Brent Rauhut Engineering Inc.

AL SPS-5

18 March 1996

Mr. Monte Symons
Pavement Performance Division - LTPP (HNR-40)
Federal Highway Administration
Turner-Fairbanks Highway Research Center
6300 Georgetown Pike, Room F-215
McLean, Virginia 22101

Subject: Final Report - Construction of SPS-5 Project (0105) on US-84 in Houston County, Alabama

Dear Monte,

Enclosed is the Final Report for the Specific Pavement Studies (SPS-5) project on US-84 in Houston County, Alabama. This report documents the construction of the rehabilitation study test sections at this location.

Please feel free to contact me should you have any questions or comments regarding any of the information included in this report.

Sincerely,

Mark D. Sargent
Project Engineer, SRCO

MDS:dmj

Enclosure: As stated.

c.w/Enc: Larry Lockett, ALDOT
Lynn Wolfe, ALDOT
Stanley Armstrong, ALDOT
Joe D. Wilkerson, FHWA-AL Div.
Evan Wisniewski, FHWA-Reg. 4
John Miller, PCS/LAW-Kennesaw, GA

c.w/Enc: Brent Rauhut, SRCO

c.w/o Enc: Morris Reinhardt, RE/SRCO

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FINAL REPORT

SPS-5 PROJECT 0105
ASPHALT REHABILITATION STUDY
US-84, EASTBOUND
HOUSTON COUNTY, ALABAMA

FHWA/LTPP

SOUTHERN REGION COORDINATION OFFICE

March 1996

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FINAL REPORT - SPS-5 PROJECT 0105

ASPHALT REHABILITATION STUDY
US-84, EASTBOUND
HOUSTON COUNTY, ALABAMA

INTRODUCTION

As part of the Strategic Highway Research Program's (SHRP) Long Term Pavement Performance (LTPP) Study, sections of highway are being selected to apply very specific treatments to study various facets of construction (both new and rehabilitated). These projects are referred to as Specific Pavement Studies (SPS). This particular project, on US-84 in Houston County, Alabama, was identified as a potential candidate for inclusion in the evaluations of asphalt concrete rehabilitation (SPS-5).

SPS-5 General Experiment Design

The anticipated products of the SPS-5 experiment are included in Table 1. The overall intent of the experiment is to evaluate some of the more common asphalt rehabilitation techniques currently used by State Highway Agencies (SHAs). This general evaluation is intended to include condition of the pavement prior to overlay (both structurally and functionally), the loading conditions the project is exposed to (including both environment and traffic) and finally, the various rehabilitation applications. The standard SPS-5 experiment design consists of nine 500' test sections (as shown in Figure 1). The standard SPS-5 experiment includes four test sections which are subjected to intensive surface preparation (milling) prior to overlay vs. four test sections which will undergo minimal surface preparation, four test sections utilizing recycled mix vs. four with virgin mix and thin overlays (approximately 2") vs. thick overlays (approximately 5"). The eight test sections represent combinations of the above mentioned features and are placed adjacent to the control section (which receives no rehabilitation) for comparison purposes. Minimal surface preparation will include patching only and/or crack sealing. Intensive surface preparation includes 2" of milling to be conducted along with patching, if necessary.

As part of the experiment, it was designated that the recycled mixture contain 30% of the Recycled Asphalt Pavement (RAP) and that the RAP material shall be the millings from the intensive surface preparation sections.

For additional information on the general experiment design for SPS-5, please refer to "Specific Pavement Studies: Experimental Design and Participation Requirements" Operational Memorandum No. SHRP-LTPP-OM-005R.

Selection/Nomination of US-84

The Alabama SPS-5 site location was identified through efforts of the Alabama DOT SPS program. The Alabama DOT reviewed anticipated rehabilitation programs over a five-year period. The list of potential rehabilitation projects which fit the experiment design criteria was

TABLE 1. KEY PRODUCTS OF SPS-5

1. Comparisons and development of empirical prediction models for performance of AC pavements with different intensities of surface preparation, with thin and thick AC overlays, and with virgin and recycled AC overlay mixtures.

2. Evaluation and field verification of the AASHTO Guide design procedures for rehabilitation of existing AC pavements with AC overlays, and other analytical overlay design procedures for AC pavements.

3. Determination of appropriate timing to rehabilitate AC pavements in relation to existing condition and type of rehabilitation procedures.

4. Development of procedures to verify and update the pavement management and life-cycle cost concepts in the AASHTO Guide using the performance prediction models developed for rehabilitated AC pavements.

5. Development of a comprehensive database on the performance of rehabilitation AC pavements for use by state and provincial engineers and other researchers.

FIGURE 1.
SPS-5, REHABILITATION OF ASPHALT CONCRETE PAVEMENTS

REHABILITATION PROCEDURES			FACTORS FOR MOISTURE, TEMPERATURE, AND PAVEMENT CONDITION													
			WET						DRY							
			FREEZE				NO FREEZE				FREEZE				NO FREEZE	
SURFACE PREP	OVERLAY MATERIAL	OVERLAY THICKNESS	FAIR		POOR		FAIR		POOR		FAIR		POOR		FAIR	POOR
Routine Maint. (Control)		0"					X									
MINIMUM	Recycled	2"					X									
	AC	5"					X									
	Virgin	2"					X									
	AC	5"					X									
INTENSE	Recycled	2"					X									
	AC	5"					X									
	Virgin	2"					X									
	AC	5"					X									

Subgrade Soil: Fine

Traffic: > 85 KESAL/Year

X = Sections on 48A500

narrowed to two potential sites. As a result, an SPS-5 candidate project was nominated by the State of Alabama on 10 May 1990. Correspondence and site information is included in Appendix A. The project site was located on US-84 near Dothan, Alabama, which was located near an existing GPS test section 014155. The GPS project information sheet and section field verification form for 014155 was submitted during the nomination process. The project site is located approximately 8 miles north/northwest of Dothan in a slightly hilly terrain. Every attempt was made to maintain the entire 500' limit outside of cut/fill transitions. This particular project site was representative of generally fine-grained soils. Traffic levels for this particular site were estimated at approximately 69 KESALs/year in the design lane. The state included two supplemental test sections located at the ends of the SPS-5 project. The supplemental test sections represented both virgin and recycled mixes, which were included in the design as supplemental test sections. The project located on US-84, in Houston County, Alabama, was officially approved on 30 May 1991.

Specific Experiment Design for US-84

The layout from the plans for this particular project are included in Appendix A. As previously mentioned, it was anticipated that the supplemental test sections, which included mill and inlay, would be positioned at either end of the project.

PRECONSTRUCTION MONITORING

A number of preconstruction monitoring measurements were performed on US-84 to establish the condition prior to rehabilitation. Each preconstruction monitoring endeavor will be discussed separately in the following text.

Pavement Surface Distress

Prior to rehabilitation, each test section was marked with paint and offset stakes, etc., to allow for the collection of pavement surface distress. Each test section was rated manually using the SHRP Distress ID Manual. The predominant distress throughout all test sections was low severity longitudinal cracking in both wheel-paths, including a small amount of low severity fatigue cracking. This roadway segment included a 1" surface friction course, which appeared to be raveling and small pieces approximately 1" to 3" in diameter from the wheelpath.

Surface Profile

Surface profile measurements were performed on 9 July 1991, utilizing the SHRP/LTPP profilometer Model 690DNC Inertial Profilometer, manufactured by K.J. Law Engineering, Inc. The K.J. Law high-speed profilometer collects data in the travel lane of each section at 6" increments. Results of this work are included in Table 2.

TABLE 2. PROFILE READINGS
INTERNATIONAL ROUGHNESS INDEX (IRI) INCHES/MILE

Test Section	Mean Values		Mean Values		Mean Values	
	Preconstruction		Postconstruction		Postconstruction	
	Date Surveyed: 8 Jul 91		Date Surveyed: 1 Apr 92		Date Surveyed: 10 Aug 94	
	LWP	RWP	LWP	RWP	LWP	RWP
010563	79.0	64.4	33.5	38.3	33.9	42.9
010506	76.8	67.5	37.6	44.2	37.8	48.3
010507	85.9	77.4	47.1	48.1	49.6	55.0
010504	72.8	65.7	50.8	53.4	54.1	59.1
010505	77.8	68.7	43.1	52.2	46.3	57.7
010502	76.7	65.5	44.7	49.0	40.4	53.6
010503	74.2	64.3	36.7	51.9	36.9	55.3
010508	78.6	66.9	51.1	59.2	56.5	64.8
010509	116.9	108.5	42.1	51.3	43.9	53.9
010564	82.6	81.3	44.5	51.1	46.5	54.6
Average	82.1	73.1	43.2	49.9	44.6	54.6

Structural Capacity

Deflection measurements were performed beginning on 7 October 1991 and were concluded on 9 October 1991. Deflection measurements were obtained using the SHRP Falling Weight Deflectometer (FWD) to evaluate the structural capacity of each of these test sections. Deflection measurements were recorded from a series of varying weights in a set pattern at 25' intervals to measure the subsurface response (deflection) of the structural layers in that highway segment. Results of the deflection testing are included in Appendix B.

Materials Sampling and Testing

Materials sampling and testing was performed on 17 September 1991. Appendix A identifies the level of effort and location of each sample taken or test performed on this project.

CONSTRUCTION

Monday, 9 December 1991 - Couch Inc. representatives established traffic control at approximately 8:00 a.m. for the milling operation on the inside lane. The contractor's name and address (office and plant) is listed below:

Couch Inc.
1020 Twitchwell Rd.
Dothan, AL 36302

The milling operations began on the inside lane at approximately 9:40 a.m. A ROADTEC RX-50 milling machine was utilized for this project. The milling operation was actually performed by a subcontractor: Douglas Asphalt Company, Douglas, Georgia, Phone: 912-384-8114. The milling head, or drum width, was 7' 2" in length. This required the subcontractor to make two passes per lane. It is normally our intent to observe the milling process of the inside lane to determine up front the possible anomalies we may face during construction practices in the outside lane. During the initial milling efforts today, the subcontractor determined that the pump utilized to transfer water from the tanker, which is towed by the milling equipment, was inoperable. The subcontractor chose to continue milling without the benefit of water as a cooling and cleaning agent.

Tuesday, 10 December 1991 - Coordination efforts were established at the plant which is located approximately 8 miles from the site. The subcontractor intended to conclude all milling operations on the inside lane by the end this day. The contractor began milling operations in the outside lane at 7:20 a.m. on test section 010506. At 7:45 a.m., the subcontractor continued milling operations on test section 010507. At the conclusion of milling operations for the virgin test sections and prior to the milling operations in the recycled test sections, the contractor elected to discontinue the milling operations and change some of the carbide teeth on the milling head. Today, the subcontractor had the benefit of a working water pump, which seemed to allow for better progress. Stanley Armstrong, our LTPP State Contact, indicated that the use of different asphalt cement (AC) types may be exorcised for the virgin and RAP test sections.

Wednesday, 11 December 1991 - At 6:30 a.m., BRE representatives arrived on-site to take advantage of the traffic control setup and obtain rod shots on the first three virgin milled test sections. It is our understanding that the contractor (Couch Inc.) intends to place the leveling courses on test sections 010506, 010507, 010504 and 010505. The texture of the milled surface is coarse, however, the subcontractor was able to maintain a fairly smooth transition between the two milling runs in each lane. At 8:00 a.m., we were able to obtain the rod shots on the previously mentioned test sections prior to the leveling operation. The contractor made a great effort to broom and ensure a clean surface, utilizing a high velocity air-blower device attached to a piece of equipment which was able to remove debris from those areas which are difficult for the rotary broom system.

Both the inside and outside lanes received a leveling course. During construction of the outside lane on test section 010507 (leveling course), we observed temperatures of 246°F (temperature obtained from haul vehicle) prior to laydown and 220°F after laydown. This is below specs, which requires a minimum of 280°F. All other trucks sampled during the construction of the above mentioned four test sections in the outside lane maintained temperatures between 280°F ± and 300°F.

Thursday, 12 December 1991 - At 6:30 a.m., the contractor is constructing the first binder lift in test sections 010506 and 010507. We are waiting for traffic control to be switched to the outside lane to enable us to obtain rod shots on those test sections where the leveling course was constructed. Rod shot elevations were obtained on test sections 010506, 010507 and 010504. A tack coat was placed on the milled surface prior to the laydown of leveling courses in all lanes. During construction of the outside lane (test sections 010507 and 010504), we obtained four 5-gallon pails of bulk HMAC samples (70 lbs. each), which will represent the virgin binder material for this SPS-5. Temperature values obtained from the construction of this binder layer in the outside lane averaged at about 290°F (after the laydown machine). We collected and labeled our samples and then returned to the hotel to perform thickness calculations at 5:15 p.m.

Friday, 13 December 1991 - Arrived onsite at 6:55 a.m. The conditions are very foggy. The contractor is delaying operation, per state law, prior to setting up traffic control. We intend to travel to the plant and obtain aggregate samples for the MRL. We obtained two 55-gallon containers of the RAP material milled from this project. We also obtained five sacks of the RAP material from US-52 nearby (75 lbs. each). The state mix design calls for 30% RAP material to be used on the SPS-5 test sections, which contain RAP mixtures. State representatives have indicated that the use of RAP material obtained from US-52 was necessary due to the amount of material anticipated on this particular project. The milled tailings from each of the highways (US-84 and US-52) are from the same mix design and aggregates used. We concluded the day by labeling all containers for shipment.

Monday, 16 December 1991 - Today, we continued collecting aggregate samples on behalf of the MRL. We also obtained rod shots on test sections 010507 and 010504. These test sections are essentially finished with the exception of the surface layer, which will consist of a finer surface mix design. We also took the liberty of obtaining rod shots on all RAP test sections that had received milling. During the milling operation, we noticed the test sections located between Stations 365+50 and 395+00 exhibited some fatigue-like longitudinal cracking in both wheel paths following the milling operation; we also noticed the surface layer (about 1" thick) seemed

to be coming up in sheets due to delamination. The milling machine was pulling up large chunks of asphalt concrete about 6" long by 3"-4" wide on average. As a result, the contractor will be required to utilize more material from the US-52 highway to compensate for the large particles which will be screened out prior to being introduced into the mix at the plant.

Tuesday, 17 December 1991 - The contractor began the day by preparing the surface with a brooming effort. The temperature is currently 45°F. The first truck arrived at 8:28 a.m. with a load of RAP leveling material. Interestingly enough, the temperatures of the RAP material prior to laydown (leveling) averaged around 300°-320°F. The breakdown roller operator immediately began a compactive effort and soon observed that the leveling material was pulling/ lifting (sticking to the drum). This was also experienced with the pneumatic roller, or intermediate roller, as well. It was theorized that the compactive effort was conducted to early and that the roller operation needed to be delayed until the temperatures in the mat decreased. The leveling material was placed in both lanes of test sections 010508 and 010503. The contractor also pulled the shoulder lane (outside). We obtained four 5-gallon pails of the RAP HMAC binder material plus an additional pail to be sent to Southwestern Labs. We observed temperatures from these samples at 315°-320°F prior to laydown. We transported all samples obtained from the site to the lab and labeled them for shipping.

Wednesday, 18 December 1991 - Today the contractor continued construction efforts in test sections 010503, 010508 and 010509. The contractor placed another lift on these test sections and pulled the inside and outside shoulders. We observed temperatures between 300°-320°F. Prior to the overlay of these test sections, we obtained rod shots to determine the thickness of the leveling layer placed yesterday on test sections 010503 and 010508. Also, we obtained rod shots on all virgin test sections in anticipation of the final surface layer.

Thursday, 19 December 1991 - Today the contractor anticipates pulling a surface lift through all recycled test sections, which includes test sections 010502, 010503, 010508, 010509 and 010564. This concluded the placement of material in the recycled test sections. We observed temperatures of the recycled surface material between 290°F and 315°F. We obtained five 5-gallon pails of the recycled surface material (70 lbs. each).

Friday, 20 December 1991 - Today, the contractor placed virgin material in all of the virgin test sections, which included 010563, 010506, 010507, 010504 and 010505. We obtained rod shots on all final surfaces in the outside lane for the recycled test sections. We also obtained five 5-gallon pails of HMAC material to represent the virgin surface mix placed. All 5-gallon pails were labeled and transferred to the lab for distribution. A cold front moved in causing temperatures to drop at the end of the day to about 40°F with an 8-mile an hour wind. We obtained rod shots on all virgin test sections that received material today. During construction of the final virgin surface mix, no anomalies were observed which would compromise the integrity of any of the virgin test sections. Construction included the placement of a smooth mat devoid of surface anomalies which would affect rideability due to the stopping and starting of laydown equipment. The equipment used for placement of all materials was a Barber-Greene laydown machine, Model Nº. BG-240B.

POSTCONSTRUCTION MONITORING

Following the completion of all rehabilitation applications, postconstruction monitoring was initiated. These monitoring activities were representative of those types of monitoring activities that took place prior to construction.

Pavement Surface Distress

Following construction, all test sections were identified by paint and filmed by video. All test sections were also filmed by the PASCO ROADRECON unit on 1 April 1992.

Surface Profile

In addition to the rod and level measurements, all sections were again profiled using the SHRP high-speed profilometer on 1 May 1992. Transverse profile measurements again were collected by the PASCO ROADRECON unit on 21 March 1994. The plots of rod and level data before and after overlay are available in Appendix D, which exhibit changes in the transverse profile.

Structural Capacity

Deflection measurements were again taken, after completion of the rehabilitation applications, on 12 June 1992. These results are also included in Appendix B. The structural response appeared to improve (less deflection was observed) after completion of the overlays, with the greatest improvements being observed in the sections with thicker overlays, as expected.

Materials Sampling and Testing

The postconstruction sampling and testing (coring of 4" cores) on 1 November 1993. Coring was performed 50' from the approach and leave end of each test section following a layout diagram indicated in the Material Sampling Plan prepared for this experiment. Sampling was conducted by the Alabama DOT under the supervision of the SRCO.

SUMMARY

After review of all pertinent data retrieved from the ensuing construction events, additional monitoring efforts have begun of the test sections located on US-84 in Houston County, Alabama. It appears that this project will contribute significantly to the research efforts. Special consideration should be given to members of the Alabama Department of Transportation. In particular, much of the credit is due to individuals such as Stanley Armstrong and Bill Page for their efforts in expediting the necessary tasks to make this project possible.

Currently, monitoring efforts are scheduled and will continue noting changes in the surface distress, surface profile and structural capacity, and compare those data with other projects of this nature around the country in an attempt to improve on existing asphalt pavement rehabilitation design methods.

APPENDIX A

SITE BACKGROUND DATA

NATIONAL RESEARCH COUNCIL

STRATEGIC HIGHWAY RESEARCH PROGRAM

Southern Region, 8240 MoPac Expressway, Suite 250, Austin, TX 78759 Tel. (512) 346-7477 Fax (512) 346-8750

HOMER G. WHEELER
Regional Engineer

March 13, 1991

Dr. Shiraz D. Tayabji
PCS/LAW Engineering
12240 Indian Creek Court, Suite 120
Beltsville, Maryland 20705-1242

Subject: Project Nomination for SPS-5, Alabama.

Dear Dr. Tayabji:

The Alabama Highway Department (AHD) has nominated a project for SPS-5. This project is located on US-84, in the eastbound lanes about five miles west of Dothan, Alabama. This project already contains a GPS test section (ID# 014155) and an SPS-3 site (01C3). This letter, with its attachments, provides the necessary documentation for this candidate project.

General Information

The original eastbound lanes on this section of US-84 were constructed in 1976 and consist of slightly less than 4" (total) over approximately 10" of a granular base material. This project was among the last projects selected to include a GPS test section. The primary reason why it was selected was to help complete the SPS-3 experiment.

During previous site visits, a very consistent pattern of distress has been noted throughout the project limits. From one end of the project to the other, low-to-medium severity longitudinal cracking has been observed in both wheelpaths in the outside lane. Roughly 70% of this would be categorized as moderate severity.

Although we were unable to document any information regarding projected growth rate traffic, the Dothan metropolitan area is probably the second fastest growing urban area in Alabama. This leads us to believe that the ESAL rate will likely increase substantially as time progresses.

There are several good reasons to select this project for inclusion in SPS-5. Those include:

1. The existence of SPS-3 test sections on another area in this project.

2. The uniformity and different nature of distress on this project, as opposed to that seen on other SPS-5 projects.

3. The willingness of AHD to cooperate with SHRP and help complete this experiment.

RECOMMENDATION

Although there are some slight deviations from the desired site location criteria (see Attachment A, Sheet D), these are minor in comparison with the benefits of including this project in the SPS-5 study. It is our recommendation that this project be promptly accepted for inclusion in this study.

As indicated in Attachment A, the AHD requests that they be notified of the status of this nomination by May 1, 1991. Please contact Gary Fitts at (512) 346-0870, with questions relating to technical project details.

Sincerely,

Homer G. Wheeler

Homer G. Wheeler, P.E.
SHRP Regional Engineer, SRCO

Attachments:

Attachment A: SPS-5 Candidate Nomination and Information Forms.

Attachment B: Proposed schedule of SPS-5 test sections and schedule of SPS-3 test sections constructed on this project.

Attachment C: Title Sheet and pertinent Plan/Profile Sheets indicating the project location and the location of each test section.

cc.w/Attach: Dr. Amir Hanna, SHRP-DC
Mr. William E. Page, AHD
Mr. Stanley R. Armstrong, AHD
Dr. Brent Rauhut, PM-SRCO

cc.w/o Attach: Mr. Neil Hawks, SHRP-DC

HGW:dmj

SHEET A. SPS-5 CANDIDATE PROJECT NOMINATION AND INFORMATION FORM

STATE AL

PROJECT LOCATION

ROUTE NUMBER 84

ROUTE SIGNING [ ] Interstate [✓] U.S. [ ] State [ ] County

Other _____

PROJECT LOCATION Start Milepost ~200 End Milepost ~207

Start Station 300+78 End Station 688+03

PROJECT LOCATION DESCRIPTION W. of Dothan, AL, between AL 123 and Whelless Airport. Same project as GPS 014155 and SPS 01C3xx.

COUNTY Houston

HIGHWAY AGENCY ~~DISTRICT~~ DIVISION NUMBER 7

SHRP ENVIRONMENTAL ZONE

[ ] WET FREEZE [✓] WET NO-FREEZE [ ] DRY FREEZE [ ] DRY NO-FREEZE

SIGNIFICANT DATES

LATEST DATE OF APPROVAL NOTIFICATION FROM SHRP 1 MAY 91

CONTRACT LETTING DATE ~ MAR 92

ESTIMATED CONSTRUCTION START DATE ~ APR 92

PROJECT DESCRIPTION

YEAR OPENED TO TRAFFIC 1976

NUMBER OF LANES (One Direction) 2

[✓] Divided [ ] Undivided

OUTSIDE LANE WIDTH (Feet) 12

OUTSIDE SHOULDER TYPE

[ ] Turf [ ] Granular [ ] Asphalt Concrete [✓] Surface Treatment

[ ] PCC [ ] Curb and Gutter Other _____

OUTSIDE SHOULDER WIDTH (Feet) 8 (w/surf. trt.)

SUBSURFACE EDGE DRAINS [ ] Placed at initial construction [✓] Not Used

[ ] Retrofitted Retrofit Date _____

ASSESSMENT OF PRESENT PAVEMENT CONDITION [ ] Fair [✓] Poor

PREDOMINATE DISTRESSES

[ ] Fatigue Cracking [ ] Other Cracking [ ] Potholes/Patches [ ] Rutting

Comments Extensive longitudinal cracking in both wheelpaths.

SHEET B. SPS-5 CANDIDATE PROJECT NOMINATION AND INFORMATION FORM

STATE AL

PAVEMENT STRUCTURE LAYER DESCRIPTIONS

LAYER[1] NO.	LAYER[2] DESCRIPTION CODE	MATERIAL TYPE[3] CLASS CODE	THICKNESS[4] † (INCHES)	STRUCTURAL[5] COEFFICIENT
1	SUBGRADE (7)	52 or 60 *		
2	05	23	10.5	0.12
3	04	28	2.8	0.44
4	03	01	1.0	0.44
5				0.
6				0.
7				0.
8				0.
9				0.

NOTES

1. Layer 1 is the natural occurring subgrade soil. The existing surface will have the largest assigned layer number.

2. Layer description codes:

Overlay 01	Base Layer 05	Porous Friction Course . 09
Seal Coat 02	Subbase Layer 06	Surface Treatment 10
Original Surface . 03	Subgrade 07	Embankment (Fill) 11
Subsurface HMAC .. 04	Interlayer 08	

3. Refer to Tables 1 through 4 for material class codes.

4. If subgrade depth to a rigid layer is known, enter this depth for subgrade, otherwise leave blank for subgrade layer.

5. Enter AASHTO structural layer coefficient used in pavement design or typical coefficient used by agency for this material. For the subgrade, enter either AASHTO soil support value or estimated resilient modulus.

* The roadbed soil has been described both ways. We have not yet received test results for samples obtained from outside the GPS test section.

† These thicknesses were indicated from the MS4 FT performed on GPS 014155. No rigid layer was encountered during the shoulder probe.

SHEET C. SPS-5 CANDIDATE PROJECT NOMINATION AND INFORMATION FORM

STATE AL

TRAFFIC DATA

ANNUAL AVERAGE DAILY TRAFFIC (TWO DIRECTION)	7000
% HEAVY TRUCKS AND COMBINATIONS (OF AADT)	8
COUNT YEAR OF AADT ESTIMATE	1989
TRAFFIC GROWTH RATE SINCE PROJECT OPENED TO TRAFFIC (%/YR)	-
18K ESAL RATE IN PROPOSED STUDY LANE (1,000 ESAL/YR)	69 (from ague
YEAR OF ESAL RATE ESTIMATE	1989
ESTIMATED TOTAL 18K ESAL APPLICATIONS IN STUDY LANE[1]	-

REHABILITATION INFORMATION[2]

PRIMARY CAUSE FOR REHABILITATION Extensive cracking.

OVERLAY	Thickness (Inches)	Material Type Class Code
Surface Course	na	na
Binder Course	na	na

SURFACE PREPARATION PRIOR TO OVERLAY

[ ] Patching [ ] Crack Sealing [✓] Milling Depth of Mill _____

Other _____

OTHER CONSTRUCTION ACTIVITIES TO BE PERFORMED DURING REHABILITATION

Not yet determined.

NOTES

1. Leave blank if estimate is not available.
2. This information concerns the planned rehabilitation work to be performed by the agency on the non-experimental portions of the project.

SHEET D. SPS-5 CANDIDATE PROJECT NOMINATION AND INFORMATION FORM

STATE AL

TEST SECTION LAYOUT

NUMBER OF TEST SECTIONS ENTIRELY ON: FILL 5 CUT 5

SHORTEST TRANSITION BETWEEN CONSECUTIVE ~~TEST~~ Monitored SECTIONS (Feet) 200

COMMENTS ON DEVIATIONS FROM DESIRED SITE LOCATION CRITERIA

1. The traffic rate is slightly less than what is preferred in the experiment design.
2. The subgrade is best classified as "loam", and is borderline fine/coarse. The experiment design prefers "fine" subgrade.
3. There are several minor intersections within the test section schedule. It is unlikely that they affect the ESAL rate within the project.

OTHER SHRP TEST SECTIONS

DOES PROJECT CONFORM TO GPS-1 OR GPS-2 PROJECT CRITERIA?	[✓] YES	[ ] NO
DOES AGENCY APPLIED TREATMENT QUALIFY FOR GPS-6B?	[ ] YES	[ ] NO ?
IS PROJECT SUITABLE FOR SPS-3 TEST SECTIONS?	[✓] YES	[ ] NO 01C3
IS AGENCY INTERESTED IN USE OF PROJECT AS SPS-3 SITE?	[✓] YES	[ ] NO "

DISTANCE TO NEAREST GPS TEST SECTION ON SAME ROUTE (Miles) same project

TEST SECTION NUMBER OF NEAREST GPS SECTION 014155

SUPPLEMENTAL TEST SECTIONS

IF SUPPLEMENTAL EXPERIMENTAL TEST SECTIONS ARE PROPOSED, COMPLETE THE FOLLOWING

TOTAL NUMBER OF SUPPLEMENTAL TEST SECTIONS 2

FACTORS TO BE INVESTIGATED Mill & inlay with "virgin" & 30% RAP mix.

STRATEGIC HIGHWAY RESEARCH PROGRAM

NATIONAL ACADEMY OF SCIENCES / NATIONAL RESEARCH COUNCIL
818 Connecticut Avenue, N.W., 4th Floor, Washington D.C 20006
SHRP Telecopier: (202) 223-2875 Verification: (202) 334-3774

MEMORANDUM

May 30, 1991

TO: Homer Wheeler, Southern Region

FROM: Amir N. Hanna

SUBJECT: Nomination for an SPS-5 Site in Alabama

We have completed the review of the nomination for an SPS-5 site on U.S. 84 in Houston County, Alabama (your submission of March 13, 1991). With a few tolerable exceptions, the site is a viable candidate for the SPS-5 experiment.

A concern about this test site is that traffic rate in the study lane is estimated at 69,000 ESAL/year which is 81% of the minimum desired traffic rate of 85,000 ESAL/year. However, taking into account the potential growth in traffic rate, it is likely that the desired traffic rate will be reached shortly after the rehabilitation is completed. Therefore, this deviation in traffic rate can be tolerated. Another concern, is the existence of a minor intersection within the test site. However, the information indicated on the plans reveals no significant effect on traffic flow. Otherwise, the proposed site meets the requirements for the SPS-5 experimental design for roadways in the "wet-no freeze" environmental zone.

Based on this review, the test site is considered acceptable and will be included in the experiment if no other discrepancies arise during site verification. Also, this approval stipulates the agreement of the Alabama Highway Department to conform to all design and participation requirements for this experiment.

Please inform the Alabama Highway Department of the acceptance of the proposed test site and proceed with coordination of the related activities. Also, we request that a copy of the final design cross sections and other details pertaining to the test sections and the proposed plans for field sampling and testing be forwarded to our office for review prior to implementation.

cc: N.F. Hawks
D. Ooten
P-001B (S. Tayabji)

Brent Rauhut Engineering Inc.

February 20, 1991

Mr. Stanley R. Armstrong, P.E.
Assistant Materials and Test Engineer
Alabama Highway Department
1409 Coliseum Blvd.
Montgomery, Alabama 36130

Subjects: Preliminary layouts for SPS-5 candidate on US 84, SPS-1.

Dear Stanley,

The attached tables include two potential test section schedules for SPS-5 on the project on US 84 west of Dothan in Houston County. The first (Schedule A) includes the basic SPS-5 test sections with two supplemental "mill and fill" sections, Schedule B includes these plus four more supplemental sections, which examine an intermediate (3.5 inches) overlay thickness for both virgin and 30% RAP mixes and both levels of surface preparation.

Along with the test section schedules, handwritten quantity estimates are provided for square yards of cold milling and tons of asphalt concrete. These estimates are for work to be done in the eastbound lanes and shoulders, and do not include materials which would be needed in crossovers or intersections.

Of the projects which have been nominated and accepted in the Southern Region, the projects in Georgia and Florida will include the supplemental sections indicated in Schedule B, while those in Mississippi and Texas will include only the standard SPS-5 test sections. The Texas project is similar to US 84, in that the SPS-3 experiment was also built within the limits of the original construction project.

At this time, I am not sending project nomination forms to SHRP. If you want me to prepare and send them, formally nominating this project for SPS-5, I will be happy to do so.

With regard to SPS-1, the first draft of the materials sampling and testing guide for this experiment was on my desk when I returned from my visit to Alabama and Oklahoma. Rather than broadcasting the first draft to everyone for review, SHRP has sent it to the regional offices for their evaluation prior to distributing it to the states. Given the relatively short amount of time between now and the time when a sampling and testing plan must be drafted for the project in Lee County, I will use this document to draft a plan specifically for this project. I hope to have this draft to you by the end of March. Please let me know if you need it sooner than that.

8240 Mopac, Suite 220 • Austin, Texas 78759 • (512) 346-0870 • FAX (512) 346-3750

Please call if you have any questions or comments.

Sincerely,

Gary L. Fitts, P.E.
Project Engineer, SRCO

Attachments: As stated.

/glf

SCHEDULE A, TEST SECTION LAYOUT
US 84, HOUSTON CO., AL

SHRP ID	SURF PREP	O/L TH	O/L MAT	BEG STA	END STA	TRANS
01S503	MILL/INLY	0	VIR	30100	31400	200
010506	MILL/INLY	2	VIR	31600	32400	300
010507	MILL/INLY	5	VIR	32700	33500	50
010504	MINIMAL	5	VIR	33550	34200	300
010505	MINIMAL	2	VIR	34500	35350	0
010502	MINIMAL	2	30% RAP	35350	36200	300
010503	MINIMAL	5	30% RAP	36500	37100	50
010508	MILL/INLY	5	30% RAP	37150	37800	300
010509	MILL/INLY	2	30% RAP	38100	39000	200
01S504	MILL/INLY	0	30% RAP	39200	40050	N/A

QUANTITY CALCULATIONS, SPS-5

SCHEDULE A

COLD MILLING (SY)

To be milled:

$$\left((33550 - 30100) + (40050 - 37100)\right)' \times 24' \div 9$$

$$= (3450 + 2950) \times 24/9 = \underline{17,067 \text{ SY}}$$

Not to be milled:

$$(37100 - 33550) \times 24 \div 9 = \underline{9,467 \text{ SY}}$$

"Virgin" HMAC

- Replace milled (assume 2" avg. thickness):

$$= (33550 - 30100)' \times 24' \times (2''/12)' \times 140\#/ft^3 \times 1 \text{ ton}/2000\#$$

$$= 966 \text{ tons}$$

- 0-2" transition:

$$= 200' \times 36' \times (1/12)' \times 140\#/ft^3 \times 1 \text{ ton}/2000\#$$

$$= 42 \text{ tons}$$

SCHEDULE A (cont'd)

"Virgin" HMAC (cont'd)

- 2" overlay:

$= \left((33500 - 32700) + (35350 - 34500)\right)' \times 36' \times (2/12)' \times 140/2000$

$= 693$ tons

- 2" - 5" transitions:

$= (300' + 300') \times 36' \times (3.5/12)' \times 140/2000$

$= 441$ tons

- 5" overlay:

$= (34200 - 32700)' \times 36' \times (5/12)' \times 140/2000$

$= 1575$ tons

Total, "Virgin" HMAC $= (966 + 42 + 693 + 441 + 1575)$ tons

$= \underline{3717 \text{ tons}}$

Schedule A, cont'd

"30% RAP"

- Replace milled (assume 2" th):
  = (40050 - 37100)' x 24' x (2/12)' x 140/2000
  = 826 tons

- 2" overlay:
  = ((36200 - 35350) + (39000 - 32100)' x 36' x (2/12) x 140/2000
  = (1750' x 36' x (2/12)' x 140/2000)
  = 735 tons

- 2"-5" transitions:
  = (300 + 300)' x 36' x (3.5/12)' x 140/2000
  = 441 tons

- 5" overlays:
  = (37800 - 36500)' x 36' x (5/12)' x 140/2000
  = 1365 tons

- 2"-0" transition
  = (39200 - 39000)' x 36' x (1/12)' x 140/2000
  = 42 tons

Total, 30% RAP = 826 + 735 + 441 + 1365 + 42
= 3409 tons

SCHEDULE B, TEST SECTION LAYOUT
US 84, HOUSTON CO., AL

SHRP ID	SURF PREP	O/L TH	O/L MAT	BEG STA	END STA	TRANS
01S503	Mill/inlay	0.0	Virgin	30100	31500	100
010506	Mill/inlay	2.0	Virgin	31600	32400	100
01S506	Mill/inlay	3.5	Virgin	32500	33500	50
010507	Mill/inlay	5.0	Virgin	33550	34200	50
010504	Minimal	5.0	Virgin	34250	35450	100
01S502	Minimal	3.5	Virgin	35550	36300	100
010505	Minimal	2.0	Virgin	36400	37100	0
010502	Minimal	2.0	30% RAP	37100	37950	100
01S501	Minimal	3.5	30% RAP	38050	39300	100
010503	Minimal	5.0	30% RAP	39400	40200	0
010508	Mill/inlay	5.0	30% RAP	40200	40900	100
01S505	Mill/inlay	3.5	30% RAP	41000	41600	50
010509	Mill/inlay	2.0	30% RAP	41650	42250	100
01S504	Mill/inlay	0.0	30% RAP	42350	43000	---

QUANTITY CALCULATIONS, SPS-5
SCHEDULE B

Cold Milling (SY):

To be milled:

$((34250-30100)+(43000-40200))' \times 24' \times (1/9)$

= 18,533 SY

Not to be milled:

$(40200-34250)' \times 24' \times (1/9)$

= 15,867 SY

"Virgin" HMAC

- Replace milled AC (assume 2")

$= (34250-30100)' \times 24' \times (2/12)' \times 140/2000$

= 1162 tons

- 0-2" overlay transition

$= (31600-31500)' \times 36' \times (1/12)' \times 140/2000$

= 21 tons

- 2" overlays

$= ((32400-31600)+(37100-36400))' \times 36' \times (2/12)' \times 140/2000$

= 630 tons

- 2"-3.5" transitions

$= (100' + 100') \times 36' \times (2.75/12)' \times 140/2000$

= 116 tons

Schedule B, cont'd

"Virgin" HMAC (cont'd)

- 3.5" overlays

= ((33500-32500)+(36300-35550))' x 36' x (3.5/12) x 140/20(

= 1286 tons

- 3.5" - 5" transitions

= (50 + 100)' x 36' x (4.25/12)' x 140/2000

= 134 tons

- 5" overlays

= (35450 - 33550) x 36' x (5/12)' x 140/2000

= 1995 tons

Total, "Virgin" HMAC = 1162+21+630+116+1286+134+1995

= 5344 tons

30% RAP

- Replace milled AC (assume 2")

= (43000 - 40200)' x 36' x (2/12)' x 140/2000

= 1176 tons

- 2"-3.5" transitions

= (100' + 50') x 36' x (2.75/12)' x 140/2000

= 87 tons

Schedule B, cont'd

30% RAP (cont'd)

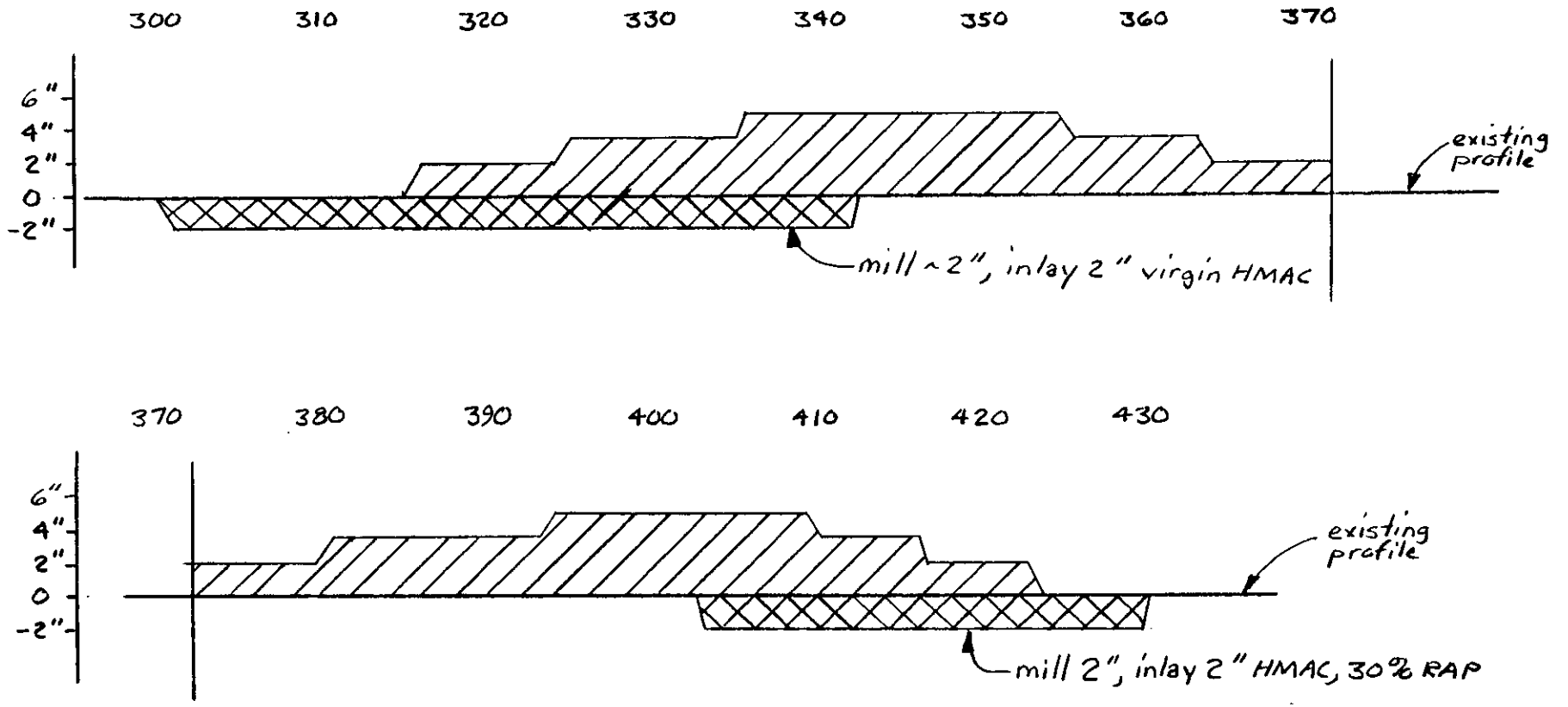
- 3.5" overlays
  = ((39300 - 38050) + (41600 - 41000)) ' x 36 ' x (3.5/12)' x 140/2000
  = 1360 tons

- 3.5" - 5" transitions
  = (100 + 100') x 36' x (4.25/12)' x 140/2000
  = 179 tons

- 5" overlays
  = (40900 - 39400) x 36' x (5/12)' x 140/2000
  = 1575 tons

- 2" - 0" transition
  = 100' x 36' x (1/12)' x 140/2000
  = 21 tons

Total, 30% RAP mix = 1176 + 87 + 1360 + 179 + 1575 + 21
= 4398 tons



SCHEDULE "B", SIDE VIEW SCHEMATIC

NATIONAL RESEARCH COUNCIL

STRATEGIC HIGHWAY RESEARCH PROGRAM

Southern Region, 8240 MoPac Expressway, Suite 250, Austin, TX 78759 Tel. (512) 346-7477 Fax (512) 346-8750

May 31, 1991

HOMER G. WHEELER
Regional Engineer

Mr. William E. Page
Assistant Chief Engineer
Operations Division
Alabama Highway Department
1409 Coliseum Boulevard
Montgomery, Alabama 36130

Subject: SPS-5 Nomination.

Dear Bill,

We have just received word from SHRP-DC that their review of the SPS-5 site on US-84 in Houston County, Alabama is complete.

The project is approved. The approval stipulates that the agreement of the Alabama State Highway Department to conform to all of the design and participation requirements for the experiment.

One of the other important functions of this SPS-5 project is the installation of traffic data monitoring equipment (Automatic Vehicle Classification and Weigh-In-Motion). One of the concerns expressed was the existence of a minor intersection within the test site. However, the information indicated on the plans reveals no significant effect on traffic flow and therefore should not present any difficulty. Otherwise the proposed site meets the requirements for the SPS-5 experimental design for roadways in the "wet-no freeze" environmental zone.

As you probably are aware, Mr. Gary Fitts will be leaving this organization to work with the Asphalt Institute as the District Engineer for Texas and Oklahoma. His replacement is Project Engineer Mark Sargent. Mark will pick up where Gary left off and continue to work with your staff to furnish any needed information to SHRP-DC, prepare the sampling and testing plan for submittal and approval to SHRP-DC.

Thank you for your continued cooperation and support.

