bottom course. The penetration in this instance is 39 on recovered asphalt. The Voids Bitumen Index is 1.4 for the well compacted mixture and 6.5 for the less well compacted. Penetrations are correspondingly 58 and 39.

Conclusions - It appears that the top course of pavement is lacking in compaction and the asphalt has hardened more than expected. The brittleness of this course resulted in cracking of the top course from the truck traffic.

I-15-2(8)104
Lava Beds-Bonneville Co. Line

Construction Information

Subgrade - Subgrade was compacted to 95 per cent minimum density. Difficulties experienced getting 100 per cent and no amount rolling or type roller appeared to be able to get 100 per cent density. Shearing of soil occurred at 98-99 per cent and if adding water then too sensitive and would not compact. Otherwise 2" base placed over subgrade same season.

Base - 2" base left uncovered first winter. Base and any granular subgrade were recompactd using pneumatic and vibratory rollers at 40 hours per mile.

Plantmix - Plantmix placed mid-September to end-September. Temperatures were warm above 60°F. Some light showers occurred. Used Blaw Knox pavers keeping one in reserve and used dump truck and Kocal loader to feed pavers. Placed one lane for a half shift and then adjoining lane second half shift. Both hot and cold joints were rolled leaving 0.1 ft. to be rolled.

FIELD INVESTIGATION DATA

I-15-2(8)104
or I-15-2(11)96 "B"2 Test Pits (1) Station 1961+00 NBTL
(2) Station 1961+00 SBTL

Thicknesses, Ft.	Hi	Measured		Mean	Design	
		Lo				
Plantmix Surf.	0.32	0.30		0.31		0.30
3/4" Base	0.40	0.40		0.40		0.40
2" Base	0.40	0.40		0.40		0.40
3/4" Composite	1.00	1.00		1.00		0.80
Densities	Hi	Measured		Mean	Hi	% Lab. Std.
		Lo				Lo
3/4" Base	136.3	130.7		133.6	99.6	95.6
2" Base	135.8	131.8		133.8	99.2	96.3
Moistures, %	Hi		Lo		Mean	
Plantmix Surf.	1.1		0.3			0.7
3/4" Base	6.1		4.4			5.1
2" Base	5.4		5.3			5.4
Rut Depths, Ft.	Hi	IWP	Mean	Hi	OWP	Mean
		Lo			Lo	
Traffic Lane						
10 ft. edge	0.02	0.015	0.02	0.015	0.01	0.015
4 ft. edge	0.01	0.01	0.01	0.01	0.005	0.01
Benkelman Beam Deflections, In.						
Alt. Rt. & Lt. of CL						
		NBL			SBL	
	IWP		OWP	IWP		OWP
Hi	0.009		0.009	0.009		0.011
Lo	0.003		0.004	0.005		0.005
Mean	0.006		0.007	0.008		0.007

LAB TESTS ON PLANTMIX SURFACING

I-15-2(8)104
or I-15-2(11)96 "B"

	Class "B"	Class "D"
Gradation % Passing		
3/4	100	100
4	55	62
8	43	49
40	22	25
200	6	8
Surf. Area	31.64	39.82
% Asph.*	5.37	5.35
Wt/Cf, Field	142.7	136.5
Wt/CF, Lab.	145.3	144.0
% Comp.	98.2	94.8
% Air Voids, Field	2.3	8.7
% Air Voids, Lab.	0.3	3.7
Stability	29	29
Abson		
Penetration	58	39
Ductility	140+	83
Voids - Bitumen		
Index Ratio		
Field	1.4	6.5
Lab.	0.2	2.8
Grade Asph.	120 - 150	
Source Asph.	American	
Source Aggr.	Bg-77	

* % Asph. by wt. of aggr.

LAB TESTS ON PLANTMIX SURFACING

I-15-2(8)104
or-I-15-2(11)96 "B"

Gradation % Passing	Composite Sample Class "B" and Class "D"
3/4	100
4	51
10	40
40	22
200	6
Surf. Area	32.39
% Asph.*	5.22
Wt/CF, Field	146.2
Wt/CF, Lab.	146.8
% Comp.	99.6
% Air Voids, Field	2.2
% Air Voids, Lab.	2.0
Stability	20
Abson	
Penetration	56
Ductility	117
Voids - Bitumen	
Index Ratio	
Field	1.4
Lab.	1.2
Grade Asph.	120 - 150
Source Asph.	American
Source Aggr.	Bg-77

*%Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-15-2(8)104 or
I-15-2(11)96 "B"

Plantmix Surfacing*

Class "D"

Gradation % Passing	Lab Tests			1225's		
	Hi	Lo	Mean	Hi	Lo	Mean
4	68	48	58	59	53	57
10	50	35	43	47	37	44
40	26	19	23	24	14	20
200	13	6	8	7	3	5
% Asph.**	5.64	4.97	5.35	6.2	5.2	5.8

Class "B"

4	51	43	48	56	43	46
10	47	31	36	42	29	35
40	26	18	21	20	12	17
200	6	4	6	11	2	4
% Asph.	5.78	4.18	5.24	6.3	4.5	5.3

% Asph.

Lab. Mix Design "B"-5.2%

Field Mix Design "B"-5.0-5.3% "D"-5.2-5.3%

Grade Asph. 120 - 150

Brand Asph. American

Source Aggr. Bg-77

Type Plant Pioneer Continuous

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

LAB TESTS ON BASE AND SUBGRADE

I-15-2(8)104 or
I-15-2(11)96 "B"

Gradation % Passing	Composite 3/4"	3/4" Base	2" Base	Subgrade
3/4	100	100	89	44
4	48	46	51	25
10	38	37	42	20
50	19	16	21	9
200	5	5	9	4
Sand Equiv.	59	57	41	32
Liquid Limit	NV	NV	NV	NV
Vibrator density, Wt/CF	136.7	136.8	136.9	

I-15-3(7)111
Bingham Co. Line-Idaho Falls

Pavement Performance - This project was opened to traffic in the late fall of 1962. The earliest evidence of distress noted was in 1964 with the opening of longitudinal cracks that appeared to come from cold joints in the lower or first course or in the top course. During late 1964 and early 1965 the longitudinal cracking became almost continuous in the inner wheel path of the outer lane and intermittent in the outer wheel path. Cracking appears to be progressing rapidly although no evidence of rutting is apparent.

Analysis of Data - The investigation indicates that design thicknesses of the pavement structure were obtained or exceeded slightly. The borrow used was granular and in many instances the design is well above minimums necessary as clean granular material made up the subgrade. Rut depths measured with either the 4 ft. or 10 ft. span show only slight rutting, 0.02' in 4 ft. and 0.03' in 10 ft. The Benkelman Beam deflection measurements are less with 0.011 in. maximum at the time taken.

Slight stripping was noted by the investigators. The density and gradation of base course materials were well within specification requirements and no evidence of differences between wheel paths and portion of base between wheel paths.

Tests on two samples of asphalt surfacing indicate the asphalt content to be perhaps lower than desirable. The Lab recommendations were to use 4.9-5.0 asphalt by wt. of the mix. The field used from 5.0 to 5.3 per cent. Field extractions gave a mean of 5.5 and Lab extractions gave a mean of 5.01 per cent asphalt. The Lab compacted specimens had 5.5 and 6.4 per cent air voids while field cores gave 9.3 and 10.2 per cent air voids. Stabilities were well above minimums desired. The retained penetration of the asphalt was 37 and 38 or about 40 per cent of its original penetration.

Conclusions - The high void content of the field mix can be responsible for the hardening of the asphalt causing the mat to become excessively brittle and cracking. The deflections are low and no other evident cause of the trouble is apparent.

I-15-3(7)111
Bingham Co. Line-Idaho Falls

Construction Information

Subgrade - This project was constructed during 1961 and 1962. The subgrade was constructed mostly from granular borrow and only a portion of it was near final elevations during the fall of 1961. Equipment was required to route their hauling over full width of the roadbed and vibratory drum rollers were used in compaction.

Base - Base courses were placed following completion of the subgrade and rolled with vibratory rollers. The prime coat and paving followed base construction.

Asphalt Paving - The asphalt pavement was constructed during the late summer and early fall. All joints were rolled flat at the time of break-down rolling.

FIELD INVESTIGATION DATA

I-15-3(7)111

2 Test Pits (1) MP 118.3, SBTL, OWP, BWP
(2) MP 116.5, NBTL, OWP, BWP

Thicknesses, Ft.	Measured			Design
	Hi	Lo	Mean	
Plantmix Surf.	0.35	0.35	0.35	0.30
3/4" Base	0.30	0.30	0.30	0.30
2" Base	0.40	0.40	0.40	0.30

Densities	Measured			% Lab. Std.		
	Hi	Lo	Mean	Hi	Lo	Mean
3/4" Base	137.5	134.7	136.5	101.3	98.0	99.9
2" Base	139.2	135.1	136.9	100.9	97.7	99.1

Moistures, %				Mean
	Hi	Lo	Mean	
Plantmix Surf.	1.5	0.3	0.9	0.9
3/4" Base	4.6	3.4	4.2	4.2
2" Base	4.5	3.6	4.2	4.2
Subgrade	4.3	4.3	4.3	4.3

Rut Depths, Ft.	IWP			OWP		
	Hi	Lo	Mean	Hi	Lo	Mean
Traffic Lane						
10 ft. edge	0.03	0.02	0.025	0.02	0.005	0.01
4 ft. edge	0.02	0.015	0.02	0.005	0.00	0.00

Benkelman Beam Deflections, In.
Alt. Rt. & Lt. of CL

	NBL			SBL		
	IWP	OWP	IWP	OWP	OWP	OWP
Hi	0.010	0.011	0.011	0.011	0.011	0.011
Lo	0.005	0.007	0.006	0.006	0.007	0.007
Mean	0.008	0.009	0.008	0.008	0.009	0.009

LAB TESTS ON PLANTMIX SURFACING

I-15-3(7)111

2 Samples

Class "E"

Gradation % Passing	Hi	Lo	Mean
3/4	100	100	100
4	64	59	62
8	48	44	46
40	26	23	24
200	8	6	7
Surf. Area			37.61
% Asph.*	4.96	4.76	4.86
Wt/CF, Field	143.3	136.0	139.7
Wt/CF, Lab.	143.3	141.5	142.4
% Comp.	100.0	96.1	98.1
% Air Voids, Field	10.2	9.3	9.8
% Air Voids, Lab.	6.4	5.5	6.0
Stability	42	39	40
Abson			
Penetration	38	37	38
Ductility	29	23	26
Voids - Bitumen			
Index Ratio (Mean)			
Field			7.6
Lab.			4.6
Grade Asph.	85 - 100		
Source Asph.	American		
Source Aggr.	Bn-100		

* % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-15-3(7)111

Plantmix Surfacing*

Gradation % Passing	Class "E"			1225"s		
	Hi	Lo	Mean	Hi	Lo	Mean
4	65	53	58	61	58	60
10	48	34	41	44	38	41
40	25	18	22	25	19	21
200	8	4	7	9	4	6
% Asph.**	5.43	4.47	5.01	6.1	4.6	5.5

% Asph.

