COMPARISON OF AASHO AND TEXAS TEST METHODS AND SPECIFICATIONS FOR FLEXIBLE BASE MATERIAL

by

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conducted by

Materials and Tests Division, Soils Section
Texas State Highway Department
in cooperation with
The U.S. Department of Commerce
Bureau of Public Roads

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ACKNOWLEDGMENTS

In the gathering of literally hundreds of items pertaining to sampling, testing, measurement of pavement sections, history of construction and maintenance, so much assistance was obtained from so many people that it would be very difficult to list all who have contributed to this project. We are grateful for the assistance given by personnel of the laboratory of the Bureau of Public Roads in Washington, D.C. for their performance of many check tests and to members of the local B.P.R. Division and Regional personnel for their observation of the sampling and progress of the project.

Acknowledgment is made to members of the Texas Highway Department, Materials and Tests Division, under the leadership of Mr. A. W. Eatman, Materials and Tests Engineer. The performance of many tests and their presentation by members of the THD Soils Section of the Materials and Tests Division is gratefully acknowledged. The assistance in sampling and the gathering of construction and maintenance data by personnel in the San Antonio, Austin, Houston, Waco and Corpus Christi Districts of the Texas Highway Department was also an outstanding contribution to the successful completion of this project.

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ABSTRACT

For a number of years there has been some disagreement between the personnel of the Bureau of Public Roads in Washington, D.C., and of the Texas Highway Department concerning the Liquid Limit and Plasticity Index to be specified for flexible base materials and the methods of test for their determination. In view of these differences a cooperative study of flexible base performance and testing procedures was entered into by these agencies to compare L.L. and P.I. test results for a suitable range of flexible base materials using the a) wet and b) dry methods of sample preparation, and to conduct a study of the performance of existing flexible base courses whose plasticity indices cover a considerable range.

Forty-two samples of various types of flexible base materials were collected from various parts of Texas and processed by splitting each sample into two nearly identical portions, one of which was sent to B.P.R. Laboratory in Washington, D.C., and the other retained in the T.H.D. Laboratory. Small samples of soil binder which were obtained by each laboratory were also exchanged. Each laboratory performed test for soil constants and some sieve size analysis on all samples. From time to time detailed test results were exchanged between the two laboratories.

A study of the relation of the soil constants and road performance was also made. This included obtaining records of construction and maintenance data and evaluating road performance.

Results of the investigation indicate that operators from the laboratories

are in reasonably close agreement on L.L. and P.I. values so long as they are testing the same minus No. 40 material. This was not found to be the case when operators did their own preparation and testing. The difference in P.I. produced by the laboratories' use of two different preparation methods (wet and dry) can be expected to be as much as four or five points for a great many of our flexible base materials.

Soil binder content data indicate that each laboratory has a wet and dry method of preparation, neither of which are alike. The wet methods showed less discrepancy in P.I. and soil binder contents than did the dry methods of preparation. The findings indicate that the methods of preparation employed by the B.P.R. produced amounts of soil binder in excess of those obtained by T.H.D. Laboratory for both wet and dry methods, thus indicating that the B.P.R. scrubbing equipment produced severe grinding effects on many of the samples tested. In general, both methods of preparation used by the B.P.R. produce more large particles in soil binder than the T.H.D. wet method does. This usually causes tests made by B.P.R. to indicate greater amounts of soil binder, lower L.L. and lower P.I. than are indicated by T.H.D. wet method.

The data obtained from roads of known behavior do not show any correlation between the soil constants (L.L. and P.I.) and pavement performance. This evidence does not substantiate the idea that Texas should use a maximum L.L. of 25 and P.I. of 6 in specifications for base materials.

FOREWORD

For a number of years there has been some disagreement between the personnel of the Bureau of Public Roads in Washington, D.C., and of the Texas Highway Department concerning the Liquid Limit and Plasticity Index to be specified for flexible base materials and the methods of test for their determination. In view of these differences a cooperative study of flexible base performance and testing procedures was entered into so that a body of factual data could be accumulated through which differences may be resolved.

OBJECTIVES

First, to compare L.L. and P.I. test results for a suitable range of flexible base materials using the a) wet and b) dry methods of sample preparation, through a cooperative check test program between the Bureau of Public Roads and the Texas Highway Department. Secondly, to conduct a study of the performance of existing flexible base courses whose plasticity indices cover a considerable range. Thirdly, to try to reach a mutual understanding of the significance of the findings of this research project.

OUTLINE OF RESEARCH CONDUCTED

Forty-two* samples of various types of flexible base materials were collected from various parts of Texas and processed in the following manner:

*Note: Twenty out of thirty samples taken from roads of known performance were taken in the presence of representatives of the Bureau of Public Roads. The other ten were taken from sections of roads being studied by the Texas Transportation Institute research project No. 2-8-62-32. The first 12 samples were taken for correlation of soil constants test only; see Table I for identification.

1. Each sample (4 to 6 sample bagfuls) was airdried and split into two portions as nearly identical as possible by the use of a mechanical sample splitter.

2. One portion of each sample (two bags) was submitted to the B.P.R. laboratory in Washington, D.C. for determination of L.L., P.I. and gradation by the Bureau's normal procedures.

3. One portion of each sample was retained in Texas where the T.H.D. laboratory determined the soil constants and gradation in conformance with the normal T.H.D. procedures.

4. Each laboratory exchanged small cartons of their prepared soil binder, the fraction passing the No. 40 sieve, and obtained L.L. and P.I. on each others samples.

5. Detailed test reports were exchanged between laboratories.

CONCLUSIONS

The data obtained in this investigation strongly supports the following conclusions:

1. That when operators performed the liquid limit and plastic limit tests on the same minus No. 40 material, there was reasonably close agreement between results obtained by B.P.R. and T.H.D. laboratories. In general, there was a tendency for the T.H.D. Laboratory P.I. results to average approximately two points higher than those obtained by the B.P.R. Laboratory.

2. When soil binder was prepared by T.H.D. Laboratory employing the wet method, and by the B.P.R. Laboratory employing their dry method, P.I. of

wet prepared soil binder was higher than that of the dry prepared soil binder. Determinations of P.I. by T.H.D. were in extreme cases six to ten points higher than those determined by B.P.R., and when determinations of P.I. were made by B.P.R. only on both sets of soil binder, extreme differences in P.I. were as much as six to eight points. Apparently, the difference in the two methods of preparation used by the two laboratories can be expected to produce differences of as much as four to five points in the P.I. of a great many of our flexible base materials.

3. The plasticity indexes obtained by the two laboratories are far more erratic when using their dry methods of preparation than when using their respective wet methods.

4. Soil binder content data indicate that each laboratory has a wet and a dry method of preparation, neither of which are alike. Of the two procedures, the wet methods (although unalike) show less discrepancy in soil binder results than do the dry methods.

5. That the methods of preparation employed by the B.P.R. produced amounts of soil binder in excess of those obtained by T.H.D. Laboratory for both wet and dry methods, thus indicating that the B.P.R. scrubbing equipment produced severe grinding effects on many of the samples tested. In general, both methods of preparation used by the B.P.R. produces more large particles in soil binder than the T.H.D. wet method does. This usually causes B.P.R. tests to indicate greater amounts of soil binder, lower L.L. and lower P.I. than are indicated by T.H.D. wet method.

6. That the data for the roads sampled do not show any correlation between the soil constants (L.L. and P.I.) and pavement performance.

7. That evidence obtained in this report does not substantiate the idea that Texas should use a maximum L.L. of 25 and P.I. of 6 in specifications for base materials.

DISCUSSION

Sampling: Photograph Nos. 1-D thru 6-D on pages A-24 thru A-26 of the appendix illustrate how most of the samples from completed roads were taken. Handling such as splitting of samples has been discussed in this report under the section, "Outline of Research". Table I shows the location from which the first twelve samples were taken for use as operator check samples. After it was determined that operators of the two laboratories involved checked reasonably close on L.L. and P.I. for the same minus No. 40 materials, it was decided to obtain the remaining samples from roads of known behavior. The first ten of these samples were taken from sections of road being studied under Texas Transportation Institute of the Texas A&M University Research Project No. 2-8-62-32. Detailed information including identification, pavement thickness and performance is shown on pages A-2 thru A-9 of the appendix. The same type of information for the remaining 20 samples which were taken in cooperation with B.P.R. personnel is given on pages A-10 thru A-23 of the appendix. Photographs Nos. 7-P thru 26-P, showing pavement condition when sampled are shown on pages A-27 thru A-36 of the appendix.

Tabulation of Test Results: All test data from both testing laboratories are shown in Tables II and III, pages A-37 thru A-47 of the appendix. Test data from the B.P.R. Laboratory are shown in black and those from the T.H.D. Laboratory are shown in red.

Graphic Analysis: In order to reduce the difficulties of interpreting the massive tabulations of data presented, a number of graphs were prepared and they are attached to the end of the report. Fig. 1 shows that in cases where each laboratory is testing the same minus No. 40 material there is fairly good agreement in liquid limit tests performed by operators of both laboratories. The trend appears to be that for materials with L.L. below 30, T.H.D. operators obtain liquid limits that are one or two points higher than those obtained by B.P.R. operators. Since T.H.D. Laboratory operators used the hand method for determination of L.L., additional tests using the L.L. machine were also run by T.H.D. The values which could be determined without the soil sliding in the dish are shown in red in Tables II and III. The T.H.D. results are not satisfactory for liquid limits in excess of 25, which were often from 3 to 5 points below those obtained by B.P.R. and T.H.D. using the hand method. If a maximum L.L. is included in specifications we do not believe the letters NP indicate compliance because it is not uncommon to find NP materials which have liquid limits in excess of 35. The letters NP merely means that sliding in the dish occurred and that a value for L.L. is unavailable.

Fig. 2 shows results of P.I. tests obtained by both laboratories testing the same minus No. 40 material. The trend in Fig. 2 is for T.H.D. operators to obtain plasticity indexes which are generally two points higher than those obtained by B.P.R. personnel. We consider this to be in reasonably close agreement.

Fig. 3 shows results of plasticity indexes obtained by both laboratories where B.P.R. Laboratory used their dry method of soil binder preparation and T.H.D. Laboratory used their wet method of preparation. This graph

shows that extreme differences of P.I. amount to as much as six to ten points in which T.H.D. results were the highest in all cases except one. In the case of testing many Texas flexible base materials, it appears that it would be normal for the T.H.D. wet method to produce results which are four to six points above those obtained by B.P.R. using their dry method of preparation. Fig. 4 was prepared to show comparison of plasticity indexes obtained by only the B.P.R. Laboratory when each laboratory prepares the materials by means of its own preparation methods. This comparison shows that the extreme differences due to use of different preparation methods is from six to eight points. It can be seen that it would not be unusual for Texas to encounter many materials which would show a difference of from two to five points even if all plasticity indexes were run by the B.P.R. Laboratory.

Fig. 5 shows variation of P.I. results when the two dry methods of preparation are used. Fig. 6 shows results of plasticity indexes obtained by use of the laboratories two wet methods of preparation. It may be noted that the spread of points for the wet methods is far less than that for the dry methods as shown in Fig. 5.

Fig. 7 shows the relation of soil binder contents obtained by the two laboratories using the AASHO dry method of preparation. Obviously there are great differences in interpretation of AASHO Method T-87 permitted relative to the degree of pulverization. Fig. 8 shows a comparison of the wet methods of soil preparation. Although these results are less erratic than those shown for the dry methods in Fig. 7, it appears that there is also a difference in interpretation as to how much pulverization can be permitted prior to slaking of the samples because B.P.R. soil binder contents are higher than those obtained by T.H.D. for 76 per cent of the tests.

Fig. 9 shows a comparison of the soil binder content obtained by B.P.R. Laboratory using its dry method of preparation and the T.H.D. Laboratory using its wet method of preparation. It may be noted that 80 per cent of all points show that the B.P.R. Laboratory produced soil binder contents that were in excess of those produced by T.H.D. Laboratory. In some cases the differences were as much as 14 to 19 per cent. Contractors might strenuously object to having gradation samples pulverized this much prior to testing. Fig. 10 identifies the data for use in plotting Fig. Nos. 11 and 12. Only those samples taken from final course of base on existing roads of known behavior were used in plotting these charts. Further identification may be made by reference to pages A-2 thru A-23 of the appendix. Fig. Nos. 11 and 12 show that there is little or no correlation between service performance and liquid limits or plasticity indexes regardless of whether tests are run by B.P.R. Laboratory or T.H.D. Laboratory. Obviously, there are many other considerations involved in selecting base materials for constructing successful roads other than liquid limit or plasticity index. Such things as shearing strength, compaction, gradation, hardness, thickness of wearing course, volume and weight of traffic, drainage, etc., sometimes overshadow the significance of the soil constants.

RECOMMENDATIONS

The results of this investigation appear to justify the following recommendations:

1. That AASHO seriously consider either abolition or revision of test method T-87, "Dry Preparation of Disturbed Soil Samples for Tests". If use of the method is to be continued, it is necessary that Step 3(d) be revised so as to define the effort necessary to break up aggregations without reducing the size of the individual grains. It is doubtful that this can be done except in cases where use of the method is limited to very hard aggregate materials containing very sandy binder.

2. That AASHO consider revision of test method T-146, Step 4(a) so as to delete any reference to breaking up sample of dried material prior to slaking or soaking.

3. That AASHO consider revision of M-147 "Standard Specification for Materials for Soil-Aggregate Subbase, Base and Surface Course" so as to permit the use of materials having higher liquid limits and plasticity indexes when the wet method of preparation is used. Maximum limits of 35 for L.L. and 12 for P.I. are suggested for top 6 to 8 inches of base and 40 and 20 respectively for subbases.

4. That more and more consideration be given to the use of strength tests such as Texas Triaxial for purposes of evaluating quality of base material rather than relying strictly upon L.L., P.I. and gradation as the only criteria.

5. That the weight and volume of traffic anticipated and thickness of surfacing be seriously considered in connection with the evaluating and specifying grades of flexible base materials for use.

