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16. Abstract

This report documents the construction and initial evaluation of the HaTelit 20/9 Polyester Geogrid material placed at mid-depth of the HMAC overlay of the Broken and Seated PCC pavement on Interstate 10, west of Lake Charles, LA. The roadway has an ADT of 43,400 vpd with 20% of these being heavy trucks. This experimental feature is expected to reduce and limit the severity and extent of pavement distress.

The material was placed between the two lifts of Binder Coarse, with an AC tack coat placed on the first lift prior to rolling the material in place. The material was also physically secured by nailing it to the previous lift. The remaining Binder along with the Wearing Coarse was placed over the material.

The serviceability of the pavement increased after construction to an average of 4.2 PSI. Cost figures are provided in Table 3 and can be compared to the control sections. The performance of this experimental feature will be monitored over the next three (3) years and will be compared to the two control sections.

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INTERSTATE REHABILITATION WITH HATELIT POLYESTER GRID

I-10 SULPHUR - WESTLAKE, CALCASIEU PARISH

INTERIM REPORT

BY

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RESEARCH REPORT NO. 262

EXPERIMENTAL PROJECT NO. 9
PAVEMENT REHABILITATION TECHNIQUES

Conducted by
LOUISIANA DEPARTMENT OF TRANSPORTATION
AND DEVELOPMENT
Louisiana Transportation Research Center
In Cooperation With
U. S. Department of Transportation
FEDERAL HIGHWAY ADMINISTRATION

JULY 1992

ABSTRACT

This report documents the construction and initial evaluation of the HaTelit 20/9 Polyester Geogrid material placed at mid-depth of the HMAC overlay of a broken and seated PCC pavement on Interstate 10, west of Lake Charles, La. The roadway has an ADT of 43,400 with 20% of these being heavy trucks. This experimental material is expected to reduce and limit the severity and extent of pavement distress.

The material was placed between the two lifts of binder Course, with an asphalt tack coat placed on the first lift prior to rolling the material in place. The material was also physically secured by nailing it to the previous lift. The remaining binder and wearing course was placed over the material.

The serviceability of the pavement increased after construction to an average of 4.2 PSI. Cost figures are provided in Table 3 and can be compared to the control sections. The performance of this experimental feature will be monitored over the next three (3) years and will be compared to the two control sections.

SI UNIT CONVERSION FACTORS*

To Convert from	To	Multiply by
	Length	
foot	meter (m)	0.3048
inch	meter (m)	0.0254
yard	meter (m)	0.9144
mile (statute)	kilometer (km)	1.609
	Area	
square foot	square meter (m^2)	0.0929
square inch	square meter (m^2)	0.000645
square yard	square meter (m^2)	0.8361
	Volume (Capacity)	
cubic foot	cubic meter (m^3)	0.02832
gallon (U.S. liquid)**	cubic meter (m^3)	0.003785
gallon (Can. liquid)**	cubic meter (m^3)	0.004546
ounce (U.S. liquid)	cubic meter (m^3)	0.03382
	Mass	
ounce-mass (avdp)	kilogram (kg)	0.02835
pound-mass (avdp)	kilogram (kg)	0.4536
ton (metric)	kilogram (kg)	1000
ton (short, 2000 lbs)	kilogram (kg)	907.2
	Mass per Volume	
pound-mass/cubic foot	kilogram/cubic meter (kg/m^3)	16.02
pound-mass/cubic yard	kilogram/cubic meter (kg/m^3)	0.5933
pound-mass/gallon (U.S.)**	kilogram/cubic meter (kg/m^3)	119.8
pound-mass/gallon (Can.)**	kilogram/cubic meter (kg/m^3)	99.78
	Temperature	
deg Celsius (C)	Kelvin (K)	$t_k=(t_c+273.15)$
deg Fahrenheit (F)	Kelvin (K)	$t_k=(t_F+459.67)/1.8$
deg Fahrenheit (F)	Kelvin (K)	$t_c=((t_F-32)/1.8)$

*The reference source for information on SI units and more exact conversion factors is "Metric Practice Guide" ASTM E 380.
**One U.S. gallon equals 0.8327 Canadian gallon.

