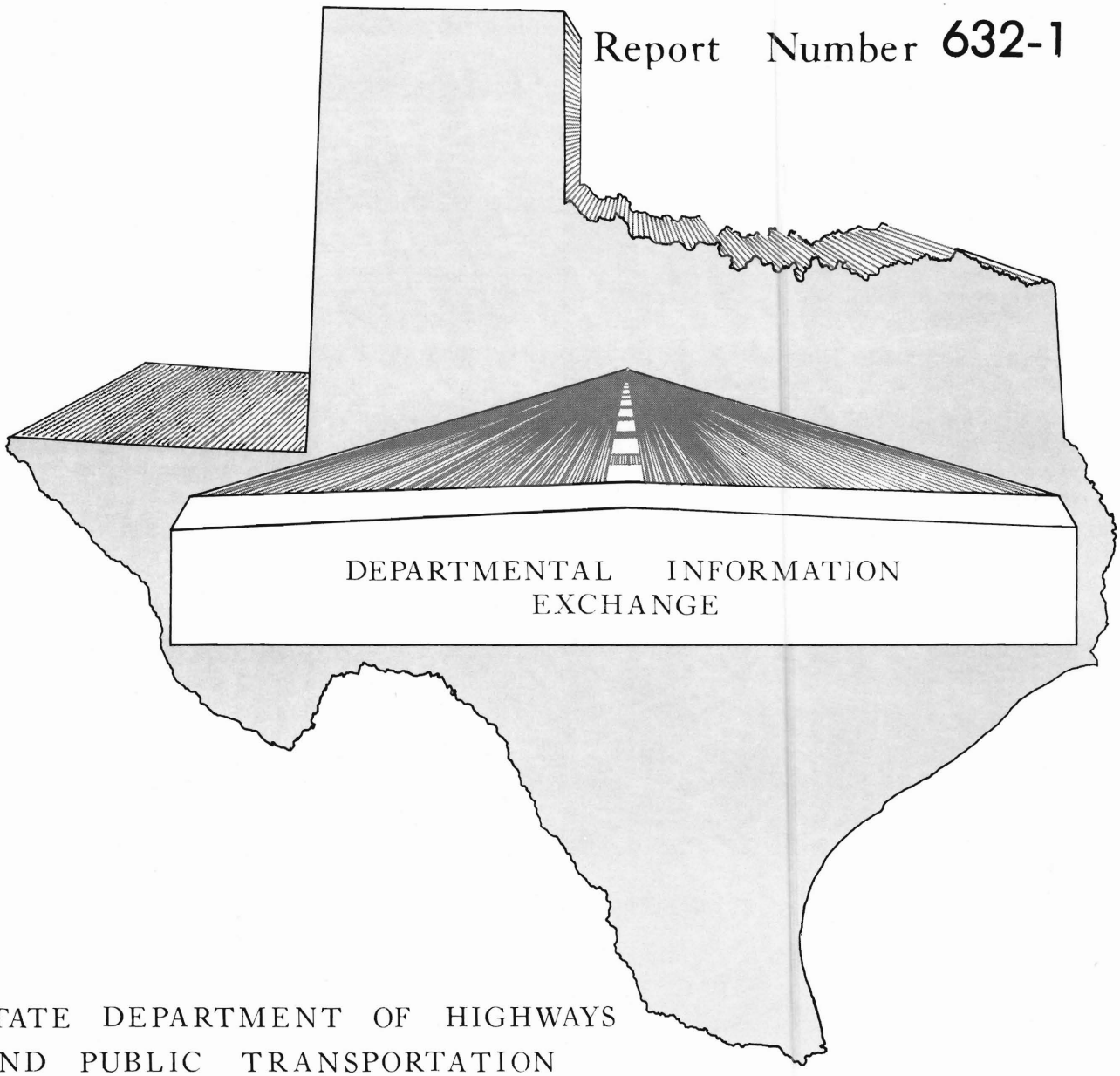
EXPERIMENTAL PROJECTS

THIN BONDED CONCRETE OVERLAYS

Report Number 632-1



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AND PUBLIC TRANSPORTATION

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9. Performing Organization Name and Address	10. Work Unit No.
State Department of Highways and Public Transportation Houston Urban Project Houston, Texas	11. Contract or Grant No.
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address State Department of Highways and Public Transportation Houston Urban Project Houston, Texas	Construction
	14. Sponsoring Agency Code