CHART FOR COMPARISON OF OPERATORS TECHNIQUE IN DETERMINATION OF LIQUID LIMIT RUN ON SAME -40 MATERIAL

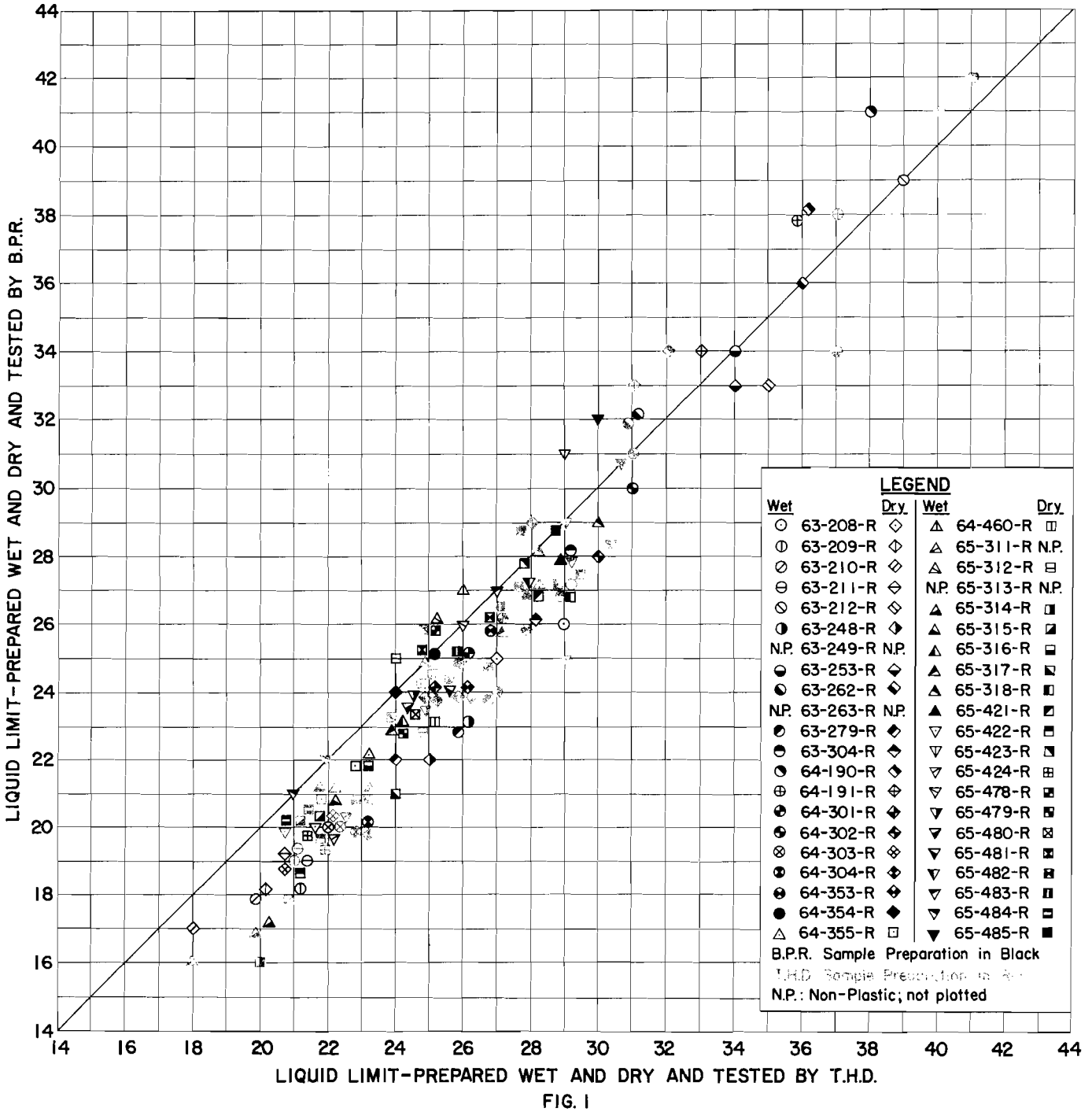

FIG. 1

CHART FOR COMPARISON OF OPERATORS TECHNIQUE IN DETERMINATION OF PLASTICITY INDEX RUN ON SAME -40 MATERIAL

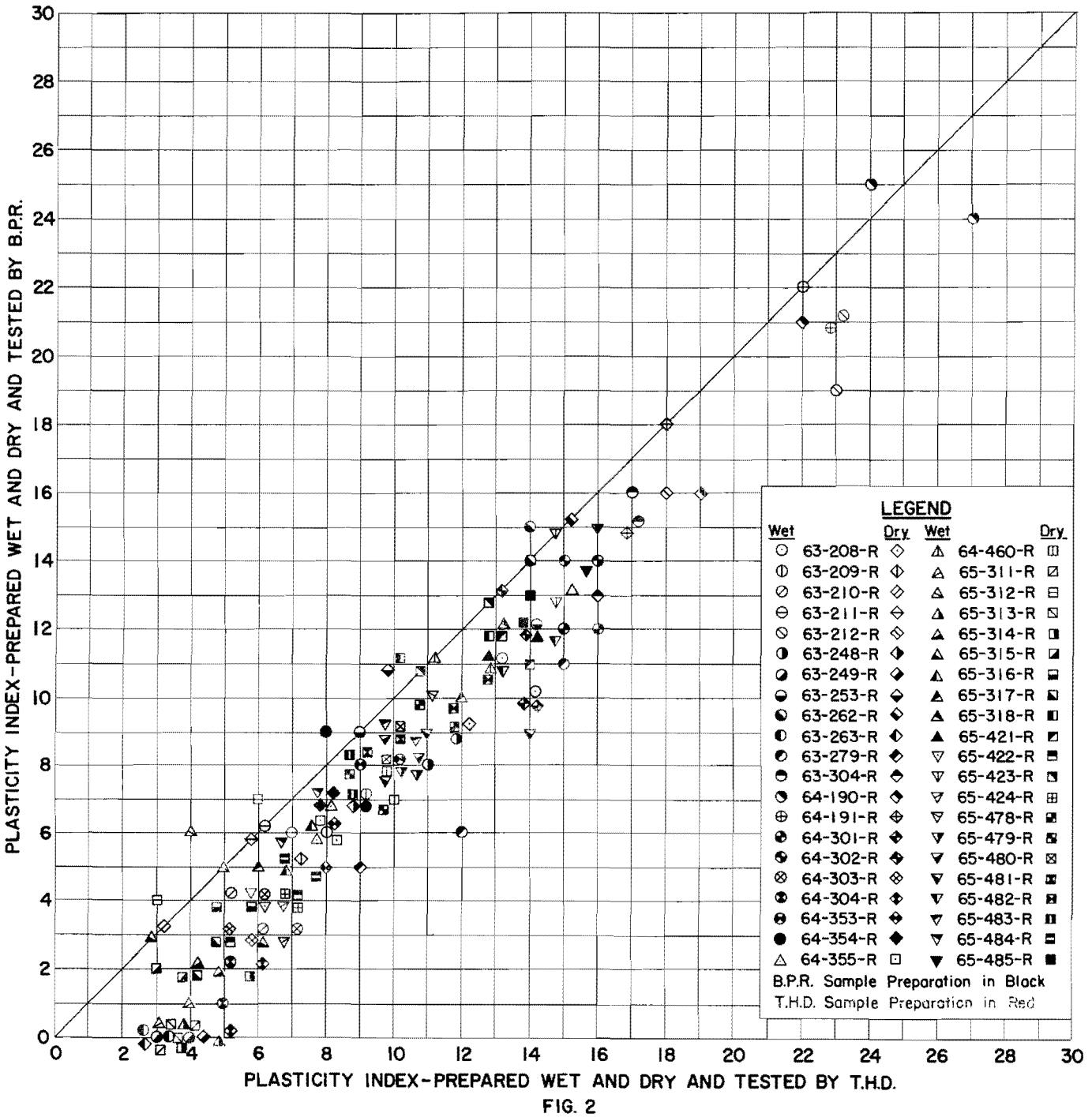

FIG. 2

COMPARISON OF PLASTICITY INDEX DETERMINED BY B.P.R. AND T.H.D. USING B.P.R. DRY METHOD AND T.H.D. WET METHOD OF PREPARATION