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INTRODUCTION

The primary purpose of this experimental project was to evaluate the ability of the product (HaTelit 20/9 Polyester Grid) to improve distribution of tensile stresses within the asphaltic concrete layers when placed over a broken and seated PCC pavement. Unstable bases are prevalent across Louisiana and are the primary cause of cracking and faulting of the PCC pavement. Reflective cracking of new HMAC overlays due to movement in the underlying PCC slab has historically been a detriment to the long-term serviceability of an overlay. The experimental feature utilizing break and seat prior to overlay and HaTelit polyester reinforcement grid between lifts are purported to limit the severity and extent of this pavement distress.

SCOPE

The scope of this research consisted of the monitoring of the construction and three year evaluation the HaTelit geogrid material incorporated within a construction project that utilized several pavement rehabilitation strategies. The experimental feature included Breaking and Seating the PCC pavement with HMAC overlay and the HaTelit fabric placed at mid depth of the overlay. The three year evaluation of this strategy will be compared to the same strategy without the HaTelit material included in the HMAC overlay and a control section.

METHODOLOGY

This report documents the construction of the experimental feature which consists of breaking and seating the PPC pavement with HMAC overlay and the HaTelit material placed at mid-depth of the overlay. The control section and section 1 circumscribe the experimental feature, section 2, on each side as shown in Figure 1.

Project Description

The experimental feature was incorporated into State Construction Project No. 450-91-42, Sulphur to Westlake, Route I-10, located in Calcasieu Parish. The jointed reinforced concrete pavement (JRCP) was originally constructed in 1962. The six lane pavement structure is separated by a 40' depressed median. The original pavement thickness was 10" with 1" diameter smooth doweled load transfer bars. The slab lengths were typically 58.5 feet and the total length of the construction project was approximately six miles. The current average daily traffic (ADT) is 43,400 with 20% heavy truck traffic.

The purpose of this construction was part of the ongoing rehabilitation process of our Interstate systems in Louisiana. The structural capacity of the roadway section was increased where the project consisted of constructing 7½" minimum thick HMAC overlay. Also, the surface friction and rideability requirements were increased.

Construction Specifications

The following special provisions was used for the installation of the HaTelit polyester grid:

August 3, 1990
SPECIAL PROVISIONS
HaTeLIT POLYESTER GRID

REINFORCEMENT MESH - HIGH TENACITY POLYESTER: This item consists of furnishing and installing a polyester reinforcement mesh in the asphalt pavement at the stations shown in the work plan in accordance with the specifications and the manufacturer's recommendations.

