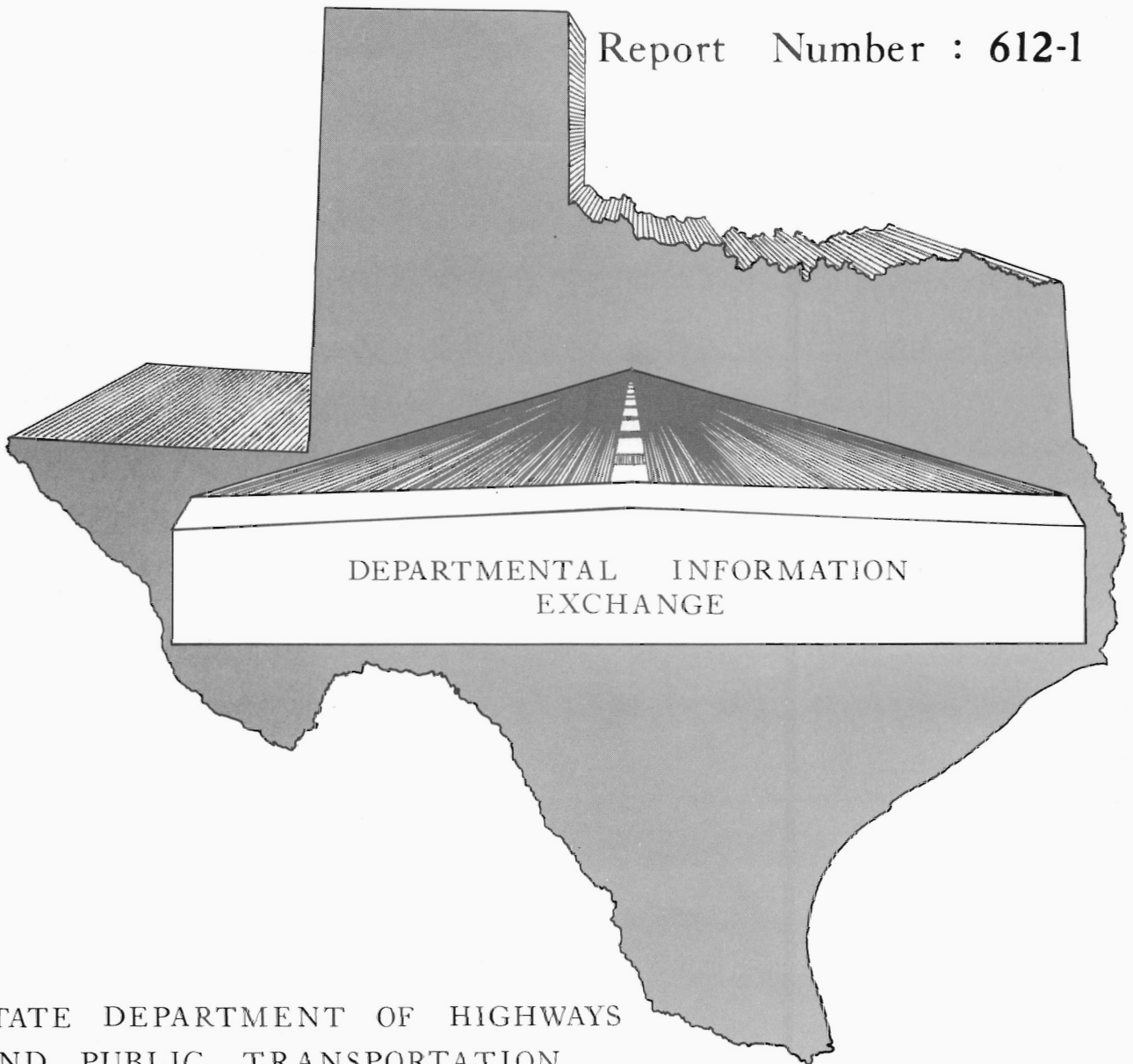


EXPERIMENTAL PROJECTS

LIGHTWEIGHT AGGREGATE SPRINKLE TREATMENT

Report Number : 612-1



STATE DEPARTMENT OF HIGHWAYS
AND PUBLIC TRANSPORTATION

Test Sections
of
H.M.A.C. (Class A), Type "D"
with

LIGHTWEIGHT AGGREGATE SPRINKLE TREATMENT SURFACE

Project C 24-5-53
US 90 in Hondo
Medina County

Project C 73-3-38
Project C 73-4-30
US 281 in Pleasanton
Atascosa County

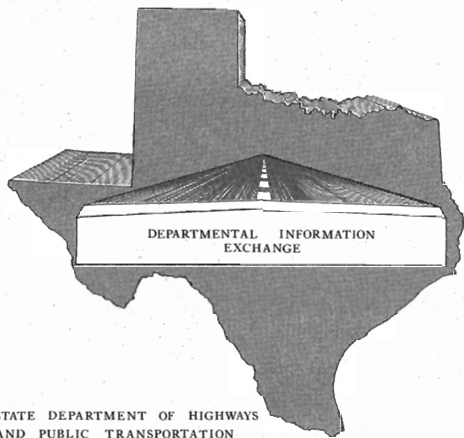
A NARRATIVE REPORT

1-D15-76-612
612-1



Prepared by
District 15 Laboratory
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Supv. Lab. Engineer

September, 1975



STATE DEPARTMENT OF HIGHWAYS
AND PUBLIC TRANSPORTATION

EXPERIMENTAL PROJECTS

Report No. 612-1

May 1976

LIGHTWEIGHT AGGREGATE SPRINKLE TREATMENT

The following are skid resistance values to be included in Experimental Projects Report No. 612-1 as Appendix A:

APPENDIX A

Project C 24-5-53, US-90 in Hondo, Medina County

<u>Location</u>	<u>7-11-75</u>	<u>7-24-75</u>	<u>8-25-75</u>	<u>11-3-75</u>	<u>3-5-76</u>
Westbound Lane A	44	43	43	43	31
Westbound Lane B	43	38	41	42	30
Eastbound Lane A	43	42	42	44	33
Eastbound Lane B	41	35	37	38	27

Project C 73-3-38 & 40, US-281 S. in Pleasanton, Atascosa County

<u>Location</u>	<u>8-7-75</u>	<u>9-4-75</u>	<u>11-3-75</u>	<u>3-4-76</u>
Northbound Lane A	46	43	38	29
Northbound Lane B	40	41	32	27
Southbound Lane A	43	49	42	30
Southbound Lane B	40	45	34	26

A NARRATIVE REPORT

Included as a part of the 1975 District 15 State Highways Safety and Betterment Program was a 3.957 mile section of U.S. 90, extending from the West City Limits of Hondo to a point 3.957 miles East of Hondo. Also included were two adjoining sections of U.S. 281, extending from 0.1 mile North of North City Limits of Pleasanton to F.M. 1334, a total of 2.265 miles. These were combined into one contract to be handled by the Medina County Residency, Mr. C. E. Hackebell, Resident Engineer.