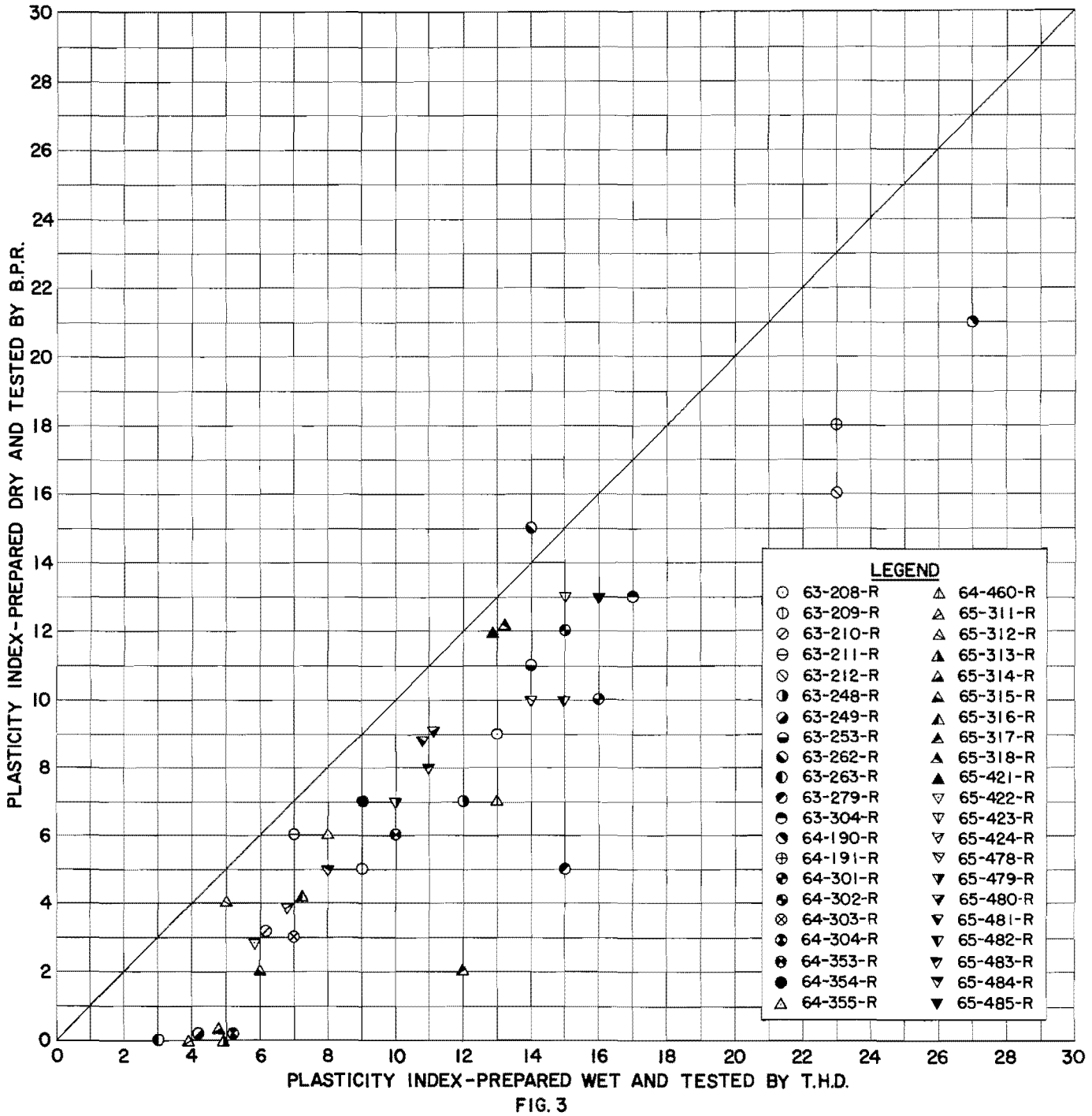

FIG. 3

COMPARISON OF PLASTICITY INDEX DETERMINED BY B.P.R. USING B.P.R. DRY METHOD AND T.H.D. WET METHOD OF PREPARATION

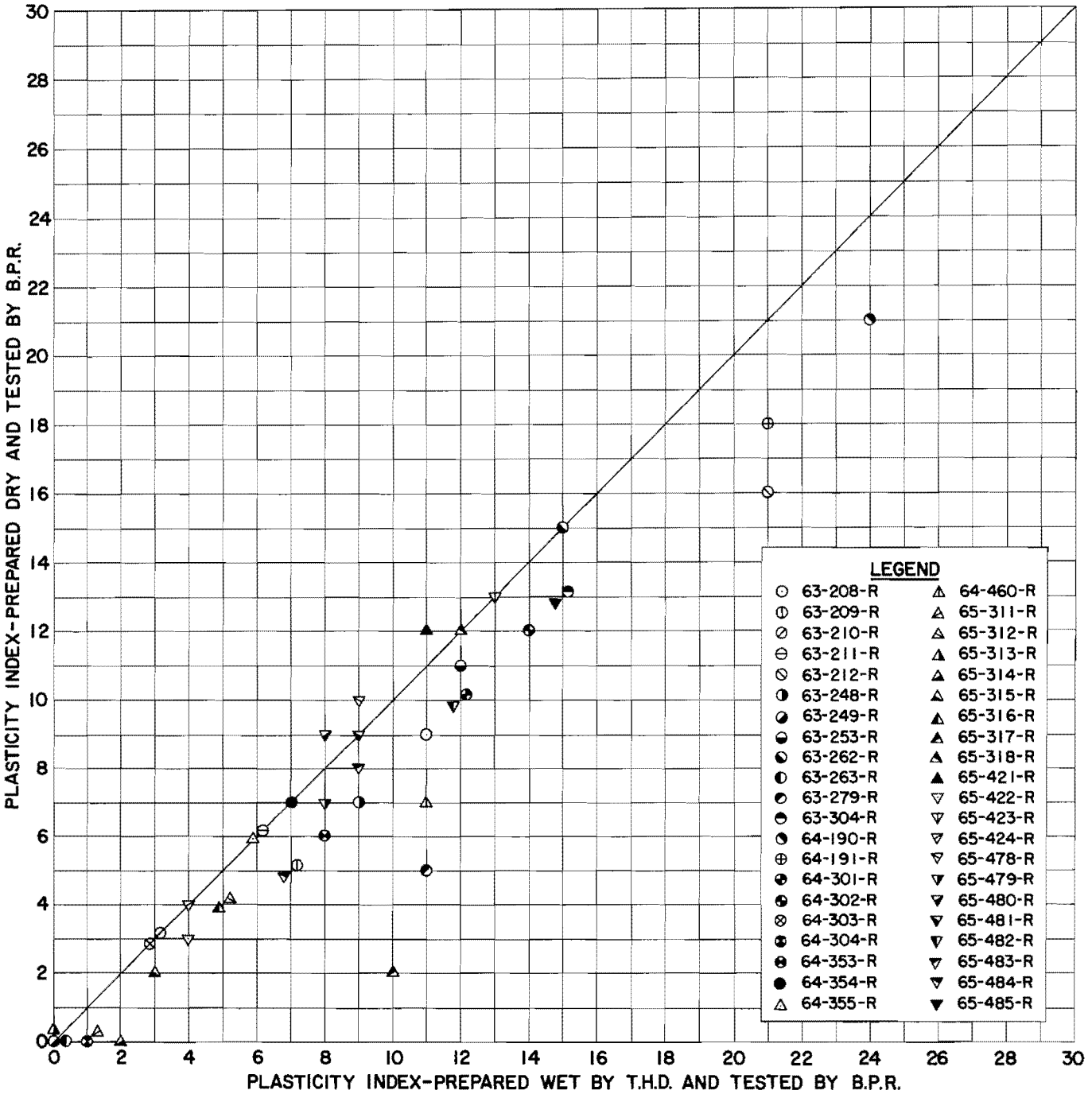

FIG. 4

COMPARISON OF PLASTICITY INDEX DETERMINED BY B.P.R. AND T.H.D. BOTH USING THEIR DRY METHODS OF PREPARATION

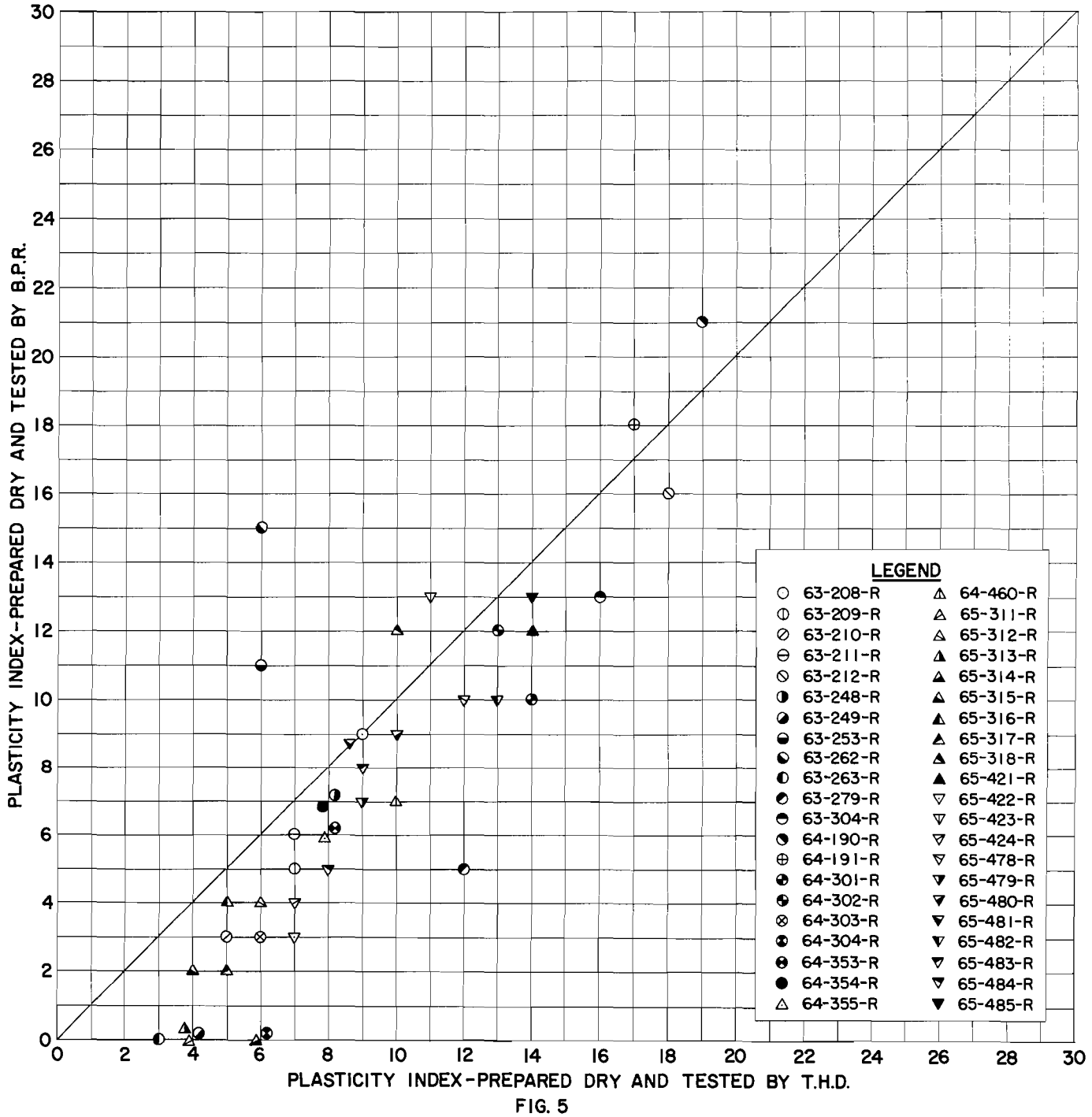

FIG. 5

COMPARISON OF PLASTICITY INDEX DETERMINED BY B.P.R. AND T.H.D. BOTH USING THEIR WET METHODS OF PREPARATION

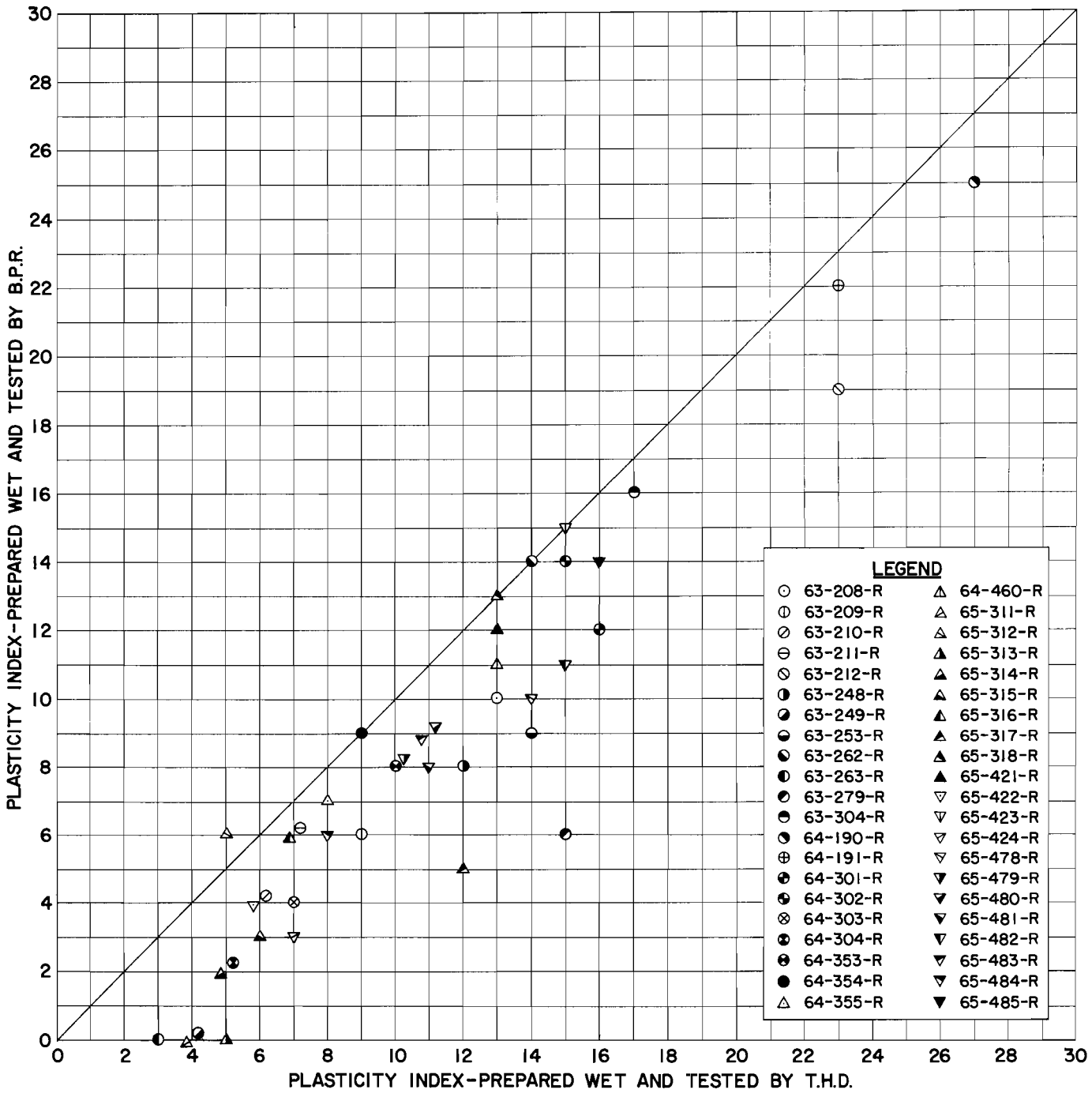

FIG. 6

RELATION OF SOIL BINDER CONTENTS OBTAINED BY B.P.R. DRY METHOD AND T.H.D. DRY METHOD

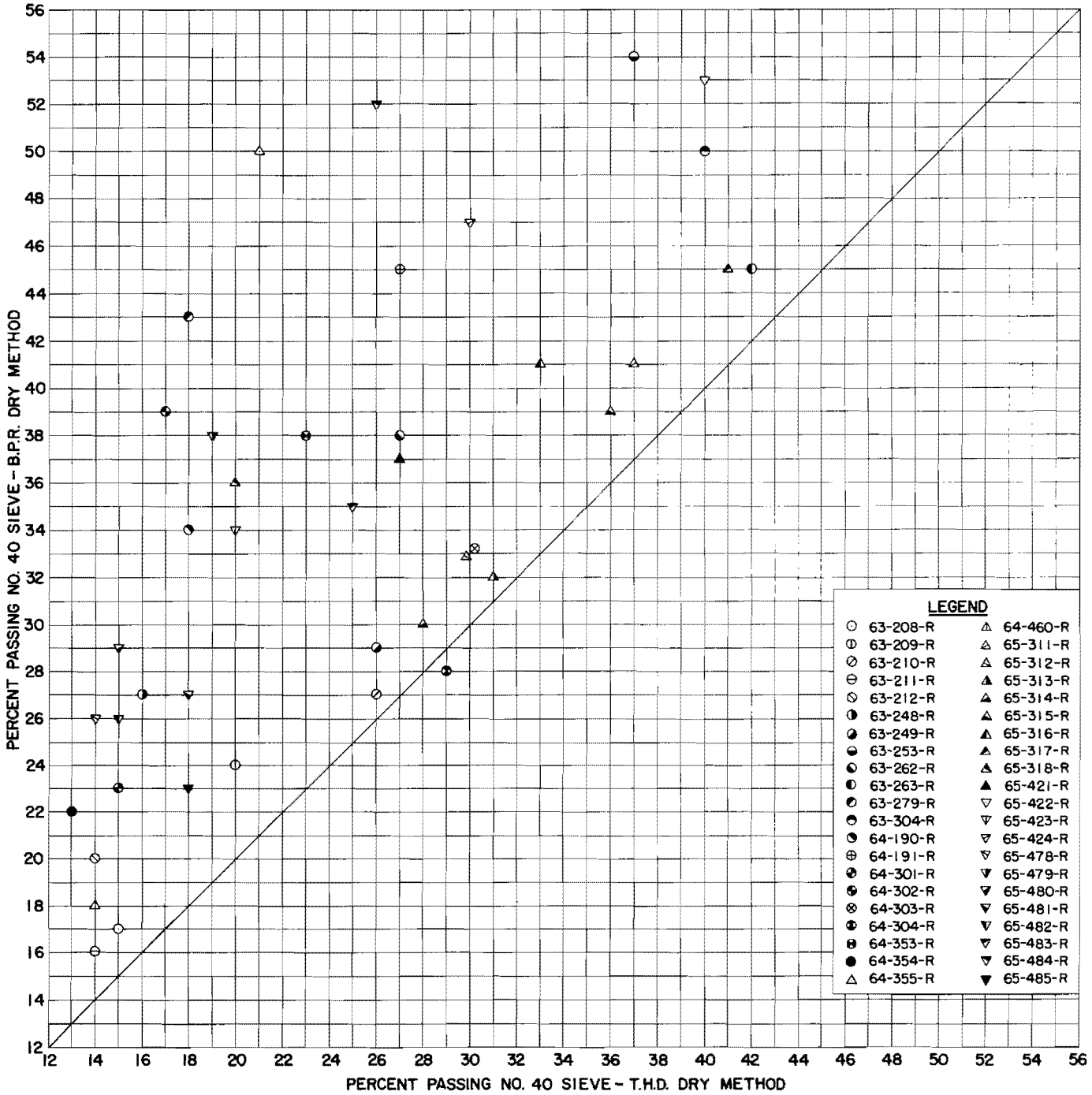

FIG. 7

RELATION OF SOIL BINDER CONTENTS OBTAINED BY B.P.R. WET METHOD AND T.H.D. WET METHOD

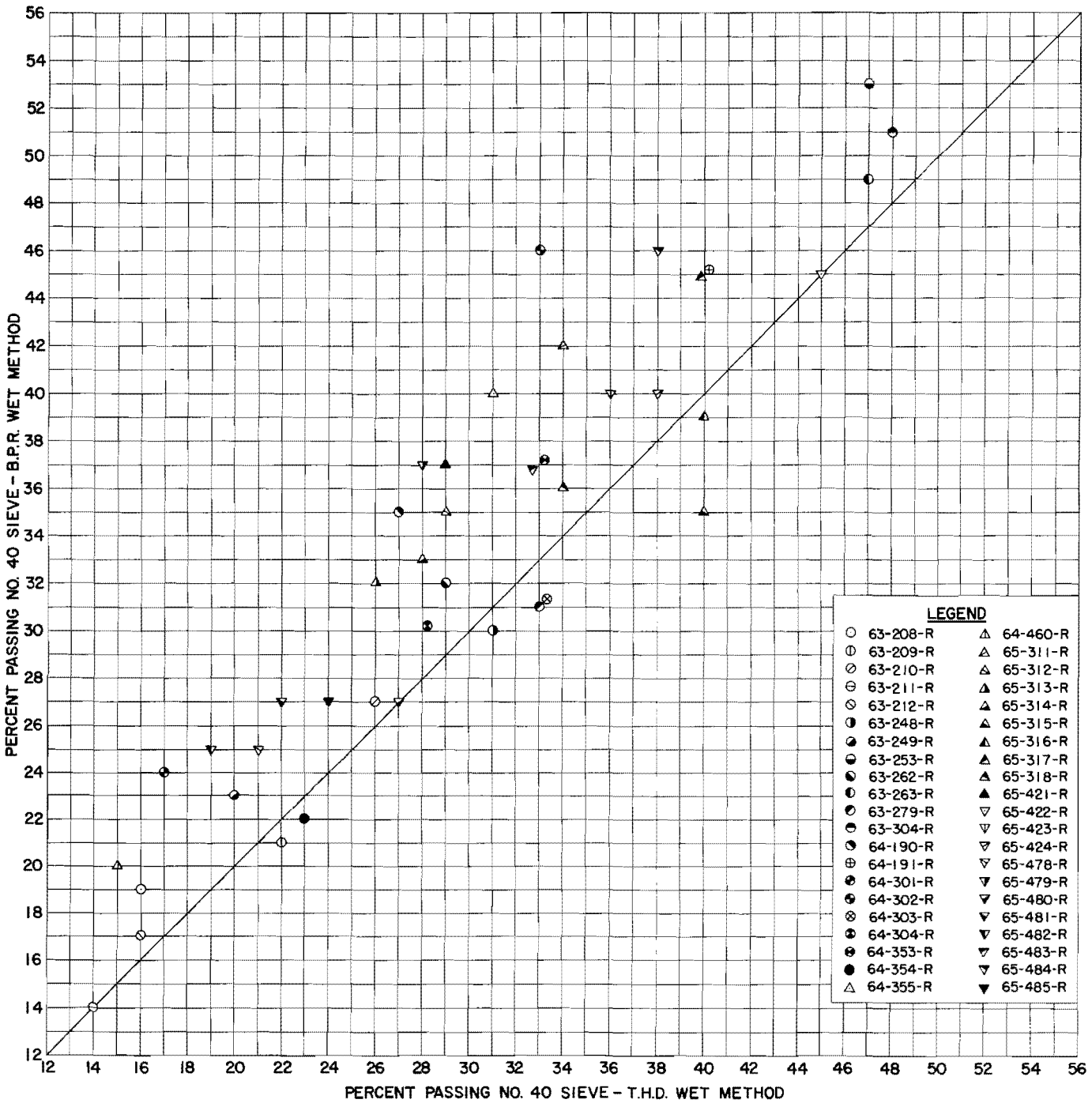

FIG. 8

RELATION OF SOIL BINDER CONTENTS OBTAINED BY B.P.R. DRY METHOD AND T.H.D. WET METHOD

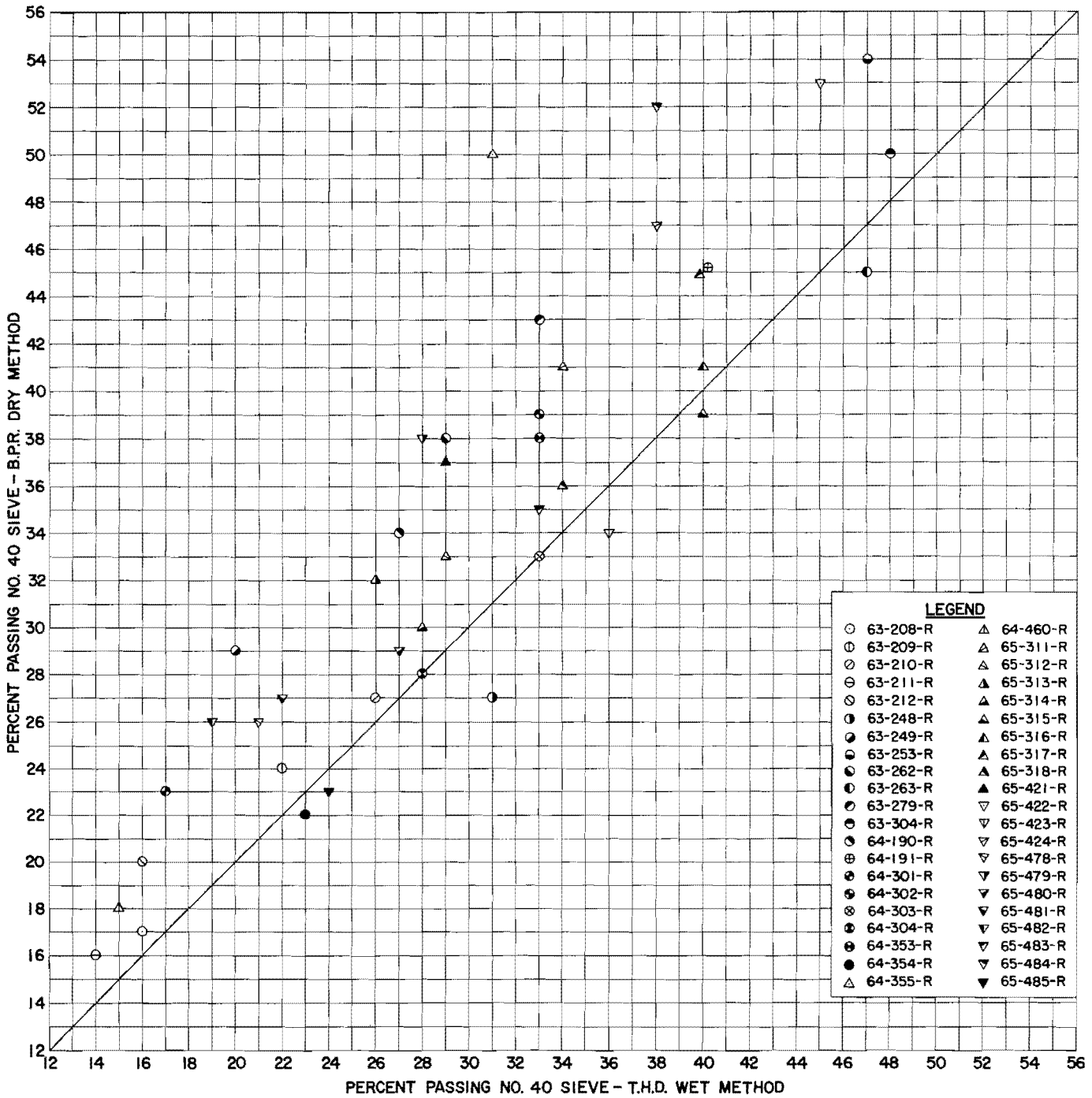

FIG. 9

IDENTIFICATION OF PLOTTING NUMBERS FOR BASE COURSE PERFORMANCE SAMPLES

Plotting No.	Field No.	Texas Lab. No.	Base Behavior of Road Section	% –No. 40		L.L.		P.I.	
				THD	BPR	THD	BPR	THD	BPR
1	1-II	64-190-R	Good	27	34	41	38	27	21
2	3-II	64-301-R	Doubtful	17	23	27	24	16	10
3	5-II	64-303-R	Good	33	33	22	19	7	3
4	6-II	64-304-R	Fairly Good	28	28	23	N.P.	5	0
5	7-II	64-353-R	Good	33	38	28	24	10	6
6	8-II	64-354-R	Good	23	22	26	24	9	7
7	9-II	64-355-R	Good	31	50	22	22	8	6
8	10-II	64-460-R	Good	15	18	28	23	13	7
9	11-II	65-311-R	Doubtful	34	41	18	N.P.	4	0
10	13-II	65-313-R	Fairly Good	26	32	18	N.P.	5	0
11	14-II	65-314-R	Good	28	30	20	N.P.	5	0
12	16-II	65-316-R	Poor	40	41	23	22	7	4
13	17-II	65-317-R	Fairly Good	40	45	27	21	12	2
14	18-II	65-318-R	Poor	34	36	28	27	13	12
15	19-II	65-421-R	Fairly Good	29	37	28	27	13	12
16	20-II	65-422-R	Poor	45	53	21	19	6	3
17	22-II	65-424-R	Good	38	47	22	20	7	4
18	23-II	65-478-R	Doubtful	21	26	29	26	14	10
19	25-II	65-480-R	Good	27	29	26	24	11	9
20	27-II	65-482-R	Good	19	26	30	26	15	10
21	29-II	65-484-R	Fairly Good	38	52	22	20	8	5
22	30-II	65-485-R	Fairly Good	24	23	31	29	16	13