15. Supplementary Notes

Work done in cooperation with U.S. Department of Transportation, Federal Highway Administration.

16. Abstract

This report contains brief descriptions of the existing roadway, work done prior to placement of the thin bonded concrete, and construction of the test sections on the main lanes of I-610 South Loop between Cullen Road and Calais Street in Houston, Texas. Special Specification Item 3337 for thin bonded concrete overlays is also included in this report, as are a map of the site location and four pictures of various phases of construction.

17. Key Words	18. Distribution Statement
Thin Bonded Concrete, Polymer Concrete, Steel Mesh Reinforcing, Steel Fiber Reinforcing.	This document is available from: State Department of Highways and Public Transportation Transportation Planning Division P.O. Box 5051, Austin, Texas 78763

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
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The material contained in this report is experimental in nature and is published for informational purposes only. Any discrepancies with official views or policies of the DHT should be discussed with the appropriate Austin Division prior to implementation of the procedures or results.

DATA SHEET AND

SPECIAL SPECIFICATION

THIN BONDED CONCRETE OVERLAYS

ROADWAY MAIN LANES

HOUSTON, TEXAS

I-610 SOUTH LOOP BETWEEN CULLEN ROAD AND CALAIS STREET

FIVE SECTIONS EACH 48' IN WIDTH BY 200' IN LENGTH CONSISTING OF:

2" NON-REINFORCED @ $18.00/S.Y.

2" STEEL MESH REINFORCED @ $20.00/S.Y.

3" STEEL MESH REINFORCED @ $23.00/S.Y.

3" STEEL FIBER REINFORCED @ $29.00/S.Y.

2" STEEL FIBER REINFORCED @ $25.00/S.Y.

EXISTING PAVEMENT WAS SLIPFORMED 8" CRCP FIVE SACK MIX HAVING COLORADO RIVER GRAVEL FOR COARSE AGGREGATE. THE PAVEMENT HAS BEEN IN SERVICE 14 YEARS. TRAFFIC COUNT AT THIS LOCATION IS 56,523 EASTBOUND.

THIS PAVEMENT PRIOR TO PLACING THE OVERLAY WAS SELECTIVELY REPAIRED USING POLYMER CONCRETE AS PATCHING MATERIAL. ALL LONGITUDINAL CRACKS WERE ROUTED OUT 3/4" WIDE AND 3/4" TO 1" DEEP, THEN FILLED WITH DRY SAND INTO WHICH A LIQUID MONOMER WAS INJECTED. SOME TRANSVERSE CRACKS WERE REPAIRED IN THE SAME MANNER. SPECIFICATIONS REQUIRED 1/8"± SCARIFICATION OF EXISTING SURFACE. THE SUBCONTRACTOR INVOLVED WAS STAN FORDE CONSTRUCTION COMPANY. HE RECOMMENDED AND BID TO THE PRIME CONTRACTOR, SIMONSEN CONSTRUCTION CO., INC., SCARIFYING 1/4". THIS WAS DONE AS A MINIMUM WITH SOME VARIATIONS UP TO 3/8"±.

CUTTINGS WERE THEN REMOVED AND THE SURFACE BROOMED TO REVEAL THE NEW CLEAN CHIPPED SURFACE. SANDBLASTING FOLLOWED IN PROPER SEQUENCE IN ADVANCE OF PLACING THE OVERLAYS TO PROVIDE A CLEAN DRY TEXTURED SURFACE UPON WHICH THE BONDING GROUT WAS BROOMED. THE CONCRETE WAS PLACED IMMEDIATELY BEHIND THE BONDING GROUT.