Sincerely,

Homer G. Wheeler, P.E.
SHRP Regional Engineer, SRCO

cc: Neil Hawks, SHRP-DC
Stanley Armstrong, ALHD
Brent Rauhut, PM-SRCO
Amir Hanna, SHRP-DC
Gary Fitts/Mark Sargent, PE-SRCO

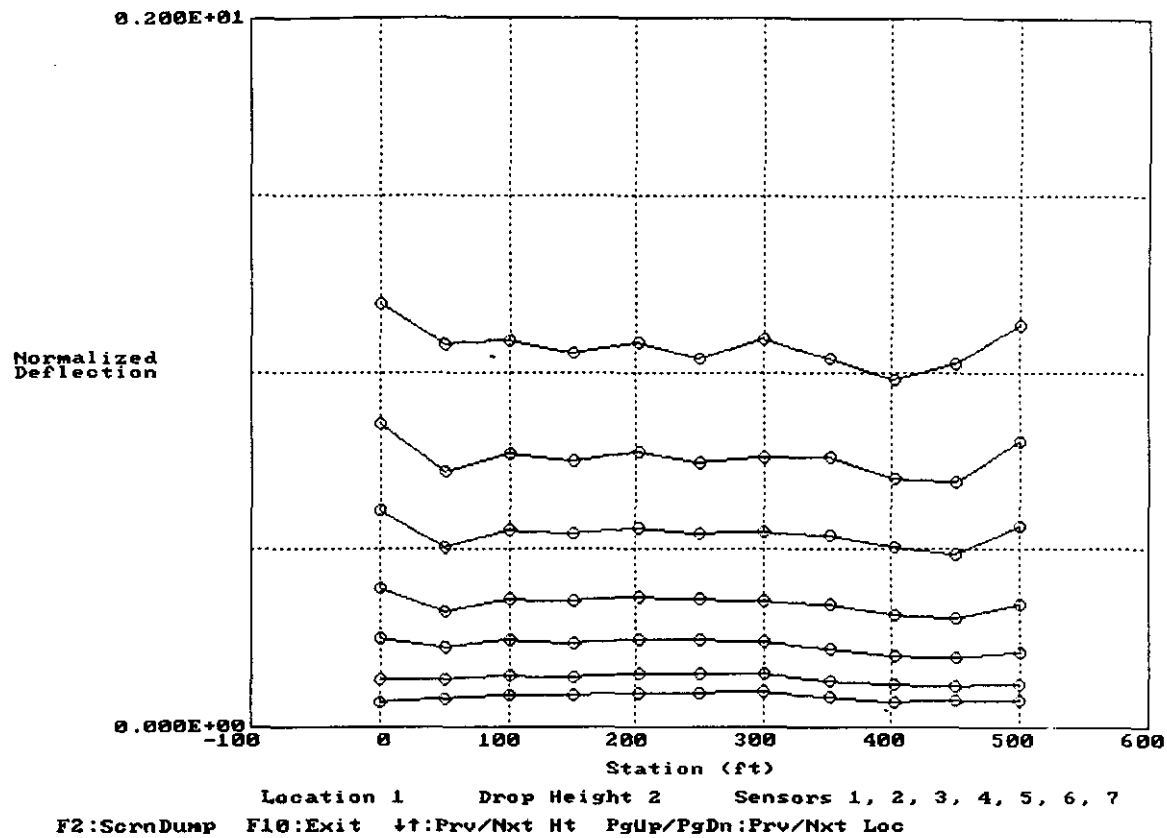
HGW:dmj

APPENDIX B

DEFLECTION PLOTS -

PRECONSTRUCTION/POSTCONSTRUCTION

PRECONSTRUCTION



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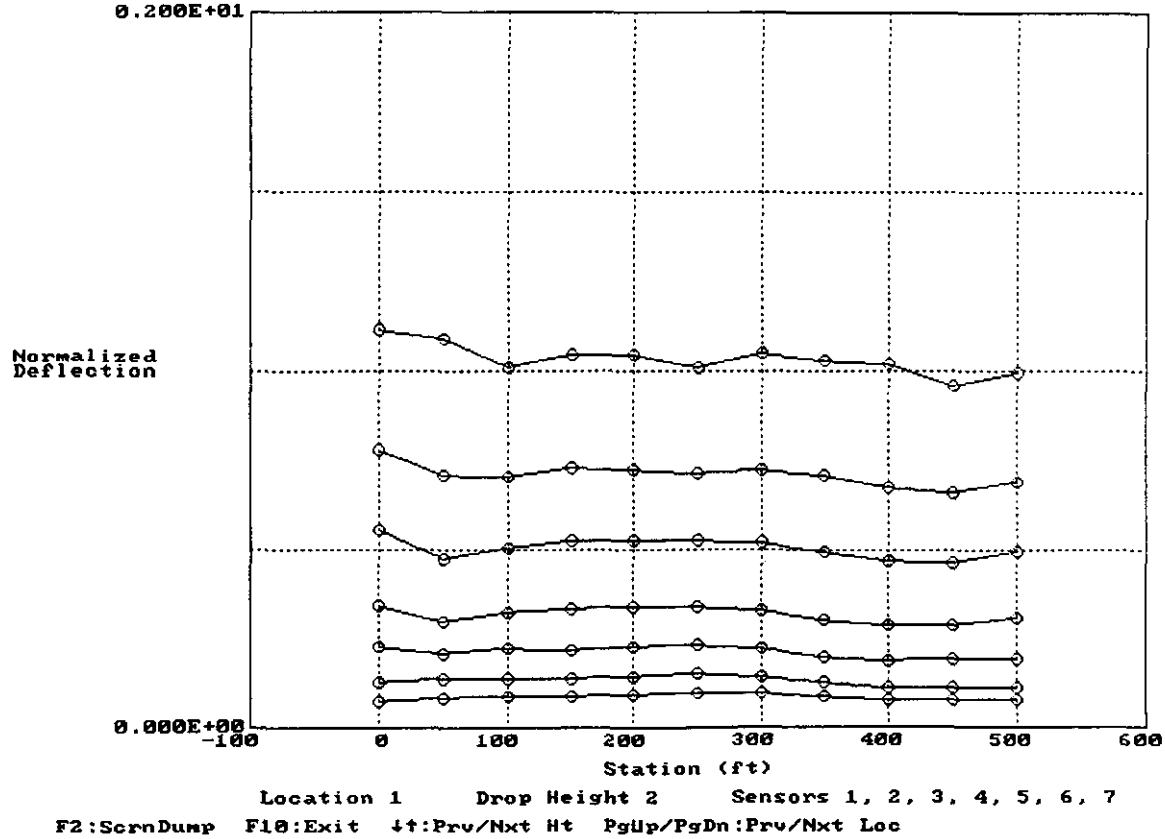

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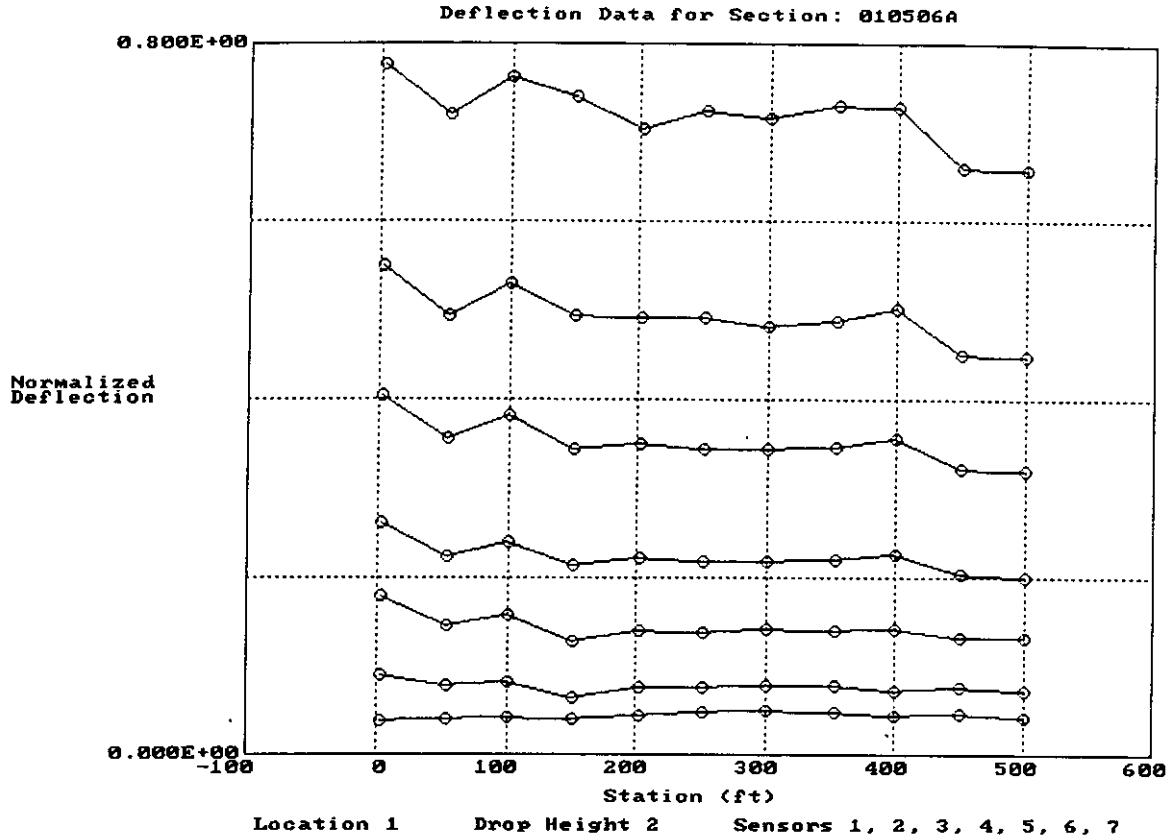

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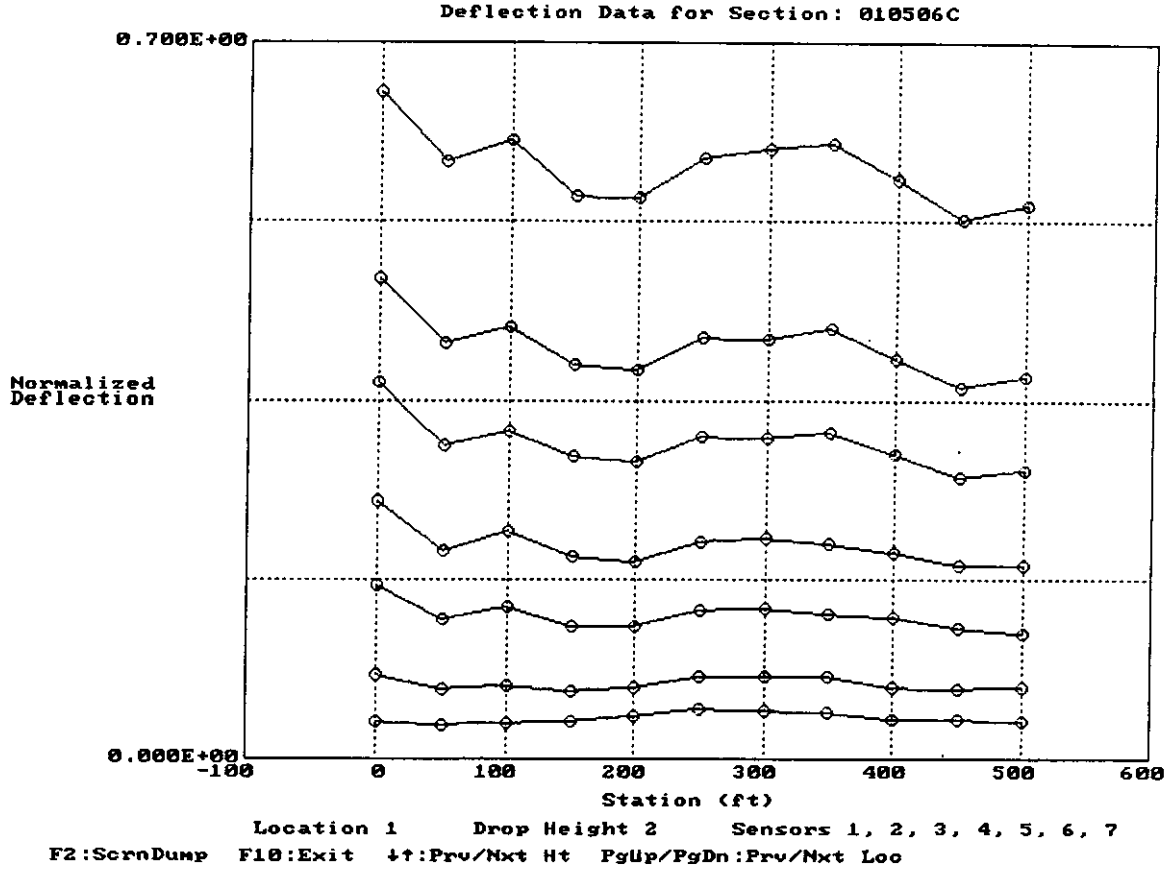

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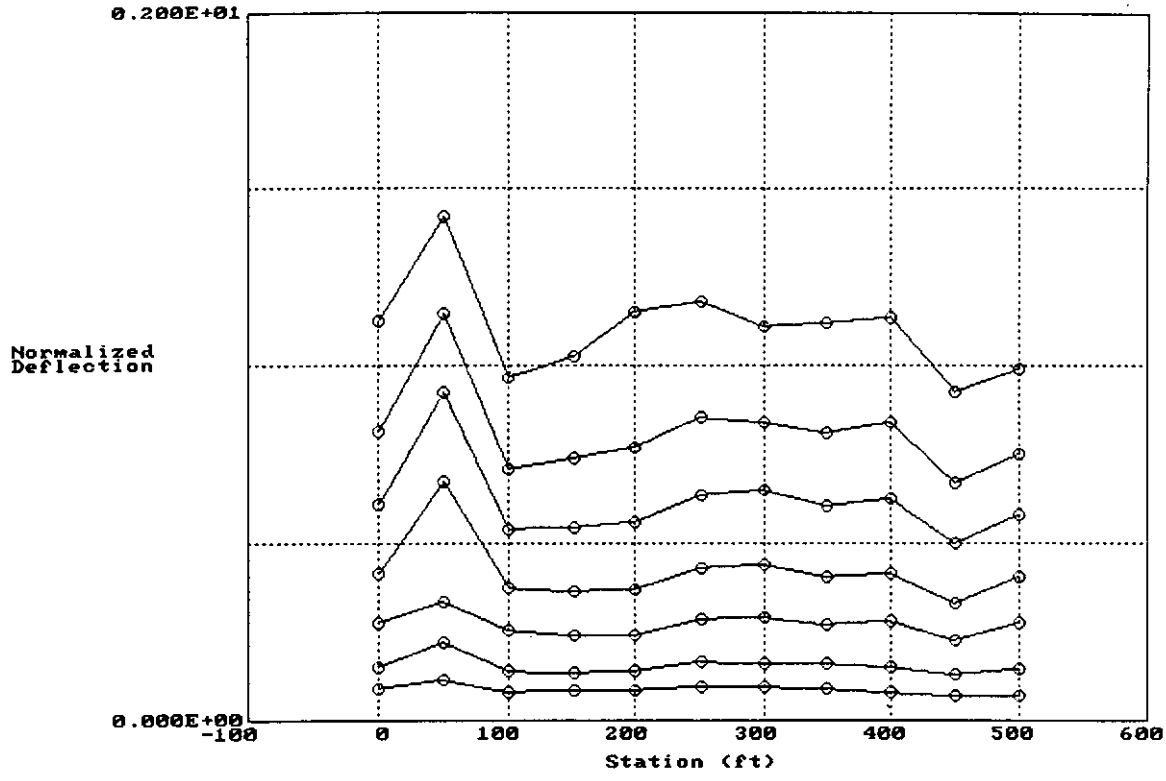

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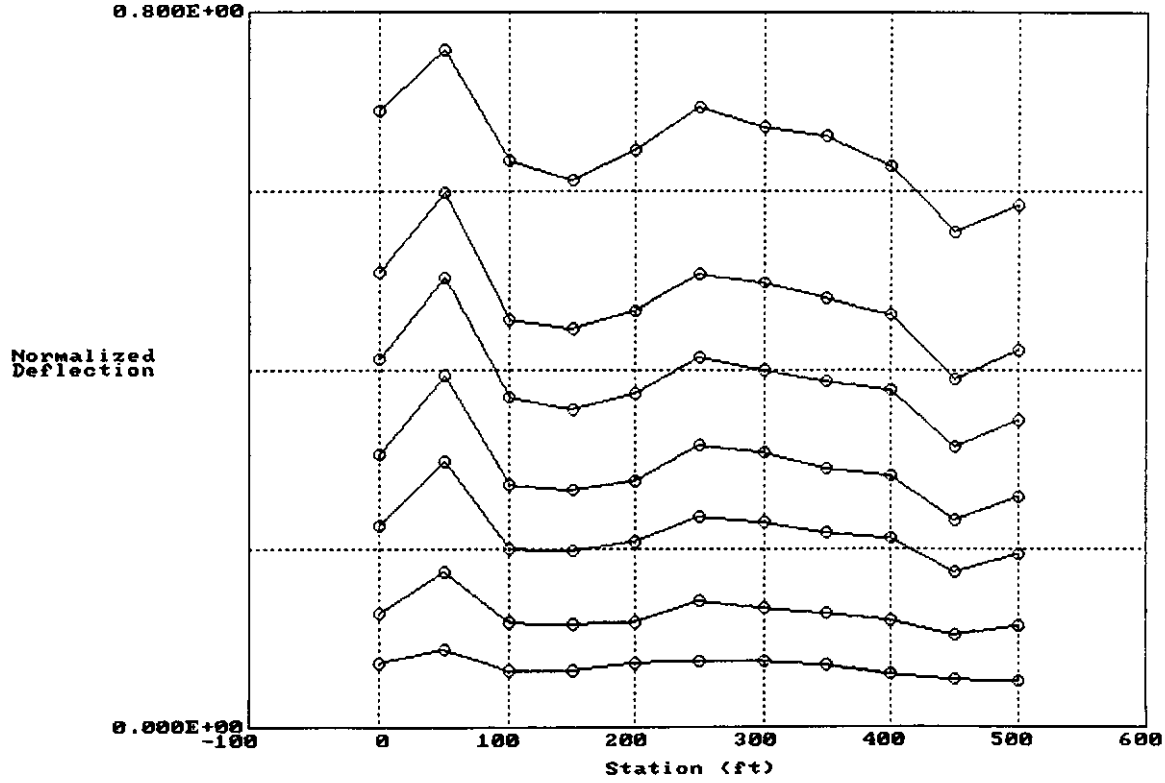

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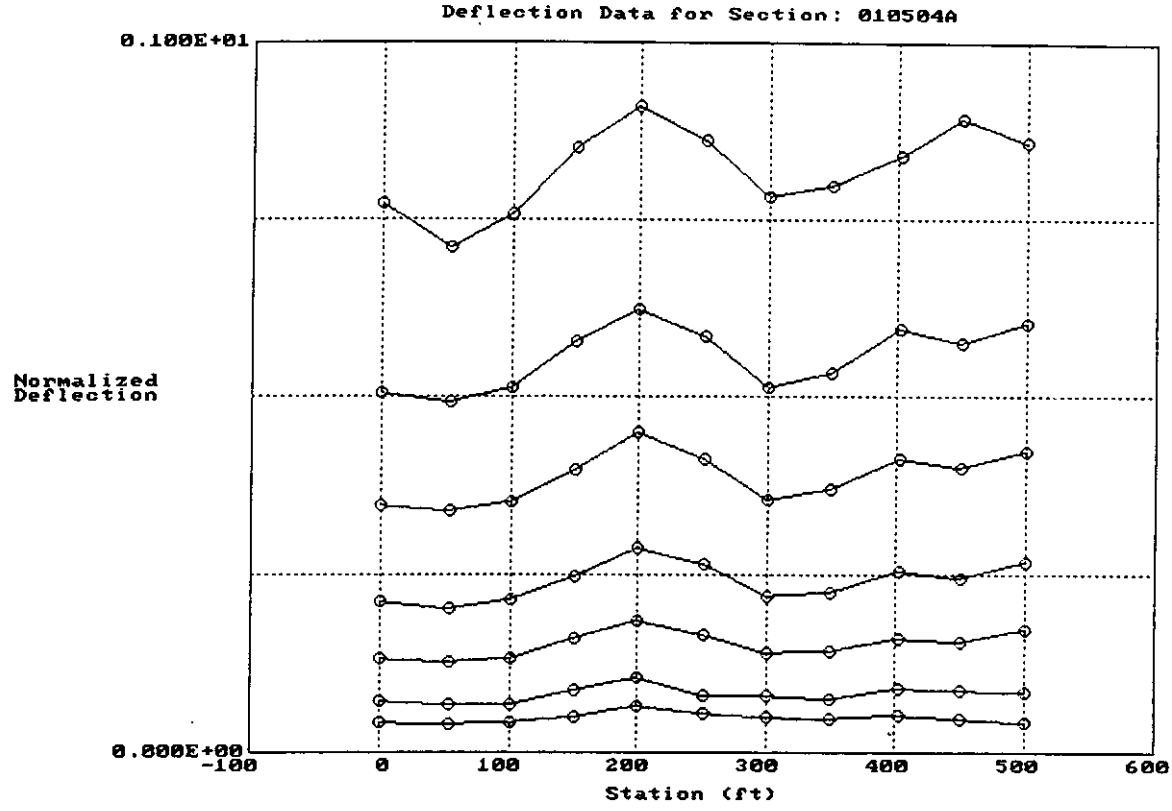

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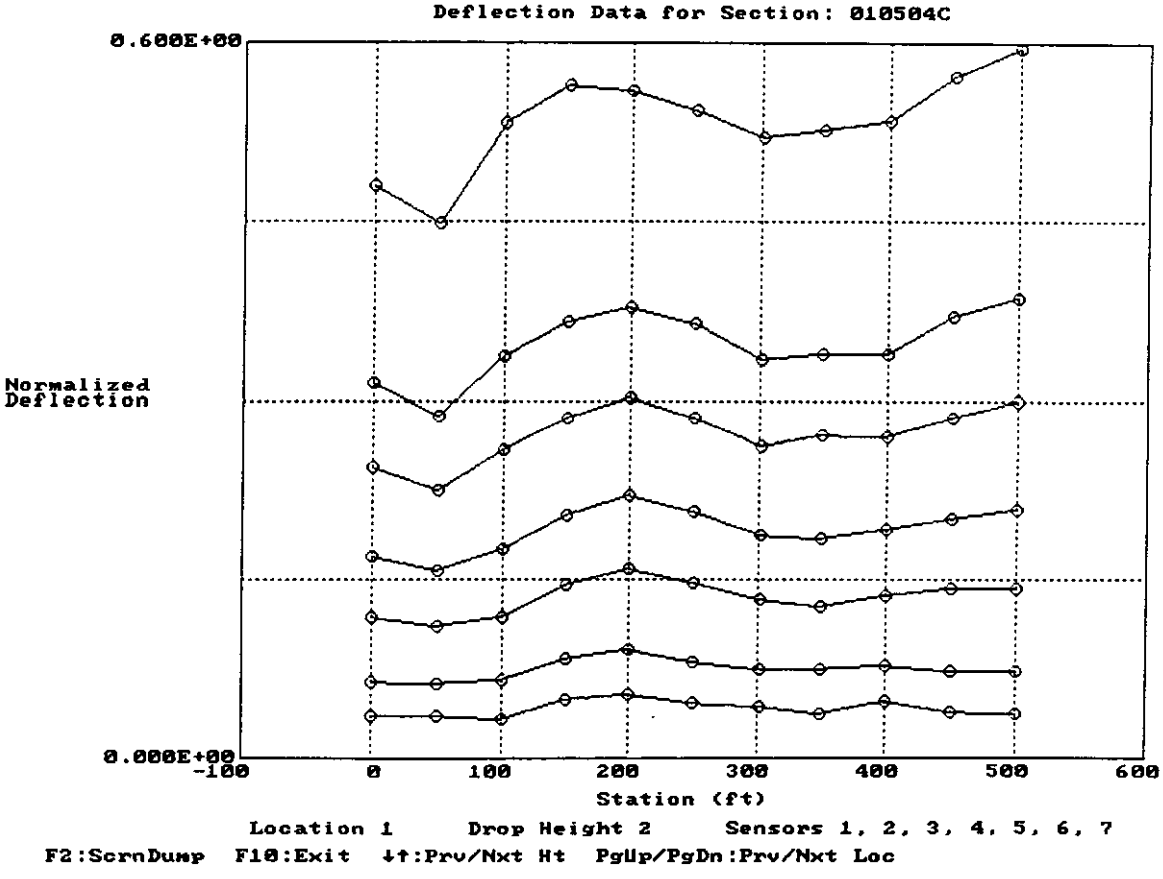

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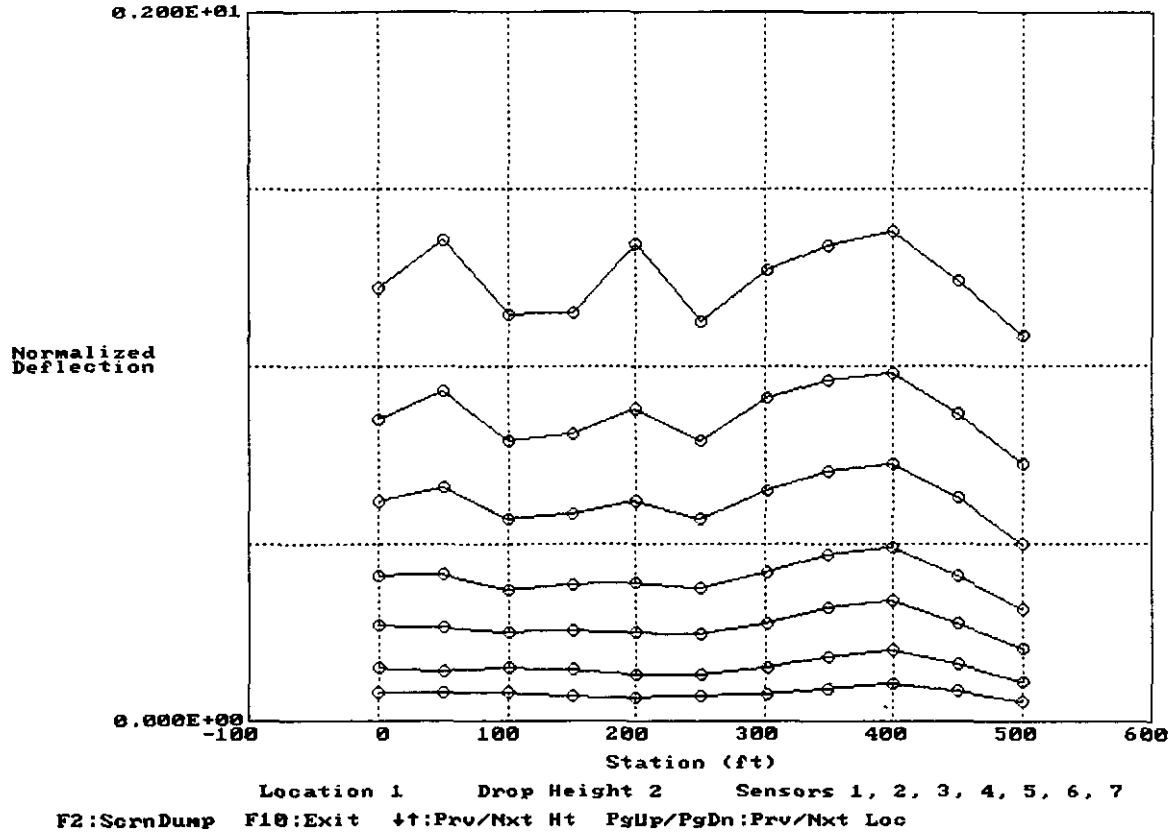

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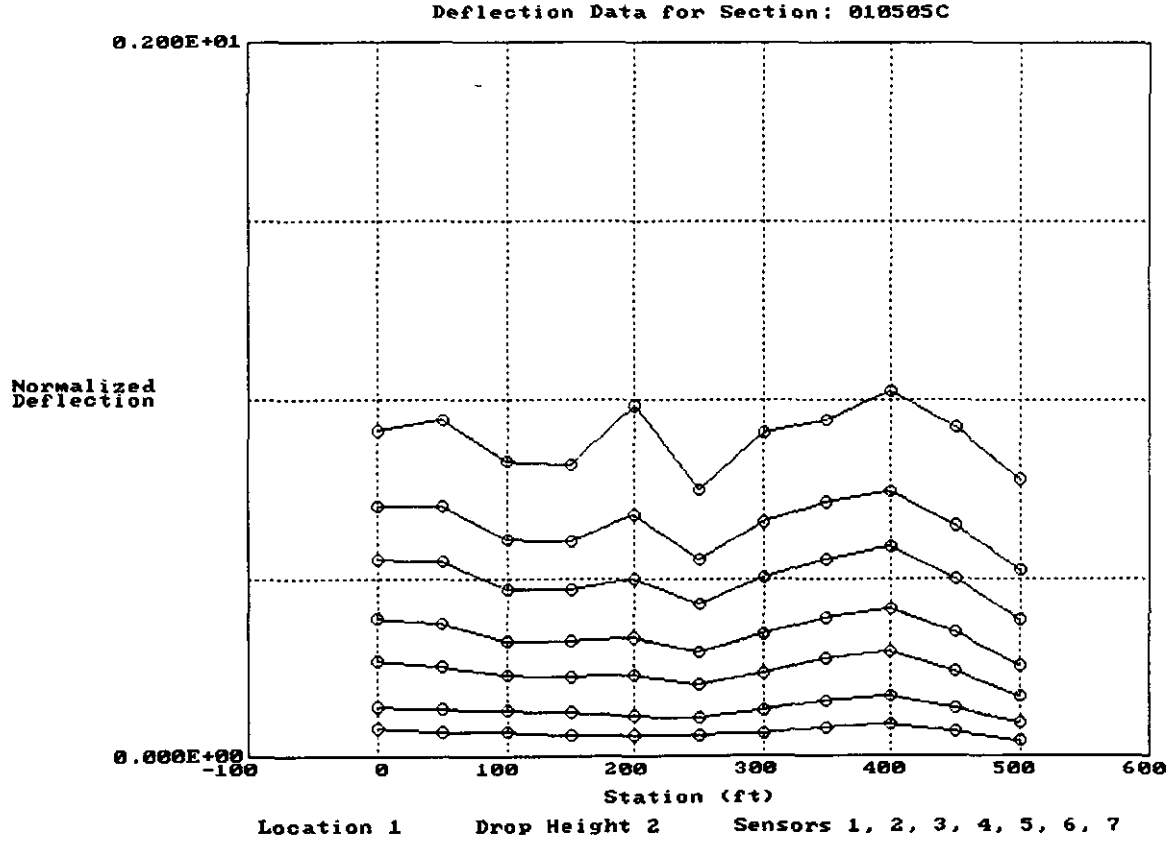

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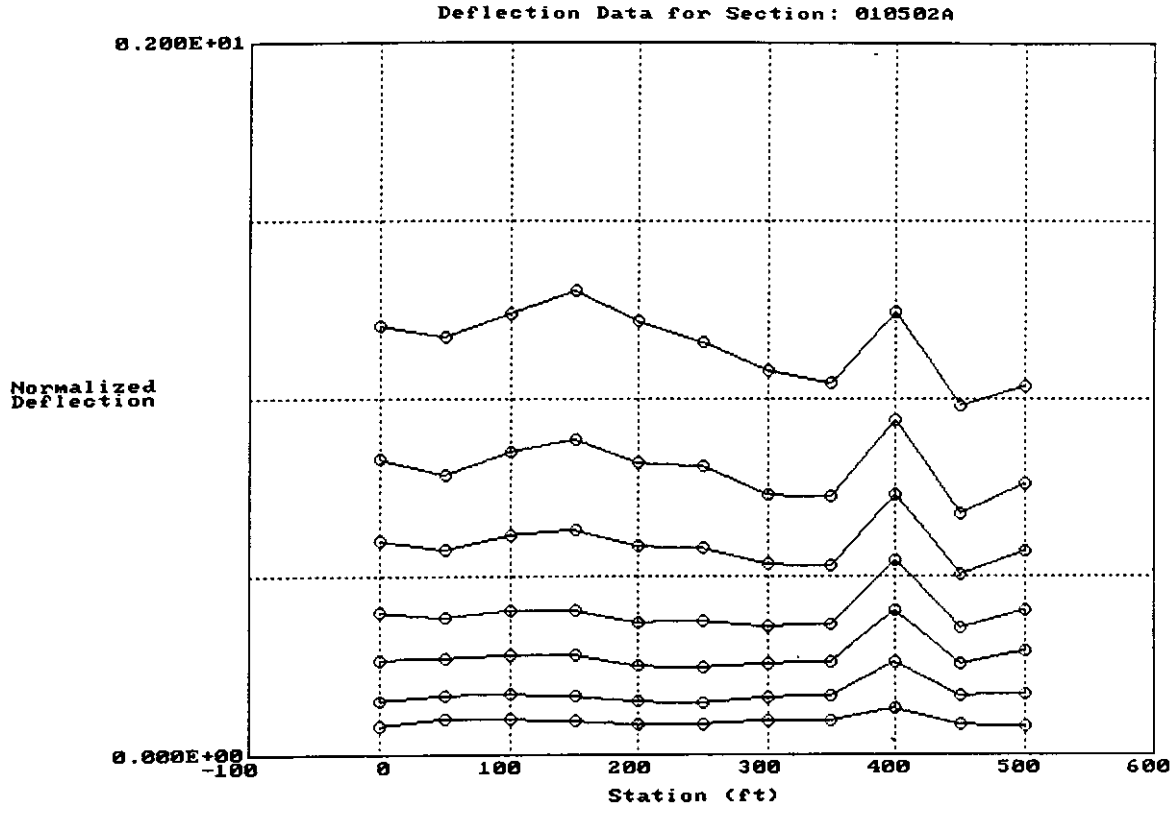

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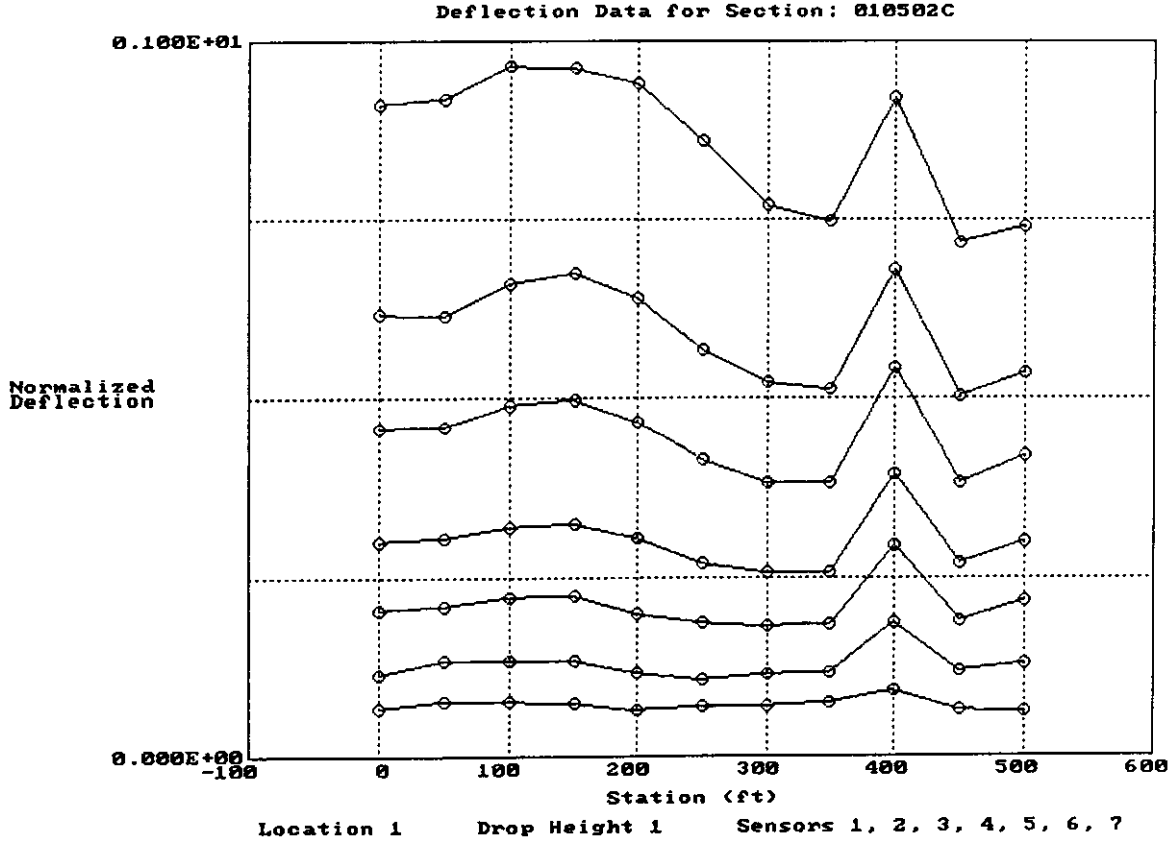

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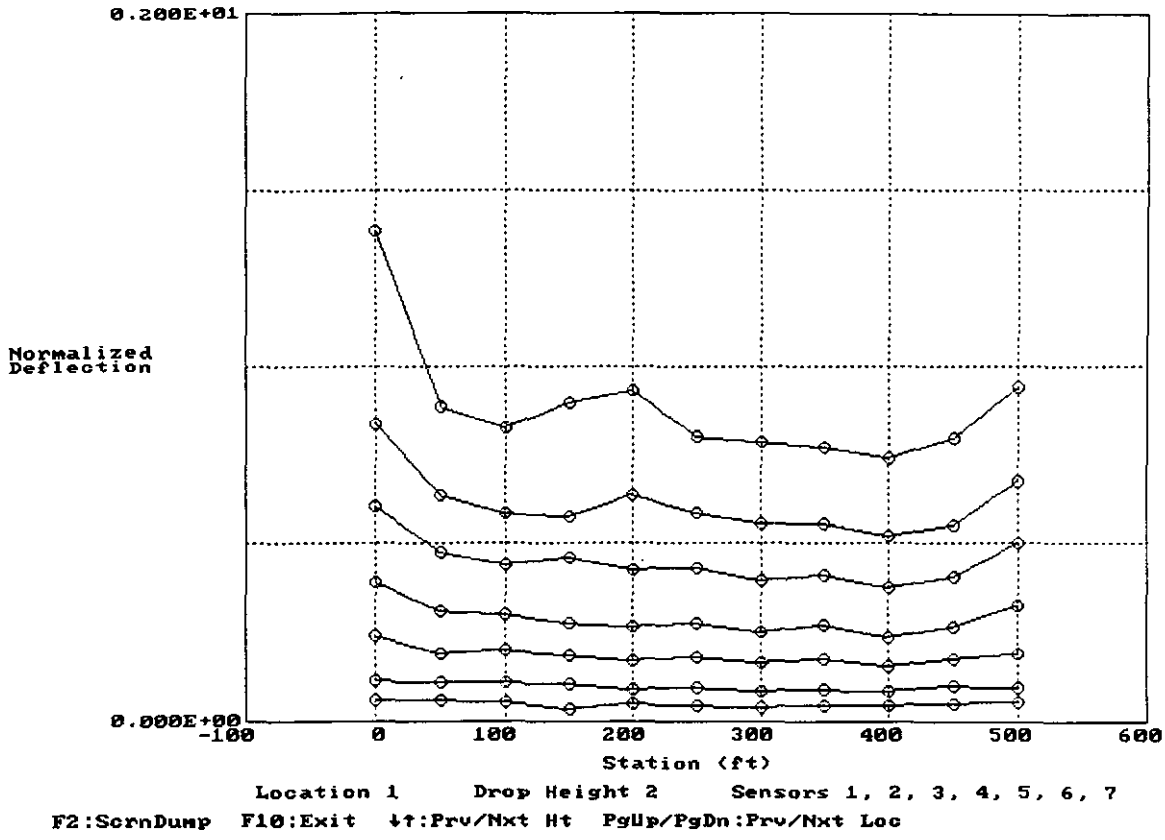

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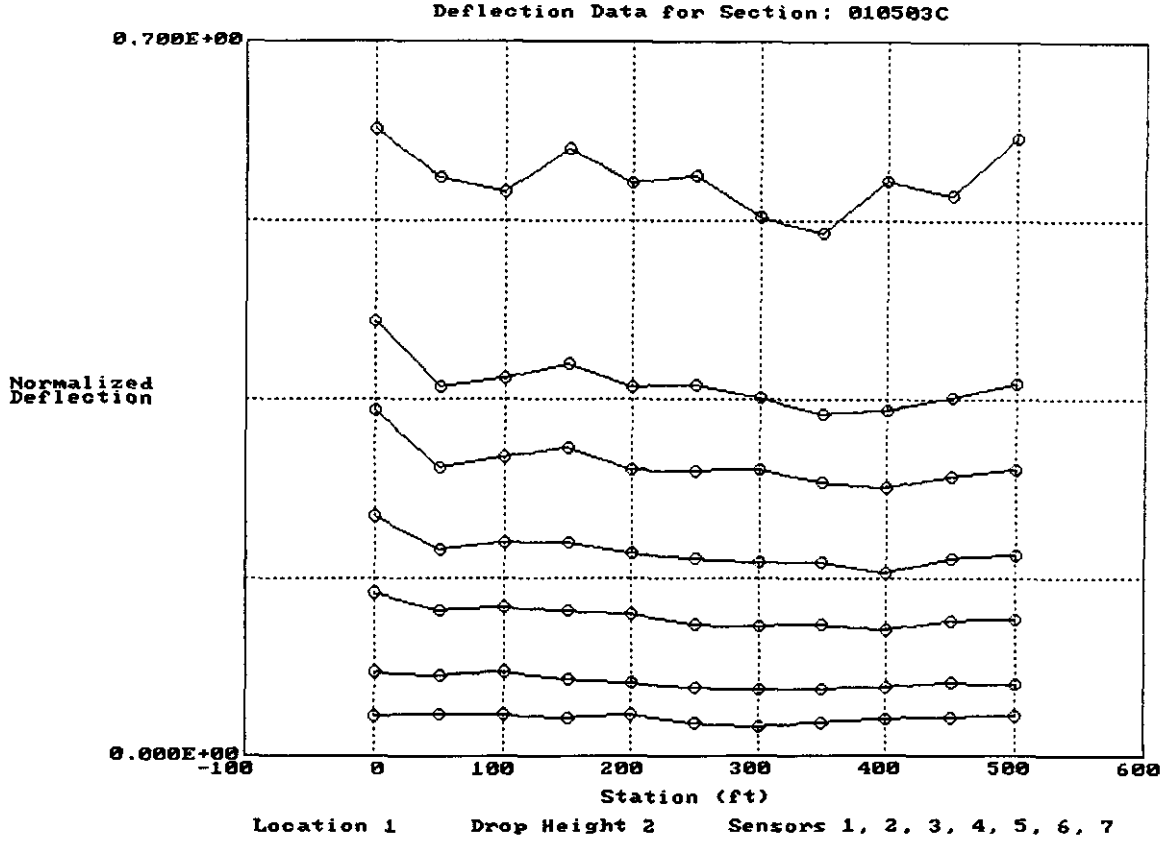

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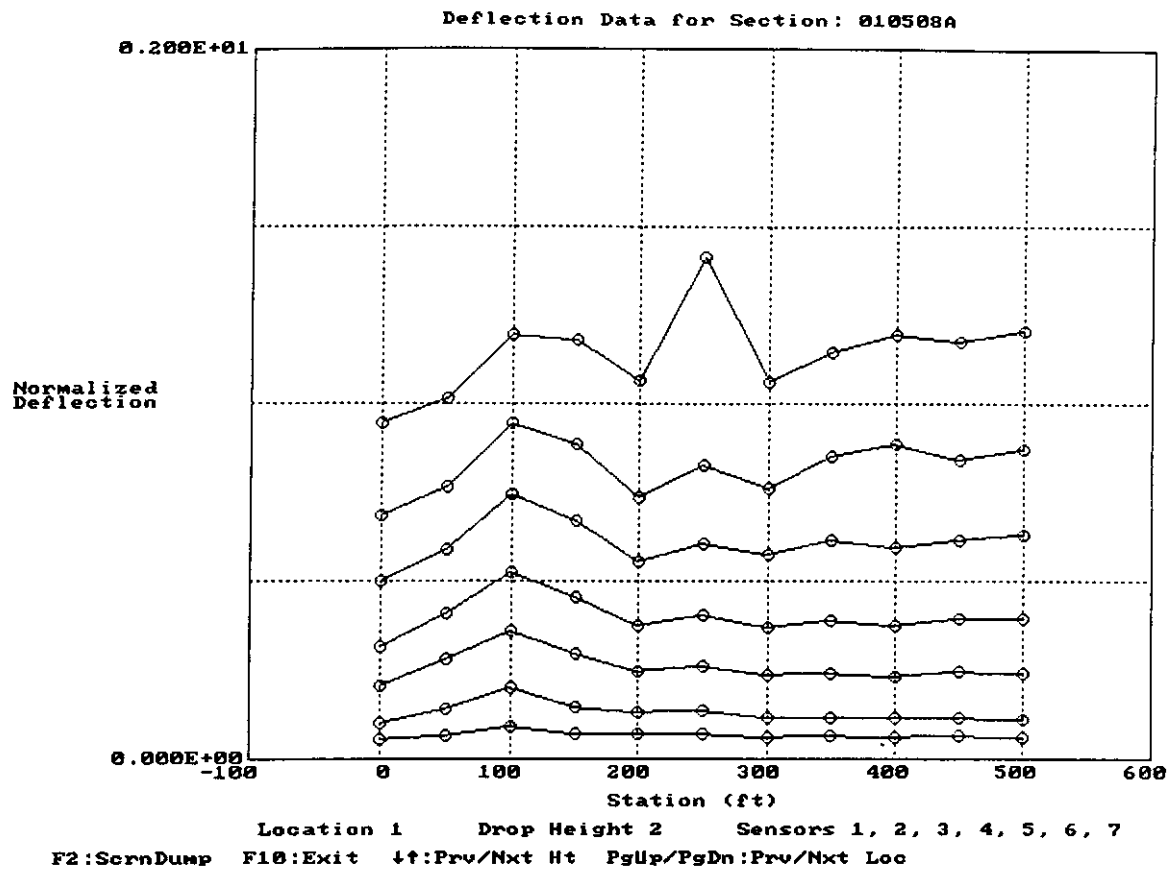

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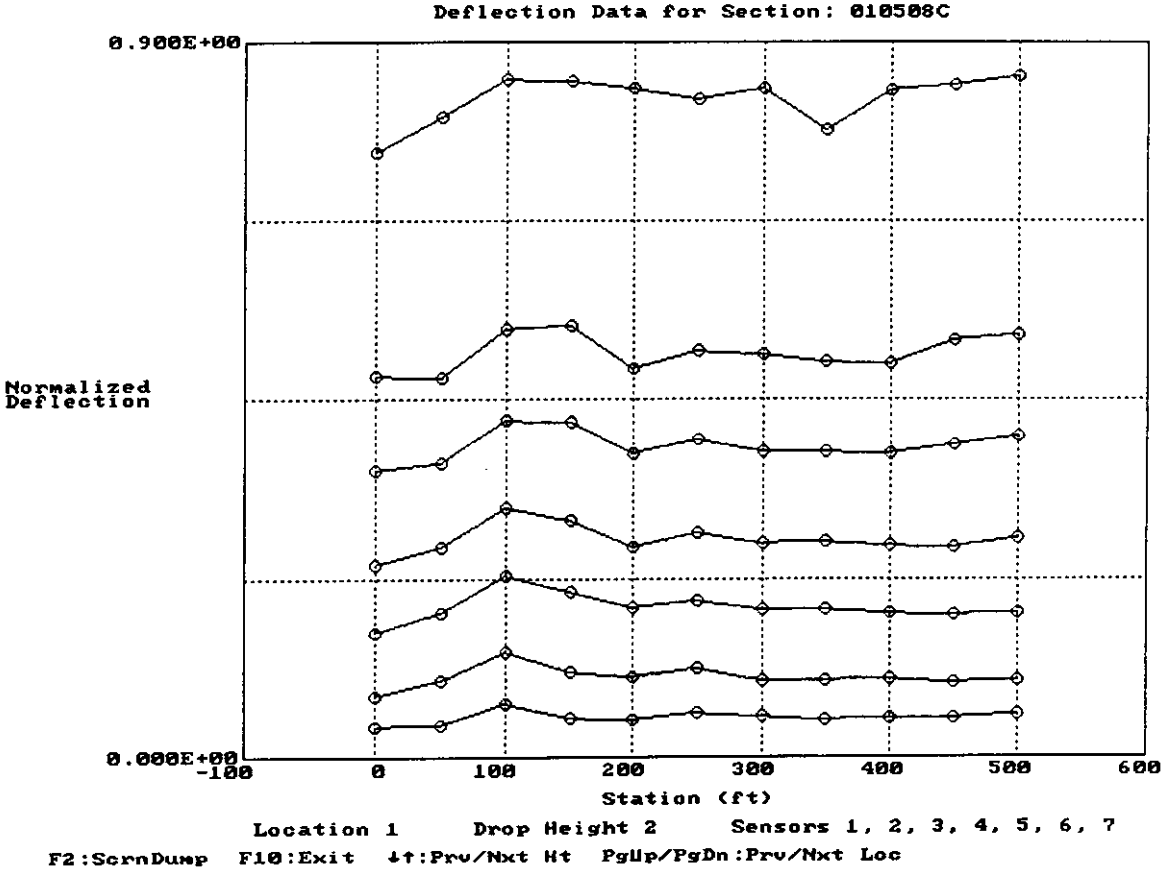

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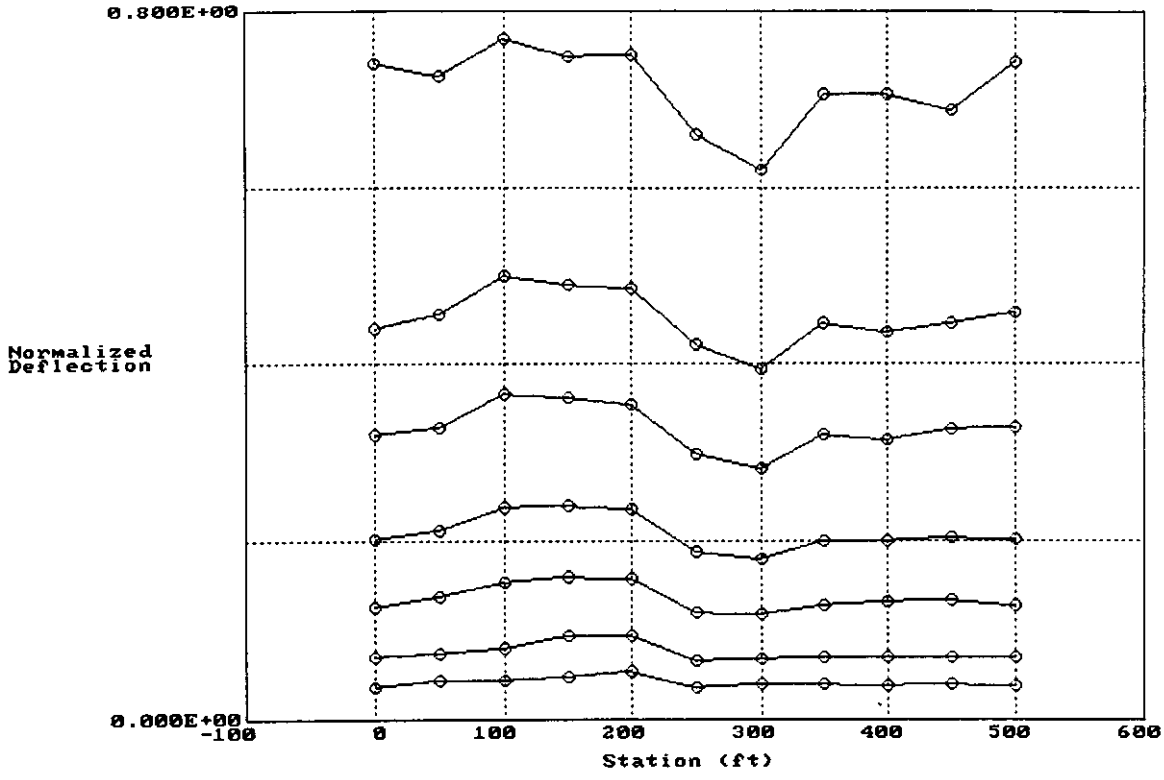

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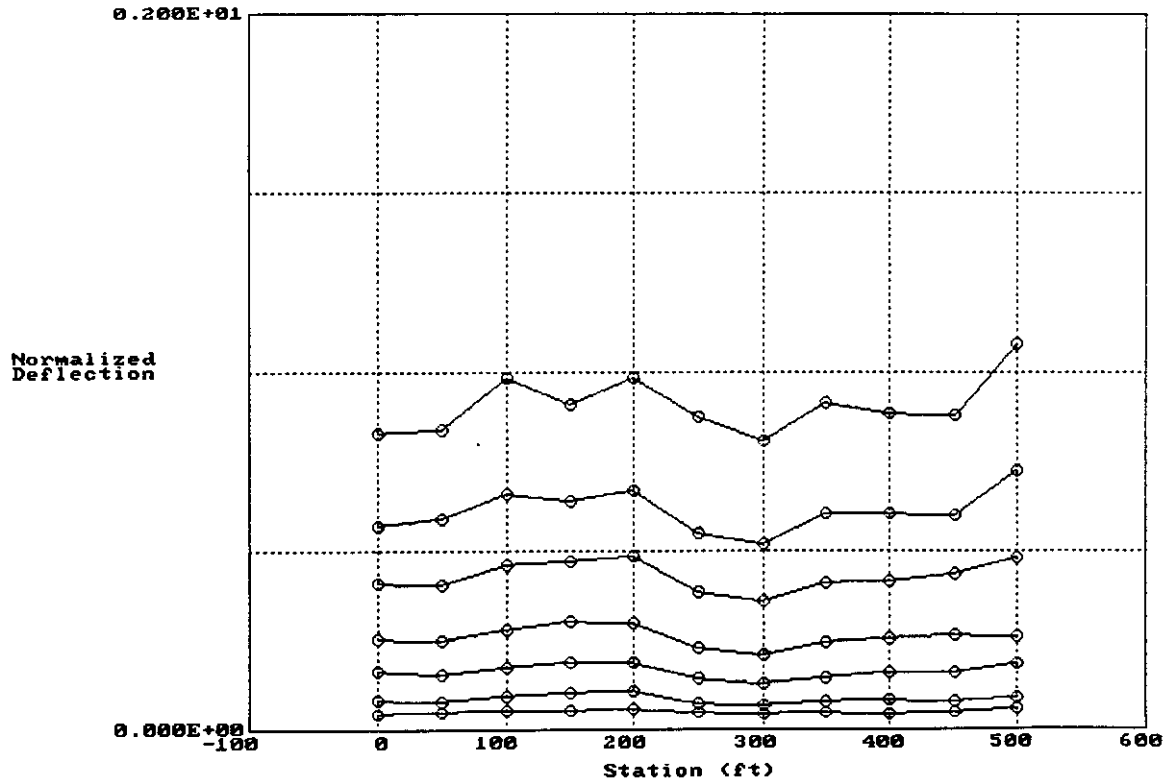

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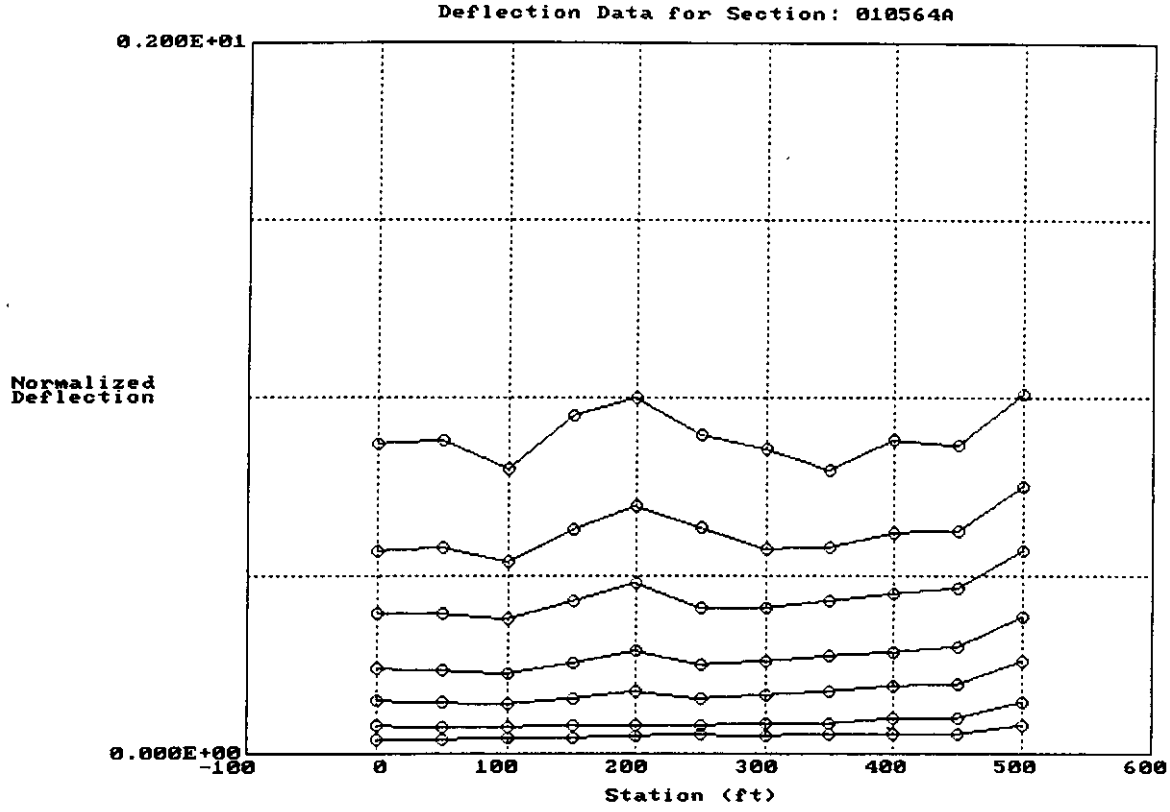

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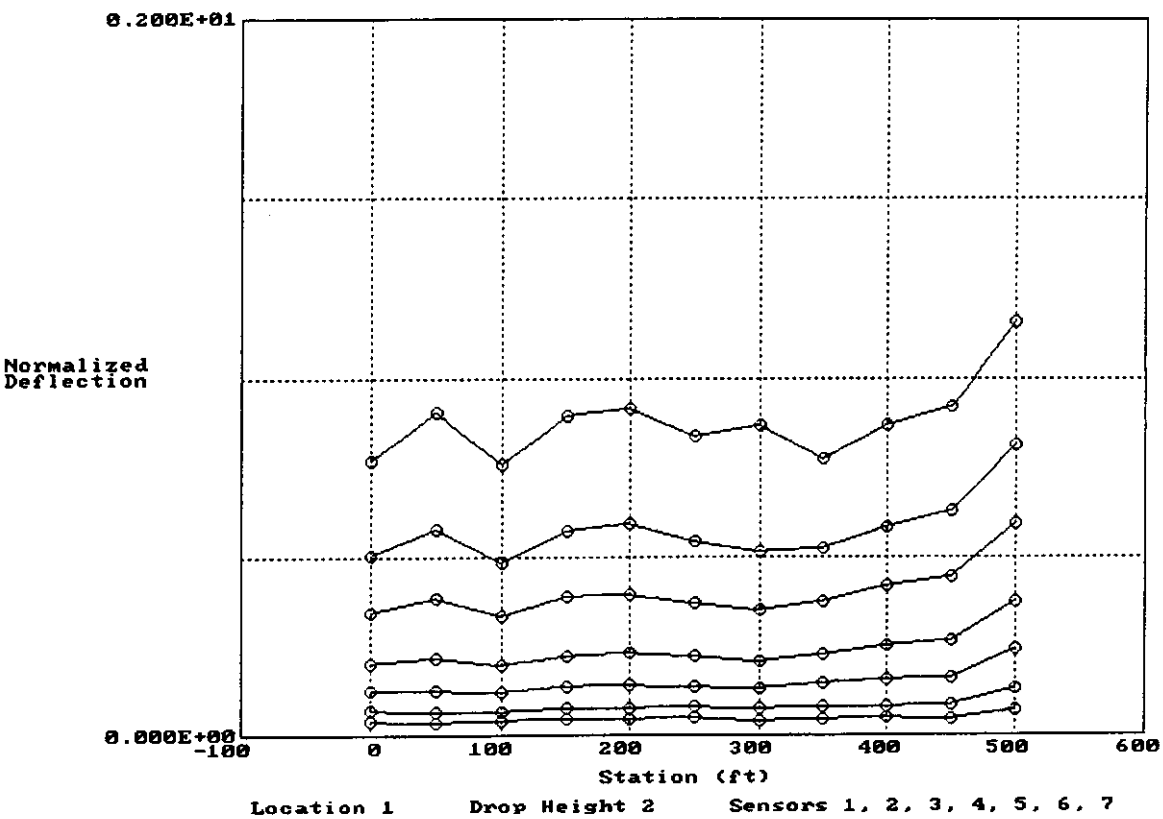


APPENDIX C

MATERIAL SAMPLING AND FIELD TESTING PLAN

Brent Rauhut Engineering Inc.