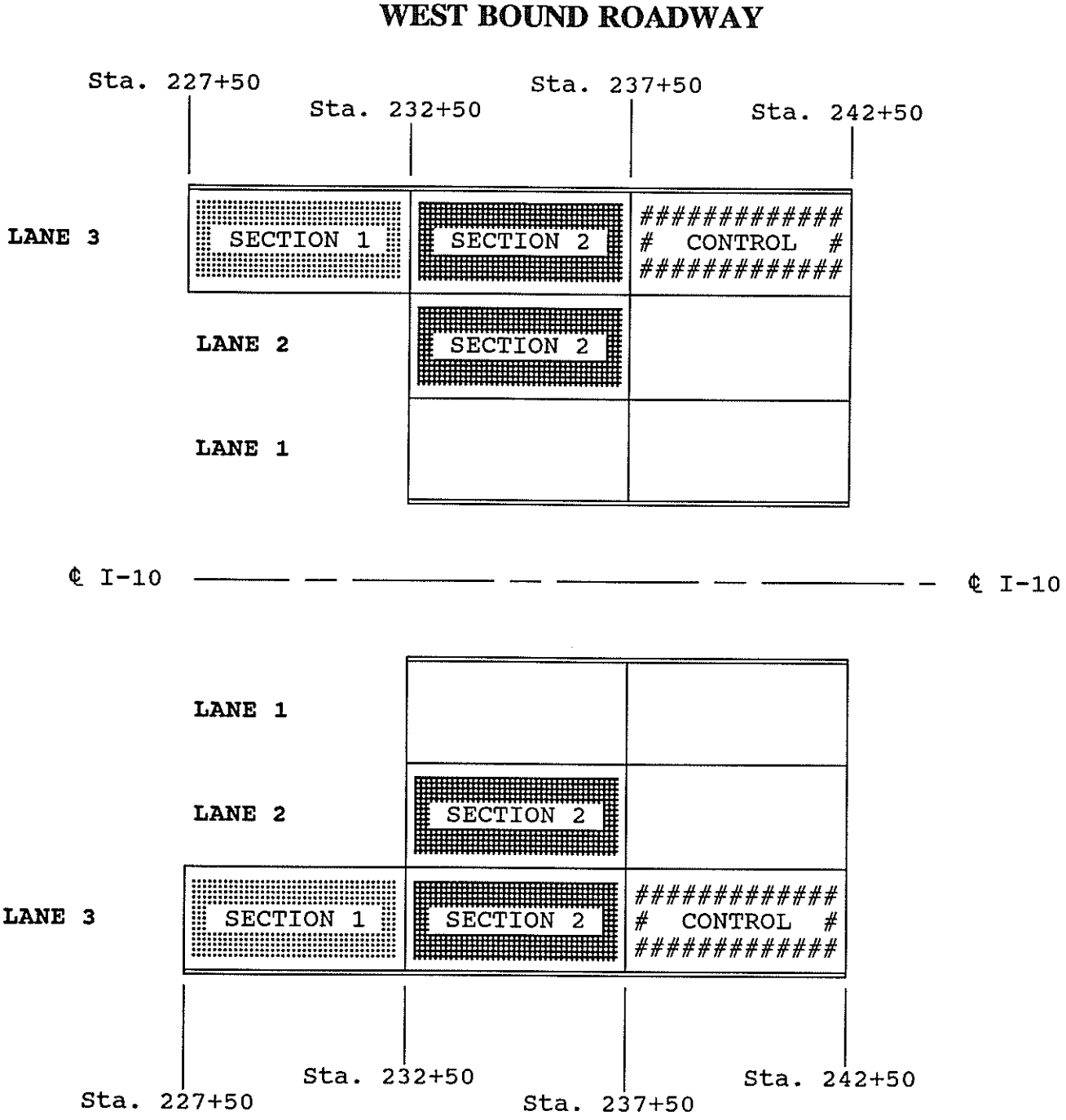

FIGURE 1. Experimental Feature Chart - Actual Construction

The polyester grid reinforcement mesh shall be a HaTelit Type 20/9 with 20mm x 20mm mesh size or approved equal.

The polyester grid reinforcement mesh shall be placed between the lifts of the Type 3 binder course approximately 3 to 4 inches below the wearing surface. The asphalt tack coat shall be applied before placement.

A notarized certificate of compliance of the HaTeLIT material shall be supplied by the manufacturer with each shipment.

Measurement will be made by the square yard of fabric in place and payment will be made at the contract unit price under:

Item S-016, Reinforcement Mesh - High Tenacity Polyester, per square yard.

Construction Sequence

The contract was performed by L. J. Earnest, Inc. of Bossier City, La. and construction began in the winter of 1990. All construction activities were performed under traffic, maintaining at least two lanes of traffic in each direction at all times. Construction was completed in the fall of 1991.

The first problem arose when one of the two experimental test sections to be constructed was eliminated. The original test features required placing the HaTeLIT material in both the break, seat and overlay section and the patch, overlay, and saw and sealed section (see Appendix "A"). The HMAC overlay was tapered from the 7½" minimum to the existing PCC pavement in planned test section 3, not allowing enough cover for the material to be placed. Therefore this test section was eliminated.

It was required that the HaTelit polyester grid be placed in the binder course, 3" - 4" below the top surface as shown in Figure 2. The second problem arose when an unidentified tack coat was placed on the base course prior to placement of the reinforcement mesh. The 5'8" wide polyester grid was then placed on the surface with a longitudinal overlap of approximately 12", but was not physically secured to the previous HMAC lift. A total of five (5) rolls of polyester grid were placed to span the two lane width of 24'. After a period of less than one week after installation, the roadway began to ravel and spall in test section 2 at the interface of the HaTeLIT material as shown in Figures 2 and 3. Therefore, due to the limited amount of

Figure 2. Extreme Raveling and spalling at HaTeLIT Interface.