A GOMACO 450 TRANSVERSE FINISHER WAS USED TO CONSOLIDATE AND FINISH THE CONCRETE TO GRADE AND SECTION. TRANSVERSE TINEING WAS DONE BY HAND FROM A WORK BRIDGE.

CURING WITH WHITE PIGMENTED TYPE 2 COMPOUND FOLLOWED AT A RATE OF 120 SF/GAL.

OPENING TO TRAFFIC WAS SPECIFIED TO BE NO LESS THAN FOUR DAYS. SAWING, SEALING, STRIPING AND RAISING THE SHOULDERS ACTUALLY RESULTED IN EACH SECTION HAVING SIX CURING DAYS BEFORE OPENING TO TRAFFIC.

RESEARCH FOR THIS PROJECT, MEASUREMENT OF ITS PERFORMANCE AND RECOMMENDATIONS RELATIVE TO THE USE OF THESE MATERIALS AND PROCEDURES FOR FUTURE REPAIR PROJECTS ALL ARE BEING HANDLED BY THE CENTER FOR TRANSPORTATION RESEARCH OF THE UNIVERSITY OF TEXAS.

COST TO THE STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION INCLUDING SCARIFICATION, EXCLUSIVE OF TRAFFIC CONTROL, WAS $159,319.50 OR $30.00/S.Y. AS AN AVERAGE OF ALL FIVE SECTIONS.

ADDITIONAL DETAILS OR INFORMATION WILL BE AVAILABLE FROM:

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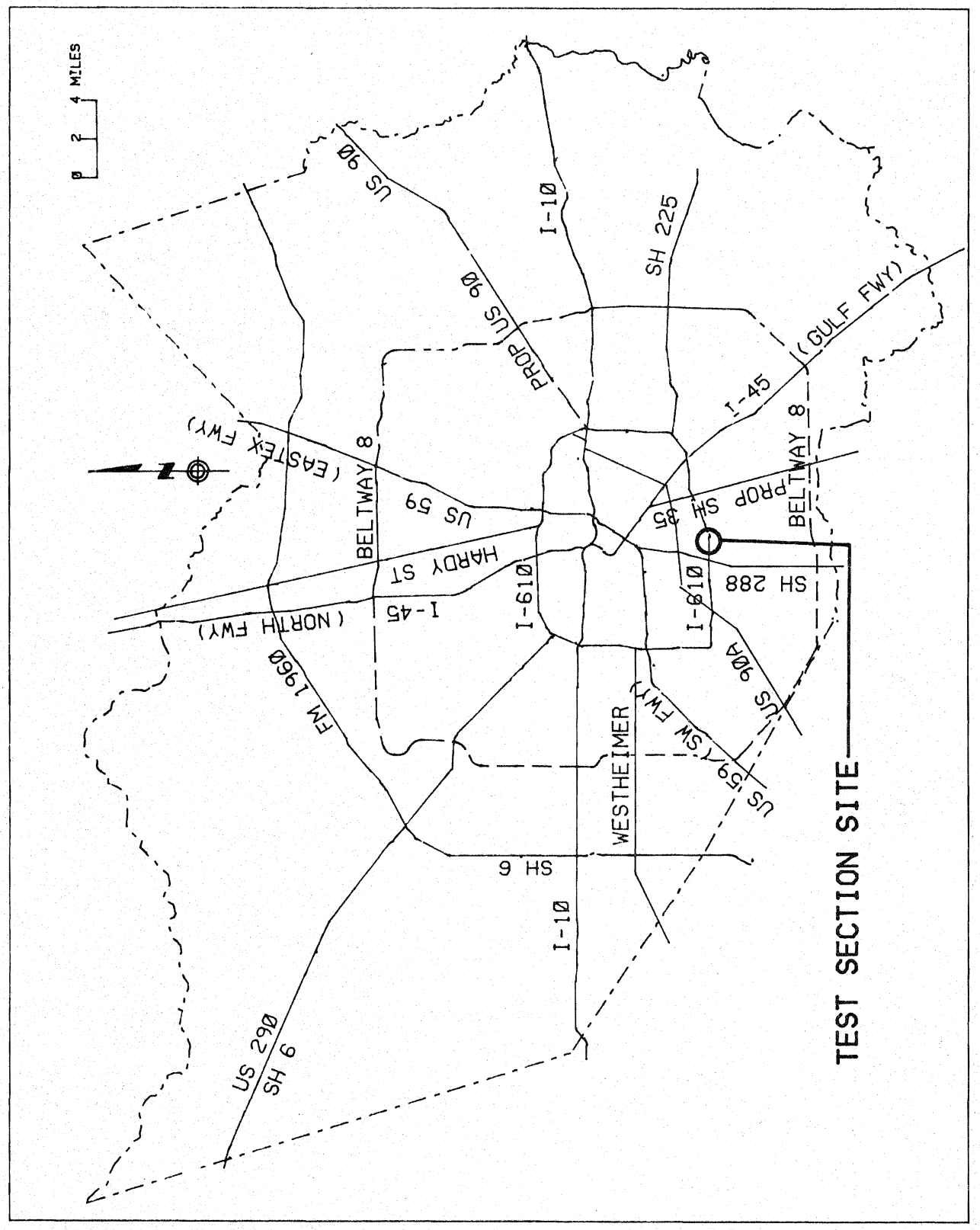
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I-10
SH 225
US 90
PROP
(GULF FWY)
I-45
BELTWAY 8
(EASTEX FWY)
US 59
PROP SH 35
BELTWAY 8
HARDY ST
I-610
I-610
SH 288
I-45
(NORTH FWY)
FM 1960
US 90A
WESTHEIMER
US 59 (SW FWY)
SH 6
I-10
US 290
SH 6
TEST SECTION SITE