July 3, 1991

Mr. Stanley R. Armstrong
Assistant Materials & Test Engineer
Alabama Highway Department
1409 Coliseum Boulevard
Montgomery, Alabama 36130

Subject: Materials Sampling and Field Testing Plan for Section 0105.

Dear Stanley,

Attached is the submittal I plan on sending to SHRP-DC for the MS&FT on US-84 in Dothan. Please let me know if you have any revisions that you would like to have made before this is finalized and submitted.

Sincerely,

Mark D. Sargent
Project Engineer, SRCO

Attachment: As stated above.

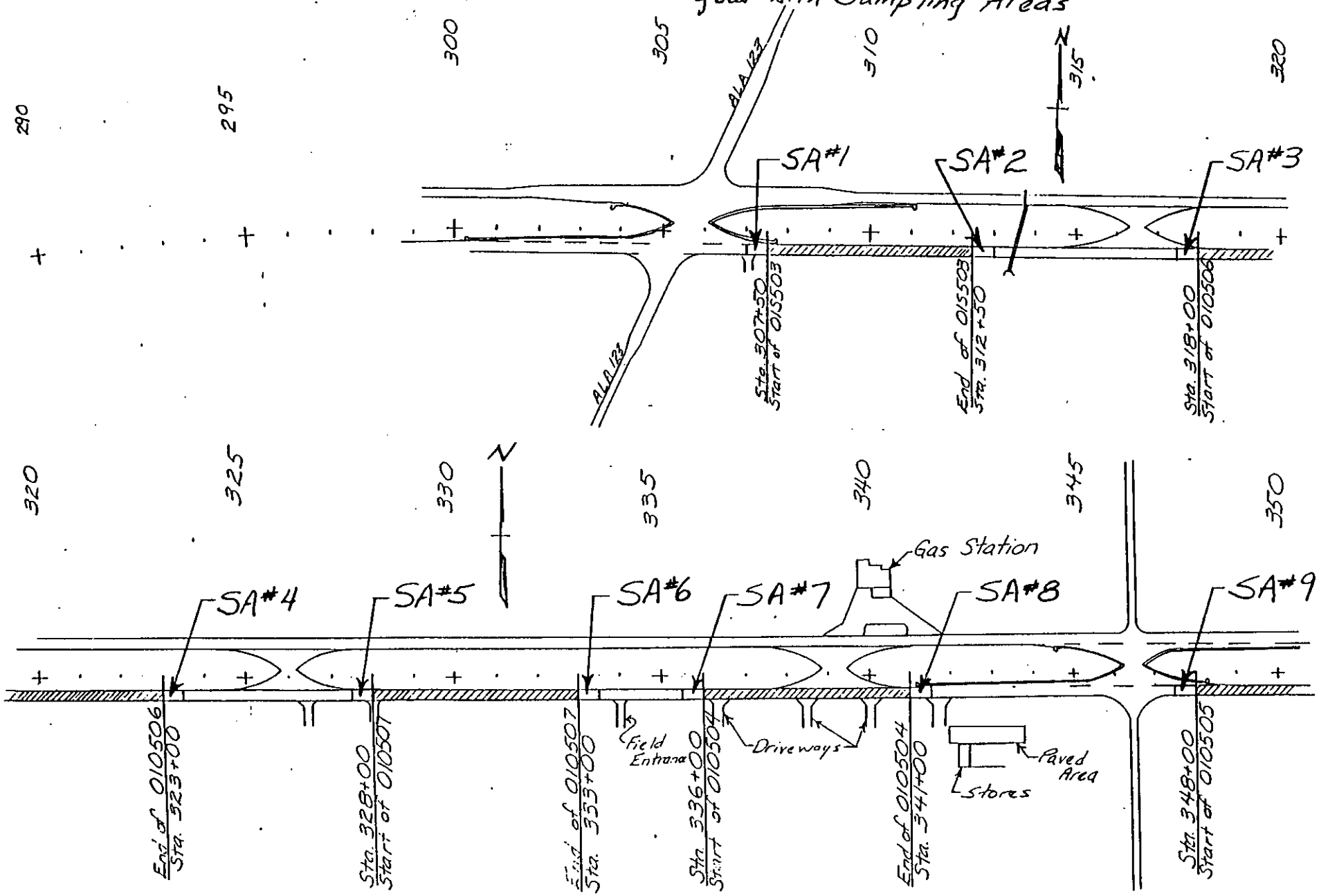
MDS:dmj

8240 Mopac, Suite 220 • Austin, Texas 78759 • (512) 346-0870 • FAX (512) 346-8750

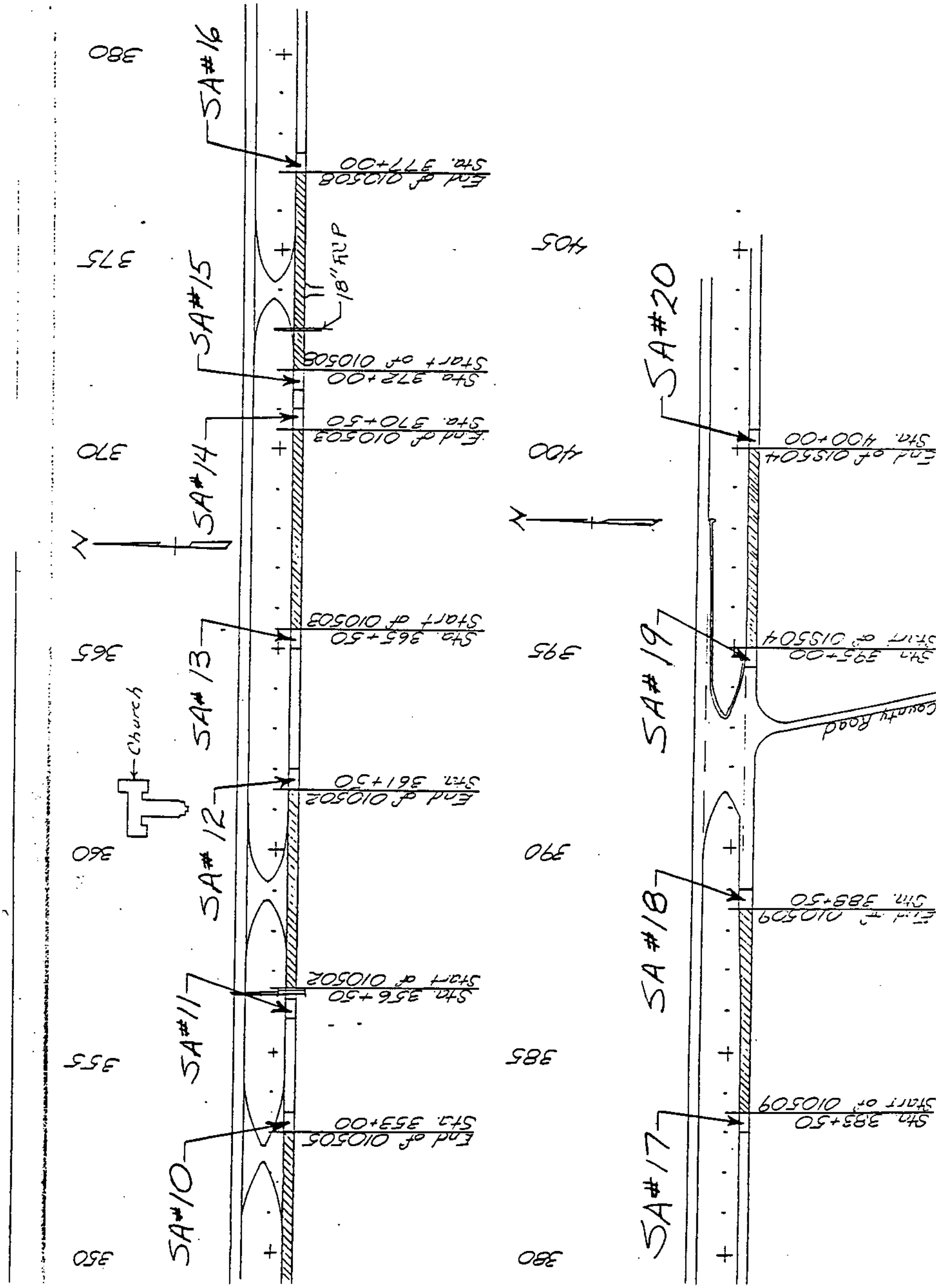
SHRP A.C. Rehab. Study Site (0105)

US 84 (Eastbound) Houston Co. Alabama

Section Layout with Sampling Areas



C.3


SA#10
SA#11
SA#12
SA#13
SA#14
SA#15
SA#16
SA#17
SA#18
SA#19
SA#20
Sta. 353+00 End of 010505
Sta. 356+50 Start of 010502
Sta. 361+50 End of 010502
Sta. 365+50 Start of 010503
Sta. 370+50 End of 010503
Sta. 372+00 Start of 010508
Sta. 377+00 End of 010508
18" RCP
Church
Sta. 383+50 Start of 010509
Sta. 388+50 End of 010509
Sta. 395+00 Start of 015504
Sta. 400+00 End of 015504
County Road
350
355
360
365
370
375
380
385
390
395
400
405

SPS-5 TEST SECTION LAYOUT
US 84, HOUSTON CO., AL

SHRP ID	O/L TH	SHRP TEST SECTION Begin Sta.	Transition	
			From	To
01S503	0	307+50	314+00	316+00
010506	2	318+00	324+00	327+00
010507	5	328+00	335+00	335+50
010504	5	336+00	342+00	345+00
010505	2	348+00	353+50	353+50
010502	2	356+50	362+00	365+00
010503	5	365+50	371+00	371+50
010508	5	372+00	378+00	381+00
010509	2	383+50	390+00	392+00
01S504	0	395+00	400+50	400+50

Figure 1
Side View, SPS - 5 Section Diagram
US - 84 Houston Co., AL
East Bound

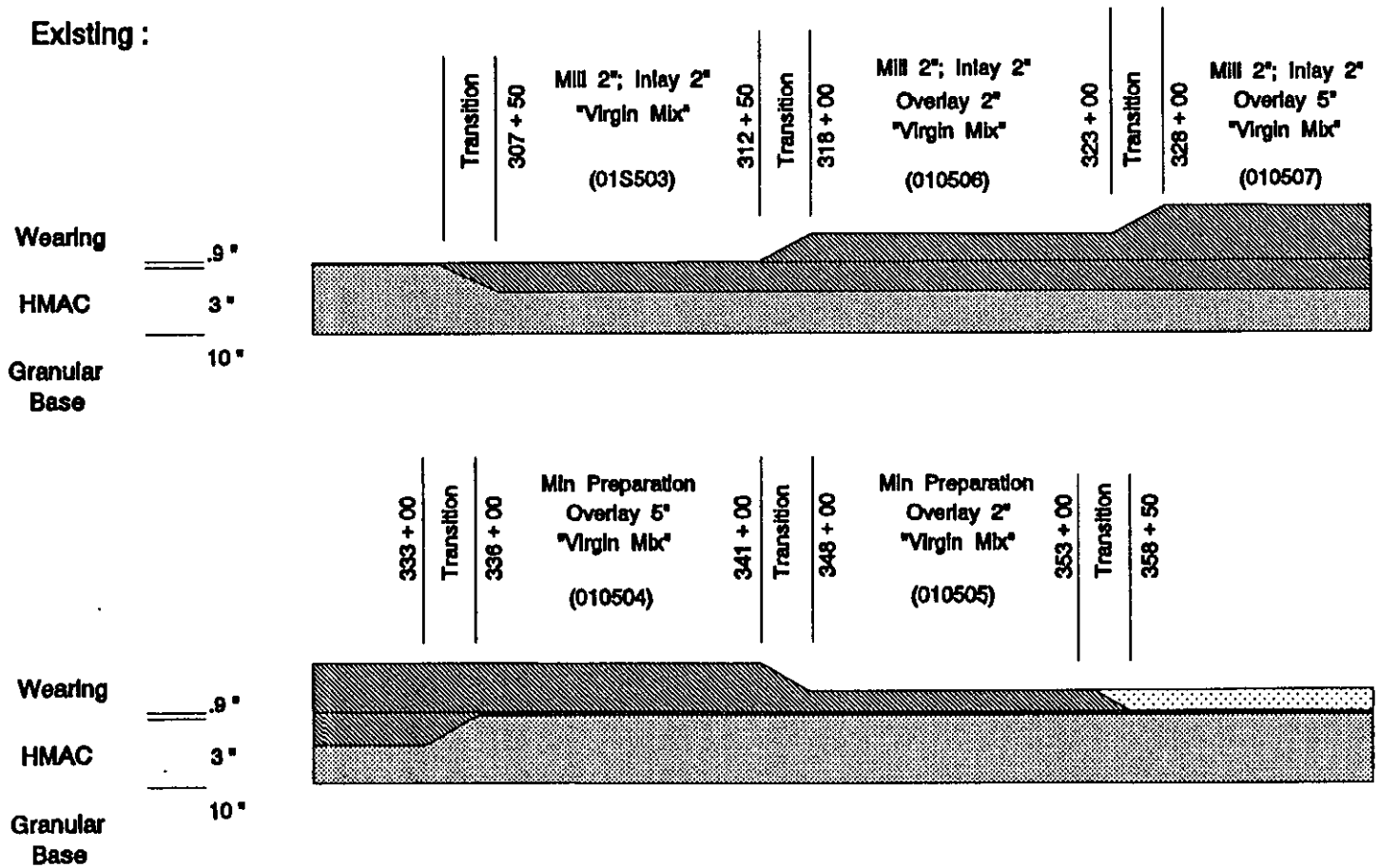


Figure 1
Side View, SPS - 5 Section Diagram
US - 84 Houston Co., AL
East Bound

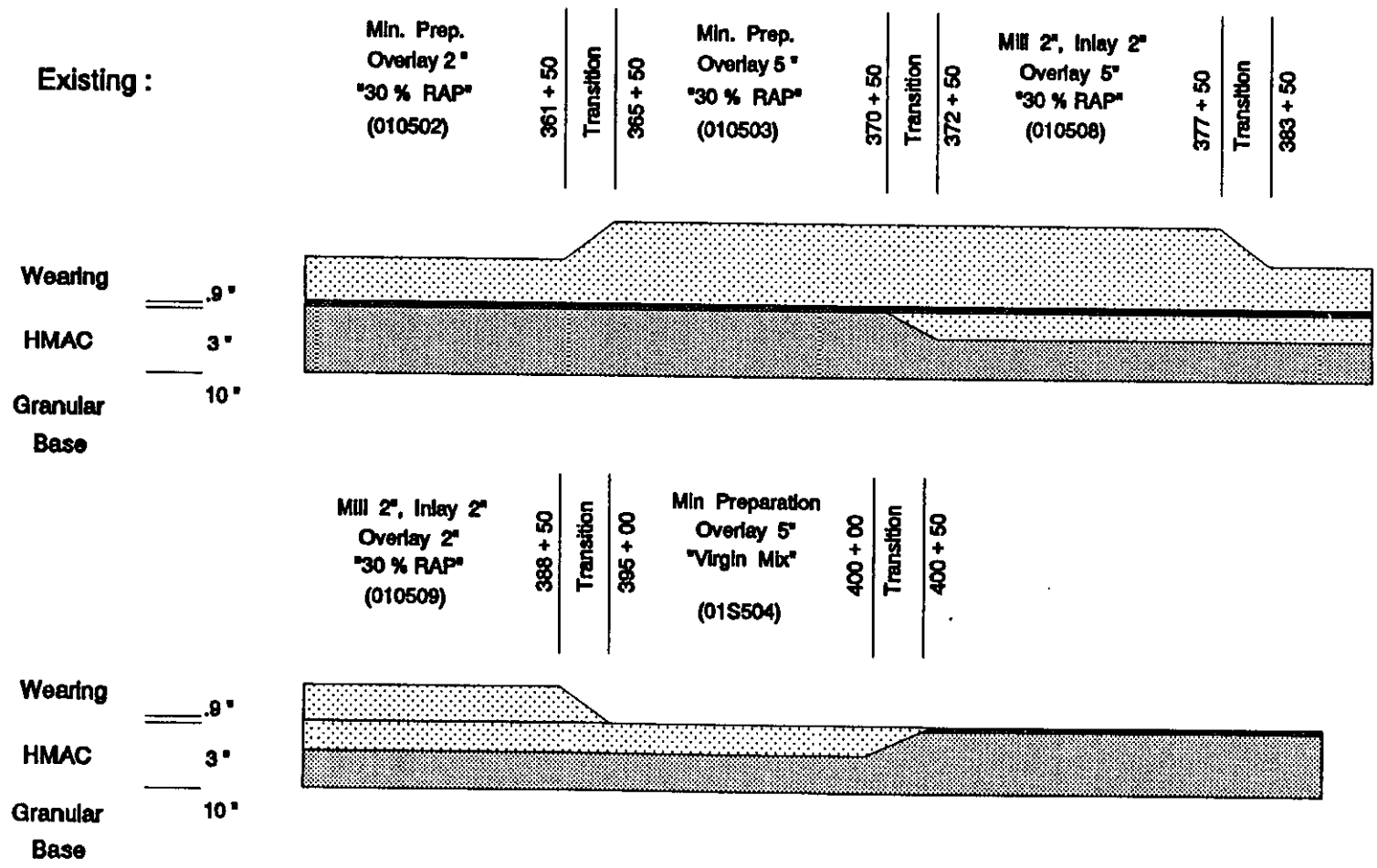


TABLE 1. SCOPE OF MATERIALS SAMPLING AND FIELD TESTING

MATERIAL & SAMPLING DESCRIPTION	NUMBER OF MATERIAL SAMPLES	SAMPLE TYPE DESIGNATION
PRE-CONSTRUCTION SAMPLING		
1. Asphalt Concrete (Original Layer)		
Coring - 4" diam. cores	28	C1-C28
Coring - 6" diam. cores	3	A1-A3
Coring - 12" diam. cores	6	BA1-BA6
Bulk Sampling (12" × 12" Slab)	2	TP1
2. Unbound Base/Subbase Layers (Per Layer)		
Augering 6" diam. holes	3	A1-A3
Bulk Sampling in 12" diam. holes	6	BA1-BA6
Bulk Sampling in Test Pits	1	TP1
In Situ Density & Moisture Content (Nuclear Gauge)	1	TP1
Moisture Content Samples	8	TP1, BA1-BA6
3. Subgrade		
Thin-walled Tube Sampling *(Two tube samples per hole. If undisturbed tube sampling is not possible, splitspoon sampling will be conducted.)	6*	A1-A3
Bulk Sampling in 12" diam. holes	6	BA1-BA6
Bulk Sampling in Test Pits	1	TP1
In Situ Density & Moisture Content (Nuclear Gauge)	1	TP1
Moisture Content Samples	8	BA1-BA6, TP1
4. Shoulder Auger Probes	3	S1-S3
POST-CONSTRUCTION SAMPLING		
1. Asphaltic Concrete (Overlay)		
Coring - 4" diam. cores	48	C29-C76

TABLE 3. SPS-5 LABORATORY TESTING PLANS (PRE-CONSTRUCTION)

MATERIAL TYPE AND PROPERTIES	SHRP TEST DESIGNATION	SHRP PROTOCOL	NO. OF TESTS PER LAYER	MATERIAL SOURCE/ SAMPLE TYPE DESIGNATION
PRE-CONSTRUCTION				
1. ASPHALT CONCRETE:				
A. ASPHALTIC CONCRETE:				
Core Examination/Thickness	AC01	P01	28	ALL C-TYPE CORES
Bulk Specific Gravity	AC02	P02	9	[C3 C4 C5], [C14,C15,C16], [C22 C23 C24] (see note 3)
Maximum Specific Gravity	AC03	P03	3	[BA1-3], [TP], [BA4-6]
Asphalt Content (Extraction)	AC04	P04	3	[BA1-3], [TP], [BA4-6]
Creep Compliance	AC06	P06	3	C2, C9, C20 (see note 1)
Resilient Modulus	AC07	P07	6	[C4 C5], [C15, C16], [C23, C24]
Tensile Strength	AC07	P07	9	[C3 C4 C5], [C14, C15, C16], [C22 C23 C24]
Field Moisture Damage	AC08	P08	3	A1, A2, A3
B. EXTRACTED AGGREGATE:				
Type and Classification:				
Coarse Aggregate	AG03	P13	3	[BA1-3] [TP] [BA4-6]
Fine Aggregate	AG03	P13	3	[BA1-3] [TP] [BA4-6]
Gradation of Aggregate	AG04	P14	3	[BA1-3] [TP] [BA4-6]
NAA Test for Fine Aggregate Particle Shape	AG05	P14A (note 2)	3	[BA1-3] [TP] [BA4-6]
C. ASPHALT CEMENT:				
Abson Recovery	AE01	P21	3	[BA1-3] [TP] [BA4-6]
Penetration at 77 and 115°F	AE02	P22	3	[BA1-3] [TP] [BA4-6]
Specific Gravity (60F)	AE03	P23	3	[BA1-3] [TP] [BA4-6]
Viscosity at 77F	AE04	P24	3	[BA1-3] [TP] [BA4-6]
Viscosity at 140F, 275F	AE05	P25	3	[BA1-3] [TP] [BA4-6]

NOTES:
1. Creep compliance will be performed when suitable procedures are developed -- cores will be stored.
2. National Aggregate Association will perform tests at no cost to the State.
3. Cores within brackets are from the same sampling area.

TABLE 2. BULK MATERIAL SAMPLING DURING CONSTRUCTION

A. Materials to be Tested as a Part of LTPP.

MATERIAL & SAMPLING DESCRIPTION	NUMBER OF MATERIAL SAMPLES	SAMPLE LOCATION
1. Virgin Asphalt Concrete Mix	100 lb.	Mix Plant
2. Recycled Asphalt Concrete Mix	100 lb.	Mix Plant

B. Materials to be Shipped to the SHRP Asphalt Reference Library.

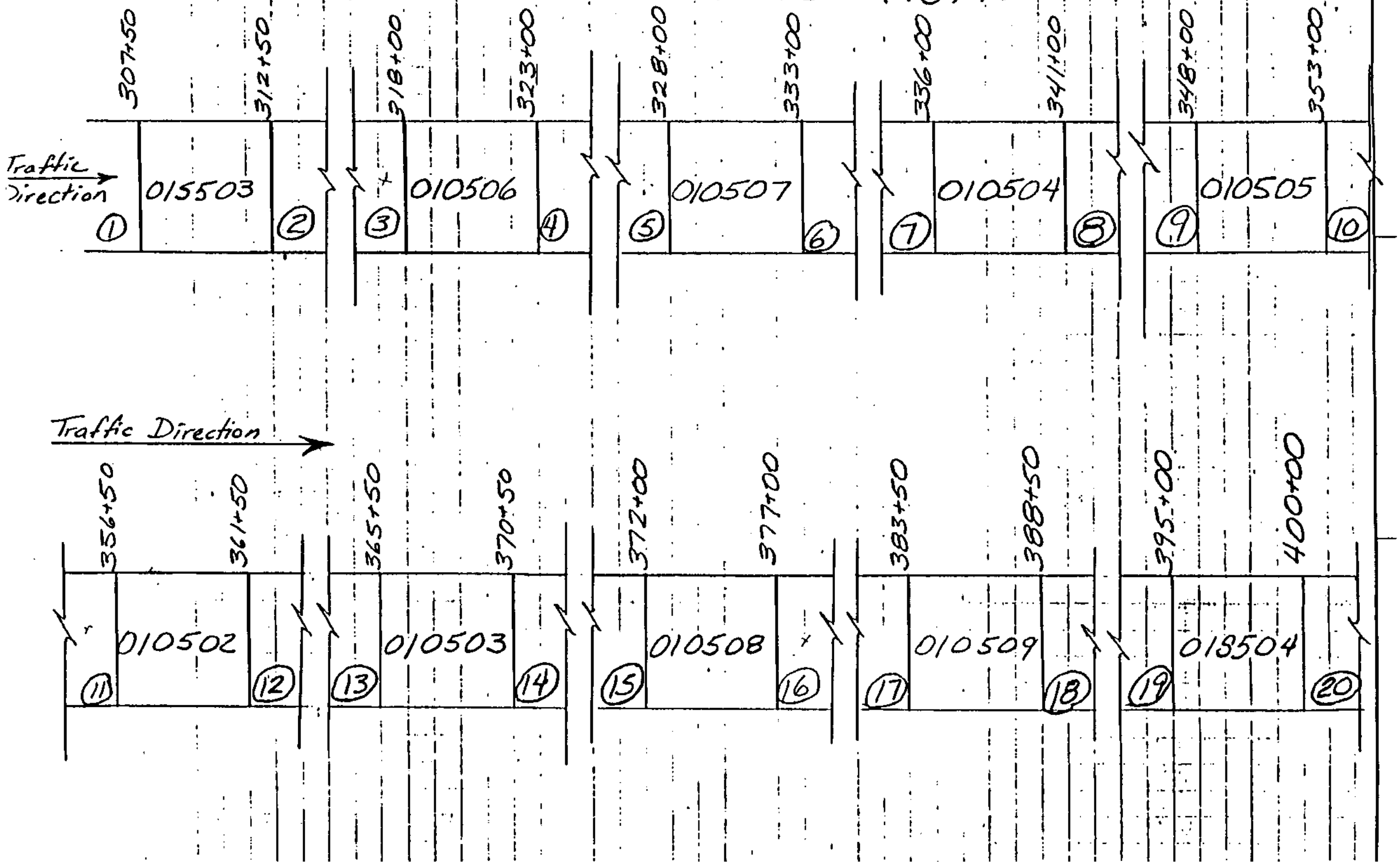
MATERIAL & SAMPLING DESCRIPTION	NUMBER OF MATERIAL SAMPLES	SAMPLE LOCATION
1. Virgin Asphalt Cement Used in Virgin Mix 5 Gallon Containers	11	Mix Plant
2. Virgin Asphalt Cement Used in Recycled Mix 5 Gallon Containers	11	Mix Plant
3. Virgin Aggregate		
Used in Virgin Mix (55 gal. drums)	1000 lbs.	Mix Plant
Used in Recycled Mix (55 gal. drums)	1000 lbs.	Mix Plant
4. Recycled Asphaltic Concrete (Prior to Remixing)	1000 lbs.	Mix Plant
5. Finished Asphaltic Concrete Mix		
Virgin AC Mix	200 lbs.	Mix Plant
Recycled AC Mix	200 lbs.	Mix Plant

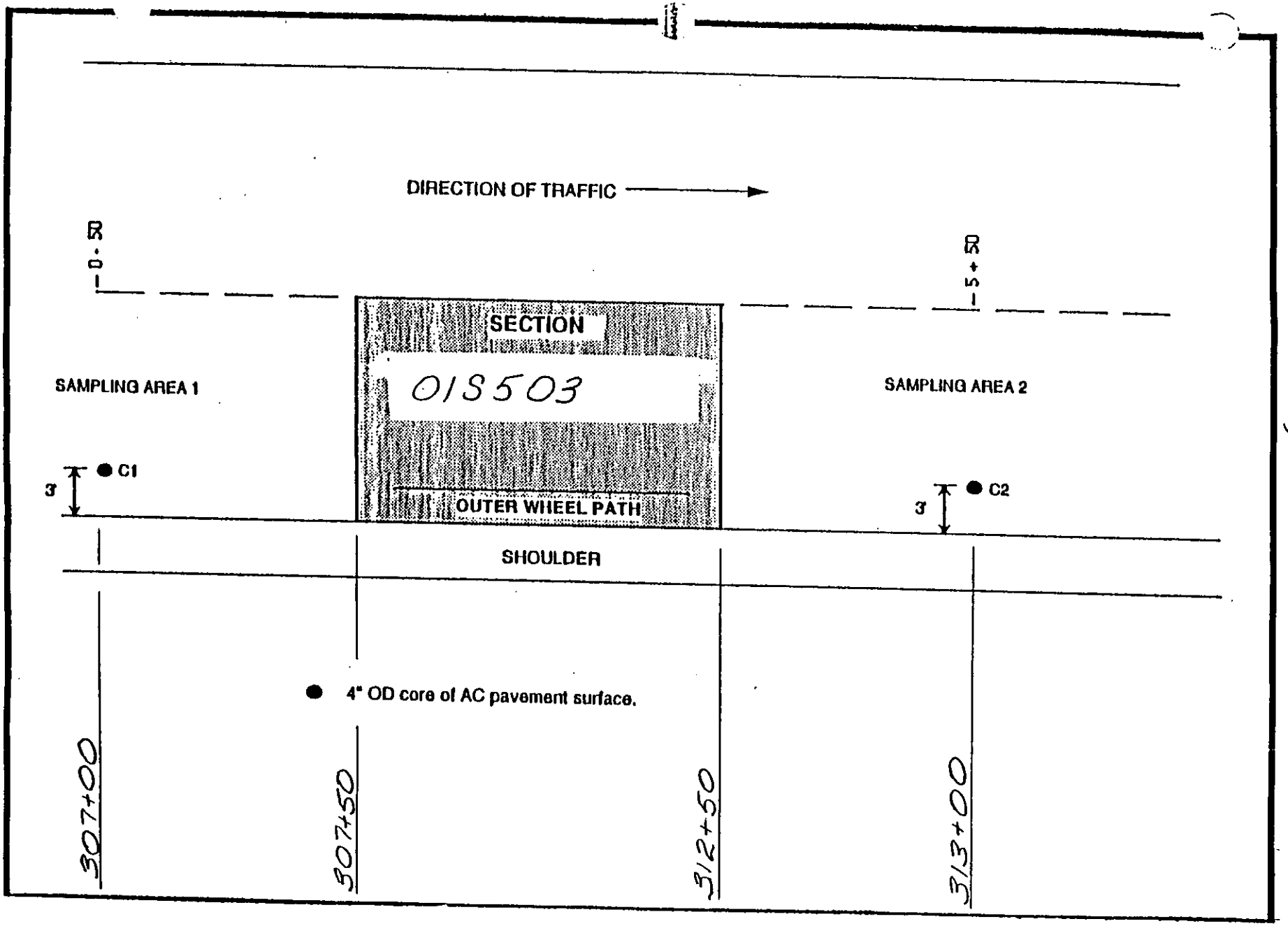
TABLE 3. SPS-5 LABORATORY TESTING PLANS (POST-CONSTRUCTION)

MATERIAL TYPE AND PROPERTIES	SHRP TEST DESIGNATION	SHRP PROTOCOL	NO. OF TESTS PER LAYER	MATERIAL SOURCE/ SAMPLE TYPE DESIGNATION
A. ASPHALTIC CONCRETE:				
Core Examination/Thickness	AC01	P01	40	All Cores
Bulk Specific Gravity	AC02	P02	40	All Cores
Maximum Specific Gravity	AC03	P03	6	BV1,BV2,BV3,BR1,BR2,BR3
Asphalt Content (Extraction)	AC04	P04	6	BV1,BV2,BV3,BR1,BR2,BR3
Moisture Susceptibility	AC05	P05	6	BV1,BV2,BV3,BR1,BR2,BR3
Creep Compliance	AC06	P06	2	[C37,C38,C39],[C63,C64,C65] (Note 1)
Resilient Modulus	AC07	P07	6	[C41,C42],[C44,C45],[C47,C48], [C58,C59],[C61,C62],[C67,C68]
Tensile Strength	AC07	P07	18	[C40,C41,C42],[C43,C44,C45], [C46,C47,C48],[C57,C58,C59], [C60,C61,C62],[C66,C67,C68]
B. EXTRACTED AGGREGATE:				
Bulk Specific Gravity:				
Coarse Aggregate	AG01	P11	6	BV1,BV2,BV3,BR1,BR2,BR3
Fine Aggregate	AG02	P12	6	BV1,BV2,BV3,BR1,BR2,BR3
Type and Classification:				
Coarse Aggregate	AG03	P13	6	BV1,BV2,BV3,BR1,BR2,BR3
Fine Aggregate	AG03	P13	6	BV1,BV2,BV3,BR1,BR2,BR3
Gradation of Aggregate	AG04	P14	6	BV1,BV2,BV3,BR1,BR2,BR3
NAA Test for Fine Aggregate Particle Shape	AG05	P14A (Note 2)	6	BV1,BV2,BV3,BR1,BR2,BR3
C. ASPHALT CEMENT:				
Abson Recovery	AE01	P21	6	BV1,BV2,BV3,BR1,BR2,BR3
Penetration at 77F & 115F	AE02	P22	6	BV1,BV2,BV3,BR1,BR2,BR3
Specific Gravity (60F)	AE03	P23	6	BV1,BV2,BV3,BR1,BR2,BR3
Viscosity at 77F	AE04	P24	6	BV1,BV2,BV3,BR1,BR2,BR3
Viscosity at 140F & 275F	AE05	P25	6	BV1,BV2,BV3,BR1,BR2,BR3

NOTES:
1. Creep compliance will be performed when suitable procedures are developed -- cores will be stored.
2. National Aggregate Association will perform tests at no cost to the State.

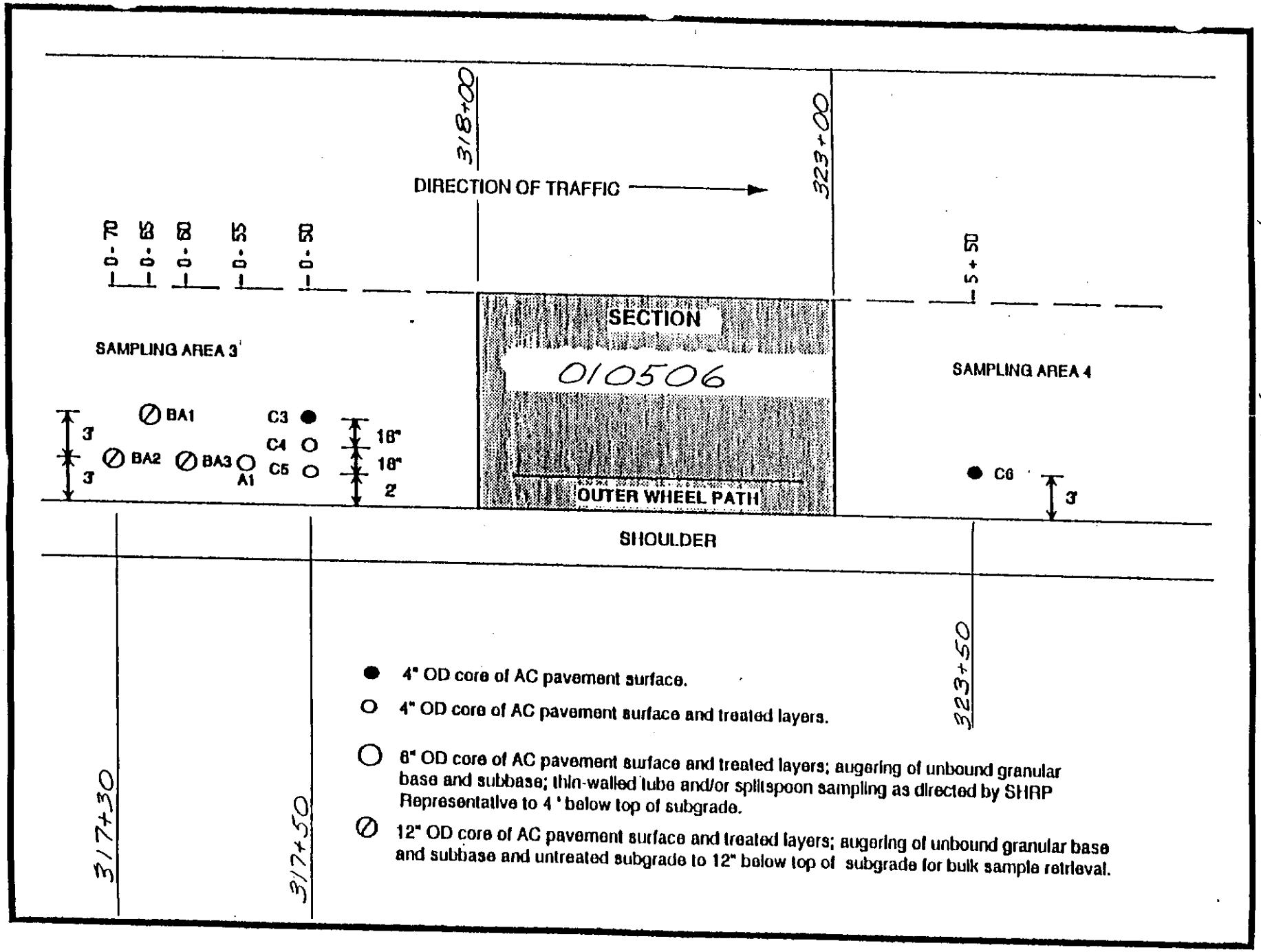
SPS-5 in Houston Co, AL: Sampling Area Layout "PRECONSTRUCTION"





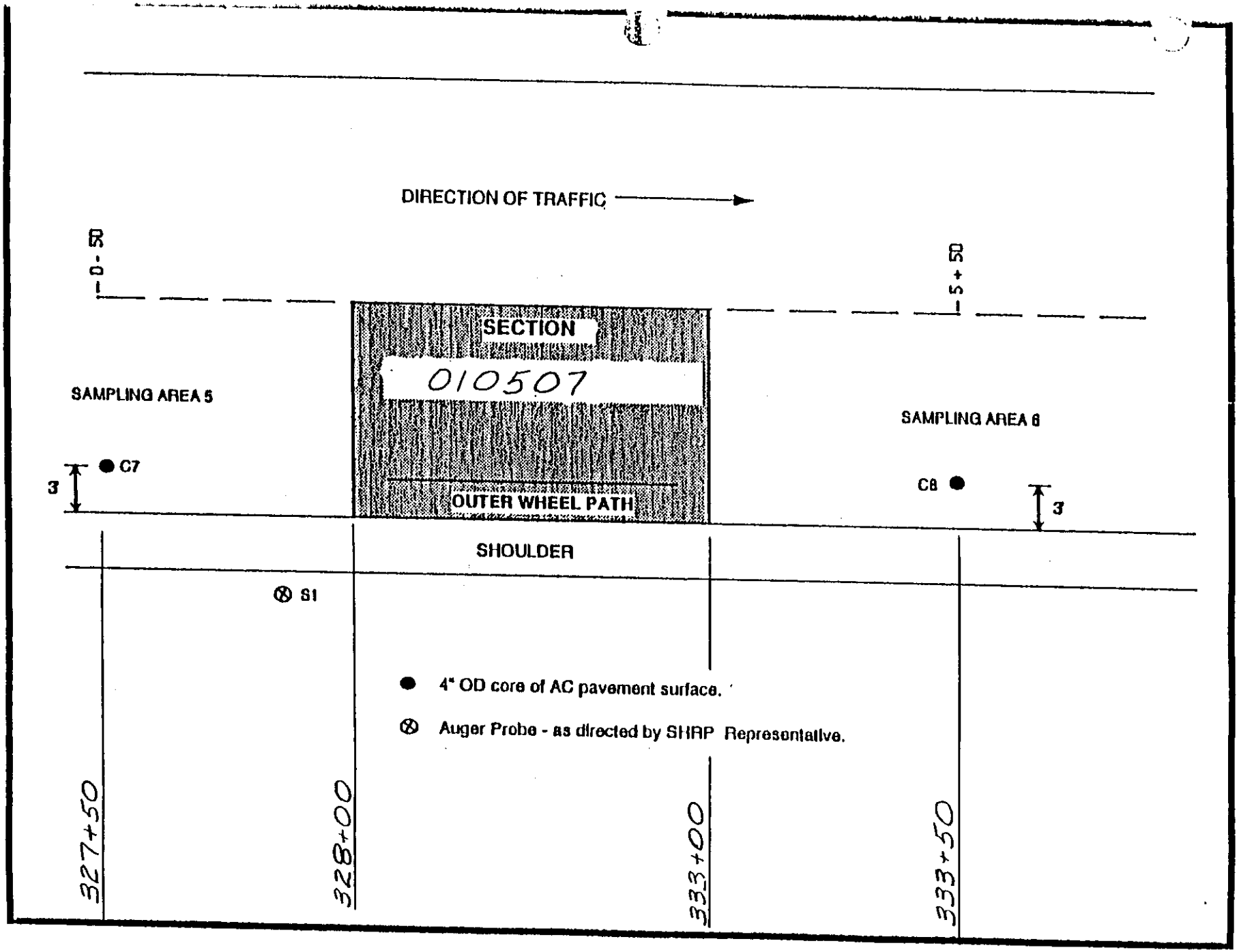
"Pre-Construction" Sampling Plan for Section 015503

US-84, Houston Co, AL. SPS-5 Materials Sampling Plan



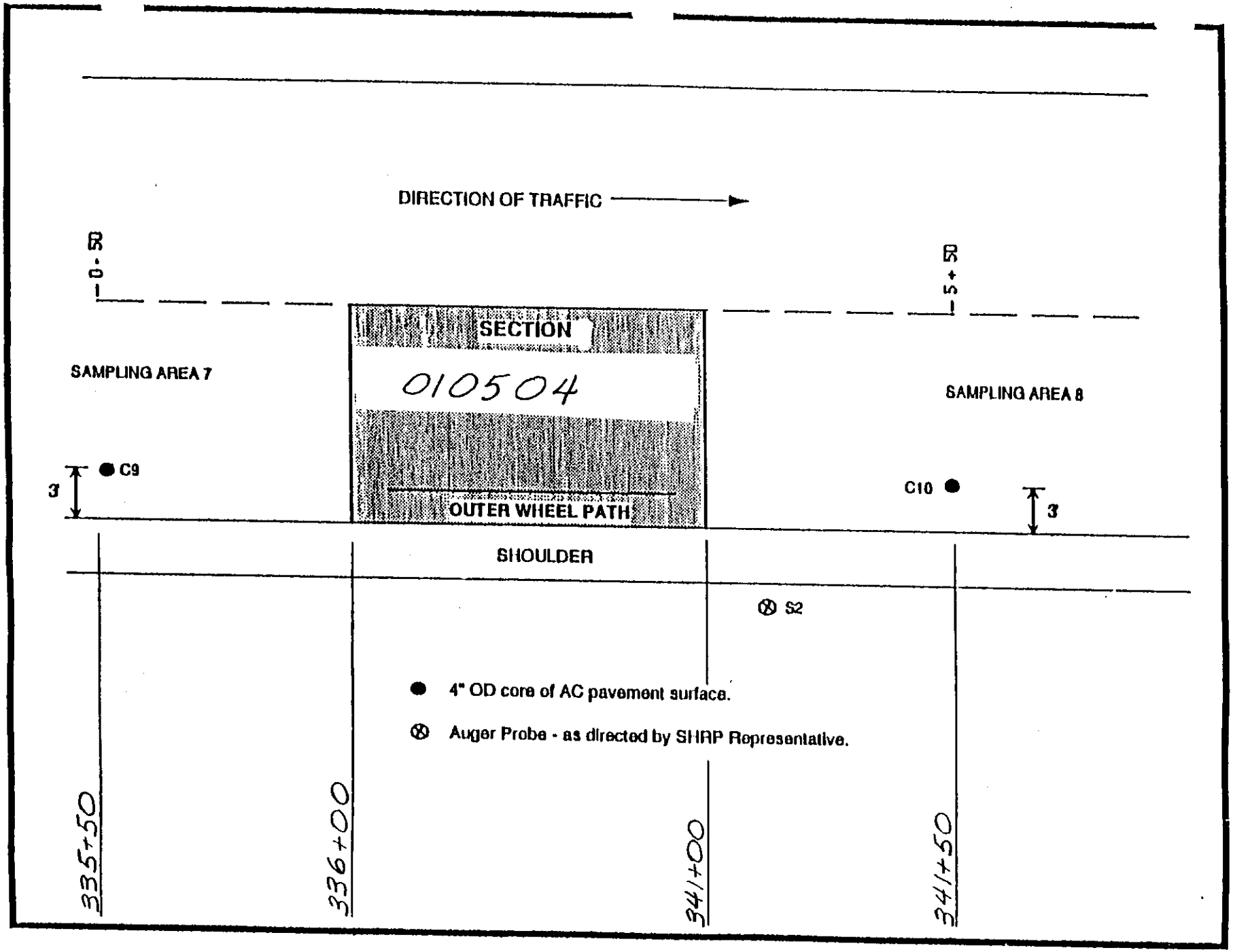
"Pre-Construction" Sampling Plan for Section 010506