Based upon the skid results that were obtained in January, February, and March, 1975 on the Sprinkle Treatment test sections placed on F.M. 1604, in San Antonio, on Project C 73-5-38, it was decided that this betterment work would also include Sprinkle Treatment rolled into the hot asphalt mat.

In the April, 1975 letting, Kelly Construction Co., San Antonio, Texas, was the low bidder on this proposed work known as Project C 24-5-53, etc., Medina County, etc. The Specification Data Notes required the aggregate for Item 3030, "Sprinkle Treatment," to have a minimum "Polish Value" of 42 and permitted the use of Lightweight Aggregate meeting the gradation requirements of T.H.D. Item 303, Grade 4. It was further required that the Sprinkle Aggregate be pre-coated with AC-10 and be placed at the rate of one cubic yard to 400 square yards, or as directed by the Engineer, and be placed uniformly on the surface in a manner that would not mar or rut the overlay.

The H.M.A.C. Type "D" for the work in Hondo was furnished by Vulcan Materials Co., in San Antonio. This was a weigh batch, pug mill type mixture. Vulcan also furnished the pre-coated Sprinkle Aggregate for the entire contract. This was a Grade 4 Lightweight Aggregate made by Featherlite Co., in Ranger. AC-10, at a temperature of 325^o F, was applied to the aggregate, also at 325^o F, at the rate of 2% by weight. Servtex Materials Co., New Braunfels, Texas, furnished the H.M.A.C. Type "D" for the work in Pleasanton. This was made in a Boeing Dryer-Drum Mixer presently leased and operated by Servtex.

In order to conform with the "no rutting of the mat" requirement, the Contractor modified a Grace Spreader Box by moving the wheels from underneath to the outside. This arrangement permitted the Sprinkle Aggregate to be placed with the box straddling the 12 foot mat. The spreader was towed by the lay down machine. An offset loading chute was provided on the spreader which allowed it to be charged from the side by a front-end loader.