Lab. Mix Design "E" 4.9 - 5.0%

Field Mix Design "E" 5.0 - 5.3%

Grade Asph. 85 - 100

Brand Asph. American

Source Aggr. Bn-100

Type Plant Cedar Rapids Batch

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

LAB TESTS ON BASE AND SUBGRADE

I-15-3(7)111

2 Test Pits

Gradation % Passing	<u>3/4" Base</u>			<u>2" Base</u>			<u>Subgrade</u>		
	Hi	Lo	Mean	Hi	Lo	Mean	Hi	Lo	Mean
3/4	100	99	100	91	86	88	57	50	54
4	49	46	48	45	41	43	33	26	30
10	37	34	36	36	32	34	30	22	26
50	18	17	18	19	17	18	14	13	14
200	7	7	7	7	5	6	4	4	4
Sand Equiv.	57	35	46	46	45	46	46	31	38
Liquid Limit	NV								
Plastic Limit	NP								
Plastic Index	NP								
"R" Value									
Vibrator density, Wt/CF	137.5	135.7	136.6	138.3	138.0	138.2			

I-15-3(3)117
Idaho Falls-Bassett

Pavement Performance - This project was opened to traffic in the late fall of 1962. No distress is evident and the project is in excellent condition.

Analysis of Data - The investigation indicates that design thicknesses were obtained or exceeded slightly. Granular borrow was used on part of the project but large portions were constructed using earth. Rut depths were less than 0.01 ft. with 4 ft. gage and also the 10 ft. gage. Benkelman Beam deflections were not taken. The base course on this project indicates that compaction is still 99 per cent of AASHO T 180 Method C. The asphalt surfacing cores indicate a lower than designed asphalt content. The Voids Bitumen Index was 5.7 on the field compacted core. The penetration of 38 indicates some hardening of the asphalt is occurring. These values are from a single sample.

Conclusions - The performance of this project is excellent. The higher voids bitumen index and low penetration on the asphalt from a single sample and may not represent the project average. Construction records show higher asphalt contents used. Further observation of this project is warranted and further testing to confirm its performance perhaps should be undertaken.

I-15-3⁶(3)117
Idaho Falls-Bassett

Construction Information

Subgrade - Subgrade constructed mostly of silt soils. Portions lay over winter and were recompacted by sheepsfoot rollers, paddle foot rollers and vibratory rollers prior to placing base course material.

Base - Base course material placed on recompacted base. The 3/4-inch base was placed using AASHO T 180 Method A control with 97 per cent Min. specified. Contractor used pugmill to add water, spread base with a jersey spreader, rolled one coverage with a 8-10 ton steel tandem roller and completed compaction with a Jackson vibratory compactor. No trouble attaining virtually 100 per cent Densities throughout. Base was land-planed and prime coat placed immediately.

Plantmix - Plantmix was placed late summer under ideal conditions. Some heavy rains. Hot joints were left unrolled until adjacent lay was made and then rolled together. Cold joints were rolled flat at time of lay.

FIELD INVESTIGATION DATA

I-15-3(5)117

1 Test Pit - MP 121.8, NBTL, OWP, BWP

Thicknesses, Ft.	Hi	Measured Lo	Mean		Design	
Plantmix Surf.			0.35		0.30	
3/4" Base Composite			0.80		0.80	
Densities	Hi	Measured Lo	Mean	Hi	% Lab Std. Lo	Mean
3/4" Base	136.6	136.3	136.4	99.0	98.8	98.9
Moistures, %	Hi		Lo		Mean	
3/4" Base	4.1		3.9		4.0	
Subgrade	4.3		4.3		4.3	
Rut Depths, Ft.	Hi	IWP Lo	Mean	Hi	OWP Lo	Mean
Traffic Lane						
10 ft. edge			0.01			0.01
4 ft. edge			0.01			0.005

LAB TESTS ON PLANTMIX SURFACING

I-15-3(5)117

Composite - Class "E" and "C"

Gradation % Passing	One Sample
3/4	100
4	57
8	44
40	22
200	7
Surf. Area	35.12
% Asph.*	4.97
Wt/CF, Field	138.7
Wt/CF, Lab.	142.3
% Comp.	97.5
% Air Voids, Field	8.0
% Air Voids, Lab.	5.4
Stability	39
Abson	
Penetration	38
Ductility	140+
Voids - Bitumen	
Index Ratio (Mean)	
Field	5.7
Lab.	3.8
Grade Asph.	85 - 100
Source Asph.	Phillips , <i>Humble</i>
Source Aggr.	Bn-85 Ext.

* % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-15-3(5)117

Plantmix Surfacing*

Class "E"

Gradation % Passing	Lab Tests			1225's		
	Hi	Lo	Mean	Hi	Lo	Mean
4	54	49	52	51	50	51
10	40	34	37	36	34	35
40	28	24	26	26	26	26
200	8	6	6	5	5	5
% Asph.**	5.69	5.18	5.44	5.5	5.5	5.5

Class "C"

4	51	48	50	54	45	50
10	39	34	36	39	33	36
40	28	21	25	27	20	25
200	7	5	6	7	5	6
% Asph.	5.3	5.0	5.2	6.1	4.8	5.3

% Asph.

Lab. Mix Design

Field Mix Design "E" 5.4-5.6%; "C" 5.2-5.5%

Grade Asph. 85 - 100

Source Aggr. Bn-85 Ext.

Type Plant, Barber Greene Continuous

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

LAB TESTS ON BASE AND SUBGRADE

I-15-3(5)117

Gradation % Passing	3/4" Base Composite	Subgrade
3/4	100	50
4	39	27
10	34	23
50	18	13
200	7	3
Sand Equiv.	47	48
Liquid Limit	NV	NV
Plastic Limit	NP	NP
Plastic Index	NP	NP
Vibrator density, Wt/CF	138.0	

I-15W-5(4)118

I-80N-3(6)211

Snake River-Raft River, West Bound Lanes

Pavement Performance - This project was opened to traffic in 1961 and gave excellent performance. No cracking in evidence. Project overlaid with 0.1 ft. of plantmix with lime filler to give total 0.4 ft. thickness in 1965. Review of condition in 1966 shows a few transverse cracks.

Analysis of Data - Lab voids on compacted mix and also field voids are high averaging 7.1 and 8.0 respectively. Likewise, the Voids Bitumen Index Ratio is high with values of 5.6 and 6.3. The actual asphalt contents are lower than lab design by about $\frac{1}{4}$ per cent if extractions are correct. The field data indicates that they used a higher percentage asphalt than recommended in the top course, Class "E", and slightly less in the bottom course. Asphalt did not harden excessively with penetrations from 35 to 50 on the recovered asphalt.

Conclusions - It appears compaction and asphalt contents were satisfactory as the performance has been satisfactory. It is possible additional samples may have indicated even higher asphalt contents and less voids than the two samples tested.

I-15W-5(4)118
I-80N-3(6)214
Snake River-Raft River, West Bound Lanes

Construction Information

Subgrade - Subgrade on west bound lanes recompact to density prior to placing base and surfacing.

Base - Compacted prior to constructed mat.

Asphalt Surfacing - Constructed during 1960 to July 1961. Mat was placed during August - October 1960. First course finished by September 19, 1960, and temperatures were relatively warm, averaging 60-90°F. Top course placed September 20 - October 14, 1960, with minimums air temperature 32-43°F. and maximums 47-80°F. Shoulders were sealed the following spring.

FIELD INVESTIGATION DATA

I-15W-5(4)118

I-80N-3(6)214

2 Test Pits (1) I-80N MP 230, WBIL, IWP and OWP
(2) I-15W MP 5, WBIL, BWP and OWP

Thicknesses, Ft.	Hi	Measured		Mean	Design	
		Lo				
Plantmix Surf.	0.37	0.35		0.36	0.30	
3/4" Base				0.43	0.40	
2" Base				0.43	0.54	
Composite 3/4"				1.17	0.94	
Densities	Hi	Measured		Mean	% Lab Std.	
		Lo			Lo	Mean
3/4" Base	132.0	123.5		127.4	102.3	93.9
2" Base	139.6	134.3		137.0		97.8
Moistures, %	Hi			Lo	Mean	
Plantmix Surf.	0.8			0.5	0.6	
3/4" Base	5.8			3.8	5.1	
2" Base	4.7			4.3	4.5	
Rut Depths, Ft.	Hi	IWP		Mean	OWP	
		Lo			Lo	Mean
Traffic Lane						
10 ft. edge	0.025	0.01		0.02	0.01	0.005
4 ft. edge	0.02	0.01		0.015	0.01	0.005
Benkelman Beam Deflections, In.						
Alt. Rt. & Lt. of CL						
		WBL				
		IWP		OWP		
Hi	0.016			0.019		
Lo	0.006			0.006		
Mean	0.010			0.012		

LAB TESTS ON PLANTMIX SURFACING

I-15W-5(4)118
I-80N-3(6)214

Composite Class "E" and Class "B"			
Gradation % Passing	Hi	Lo	Mean
3/4	100	100	100
4	65	55	60
8	50	45	48
40	31	27	29
200	8	6	7
Surf. Area			38.14
% Asph.*	4.98	4.78	4.88
Wt/CF, Field	137.2	135.9	136.6
Wt/CF, Lab.	138.3	137.7	138.0
% Comp.	99.2	98.7	99.0
% Air Voids, Field	8.1	8.0	8.0
% Air Voids, Lab.	7.4	6.8	7.1
Stability	39	35	37
Abson			
Penetration	50	36	43
Ductility	140+	93	116
Voids - Bitumen			
Index Ratio (Mean)			
Field			6.3
Lab.			5.6
Grade Asph.	85 - 100		
Source Asph.	Humble		
Source Aggr.	Cs-129		

* % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-15W-5(4)118

I-80N-3(6)214

Plantmix Surfacing*

I-15W Job Only

Class "E"

Gradation % Passing	Lab Tests			1225's		
	Hi	Lo	Mean	Hi	Lo	Mean
4	60	54	56	59	54	57
10	52	44	47	49	46	48
40	31	24	27	30	27	29
200	8	4	6	6	4	5
% Asph.**	5.11	4.30	4.73	5.59	5.34	5.41

Class "B"

4	55	39	45	47	44	45
10	40	29	34	36	32	34
40	25	17	21	23	20	21
200	7	2	5	5	2	3
% Asph.	5.15	4.04	4.55	5.11	4.80	4.93

% Asph.