US-84, Houston Co, AL SPS-5 Materials Sampling Plan



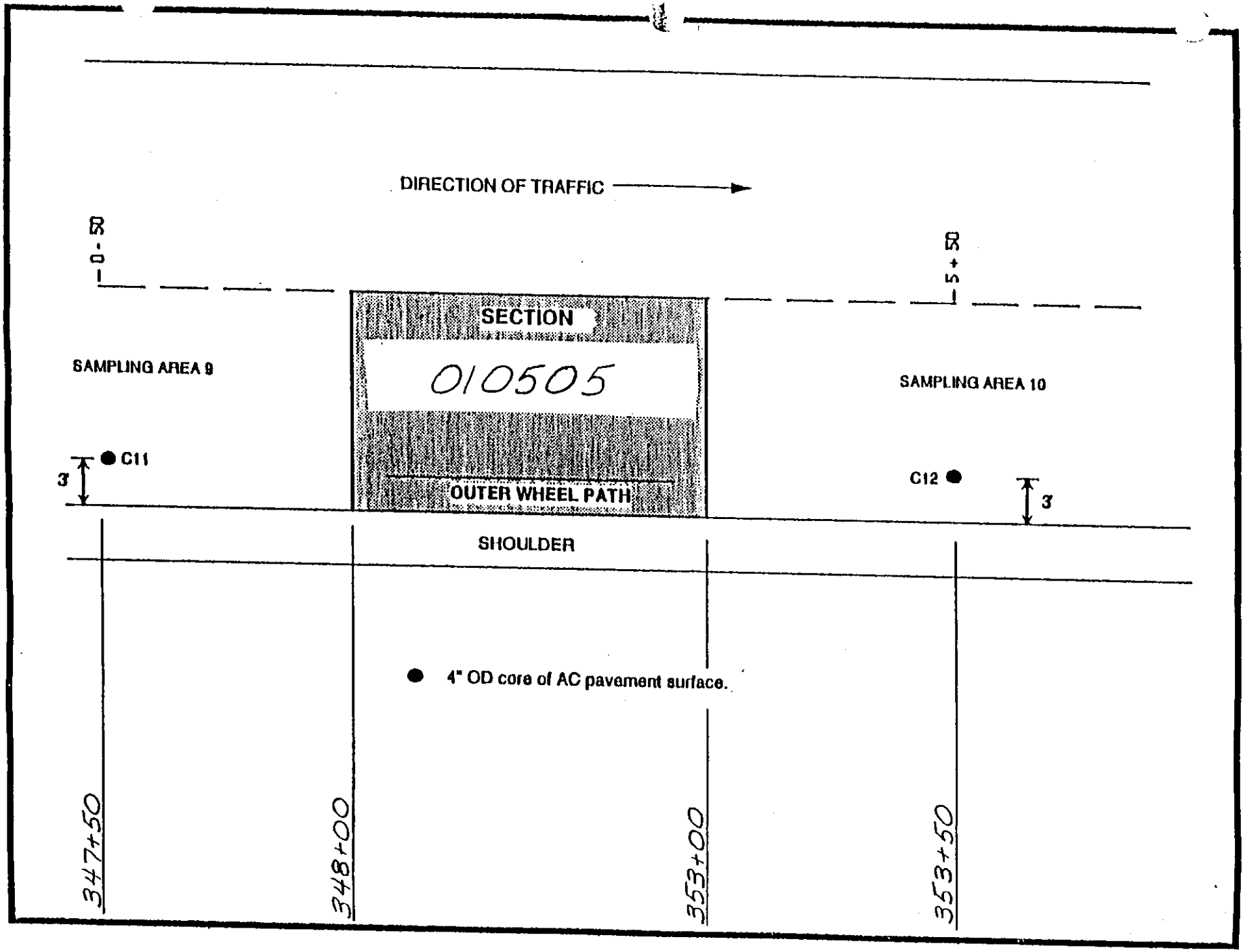
"Pre-Construction" Sampling Plan for Section 010507

US-84, Houston Co, AL. SPS-5 Materials Sampling Plan



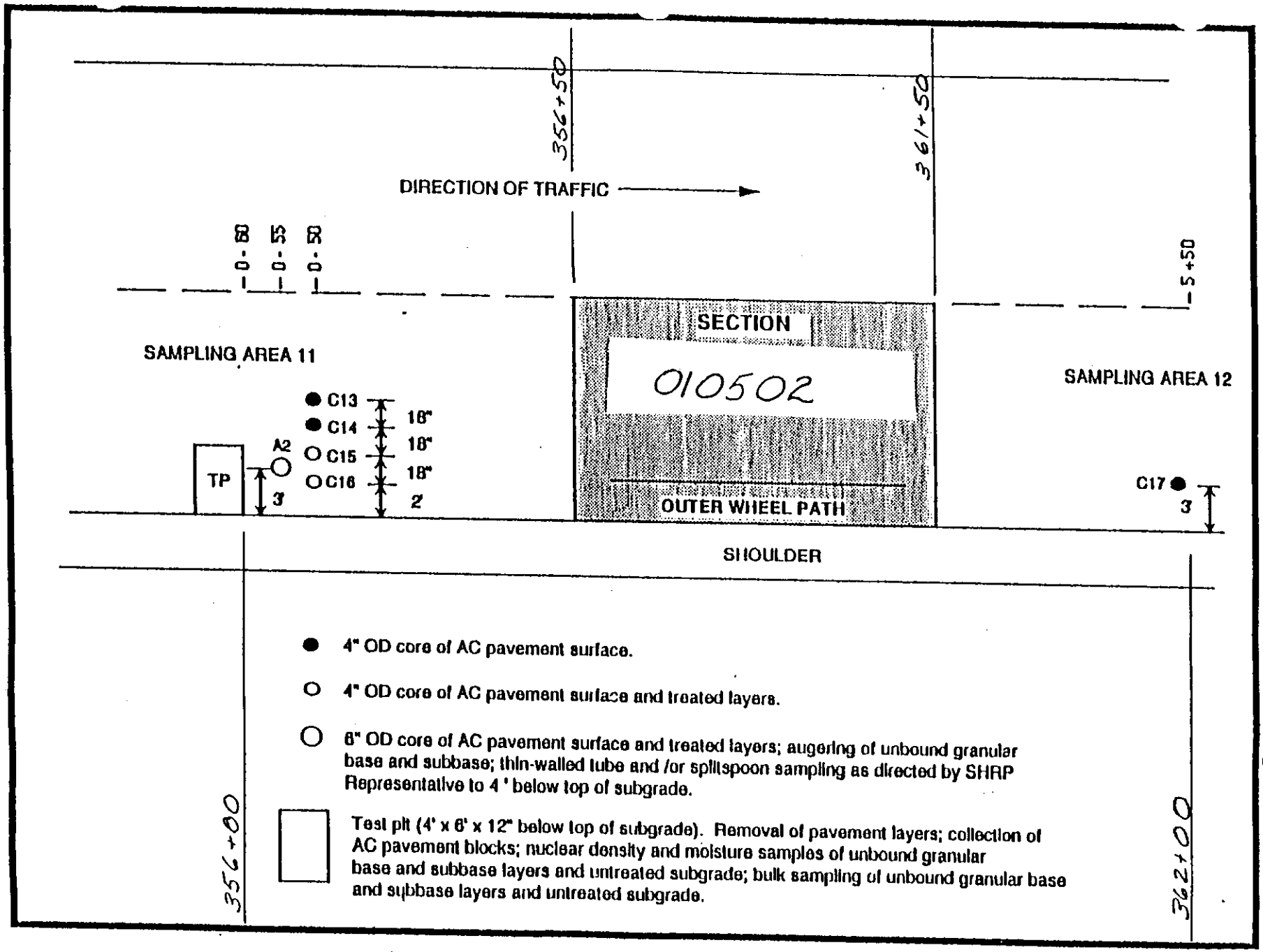
"Pre-Construction" Sampling Plan for Section 010504

US-84, Houston Co, AL. SPS-5 Materials Sampling Plan



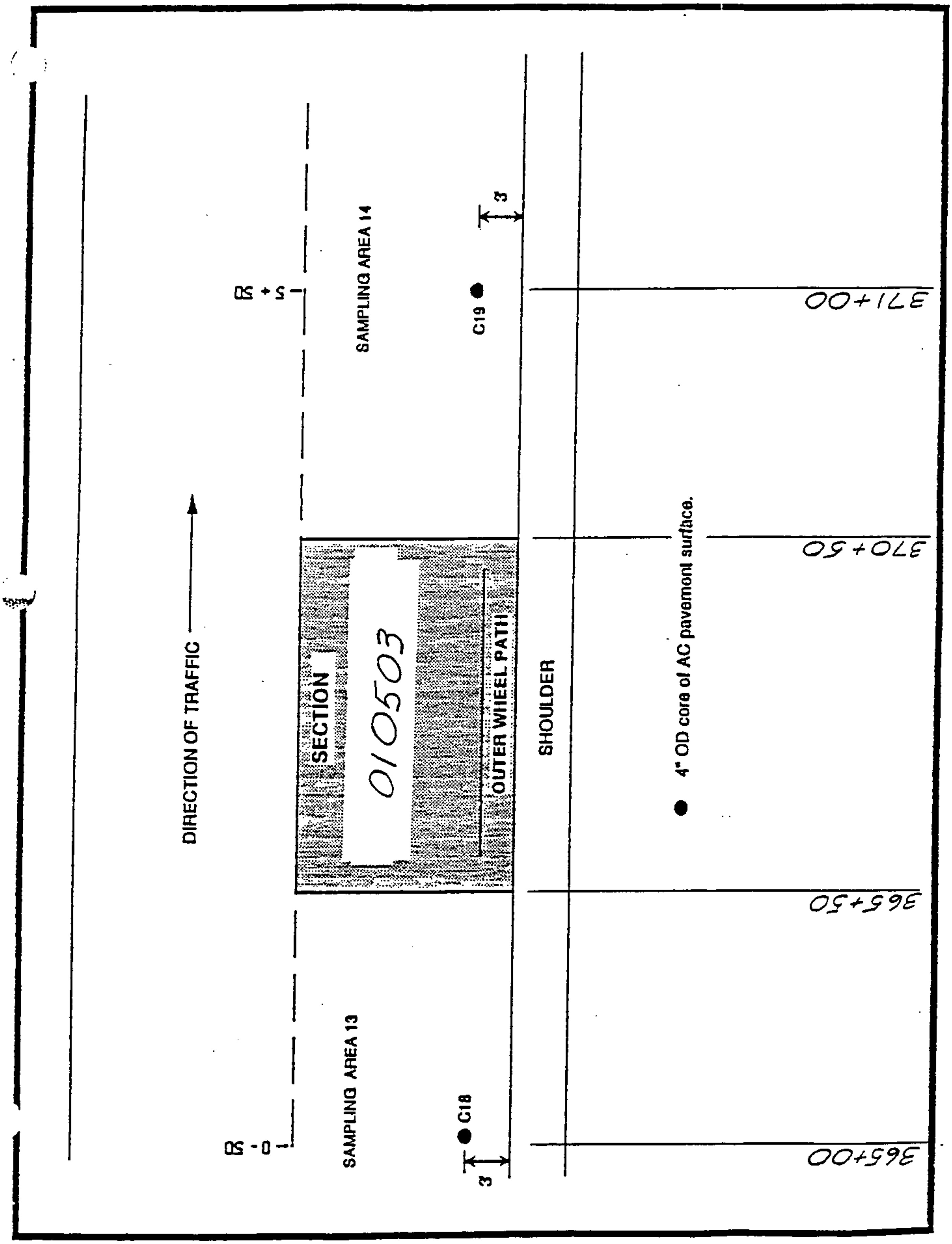
"Pre-Construction" Sampling Plan for Section 010505

US-84, Houston Co, AL. SPS-5 Materials Sampling Plan

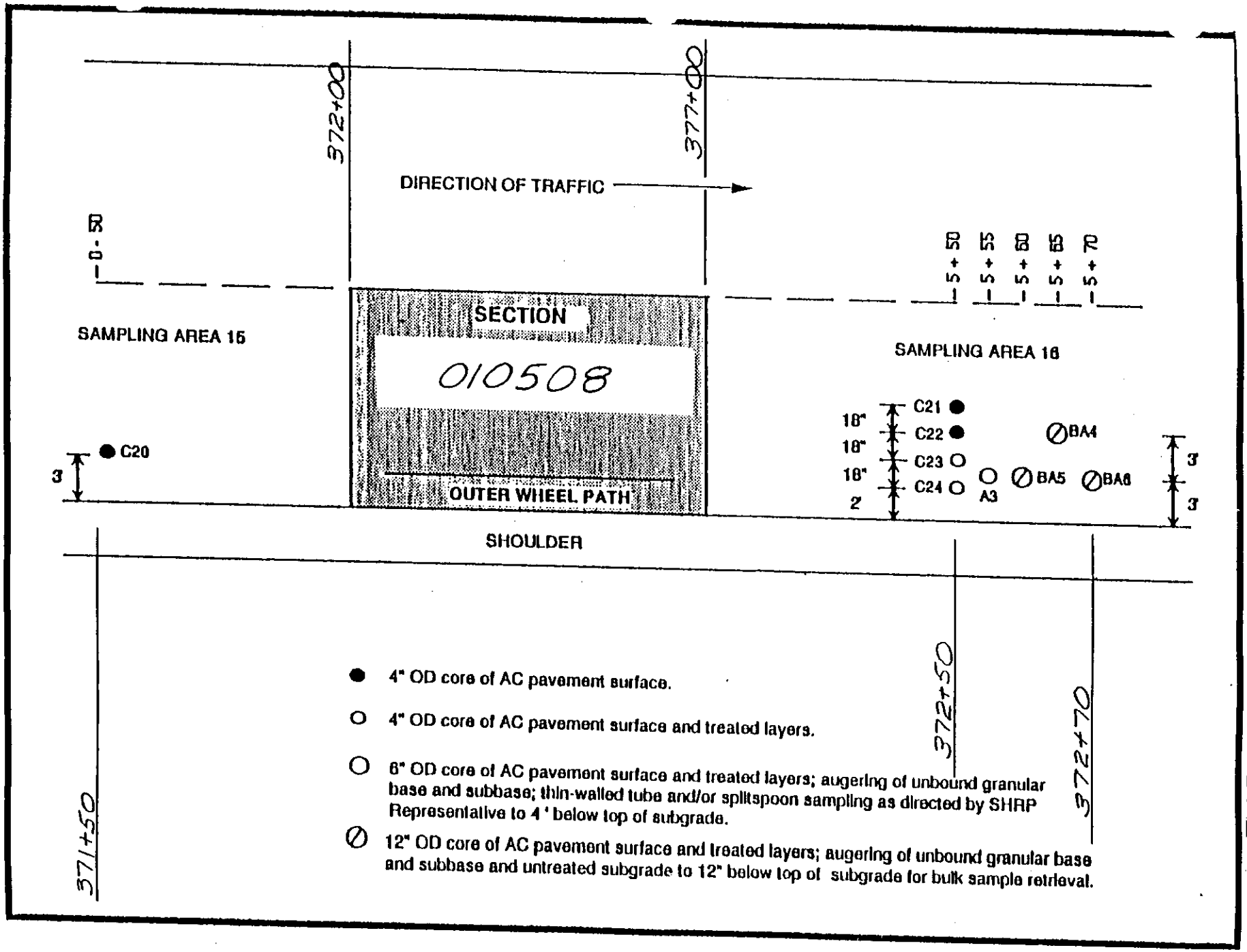


"Pre-Construction" Sampling Plan for Section 010502

US-84, Houston Co, AL. SPS-5 Materials Sampling Plan

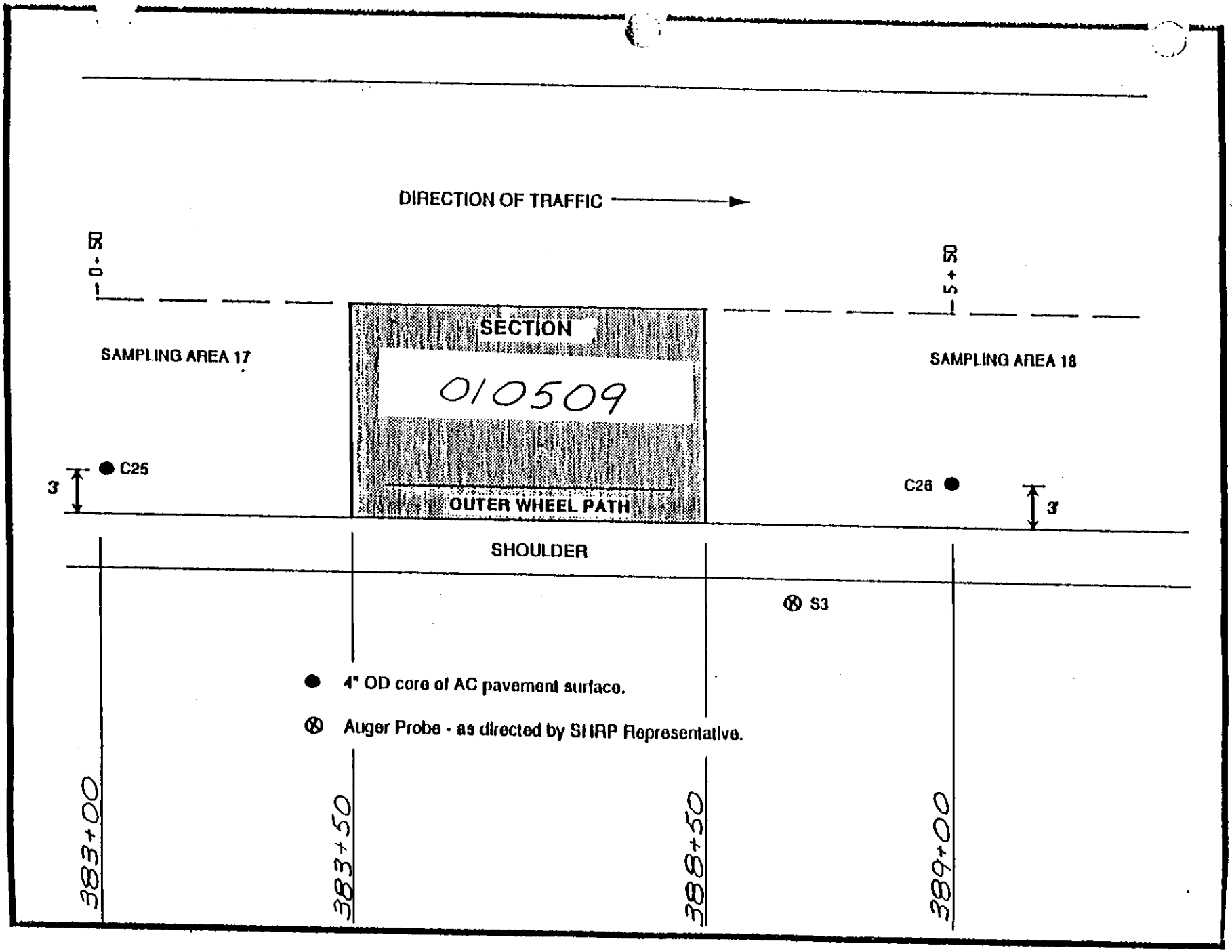


"Pre-Construction" Sampling Plan for Section 010503



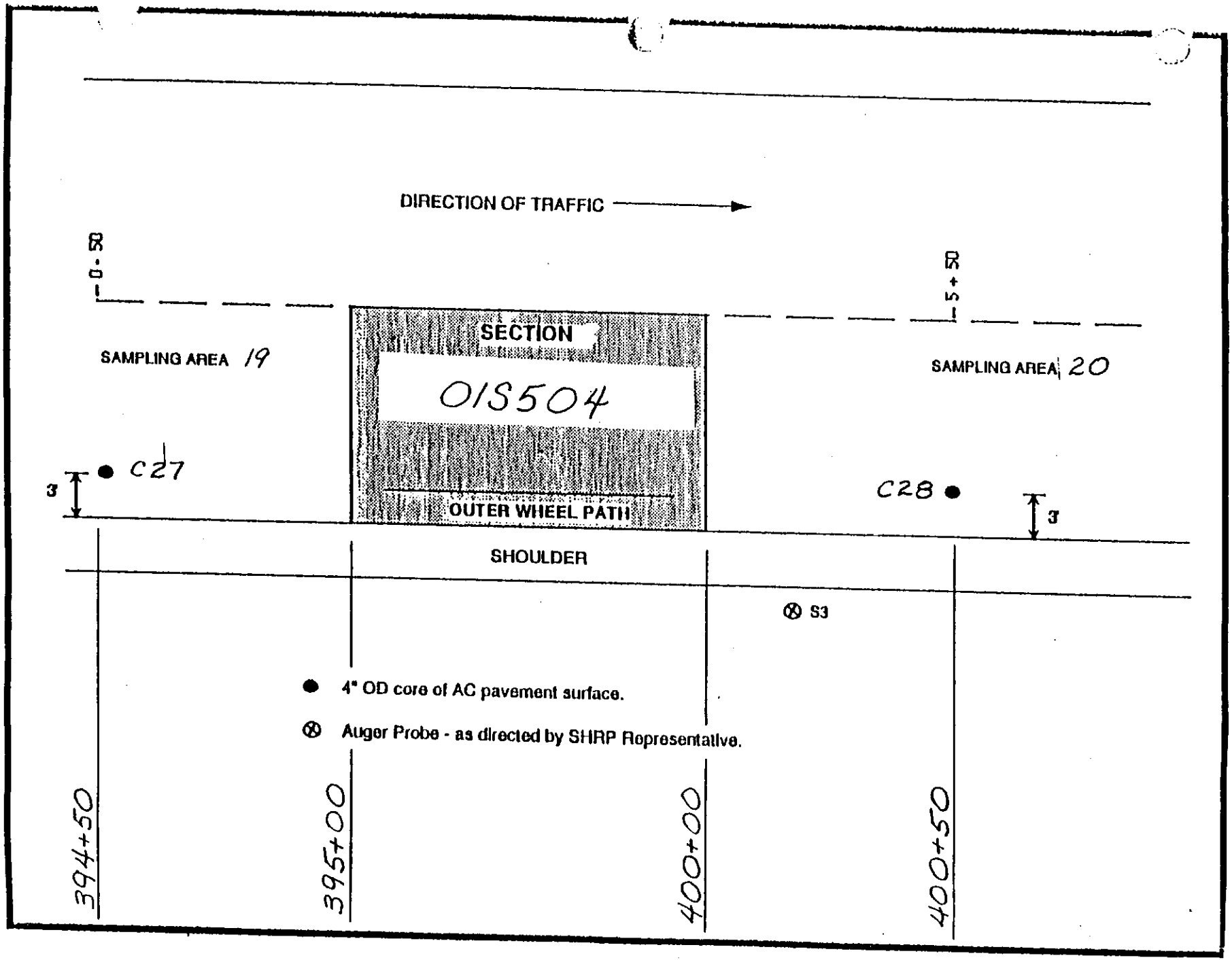
US-84, Houston Co., AL. SPS-5 Materials Sampling Plan

"Pre-Construction" Sampling Plan for Section 010508



"Pre-Construction" Sampling Plan for Section 010509

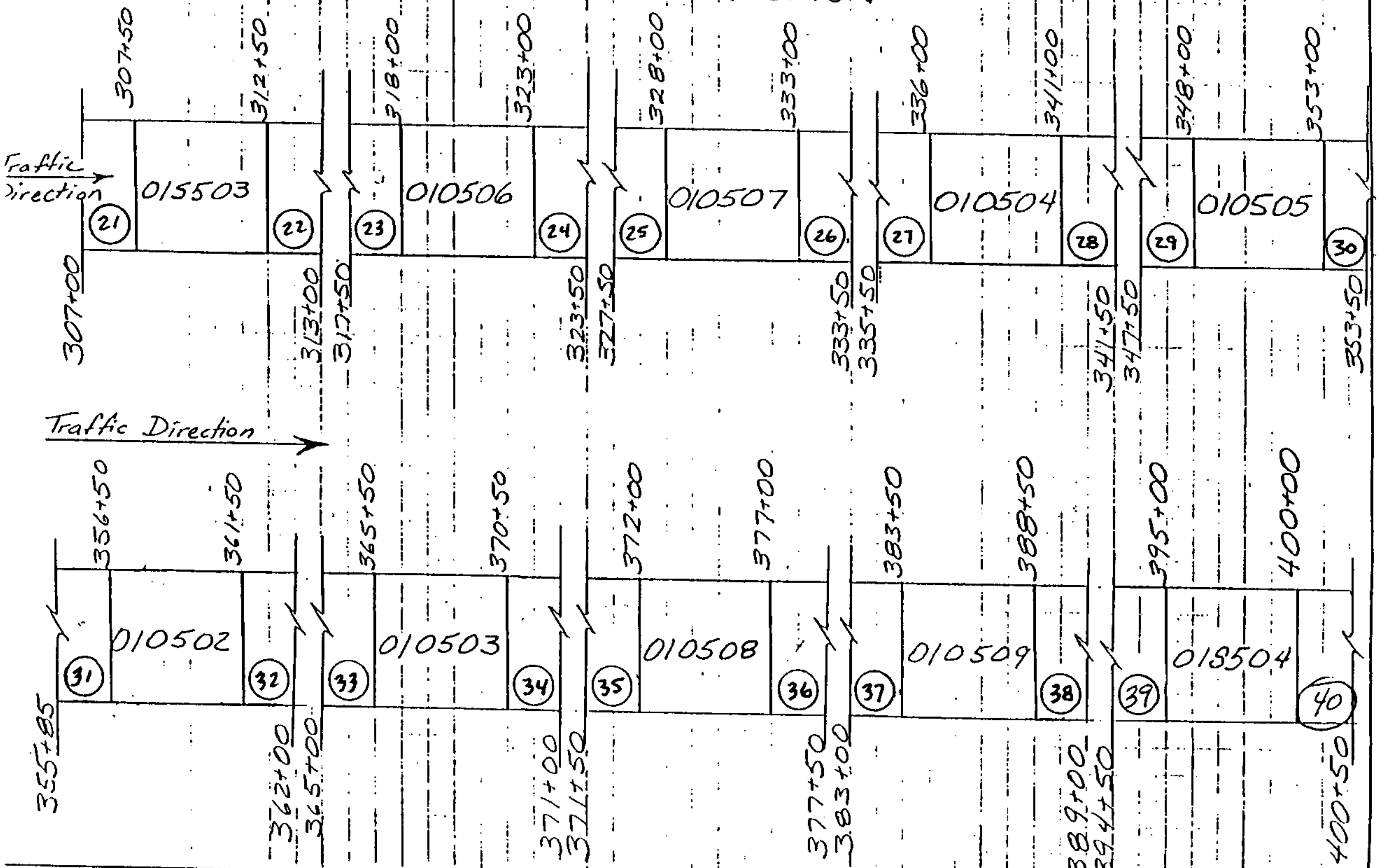
US-84, Houston Co., AL. SPS-5 Materials Sampling Plan

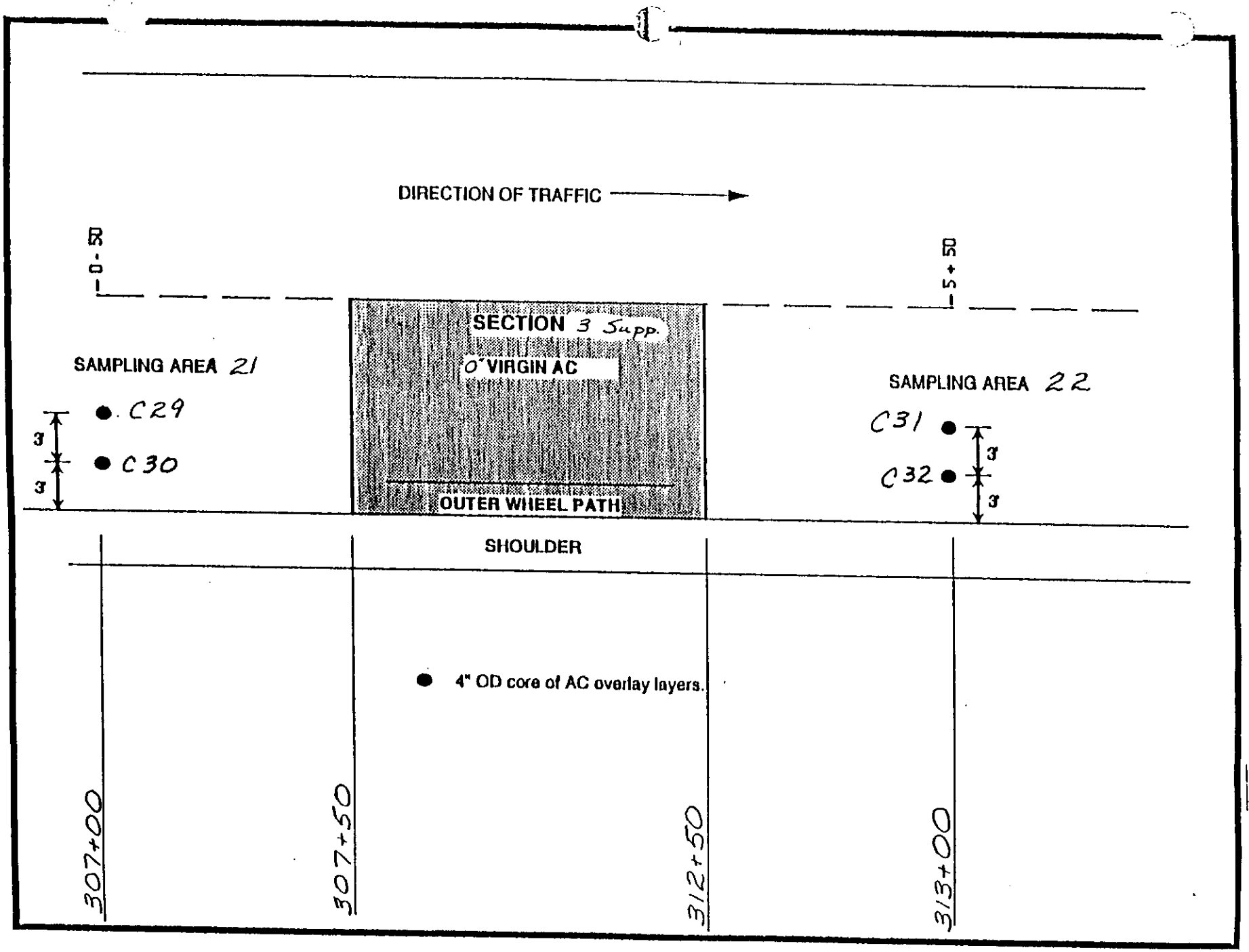


"Pre-Construction" Sampling Plan for Section 015504

US-84, Houston Co., AL. SPS-5 Materials Sampling Plan

SPS-5 in Houston Co, AL: Sampling Area Layout
POST-CONSTRUCTION



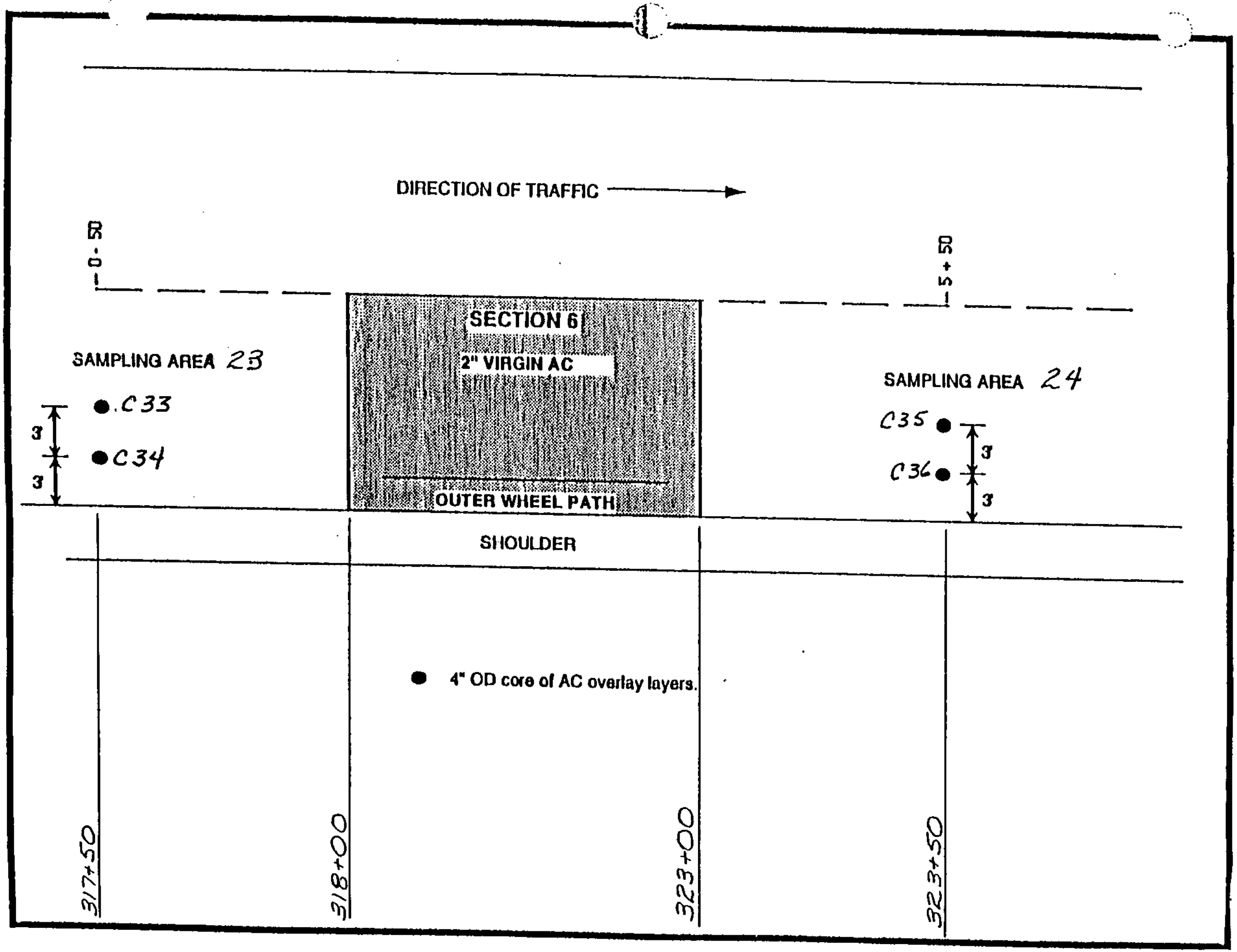


"Post-Construction" Sampling Plan for Section 015503

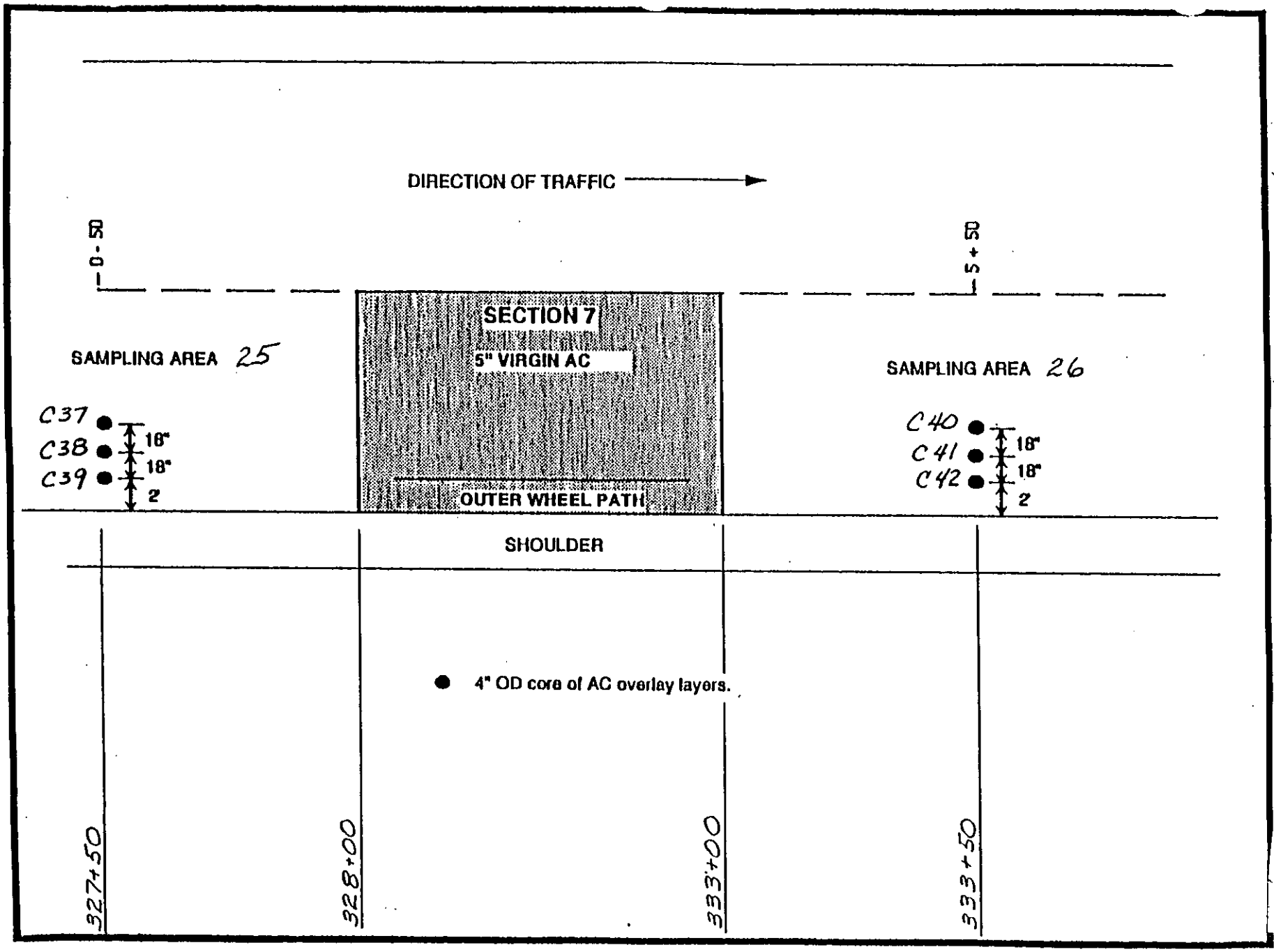
US-84, Houston Co., TX. SPS-5 Materials Sampling Plan

SPS-5 Materials Sampling Plan

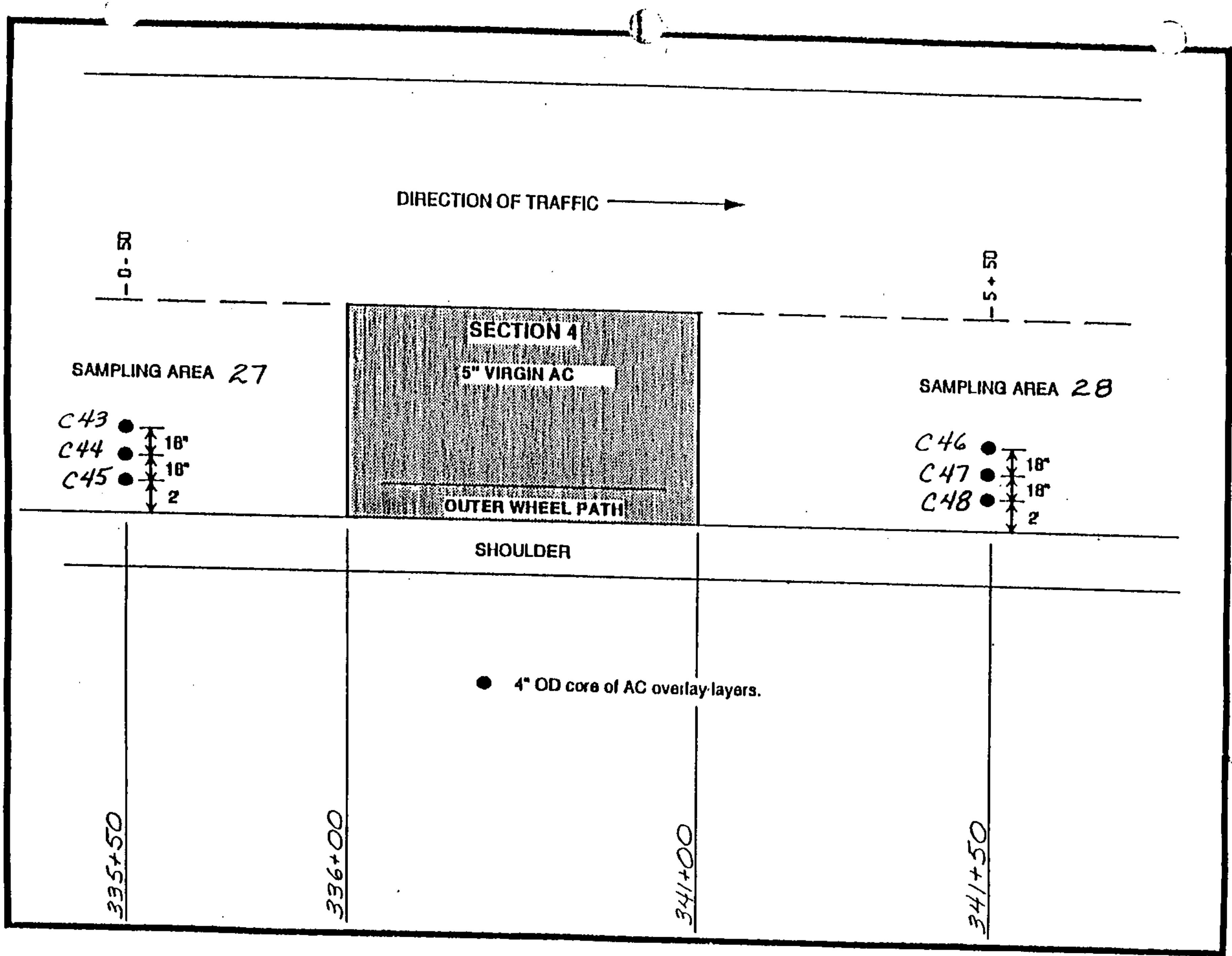
US-84, Houston Co, AL.