FIG. 10

RELATIONSHIP OF P.I., PERCENT MINUS NO. 40 AND ROAD PERFORMANCE

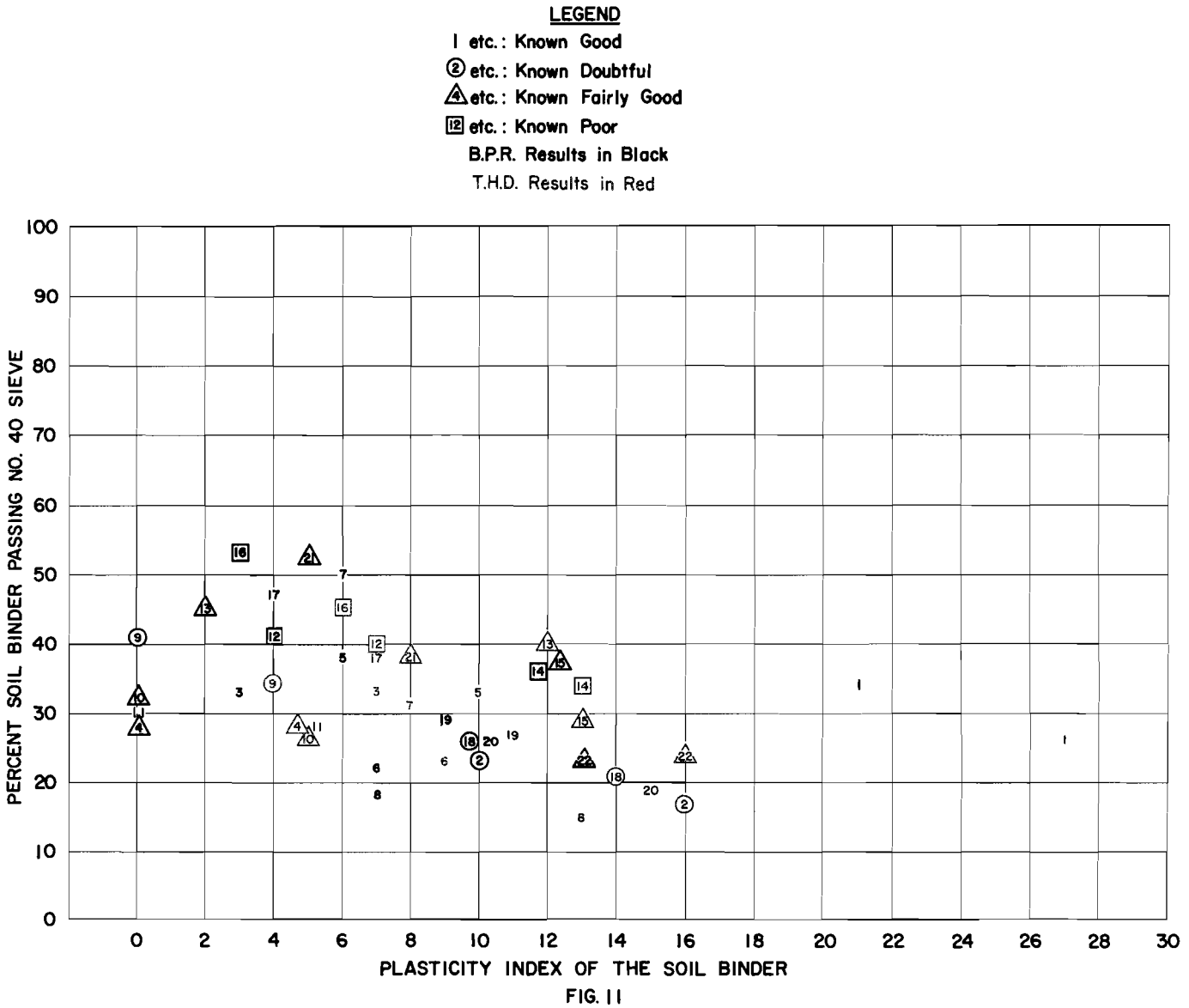

FIG. 11

RELATIONSHIP OF L.L., PERCENT MINUS NO. 40 AND ROAD PERFORMANCE

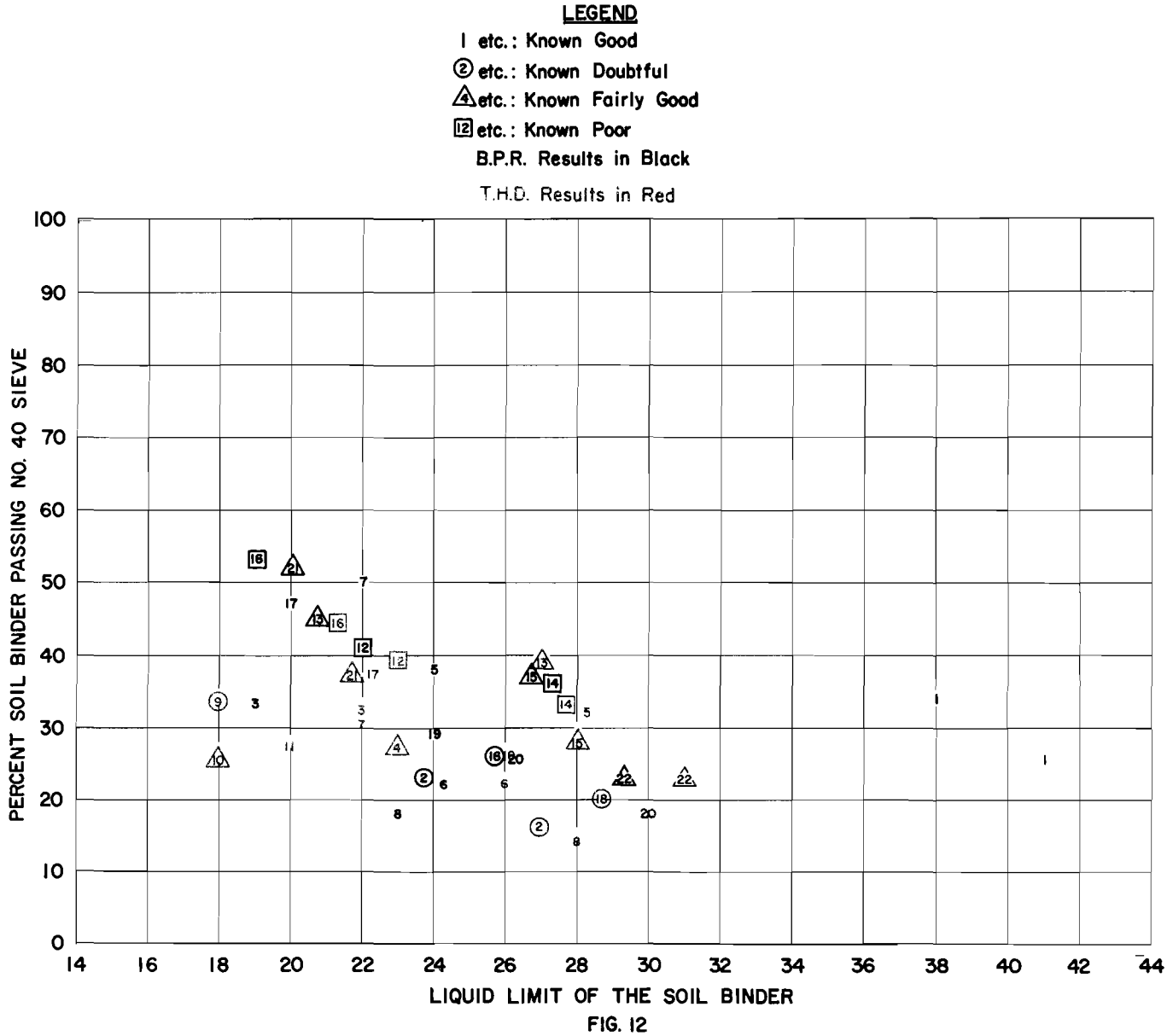

FIG. 12

APPENDIX

TABLE I

LOCATION OF SAMPLES FOR OBJECTIVE C-1

Lab. No.	Material	Sample From	County	Control and TTI No.	Hwy.
63-208-R	Cr. Stone	Lemly Pit	Hill	1190-3-1 2059-1-3&4 2305-2&3-4&7	FM 1133 FM 1304 FM 2411
63-209-R	Cr.Gr.Congl.	Harding Pit	McLennan		
63-210-R	Cr. Stone	Anderson Pit	McLennan		FM 185
63-211-R	Gravel	Dosher Pit	McLennan	C-2506-1	FM 1695
63-212-R	Gravel	Lyons Pit	Bosque	C-2058-1	FM 2136
63-248-R	Caliche	Odiorne Pit 1	Blanco	113-5-16	US 281
63-249-R	Limestone	Eastman Pit	Mason	396-2-14	SH 29-W
63-253-R	Caliche	Moczygemba Pit	Karnes	100-6-22	US 181
63-262-R	Caliche Shell, Sand	Crouch Pit Nueces Bay	San Patricio	Dist. 16	
63-263-R	Caliche	Shell, 65% S. Western Matls. Co. Caliche, 15% Viola Rd. Field Sand 20% - all by Vol.			
63-279-R	Sand-Shell	Parker Bros.	Harris	Dist. 12	

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Travis County. Date Sampled June 8, 1964

Control No. 16 Sec. No. 1 Highway No. 81 Business Rt.

Sampled by: James F. Todd, Chester McDowell, etc.

At request for HPR-1( ) Research Project 1-9-63-48

Sample No. Field No. 1-II
Lab. No. 64-190-R

Sample Location: From T.T.I. Section for HPR-1-32 opposite Goodnight Motel Office on Congress Avenue in South Austin

Description of Section: 7½ in. of HMAC on 6 in. of gravel base (64-190-R) overlaying 11 in. of caliche gravel subbase (Lab. No. 64-191-R, 2-II). Black clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Has been excellent for approximately 30 years carrying heavy traffic especially before construction of IH 35

Latest Traffic Count: 5500

Latest P.S.I.: 3.63

History of Pavement Construction & Maint.:
10" to 12" selected and gravel with oiled and asphaltic surface in 1934
Widen shoulders and approx. 5" Asph. Conc. - 1936
Widen shoulders and 100#/s.y. Asph. Conc. - 1954

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Falls County. Date Sampled Not readily available

Control No. 209 Sec. No. 3 Highway No. US 77

Sampled by: District Laboratory Personnel

At request for HPR-1( ) Research Project 1-9-63-48

Sample No. Field No. 3-II
Lab. No. 64-301-R

Sample Location: From T.T.I. Section for HPR-1-32, Sta. 321+00

Description of Section: 6 in. HMAC on 14 in. gravel base on black clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Test section cracked but fairly good. Remainder of project fair to poor.

Latest Traffic Count: 1640

Latest P.S.I.: 4.68

History of Pavement Construction & Maint.:
Base and 280 lbs./s.y. HMAC placed - 1952
Seal shoulders - 1955
Widen, Seal shoulders, add HMAC - 1960

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Bell County. Date Sampled 8-9-63

Control No. 15 Sec. No. 7 Highway No. IH 35

Sampled by: District Lab. Personnel

At request for HPR-1( ) Research Project 1-9-63-48

Sample No. Field No. 10-II
Lab. No. 64-460-R

Sample Location: From T.T.I. test Section for HPR-1-32, Sta. 238+72

Description of Section: 4 in. HMAC, 12 in. Cr. Limestone-Caliche Base, 8 in. Caliche rock subbase (Lab. No. 64-302-R, 4-II) and 6 in. lime treated clay. Clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Good where swelling conditions are not severe

Latest Traffic Count: 4660

Latest P.S.I.: 4.28

History of Pavement Construction & Maint.:
Constructed in 1958
Seal shoulders - 1963
Level-up - 1963
Add base to low section of shoulders - 1964

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Falls County. Date Sampled 8-12-63

Control No. 590 Sec. No. 2 Highway No. SH 320

Sampled by: District Lab. Personnel

At request for HPR-1( ) Research Project 1-9-63-48

Sample No.: Field No. 5-II
Lab. No. 64-303-R

Sample Location: From T.T.I. test section for HPR-1-32, Sta. 36+09

(Crushed limestone)

Description of Section: Double surface treatment on 10 in. Cr. limestone and approximately 9 in. caliche gravel base on black clay subgrade.

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Good in test section and overall with a few exceptions.

Latest Traffic Count: 620

Latest P.S.I.: 3.32

History of Pavement Construction & Maint.:
Cr. stone base and double surface treatment placed in 1960
Sealed - 1964

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Hamilton County. Date Sampled 9-20-63

Control No. 55 Sec. No. 2 Highway No. US 84

Sampled by: District Lab. Personnel

At request for HPR-1( ) Research Project 1-9-63-48

Sample No.: Field No. 6-II
Lab. No. 64-304-R

Sample Location: From T.T.I. Test Section for HPR-1-32, Sta. 468+12

Description of Section: 1½ in. HMAC on 5 in. Cr. limestone base on double surface on 5 in. nodular limestone on plastic clay subgrade (Black)

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Test section good. Overall fair (since 1958) except for a few patches on west end of project.

Latest Traffic Count: 770

Latest P.S.I.: 3.34

History of Pavement Construction & Maint.:
Single surface treatment added to open base - 1939
Base and double surface treatment placed - 1952
Treat surface with emulsion - 1955
Treat surface with emulsion - 1957
Level-up - 1958
Seal Coat - 1958

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Bexar County. Date Sampled 7-23-64

Control No. 17 Sec. No. 11 Highway No. Spur 247 (US 87)

Sampled by: District Lab. Personnel

At request for HPR-1( ) Research Project 1-9-63-48

Sample No.: Field No. 7-II
Lab. No. 64-353-R

Sample Location: From T.T.I. Section for HPR-1-32, Sta. 162+06 in S.E. San Antonio

Description of Section: 7½ in. HMAC on 9 in. gravel base
Black silty clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Good in section and overall

Latest Traffic Count: 12,800

Latest P.S.I.: 3.42

History of Pavement Construction & Maint.:
Constructed in 1954

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Bexar County. Date Sampled 7-22-64

Control No. 25 Sec. No. 2 Highway No. IH 10

Sampled by: District Lab. Personnel

At request for HPR-1( ) Research Project 1-9-63-48

Sample No. Field No. 8-II
Lab. No. 64-354-R

Sample Location: From T.T.I. test section for HPR-1-32 Sta. 195+15, 4 mi. E. San Antonio city limits

Description of Section: 4-3/4 in. HMAC on 8 in. Cr. class I caliche gravel base
17½ in. Cr. caliche subbase
Black clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Good in section. Whole job good except for swelling conditions.