Lab. Mix Design

Field Mix Design

"E" 5.3%; "B" 4.8 - 5.0%

Grade Asph.

85 - 100

Brand Asph.

Humble

Source Aggr.

Cs-129

Type Plant

Cedar Rapids Continuous

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-15W-5(4)118

I-80N-3(6)214

Plantmix Surfacing*

I-80N Job Only

Class "E"

Gradation % Passing	Lab Tests			1225's		
	Hi	Lo	Mean	Hi	Lo	Mean
4	63	55	59	60	53	57
10	54	44	50	48	39	47
40	34	26	30	30	24	28
200	15	5	7	7	4	5
% Asph.**	5.72	4.28	4.82	5.5	4.8	5.3

Class "B"

4	50	41	46	49	45	46
10	39	31	35	39	33	35
40	25	19	22	28	19	23
200	6	3	5	7	2	4
% Asph.	5.15	3.92	4.51	5.0	4.3	4.7

% Asph.

Lab. Mix Design

Field Mix Design "E" - 5.3%; "B" - 4.8%

Grade Asph. 85 - 100

Brand Asph. Humble

Source Aggr. Cs-129

Type Plant Cedar Rapids Continuous

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

LAB TESTS ON BASE AND SUBGRADE

I-15W-5(4)118
I-80N-3(6)214

Gradation % Passing	3/4" Base	2" Base	Composite
3/4	100	93	99
4	53	43	65
10	33	32	56
50	16	18	26
200	8	7	9
Sand Equiv.	40	39	42
Liquid Limit	NV	NV	NV
Plastic Limit	NV	NV	NV
Plastic Index	NP	NP	NP
"R" Value			
Vibrator density, Wt/CF (Composite 3/4" & 2")	131.5		129.0

I-15W-5(6)118
I-80N-3(24)214
Snake River-Raft River-East Bound Lanes

Pavement Performance - This project was opened to traffic in 1963. Cracking in the wheel paths was severe. Project did not indicate any rutting but the form of cracking indicates an overstress in flexure of the mat. Project had 0.2 ft. asphalt surfacing with lime filler used to overlay the east bound lanes in 1965. Examination in the spring of 1966 shows no reflection cracking.

Analysis of Data - This project, east bound lanes, shows high air voids 7.7 - 9.9 in the field and the same mixes compacted in the lab also gave high voids ranging from 7.7 - 12.4. Both bottom and top course are exceedingly high in voids and the voids bitumen index ranged from 5.4 - 9.1 in the field and 6.9 - 9.1 in the lab mixes. The asphalt contents were at or above the lab designs. Compaction is indicated to be 98 per cent of lab compaction. Penetration of the asphalt is 35 to 47 or lower than other jobs.

Deflections were as high as 0.025 in. and rut depths were as much as 0.04. It appears that with the high deflection that the mixture was too brittle to withstand the flexure.

Conclusions - It is evident that cracking was serious. It appears that the lab mix design was low in asphalt content. Field mixes with asphalt contents in the order of the lab recommendation gave voids bitumen index ratios above 5. It is concluded a higher percentage of asphalt for the aggregate from this source was needed to fill voids and thereby prevent hardening.

I-15W-5(6)118
I-80N-3(24)214
Snake River-Raft River-East Bound Lanes

Construction Information

Subgrade - Subgrade on this project was constructed at the same time the west bound lanes were built. The project was not covered with base at the time of grading. Grading took place in 1959. Base was placed when the plantmix was placed on the west bound lanes in 1960 to prevent wind erosion. Construction of the plantmix surfacing was finally undertaken in 1962.

Base - Base was placed in 1960 to prevent wind erosion of the subgrade. The subgrade was reconditioned to Class "A" compaction before base was placed.

Asphalt Pavement - The asphalt pavement was placed in 1961 and 1962 after recompacting the base. The first course of plantmix was placed October 13, 1961 to October 20, 1961 and May 25, 1962 to August 4, 1962. Temperatures ranged from 40° Min. to about 80°F Max. The top course was placed July 23, 1962, to August 7, 1962. Minimum temperatures were in the 58-65°F and the Maximum 80°-95°F.

FIELD INVESTIGATION DATA

I-80N-3(24)214
I-15W-5(6)118

- 4 Test Pits (1) MP 230, I-80N, EBITL, OWP, BWP
(2) MP 1, I-15W, EBITL, OWP, BWP
(3) MP 6, I-15W, IWP, BWP, EBITL
(4) MP 12, I-15W, EBITL, OWP, BWP

Thicknesses, Ft.	Hi	Measured Lo	Mean	Design
Plantmix Surf.	0.36	0.29	0.33	0.30
3/4" Base	0.38	0.19	0.30	0.40
2" Base	0.66	0.53	0.59	0.54
3/4" Composite			1.19	1.24

Densities	Hi	Measured Lo	Mean	Hi	% Lab Std. Lo	Mean
3/4" Base	131.8	126.0	128.4	99.3	94.1	96.3
2" Base	133.4	125.7	129.2	98.4	97.3	97.8

Moistures, %	Hi	Lo	Mean
Plantmix Surf. "E"	5.8	3.7	3.9
Plantmix Surf. "B"	6.8	1.7	5.2
3/4" Base	7.7	5.9	6.8
2" Base	7.7	6.3	6.8

Rut Depths, Ft.	Hi	IWP Lo	Mean	Hi	OWP Lo	Mean
Traffic Lane						
10 ft. edge	0.03	0.02	.025	0.04	0.01	0.03
4 ft. edge	0.02	0.015	0.02	0.03	0.01	0.02

Benkelman Beam Deflections, In. Alt. Rt. & Lt. of CL

	IWP	EBL	OWP
Hi	0.022		0.025
Lo	0.009		0.006
Mean	0.014		0.013

LAB TESTS ON PLANTMIX SURFACING

I-80N-3(24)214
I-15W-5(6)118

Gradation % Passing	Class "B"			Class "E"		
	Hi	Lo	Mean	Hi	Lo	Mean
3/4	100	100	100	100	100	100
4	64	56	58	70	66	68
8	38	35	36	50	42	45
40	19	16	17	30	18	22
200	10	8	8	19	9	13
Surf. Area			33.93			47.64
% Asph.*	5.72	4.86	5.24	5.81	5.68	5.76
Wt/CF, Field	131.2	129.9	130.6	130.2	124.8	128.1
Wt/CF, Lab.	130.2	127.6	128.8	130.6	126.3	128.3
% Comp.	101.3	100.8	101.0	100.8	98.8	99.8
% Air Voids, Field	9.9	7.0	8.4	13.0	10.0	11.0
% Air Voids, Lab.	12.4	7.7	10.7	11.9	9.4	11.0
Stability	37	31	34	38	33	35
Abson						
Penetration	47	37	40	38	35	37
Ductility	140+	31	78	41	34	37
Voids - Bitumen						
Index Ratio (Mean)						
Field			6.9			9.1
Lab.			5.4			9.1
Grade Asph.	85 - 100		120 - 150			
Source Asph.	American					
Source Aggr.	Cs-84a					

* % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-80N-3(24)214

I-15W-5(6)118

Plantmix Surfacing*

I-15W Job Only

Class "E"

Gradation % Passing	Lab Tests			1225's		
	Hi	Lo	Mean	Hi	Lo	Mean
4	71	62	66	71	62	65
10	41	32	37	42	33	37
40	22	11	17	22	11	15
200	11	7	9	10	5	6
% Asph.**	6.04	5.13	5.52		None	

Class "B"

4	61	47	55	62	50	56
10	39	27	32	37	23	31
40	22	13	16	19	8	13
200	18	3	7	8	2	5
% Asph.	5.17	4.64	4.91		None	

% Asph.

Lab. Mix Design "E" 5.0 - 5.2%; "B" 5.2 - 5.6%

Field Mix Design "E" 5.8 - 6.3%; "B" 4.8 - 5.4%

Grade Asph. 85 - 100

Brand Asph. American

Source Aggr. Cs-84a

Type Plant Cedar Rapids Batch

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-80N-3(24)214
I-15W-5(6)118

Plantmix Surfacing*

I-15W Job Only

Class "B"

Gradation % Passing	Lab Tests			1225's		
	Hi	Lo	Mean	Hi	Lo	Mean
4	62	37	54	64	51	58
10	36	17	29	35	26	31
40	19	9	14	20	9	14
200	11	2	6	9	3	5
% Asph.**	4.55	4.06	4.33	6.80	4.33	5.16

% Asph.

Lab Mix Design "B" 5.2 - 5.6%

Field Mix Design "B" 4.3 - 5.1%

Grade Asph. 120 - 150

Brand Asph. American

Source Aggr. Cs-84a

Type Plant Cedar Rapids Batch

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-80N-3(24)214
I-15W-5(6)118

Plantmix Surfacing*

I-80N Job Only

Gradation % Passing	<u>Class "E"</u>			1225's		
	Hi	Lab Tests Lo	Mean	Hi	Lo	Mean
4	66	61	63	65	54	60
10	40	34	36	40	31	36
40	21	14	17	21	12	16
200	10	6	8	8	4	6
% Asph.**	6.05	5.24	5.45		None	

Gradation % Passing	<u>Class "B"</u>			1225's		
	Hi	Lab Tests Lo	Mean	Hi	Lo	Mean
4	57	47	53	61	48	55
10	38	27	31	39	28	32
40	17	12	15	21	9	15
200	8	5	6	6	4	4
% Asph.	5.67	4.65	5.06		None	

% Asph.