SPECIAL SPECIFICATION

ITEM 3337

THIN BONDED CONCRETE OVERLAY

1. Description. This item shall govern for the materials to be used, for the scarifying of the existing concrete pavement, and for the furnishing and the placing of the thin bonded concrete overlay at the location shown, in accordance with the details shown in the plans, the requirements of Item 360, "Concrete Pavement (Water Cement Ratio)" except as noted herein, and with these specifications.

2. Materials. Materials and concrete design mix shall be as follows:

(1) Fibrous concrete mix design

Cement Type I or II	-	8 Sk. per Cu. Yd.
Fine aggregate (SSD)	-	1320 Lb. per Cu. Yd.
Coarse aggregate(natural or crushed gravel)		
3/8" Max. (SSD)	-	1335 Lb. per Cu. Yd.
Water factor	-	5 Gal. per Sk. Cement
Bekaert Dramix fiber ZP 50/50 or equal	-	85 Lbs. per Cu. Yd.
Water reducer	-	as directed by manufacturer
Entrained air	-	4-6%
Slump	-	3-4 inches

(2) Steel reinforced & non-reinforced concrete mix design

Cement Type I	-	7 Sk. per Cu. Yd.
C.A.F.	-	0.60

Coarse aggr. gradation of natural or crushed gravel as follows:

Sieve Size	Percent Retained
3/4"	0
1/2"	0- 15
3/8"	15- 40
No.4	40- 98
No. 8	98-100

Water factor	-	4.5 Gal. per Sk. Cement
Entrained Air	-	4-6%

(3) The temperature of the overlay concrete at the time of placement on the slab shall not exceed 85°F. When a retarding admixture is required it shall meet the requirements of the Item, "Concrete Admixtures", except for measurement and payment.

(4) The concrete shall have a minimum 7 day flexural strength of 700 psi.