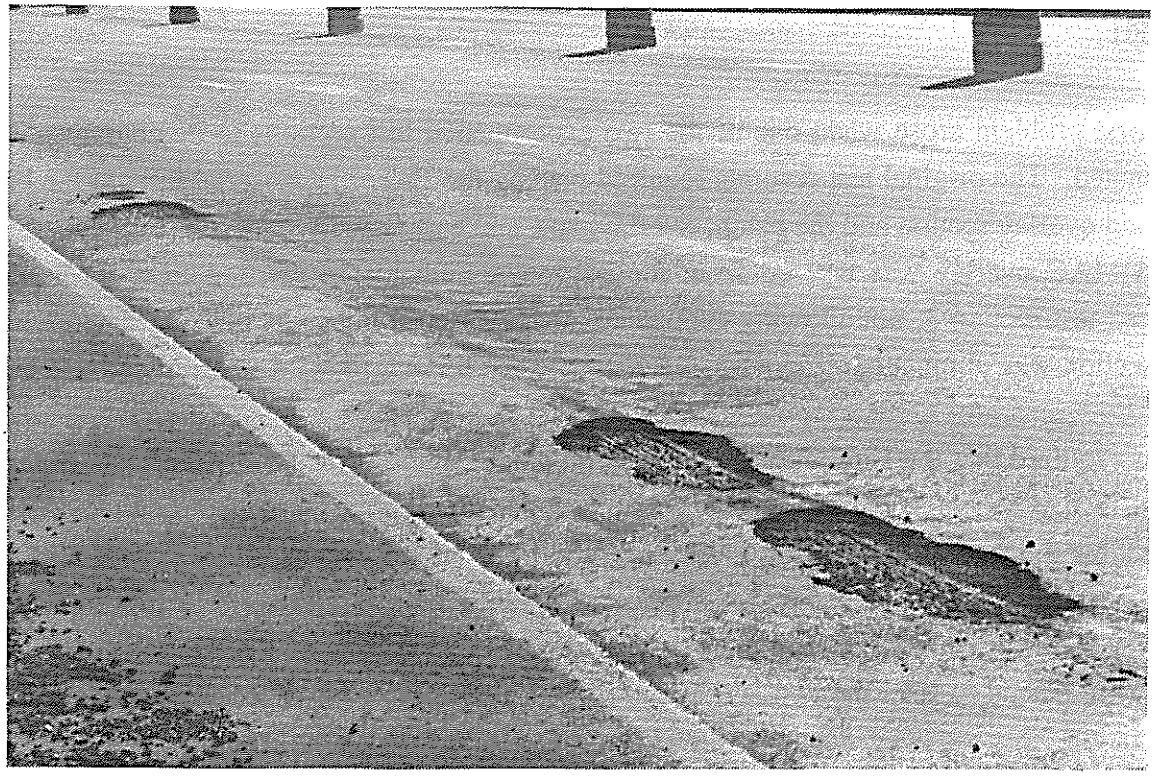

Figure 3. Extreme Raveling and spalling at HaTeLIT Interface.

material ordered and the mishandling of the material during construction, the actual experimental feature of this project was limited to the one test section for each roadway. The east bound roadway was under construction at this time and it was recommended prior to placing the polyester grid by the manufacturer that an asphalt cement (AC) tack coat be placed on the surface before installing the polyester grid and required it to be nailed to the surface prior to placing the HMAC overlay.

The east bound roadway was then prepared in accordance with the manufacturers recommendations using an AC tack coat and the polyester grid was placed and secured with nails in the same arrangement as the west bound roadway. The roadway was then overlayed in accordance with the plans and specifications.