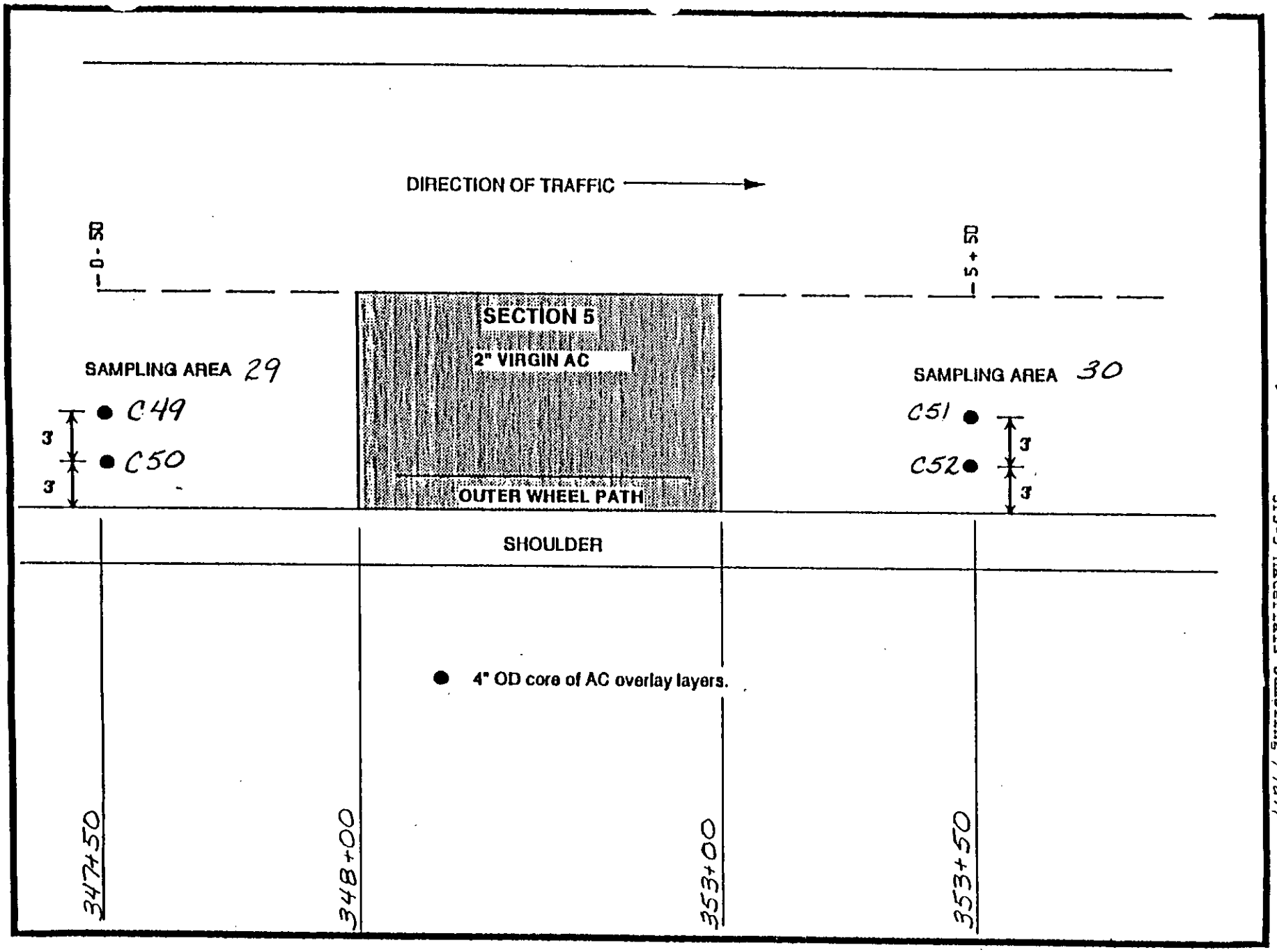
"Post-Construction" Sampling Plan for Section 010506



"Post-Construction" Sampling Plan for Section 010507

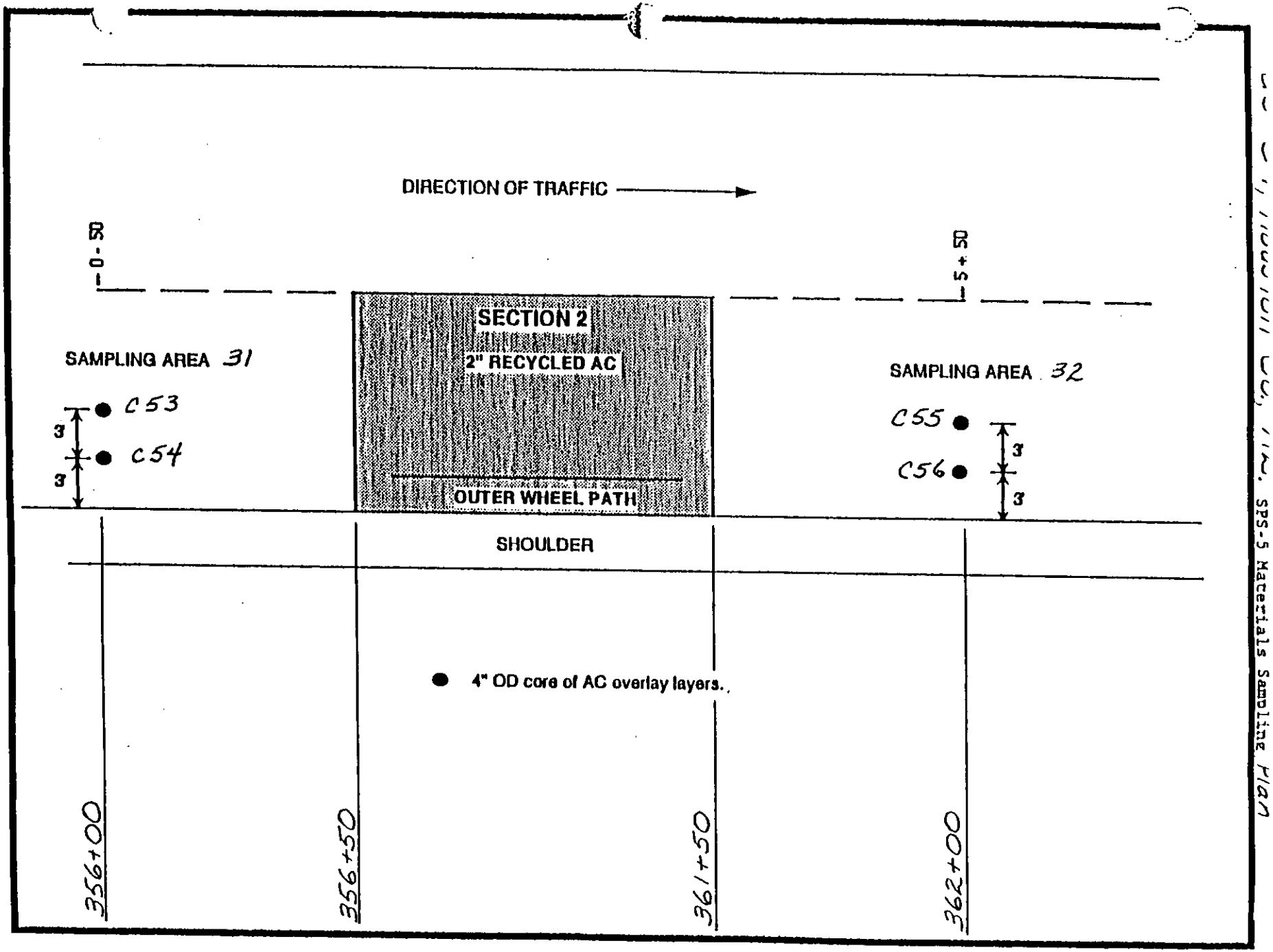


"Post-Construction" Sampling Plan for Section 010504

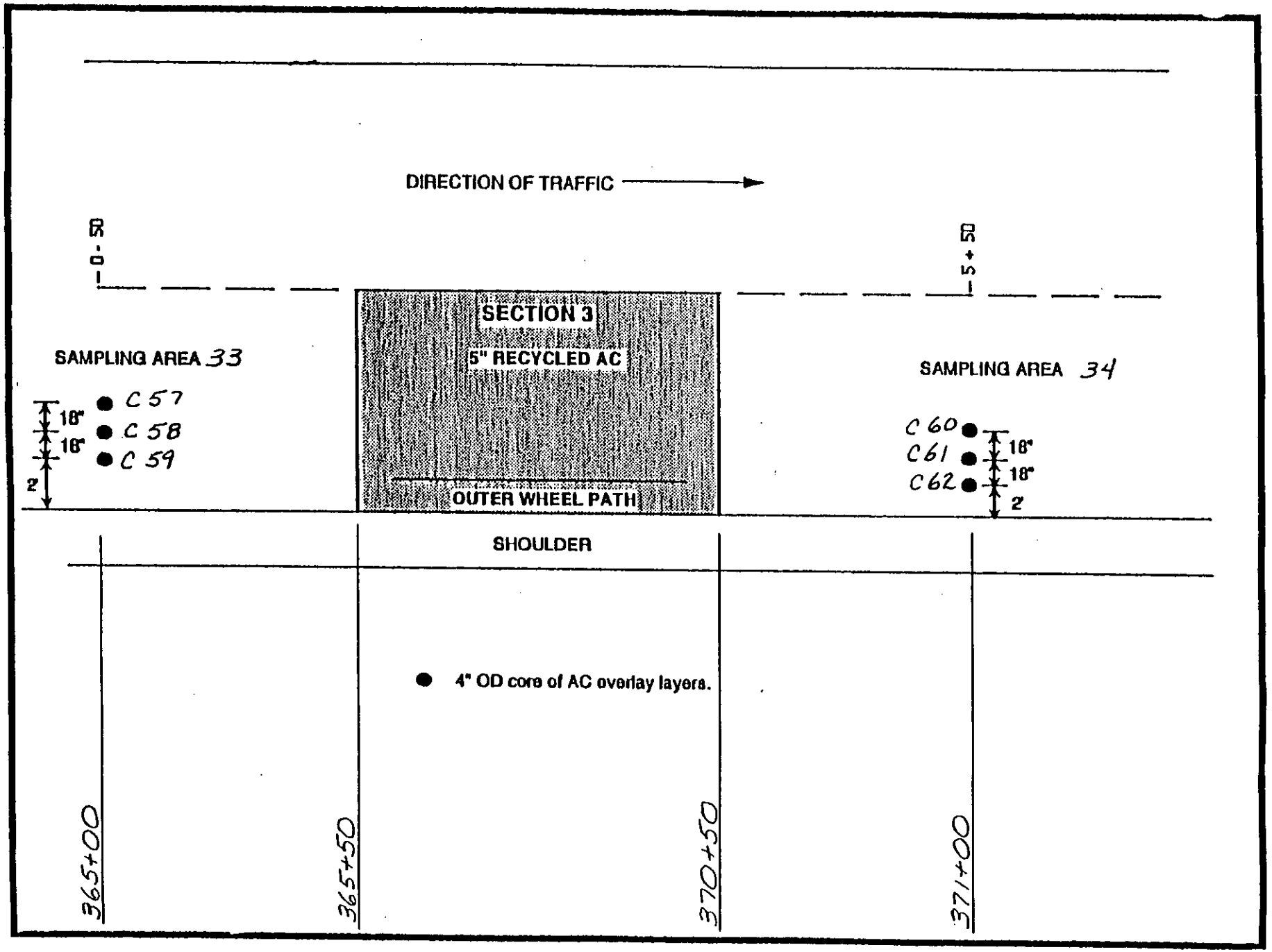


"Post-Construction" Sampling Plan for Section 010505

US-07, Houston Co., MN. SPS-5 Materials Sampling Plan

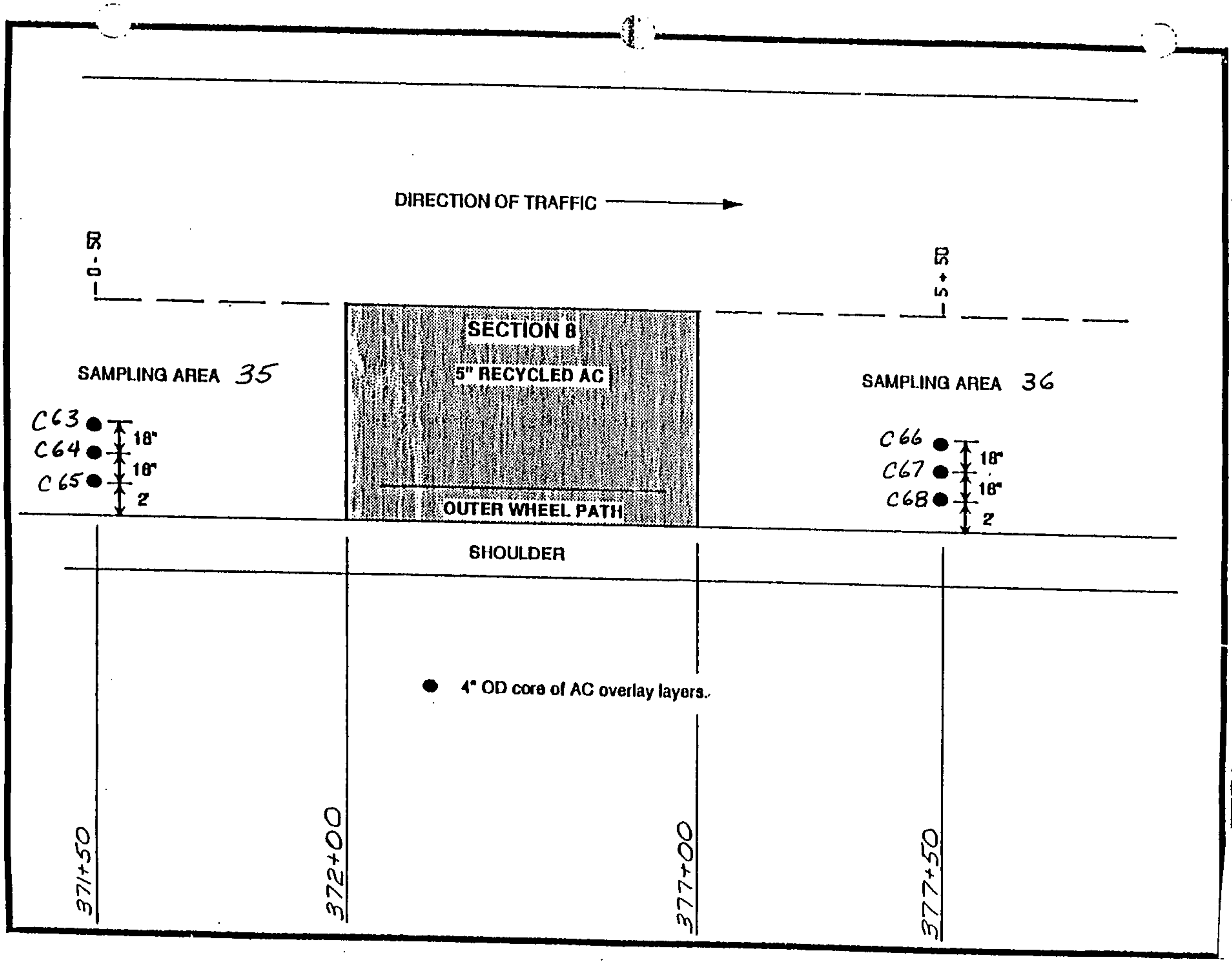


"Post-Construction" Sampling Plan for Section 010502

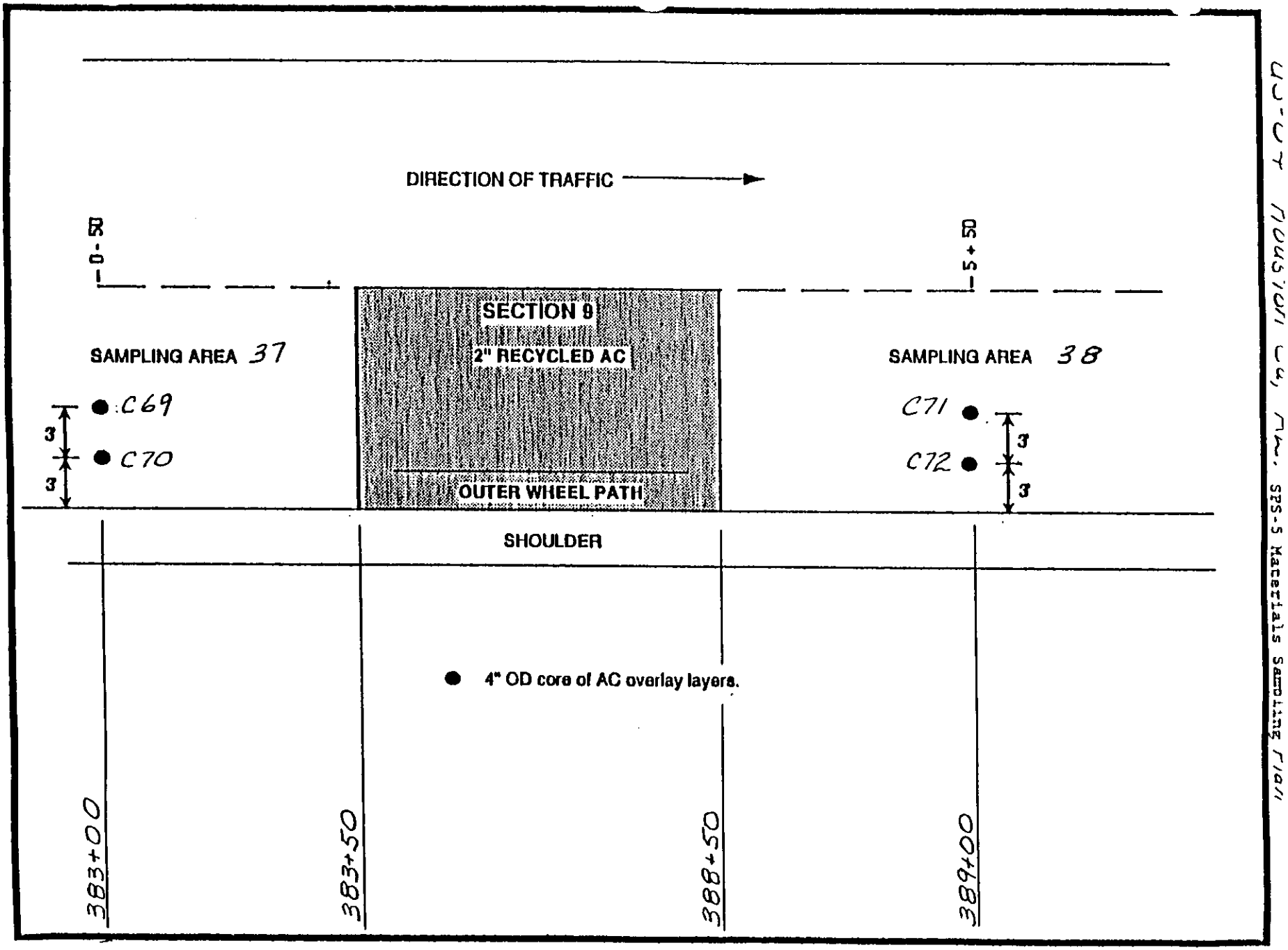


"Post-Construction" Sampling Plan for Section 010503

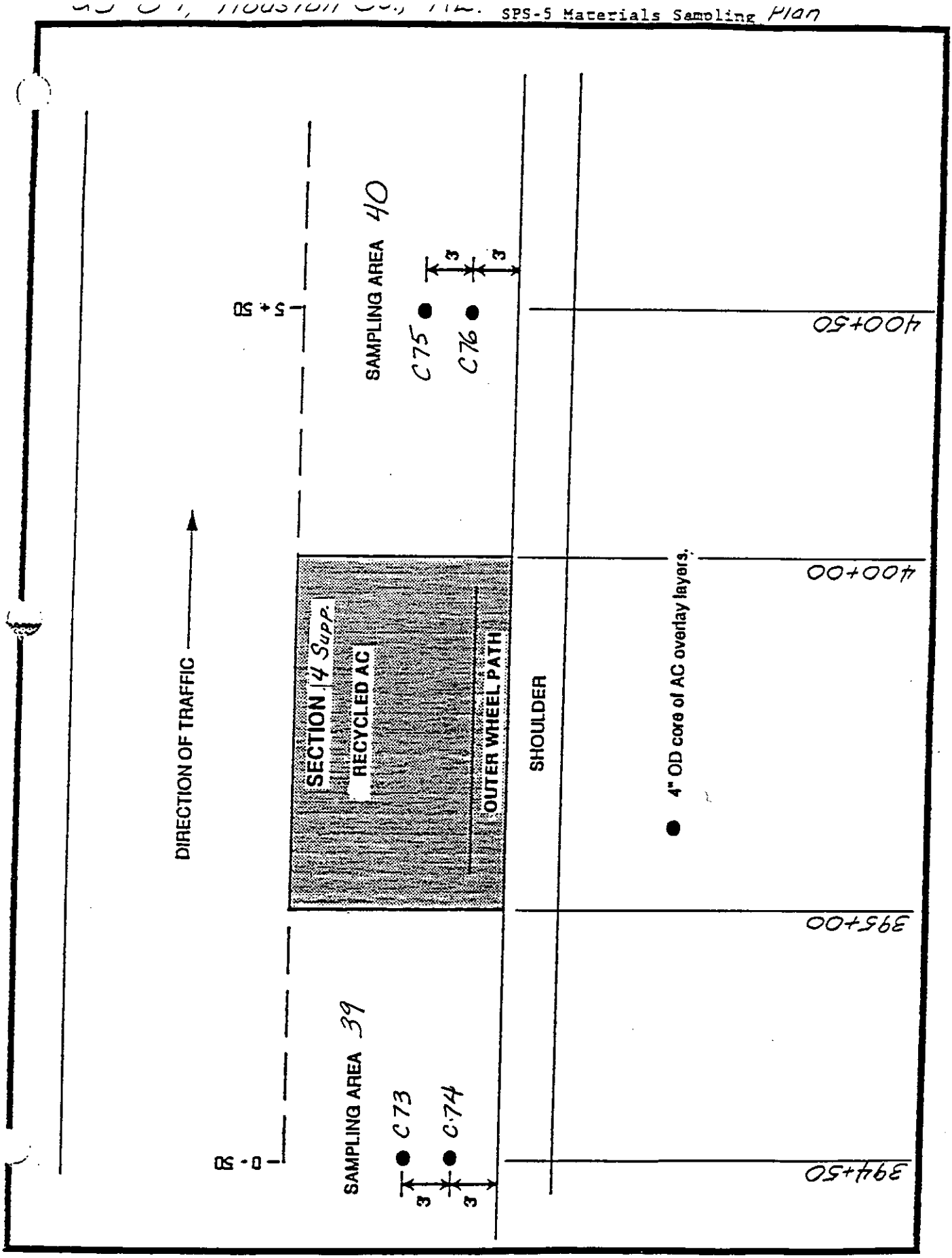
U-07, Houston Co., HK. SPS-5 Materials Sampling Plan



"Post-Construction" Sampling Plan for Section 010508



"Post-Construction" Sampling Plan for Section 010509



"Post-Construction" Sampling Plan for Section 0/S504

TABLE 3. SPS-5 LABORATORY TESTING PLANS (PRE-CONSTRUCTION)

MATERIAL TYPE AND PROPERTIES	SHRP TEST DESIGNATION	SHRP PROTOCOL	NO. OF TESTS PER LAYER	MATERIAL SOURCE/ SAMPLE TYPE DESIGNATION
2. UNBOUND GRANULAR BASE AND SUBBASE				
Particle Size Analysis	UG01	P41	3	[BA1-3] [TP] [BA4-6]
Sieve Analysis (washed)	UG02	P41	3	[BA1-3] [TP] [BA4-6]
Atterberg Limits	UG04	P43	3	[BA1-3] [TP] [BA4-6]
Moisture-Density Relations	UG05	P44	3	[BA1-3] [TP] [BA4-6]
Resilient Modulus	UG07	P46	3	[BA1-3] [TP] [BA4-6]
Classification	UG08	P47	3	[BA1-3] [TP] [BA4-6]
Permeability	UG09	P48	3	[BA1-3] [TP] [BA4-6]
Natural Moisture Content	UG10	P49	3	[BA1-3] [TP] [BA4-6]
3. SUBGRADE				
Sieve Analysis	SS01	P51	3	[BA1-3] [TP] [BA4-6]
Hydrometer to 0.001mm	SS02	P42	3	[BA1-3] [TP] [BA4-6]
Atterberg Limits	SS03	P43	3	[BA1-3] [TP] [BA4-6]
Classification	SS04	P52	3	[BA1-3] [TP] [BA4-6]
Moisture-Density Relations	SS05	P55	3	[BA1-3] [TP] [BA4-6]
Resilient Modulus	SS07	P46	3	A1 A2 A3 or [BA1-3] [TP] [BA4-6]
Unit Weight	SS08	P56	3	[BA1-3] [TP] [BA4-6]
Natural Moisture Content	SS09	P49	3	[BA1-3] [TP] [BA4-6]
Depth to Rigid Layer			3	S1 S2 S3

NOTES:
1. Creep compliance will be performed when suitable procedures are developed -- cores will be stored.
2. National Aggregate Association will perform tests at no cost to the State.
3. Cores within brackets are from the same sampling area.

TABLE 3. SPS-5 LABORATORY TESTING PLANS (POST-CONSTRUCTION)

MATERIAL TYPE AND PROPERTIES	SHRP TEST DESIGNATION	SHRP PROTOCOL	NO. OF TESTS PER LAYER	MATERIAL SOURCE/ SAMPLE TYPE DESIGNATION
A. ASPHALTIC CONCRETE:				
Core Examination/Thickness	AC01	P01	40	ALL CORES
Bulk Specific Gravity	AC02	P02	40	ALL CORES
Maximum Specific Gravity	AC03	P03	6	BV1, BV2, BV3, BR1, BR2, BR3
Asphalt Content (Extraction)	AC04	P04	6	BV1, BV2, BV3, BR1, BR2, BR3
Moisture Susceptibility	AC05	P05	6	BV1, BV2, BV3, BR1, BR2, BR3
Creep Compliance	AC06	P06	2	[C37,C38,C39], [C63,C64,C65]
Resilient Modulus	AC07	P07	6	[C58,C59] [C61,C62] [C44,C45] [C47,C48] [C67,C68]
Tensile Strength	AC07	P07	18	[C57,C58,C59] [C60,C61,C62] [C43,C44,C45] [C46,C47,C48] [C40,C41,C42] [C66,C67,C68]
B. EXTRACTED AGGREGATE:				
Bulk Specific Gravity:				
Coarse Aggregate	AG01	P11	6	BV1, BV2, BV3, BR1, BR2, BR3
Fine Aggregate	AG02	P12	6	BV1, BV2, BV3, BR1, BR2, BR3
Type and Classification:				
Coarse Aggregate	AG03	P13	6	BV1, BV2, BV3, BR1, BR2, BR3
Fine Aggregate	AG03	P13	6	BV1, BV2, BV3, BR1, BR2, BR3
Gradation of Aggregate	AG04	P14	6	BV1, BV2, BV3, BR1, BR2, BR3
NAA Test for Fine Aggregate Particle Shape	AG05	P14A (note 2)	6	BV1, BV2, BV3, BR1, BR2, BR3
C. ASPHALT CEMENT:				
Abson Recovery	AE01	P21	6	BV1, BV2, BV3, BR1, BR2, BR3
Penetration at 77 and 115°F	AE02	P22	6	BV1, BV2, BV3, BR1, BR2, BR3
Specific Gravity (60F)	AE03	P23	6	BV1, BV2, BV3, BR1, BR2, BR3
Viscosity at 77F	AE04	P24	6	BV1, BV2, BV3, BR1, BR2, BR3
Viscosity at 140F, 275F	AE05	P25	6	BV1, BV2, BV3, BR1, BR2, BR3

NOTES:
1. Creep compliance will be performed when suitable procedures are developed -- cores will be stored.
2. National Aggregate Association will perform tests at no cost to the State.

TABLE 1. SCOPE OF MATERIALS SAMPLING AND FIELD TESTING

MATERIAL & SAMPLING DESCRIPTION	NUMBER OF MATERIAL SAMPLES	SAMPLE TYPE DESIGNATION
PRE-CONSTRUCTION SAMPLING		
1. Asphalt Concrete (Original Layer)		
Coring - 4" diam. cores	28	C1-C28
Coring - 6" diam. cores	3	A1-A3
Coring - 12" diam. cores	6	BA1-BA6
Bulk Sampling (12" × 12" Slab)	2	TP1
2. Unbound Base/Subbase Layers (Per Layer)		
Augering 6" diam. holes	3	A1-A3
Bulk Sampling in 12" diam. holes	6	BA1-BA6
Bulk Sampling in Test Pits	1	TP1
In Situ Density & Moisture Content (Nuclear Gauge)	1	TP1
Moisture Content Samples	8	TP1, BA1-BA6
3. Subgrade		
Thin-walled Tube Sampling *(Two tube samples per hole. If undisturbed tube sampling is not possible, splitspoon sampling will be conducted.)	6*	A1-A3
Bulk Sampling in 12" diam. holes	6	BA1-BA6
Bulk Sampling in Test Pits	1	TP1
In Situ Density & Moisture Content (Nuclear Gauge)	1	TP1
Moisture Content Samples	8	BA1-BA6, TP1
4. Shoulder Auger Probes	3	S1-S3
POST-CONSTRUCTION SAMPLING		
1. Asphaltic Concrete (Overlay)		
Coring - 4" diam. cores	48	C29-C76

TABLE 1. SCOPE OF MATERIALS SAMPLING AND FIELD TESTING

MATERIAL & SAMPLING DESCRIPTION	NUMBER OF MATERIAL SAMPLES	SAMPLE TYPE DESIGNATION
PRE-CONSTRUCTION SAMPLING		
1. Asphalt Concrete (Original Layer)		
Coring - 4" diam. cores	28	C1-C28
Coring - 6" diam. cores	3	A1-A3
Coring - 12" diam. cores	6	BA1-BA6
Bulk Sampling (12" × 12" Slab)	2	TP1
2. Unbound Base/Subbase Layers (Per Layer)		
Augering 6" diam. holes	3	A1-A3
Bulk Sampling in 12" diam. holes	6	BA1-BA6
Bulk Sampling in Test Pits	1	TP1
In Situ Density & Moisture Content (Nuclear Gauge)	1	TP1
Moisture Content Samples	8	TP1, BA1-BA6
3. Subgrade		
Thin-walled Tube Sampling *(Two tube samples per hole. If undisturbed tube sampling is not possible, splitspoon sampling will be conducted.)	6*	A1-A3
Bulk Sampling in 12" diam. holes	6	BA1-BA6
Bulk Sampling in Test Pits	1	TP1
In Situ Density & Moisture Content (Nuclear Gauge)	1	TP1
Moisture Content Samples	8	BA1-BA6, TP1
4. Shoulder Auger Probes	3	S1-S3
POST-CONSTRUCTION SAMPLING		
1. Asphaltic Concrete (Overlay)		
Coring - 4" diam. cores	48	C29-C76

Brent Rauhut Engineering Inc.

August 20, 1991

Dr. Amir N. Hanna
Strategic Highway Research Program
818 Connecticut Avenue, N.W. - 4th Floor
Washington, DC 20006

Subject: Revision of Table 3 for Materials Sampling and Field Testing (MS&FT) Plan for the SPS-5 Project 0105 in Dothan, Alabama.

Dear Amir,

Please find attached, for your records, a revised Table 3 for the SPS-5 MS&FT Plan in Dothan, Alabama.

The revision reflects an additional two core samples [C41, C42] for the resilient modulus test. This will conclude a total of six core sample sets of for resilient modulus testing in the postconstruction sampling phase. Three sets are designated for the virgin asphalt sections and three sets for the recycled asphalt cement (RAP) sections.

Currently, the State of Alabama anticipates a September letting of the contract for this SPS-5 project, with construction to begin some time in October 1991.

If you should require any additional information regarding the above, please don't hesitate to call.

Sincerely,

Mark D. Sargent
Project Engineer, SRCO

Attachment: As stated.

cc.w/Attach: Homer Wheeler, SHRP RE-SRCO
File:

MDS:dmj

TABLE 3. SPS-5 LABORATORY TESTING PLANS (POST-CONSTRUCTION)

MATERIAL TYPE AND PROPERTIES	SHRP TEST DESIGNATION	SHRP PROTOCOL	NO. OF TESTS PER LAYER	MATERIAL SOURCE/ SAMPLE TYPE DESIGNATION
A. ASPHALTIC CONCRETE:				
Core Examination/Thickness	AC01	P01	40	All Cores
Bulk Specific Gravity	AC02	P02	40	All Cores
Maximum Specific Gravity	AC03	P03	6	BV1,BV2,BV3,BR1,BR2,BR3
Asphalt Content (Extraction)	AC04	P04	6	BV1,BV2,BV3,BR1,BR2,BR3
Moisture Susceptibility	AC05	P05	6	BV1,BV2,BV3,BR1,BR2,BR3
Creep Compliance	AC06	P06	2	[C37,C38,C39],[C63,C64,C65] (Note 1)
Resilient Modulus	AC07	P07	6	[C41,C42],[C44,C45],[C47,C48], [C58,C59],[C61,C62],[C67,C68]
Tensile Strength	AC07	P07	18	[C40,C41,C42],[C43,C44,C45], [C46,C47,C48],[C57,C58,C59], [C60,C61,C62],[C66,C67,C68]
B. EXTRACTED AGGREGATE:				
Bulk Specific Gravity:				
Coarse Aggregate	AG01	P11	6	BV1,BV2,BV3,BR1,BR2,BR3
Fine Aggregate	AG02	P12	6	BV1,BV2,BV3,BR1,BR2,BR3
Type and Classification:				
Coarse Aggregate	AG03	P13	6	BV1,BV2,BV3,BR1,BR2,BR3
Fine Aggregate	AG03	P13	6	BV1,BV2,BV3,BR1,BR2,BR3
Gradation of Aggregate	AG04	P14	6	BV1,BV2,BV3,BR1,BR2,BR3
NAA Test for Fine Aggregate Particle Shape	AG05	P14A (Note 2)	6	BV1,BV2,BV3,BR1,BR2,BR3
C. ASPHALT CEMENT:				
Abson Recovery	AE01	P21	6	BV1,BV2,BV3,BR1,BR2,BR3
Penetration at 77F & 115F	AE02	P22	6	BV1,BV2,BV3,BR1,BR2,BR3
Specific Gravity (60F)	AE03	P23	6	BV1,BV2,BV3,BR1,BR2,BR3
Viscosity at 77F	AE04	P24	6	BV1,BV2,BV3,BR1,BR2,BR3
Viscosity at 140F & 275F	AE05	P25	6	BV1,BV2,BV3,BR1,BR2,BR3

NOTES:
1. Creep compliance will be performed when suitable procedures are developed -- cores will be stored.
2. National Aggregate Association will perform tests at no cost to the State.

TABLE 3. SPS-5 LABORATORY TESTING PLANS (POST-CONSTRUCTION)

MATERIAL TYPE AND PROPERTIES	SHRP TEST DESIGNATION	SHRP PROTOCOL	NO. OF TESTS PER LAYER	MATERIAL SOURCE/ SAMPLE TYPE DESIGNATION
A. ASPHALTIC CONCRETE:				
Core Examination/Thickness	AC01	P01	40	All Cores
Bulk Specific Gravity	AC02	P02	40	All Cores
Maximum Specific Gravity	AC03	P03	6	BV1,BV2,BV3,BR1,BR2,BR3
Asphalt Content (Extraction)	AC04	P04	6	BV1,BV2,BV3,BR1,BR2,BR3
Moisture Susceptibility	AC05	P05	6	BV1,BV2,BV3,BR1,BR2,BR3
Creep Compliance	AC06	P06	2	[C37,C38,C39],[C63,C64,C65] (Note 1)
Resilient Modulus	AC07	P07	6	[C41,C42],[C44,C45],[C47,C48], [C58,C59],[C61,C62],[C67,C68]
Tensile Strength	AC07	P07	18	[C40,C41,C42],[C43,C44,C45], [C46,C47,C48],[C57,C58,C59], [C60,C61,C62],[C66,C67,C68]
B. EXTRACTED AGGREGATE:				
Bulk Specific Gravity:				
Coarse Aggregate	AG01	P11	6	BV1,BV2,BV3,BR1,BR2,BR3
Fine Aggregate	AG02	P12	6	BV1,BV2,BV3,BR1,BR2,BR3
Type and Classification:				
Coarse Aggregate	AG03	P13	6	BV1,BV2,BV3,BR1,BR2,BR3
Fine Aggregate	AG03	P13	6	BV1,BV2,BV3,BR1,BR2,BR3
Gradation of Aggregate	AG04	P14	6	BV1,BV2,BV3,BR1,BR2,BR3
NAA Test for Fine Aggregate Particle Shape	AG05	P14A (Note 2)	6	BV1,BV2,BV3,BR1,BR2,BR3
C. ASPHALT CEMENT:				
Abson Recovery	AE01	P21	6	BV1,BV2,BV3,BR1,BR2,BR3
Penetration at 77F & 115F	AE02	P22	6	BV1,BV2,BV3,BR1,BR2,BR3
Specific Gravity (60F)	AE03	P23	6	BV1,BV2,BV3,BR1,BR2,BR3
Viscosity at 77F	AE04	P24	6	BV1,BV2,BV3,BR1,BR2,BR3
Viscosity at 140F & 275F	AE05	P25	6	BV1,BV2,BV3,BR1,BR2,BR3

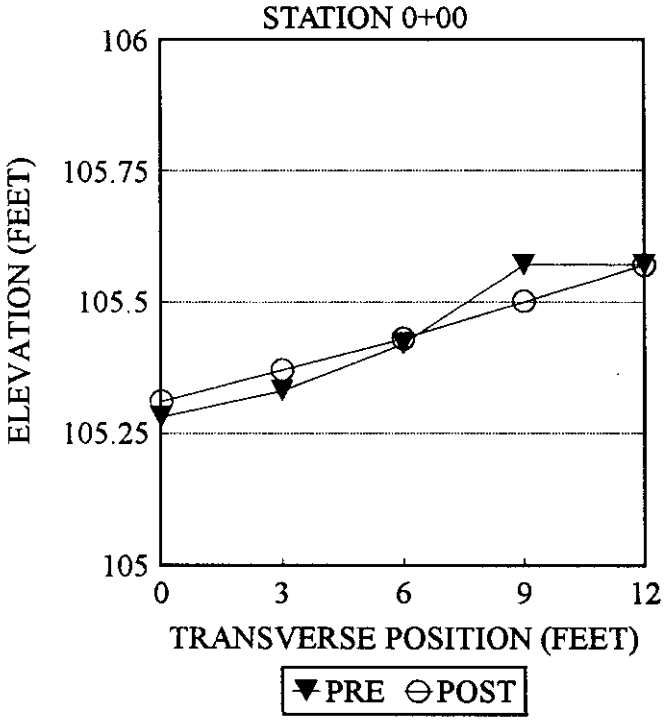
NOTES: 1. Creep compliance will be performed when suitable procedures are developed -- cores will be stored.
2. National Aggregate Association will perform tests at no cost to the State.

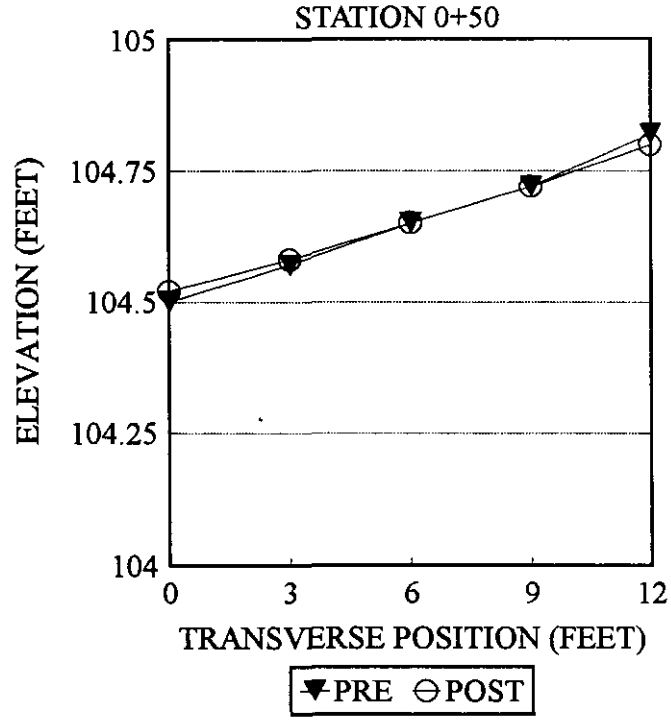
APPENDIX D

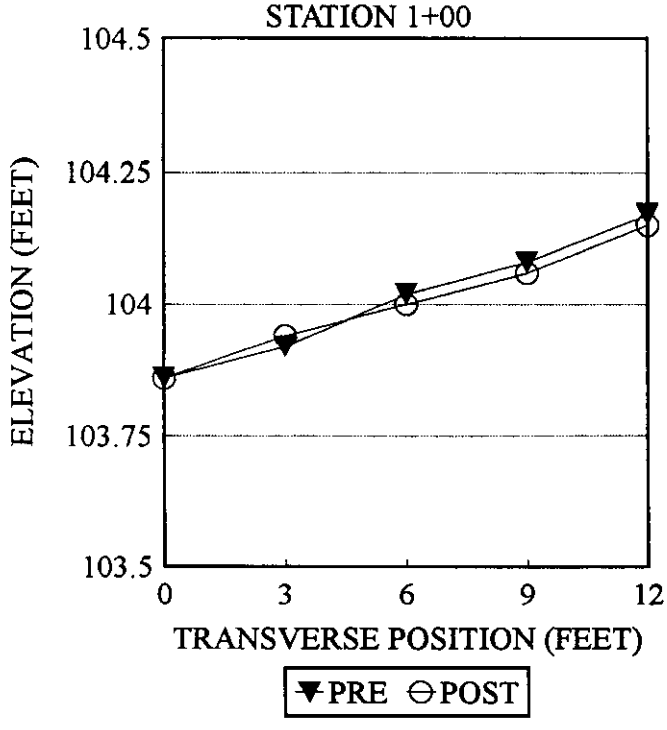
ROD AND LEVEL PLOTS -

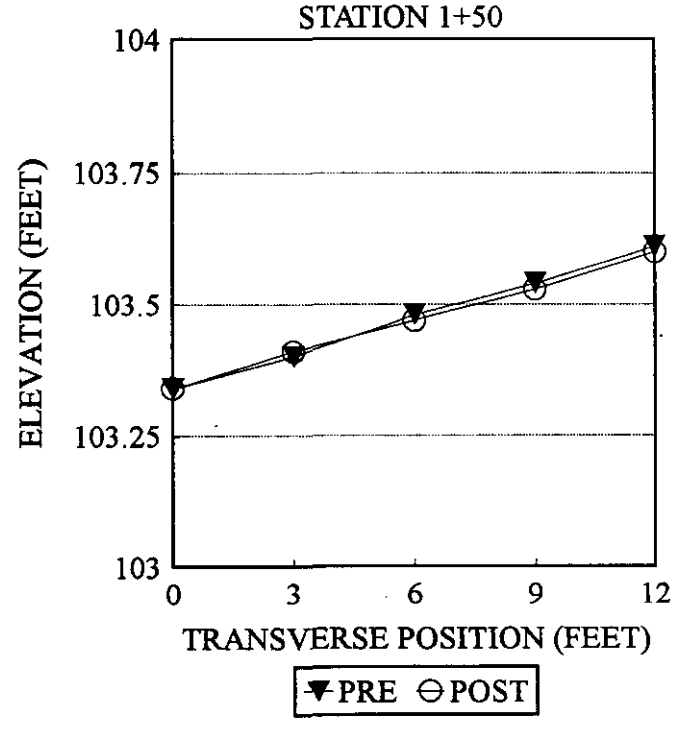
PRECONSTRUCTION/POSTCONSTRUCTION

SECTION 010563









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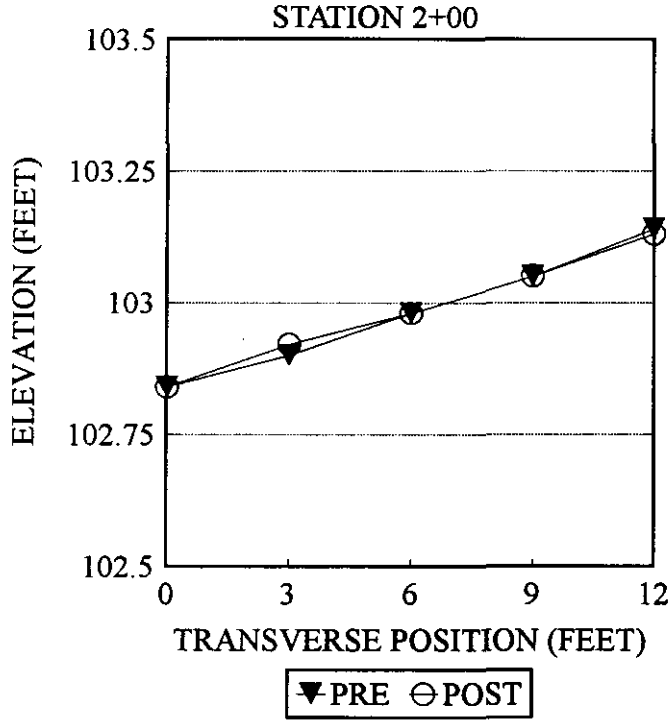

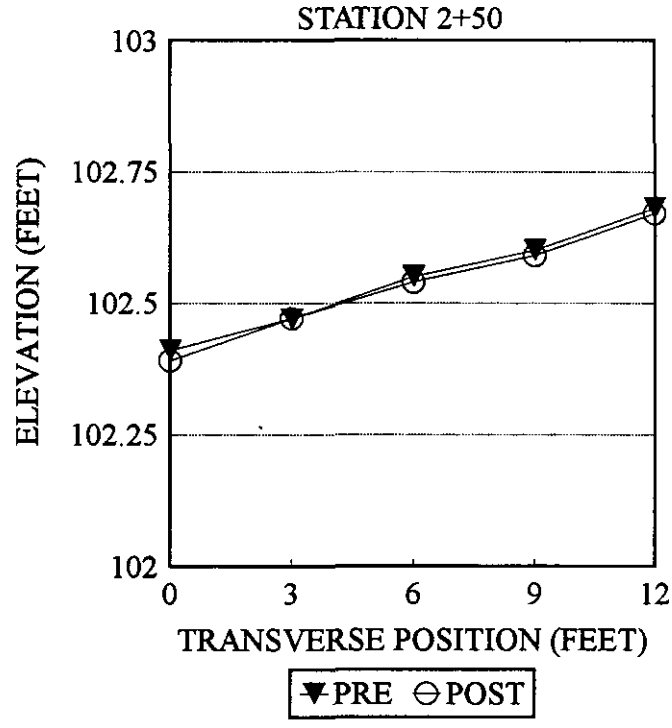

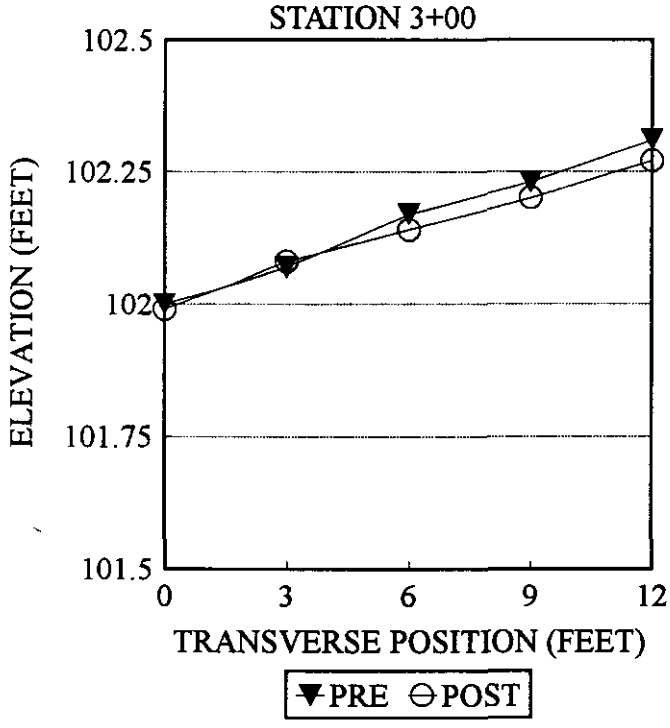

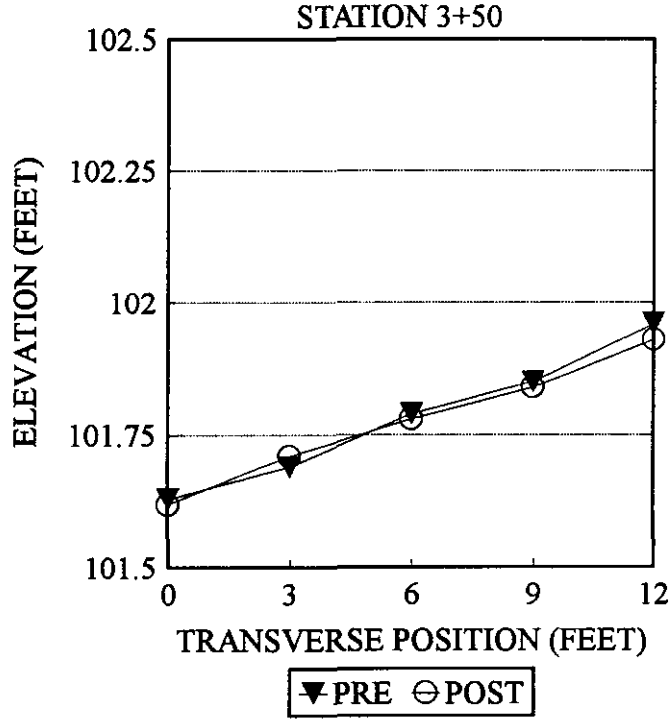

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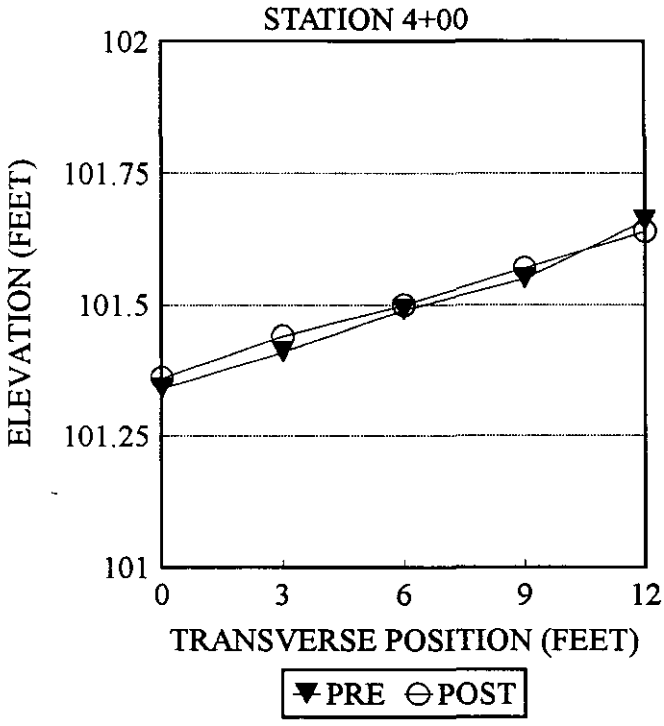

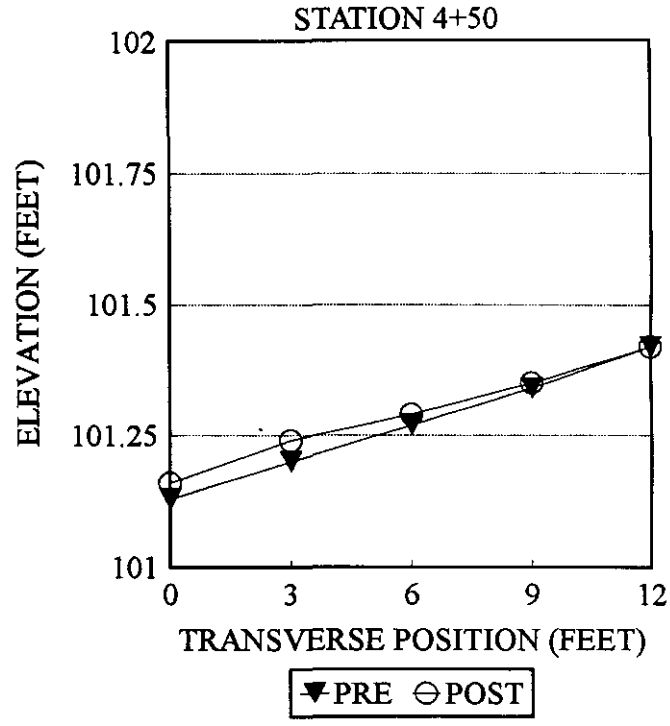

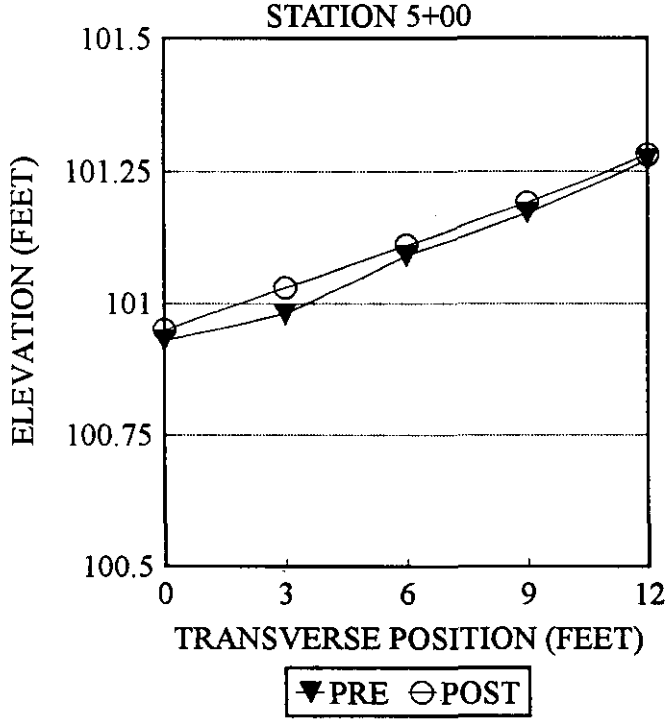

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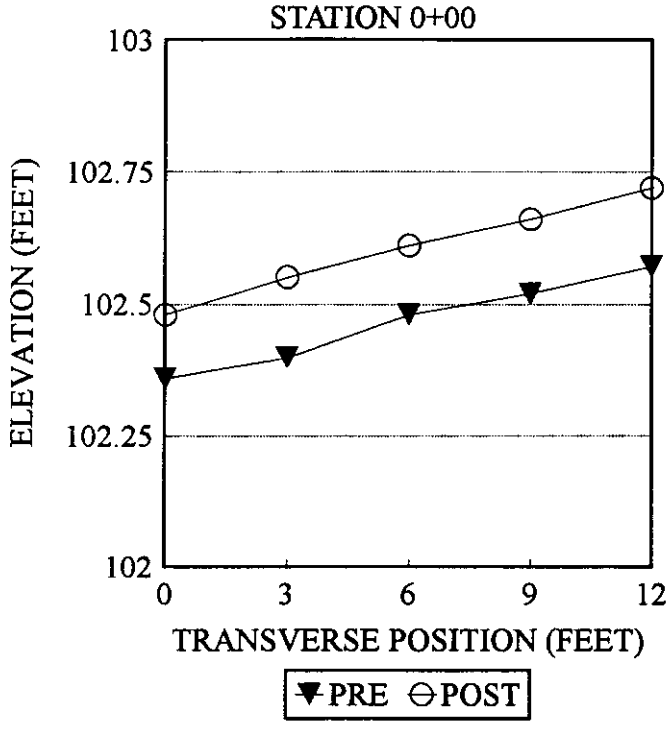