Lab Mix Design

Field Mix Design "E" 6.0%; "B" 5.4%

Grade Asph. 85 - 100

Brand Asph. American

Source Aggr. Cs-84a

Type Plant Cedar Rapids Batch

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

LAB TESTS ON BASE AND SUBGRADE

I-80N-3(24)214
I-15W-5(6)118

Gradation % Passing	3/4" Base			2" Base			Composite		
	Hi	Lo	Mean	Hi	Lo	Mean	Hi	Lo	Mean
3/4	100	100	100	98	94	95	100	100	100
4	56	47	52	62	53	56			61
10	39	30	35	46	34	40			39
50	20	15	17	24	17	20			20
200	10	7	8	9	8	9			7
Sand Equiv.	36	35	36	46	36	40			30
Liquid Limit	NV	NV	NV	NV	NV	NV			NV
Plastic Limit	NV	NV	NV		NV				NV
Plastic Index	NP	NP	NP		NP				NP
"R" Value									
Vibrator density, Wt/CF	135.0	132.0	133.5		133.1				132.7

I-80N-3(3)206
Burley-Snake River

Pavement Performance - This pavement was constructed in 1961. The portion opened to traffic was from SH 27 East and the Interchange area remained closed and still does in 1966. The portion of the project opened to traffic had a seal coat placed in 1962 as the mat was dry. Ruts in 1965 were from 1/8 to 3/8 in. deep and several cracks were noted in the outer wheel paths. An overlay of 0.1 was placed in 1965 and lime filler was used. Examination in 1966 shows no evidence of crack reflection.

Analysis of Data - The only portion examined was beneath the structures unopened to traffic. Tests show the asphalt content to be very low, voids very high and the voids bitumen index to be very high. Only two samples were taken and similar results were obtained on both. The mix design was for 5.0 per cent asphalt; whereas, extractions gave 3.6 per cent. Tests made during construction shows 4.1 to 5.0 or an average of 4.5 per cent used in the Class "B" mix and 5.0 in the Class "E" mix. The voids bitumen index ratio of 6.6 to 7.2 on lab compacted materials confirms the decision in 1962 that the mat lacked asphalt. The penetration of the asphalt was 30 and 31 showing excessive hardening. The per cent compaction averaged 95.

Conclusions - This pavement did not receive enough asphalt during construction and it appears that compaction was also low since field compaction was only 95 per cent of lab values. The seal coat placed the second summer in all probability gave the pavement an extended life.

LAB TESTS ON PLANTMIX SURFACING

I-80N-3(3)206

Gradation % Passing	Class "E"	Class "B"
3/4	100	100
4	49	50
8	34	35
40	16	17
200	5	5
% Asph.*	3.62	3.58
Wt/CF, Field	123.8	126.8
Wt/CF, Lab.	130.5	132.3
% Comp.	94.9	95.8
% Air Voids, Field	15.0	12.6
% Air Voids, Lab.	10.3	8.7
Stability	41	40
Abson		
Penetration	31	30
Ductility	26	35
Voids - Bitumen		
Index Ratio		
Field	7.2	6.6
Lab.	10.5	9.5
Grade Asph.	85 - 100	
Source Asph.	American	
Source Aggr.	Cs-142	
Surf. Area	25.25	26.95

* % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-80N-3(3)206

Plantmix Surfacing*

Class "B"

Gradation % Passing	Lab Tests			1225's		
	Hi	Lo	Mean	Hi	Lo	Mean
4	61	44	52	55	48	52
10	38	29	36	37	30	34
40	19	13	16	18	12	16
200	6	3	4	6	3	5
% Asph.**	4.89	3.68	4.14	5.0	4.1	4.5

Class "E"

4	63	55	54	54
10	42	38	37	37
40	19	18	15	16
200	6	6	5	6
% Asph.	5.10			4.8

% Asph.
 Lab. Mix Design
 Field Mix Design "E" - 5.0%; "B" - 4.5%

Grade Asph. 85 - 100

Brand Asph. American

Source Aggr. Cs-142

Type Plant Cedar Rapids Cont.

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

I-80N-1(18)3
Jct. US95-Jct. US30

Pavement Performance - This project was opened to traffic during 1961 in the fall. During the next two years evidence of base failure occurred on the east-bound lanes particularly over the summit. Later in 1964-65, cracking in the wheel paths of the outer lanes both east and west bound became pronounced. Some separation between the two courses of pavement had occurred during the life of the pavement. The most serious distress occurred where base contamination exists.

Analysis of Data - Investigation of the base failure area indicated contamination of the base to the extent the total thickness of surfacing was inadequate. Deflections using the Benkelman Beam also showed very high deflections. A condition survey indicated some irraticness in deflections. Cores taken of the pavement mixture vary from a low of 132.5 to a maximum of 141.9, air voids ranging from 6.8 to 10.4 on the cores. Lab compaction gave air voids from 5.7 to 9.4. The asphalt content varied from 4.46 to 4.61 on the cores tested for extraction.

Tests made in 1965 shows the penetrations ranging from 20 to 22 on cores taken at that time. The voids bitumen index ratio shows values of 5.0 on lab compacted specimens and 5.1 in the field.

Conclusions - It is concluded that the mix was lacking in asphalt and perhaps some on compaction in areas. The lack of asphalt causing rapid hardening of the asphalt and brittleness. The deflections are higher on this project than any others noted and would cause cracking for the brittle pavement more readily than where deflections are lower.

I-80N-1(18)3
Jct. US95-Jct. US30

Construction Information

Subgrade - Subgrade was constructed during 1959 and 1960. No problems were encountered.

Base - A portion of the designed thickness of the project consisted of selected granular material. This material was placed using heavy earth-moving equipment to place material. During construction portions of the base had to be excavated and the subgrade recompactd due to soft areas developing.

Asphalt Surfacing - The asphalt surfacing was placed during summer months. The production of aggregates for the hot plant was nearly simultaneous in that crushing was to a surge pile and drawn immediately into the hot plant drier and thence to the screening plant. Paver used a Kocal pickup device.

Construction records show from low asphalt contents on extractions averaging 4.51 on the Class "C" mix and 4.72 on the Class "E" mix. The 1225 forms show averages of 5.0 and 5.4 respectively as being used.

FIELD INVESTIGATION DATA

I-80N-1(18)3

Thicknesses, Ft.	Measured			Design
	Hi	Lo	Mean	
Plantmix Surf.	0.40	0.23	0.34	0.30
3/4" Base	0.62	0.15	0.38	0.40
2" Base	0.60	0.15	0.37	0.40

Rut Depths, Ft.	IWP			OWP		
	Hi	Lo	Mean	Hi	Lo	Mean
Traffic Lane						
10 ft. edge	0.03	0.00	0.015	0.03	0.00	0.015
4 ft. edge	0.01	0.00	0.005	0.01	0.00	0.005
Passing Lane						
10 ft.	0.02	0.00	0.001	0.02	0.00	0.01
4 ft.	0.01	0.00	0.00	0.01	0.00	0.00

Benkelman Beam Deflections, In.
Alt. Rt. & Lt. of CL

WBL

EBL

	WBL			EBL		
	IWP	OWP	IWP	EBL less distressed section OWP	IWP	EBL plus distressed section OWP
Hi	0.050	0.050	0.068	0.072	0.083	0.091
Lo	0.013	0.010	0.012	0.011	0.023	0.023
Mean	0.026	0.026	0.022	0.023	0.036	0.038

LAB TESTS ON PLANTMIX SURFACING

I-80N-1(18)3

Gradation % Passing	Composite		
	Hi	Lo	Mean
3/4	100	100	100
4	56	54	55
8	41	39	40
40	18	18	18
200	4	3	4
% Asph.*	4.61	4.46	4.54
Wt/CF, Field	141.9	132.5	139.4
Wt/CF, Lab.	140.5	137.0	138.8
% Comp.	101.9	96.8	99.9
% Air Voids, Field	10.4	7.6	9.3
% Air Voids, Lab.	10.3	8.1	9.1
Stability	47	41	44
Abson			
Penetration	22	20	21
Ductility	12	11	11
Voids - Bitumen			
Index Ratio (Mean)			
Field			5.0
Lab.			5.1
Grade Asph.	85 - 100		
Source Asph.	Sinclair		
Source Aggr.	Py-35		
Surf. Area			25.08

* % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-80N-1(18)3

Plantmix Surfacing*

Class "E"

Gradation % Passing	Lab Tests			1225's		
	Hi	Lo	Mean	Hi	Lo	Mean
4	66	53	59	66	57	61
10	51	37	42	48	29	43
40	23	13	19	22	12	14
200	6	2	4	5	2	3
% Asph.**	5.45	3.82	4.72	6.4	3.9	5.4

Class "C"

4	63	43	53	60	50	54
10	50	30	38	44	34	39
40	26	10	17	23	9	15
200	14	2	4	4	1	3
% Asph.	5.40	3.66	4.51	6.4	4.1	5.0

% Asph.

Lab. Mix Design "E" - 5.0%; "C" - 5.0%

Field Mix Design "E" - 5.0-5.3%; "C" - 4.6-5.0%

Grade Asph. 85 - 100

Brand Asph. Sinclair

Source Aggr. Py-35

Type Plant Pioneer Continuous

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

LAB TESTS ON BASE AND SUBGRADE

I-80N-1(18)3

Gradation % Passing	Hi	Composite Lo	Mean	Hi	Subgrade Lo	Mean
3/4	97	83	90			
4	75	52	61			
8	68	42	53			
50	43	17	28			
200	19	6	12			
Sand Equiv.	45	15	22			
Liquid Limit	25	NV	12	36	NV	14
Plastic Limit				19	NP	5
Plastic Index	6.4	NP	1.5			
"R" Value				82	15	54
Vibrator density, Wt/CF	137	129	133	2.6	0.7	1.2

I-90-1(7)11
Coeur d'Alene-Bypass

Pavement Performance - Project constructed during 1960. Evidence of distress apparent in 1964 and very serious in 1965. Not all of project shows distress, predominant in westend of east bound lanes and west bound lanes on westend. Cracking evident primary in top course. Mat is stripping and appears very dry. Some separation of top from bottom course and also longitudinal cracking is evident near joints between lays. No evidence of rutting. Ravel is very serious in westend.