Once completed and convinced of the proper installation, the previously constructed west bound HMAC overlay and polyester grid in test section 2 was removed and discarded. The surface was then cleaned and new reinforcement mesh and HMAC overlay was placed in the same manner as the east bound roadway, using an AC tack coat.

After completing the construction of the HMAC overlay, the contractor delayed sawing and sealing the overlay in the control section by several months. Reflective cracking had begun at those joints on the tapered section where the overlay thickness was 2" or less. The initial investigation just after construction also revealed minor rutting, but was immeasurable.

Plant Production

L. J. Earnest, Inc. utilized its dryer drum plant between Sulphur and Westlake for asphalt mix production on this job. The plant was located approximately 3 miles from the construction site on LA 108. There were no modifications to normal plant operations for the production of the Type 3 binder course or the Type 8 wearing course. Construction of the experimental sections began on July 9, 1990 and continued intermittently as the project proceeded.

Job mix formulas were developed in accordance with the plans and the Louisiana Standard Specifications for both the Type 3 binder course and the Type 8 wearing course. Table 1 provides samples of the pertinent mix design data for each of these mixes. The source of coarse aggregate was a limestone from Dravo for the binder coarse and Novaculite for the wearing coarse. The coarse and fine sands were provided by Trinity and Quality, respectively, for the

binder and wearing coarse. Star Enterprise supplied the AC-30 grade asphaltic cement and Scanroad provided the Perma-tac 99 antistrip.

Serviceability

Shortly after the final A/C overlay, data was collected to determine the serviceability of the roadway using the K.J. Law, model 8300 Roughness Surveyor. Table 2 presents a summary of the Serviceability Index for each test section.

These values reflect an improved serviceability of approximately 25% over the original serviceability before construction which averaged 3.4 PSI.

TABLE 1

RECOMMENDED JOB MIX FORMULAS

U.S SIEVE SIZE PERCENT PASSING	WEARING COURSE	JMF LIMITS	BINDER COURSE	JMF LIMITS
1 inch	100	100	100	100
3/4 inch	100	98-100	100	100
1/2 inch	94	90-100	96	90-100
3/8 inch	82	76-88	87	78-90
No. 4	57	50-62	60	53-65
No. 10	44	40-52	44	36-48
No. 40	26	20-30	26	20-30
No. 80	14	10-18	14	10-16
No. 200	6	4-8	6	4-8
% AC	5.0	4.7-5.5	4.2	3.9-4.7
% Crushed	100	95 min	100	70 min
Mix Temp (°F)	328	285-335	305	300-350
Mix Time: (Rate, Drum Mixer, ton/hr)	200		150	
MARSHALL TEST PROPERTIES				
Specific Gravity	2.38		2.42	
Theoretical Gravity	2.45		2.52	
Stability (lbs.)	2067		2134	
Flow (.01 in)	9		9	
Air Voids (%)	2.8		3.8	
VFA (%)	81.0		73.0	

TABLE 2

SERVICEABILITY, PSI

TEST SECTION	WEST BOUND ROADWAY	EAST BOUND ROADWAY
Patch, Saw and Seal A/C Overlay	4.2	4.1
Break, Seat & Overlay with HaTelit Mesh	4.1	4.4
Break, Seat & Overlay	4.2	4.2

Construction Cost

Table 3 presents a summary of the relative construction costs for each item associated with each test section.

TABLE 3

RELATED CONSTRUCTION COSTS

		COST, PER LANE-FT.		
ITEM	DESCRIPTION	SECTION 1	SECTION 2	CONTROL
501(01)	Asphaltic Concrete (Base & Binder Course)	$ 16.54	$ 16.54	$ 16.54
501(01)(B)	Asphaltic Concrete (Type 8 Wearing Course)	$ 3.53	$ 3.53	$ 3.53
734(01)	Break and Seat Pvt.	$ 0.67	$ 0.67	
S-904	Cleaning & Sealing Transverse Joints			$ 0.19
S-909(K)	Full Depth Patching			$ 6.40
S-923	Sawing & Sealing A/C Overlay			$ 0.26
S-016	Hatelit Reinforcement Mesh	$ 13.53		
	TOTAL COST, PER LANE-FT.	$ 34.27	$ 20.74	$ 26.92