Latest Traffic Count: 6680

Latest P.S.I.: 4.24

History of Pavement Construction & Maint.:
Constructed in 1959

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Bexar County. Date Sampled 7-21-64

Control No. 72 Sec. No. 7 Highway No. US 87

Sampled by: District Lab. Personnel

At request for HPR-1( ) Research Project 1-9-63-48

Sample No.: Field No. 9-II
Lab. No. 64-355-R

Sample Location: From T.T.I. test section for HPR-1-32. Sta. 204+10 1½ mi. N. of Leon Springs

Description of Section: 5 in. HMAC on 4 in. caliche rock base on 12 in. Select material on black clay subgrade in this section

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Served good during its life but had to be removed in order to build IH 10

Latest Traffic Count: 4220

Latest P.S.I.: 3.65

History of Pavement Construction & Maint.:
Constructed in 1933
No maintenance until 1955
Being rebuilt

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Bastrop County. Date Sampled 6-29-65

Control No. 265 Sec. No. 3 Highway No. 71

Sampled by: Chester McDowell, D-9, T. O. Powell, BPR, J. C. Hawley, BPR and J. F. Todd, Dist. 14

At request for HPR-1( ) Research Project 1-9-63-48

Sample No.: Field No. 11-II
Lab. No. 65-311-R-Flex.Base
Field No. 12-II
Lab. No. 65-312-R-Subbase

Sample Location: Located 2.85 miles East of Travis and Bastrop County Line on Hwy. 71

Description of Section: Asph. surface 0" - 3"
Flex. Base 3" -7¼" Crushed Limestone
Subbase 7¼-16" Flint Gravel sand-clay
Sand-Clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Good section on a fairly good road

Latest Traffic Count: 3660 vehicles per day

Latest P.S.I.:

History of Pavement Construction & Maint.:
5" Select Material)
8" Flex. Base (Gravel)) 1950
5" Flex. Base (Crushed Stone))
Base Preservative)
100#/s.y. Asph. Conc. in 1952
Widen shoulders, one course surf. trt. on shoulders and 125#/s.y. Asph. Conc. on travel lanes in 1959

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Bastrop County. Date Sampled 6-29-65

Control No. 265 Sec. No. 3 Highway No. 71

Sampled by: Chester McDowell, D-9, T. O. Powell, BPR, J. C. Hawley, BPR and J. F. Todd, Dist. 14

At request for HPR-1( ) Research Project 1-9-63-48

Sample No.: Field No. 13-II
Lab. No. 313-R - Flex Base

Sample Location: Located 100' East of samples 11-II and 12-II on Highway 71

Description of Section: Asph. surface 0" - 2¼"
Flex. Base - 2¼" - 8" crushed limestone
Subbase - Flint gravel sand-Clay on Sand-clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Distressed section on a fairly good road

Latest Traffic Count: 3660 vehicles per day

Latest P.S.I.:

History of Pavement Construction & Maint.:
5" Select Material)
8" Flex. Base (Gravel)) 1950
5" Flex. Base (Crushed Stone))
Base Preservative)
100#/s.y. Asph. Conc. - 1952
Widen shoulders, one course surf. trt. on shoulders and
125#/s.y. Asph. Conc. on travelway in 1959

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Bastrop County. Date Sampled 6-29-65

Control No. 265 Sec. No. 4 Highway No. 71

Sampled by: Chester McDowell, D-9, T.O. Powell, BPR, J. C. Hawley, BPR and J. F. Todd, Dist. 14

At request for HPR-1( ) Research Project 1-9-63-48

Sample No.: Field No. 14-II
Lab. No. 65-314-R - Flex.Base
Field No. 15-II
Lab. No. 65-315-R - Subbase

Sample Location: Located 11.35 miles East of Travis and Bastrop Co. Line on Highway 71

Description of Section: Asph. surface 0" - 3½"
Flex. Base 3½" - 8" - Crushed limestone
Subbase 8" - 15-3/4" - Iron Ore Gravel
on sand-clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Good Section on a good portion of Hwy. 71

Latest Traffic Count: 4210 vehicles per day

Latest P.S.I.:

History of Pavement Construction & Maint.:
5" Select Material)
8" Flex. Base (Gravel)) 1950
5" Flex. Base (Crushed Stone))
Base Preservative)
100#/s.y. Asph. Conc. - 1952
Widen shoulders, one course Surf. Trt. on shoulders and 125#/s.y. Asph. Conc. on travel lanes in 1959

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Lee County. Date Sampled 6-29-65

Control No. 116 Sec. No. 1 Highway No. 21

Sampled by: Chester McDowell, D-9, T.O. Powell, BPR, J. C. Hawley, BPR and J. F. Todd, Dist. 14

At request for HPR-1( ) Research Project 1-9-63-48

Sample No.: Field No. 16-II
65-316-R

Sample Location: Located 4200' West of Lee and Burleson Co. Line on Highway 21

Description of Section: Asph. surface 0" - 3½"
Flex. Base - Iron Ore, Flint Gravel - 3½" - 20"
Heavy clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Bad section believed to be the one referred to by Mr. Harold Allen when traveling between College Station and Austin. Overall performance - fair

Latest Traffic Count: 1230 vehicles per day

Latest P.S.I.:

History of Pavement Construction & Maint.:
Grading - 1939
7" Flex. Base (Uncrushed))
3" Flex. Base (Crushed)) 1941
Triple Asph. Surf. Treatment)
12" Flex. Base)
Two course Surf. Treatment) 1954
Seal Coat in 1961

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Lee County. Date Sampled 6-29-65

Control No. 116 Sec. No. 1 Highway No. 21

Sampled by: Chester McDowell, D-9, T. O. Powell, BPR, J.C. Hawley, BPR and J. F. Todd, Dist. 14

At request for HPR-1( ) Research Project 1-9-63-48

Sample No.: Field No. 17-II
Lab. No. 65-317-R - Flex. Base

Sample Location:
Located 5200' West of Lee and Burleson Co. Line on Highway 21

Description of Section: Asph. surface 0" - ½" single penetration
Flex. Base - 1st hole ½" - 16", 2nd hole ½" - 18"
Heavy Clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Good Section on a fairly good road

Latest Traffic Count: 1230 vehicles per day

Latest P.S.I.:

History of Pavement Construction & Maint.:
Grading - 1939
7" Flex. Base (Uncrushed))
3" Flex. Base (Crushed)) 1941
Triple Asph. Surf. Treat.)
12" Flex. Base)
Two Crse. Surf. Treat.) 1954
Seal Coat - 1961

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Williamson County. Date Sampled 6-29-65

Control No. 204 Sec. No. 1 Highway No. 79

Sampled by: Chester McDowell, D-9, T. O Powell, BPR, J.C. Hawley, BPR and J. F. Todd, Dist. 14

At request for HPR-1( ) Research Project 1-9-63-48

Sample No.: Field No. 18-II
Lab. No. 65-318-R

Sample Location:
Located 1.15 miles East of Railroad overpass between Hutto and Round Rock on US 79

Description of Section: Asph. surface 0" - 3¼"
Flex. Base Clay gravel 3¼" - 13¼"
Heavy clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Poor section on a fairly good road

Latest Traffic Count: 2730 vehicles per day

Latest P.S.I.:

History of Pavement Construction & Maint.:

4" Select Material 3" Sledged Stone Base 3" Flexible Base Triple Asph. Surf. Treat.	1941
Two Crse. Surf. Trt. on shoulders 150#/s.y. Asph. Conc. on Travel lanes	1953
Widen shoulders and seal coat 125#/s.y. Asph. Conc. on Travel lanes	1959

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Williamson County. Date Sampled 9-16-65

Control No. 204 Sec. No. 1 Highway No. 79

Sampled by: Chester McDowell and James F. Todd

At request for HPR-1( ) Research Project 1-9-63-48

Sample No.: Field No. 19-II - Clay gravel
Lab. No. 65-421-E

Sample Location:
1.4 miles East of R.R. overpass on Hwy. 79 between Round Rock and Taylor

Description of Section: 0" - 3-3/4" HMAC surface
3-3/4" - 13" Gravel Base or 9¼" gravel base on heavy black clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Good section when sampled from a fairly good road

Latest Traffic Count: 2730

Latest P.S.I.:

History of Pavement Construction & Maint.:

4" Select Material 3" Sledged Stone Base 3" Flexible Base Triple Asph. Surf. Treat.	1941
Two Course Surf. Treat. on shoulders 150#/s.y. Asph. Conc. on Travel lanes	1953
Widen shoulders and seal coat 125#/s.y. Asph. Conc. on Travel lanes	1959

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Williamson County. Date Sampled 9-16-65

Control No. 321 Sec. No. 1 Highway No. 95

Sampled by: Chester McDowell and James F. Todd

At request for HPR-1( ) Research Project 1-9-63-48

Sample No.: Field No. 20-II - Crushed stone
Lab. No. 422-E
Field No. 21-II
Lab. No. 65-423-E - Local gravel

Sample Location:
3½ mi. South of Taylor
on Hwy. 95

Description of Section: 0" - 1-3/4" HMAC surface
1-3/4" - 7" crushed limestone
7" - 15½" Clay gravel on clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Poor - Being reconstructed

Latest Traffic Count: 1500

Latest P.S.I.:

History of Pavement Construction & Maint.:
10" loose gravel - 1927
10" Flex. Base and Two Crse. Surf. Treat. - 1954
5" Additional Flex. Base with 10' 2-crse. surf. treat. and
125#/s.y. Asph. Conc. on Travel lanes in 1962

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Williamson County. Date Sampled 9-16-65

Control No. 321 Sec. No. 2 Highway No. 95

Sampled by: Chester McDowell and James F. Todd

At request for HPR-1( ) Research Project 1-9-63-48

Sample No.: Field No. 22-II - Crushed stone
Lab. No. 65-424-E

Sample Location:
T.T.I. test section approximately 5 mi. South of Taylor on Hwy. 95

Description of Section: 0" - 3/4" HMAC surface
3/4" - 12½" crushed limestone on clay subgrade

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Good

Latest Traffic Count: 1500

Latest P.S.I.:

History of Pavement Construction & Maint.:
10" loose gravel in 1927
10" Flex. Base and Two Crse. Surf. Treat. in 1954
5" Addl. Flex. Base with 10 ft. 2-Crse. Surf. Treat. shoulders and 125#/s.y. Asph. Conc. on Travel lanes in 1962

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from McLennan County. Date Sampled Nov. 16, 1965

Control No. 398 Sec. No. 3 Highway No. 317

Sampled by: C. McDowell, D-9, J.C. Hawley, BPR, J.C. McReynolds, Dist. 9, et al.

At request for HPR-1(5) Research Project 1-9-63-48

Sample No.: Field No. 23-II, Cr. Limestone Base
Lab. No. 65-478-R
Field No. 24-II, Cr. Limestone Subbase
Lab. No. 65-479-R

Sample Location:
2 mi. North of Moody

Description of Section: Double surface treatment on 3½ in. of Cr. Stone placed over old double surface treatment on 6-3/4 in. of crushed limestone subbase on black clay subgrade.

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Doubtful due to cracking especially where sampled

Latest Traffic Count: 1340

Latest P.S.I.:

History of Pavement Construction & Maint.:
Original base and surfacing placed (Base) July 1939
(Surface) Oct. 1939
Sealed August 1941
Second base and surfacing placed in May 1951
Sealed September 1955

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from McLennan County. Date Sampled Nov. 16, 1965

Control No. 398 Sec. No. 3 Highway No. 317

Sampled by: C.McDowell, D-9; J.C. Hawley, BPR; J.C. McReynolds, Dist. 9, et al.

At request for HPR-1(5) Research Project 1-9-63-48

Sample No.: Field No. 25-II Cr. Limestone Base
Lab. No. 65-480-R
Field No. 26-II Cr. Limestone Subbase
Lab. No. 65-481-R

Sample Location:
6 mi. N. of Moody
or ½ mi. S. of
South Bosque River

Description of Section: Double surface treatment on 3½ in. of Cr. stone placed over old double surface treatment on 6½ in. of cr. stone subbase on black clay subgrade.

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Good section but overall performance of highway is doubtful

Latest Traffic Count: 1240

Latest P.S.I.:

History of Pavement Construction & Maint.:
Original base and surfacing placed in (Base) July 1939
(Surface) Oct. 1939
Sealed August 1941
Second base and surfacing placed in May 1951
Sealed September 1955

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Bell County. Date Sampled Nov. 16, 1965

Control No. 398 Sec. No. 4 Highway No. 317

Sampled by: C. McDowell, D-9; J.C. Hawley, BPR; J.C. McReynolds, Dist. 9, et al.

At request for HPR-1(5) Research Project 1-9-63-48

Sample No.: Field No. 27-II Cr. limestone base — Sample Location:
Lab. No. 65-482-R — 7 mi. S. of Moody
Field No. 28-II Cr. limestone subbase — Sta. 147
Lab. No. 65-483-R

Description of Section: Double surface treatment on 2½ in. of Cr. limestone over old double surface treatment on 6½ in. of Cr. limestone subbase on black clay subgrade.

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Good section of road. Overall condition doubtful on South end of job.

Latest Traffic Count: 1410

Latest P.S.I.:

History of Pavement Construction & Maint.:
Original base placed in December 1938
Additional base and penetration surface November 1939
Seal Coat August 1941
Additional flexible base and double surface treatment in September 1950
Seal Coat September 1957

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Bell County. Date Sampled November 16, 1965

Control No. 184 Sec. No. 2 Highway No. 36

Sampled by: C. McDowell, D-9; J.C. Hawley, BPR; J.C. McReynolds, Dist. 9, et al.

At request for HPR-1(5) Research Project 1-9-63-48

Sample No.: Field No. 29-II soft limestone base
Lab. No. 65-484-R

Sample Location:
2 mi. East of
Coryell Co. line

Description of Section: 0 to 1 in. of double and seal on eight inches of soft limestone on clay loam subgrade.

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Fairly good in both cases

Latest Traffic Count: 1600

Latest P.S.I.:

History of Pavement Construction & Maint.:

Grading and structures September 1944
Flexible base and double penetration surface Sept. 1945
Seal Coat July 1950
Seal Coat July 1956
Seal Coat August 1962

TEXAS STATE HIGHWAY DEPARTMENT

DIVISION OF MATERIALS & TESTS
Austin, Texas

Samples from Bell County. Date Sampled Nov. 16, 1965

Control No. 1835 Sec. No. 2 Highway No. 1741

Sampled by: C.McDowell, D-9; J.C. Hawley, BPR; J.C. McReynolds, Dist. 9, et al.

At request for HPR-1(5) Research Project 1-9-63-48

Sample No. Field No. 30-II Gravel Base
Lab. No. 65-485-R

Sample Location:
½ mi. E. of IH 35
opposite sand pit.

Description of Section: 0 to 3/4 in. depth consists of surface treatment and seal on 5-3/4 in. of gravel base underlaid by brown clay containing some sand and gravel particles.

Present Condition of Pvt. and Overall Evaluation as Good, Poor, etc.:
Fairly good

Latest Traffic Count: 540 (High percentage of trucks)

Latest P.S.I.:

History of Pavement Construction & Maint.:
Grading and structures, base and surface December 1953
Seal Coat September 1957
Recondition base and resurface November 1958
Seal Coat August 1963

SAMPLING OPERATIONS IN DIST. 14

Photo No. 1-D
Twelve in. Diam. core bit cutting surfacing.

Photo No. 2-D
Surfacing core has been cut and removed.

SAMPLING IN DIST. 14 CONTD.

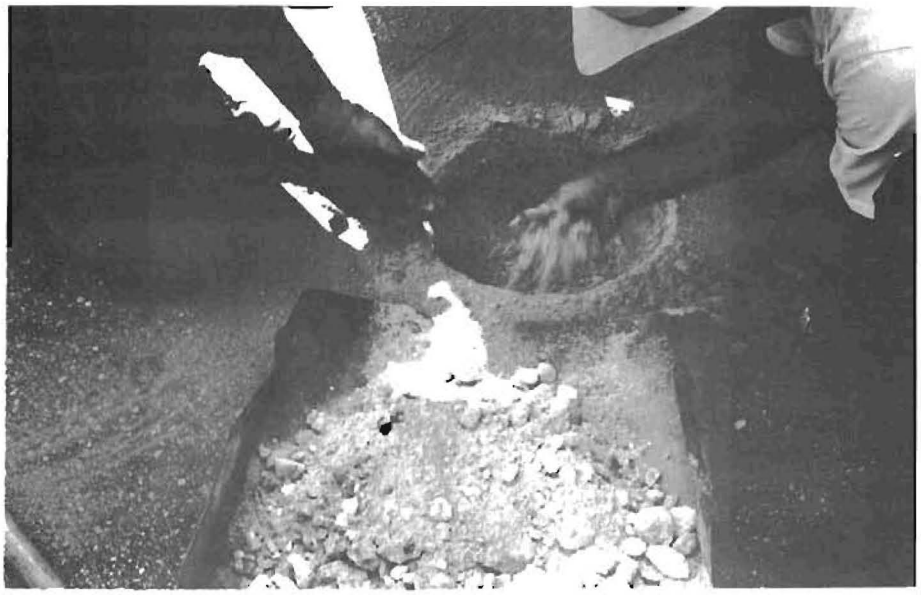

Photo No. 3-D
Removing base material.

Photo No. 4-D
Filling hole with asphaltic concrete.

SAMPLING OPERATIONS IN DIST. 9

Photo No. 5-D
Eighteen in. diameter bit cutting surfacing.

Photo No. 6-D
After removing surfacing

PHOTOGRAPHS SHOWING
CONDITION OF PAVEMENT

Photo No. 7-P
T.T.I. Test
Section.

U.S. 81 Business Route in So. Austin in good condition.

Photo No. 8-P
U.S. 77 in
Falls County
cracked and
patched.
T.T.I. Test
Section.

PAVEMENT CONDITIONS CONTD.

Photo No. 9-P
T.T.I. Test
Section.

Excellent condition of State Hwy. 320, Falls Co.

Photo No. 10-P
T.T.I. Test
Section.

Excellent condition of U.S. 84, Hamilton Co.

PAVEMENT CONDITIONS CONTD.

Photo No. 11-P
T.T.I. Test
Section.

Showing good condition of Spur 247 (U.S. 87)
in San Antonio

Photo No. 12-P
T.T.I. Test
Section

Showing good condition of IH 10, 4 mi. East
of San Antonio

PAVEMENT CONDITIONS CONTD.