Analysis of Data - Deflections are high on this project averaging from 0.016 to .022 in wheel paths but with highs up to 0.035. Compaction appears to be adequate. Voids in the mix are high ranging from 8.7 to 10.0 and the Voids Bitumen Index Ratio is 4.9 to 5.2. Cores taken in 1961 gave field voids ranging from 6.9 to 16.5 per cent with extreme variations in Wt/CF indicating nonuniform compaction although no standard was obtained at Lab for comparison. Using 1965 standards these values indicate less than 95 per cent compaction in some instances.

Conclusions - It appears both a lack of compaction and lack of asphalt are responsible for distress.

I-90-1(7)11
Coeur d'Alene-Bypass

Construction Information

Subgrade - Subgrade consists of sandy soil and lay over a winter. It was recompacted with vibratory and pneumatic rollers to standard density.

Base - Base material was placed during early summer. Material was gap-graded lacking fine sand below No. 20 sieve. No filler was available so an asphaltic emulsion was added to 0.2 ft. of base which held it together preventing ravel and displacement.

Asphalt Pavement - The asphalt pavement was placed during summer weather and it is reported the weather was warm. The asphalt treated base was tacked and a tack coat used between courses of the pavement. A strip along the lay was left uncompacted and compacted with the adjoining lay. The district reports it is not recommended.

FIELD INVESTIGATION DATA

I-90-1(7)11

Thicknesses, Ft.	Hi	Measured		Mean	Hi	Lo	Mean	Design
		Lo	Mean					
Plantmix Surf.	0.36	0.30	0.32					0.30
ATB Base	0.16	0.14	0.15					
5/8" Base	0.80	0.80	0.80					0.80
Densities	Hi	Lo	Mean	Hi	Lo	Mean		
5/8" Base	137.2	105.6	126.7	98.2	91.1	96.4		
Moistures, %	Hi		Lo			Mean		
Plantmix Surf.	2.1		1.0			1.6		
5/8" Base	11.2		3.2			5.2		
Rut Depths, Ft.	Hi	IWP	Mean	Hi	OWP	Mean		
		Lo			Lo			
Traffic Lane								
10 ft. edge	0.02	0.00	0.01	0.025	0.01	0.015		
4 ft. edge	0.01	0.005	0.005	0.01	0.005	0.005		
Passing Lane								
10 ft.	0.02	0.005	0.015	0.01	0.005	0.01		
4 ft.	0.01	0.005	0.005	0.005	0.00	0.00		
Benkelman Beam Deflections, In.								
Alt. Rt. & Lt. of CL		EBL			WBL			
	IWP		OWP	IWP		OWP		
Hi	0.023		0.021	0.031		0.035		
Lo	0.014		0.012	0.011		0.011		
Mean	0.019		0.016	0.019		0.022		

LAB TESTS ON PLANTMIX SURFACING

I-90-1(7)11

1960 Data

Gradation % Passing	<u>Class "C"</u>		Mean
	Hi	Lo	
3/4	100	100	100
4	63	52	57
10	40	32	36
40	22	9	13
200	10	4	6
Surface Area			26.49
% Asph.*	5.72	3.98	5.04
Wt/CF, Field	149.0	137.0	141.1
Wt/CF, Lab.			140.9
% Air Voids, Lab.			9.7
Stability	44	19	25
Abson Penetration			58
Voids - Bitumen Index Ratio (Mean) Lab.			5.1

* % Asph. by wt. of aggr.

LAB TESTS ON PLANTMIX SURFACING

I-90-1(7)11

1961 Data

Gradation % Passing	<u>Class "C"</u>		Mean
	Hi	Lo	
3/4	100	100	100
4	55	50	52
10	38	32	34
40	19	15	17
200	9	8	8
% Asph.*	5.43	3.95	4.81
Surf. Area			26.19
Wt/CF, Field	147.7	131.0	141.4
% Air Voids, Field	16.5	6.9	10.0
Stability	30	16	20
Voids - Bitumen Index Ratio (Mean) Field			5.2

* % Asph. by wt. of aggr.

LAB TESTS ON PLANTMIX SURFACING

I-90-1(7)11

Gradation % Passing	Class "C"		
	Hi	Lo	Mean
3/4	100	100	100
4	62	49	57
10	40	29	36
40	13	11	12
200	6	5	6
% Asph.*	5.52	4.21	4.99
Wt/CF, Field	140.0	139.2	139.5
Wt/CF, Lab.	142.1	138.8	140.3
% Comp.	100.6	98.9	99.9
% Air Voids, Field	9.6	9.1	9.3
% Air Voids, Lab.	10.0	8.7	9.3
Stability	47	32	41
Abson			
Penetration	23	16	21
Ductility	140+	19	118
Voids - Bitumen			
Index Ratio (Mean)			
Field			4.9
Lab.			4.9
Grade Asph.	85 - 100		
Source Asph.	Blackline		
Source Aggr.	Kt-121		
Surface Area			26.19

* % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-90-1(7)11

Plantmix Surfacing*

Gradation % Passing	Lab Tests			1225's		
	Hi	Lo	Mean	Hi	Lo	Mean
4	60	43	53	58	51	54
10	37	28	32	37	16	32
40	11	6	9	10	2	7
200	6	3	4	4	1	3
% Asph.**	5.69	4.30	5.01	5.5	4.4	5.0
% Asph.						
Lab. Mix Design						
Field Mix Design	5.0	5.4%				
Grade Asph.	85	100				
Brand Asph.	Blackline					
Source Aggr.	Kt-121					
Type Plant	5000 Batch					

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.

LAB TESTS ON BASE AND SUBGRADE

I-90-1(7)11

Gradation % Passing	<u>5/8" Base</u>		
	Hi	Lo	Mean
3/4	100	98	99
4	56	52	54
8	41	36	38
50	10	8	9
200	7	6	7
Sand Equiv.	65	51	56
Liquid Limit	NV	NV	NV
Plastic Limit	NV	NV	NV
Plastic Index	NP	NP	NP
Vibrator density, Wt/CF	140.0	107.5	133.2

I-90-1(6)23
Wolf Lodge-Cedar Canyon

Pavement Performance - The pavement was placed during 1961. Cracking is frequent as is rutting in the wheel paths with the deeper ruts showing serious "alligator" cracking.

Analysis of Data - This project shows excessive moisture 2.4 3.9 in the surfacing and high voids ranging from 8.9 to 11.8. Compaction ranges from 96.0 to 98.3 per cent of lab compaction. The Voids Bitumen Index Ratio is high 6.5 on Lab compacted specimens and 8.6 in the field cores. Extractions gave values of 4.8 per cent asphalt whereas 5.0 to 5.4 was the field design with 4.5 to 5.9 shown on the field extractions.

Conclusions - This surfacing is seriously deficient in asphalt content. It could have used 1.0 per cent more asphalt without difficulty and the high moisture contents in the mix indicate an even larger amount would be feasible.

I-90-1(6)23
Wolf Lodge-Cedar Canyon

Construction Information

Subgrade - Some subgrade lay over the winter although most of subgrade was rocky in texture. Recompacted some portions.

Base - Base recompacted before placing pavement.

Asphalt Pavement - The pavement was placed during summer months. Stockpile material lay over winter and was wet giving some trouble drying the aggregate. Weather was warm and only one cold joint was used.

FIELD INVESTIGATION DATA

I-90-1(6)23

2 Test Pits (1) Station 140+00 EBTL, IWP
(2) Station 50+00 WBTL, IWP

Thicknesses, Ft.	Measured			Design		
	Hi	Lo	Mean			
Plantmix Surf.	0.30	0.28	0.29			0.30
Moistures, %	Hi		Lo	Mean		
Plantmix Surf.	3.9		2.4			3.2
Rut Depths, Ft.	IWP			OWP		
	Hi	Lo	Mean	Hi	Lo	Mean
Traffic Lane						
10 ft. edge	0.03	0.00	0.015	0.02	0.01	0.015
4 ft. edge	0.02	0.00	0.01	0.01	0.00	0.005
Passing Lane						
10 ft. edge	0.045	0.025	0.035	0.025	0.01	0.02
4 ft.	0.03	0.015	0.02	0.015	0.005	0.01

LAB TESTS ON PLANTMIX SURFACING

I-90-1(6)23

Gradation % Passing	Composite Class "B" and Class "E"		
	Hi	Lo	Mean
3/4	100	100	100
4	65	60	62
8	43	40	42
40	19	19	19
200	10	9	10
% Asph.*	4.81	4.76	4.78
Wt/CF, Field	146.8	142.7	144.8
Wt/CF, Lab.	149.2	148.6	148.9
% Comp.	98.3	96.0	97.3
% Air Voids, Field	11.8	8.9	10.4
% Air Voids, Lab.	7.9	7.7	7.8
Stability	52	46	49
Abson			
Penetration	24	23	24
Ductility	108	98	103
Voids - Bitumen			
Index Ratio (Mean)			
Field			8.6
Lab.			6.5
Grade Asph.	85 - 100		
Source Asph.	Blackline and Husky		
Source Aggr.	Kt-126		

* % Asph. by wt. of aggr.

CONSTRUCTION RECORDS

I-90-1(6)23

Plantmix Surfacing*

Class "B"

Gradation % Passing	Lab Tests			1225's		
	Hi	Lo	Mean	Hi	Lo	Mean
4	57	48	51	61	42	49
10	39	26	30	35	21	26
40	16	11	13	13	4	8
200	8	4	6	5	2	4
% Asph.**	6.26	4.32	5.11	6.0	4.7	5.4

Class "E"

4	69	53	61	66	51	58
10	39	30	34	39	23	32
40	18	9	15	16	5	10
200	9	3	7	6	2	4
% Asph.	6.00	4.84	5.41	5.9	4.5	5.3

% Asph.

Lab. Mix Design
Field Mix Design

"E" and "B" 5.0 - 5.4%

Grade Asph.

85 - 100

Brand Asph.

Blackline and Husky

Source Aggr.