APPENDIX

Original Experimental Feature Chart

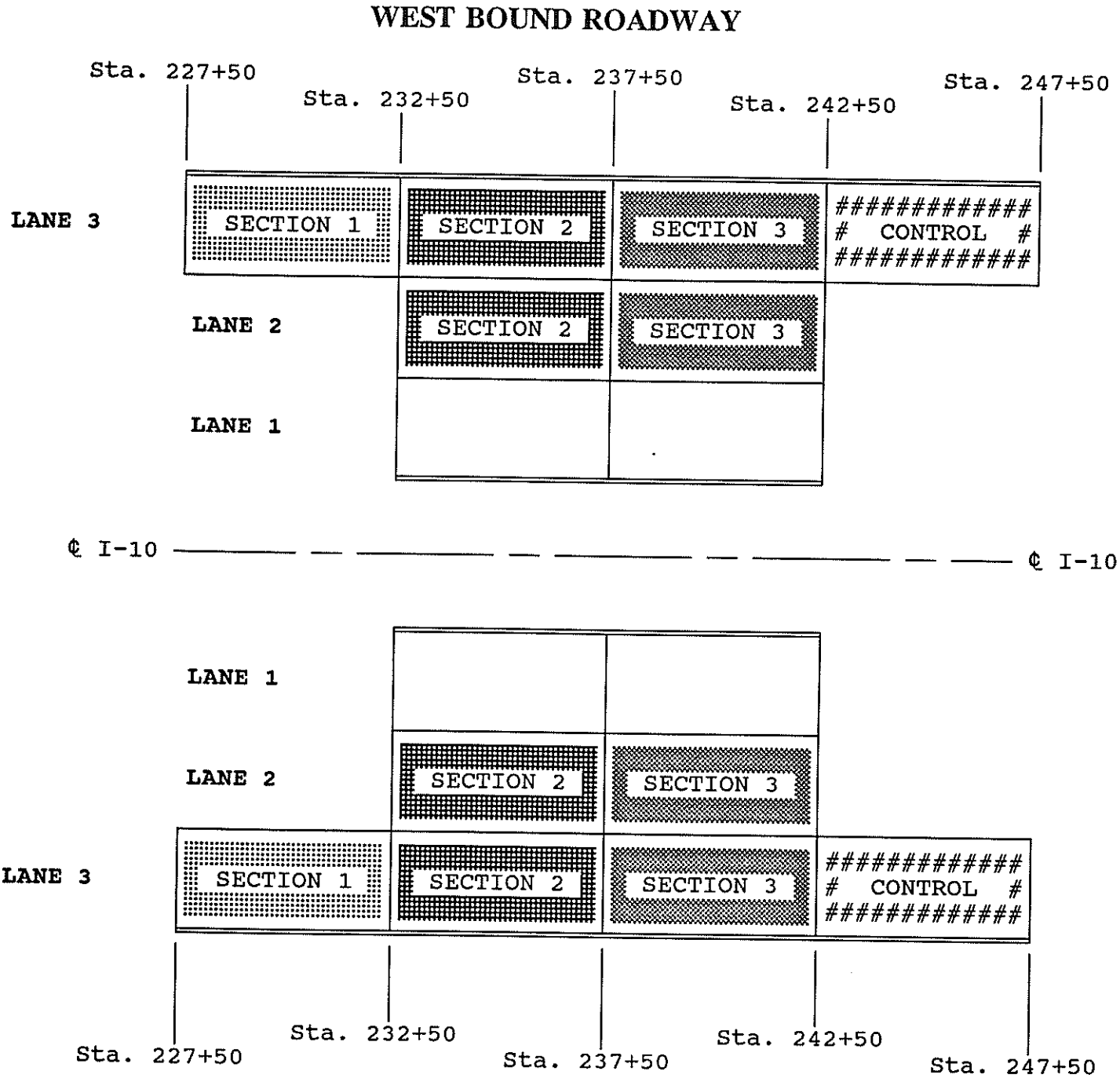

FIGURE 2. Experimental Feature Chart - WORK PLAN

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