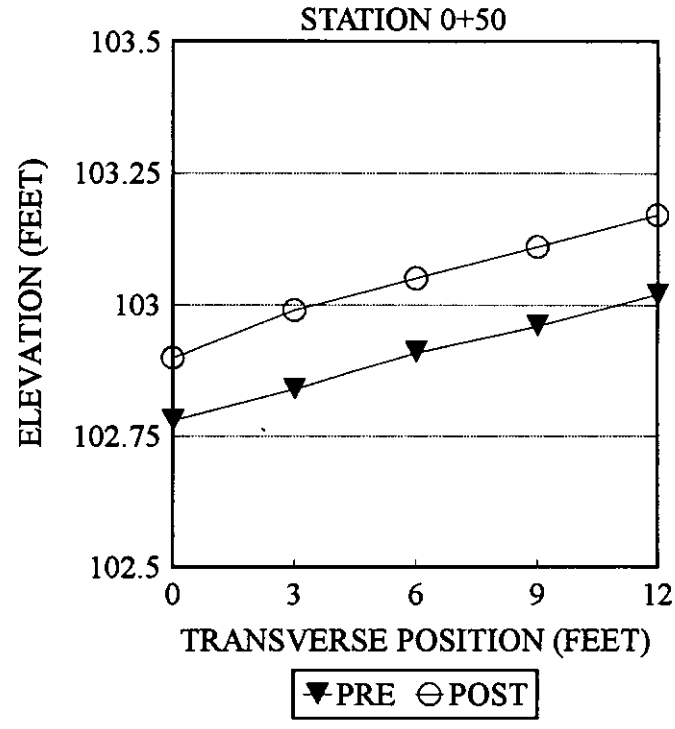

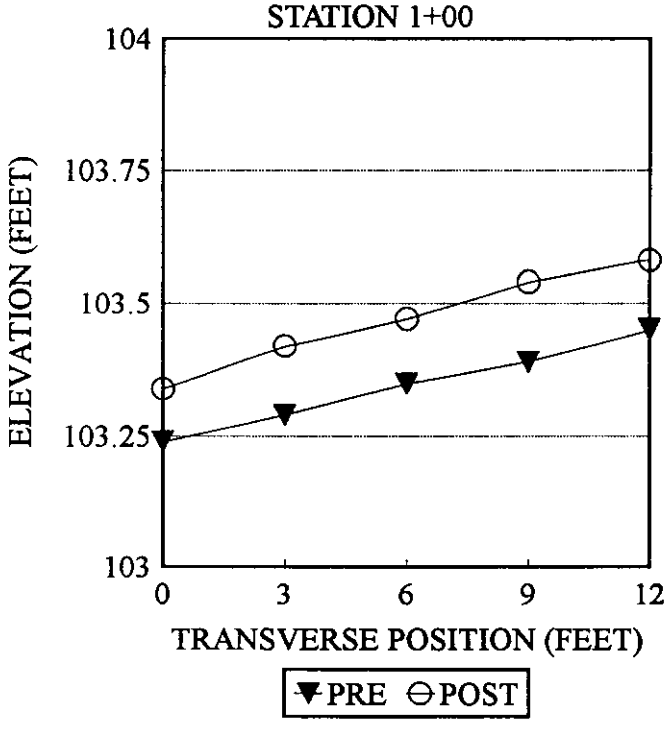

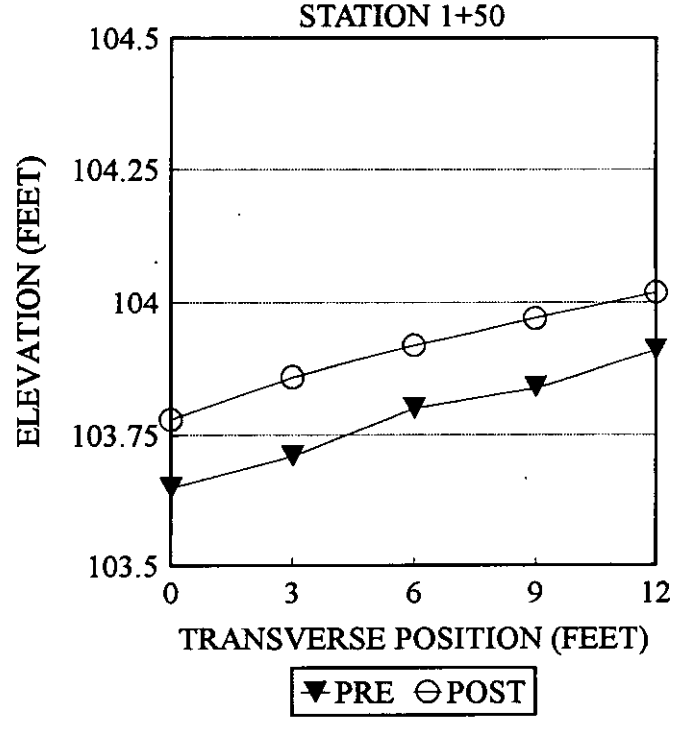

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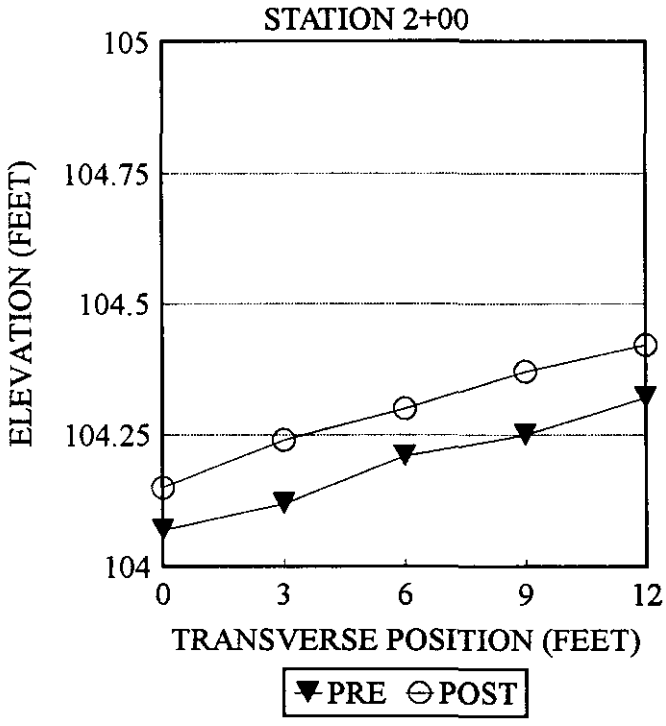

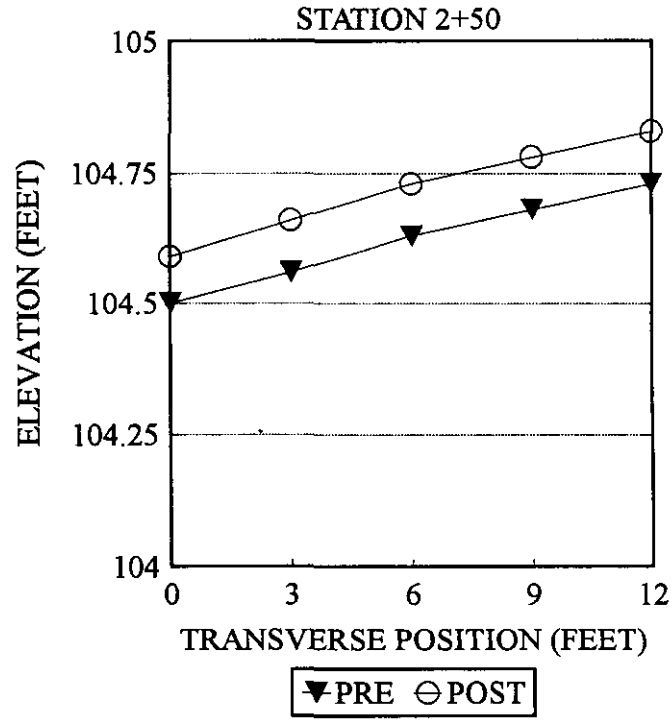

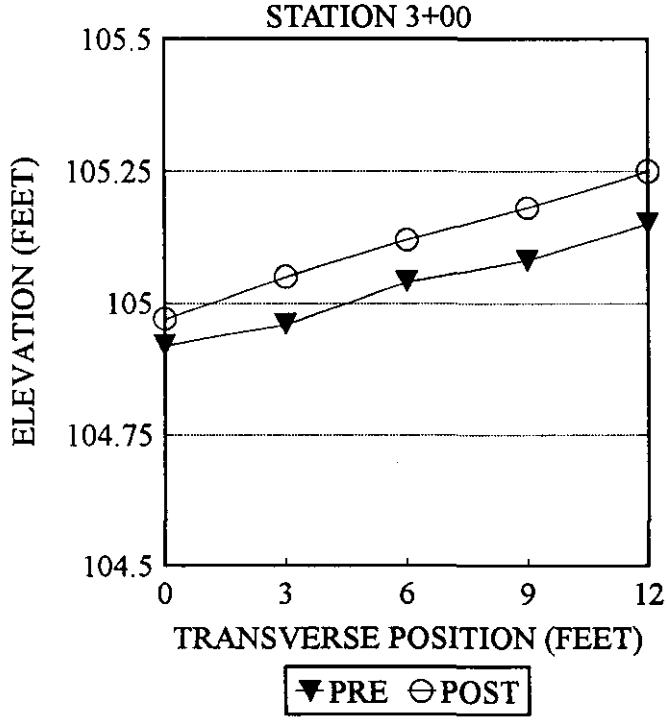

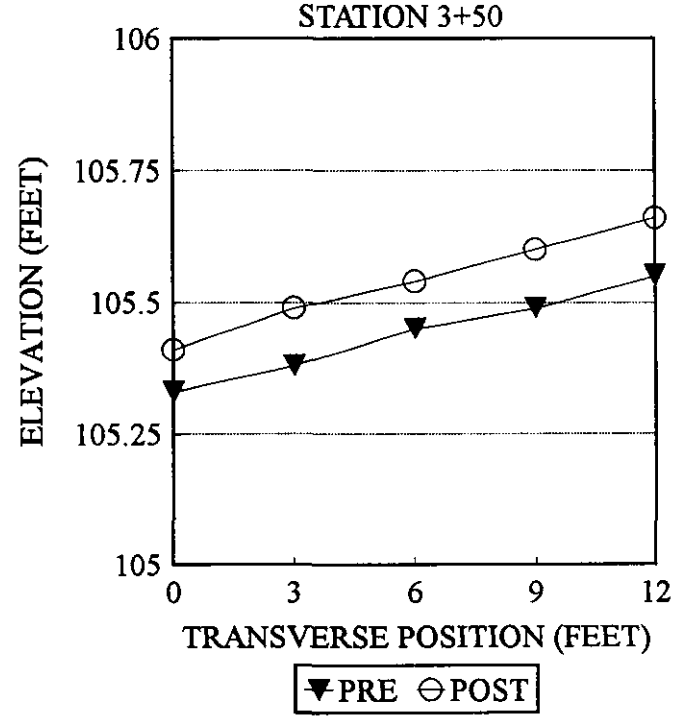

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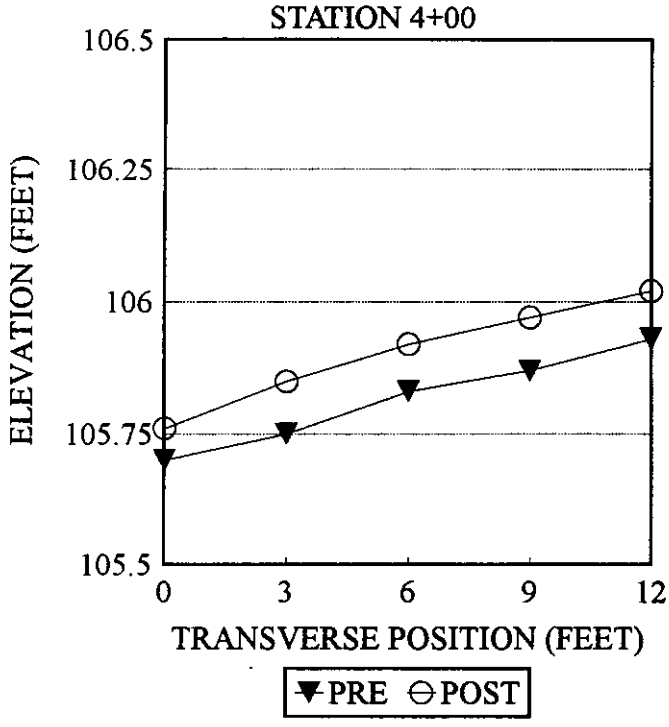

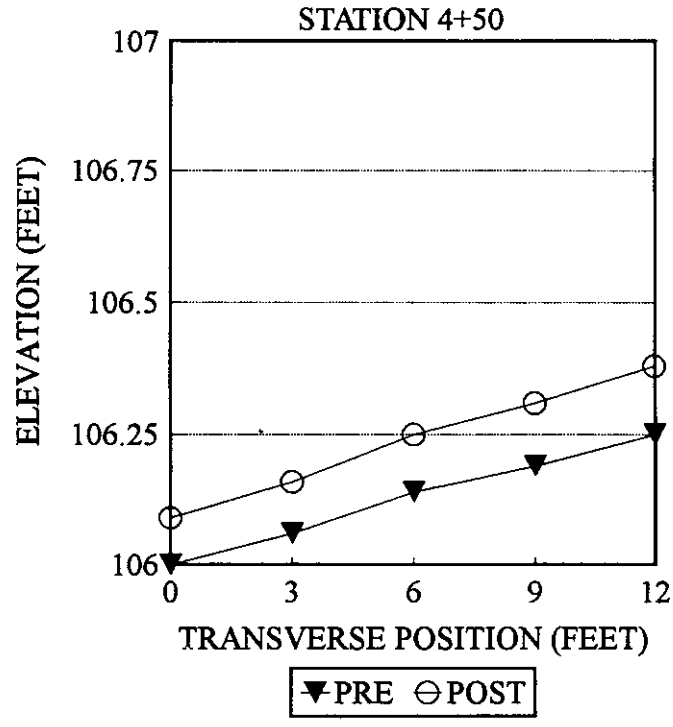

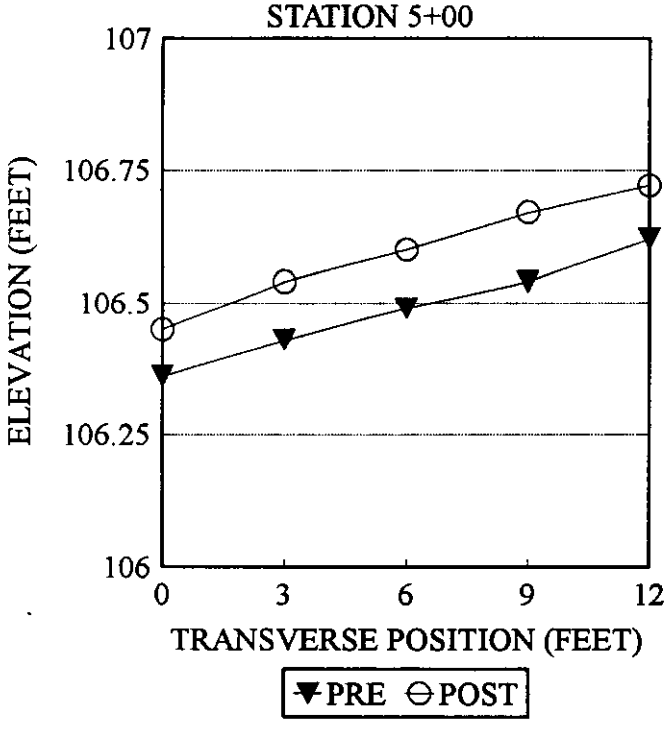

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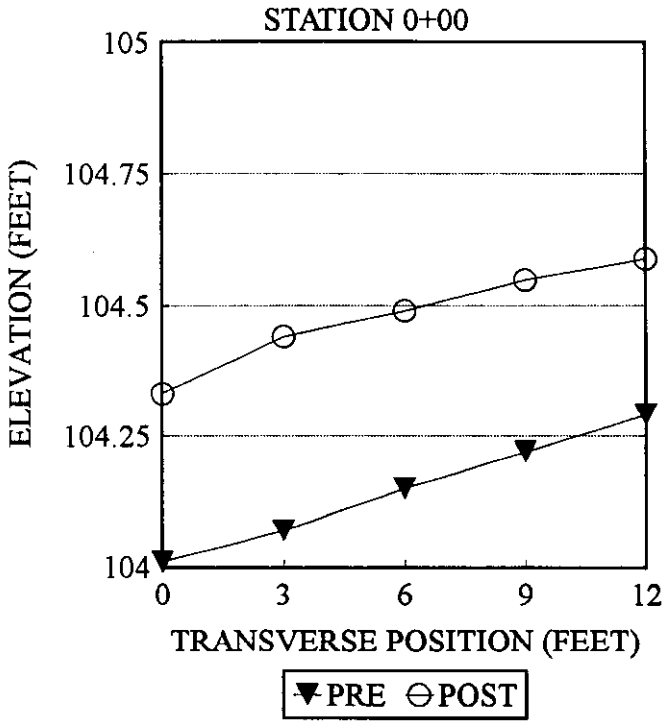

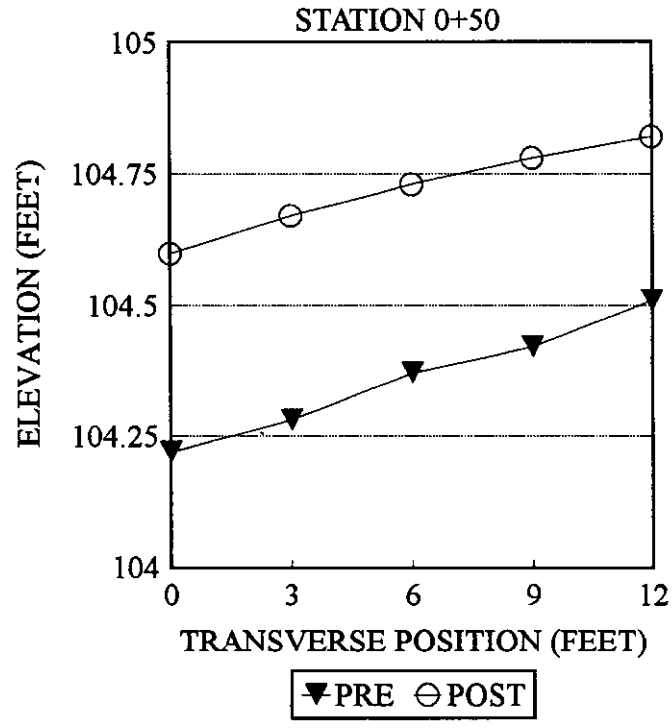

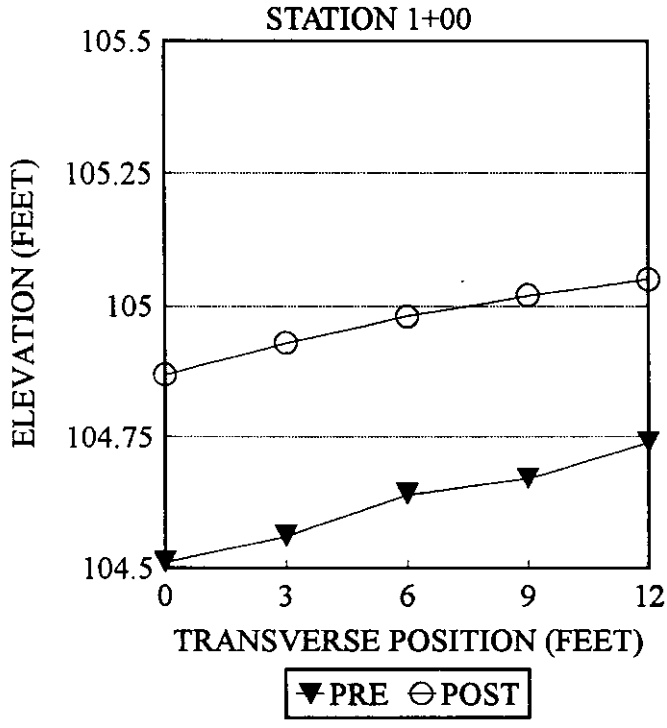

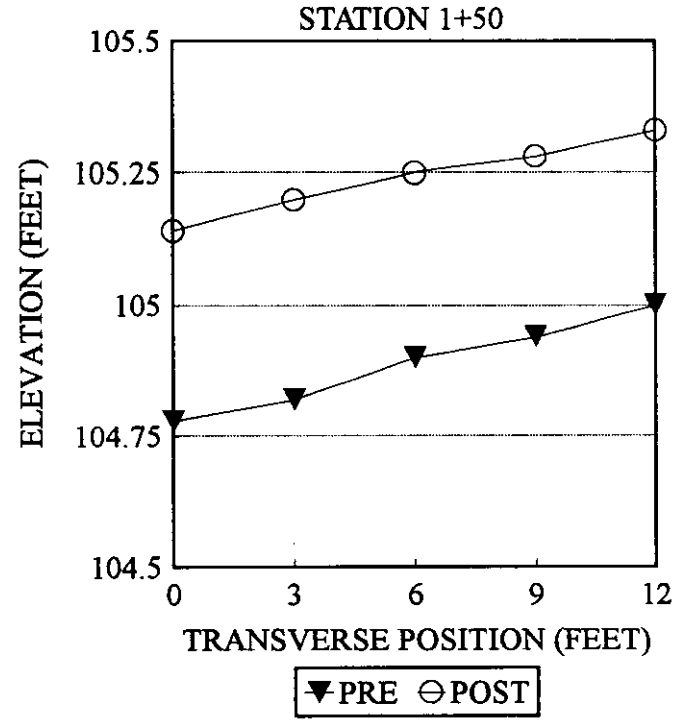

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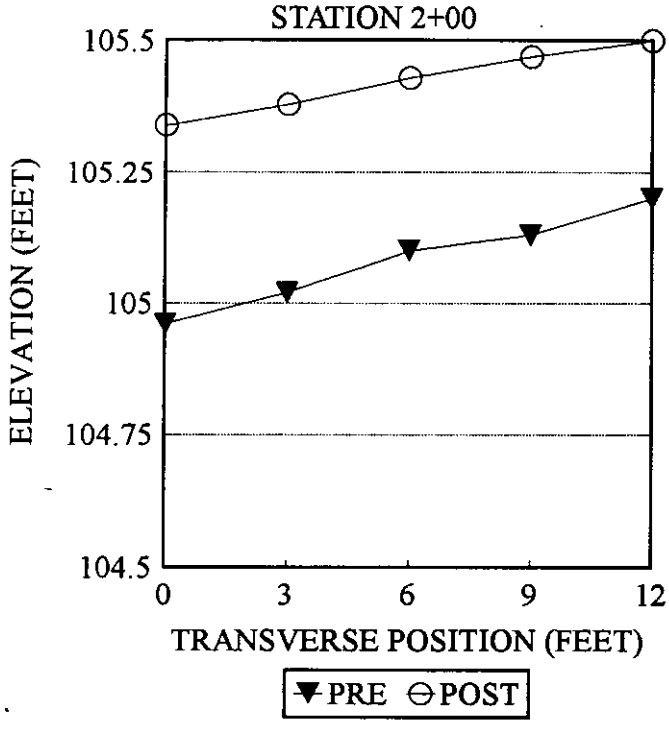

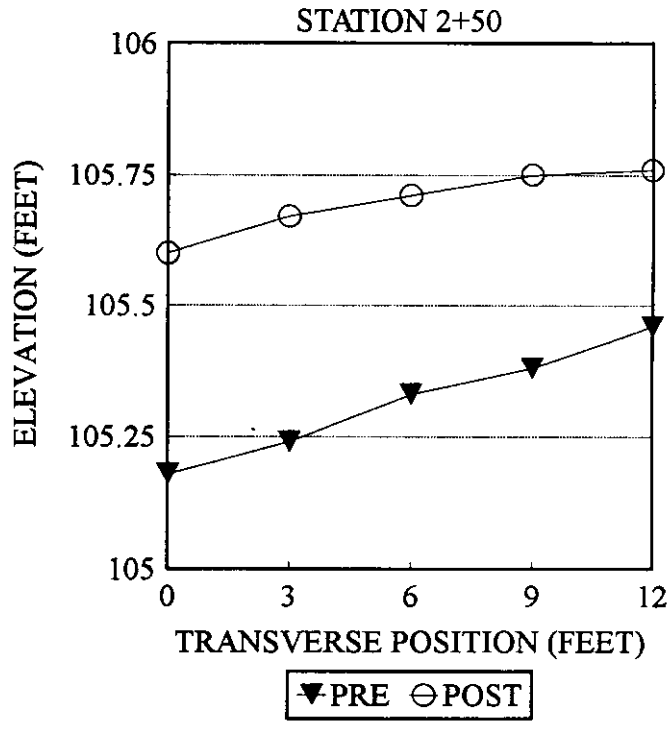

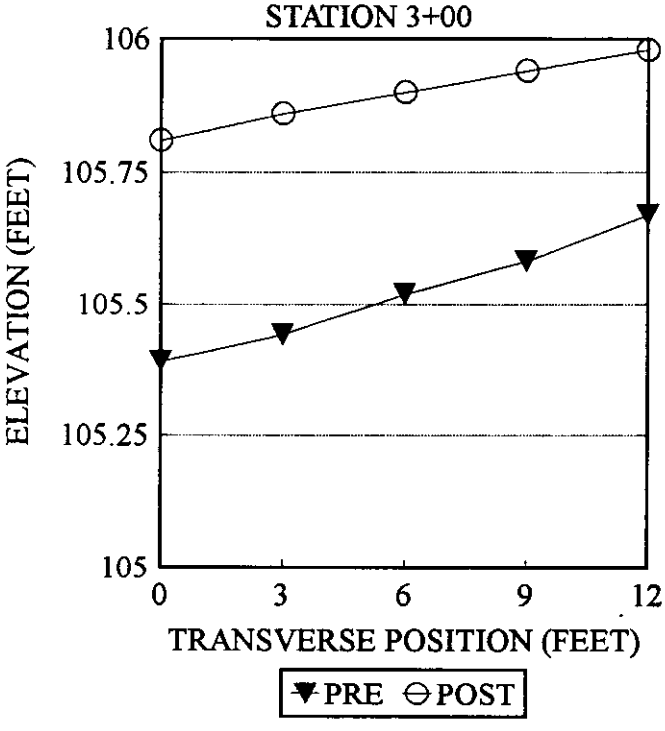

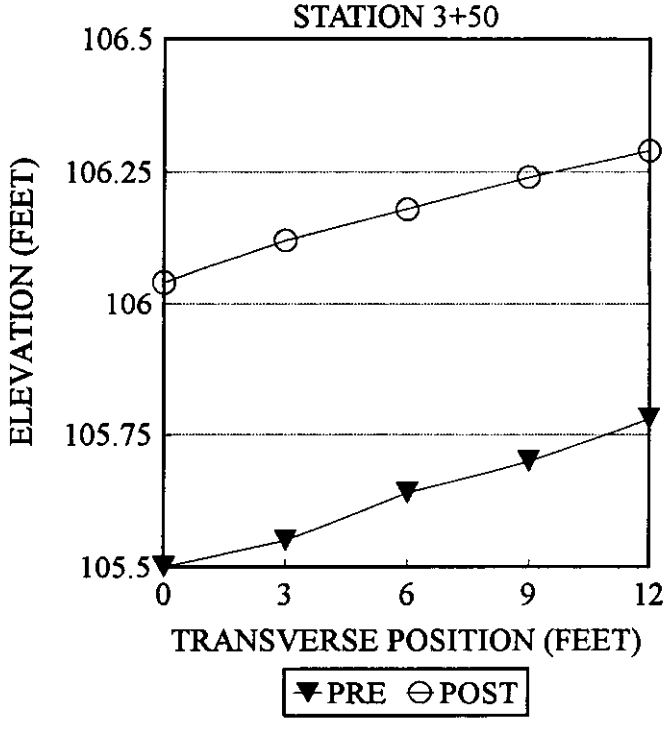

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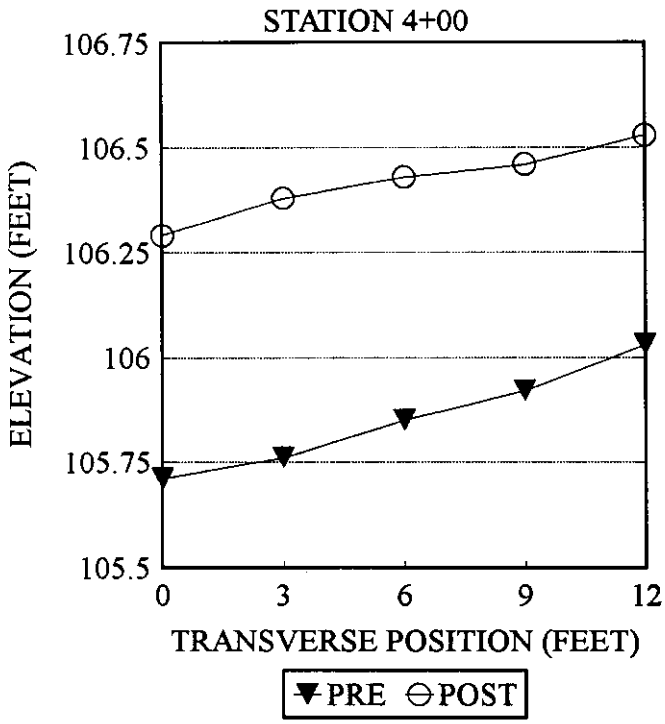

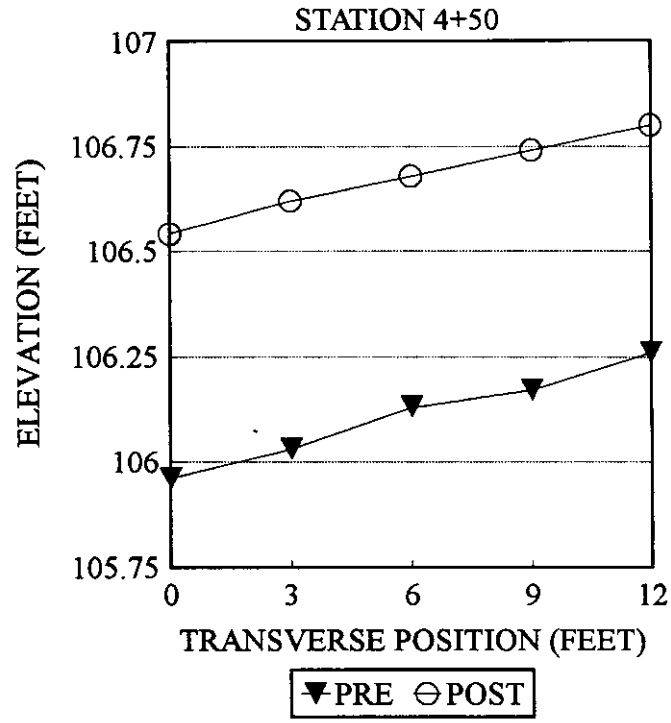

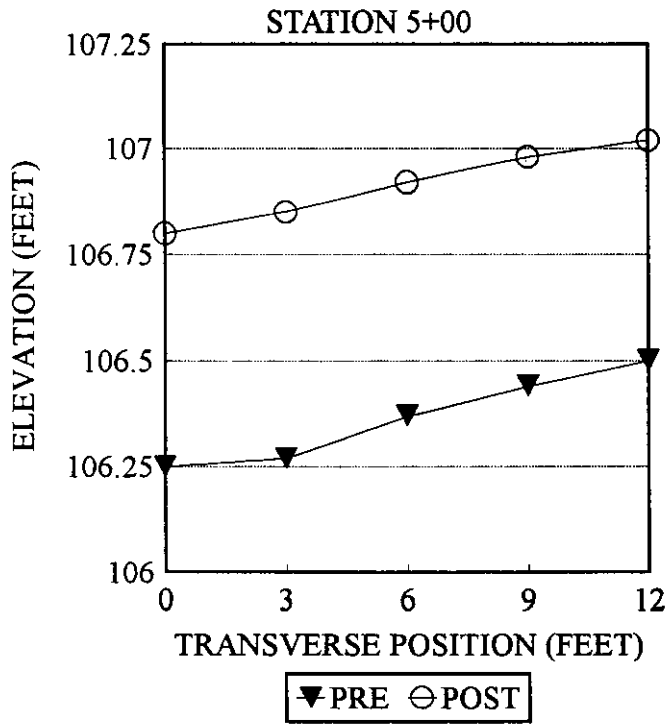

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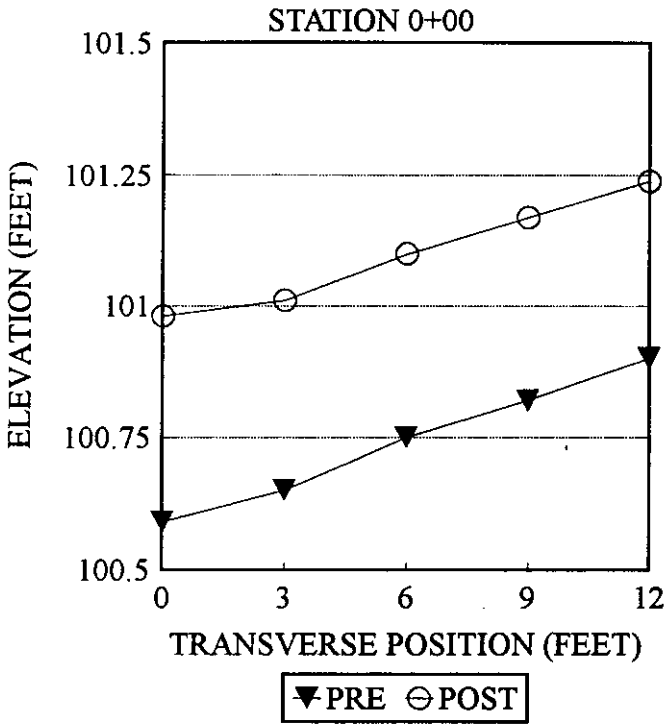

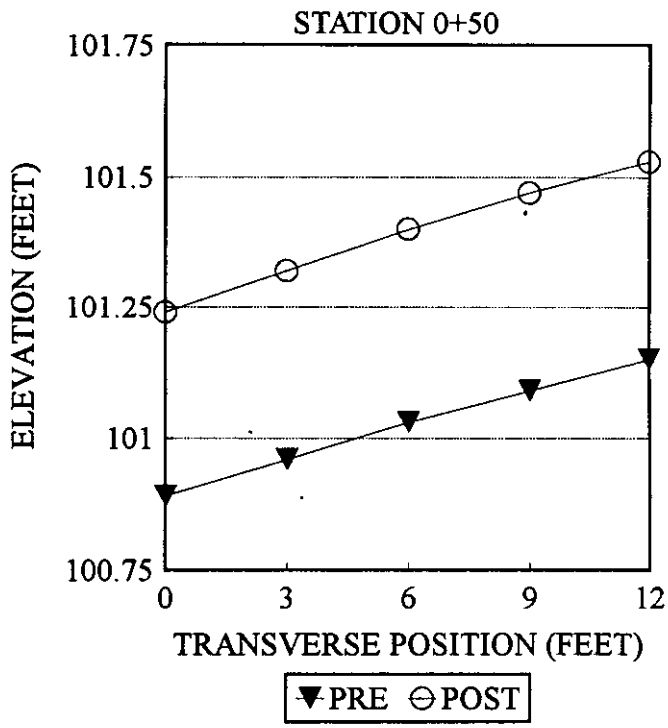

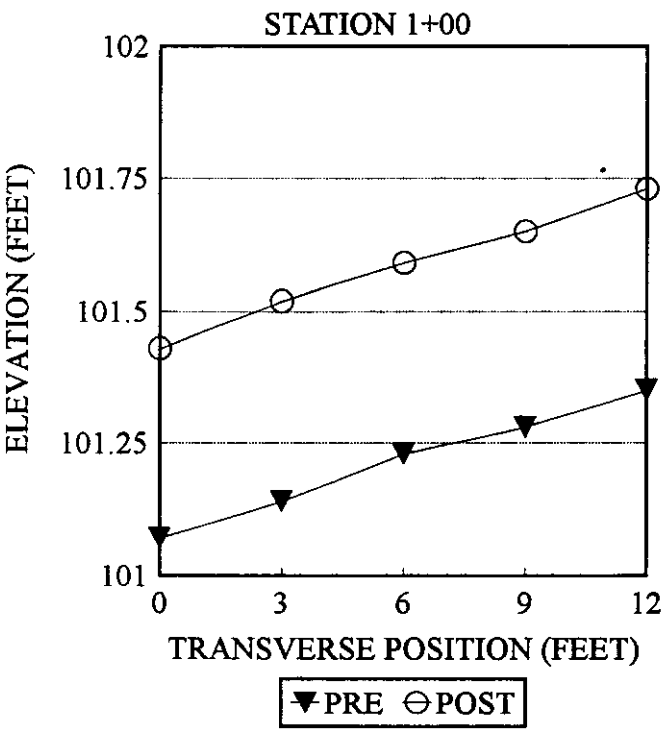

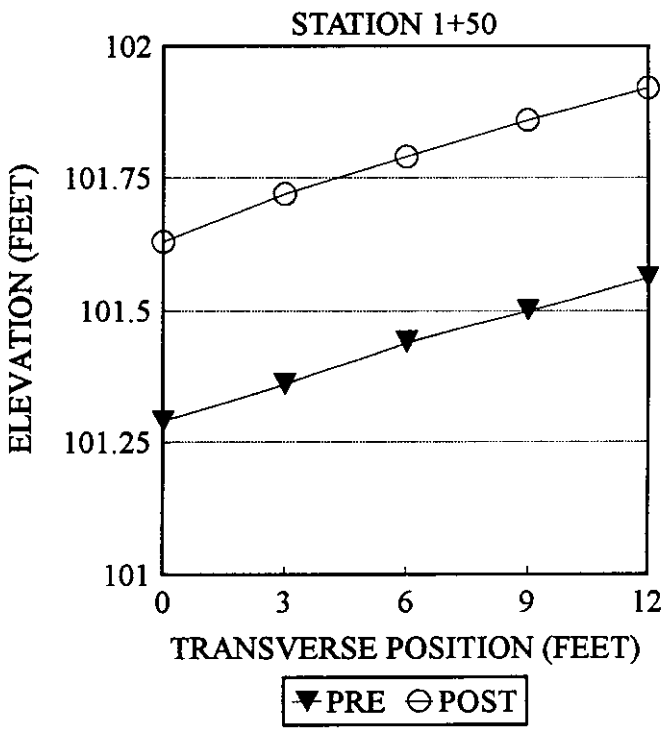

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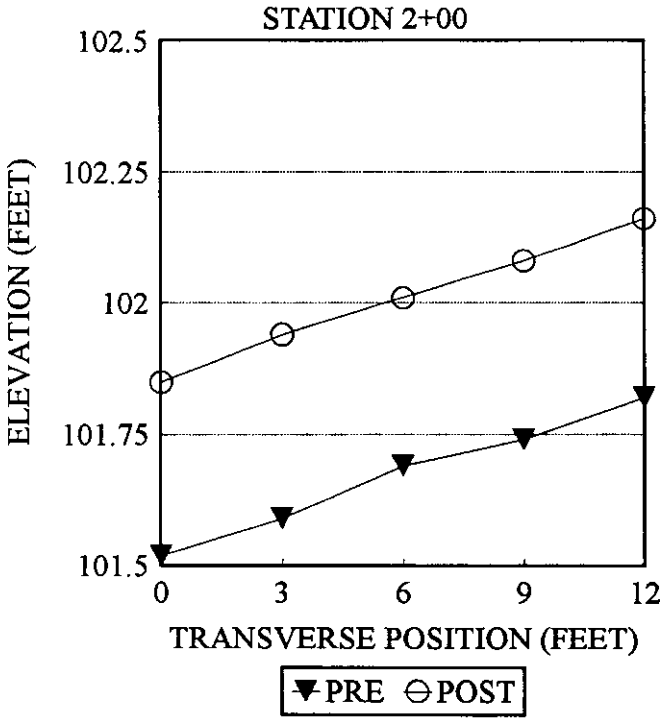

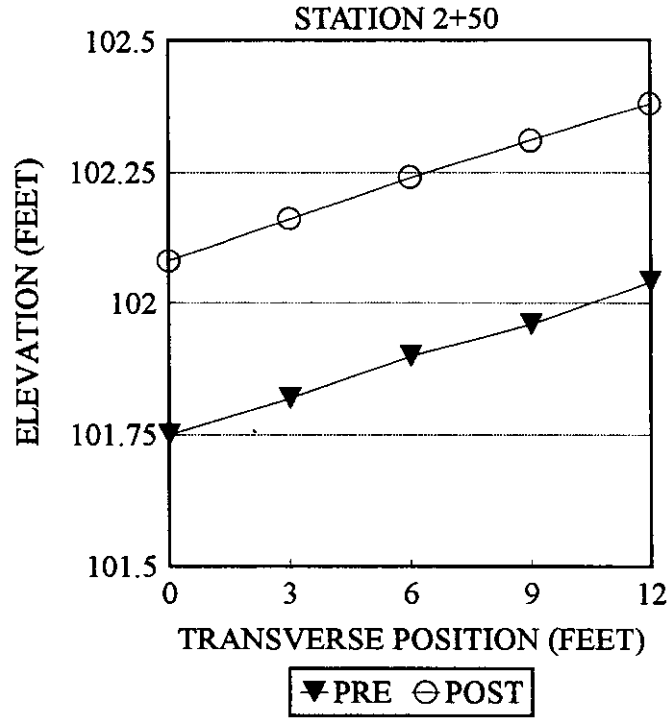

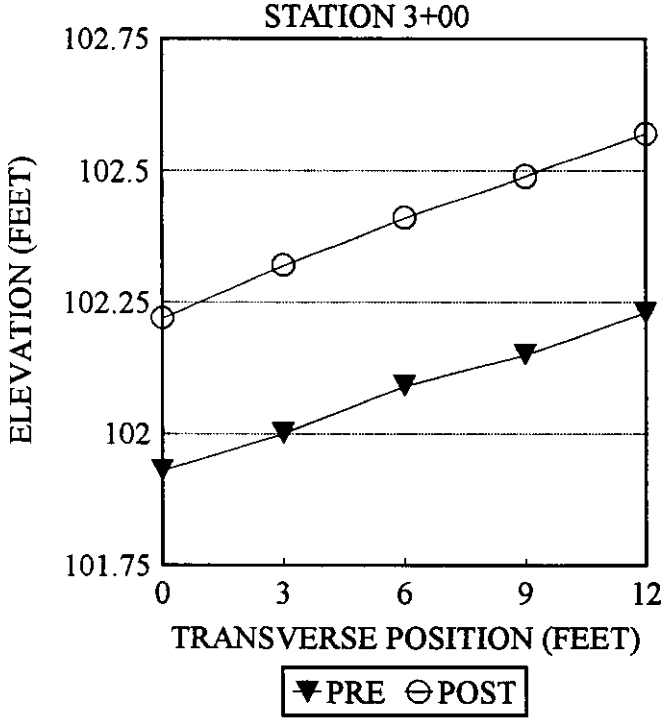

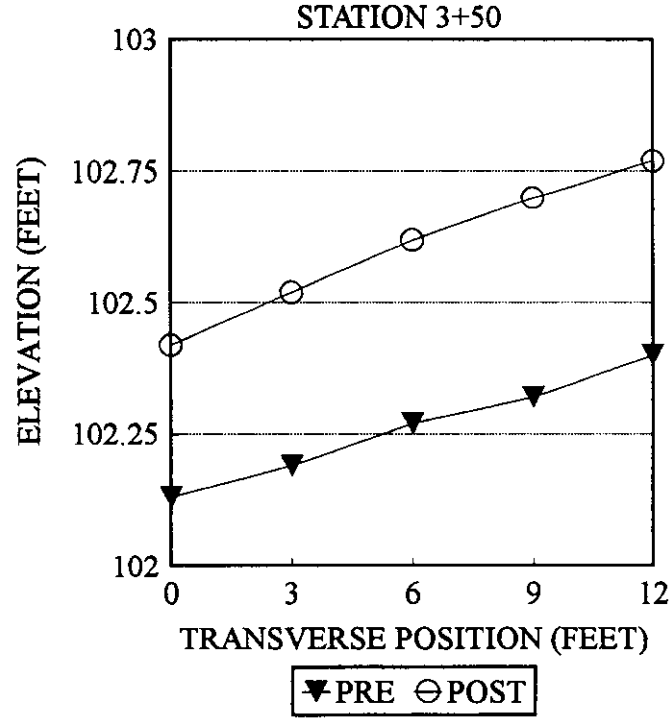

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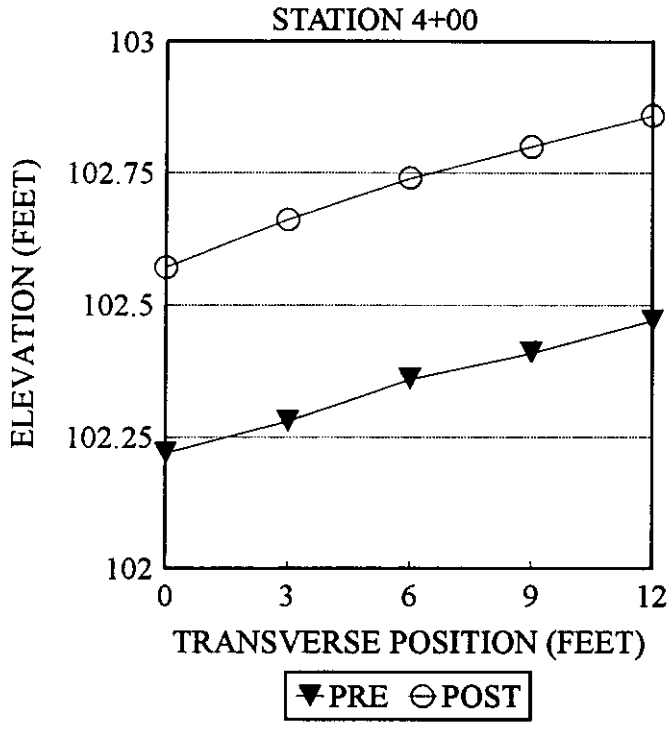

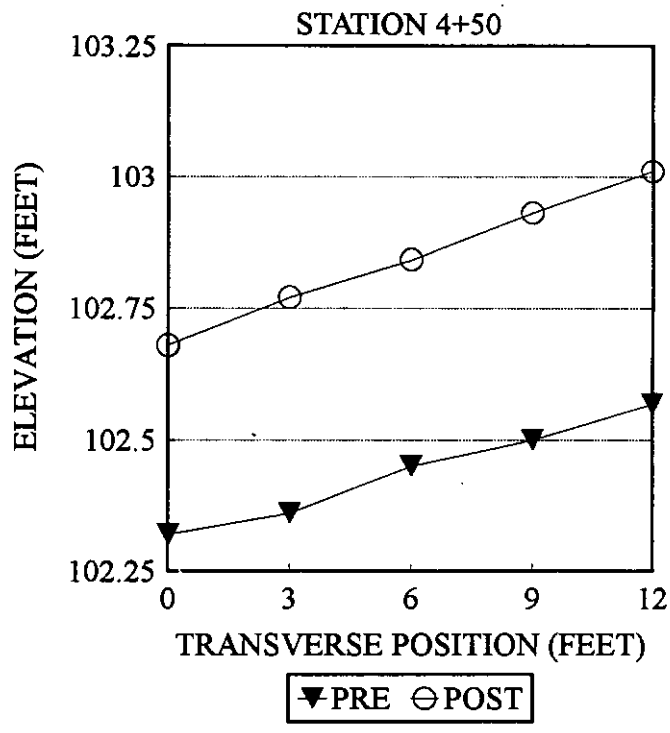

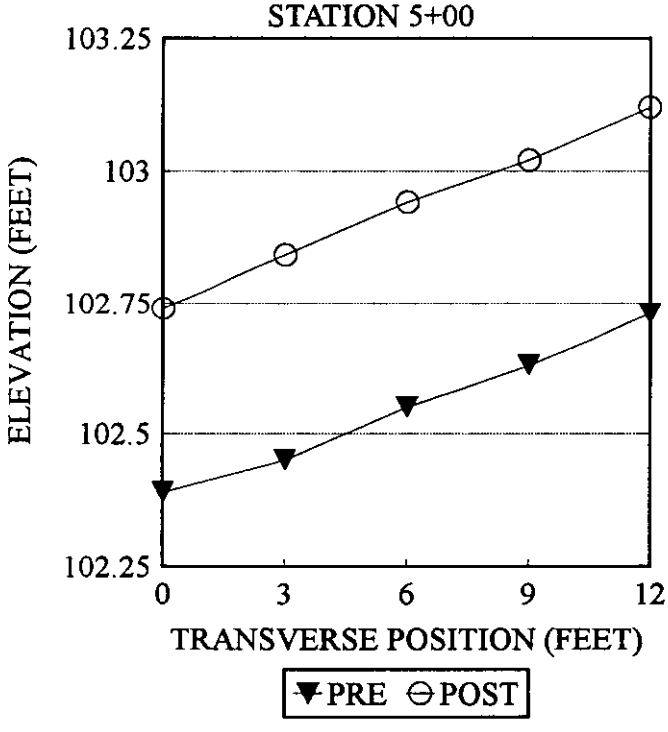

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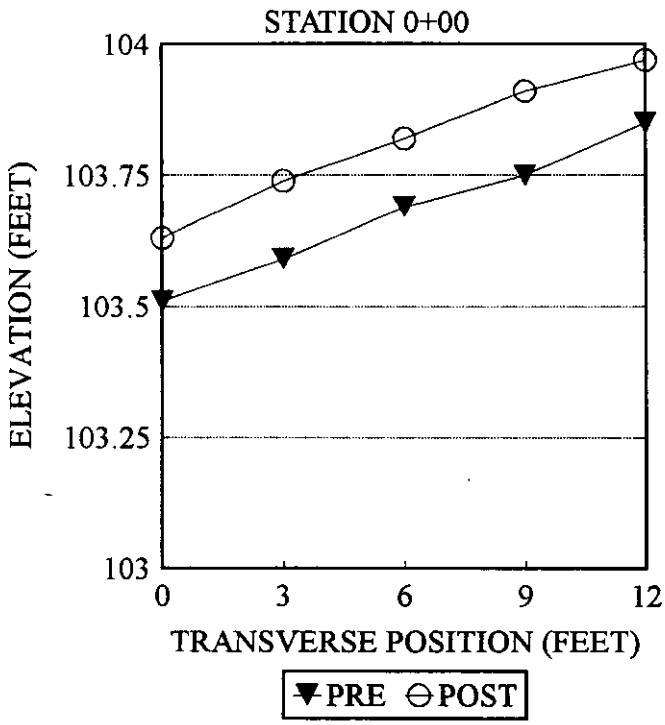