Photo No. 13-P

Good section on Hwy. 71 in Bastrop Co.
2.85 mi. East of Travis-Bastrop Co. Line

Photo No. 14-P

Distressed section 100 ft. East of above location

PAVEMENT CONDITIONS CONTD.

Photo No. 15-P

Excellent section of Hwy. 71 in Bastrop Co.
11.35 mi. East of Travis-Bastrop Co. Line

Photo No. 16-P

Poor section of Hwy. 21 in Lee County 4200 ft.
West of Lee-Burleson Co. Line

PAVEMENT CONDITIONS CONTD.

Photo No. 17-P

Good section of Hwy. 21 in Lee Co.
one mi. West of Lee-Burleson Co. Line

Photo No. 18-P

Fairly poor section of U.S. 79 between
Round Rock and Hutto in Williamson County

PAVEMENT CONDITIONS CONTD.

Photo No. 19-P

Good section on U.S. 79 between Round Rock
and Hutto in Williamson County

Photo No. 20-P

Poor section of Hwy. 95 between Taylor
and Elgin in Williamson County

PAVEMENT CONDITIONS CONTD.

Photo No. 21-P
T.T.I. Test
Section

Good section of Hwy. 95 between Taylor and Elgin

Photo No. 22-P
Section of doubtful
pavement due to
longitudinal cracks.
Located 2 mi. North
of Moody on State
Hwy. 317 in
McLennan County.

PAVEMENT CONDITIONS CONTD.

Photo No. 23-P

Good section of Hwy. 317, 13 mi. North of Moody in McLennan County. Rough surface due to poor seal coat

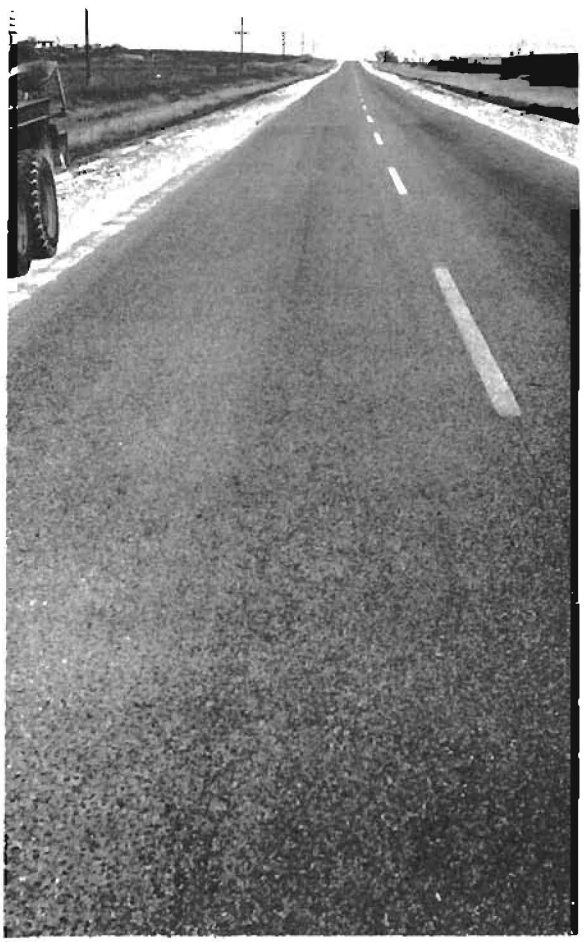

Photo No. 24-P
Good section of Hwy. 317, 13 mi. South of Moody in Bell County

PAVEMENT CONDITIONS CONTD.

Photo No. 25-P
Fairly good section
of Hwy. 36 in
Bell County

Photo No. 26-P showing fairly good section
of FM 1741 in Bell County

TABLE II
TEST DATA BY BUREAU OF PUBLIC ROADS AND TEXAS HIGHWAY DEPT.
FOR AGGREGATE SAMPLES SUPPLIED BY TEXAS HIGHWAY DEPT.

(BPR Values Shown in Black & THD Values Shown in Red)

Sample No. Tex. Hwy. Department	Sample No. Bur. of Public Rds.		Mechanical Analysis Percentage Passing Sieve 2-in.	1-3/4-in.	1½-in.	1¼-in.	1-in.	7/8-in.	3/4-in.	3/8-in.	No. 4 (4.7 mm.)	No.10 (2.0 mm.)	No.40 (0.42 mm.)	No.200 (0.074 mm.)	L.L.	L.L. Mach.	P.L.	P.I.
63-208-R	S-42989	1/	99		89		68		57	37	28	23	19	16	26		16	10
63-208-R	S-42989	3/	100	90		79		58		36	26	20	16		29		16	13
63-208-R	S-42989	3/														26	16	10
63-208-R	S-42989	2/	98		85		68		58	36	25	21	17	14	25		16	9
63-208-R	S-42989	2/	100	99		89		63		36	25	19	15		25		16	9
63-208-R	S-42989	2/														23	16	7
63-208-R	S-42989	3/	(Sample prepared wet by Tex. Hwy.Dept. and tested by BPR)												27		16	11
63-208-R	S-42989	1/	(Sample prepared wet by BPR and tested by THD)												29		15	14
63-208-R	S-42989	2/	(Sample prepared dry by BPR and tested by THD)												27		15	12
63-209-R	S-42990	1/	100		98		91		84	63	47	34	21	12	18		12	6
63-209-R	S-42990	3/				100		87		64	50	37	22		21		12	9
63-209-R	S-42990	3/														20	12	8
63-209-R	S-42990	2/	100		98		91		83	63	47	36	24	13	18		13	5
63-209-R	S-42990	2/		100		95		89		63	46	32	20		20		13	7
63-209-R	S-42990	2/														18	13	5
63-209-R	S-42990	3/	(Sample prepared wet by THD and tested by BPR)												19		12	7
63-209-R	S-42990	1/	(Sample prepared wet by BPR and tested by THD)												21		13	8
63-209-R	S-42990	2/	(Sample prepared dry by BPR and tested by THD)												20		13	7
63-210-R	S-42991	1/	97		90		79		72	54	43	34	27	19	18		14	4
63-210-R	S-42991	3/	96	94		90		83		59	46	36	26		21		15	6
63-210-R	S-42991	3/														18	15	3
63-210-R	S-42991	2/	98		95		82		73	53	42	35	27	18	17		14	3
63-210-R	S-42991	2/		100		91		79		57	43	34	26		20		15	5
63-210-R	S-42991	2/														17	15	2
63-210-R	S-42991	3/	(Sample prepared wet by THD and tested by BPR)												18		15	3
63-210-R	S-42991	1/	(Sample prepared wet by BPR and tested by THD)												20		15	5
63-210-R	S-42991	2/	(Sample prepared dry by BPR and tested by THD)												18		15	3
63-211-R	S-42992	1/	100		94		85		75	50	34	24	14	8	19		13	6
63-211-R	S-42992	3/	100			97		87		54	39	27	14		21		14	7
63-211-R	S-42992	3/														19	14	5
63-211-R	S-42992	2/	100		95		83		73	48	33	25	16	10	19		13	6
63-211-R	S-42992	2/	100	98		93		78		49	34	23	14		21		14	7
63-211-R	S-42992	2/														18	14	4
63-211-R	S-42992	3/	(Sample prepared wet by THD and tested by BPR)												19		13	6
63-211-R	S-42992	1/	(Sample prepared wet by BPR and tested by THD)												21		15	6
63-211-R	S-42992	2/	(Sample prepared dry by BPR and tested by THD)												21		15	6

1/ Sample prepared in accordance with AASHO T 146 - Wet preparation of disturbed soil samples for test by B.P.R.
2/ Sample prepared in accordance with AASHO T 87 - Dry preparation of disturbed soil samples for test by B.P.R. and T.H.D.
3/ Sample prepared by Texas Highway Department in accordance with Tex 101 - Wet method.

TABLE II (Contd.)
TEST DATA BY BUREAU OF PUBLIC ROADS AND TEXAS HIGHWAY DEPT.
FOR AGGREGATE SAMPLES SUPPLIED BY TEXAS HIGHWAY DEPT.

(BPR Values Shown in Black & THD Values Shown in Red)

Sample No. Tex. Hwy. Department	Bur. of Public Rds.		Mechanical Analysis Percentage Passing Sieve 2-in.	1-3/4-in.	1½-in.	1¼-in.	1-in.	7/8-in.	3/4-in.	3/8-in.	No. 4 (4.7 mm.)	No.10 (2.0 mm.)	No.40 (0.42 mm.)	No.200 (0.074 mm.)	L.L.	L.L. Mach.	P.L.	P.I.
63-212-R	S-42993	1/	100		98		93		87	68	51	36	17	13	39		20	19
63-212-R	S-42993	3/	100	97		94		86		66	51	36	16		40		17	23
63-212-R	S-42993	3/														36	17	19
63-212-R	S-42993	2/	100		97		89		83	66	51	40	20	15	33		17	16
63-212-R	S-42993	2/	100	100		94		86		65	49	34	14		35		17	18
63-212-R	S-42993	2/														32	17	15
63-212-R	S-42993	3/			(Sample prepared wet by THD and tested by BPR)										41		20	21
63-212-R	S-42993	1/			(Sample prepared wet by BPR and tested by THD)										39		16	23
63-212-R	S-42993	2/			(Sample prepared dry by BPR and tested by THD)										35		17	18
63-248-R	S-42994	1/	100		99		82		65	47	39	34	30	26	23		15	8
63-248-R	S-42994	3/	100	100		96		77		54	45	41	31		27		15	12
63-248-R	S-42994	3/														23	15	8
63-248-R	S-42994	2/	100		99		81		66	44	33	31	27	26	22		15	7
63-248-R	S-42994	2/	100	100		90		67		42	29	19	16		25		17	8
63-248-R	S-42994	2/														22	17	5
63-248-R	S-42994	3/			(Sample prepared wet by THD and tested by BPR)										24		15	9
63-248-R	S-42994	1/			(Sample prepared wet by BPR and tested by THD)										26		15	11
63-248-R	S-42994	2/			(Sample prepared dry by BPR and tested by THD)										25		16	9
63-249-R	S-42995	1/	100		99		81		69	48	37	30	23	7	N.P.			
63-249-R	S-42995	3/	100	100		89		69		44	33	26	20		21		17	4
63-249-R	S-42995	3/														N.P.		
63-249-R	S-42995	2/	100		98		81		68	48	39	35	29	10	N.P.			
63-249-R	S-42995	2/	100	100		90		69		48	38	30	26		21		17	4
63-249-R	S-42995	2/														N.P.		
63-249-R	S-42995	3/			(Sample prepared wet by THD and tested by BPR)										N.P.			
63-249-R	S-42995	1/			(Sample prepared wet by BPR and tested by THD)										21		18	3
63-249-R	S-42995	2/			(Sample prepared dry by BPR and tested by THD)										22		18	4
63-253-R	S-42996	1/	100		99		93		89	81	71	61	53	22	34		25	9
63-253-R	S-42996	3/	100	100		95		88		76	66	56	47		37		23	14
63-253-R	S-42996	3/														Not run		
63-253-R	S-42996	2/	100		98		92		88	74	63	58	54	23	33		22	11
63-253-R	S-42996	2/	100	100		95		88		71	57	43	37		33		27	6
63-253-R	S-42996	2/														30	27	3
63-253-R	S-42996	3/			(Sample prepared wet by THD and tested by BPR)										34		22	12
63-253-R	S-42996	1/			(Sample prepared wet by BPR and tested by THD)										34		25	9
63-253-R	S-42996	2/			(Sample prepared dry by BPR and tested by THD)										34		24	10

1/ Sample prepared in accordance with AASHO T 146 - Wet preparation of disturbed soil samples for test by B.P.R.
2/ Sample prepared in accordance with AASHO T 87 - Dry preparation of disturbed soil samples for test by B.P.R. and T.H.D.
3/ Sample prepared by Texas Highway Department in accordance with Tex 101 - Wet method.

TABLE II (Contd.)

TEST DATA BY BUREAU OF PUBLIC ROADS AND TEXAS HIGHWAY DEPT.
FOR AGGREGATE SAMPLES SUPPLIED BY TEXAS HIGHWAY DEPT.

(BPR Values Shown in Black & THD Values Shown in Red)

Sample No. Tex. Hwy. Department	Bur. of Public Rds.		Mechanical Analysis Percentage Passing Sieve 2-in.	1-3/4-in.	1½-in.	1¼-in.	1-in.	7/8-in.	3/4-in.	3/8-in.	No. 4 (4.7 mm.)	No.10 (2.0 mm.)	No.40 (0.42 mm.)	No.200 (0.074 mm.)	L.L.	L.L. Mach.	P.L.	P.I.
63-262-R	S-42997	1/	100		100		89		80	63	49	39	32	13	32		18	14
63-262-R	S-42997	3/	100	100		96		80		60	48	37	29		31		17	14
63-262-R	S-42997	3/														Not run		
63-262-R	S-42997	2/	100		99		88		79	62	49	46	38	17	36		21	15
63-262-R	S-42997	2/	100	100		96		80		61	47	34	27		29		23	6
63-262-R	S-42997	2/														N.P.		
63-262-R	S-42997	3/			(Sample prepared wet by THD and tested by BPR)										32		17	15
63-262-R	S-42997	1/			(Sample prepared wet by BPR and tested by THD)										31		17	14
63-262-R	S-42997	2/			(Sample prepared dry by BPR and tested by THD)										36		21	15
63-263-R	S-42998	1/	100		98		88		81	65	58	54	49	12	N.P.			
63-263-R	S-42998	3/	100	100		95		84		65	57	52	47		22		19	3
63-263-R	S-42998	3/														N.P.		
63-263-R	S-42998	2/	100		96		83		76	60	53	48	45	11	N.P.			
63-263-R	S-42998	2/	100	98		93		80		60	51	46	42		22		19	3
63-263-R	S-42998	2/														N.P.		
63-263-R	S-42998	3/			(Sample prepared wet by THD and tested by BPR)										N.P.			
63-263-R	S-42998	1/			(Sample prepared wet by BPR and tested by THD)										21		18	3
63-263-R	S-42998	2/			(Sample prepared dry by BPR and tested by THD)										21		18	3
63-279-R	S-43129	1/	100		98		80		70	54	45	39	31	15	23		17	6
63-279-R	S-43129	3/	100	99		91		79		59	48	41	33		27		12	15
63-279-R	S-43129	3/														23	12	11
63-279-R	S-43129	2/	100		99		87		81	70	63	54	43	17	22		17	5
63-279-R	S-43129	2/	100	100		87		66		41	28	23	18		26		14	12
63-279-R	S-43129	2/														22	14	8
63-279-R	S-43129	3/			(Sample prepared wet by THD and tested by BPR)										24		13	11
63-279-R	S-43129	1/			(Sample prepared wet by BPR and tested by THD)										26		14	12
63-279-R	S-43129	2/			(Sample prepared dry by BPR and tested by THD)										24		15	9
63-304-R	S-43128	1/	100		100		99		98	88	71	61	51	25	28		12	16
63-304-R	S-43128	3/	100	100		100		100		87	68	58	48		29		12	17
63-304-R	S-43128	3/														26	12	14
63-304-R	S-43128	2/	100		100		100		100	88	68	60	50	24	26		13	13
63-304-R	S-43128	2/	100	100		100		100		87	65	53	40		27		11	16
63-304-R	S-43128	2/														25	11	14
63-304-R	S-43128	3/			(Sample prepared wet by THD and tested by BPR)										27		12	15
63-304-R	S-43128	1/			(Sample prepared wet by BPR and tested by THD)										29		12	17
63-304-R	S-43128	2/			(Sample prepared dry by BPR and tested by THD)										28		12	16

1/ Sample prepared in accordance with AASHO T 146 - Wet preparation of disturbed soil samples for test by B.P.R.
2/ Sample prepared in accordance with AASHO T 87 - Dry preparation of disturbed soil samples for test by B.P.R. and T.H.D.
3/ Sample prepared by Texas Highway Department in accordance with Tex 101 - Wet method.

TABLE III
TEST DATA BY BUREAU OF PUBLIC ROADS AND TEXAS HIGHWAY DEPT.
FOR AGGREGATE SAMPLES SUPPLIED BY TEXAS HIGHWAY DEPT.