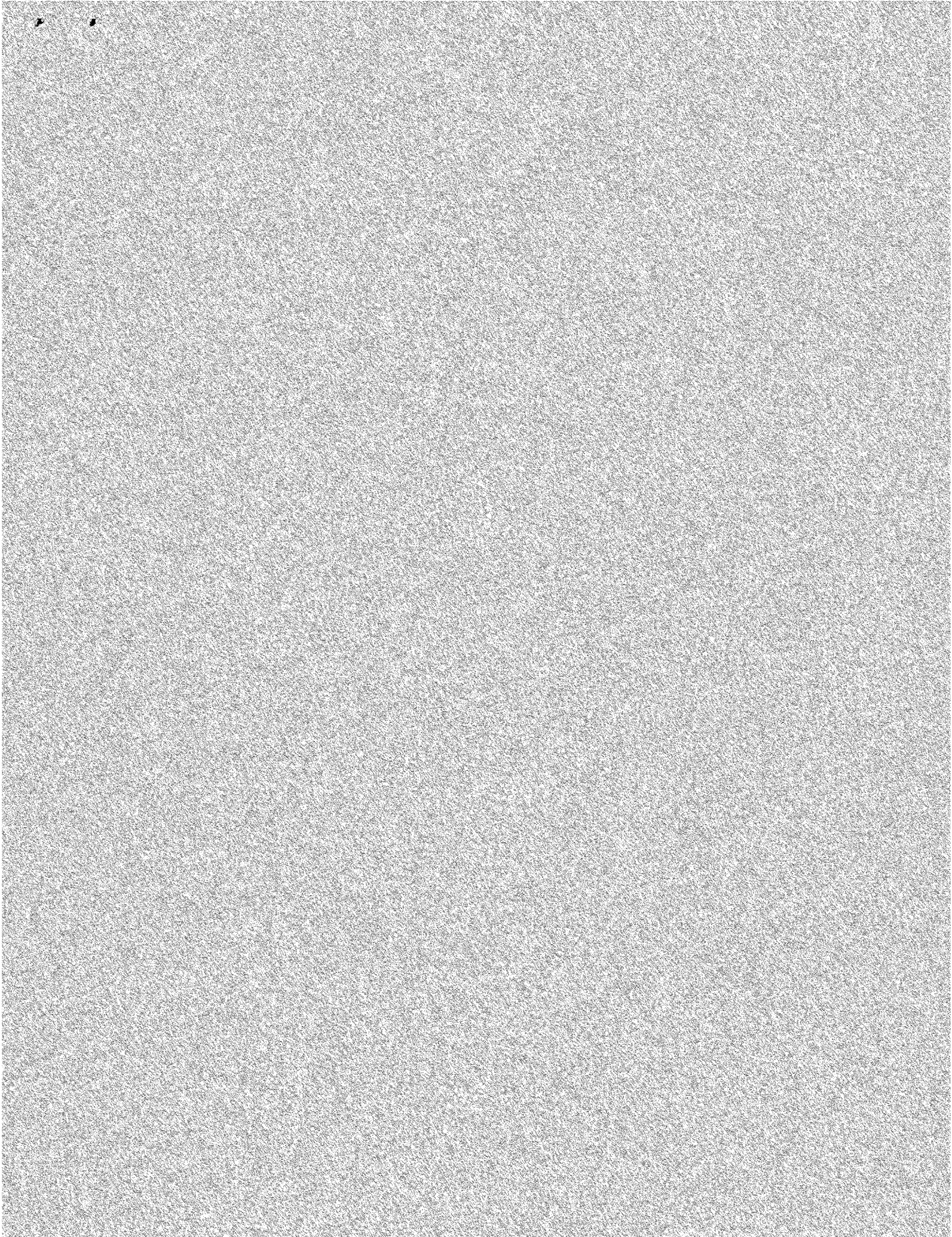
Kt-126

Type Plant

Batch

* Data presented represents all that is available from project file

** % Asph. by wt. of aggr.



POCATELLO INTERCHANGE-PORTNEUF INTERCHANGE
SPECIAL TESTING - PLANTMIX PAVEMENT.

The Materials Laboratory was requested to perform tests on Plantmix Pavement cores and chunks taken from a section of I-15 between the South Pocatello Interchange and the Portneuf Interchange.

These samples were taken in conjunction with a NCHRP No. 4-8(3), Phase I, with the intent of obtaining supplemental information in addition to the information obtained by the University of Idaho, University of Washington and Battelle Northwest.

Six pavement cores and two "Jack Hammer" pavement chunks were received by the Central Materials Laboratory. The samples were tested in accordance with a letter received from the Materials and Research Engineer on November 9, 1971.

The cores were tested for densities, rice gravities, air voids, asphalt contents and gradation. The pavement chunks were tested for moisture content and then Abson recoveries were run and the asphalt tested for:

1. Penetration at 77°F 100 gm. 5 sec. and 39.2°F 200 gm. 60 sec.
2. Ductility at 77°F (25°C) 5 cm/min. and 39.2°F (4°C) 1 cm/min.

Both the cores and pavement chunks were separated between the top and bottom lift and the lifts tested individually.

The test results are presented on the following three pages. Also attached is a list of locations from which the samples were obtained and the original construction data for the project.

Following is a list of special testing procedures and amended original construction data.

1. The seal coat was removed from the cores and pavement chunks before testing.
2. There was no asphalt treated base placed on this project. 0.3' of class "D" plantmix surfacing was programmed with a future 0.1' class "D" overlay planned. However, the future 0.1' was laid at the time of original construction resulting in two 0.20' lifts of class "D" being placed on I-15-1(9)61 Sec. "B".
3. American 85-100 penetration grade asphalt was used for all plantmix pavement placed on this project.
4. Preliminary asphalt recommendations were for 4.8%. The intended asphalt content during construction was 5.0%.

LOCATION OF TEST SAMPLES

All sampling was done in a test section between mileposts 65.196 and 65.234.

<u>Lab. No.</u>	<u>Core No.</u>	<u>Sta.</u>	<u>Lane & Direction</u>	<u>Wheel Path</u>
255124	4	0+20	Travel, NBL	BWP
255125	2	0+15	Travel, NBL	BWP
255126	5	0+30	Travel, NBL	IWP
255127	1	0+05	Travel, NBL	IWP
255128	20 Wet*	1+20	Travel, NBL	IWP
255129	20 Dry*	1+15	Travel, NBL	IWP
255184	Chunk #1**	0+00	Travel, NBL	BWP
255185	Chunk #8**	2+00	Travel, NBL	IWP

* Cores were sealed in plastic when received. Moisture content determination showed less than 0.1% moisture for all cores.

** Approximately 18" x 18" pavement sections removed from roadway with a jackhammer.

Materials Laboratory
Boise, Idaho

Distribution:
Hwy. Engr.
Dist. Engr.
Res. Engr.

255124
255125
255126

Lab. No.

REPORT OF TESTS ON MATERIAL FOR: Plantmix Pavement Cores

I-15-1(9)61 - Sec. B - Pocatello Interchange-Portneuf Interchange

Project NCHRP Proj. 4-8(3) Phase 1 County Bannock
Submitted by R. R. Jones Date Sampled 9-12-71
Identification No. Lab Overhead Quantity Represented
Sampled from Roadway Date Received 11-23-71
Tested for Special Tests - M.P. 65.196 to M.P. 65.234

T-E-S-T-R-E-S-U-L-T-S

Lab. No.	255124	255124	255125	255125	255126	255126	
Core No.	4	4	2	2	5	5	
Lift	Top	Bottom	Top	Bottom	Top	Bottom	
Density, pcf.	145.8	139.4	147.3	140.8	142.1	139.3	
Rice Gravity	2.430	2.431	2.432	2.430	2.440	2.450	
Air Voids, %	3.8	8.1	3.0	7.1	6.9	8.7	
Asphalt Extracted %	5.21	5.08	5.06	5.03	4.98	4.91	
Mechanical Analysis							<u>Specs.</u>
3/4"	100	100	100	100	100	100	-100
1/2"	—	—	—	—	—	—	90-100
3/8"	—	—	—	—	—	—	
No. 4	60	55	58	58	57	58	45-70
No. 8	41	36	40	38	39	38	25-55
No. 16	30	26	29	27	29	28	
No. 30	23	20	23	21	22	22	
No. 40	20	18	20	19	19	19	
No. 50	17	16	17	16	16	17	5-20
No. 100	12	12	12	12	11	12	
No. 200	8.4	8.4	8.4	8.3	8.1	8.7	3-9

This report covers only material as represented by the sample submitted
and does not necessarily cover all material from this source.

Date Mailed DEC 16 1971

C. B. HUMPHREY C.B.H.
Materials Engineer

Materials Laboratory
Boise, Idaho

Distribution:
Hwy. Engr.
Dist. Engr.
Res. Engr.

255127
255128
Lab. No. 255129

REPORT OF TESTS ON MATERIAL FOR: Plantmix Pavement Cores

I-15-1(9)61 - Sec. B - Pocatello Interchange-Portneuf Interchange

Project NCHRP Proj. 4-8(3) Phase 1 County Bannock
Submitted by R. R. Jones Date Sampled 9-12-71
Identification No. Lab Overhead Quantity Represented _____
Sampled from Roadway Date Received 11-23-71
Tested for Special Tests - M.P. 65.196 to M.P. 65.234

T-E-S-T R-E-S-U-L-T-S

Lab. No.	255127	255127	255128	255128	255129	255129	
Core No.	1	1	20 Wet	20 Wet	20 Dry	20 Dry	
Lift	Top	Bottom	Top	Bottom	Top	Bottom	
Density, pcf.	144.5	140.3	143.4	142.1	144.8	142.3	
Rice Gravity	2.438	2.432	2.440	2.432	2.432	2.435	
Air Voids, %	5.0	8.2	5.8	6.4	4.6	6.3	
Asphalt Extracted %	4.89	4.85	5.20	5.06	5.14	5.04	
Mechanical Analysis							<u>Specs.</u>
3/4"	100	100	100	100	100	100	100
1/2"	—	—	—	—	—	—	90-100
3/8"	—	—	—	—	—	—	
No. 4	59	54	59	60	63	61	45-70
No. 8	40	36	40	40	43	41	25-55
No. 16	29	26	29	30	31	31	
No. 30	23	20	22	24	29	24	
No. 40	20	18	19	21	20	21	
No. 50	18	16	16	18	17	18	5-20
No. 100	12	11	12	12	12	12	
No. 200	8.7	8.4	8.4	8.3	8.8	8.4	3-9

This report covers only material as represented by the sample submitted
and does not necessarily cover all material from this source.