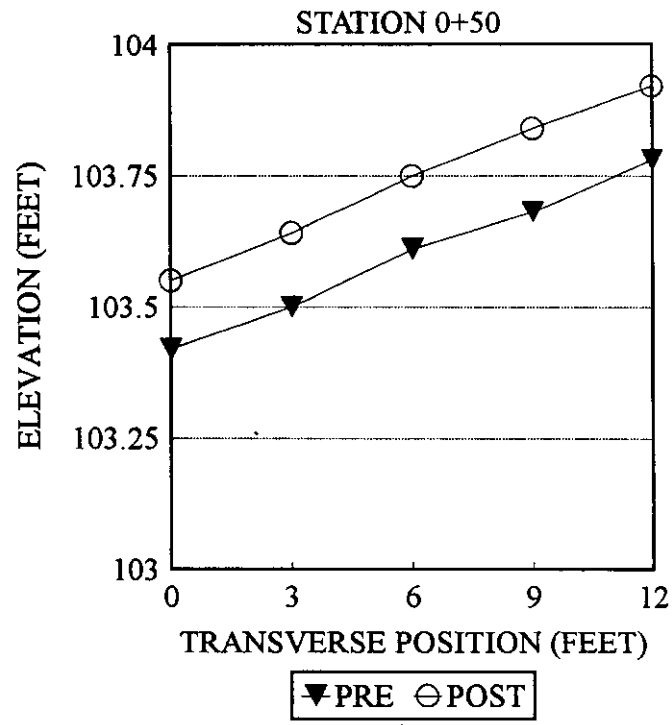

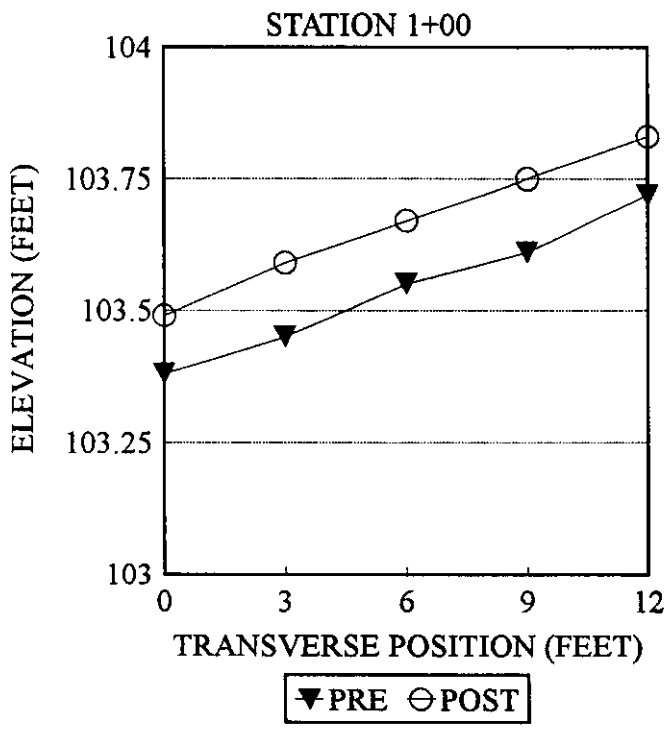

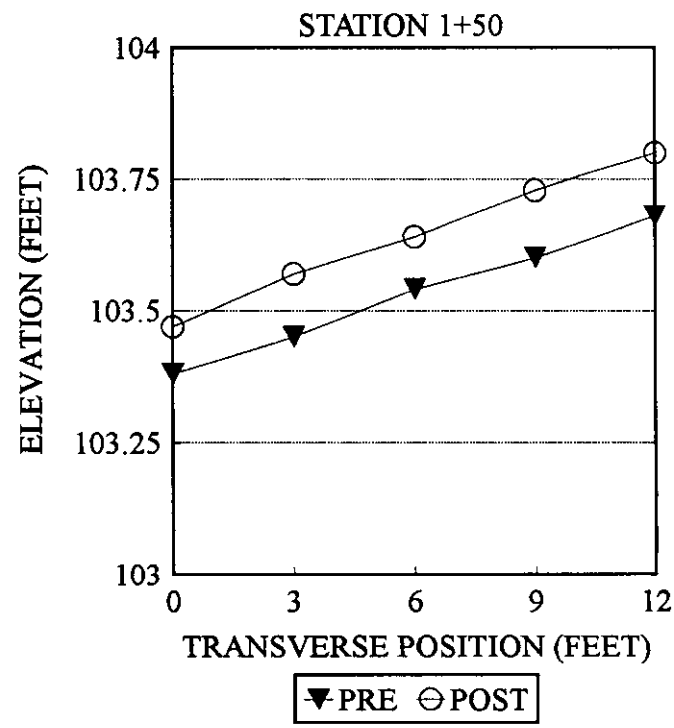

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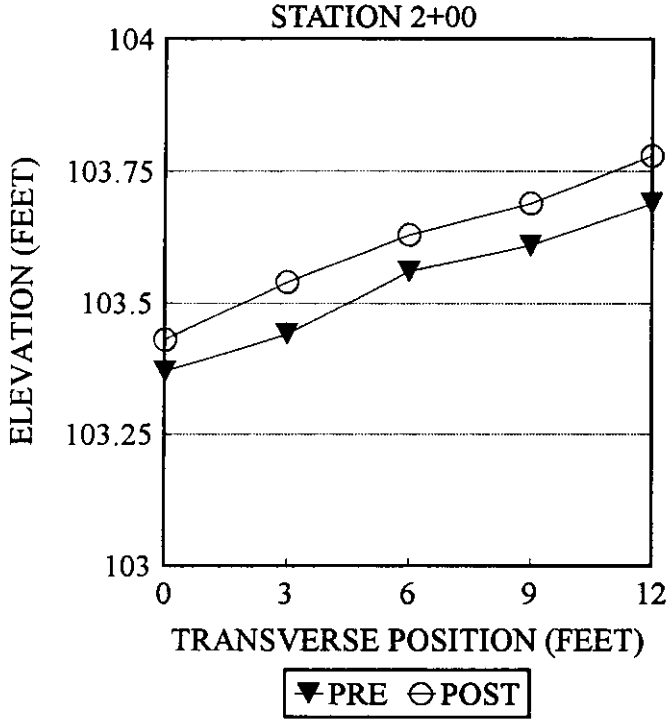

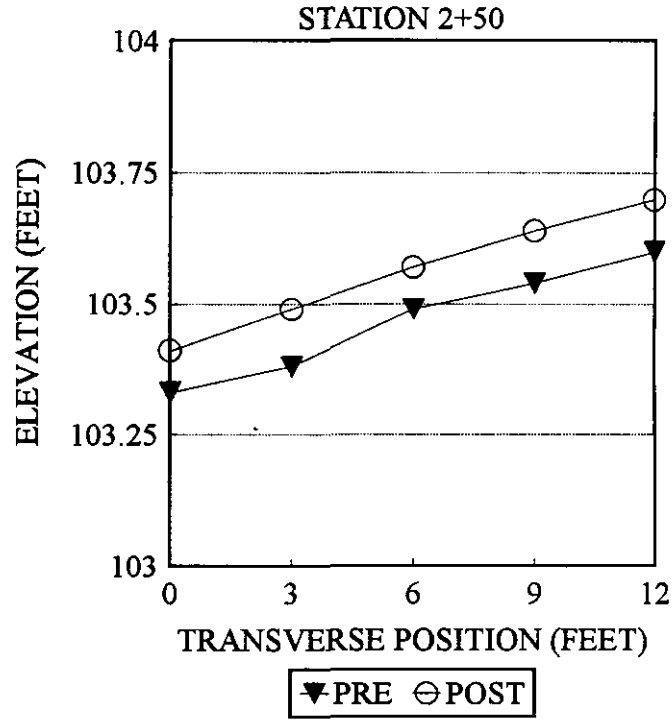

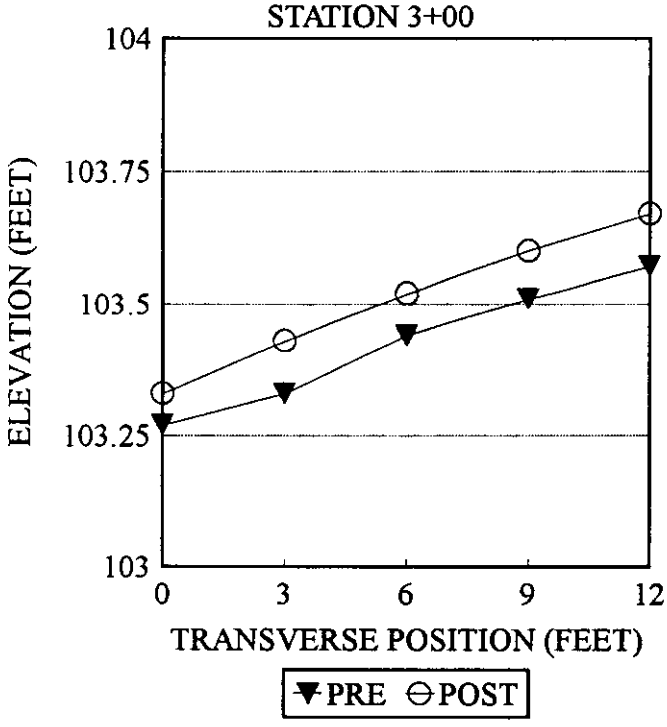

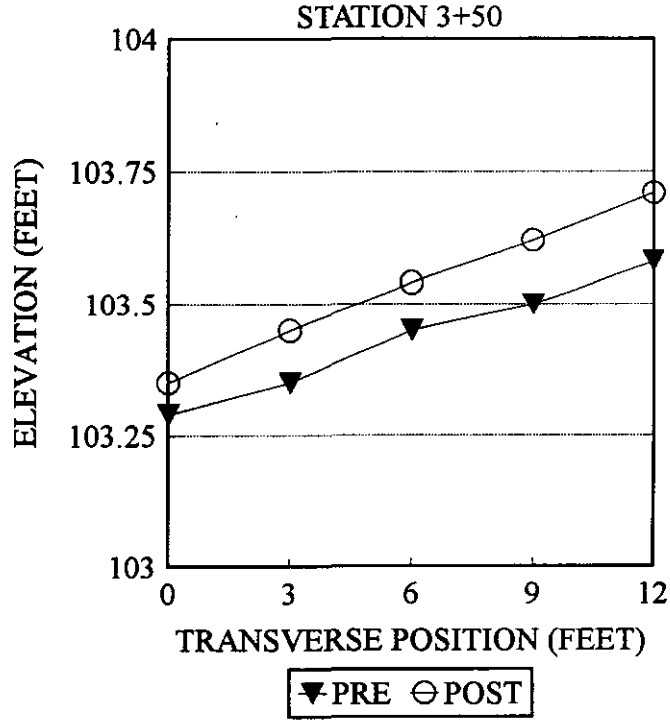

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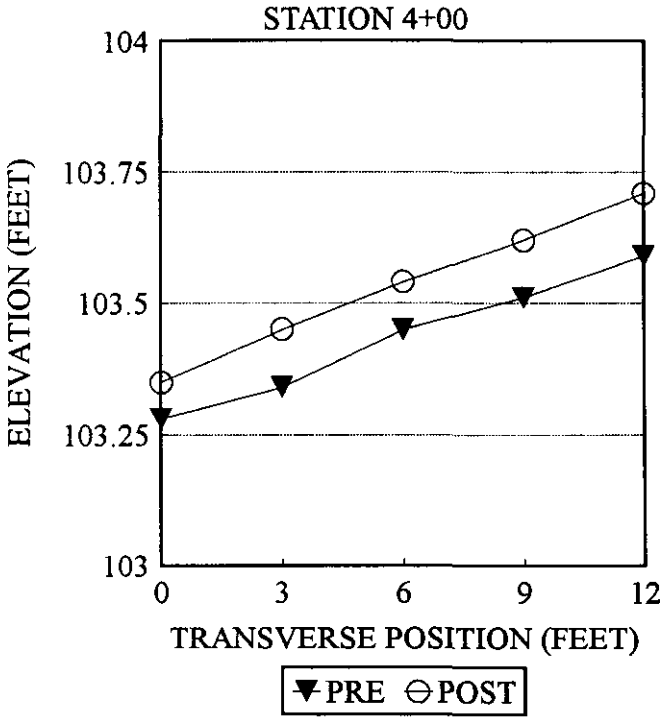

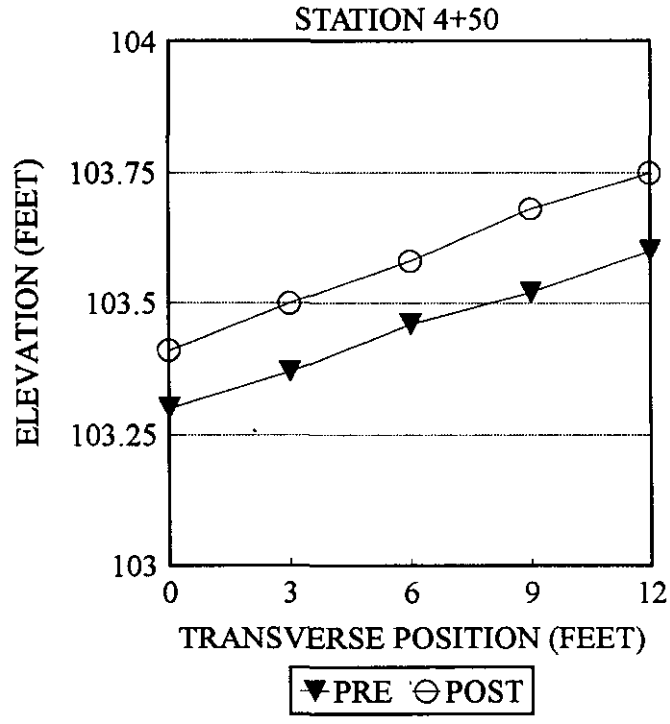

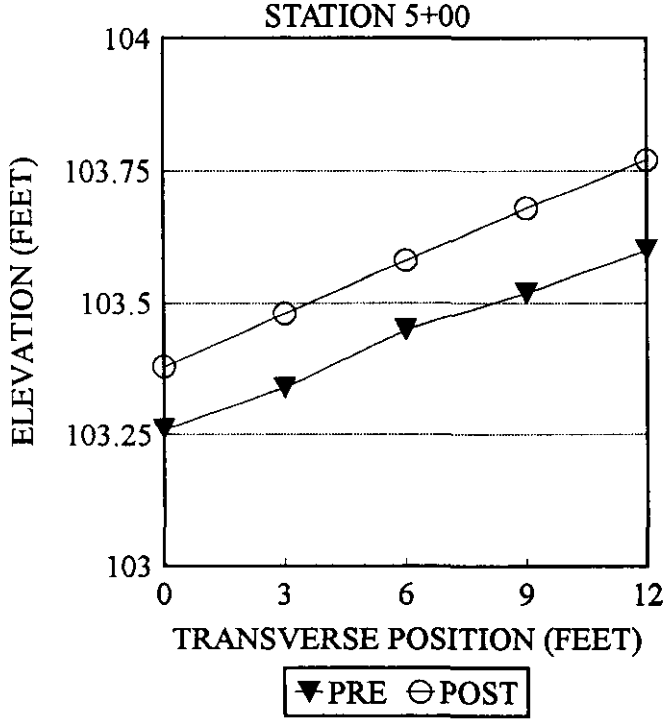

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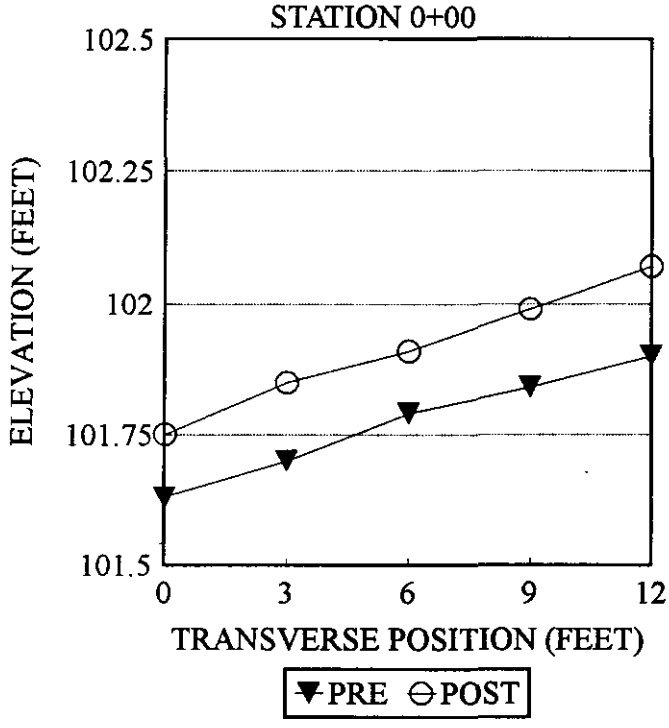

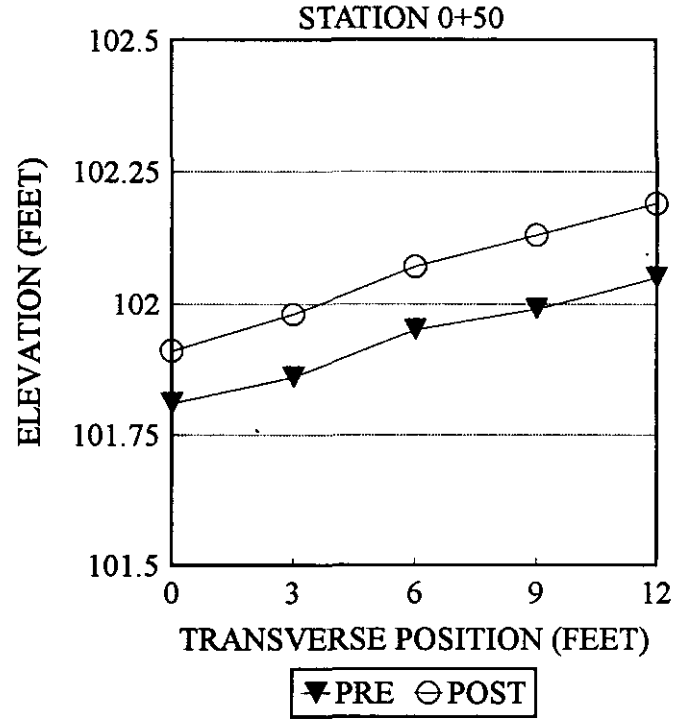

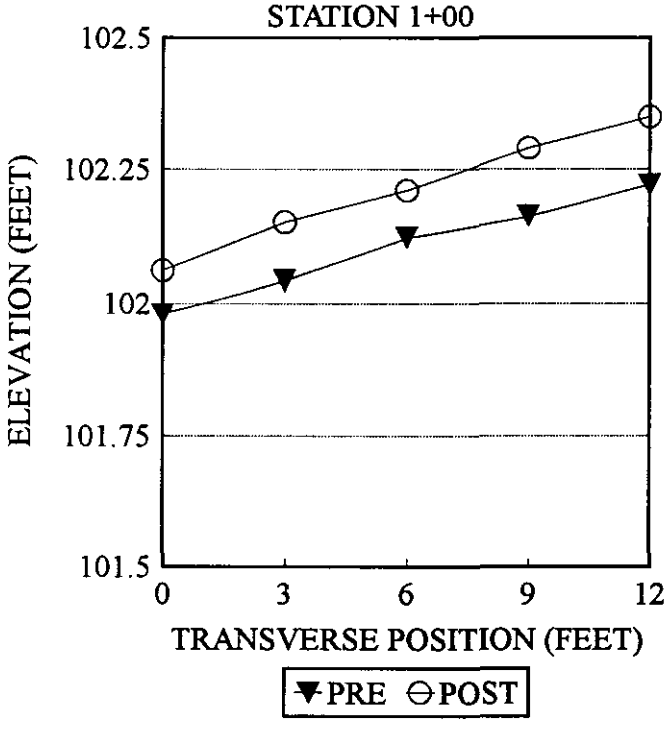

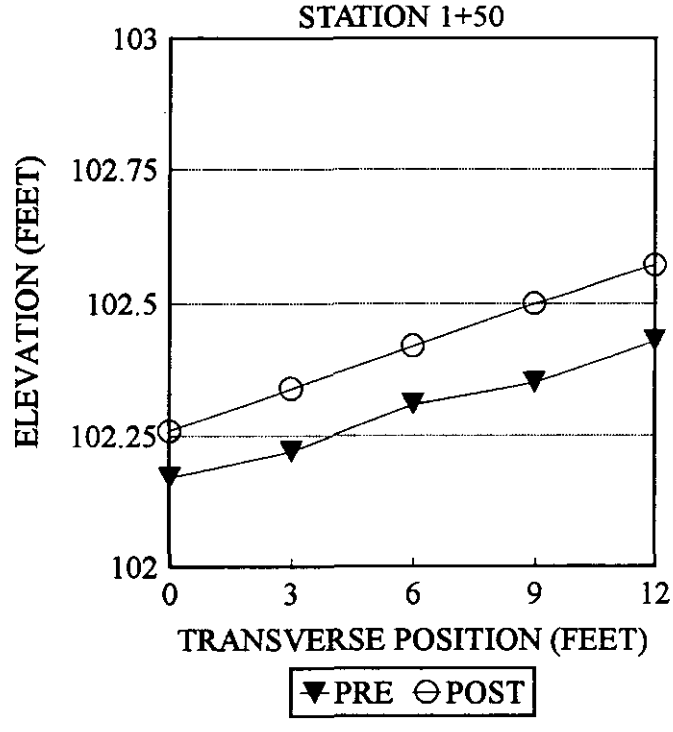

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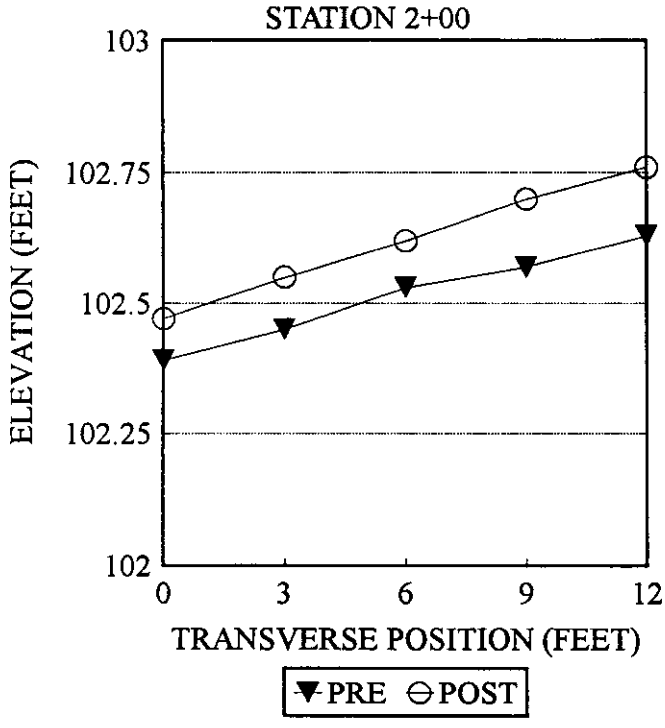

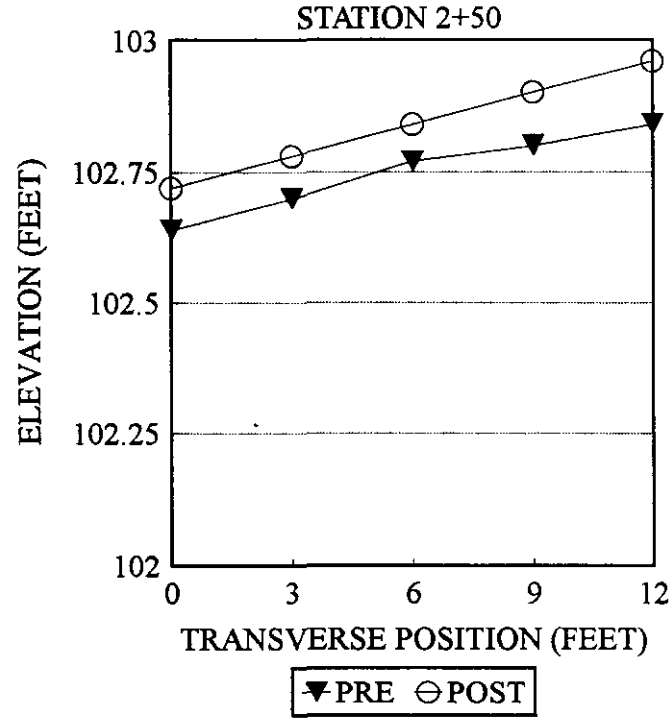

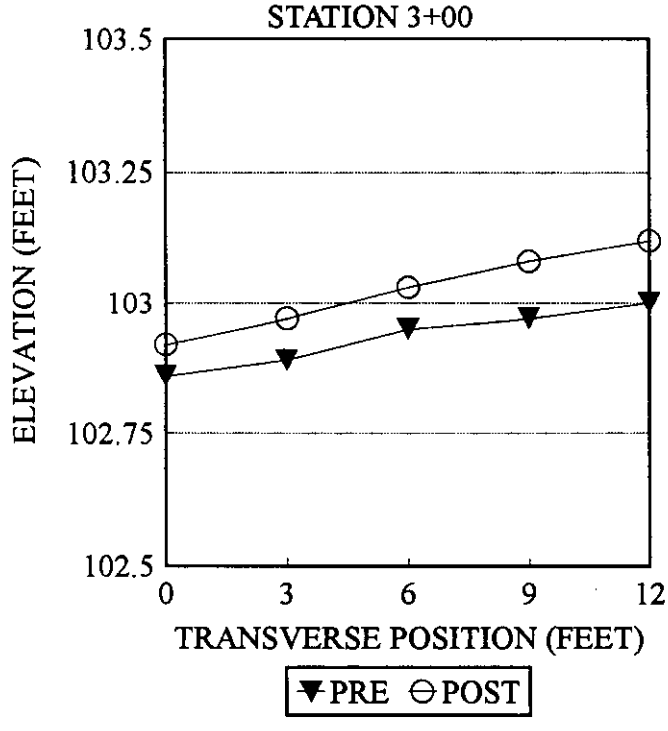

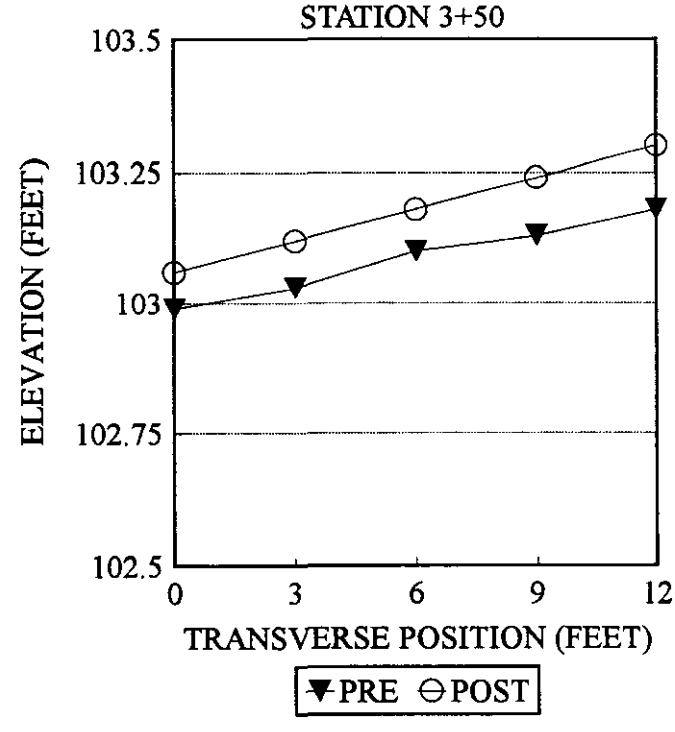

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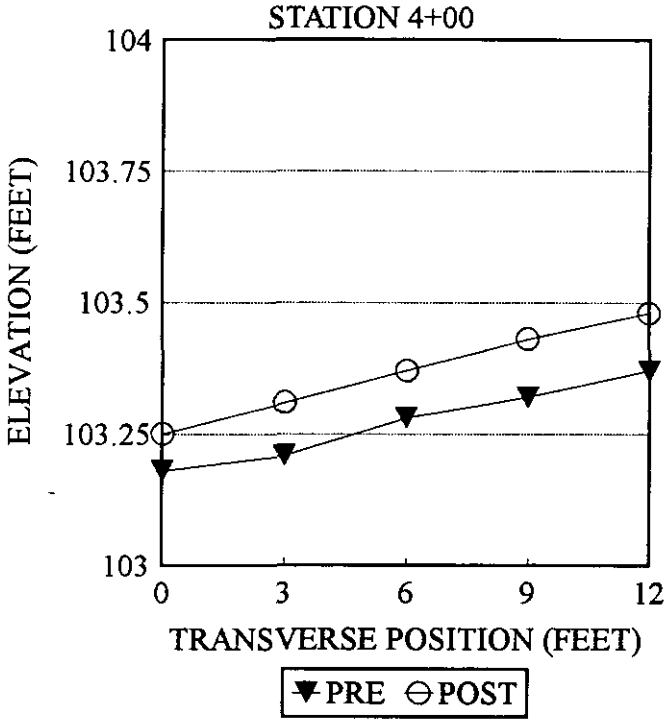

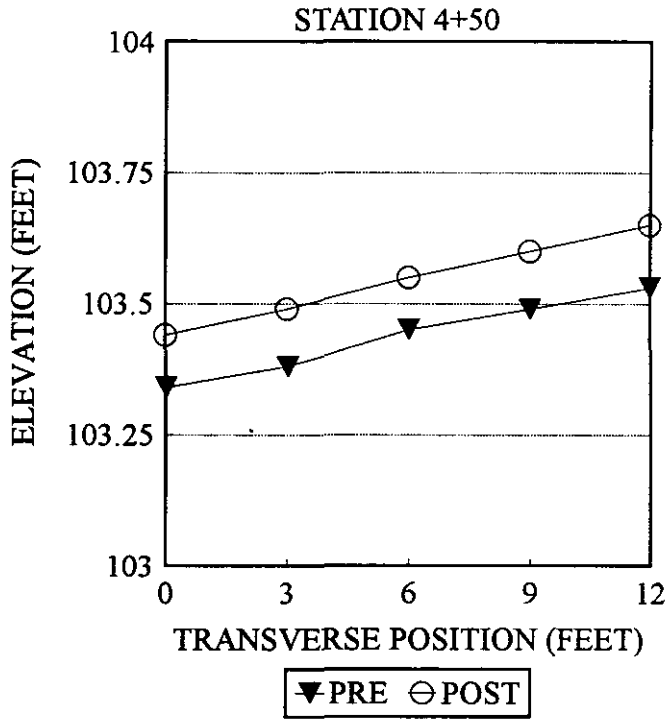

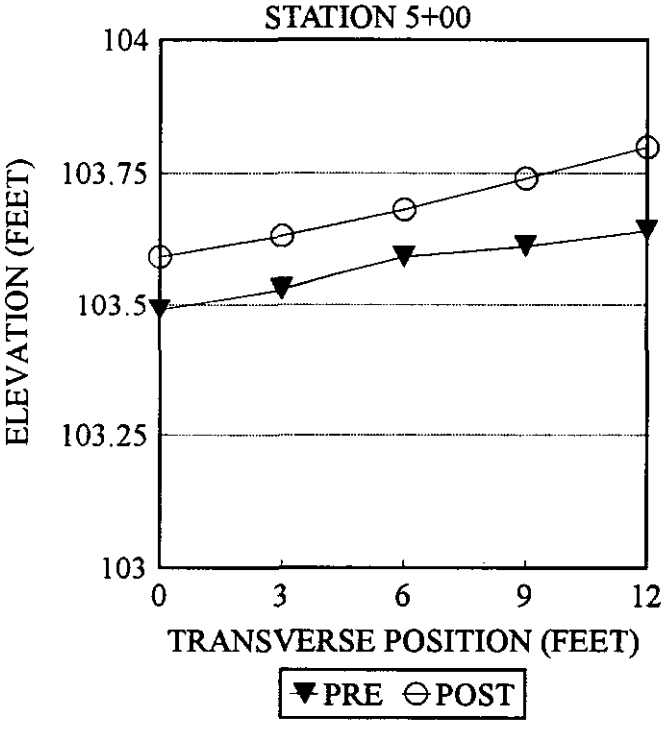

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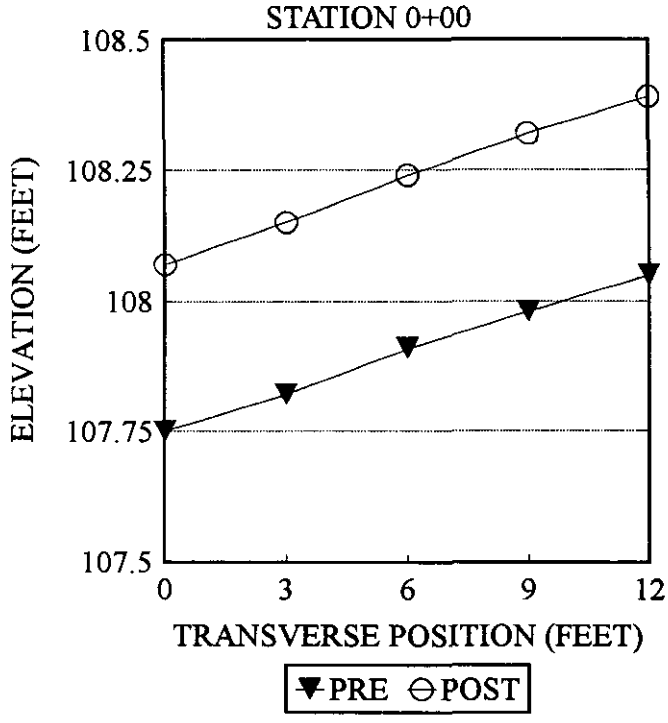

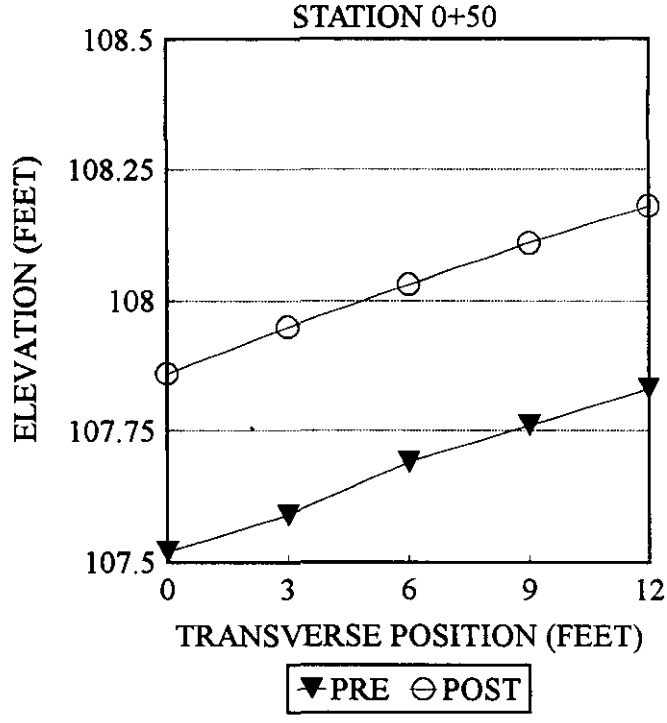

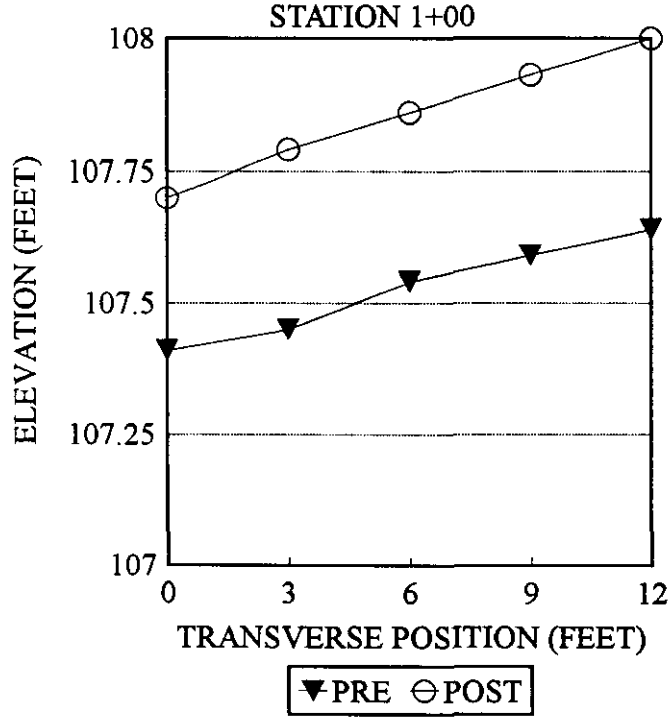

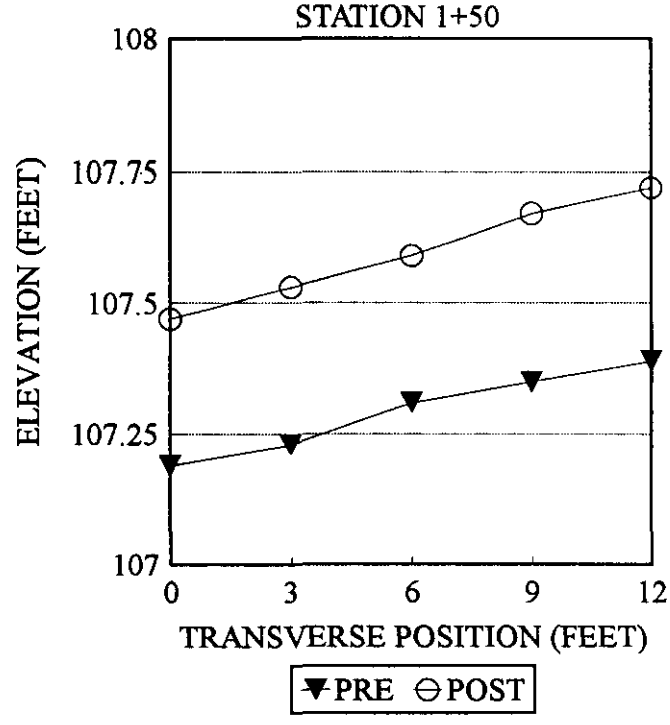

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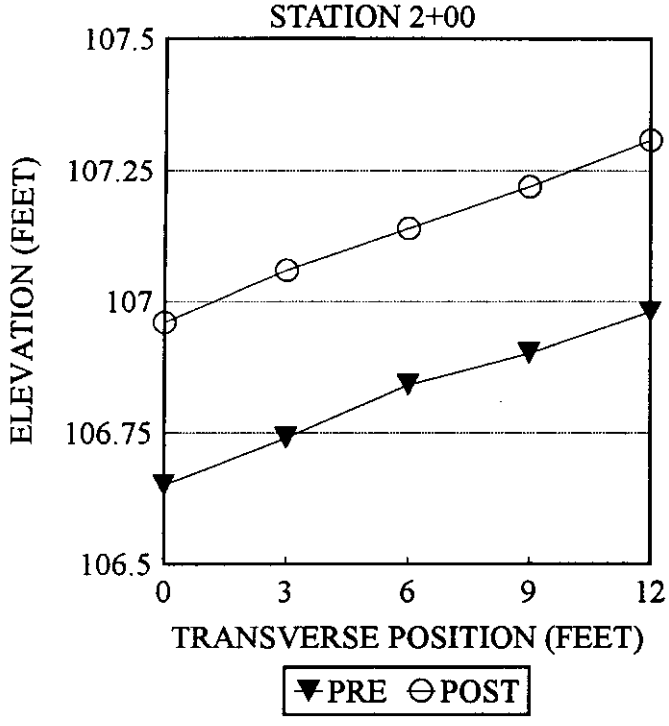

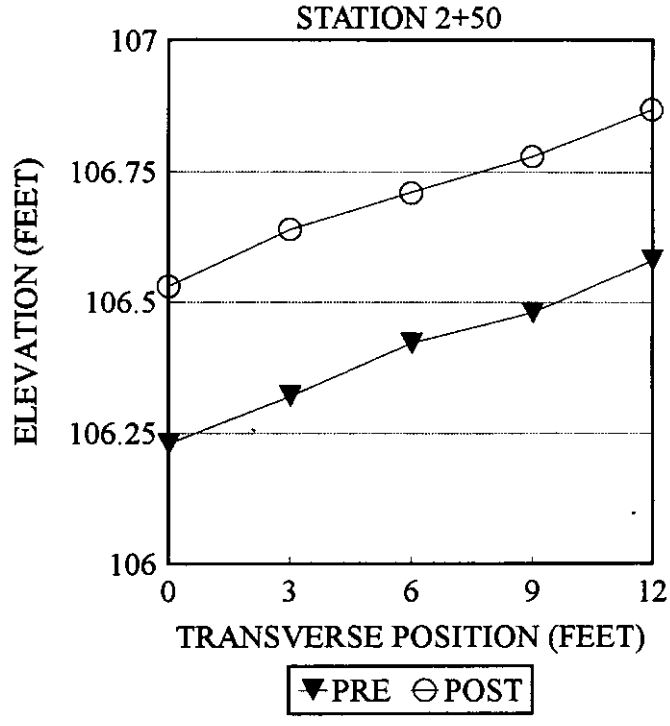

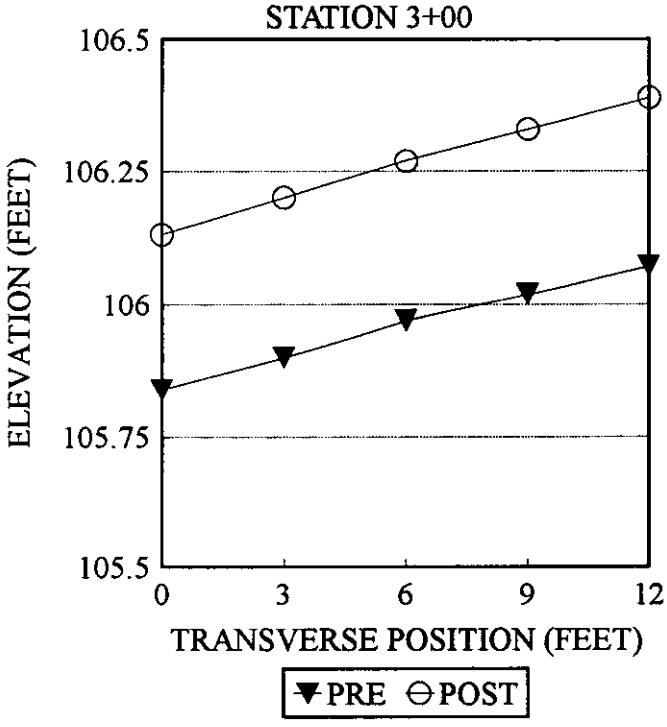

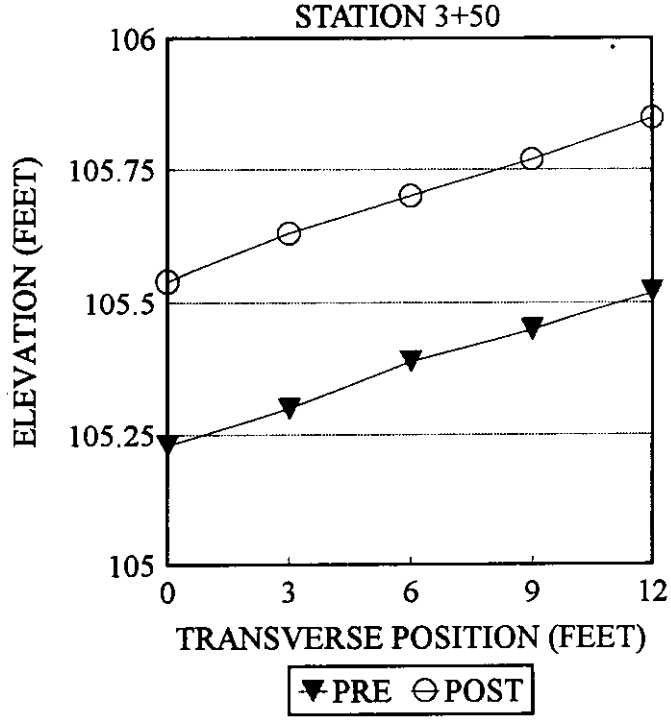

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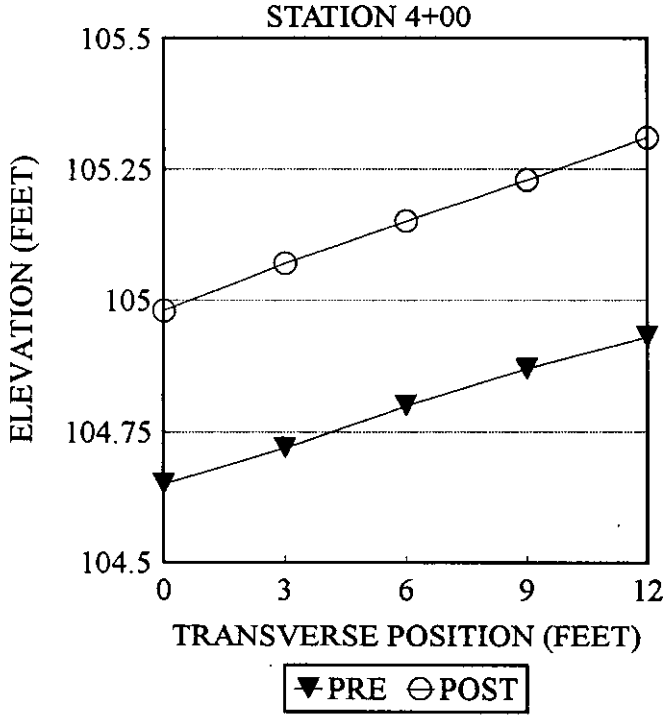
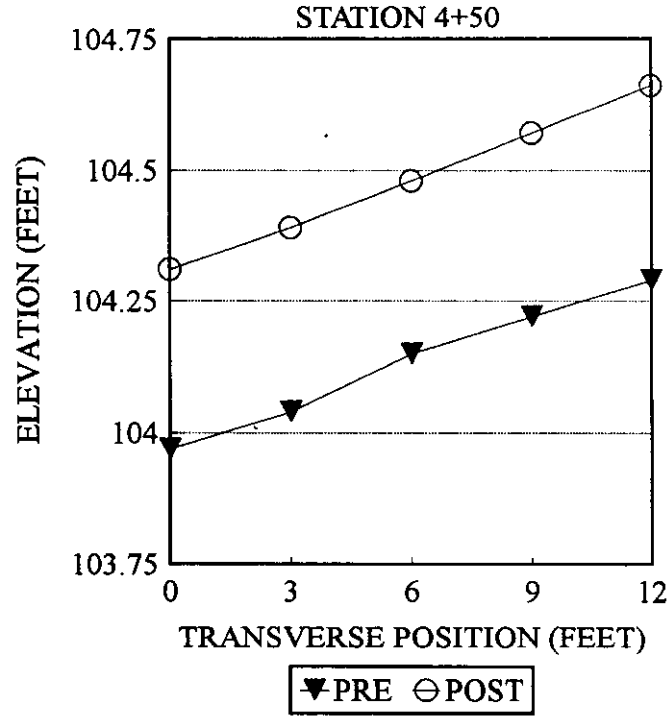
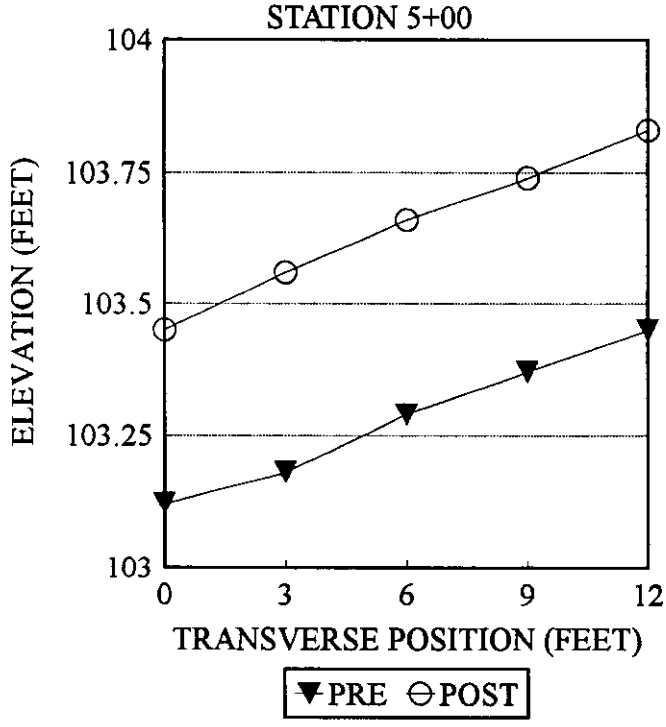
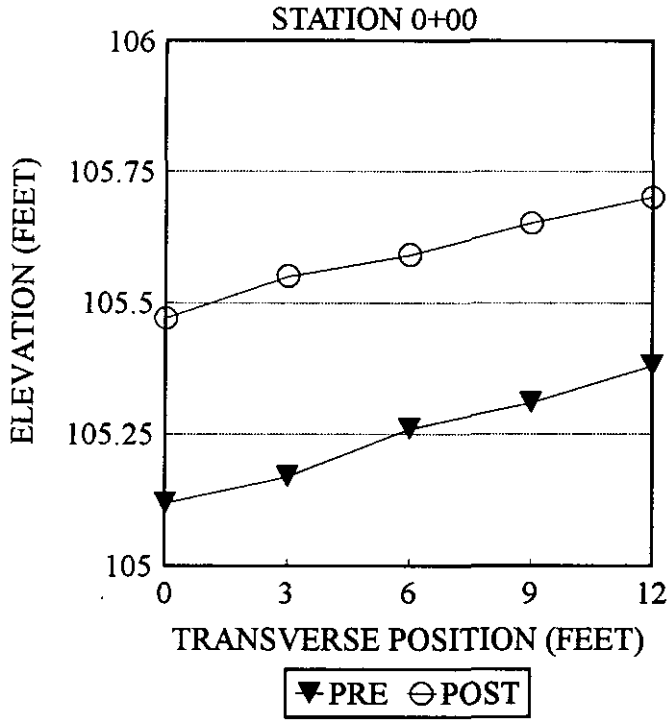
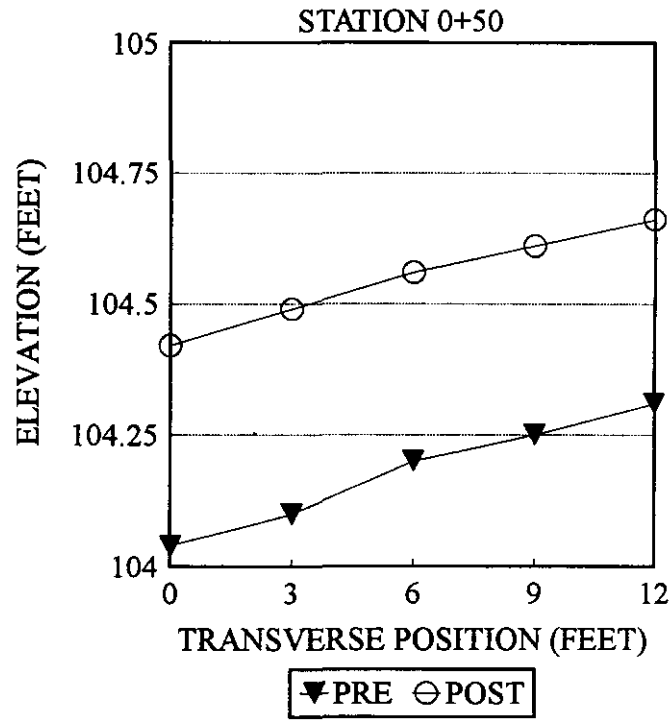