(5) Cement grout shall consist of 1 bag portland cement and 7 gallons water. It may contain a water reducing plasticizer at the option of the Engineer.

(6) "Membrane Curing" shall be at the rate of 120 S.F. per gallon and shall meet the requirements of Special Specification Item 5431, except for measurement and payment.

(7) When specified, steel reinforcing shall meet the requirements of Item 440 "Reinforcing Steel", except for measurement and payment.

3. Equipment. Equipment shall be subject to the approval of the Engineer.

(1) Sand blasting equipment shall be capable of removing rust, oil and concrete laitance from existing surface of the pavement.

(2) Scarifying equipment shall be a power-operated, mechanical scarifier capable of uniformly scarifying or removing the old surface to the depths required in a satisfactory manner. Other types of removal devices may be used if their operation is suitable and if they can be demonstrated to the satisfaction of the Engineer

(3) Transit mixers shall be loaded no more than 80% capacity when fibers are to be added to the mix at the job site. Enough mixers shall be provided to permit the intended pour to be placed without interruption.

(4) Placing and finishing equipment to be used shall be at the option of the Contractor subject to the approval of the Engineer.

4. Construction Method. The Contractor shall furnish to the Engineer, for his approval, a work plan including equipment and manpower before work is started on the overlay.

The existing concrete pavement surface shall be scarified to the depth shown in the plans followed by sand blasting. Sand-blasting shall be of such an extent as to remove all dirt, oil, and other foreign material, as well as any laitance or loose concrete from the surface and edges against which new concrete is to be placed. The entire surface shall then be air blasted just prior to the grouting - paving operation.

The prepared surface shall be dry to allow absorption of the bonding grout. Bonding grout may be scrubbed or pressure sprayed at the option of the Contractor. Care shall be exercised to insure that all parts receive a thorough, even coating and that no excess grout is permitted to collect in pockets. The rate of progress in applying grout shall be limited so that the grout does not become dry before it is covered with new concrete.

During delays in surfacing operations, should the surface of the grout indicate an extensive drying, additional grout shall be brushed on the area as directed by the Engineer. In areas where the grout becomes thoroughly dried, the grout shall be removed by sand blasting, or other methods as approved by the Engineer.

When fibers are to be added to the mix at the job site, fibers are added in 66 lb. bags at the rate 2 bags per minute. After all fibers have been added, the batch should be mixed for another 2 minutes at 16 rpm prior to placement.

The slump to be used on the job shall be as specified by the Engineer from the results of trial batches. When this slump has been established, all concrete shall be delivered with a consistency of $\pm$1 inch from that designated.

Reinforcing steel type and placement will be as shown on the plans.

The concrete overlay shall receive a tine finish as shown on the plans.