(BPR Values Shown in Black & THD Values Shown in Red)

Sample No. Tex. Hwy. Department	Sample No. Bur. of Public Rds.		Mechanical Analysis Percentage Passing Sieve 2-in.	1-3/4-in.	1½-in.	1¼-in.	1-in.	7/8-in.	3/4-in.	3/8-in.	No. 4 (4.7 mm.)	No.10 (2.0 mm.)	No.40 (0.42 mm.)	No.200 (0.074 mm.)	L.L.	L.L. Mach.	P.L.	P.I.
64-190-R	S-45219	1/			100			96		90	72	54	46	35	26	41		16	25
64-190-R	S-45219	3/		100			95		89		61	45	35	27		41		14	27
64-190-R	S-45219	2/	100		99			95		92	74	57	44	34	26	38		17	21
64-190-R	S-45219	2/		100			94		86		63	47	35	18		32		13	19
64-190-R	S-45219	3/	(Sample prepared wet by THD and tested by BPR)													42		18	24
64-190-R	S-45219	1/	(Sample prepared wet by BPR and tested by THD)													38		14	24
64-190-R	S-45219	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)														36	14	22
64-190-R	S-45219	3/	(Sample prepared dry by THD and tested by BPR)													34		18	16
64-190-R	S-45219	2/	(Sample prepared dry by BPR and tested by THD)													36		14	22
64-190-R	S-45219	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)														34	14	20
64-191-R	S-45220	1/	100		98			92		87	73	61	53	45	35	38		16	22
64-191-R	S-45220	3/	91	91			91		82		66	55	48	40		37		14	23
64-191-R	S-45220	2/	100		98			94		88	73	60	52	45	35	34		16	18
64-191-R	S-45220	2/		100			93		84		69	55	45	27		31		14	17
64-191-R	S-45220	3/	(Sample prepared wet by THD and tested by BPR)													38		17	21
64-191-R	S-45220	1/	(Sample prepared wet by BPR and tested by THD)													36		14	22
64-191-R	S-45220	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)														34	14	20
64-191-R	S-45220	2/	(Sample prepared dry by THD and tested by BPR)													33		18	15
64-191-R	S-45220	2/	(Sample prepared dry by BPR and tested by THD)													33		15	18
64-191-R	S-45220	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)														32	15	17
64-301-R	S-45221	1/	100		99			95		92	79	63	45	24	10	25		13	12
64-301-R	S-45221	3/				100		98			82	59	36	17		27		11	16
64-301-R	S-45221	2/	100		99			94		92	78	60	40	23	10	24		14	10
64-301-R	S-45221	2/		100			96		91		71	53	34	15		25		11	14
64-301-R	S-45221	3/	(Sample prepared wet by THD and tested by BPR)													26		14	12
64-301-R	S-45221	1/	(Sample prepared wet by BPR and tested by THD)													26		11	15
64-301-R	S-45221	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)														24	11	13
64-301-R	S-45221	2/	(Sample prepared dry by THD and tested by BPR)													24		14	10
64-301-R	S-45221	2/	(Sample prepared dry by BPR and tested by THD)													25		11	14
64-301-R	S-45221	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)														22	11	11
64-302-R	S-45222	1/	3" 2" 100-89		82			76		71	63	56	51	46	40	30		16	14
64-302-R	S-45222	3/	100-78	72			64		58		49	43	38	33		31		16	15
64-302-R	S-45222	2/	100-86		81			75		72	61	50	42	39	33	28		16	12
64-302-R	S-45222	2/	100-84	80			75		65		49	38	29	17		28		15	13
64-302-R	S-45222	3/	(Sample prepared wet by THD and tested by BPR)													31		17	14
64-302-R	S-45222	1/	(Sample prepared wet by BPR and tested by THD)													31		15	16
64-302-R	S-45222	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)														29	15	14
64-302-R	S-45222	2/	(Sample prepared dry by THD and tested by BPR)													29		16	13
64-302-R	S-45222	2/	(Sample prepared dry by BPR and tested by THD)													30		16	14
64-302-R	S-45222	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)														28	15	13

1/ Sample prepared in accordance with AASHO T 146 - Wet preparation of disturbed soil samples for test by B.P.R.
2/ Sample prepared in accordance with AASHO T 87 - Dry preparation of disturbed soil samples for test by B.P.R. and T.H.D.
3/ Sample prepared by Texas Highway Department in accordance with Tex 101 - Wet method.

TABLE III (Contd.)
TEST DATA BY BUREAU OF PUBLIC ROADS AND TEXAS HIGHWAY DEPT.
FOR AGGREGATE SAMPLES SUPPLIED BY TEXAS HIGHWAY DEPT.

(BPR Values Shown in Black & THD Values Shown in Red)

Sample No. Tex. Hwy. Department	Bur. of Public Rds.		Mechanical Analysis Percentage Passing Sieve 2-in.	1-3/4-in.	1½-in.	1½-in.	1-in.	7/8-in.	3/4-in.	3/8-in.	No. 4 (4.7 mm.)	No.10 (2.0 mm.)	No.40 (0.42 mm.)	No.200 (0.074 mm.)	L.L.	L.L. Mach.	P.L.	P.I.
64-303-R	S-45223	1/	100		96		85		77	62	51	42	31	24	20		16	4
64-303-R	S-45223	3/		100		91		83		65	54	44	33		22		15	7
64-303-R	S-45223	2/	100		97		83		78	62	51	42	33	26	19		16	3
64-303-R	S-45223	2/		100		93		82		63	51	42	30		22		16	6
64-303-R	S-45223	3/	(Sample prepared wet by THD and tested by BPR)												20		17	3
64-303-R	S-45223	1/	(Sample prepared wet by BPR and tested by THD)												22		16	6
64-303-R	S-45223	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													21	16	5
64-303-R	S-45223	2/	(Sample prepared dry by THD and tested by BPR)												20		17	3
64-303-R	S-45223	2/	(Sample prepared dry by BPR and tested by THD)												21		16	5
64-303-R	S-45223	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													19	16	3
64-304-R	S-45224	1/			100		92		85	67	53	42	30	23	20		18	2
64-304-R	S-45224	3/		100		99		87		65	51	39	28		23		18	5
64-304-R	S-45224	2/	100		99		90		83	65	51	38	28	21	N.P.		N.P.	N.P.
64-304-R	S-45224	2/		100		96		86		66	52	40	29		23		17	6
64-304-R	S-45224	3/	(Sample prepared wet by THD and tested by BPR)												20		19	1
64-304-R	S-45224	1/	(Sample prepared wet by BPR and tested by THD)												23		18	5
64-304-R	S-45224	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													20	18	2
64-304-R	S-45224	2/	(Sample prepared dry by THD and tested by BPR)												20		18	2
64-304-R	S-45224	2/	(Sample prepared dry by BPR and tested by THD)												23		18	5
64-304-R	S-45224	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													21	18	3
64-353-R	S-45225	1/	100		96		89		83	72	63	53	37	26	26		18	8
64-353-R	S-45225	3/		100		89		80		68	59	49	33		28		18	10
64-353-R	S-45225	2/	100		96		86		80	70	62	53	38	25	24		18	6
64-353-R	S-45225	2/		100		93		86		66	53	41	23		26		18	8
64-353-R	S-45225	3/	(Sample prepared wet by THD and tested by BPR)												26		18	8
64-353-R	S-45225	1/	(Sample prepared wet by BPR and tested by THD)												27		18	9
64-353-R	S-45225	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													25	18	7
64-353-R	S-45225	2/	(Sample prepared dry by THD and tested by BPR)												24		19	5
64-353-R	S-45225	2/	(Sample prepared dry by BPR and tested by THD)												26		18	8
64-353-R	S-45225	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													24	18	6
64-354-R	S-45226	1/			100		89		68	43	34	28	22	18	25		16	9
64-354-R	S-45226	3/		100		95		75		45	36	29	23		26		17	9
64-354-R	S-45226	2/			100		83		64	42	33	27	22	17	24		17	7
64-354-R	S-45226	2/				100		69		39	28	21	13		25		17	8
64-354-R	S-45226	3/	(Sample prepared wet by THD and tested by BPR)												25		18	7
64-354-R	S-45226	1/	(Sample prepared wet by BPR and tested by THD												25		17	8
64-354-R	S-45226	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													22	17	5
64-354-R	S-45226	2/	(Sample prepared dry by THD and tested by BPR)												24		17	7
64-354-R	S-45226	2/	(Sample prepared dry by BPR and tested by THD)												24		16	8
64-354-R	S-45226	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													23	16	7

1/ Sample prepared in accordance with AASHO T 146 - Wet preparation of disturbed soil samples for test by B.P.R.
2/ Sample prepared in accordance with AASHO T 87 - Dry preparation of disturbed soil samples for test by B.P.R. and T.H.D.
3/ Sample prepared by Texas Highway Department in accordance with Tex 101 - Wet method.

TABLE III (Contd.)

TEST DATA BY BUREAU OF PUBLIC ROADS AND TEXAS HIGHWAY DEPT.
FOR AGGREGATE SAMPLES SUPPLIED BY TEXAS HIGHWAY DEPT.

(BPR Values Shown in Black & THD Values Shown in Red)

Sample No. Tex. Hwy. Department	Bur. of Public Rds.		Mechanical Analysis Percentage Passing Sieve 2-in.	1-3/4-in.	1½-in.	1¼-in.	1-in.	7/8-in.	3/4-in.	3/8-in.	No. 4 (4.7 mm.)	No.10 (2.0 mm.)	No.40 (0.42 mm.)	No.200 (0.074 mm.)	L.L.	L.L. Mach.	P.L.	P.I.
64-355-R	S-45227	1/			100		94		90	78	67	54	40	31	22		15	7
64-355-R	S-45227	3/		100		94		86		70	57	44	31		22		14	8
64-355-R	S-45227	2/	100		98		95		92	82	68	61	50	42	22		16	6
64-355-R	S-45227	2/		100		96		88		68	52	37	21		22		14	8
64-355-R	S-45227	3/	(Sample prepared wet by THD and tested by BPR)												21		15	6
64-355-R	S-45227	1/	(Sample prepared wet by BPR and tested by THD)												23		15	8
64-355-R	S-45227	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													21	15	6
64-355-R	S-45227	2/	(Sample prepared dry by THD and tested by BPR)												21		15	6
64-355-R	S-45227	2/	(Sample prepared dry by BPR and tested by THD)												23		15	8
64-355-R	S-45227	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													20	15	5
64-460-R	S-45228	1/	100		94		78		69	50	37	28	20	14	27		16	11
64-460-R	S-45228	3/	100	95		83		65		42	31	22	15		28		15	13
64-460-R	S-45228	2/	100		94		74		66	46	33	25	18	13	23		16	7
64-460-R	S-45228	2/		100		85		67		43	31	22	14		25		15	10
64-460-R	S-45228	3/	(Sample prepared wet by THD and tested by BPR)												27		16	11
64-460-R	S-45228	1/	(Sample prepared wet by BPR and tested by THD)												26		15	11
64-460-R	S-45228	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													24	15	9
64-460-R	S-45228	2/	(Sample prepared dry by THD and tested by BPR)												24		16	8
64-460-R	S-45228	2/	(Sample prepared dry by BPR and tested by THD)												25		15	10
64-460-R	S-45228	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													21	15	6
65-311-R	S-46784	1/	100		99		92		87	76	69	62	42	24	N.P.		N.P.	N.P.
65-311-R	S-46784	3/		100		96		89		71	61	52	34		18	N.P.	14	4
65-311-R	S-46784	2/	100		99		91		86	74	67	59	41	21	N.P.		N.P.	N.P.
65-311-R	S-46784	2/		100		89		81		74	60	53	37		19	N.P.	15	4
65-311-R	S-46796	3/	(Sample prepared wet by THD and tested by BPR)												16		15	1
65-311-R	S-46784	1/	(Sample prepared wet by BPR and tested by THD)												18		15	3
65-311-R	S-46784	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)												N.P.	N.P.	N.P.	N.P.
65-311-R	S-46796	2/	(Sample prepared dry by THD and tested by BPR)												N.P.	N.P.	N.P.	N.P.
65-311-R	S-46784	2/	(Sample prepared dry by BPR and tested by THD)												18		15	3
65-311-R	S-46784	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)												N.P.	N.P.	N.P.	N.P.
65-312-R	S-46785	1/	3" 2" 100-98		95		87		79	63	51	43	35	17	26		20	6
65-312-R	S-46785	3/	100	97		95		78		56	44	36	29		25	23	20	5
65-312-R	S-46785	2/	100-97		94		87		79	62	51	41	33	17	25		21	4
65-312-R	S-46785	2/		97		90		80		59	47	39	30		25	22	19	6
65-312-R	S-46797	3/	(Sample prepared wet by THD and tested by BPR)												25		20	5
65-312-R	S-46785	1/	(Sample prepared wet by BPR and tested by THD)												25	24	21	4
65-312-R	S-46785	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)												24		21	3
65-312-R	S-46797	2/	(Sample prepared dry by THD and tested by BPR)												23		16	7
65-312-R	S-46785	2/	(Sample prepared dry by BPR and tested by THD)												24		21	3
65-312-R	S-46785	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													24	21	3

1/ Sample prepared in accordance with AASHO T 146 - Wet preparation of disturbed soil samples for test by B.P.R.
2/ Sample prepared in accordance with AASHO T 87 - Dry preparation of disturbed soil samples for test by B.P.R. and T.H.D.
3/ Sample prepared by Texas Highway Department in accordance with Tex 101 - Wet method.

TABLE III (Contd.)

TEST DATA BY BUREAU OF PUBLIC ROADS AND TEXAS HIGHWAY DEPT.
FOR AGGREGATE SAMPLES SUPPLIED BY TEXAS HIGHWAY DEPT.

(BPR Values Shown in Black & THD Values Shown in Red)

Sample No. Tex. Hwy. Department	Bur. of Public Rds.		Mechanical Analysis Percentage Passing Sieve 2-in.	1-3/4-in.	1½-in.	1¼-in.	1-in.	7/8-in.	3/4-in.	3/8-in.	No. 4 (4.7 mm.)	No.10 (2.0 mm.)	No.40 (0.42 mm.)	No.200 (0.074 mm.)	L.L.	L.L. Mach.	P.L.	P.I.
65-313-R	S-46786	1/	100		98		88		79	67	58	50	32	20	N.P.		N.P.	N.P.
65-313-R	S-46786	3/		100		92		75		60	51	42	26		18	15	13	5
65-313-R	S-46786	2/	100		98		84		76	64	56	48	32	16	N.P.		N.P.	N.P.
65-313-R	S-46786	2/		100		92		73		65	59	49	31		18	15	14	4
65-313-R	S-46798	3/	(Sample prepared wet by THD and tested by BPR)												N.P.		N.P.	N.P.
65-313-R	S-46786	1/	(Sample prepared wet by BPR and tested by THD)												18		14	4
65-313-R	S-46786	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													15	13	2
65-313-R	S-46798	2/	(Sample prepared dry by THD and tested by BPR)												N.P.		N.P	N.P.
65-313-R	S-46786	2/	(Sample prepared dry by BPR and tested by THD)												18		15	3
65-313-R	S-46786	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													N.P.	N.P.	N.P.
65-314-R	S-46787	1/	100		95		78		69	57	50	45	33	18	17		15	2
65-314-R	S-46787	3/		100		95		73		58	50	42	28		20	17	15	5
65-314-R	S-46787	2/	100		95		74		62	51	45	40	30	16	N.P.		N.P.	N.P.
65-314-R	S-46787	2/		100		87		68		54	47	41	28		20	16	14	6
65-314-R	S-46799	3/	(Sample prepared wet by THD and tested by BPR)												17		15	2
65-314-R	S-46787	1/	(Sample prepared wet by BPR and tested by THD)												20		16	4
65-314-R	S-46787	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													N.P.	N.P.	N.P.
65-314-R	S-46799	2/	(Sample prepared dry by THD and tested by BPR)												16		14	2
65-314-R	S-46787	2/	(Sample prepared dry by BPR and tested by THD)												20		16	4
65-314-R	S-46787	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													N.P.	N.P.	N.P.
			3" 2"															
65-315-R	S-46788	1/	100		91		84		78	67	58	48	35	10	21		18	3
65-315-R	S-46788	3/		100		95		88		73	63	53	40		22	21	16	6
65-315-R	S-46788	2/	100-98		94		86		80	69	60	52	39	12	20		18	2
65-315-R	S-46788	2/		100		93		85		72	62	51	36		21	20	17	4
65-315-R	S-46800	3/	(Sample prepared wet by THD and tested by BPR)												21		18	3
65-315-R	S-46788	1/	(Sample prepared wet by BPR and tested by THD)												22		19	3
65-315-R	S-46788	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													21	18	3
65-315-R	S-46800	2/	(Sample prepared dry by THD and tested by BPR)												20		18	2
65-315-R	S-46788	2/	(Sample prepared dry by BPR and tested by THD)												22		19	3
65-315-R	S-46788	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													21	18	3
65-316-R	S-46789	1/	100		96		93		89	73	58	47	39	19	23		17	6
65-316-R	S-46789	3/				100		95		77	62	49	40		23	21	16	7
65-316-R	S-46789	2/	100-99		97		93		90	78	64	50	41	20	22		18	4
65-316-R	S-46789	2/		100		96		89		73	57	45	33		23	20	18	5
65-316-R	S-46801	3/	(Sample prepared wet by THD and tested by BPR)												21		16	5
65-316-R	S-46789	1/	(Sample prepared wet by BPR and tested by THD)												24		16	8
65-316-R	S-46789	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													22	16	6
65-316-R	S-46801	2/	(Sample prepared dry by THD and tested by BPR)												21		17	4
65-316-R	S-46789	2/	(Sample prepared dry by BPR and tested by THD)												23		17	6
65-316-R	S-46789	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													22	17	5

1/ Sample prepared in accordance with AASHO T 146 - Wet preparation of disturbed soil samples for test by B.P.R.
2/ Sample prepared in accordance with AASHO T 87 - Dry preparation of disturbed soil samples for test by B.P.R. and T.H.D.
3/ Sample prepared by Texas Highway Department in accordance with Tex 101 - Wet method.