Date Mailed DEC 16 1971

G. B. HUMPHREY (W.P. S.)
Materials Engineer

Distribution:
Hwy. Engr.
Dist. Engr.
Res. Engr.

Materials Laboratory
Boise, Idaho

255184
Lab. No. 255185

REPORT OF TESTS ON MATERIAL FOR: Plantmix Pavement Chunks

I-15-1(9)61 - Sec. B - Pocatello Interchange-Portneuf Interchange

Project NCHRP 4-8(3) Phase 1 County Bannock
Submitted by R. R. Jones Date Sampled 9-12-71
Identification No. Lab Overhead Quantity Represented 11-23-71
Sampled from Roadway Date Received 11-23-71
Tested for Special Tests - M.P. 65.196 to M.P. 65.234

-T-E-S-T- R-E-S-U-L-T-S-

Lab. No.	255184		255185	
Pavement Chunk No.	1		8	
Lift	Top	Bottom	Top	Bottom
Percent Moisture	0.279	0.220	0.338	0.225
Penetration				
77°F, 100 g., 5 Sec.	50	34	33	40
39.2°F, 200 g., 60 Sec.	23	23	17	19
Ductility				
5 cm/min. @ 77°F	95 cm	20 cm	140 +cm	49 cm
1 cm/min. @ 39.2°F	4 cm	3 cm	4 cm	3 cm

This report covers only material as represented by the sample submitted
and does not necessarily cover all material from this source.

Date Mailed DEC 16 1971

G. B. HUMPHRIES P. E.
Materials Engineer

I-15-1(9)61 SECTION B
Portneuf I.C. - South Pocatello I.C.
Constructed 1965

AGGREGATE SOURCE Bk-142

ASPHALT SOURCE - 85-100 AMERICAN

TYPICAL PLANT MIX SECTION:

0.20' Class "D" Bottom Course
0.10' Class "D" 2nd Course
0.10' Class "D" Top Course (Future)

ASPHALT CONTENT

5.0% Asphalt Intended.

Asphalt Extracted:

Minimum - 4.01%
Maximum - 5.47%
Average - 4.90% (Average of 62 Extraction Tests)

ASPHALT MIX SAMPLES TAKEN FROM THE FIELD AND COMPACTED IN THE LABORATORY

	<u>STABILITY</u>	<u>DENSITY</u>	<u>R.G.</u>	<u>AIR VOIDS</u>
Minimum	19	143.1	2.43	2.9
Maximum	50	148.8	2.47	7.0
Average *	31	146.5	2.45	4.3

* Average of 16 Samples

RECORD SAMPLE CORES

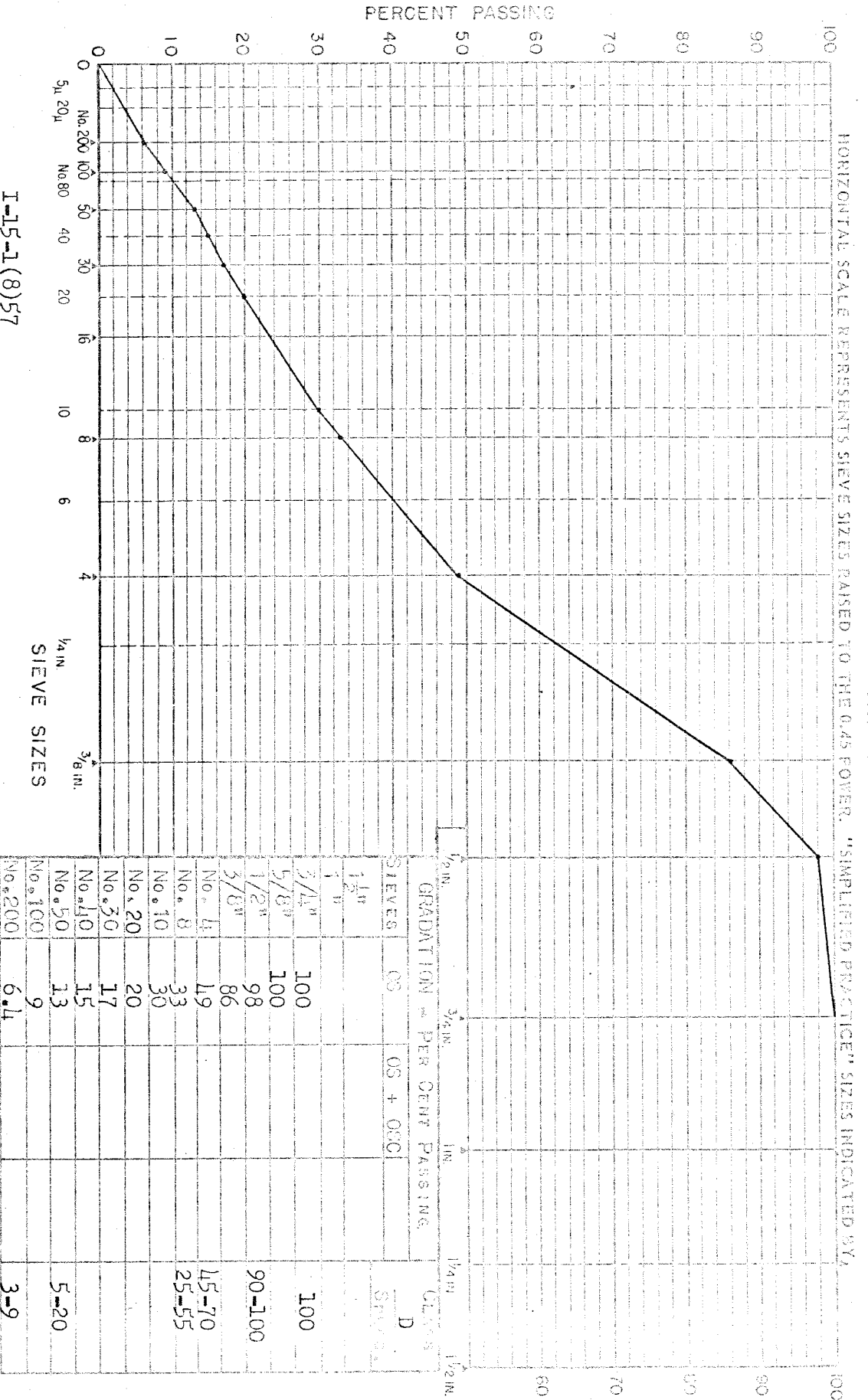
	<u>DENSITY</u>	<u>AIR VOIDS</u> *
Minimum	138.5	3.2
Maximum	148.0	9.4
Average **	141.0	7.2

* The Air Voids Were Determined from the Average Rice Gravity of the Plant Mix Field Samples.

** Average of 16 Core Samples.

Attached are average gradations for Plant Mix Aggregate (at crusher and stockpile), Plant Mix Control Gradation, (taken at hot plant), and Extractions Gradations. Note that the Plant Mix Aggregate was crushed at one time for all three of the listed projects.

GRADATION CHART



PROJECT I-15-1(8)57
I-15-1(9)61 Sec. B
I-15-1(20)66 Ave. of 3 Proj. LAB. NO. Ave. of 56 Plantmix Aggregate Gradations

IDENT. No. Port of Entry-Pocatello Ck. I.C. Pit. No. Bk-142-S

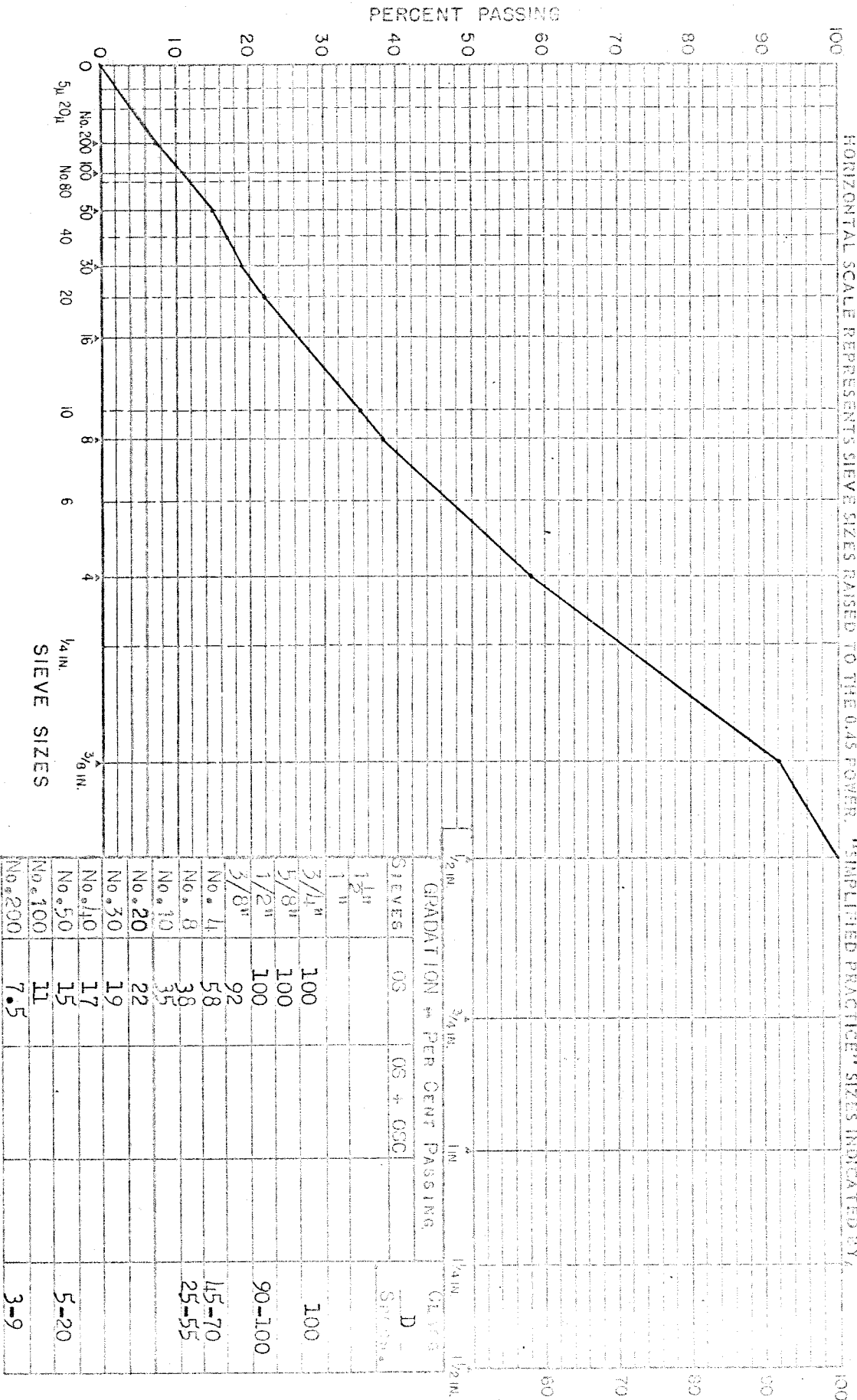
17 samples from stockpile and 39 samples from crusher belt.