Work on the mainlanes of U.S. 90 in Hondo was started on June 16, 1975 and completed on June 24, 1975. The Sprinkle Aggregate was applied on the first day at the rate of 1:392. This appeared to be too heavy a rate and the application was adjusted each day in an attempt to obtain what appeared to be good coverage and, also, to avoid loss of aggregate. The individual rates of application varied from 1:392 to 1:631, with an average of 1:521. The over-all aggregate retention was good. Initially the rolling was done with a vibratory roller, tandem roller and pneumatic roller.

As on previous work of this type the pneumatic roller pulled the Sprinkle Aggregate from the mat and its use was discontinued on the first day. The H.M.A.C. Type "D" was placed at the rate of 80 Lb/SY and on this thin mat we noticed considerable breakage of the Sprinkle Aggregate. We contributed this to the vibratory roller; it was replaced by the conventional 3 wheel roller. When possible, traffic was kept off of the completed mat until the asphalt had cooled to air temperature. Although parking lanes, turn-outs and driveways received the asphalt overlay, only the mainlanes received the Sprinkle Treatment.

Paving operations on the mainlanes of U.S. 281 in Pleasanton started on July 11, 1975 and finished on July 23, 1975. Sprinkle Aggregate was applied the first day at 1:403 and then adjusted each day from 1:403 to 1:624 with an average of 1:465. Aggregate retention was good. Rolling was done with the 3 wheel and tandem rollers. On this thinner mat, 70 Lb/SY, we found that the Sprinkle Aggregate did suffer some breakage under these rollers. Again, only the mainlanes received Sprinkle Treatment.

We found the modified Grace Spreader Box to be a good tool in this type of work. There was no marring or rutting of the completed mat. The Contractor was able to control the rate of application within reasonable tolerances. The spreader box did have some tendency to rock and in some instances, the varying amounts of applied aggregate resulted in a corduroy appearance. However, this did not detract from the riding quality of the finished mat.

The bid price for Sprinkle Treatment was \$40.00 per cubic yard. The work in Hondo used 177 C.Y. to treat 92,227 S.Y. of pavement, thereby costing \$0.07676 per square yard for Sprinkle Treatment. With a little heavier application in Pleasanton, 136 C.Y. was used on 63,305 S.Y. of Pavement, costing \$0.0859 per square yard. The average cost for the entire contract was \$0.0804 per square yard. At the rate of 1:400 it would have been \$0.10 per square yard.

The Hondo Project was skidded on July 11, 1975, 18 days after completion of the mainlanes. The skid numbers obtained were disappointingly below our anticipation, averaging 43 throughout the project. Visual inspection of the pavement surface revealed that we still had good aggregate retention. We also observed that the individual Sprinkle Aggregate particles still had a thin film of asphalt on the exposed surfaces. It was our opinion that skid resistance would improve after additional traffic had exposed the raw surfaces of these aggregate particles. On July 24, 1975 we skidded the entire project only to find that while the inside lanes had about the same skid numbers as before, the outside lanes had both dropped 5 points and now averaged 36 in those lanes.

Skid numbers were obtained on the Pleasanton Projects on August 7, 1975, 16 days after completion of the mainlane work. Again, the skid numbers were below our expectation, averaging 42 throughout the entire work. Again, we still had good aggregate retention and also, a thin film of asphalt still showed on the pre-coated aggregate particles.

After reviewing all skid test data, the construction methods used on these projects and also the results of Sprinkle Treatments on F.M. 1604, Bexar County, in January of 1975, it was our thought that we should obtain the best skid numbers where the best rate of application (1:400) was obtained. On the work done on the first day's run for both projects we had placed the Sprinkle Aggregate at a rate very close to 1:400, namely 1:392 in Hondo and 1:403 in Pleasanton. We decided that during our next skid testing these areas would be isolated and their skid numbers reviewed separately.

On August 25, 1975, the Hondo work was skidded. The first day's run averaged 44 as compared to an average of the entire project of 41. We skidded the Pleasanton work on September 4, 1975. The first day's run averaged 49 as compared to an average of the entire project of 44.

These skid numbers are indicative of a high friction quality pavement surface. We believe they will improve as traffic action exposes the aggregate surfaces. Further monitoring with the skid trailer will be done and the results reported at a later date.

District 15 is of the opinion that Sprinkle Treatment is an effective means of achieving high quality, low cost, skid resistant pavements. With high frictional quality aggregates being in short supply and at a premium cost, it behooves us to place them at the surface of the completed pavement section.