TABLE III (Contd.)
TEST DATA BY BUREAU OF PUBLIC ROADS AND TEXAS HIGHWAY DEPT.
FOR AGGREGATE SAMPLES SUPPLIED BY TEXAS HIGHWAY DEPT.

(BPR Values Shown in Black & THD Values Shown in Red)

Sample No. Tex. Hwy. Department	Bur. of Public Rds.		Mechanical Analysis Percentage Passing Sieve 3" 2"	1-3/4-in.	1½-in.	1¼-in.	1-in.	7/8-in.	3/4-in.	3/8-in.	No. 4 (4.7 mm.)	No.10 (2.0 mm.)	No.40 (0.42 mm.)	No.200 (0.074 mm.)	L.L.	L.L. Mach.	P.L.	P.I.
65-317-R	S-46790	1/	100-97		93		88		84	71	61	53	45	18	23		18	5
65-317-R	S-46790	3/	100	96		93		84		71	60	50	40		27	25	15	12
65-317-R	S-46790	2/	97		94		88		84	73	63	54	45		21		19	2
65-317-R	S-46790	2/	100	97		95		80		68	59	51	41		23	21	18	5
65-317-R	S-46802	3/	(Sample prepared wet by THD and tested by BPR)												26		16	10
65-317-R	S-46790	1/	(Sample prepared wet by BPR and tested by THD)												24		18	6
65-317-R	S-46790	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													23	18	5
65-317-R	S-46802	2/	(Sample prepared dry by THD and tested by BPR)												21		18	3
65-317-R	S-46790	2/	(Sample prepared dry by BPR and tested by THD)												24		20	4
65-317-R	S-46790	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													22	20	2
65-318-R	S-46791	1/	100		98		96		90	71	56	46	36	21	29		16	13
65-318-R	S-46791	3/		100		99		94		81	65	54	34		27	27	15	13
65-318-R	S-46791	2/	97		97		96		91	72	57	46	36	26	27		15	12
65-318-R	S-46791	2/		100		100		93		78	60	46	30		28	28	19	10
65-318-R	S-46803	3/	(Sample prepared wet by THD and tested by BPR)												28		16	12
65-318-R	S-46791	1/	(Sample prepared wet by BPR and tested by THD)												30		15	15
65-318-R	S-46791	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													28	15	13
65-318-R	S-46803	2/	(Sample prepared dry by THD and tested by BPR)												27		16	11
65-318-R	S-46791	2/	(Sample prepared dry by BPR and tested by THD)												29		16	13
65-318-R	S-46791	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													27	16	11
			4"-100;3"-96															
65-421-R	S-46792	1/	2"-96		95		92		88	73	59	49	37	26	28		16	12
65-421-R	S-46792	3/		100		94		84		64	48	39	29		27	27	15	13
65-421-R	S-46792	2/	97		95		92		88	73	59	48	37		27		15	12
65-421-R	S-46792	2/		100		92		84		68	53	42	27		28	27	15	14
65-421-R	S-46804	3/	(Sample prepared wet by THD and tested by BPR)												27		16	11
65-421-R	S-46792	1/	(Sample prepared wet by BPR and tested by THD)												29		15	14
65-421-R	S-46792	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													27	15	12
65-421-R	S-46804	2/	(Sample prepared dry by THD and tested by BPR)												27		16	11
65-421-R	S-46792	2/	(Sample prepared dry by BPR and tested by THD)												28		15	13
65-421-R	S-46792	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													26	15	11
			2"															
65-422-R	S-46793	1/			100		99		96	82	68	57	45	33	20		16	4
65-422-R	S-46793	3/				100		98		86	73	60	45		21	20	15	6
65-422-R	S-46793	2/			100		99		96	85	74	65	53	40	19		16	3
65-422-R	S-46793	2/				100		99		85	71	58	46		22	21	15	7
65-422-R	S-46805	3/	(Sample prepared wet by THD and tested by BPR)												20		16	4
65-422-R	S-46793	1/	(Sample prepared wet by BPR and tested by THD)												22		16	6
65-422-R	S-46793	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													21	16	5
65-422-R	S-46805	2/	(Sample prepared dry by THD and tested by BPR)												20		16	4
65-422-R	S-46793	2/	(Sample prepared dry by BPR and tested by THD)												21		16	5
65-422-R	S-46793	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													20	16	4

1/ Sample prepared in accordance with AASHO T 146 - Wet preparation of disturbed soil samples for test by B.P.R.
2/ Sample prepared in accordance with AASHO T 87 - Dry preparation of disturbed soil samples for test by B.P.R. and T.H.D.
3/ Sample prepared by Texas Highway Department in accordance with Tex 101 - Wet method.

TABLE III (Contd.)

TEST DATA BY BUREAU OF PUBLIC ROADS AND TEXAS HIGHWAY DEPT.
FOR AGGREGATE SAMPLES SUPPLIED BY TEXAS HIGHWAY DEPT.

(BPR Values Shown in Black & THD Values Shown in Red)

Sample No. Tex. Hwy. Department	Sample No. Bur. of Public Rds.		Mechanical Analysis Percentage Passing Sieve 2-in.	1-3/4-in.	1½-in.	1¼-in.	1-in.	7/8-in.	3/4-in.	3/8-in.	No. 4 (4.7 mm.)	No.10 (2.0 mm.)	No.40 (0.42 mm.)	No.200 (0.074 mm.)	L.L.	L.L. Mach.	P.L.	P.I.
65-423-R	S-46794	1/			100		98		94	77	61	50	40	32	31		16	15
65-423-R	S-46794	3/	100	95		94		90		72	57	46	36		29	27	14	15
65-423-R	S-46794	2/	100		99		95		91	74	59	44	34	27	28		15	13
65-423-R	S-46794	2/		100		98		94		73	55	39	20		25	24	14	11
65-423-R	S-46806	3/	(Sample prepared wet by THD and tested by BPR)												29		16	13
65-423-R	S-46794	1/	(Sample prepared wet by BPR and tested by THD)												29		14	15
65-423-R	S-46794	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													28	14	14
65-423-R	S-46806	2/	(Sample prepared dry by THD and tested by BPR)												26		15	11
65-423-R	S-46794	2/	(Sample prepared dry by BPR and tested by THD)												28		15	13
65-423-R	S-46794	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													26	15	11
65-424-R	S-46795	1/	100		99		96		91	77	64	53	40	30	20		17	3
65-424-R	S-46795	3/		100		97		93		77	64	52	38		22	21	15	7
65-424-R	S-46795	2/			100		97		92	80	70	60	47		20		16	4
65-424-R	S-46795	2/		100		96		92		75	59	55	30		22	21	15	7
65-424-R	S-46807	3/	(Sample prepared wet by THD and tested by BPR)												20		16	4
65-424-R	S-46795	1/	(Sample prepared wet by BPR and tested by THD)												22		15	7
65-424-R	S-46795	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													21	15	6
65-424-R	S-46807	2/	(Sample prepared dry by THD and tested by BPR)												20		16	4
65-424-R	S-46795	2/	(Sample prepared dry by BPR and tested by THD)												22		15	7
65-424-R	S-46795	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													21	15	6
65-478-R	S-46979	1/			100		86		74	54	41	32	25	21	26		16	10
65-478-R	S-46979	3/		100		93		78		50	38	28	21		29		15	14
65-478-R	S-46979	2/			100		86		72	53	41	31	26	22	26		16	10
65-478-R	S-46979	2/		100		98		78		55	40	27	14		27		15	12
65-478-R	S-46980	3/	(Sample prepared wet by THD and tested by BPR)												25		16	9
65-478-R	S-46979	1/	(Sample prepared wet by BPR and tested by THD)												26		15	11
65-478-R	S-46979	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													25	15	10
65-478-R	S-46981	2/	(Sample prepared dry by THD and tested by BPR)												25		16	9
65-478-R	S-46979	2/	(Sample prepared dry by BPR and tested by THD)												25		14	11
65-478-R	S-46979	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													24	14	10
65-479-R	S-46982	1/			100		95		88	75	61	49	37	32	24		16	8
65-479-R	S-46982	3/		100		95		85		64	49	38	28		25		15	10
65-479-R	S-46982	2/	100		99		95		88	74	60	47	38	33	23		16	7
65-479-R	S-46982	2/		100		99		87		63	48	35	19		24		15	9
65-479-R	S-46983	3/	(Sample prepared wet by THD and tested by BPR)												24		16	8
65-479-R	S-46982	1/	(Sample prepared wet by BPR and tested by THD)												25		14	11
65-479-R	S-46982	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													24	14	10
65-479-R	S-46984	2/	(Sample prepared dry by THD and tested by BPR)												23		15	8
65-479-R	S-46982	2/	(Sample prepared dry by BPR and tested by THD)												24		14	10
65-479-R	S-46982	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													23	14	9

1/ Sample prepared in accordance with AASHO T 146 - Wet preparation of disturbed soil samples for test by B.P.R.
2/ Sample prepared in accordance with AASHO T 87 - Dry preparation of disturbed soil samples for test by B.P.R. and T.H.D.
3/ Sample prepared by Texas Highway Department in accordance with Tex 101 - Wet method.

TABLE III (Contd.)

TEST DATA BY BUREAU OF PUBLIC ROADS AND TEXAS HIGHWAY DEPT.
FOR AGGREGATE SAMPLES SUPPLIED BY TEXAS HIGHWAY DEPT.

(BPR Values Shown in Black & THD Values Shown in Red)

Sample No. Tex. Hwy. Department	Sample No. Bur. of Public Rds.		Mechanical Analysis Percentage Passing Sieve 2-in.	1-3/4-in.	1½-in.	1¼-in.	1-in.	7/8-in.	3/4-in.	3/8-in.	No. 4 (4.7 mm.)	No.10 (2.0 mm.)	No.40 (0.42 mm.)	No.200 (0.074 mm.)	L.L.	L.L. Mach.	P.L.	P.I.
65-480-R	S-46985	1/			100		87		74	55	44	35	27	22	24		15	9
65-480-R	S-46985	3/		100		98		85		62	50	38	27		26		15	11
65-480-R	S-46985	2/			100		86		74	56	46	36	29	24	24		15	9
65-480-R	S-46985	2/		100		96		71		48	36	25	15		25		15	10
65-480-R	S-46986	3/	(Sample prepared wet by THD and tested by BPR)												24		16	8
65-480-R	S-46985	1/	(Sample prepared wet by BPR and tested by THD)												25		15	10
65-480-R	S-46985	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													24	15	9
65-480-R	S-46987	2/	(Sample prepared dry by THD and tested by BPR)												24		16	8
65-480-R	S-46985	2/	(Sample prepared dry by BPR and tested by THD)												25		15	10
65-480-R	S-46985	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													23	15	8
65-481-R	S-46988	1/	100		98		83		72	54	42	34	27	22	24		16	8
65-481-R	S-46988	3/		100		88		71		53	41	30	22		26		15	11
65-481-R	S-46988	2/	100		99		83		72	53	42	33	27	22	25		16	9
65-481-R	S-46988	2/		100		91		76		52	40	30	18		25		16	9
65-481-R	S-46989	3/	(Sample prepared wet by THD and tested by BPR)												25		16	9
65-481-R	S-46988	1/	(Sample prepared wet by BPR and tested by THD)												25		15	10
65-481-R	S-46988	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													24	15	9
65-481-R	S-46990	2/	(Sample prepared dry by THD and tested by BPR)												24		16	8
65-481-R	S-46988	2/	(Sample prepared dry by BPR and tested by THD)												25		15	10
65-481-R	S-46988	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													24	15	9
65-482-R	S-46991	1/	100		98		78		66	49	38	31	25	19	27		16	11
65-482-R	S-46991	3/		100		88		74		50	37	27	19		30		15	15
65-482-R	S-46991	2/	100		99		80		66	49	39	31	26	20	26		16	10
65-482-R	S-46991	2/		100		93		78		53	36	25	15		28		15	13
65-482-R	S-46992	3/	(Sample prepared wet by THD and tested by BPR)												28		16	12
65-482-R	S-46991	1/	(Sample prepared wet by BPR and tested by THD)												28		15	13
65-482-R	S-46991	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													26	15	11
65-482-R	S-46993	2/	(Sample prepared dry by THD and tested by BPR)												27		16	11
65-482-R	S-46991	2/	(Sample prepared dry by BPR and tested by THD)												27		15	12
65-482-R	S-46991	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													25	15	10
65-483-R	S-46994	1/	100		99		91		85	70	58	48	37	21	27		18	9
65-483-R	S-46994	3/		100		95		85		70	57	45	33		29		18	11
65-483-R	S-46994	2/	100		99		90		82	67	56	46	35	28	25		17	8
65-483-R	S-46994	2/		100		97		87		69	55	42	25		27		18	9
65-483-R	S-46995	3/	(Sample prepared wet by THD and tested by BPR)												28		19	9
65-483-R	S-46994	1/	(Sample prepared wet by BPR and tested by THD)												27		17	10
65-483-R	S-46994	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													26	17	9
65-483-R	S-46996	2/	(Sample prepared dry by THD and tested by BPR)												26		19	7
65-483-R	S-46994	2/	(Sample prepared dry by BPR and tested by THD)												26		17	9
65-483-R	S-46994	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													25	17	8

1/ Sample prepared in accordance with AASHO T 146 - Wet preparation of disturbed soil samples for test by B.P.R.
2/ Sample prepared in accordance with AASHO T 87 - Dry preparation of disturbed soil samples for test by B.P.R. and T.H.D.
3/ Sample prepared by Texas Highway Department in accordance with Tex 101 - Wet method.

TABLE III (Contd.)
TEST DATA BY BUREAU OF PUBLIC ROADS AND TEXAS HIGHWAY DEPT.
FOR AGGREGATE SAMPLES SUPPLIED BY TEXAS HIGHWAY DEPT.

(BPR Values Shown in Black & THD Values Shown in Red)

Sample No. Tex. Hwy. Department	Sample No. Bur. of Public Rds.		Mechanical Analysis Percentage Passing Sieve: 2-in.	1-3/4-in.	1½-in.	1¼-in.	1-in.	7/8-in.	3/4-in.	3/8-in.	No. 4 (4.7 mm.)	No.10 (2.0 mm.)	No.40 (0.42 mm.)	No.200 (0.074 mm.)	L.L.	L.L. Mach.	P.L.	P.I.
65-484-R	S-46997	1/			100		96		90	77	65	55	46	37	21		15	6
65-484-R	S-46997	3/				100		88		73	59	48	38		22		14	8
65-484-R	S-46997	2/			100		96		91	78	66	59	52	42	20		15	5
65-484-R	S-46997	2/		100		98		87		67	49	39	26		22		14	8
65-484-R	S-46998	3/	(Sample prepared wet by THD and tested by BPR)												22		15	7
65-484-R	S-46997	1/	(Sample prepared wet by BPR and tested by THD)												21		14	7
65-484-R	S-46997	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													20	14	6
65-484-R	S-46999	2/	(Sample prepared dry by THD and tested by BPR)												20		15	5
65-484-R	S-46997	2/	(Sample prepared dry by BPR and tested by THD)												21		14	7
65-484-R	S-46997	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													20	14	6
			3" 2"															
65-485-R	S-47000	1/	100-99		97		91		87	70	55	42	27	20	32		18	14
65-485-R	S-47000	3/		100		95		92		73	56	41	24		31		15	16
65-485-R	S-47000	2/	100-98		97		92		87	70	55	37	23	17	29		16	13
65-485-R	S-47000	2/		100		97		90		73	55	38	18		28		14	14
65-485-R	S-47001	3/	(Sample prepared wet by THD and tested by BPR)												31		16	15
65-485-R	S-47000	1/	(Sample prepared wet by BPR and tested by THD)												30		14	16
65-485-R	S-47000	1/	(Sample prepared wet by BPR and tested by THD using LL Machine)													29	14	15
65-485-R	S-47002	2/	(Sample prepared dry by THD and tested by BPR)												29		17	12
65-485-R	S-47000	2/	(Sample prepared dry by BPR and tested by THD)												29		15	14
65-485-R	S-47000	2/	(Sample prepared dry by BPR and tested by THD using LL Machine)													26	15	11

1/ Sample prepared in accordance with AASHO T 146 - Wet preparation of disturbed soil samples for test by B.P.R.
2/ Sample prepared in accordance with AASHO T 87 - Dry preparation of disturbed soil samples for test by B.P.R. and T.H.D.
3/ Sample prepared by Texas Highway Department in accordance with Tex 101 - Wet method.