AVERAGE PLANTMIX AGGREGATE GRADATION

GRADATION CHART



HORIZONTAL SCALE REPRESENTS SIEVE SIZES RAISED TO THE 0.45 POWER. "SIMPLIFIED PRACTICE" SIZES INDICATED BY



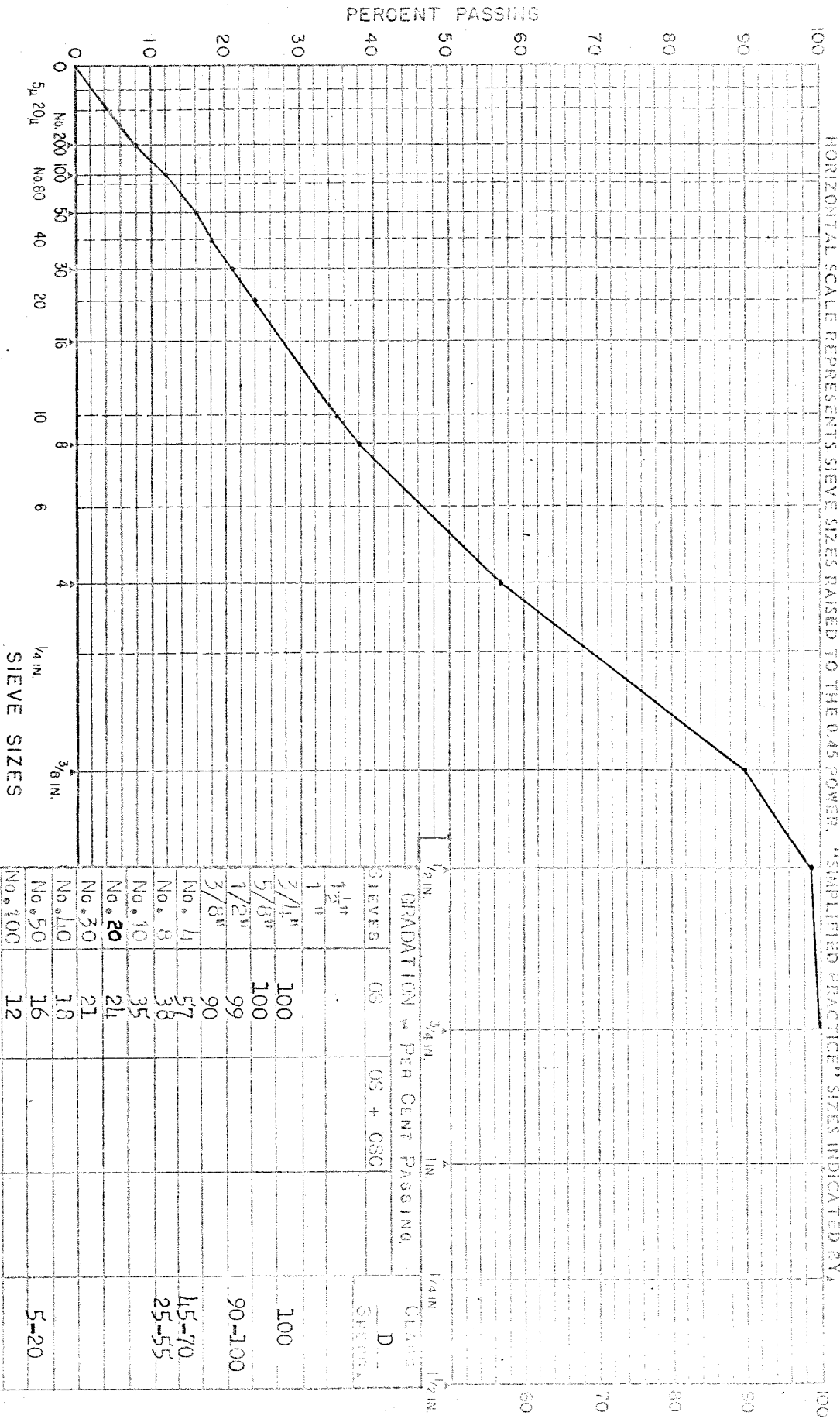
PROJECT I-15-1(9)61 Sec. B LAB. NO. Ave. of 13 Plantmix Control Gradations

IDENT. NO. Portneuf I.C. - S. Pocatello I.C. P.I.T. NO. Bk-1112-S

AVERAGE PLANTMIX CONTROL GRADATIONS

GRADATION CHART

HORIZONTAL SCALE REPRESENTS SIEVE SIZES RAISED TO THE 0.45 POWER. "SIMPLIFIED PRACTICE" SIZES INDICATED BY



PROJECT I-15-1(9)61 Sec B

LAB. NO. Ave. of 62 Extraction Gradations

IDENT. No. Portneuf I.C.-S. Pocatello I.C.

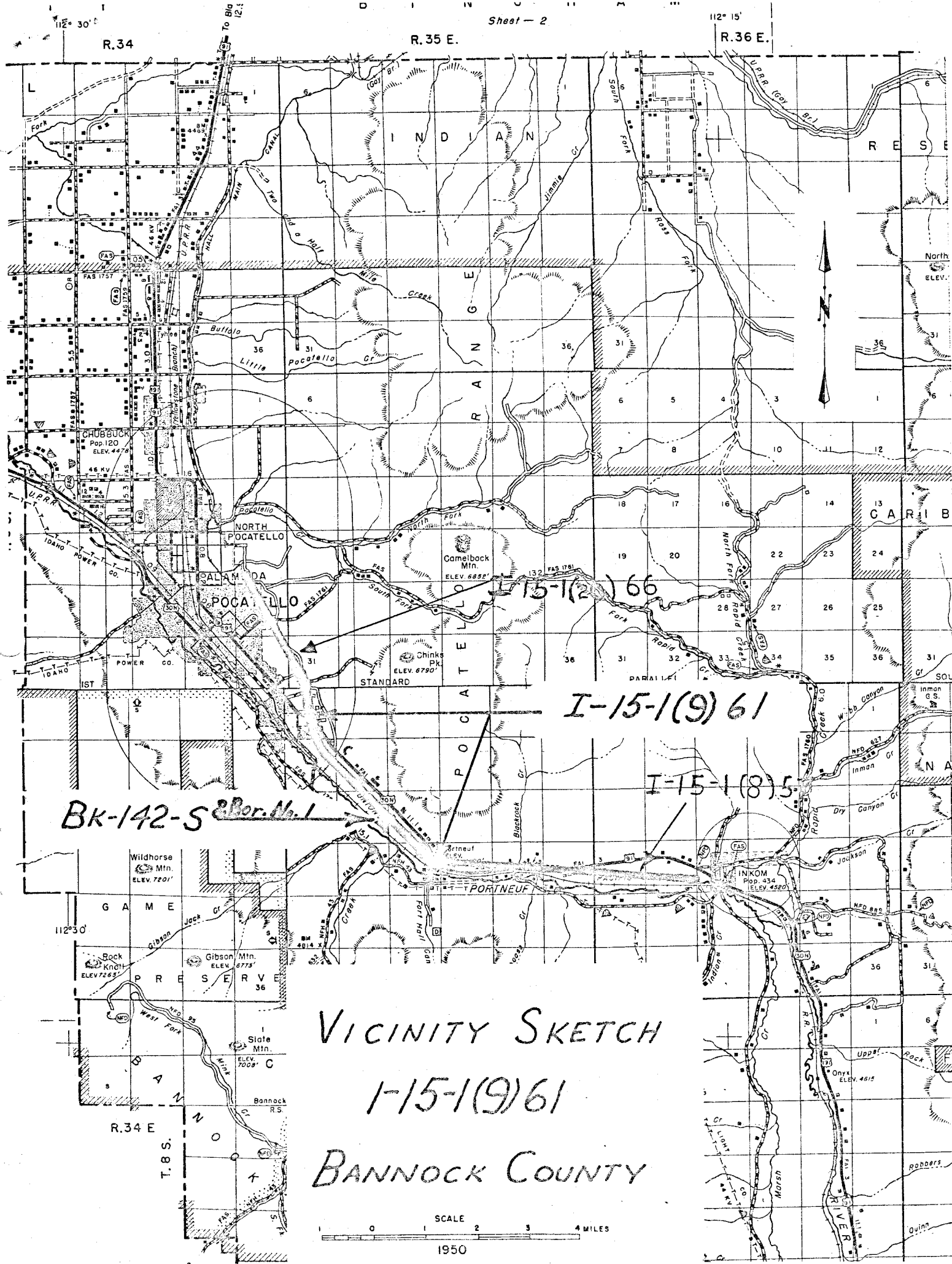
PIT. No. Bk-1 1/2-S

Ave. Extraction 4.90%

American 85-100

Lab Design 5.0%

AVERAGE EXTRACTION GRADATION



BK-142-S & Bor. No. 1

I-15-1(2) 66

I-15-1(9) 61

I-15-1(8) 5

VICINITY SKETCH
I-15-1(9) 61
BANNOCK COUNTY