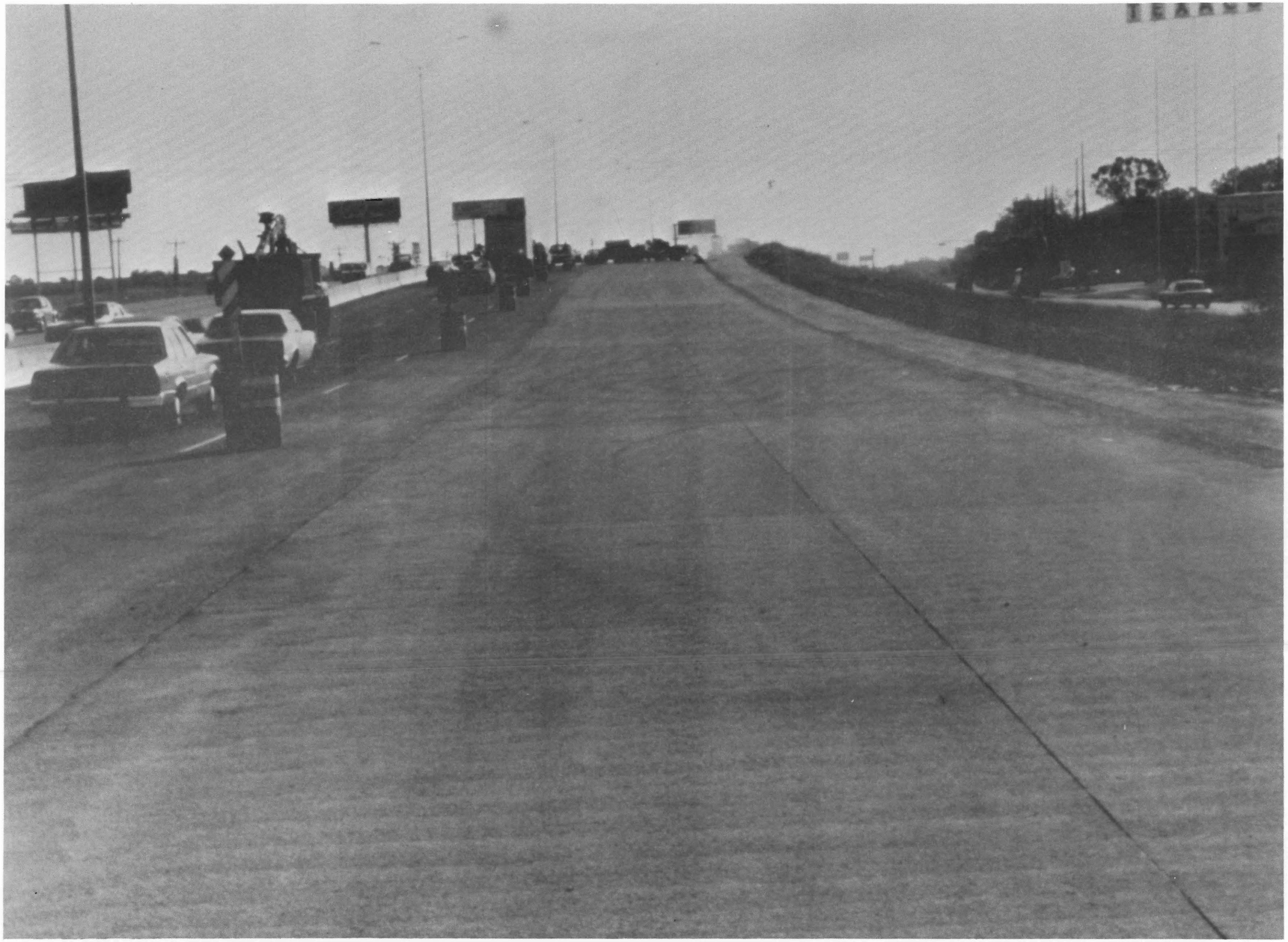
The concrete overlay shall cure for a period of 4 days. The surface temperature shall be maintained above 40°F for the curing period.

5. Measurement. Scarification as described herein and in the plans will be measured by the square yard of "Scarify Concrete Surface (1/8in.)".

   The concrete overlays as described herein and in the plans will be measured by the square yard of "Concrete Overlay" of the various depths and type of reinforcing placed.

6. Payment. Payment for "Scarify Concrete Surface (1/8in.)" measured as described above will be paid for at the unit price bid per square yard, which price shall be full compensation for removing all material to the depth shown, loading, hauling, unloading and disposing of all cuttings; for all sand blasting and air blasting; and for all labor, tools, equipment, manipulation and incidentals necessary to complete the work.

   Payment for the type of overlay placed as described above will be paid for at the unit price bid per square yard of "Concrete Overlay", of the depth specified, and with or without reinforcing steel, which price shall be full compensation for placing grout on the existing concrete slab; for furnishing, hauling, mixing, placing, finishing and curing of the concrete overlay; for sawing and sealing of joints; for all labor, tools, equipment and incidentals necessary to complete the work.




CAMEL