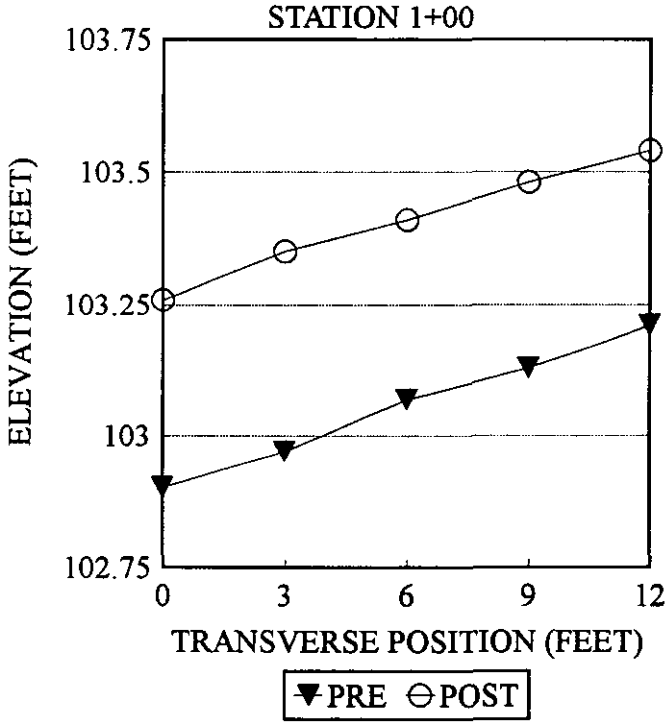


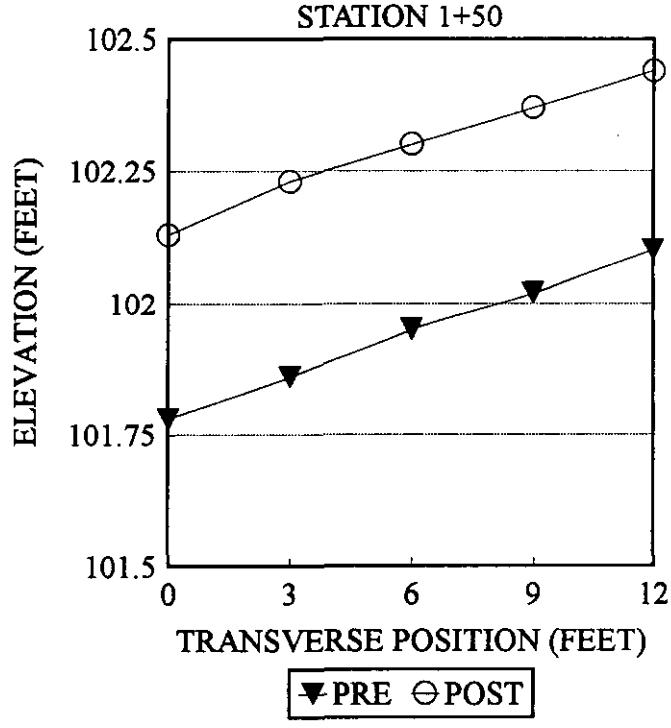


SECTION 010508









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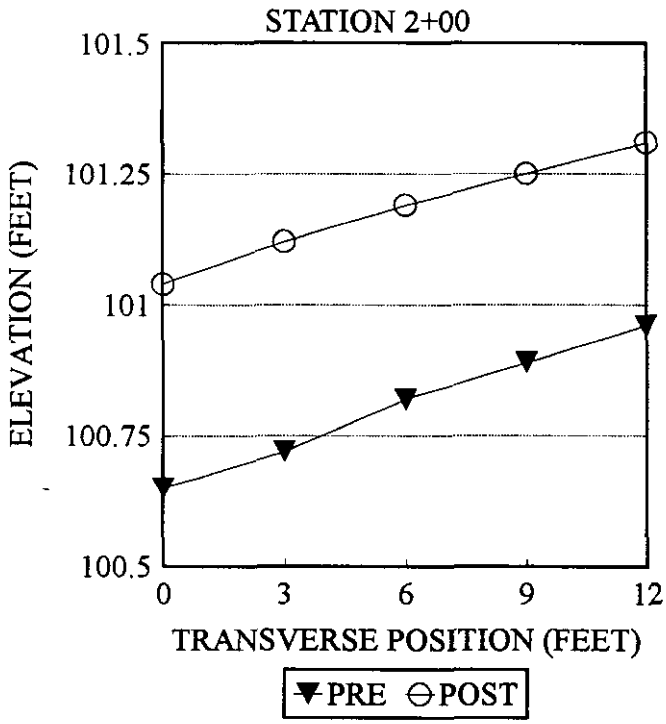

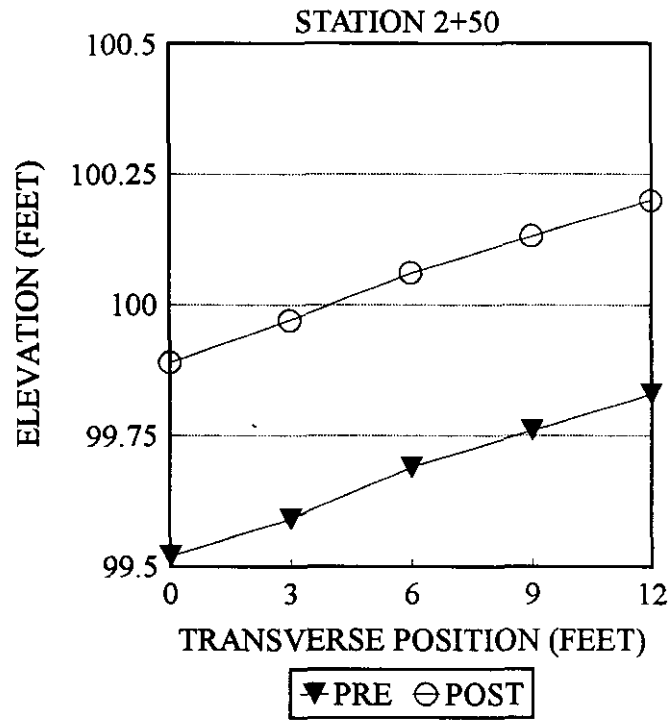

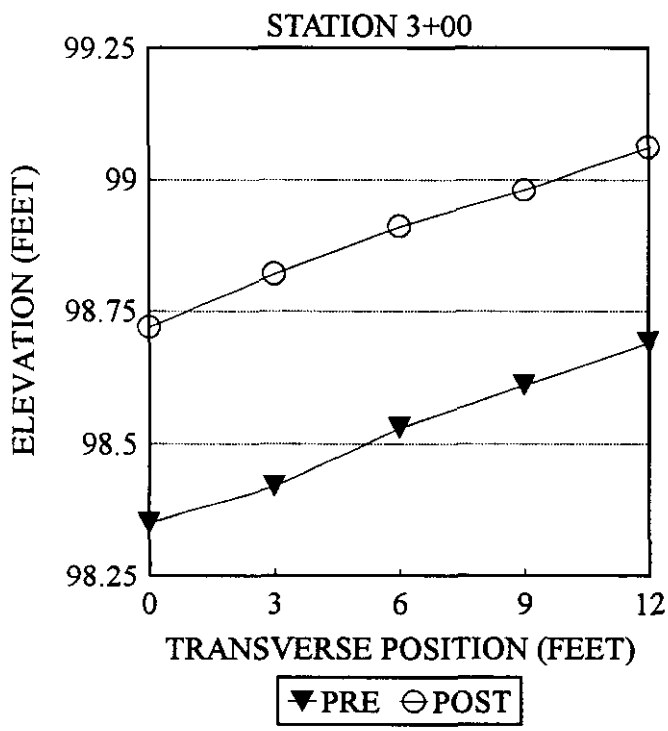

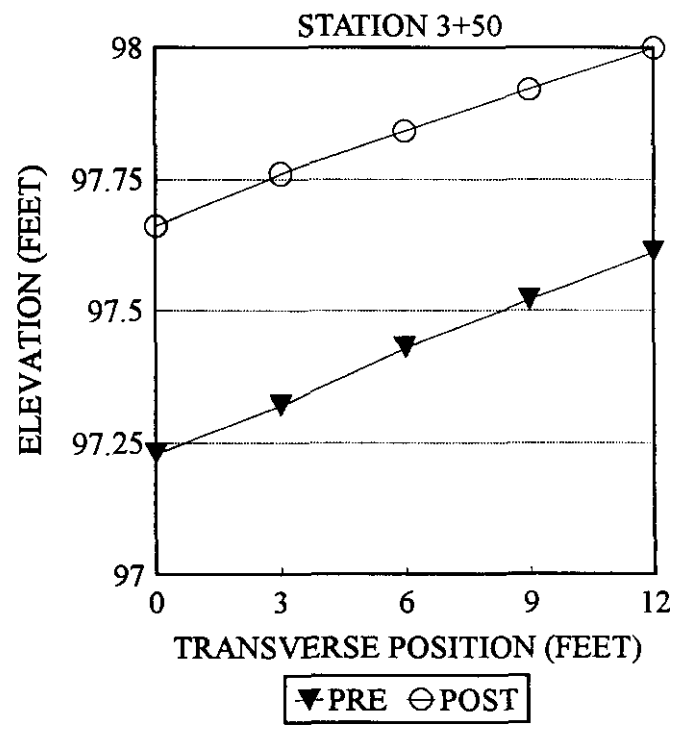

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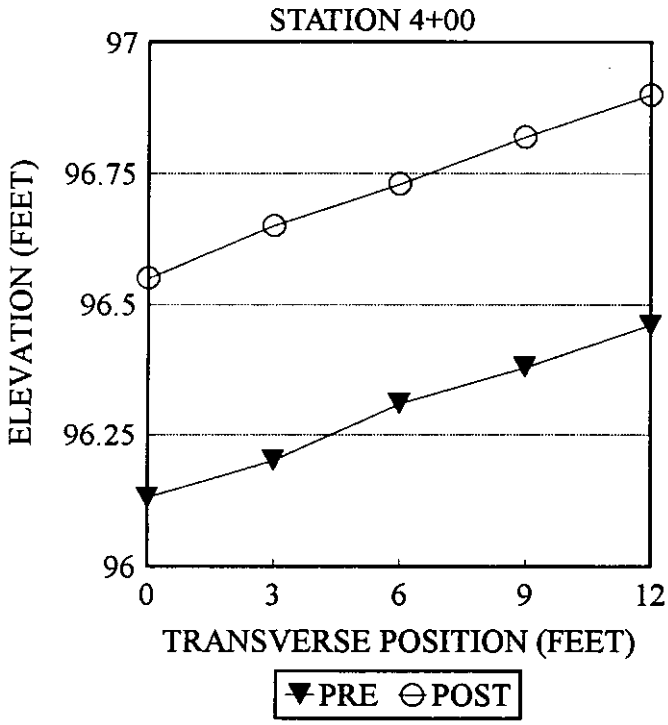

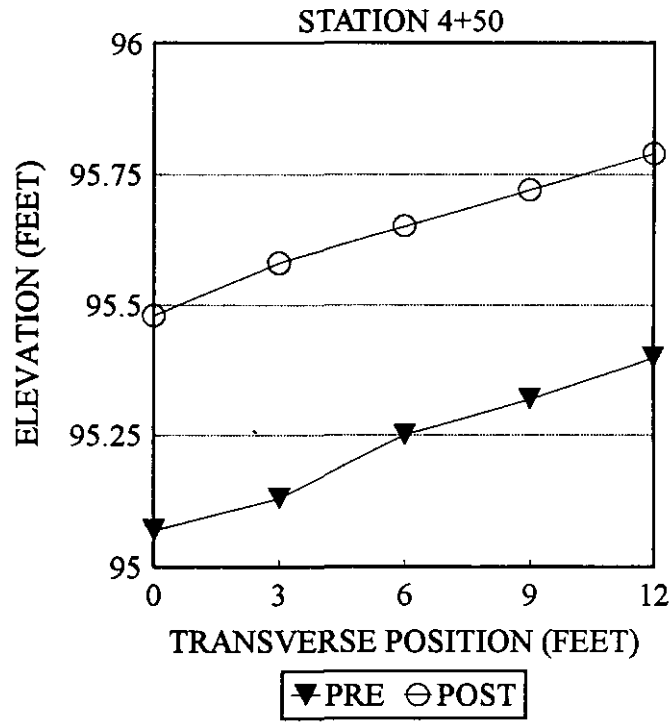

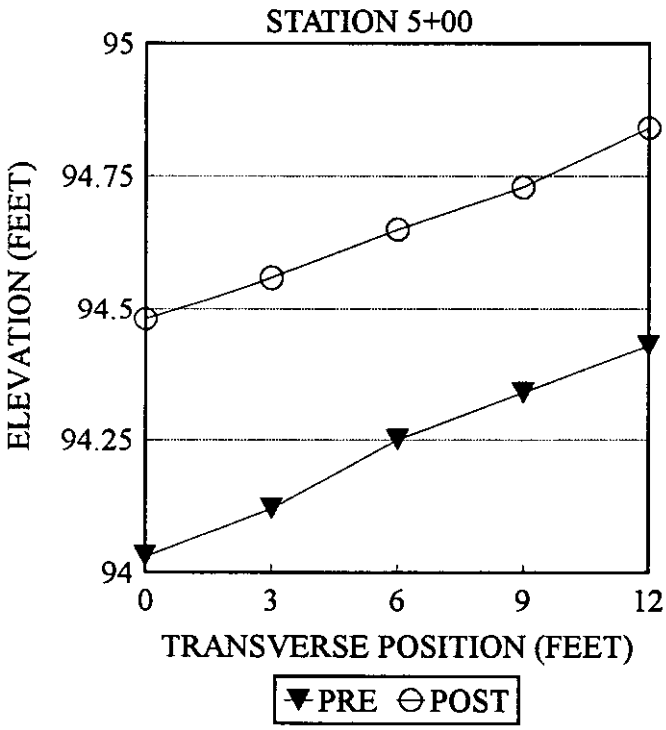

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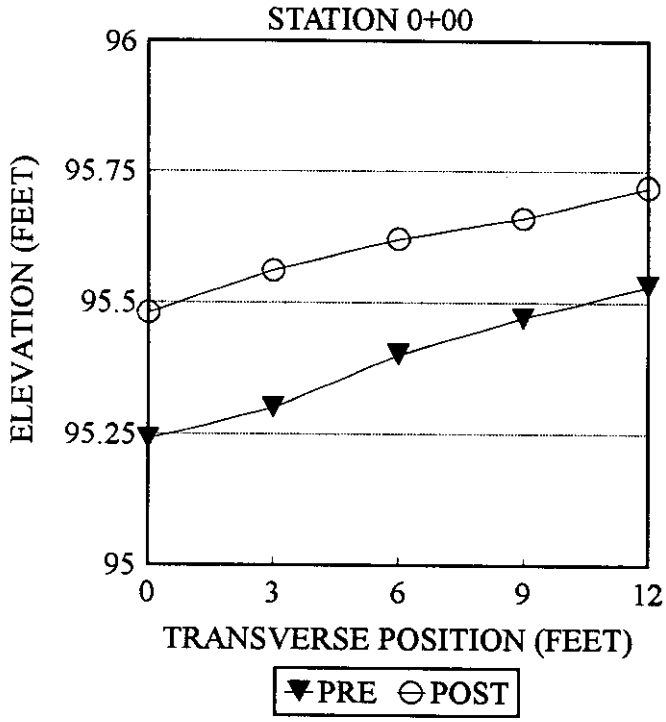

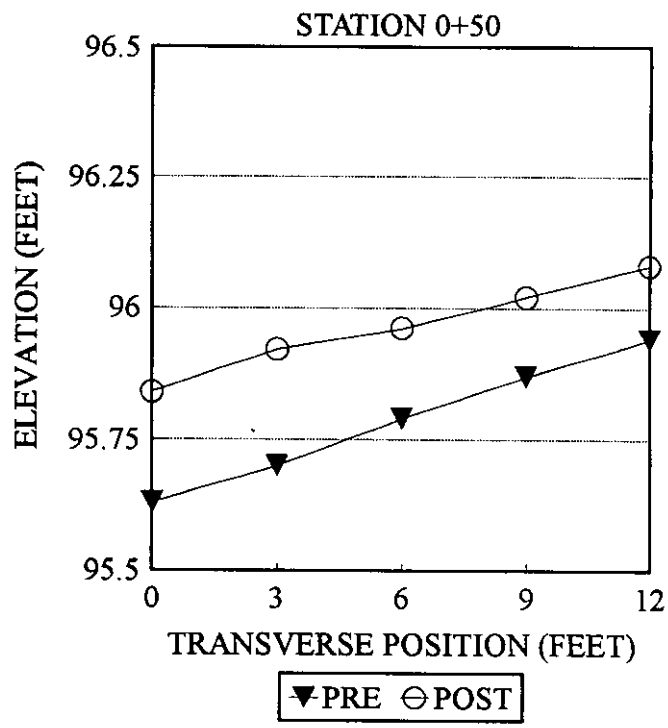

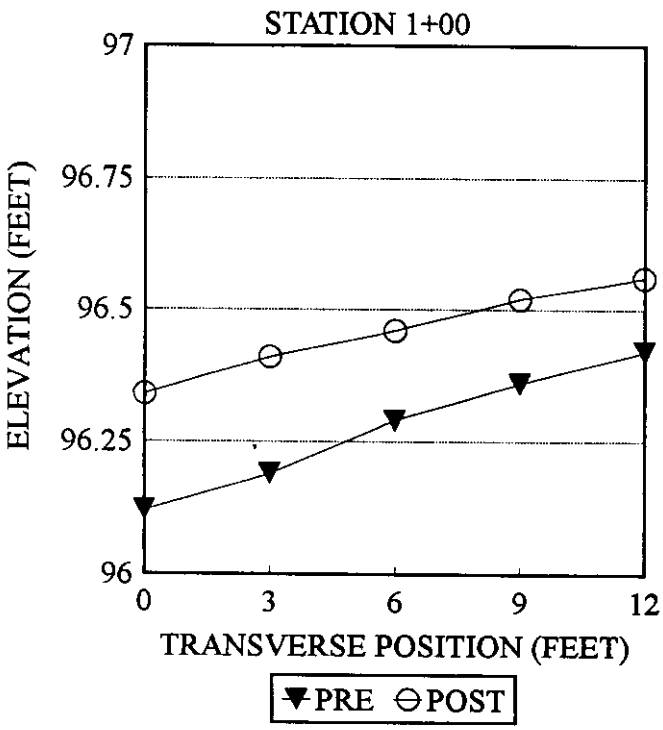

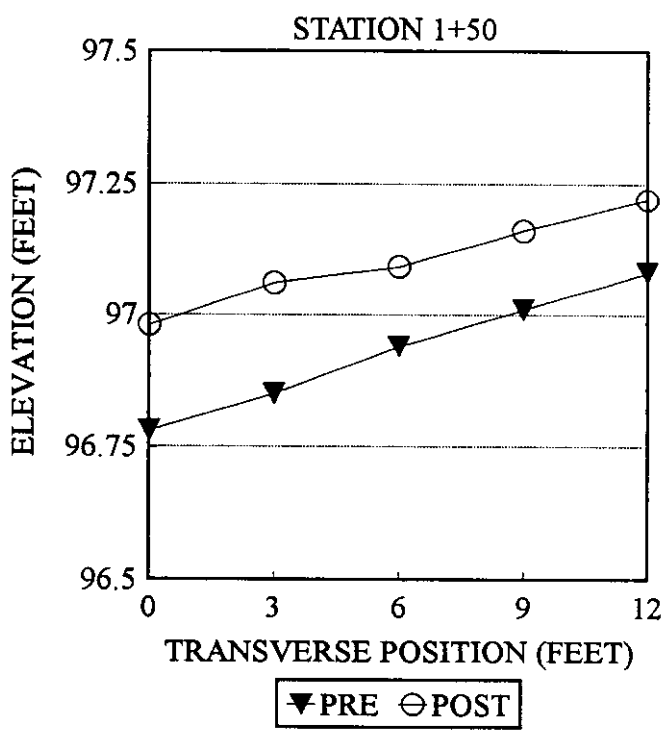

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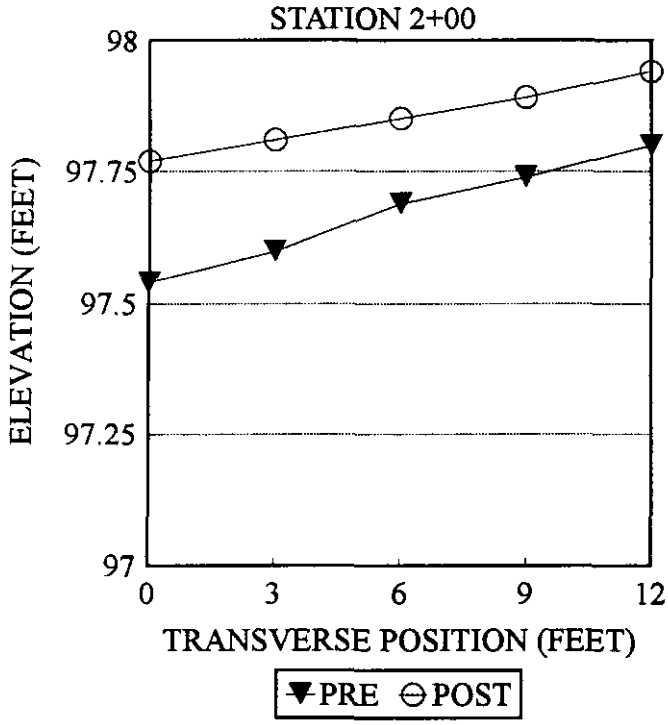

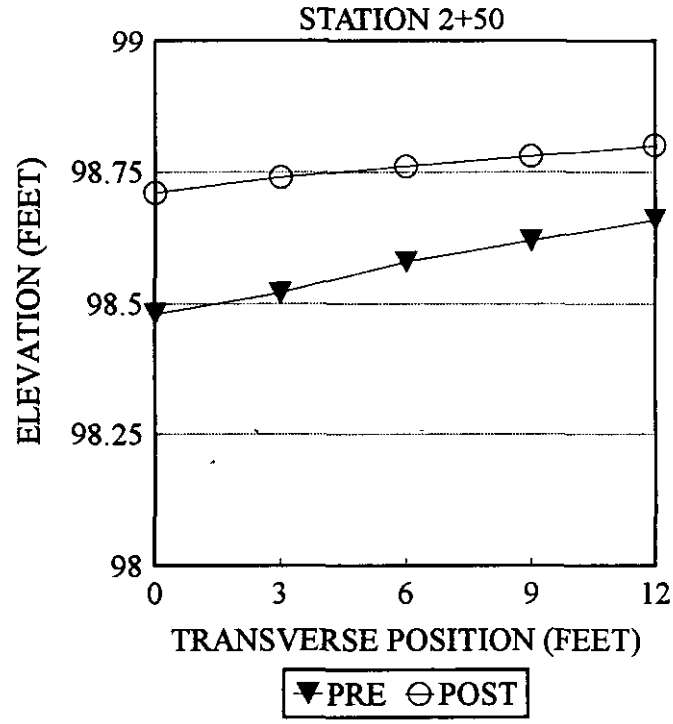

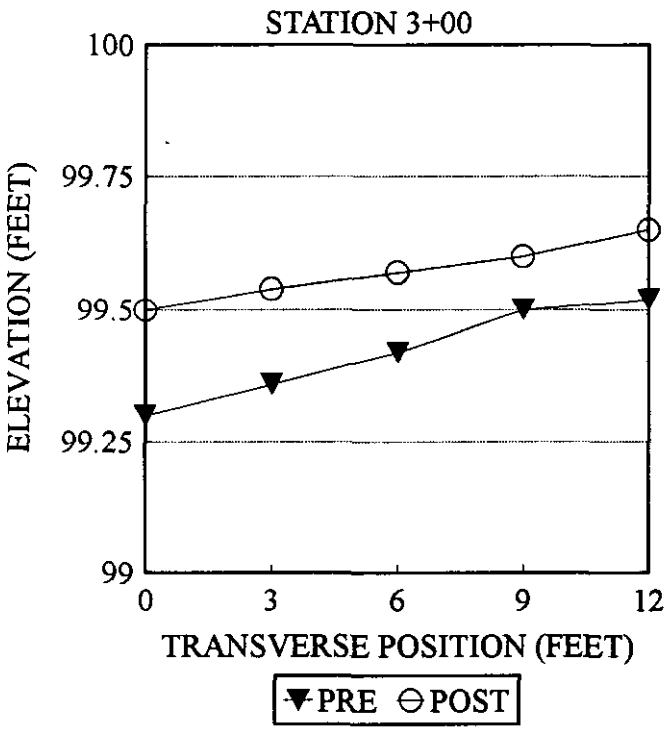

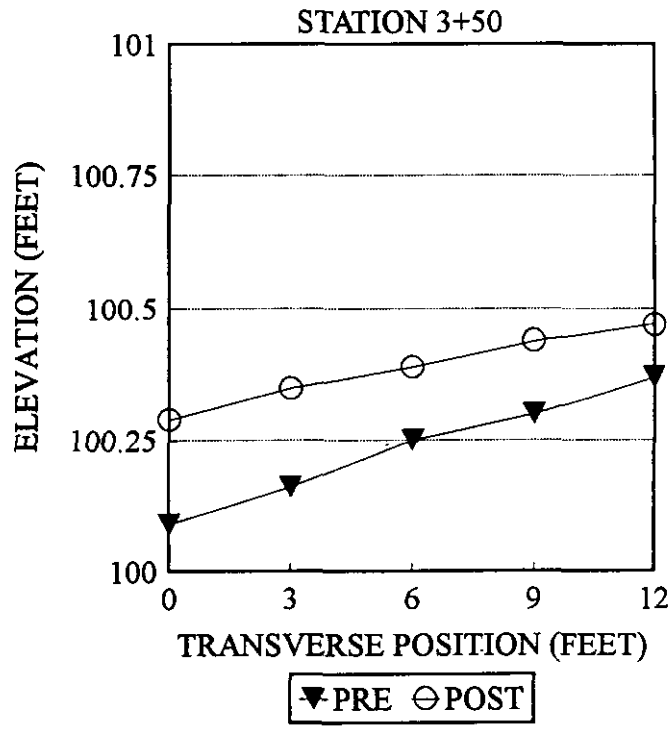

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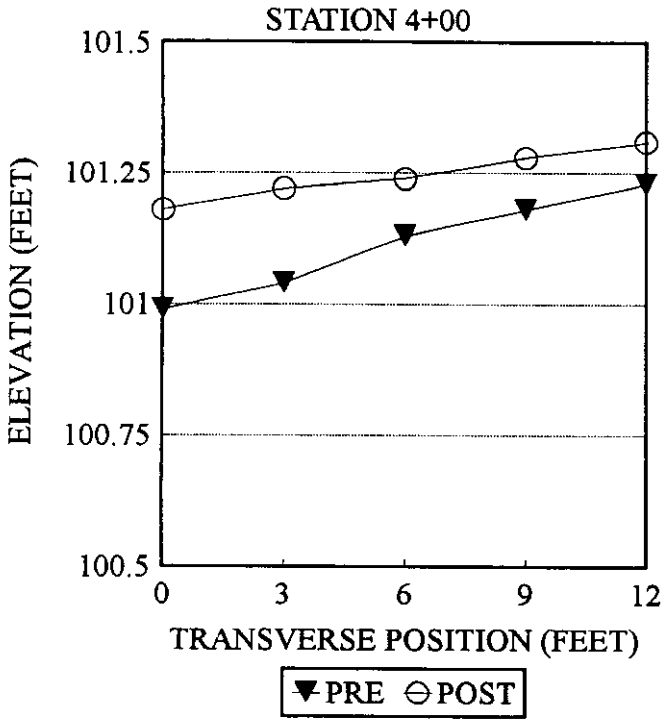
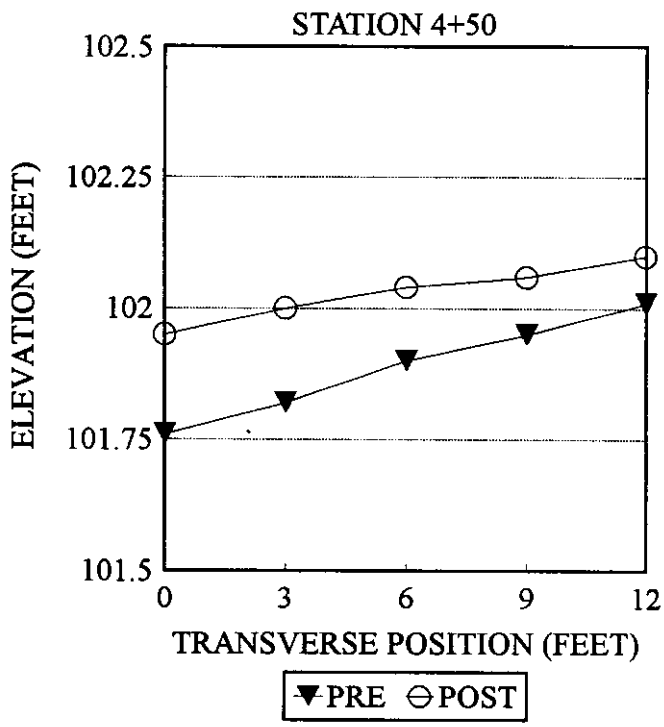
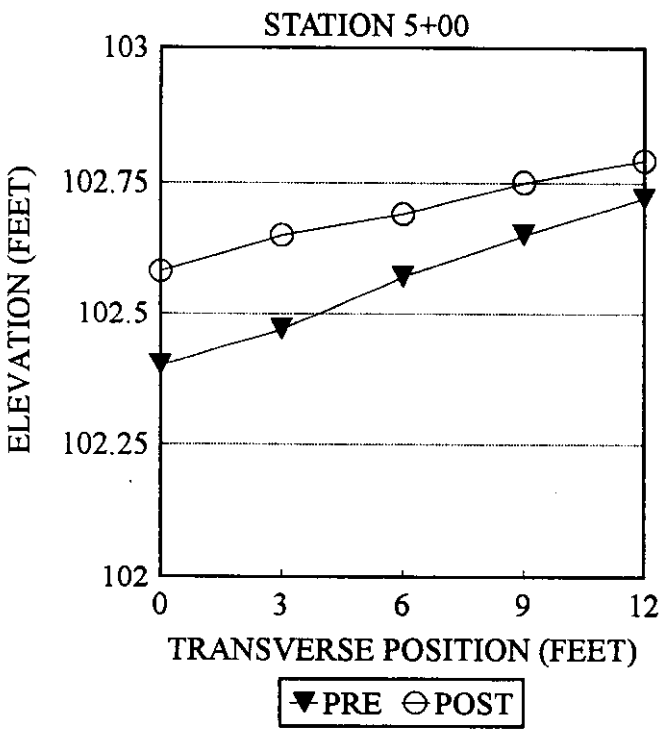
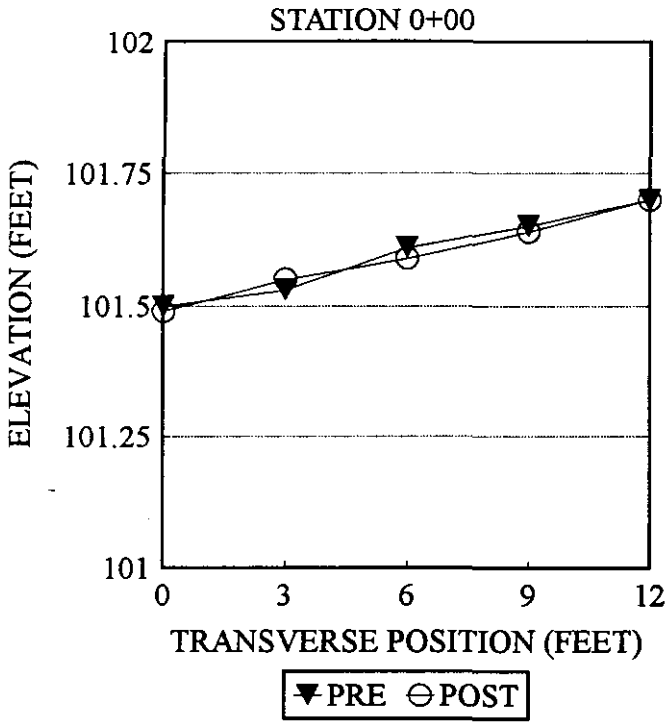
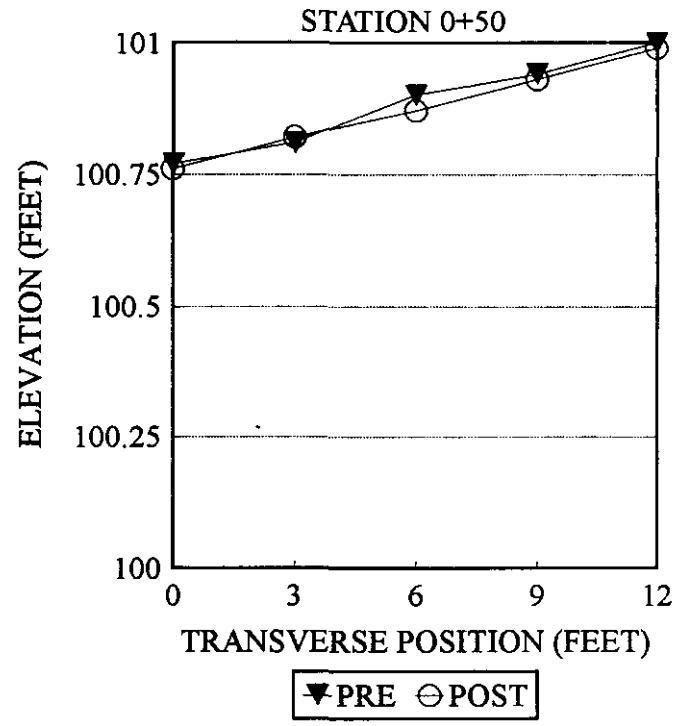


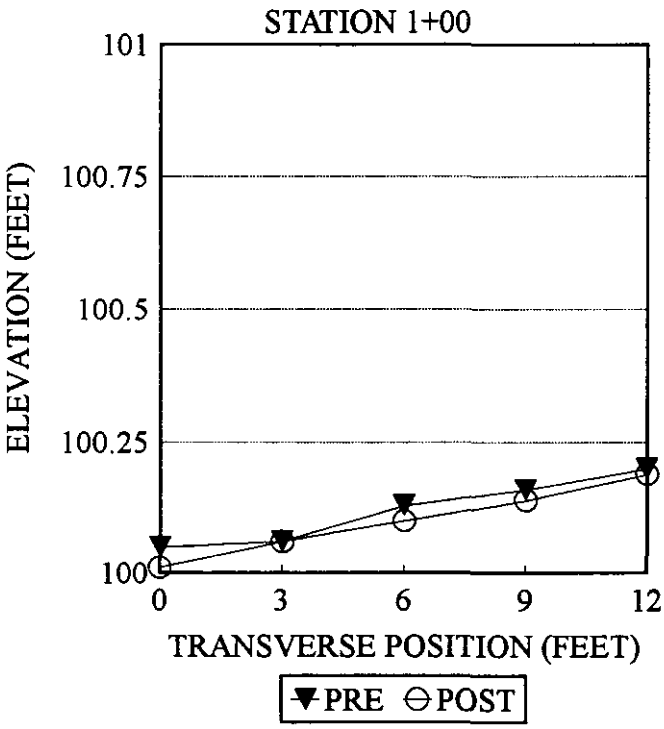


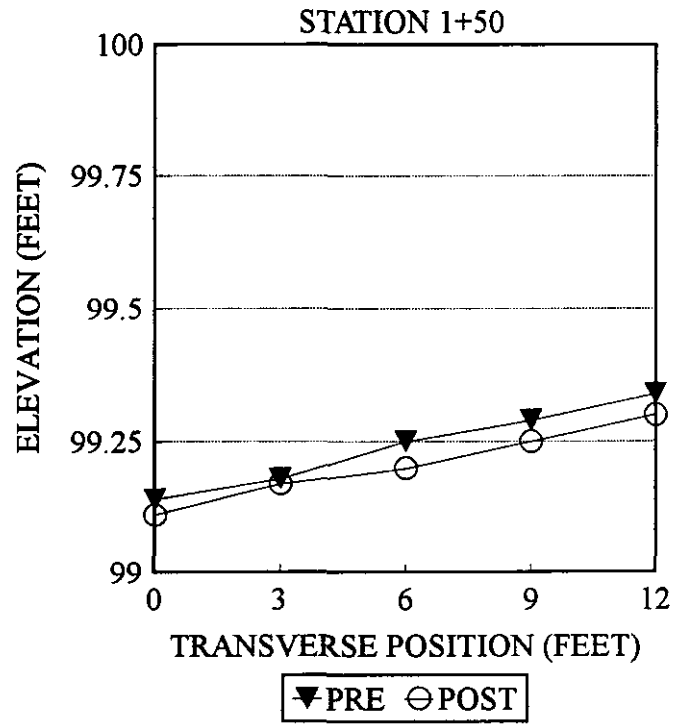


SECTION 010564









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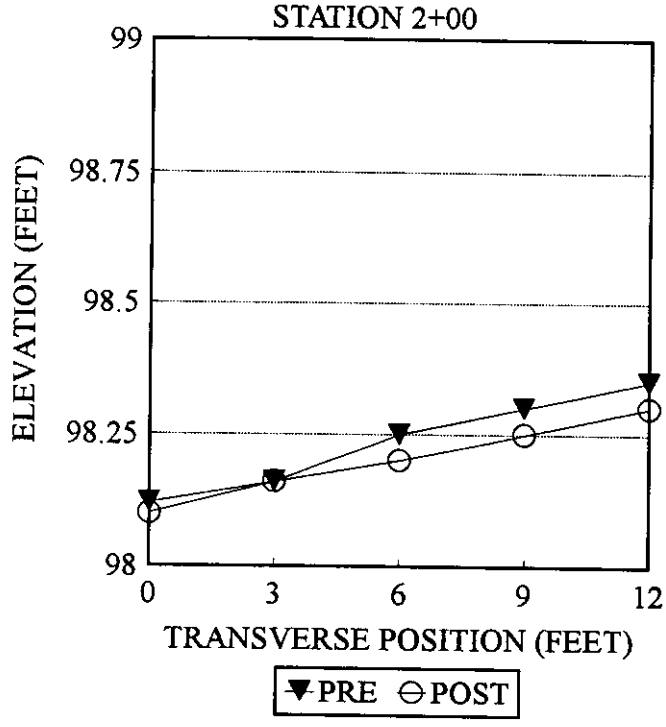

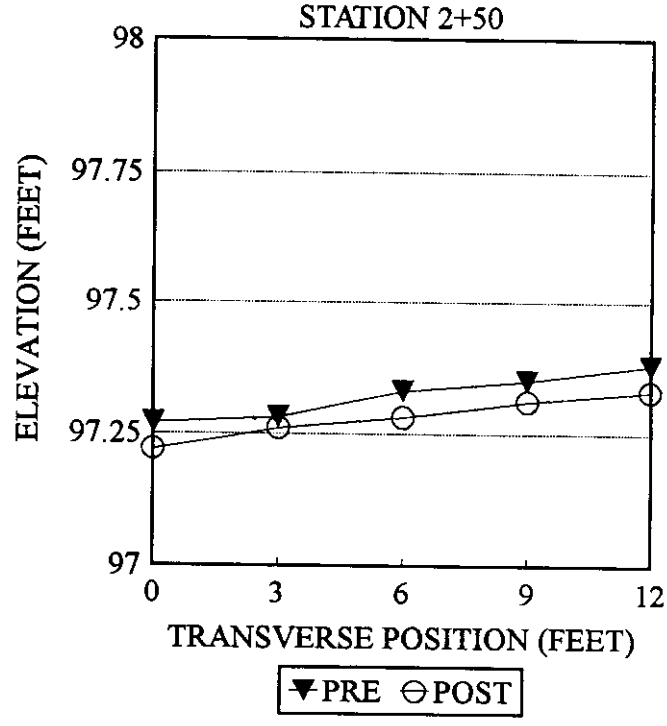

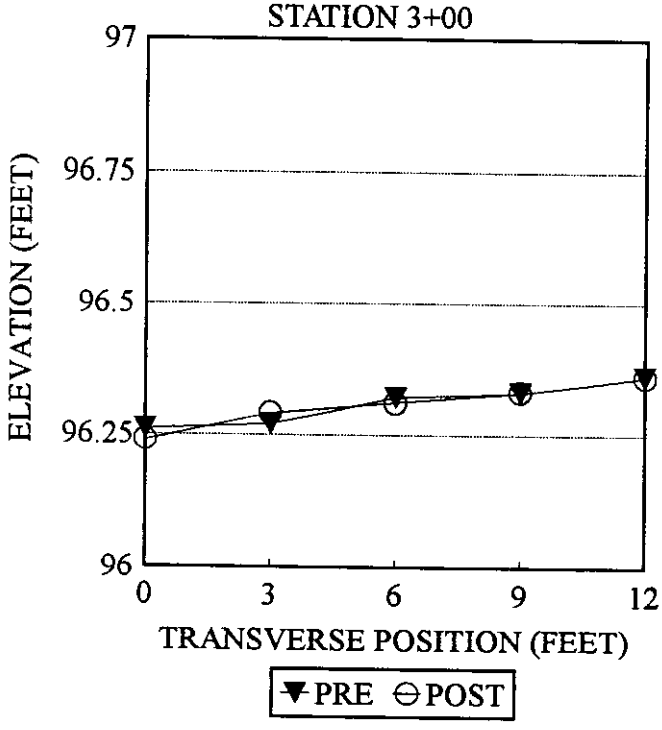

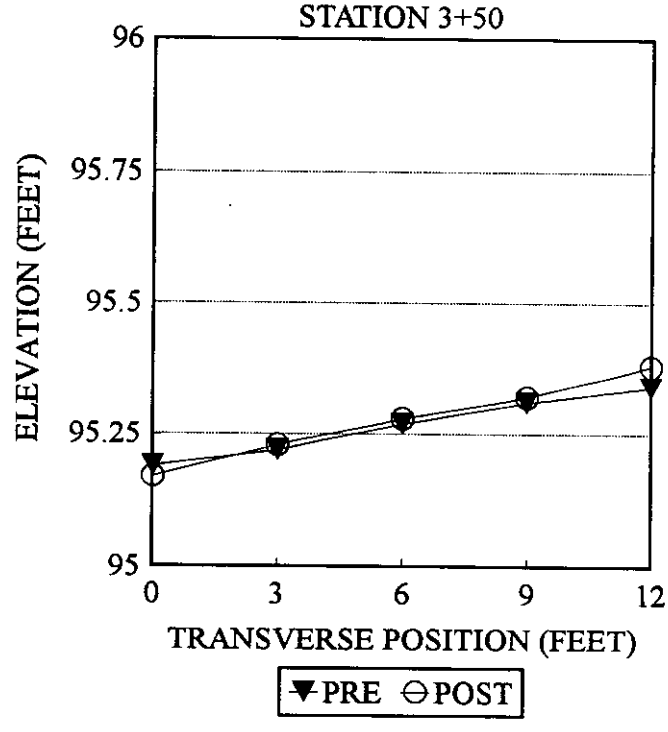

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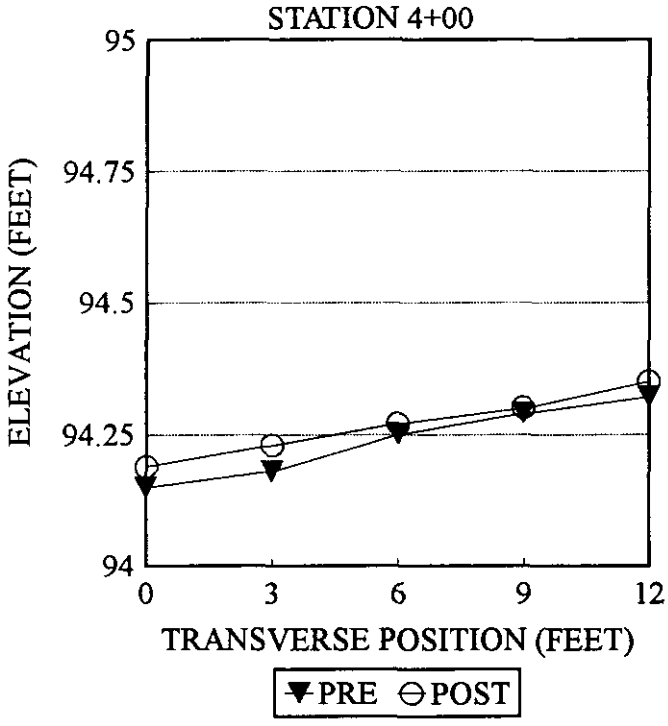

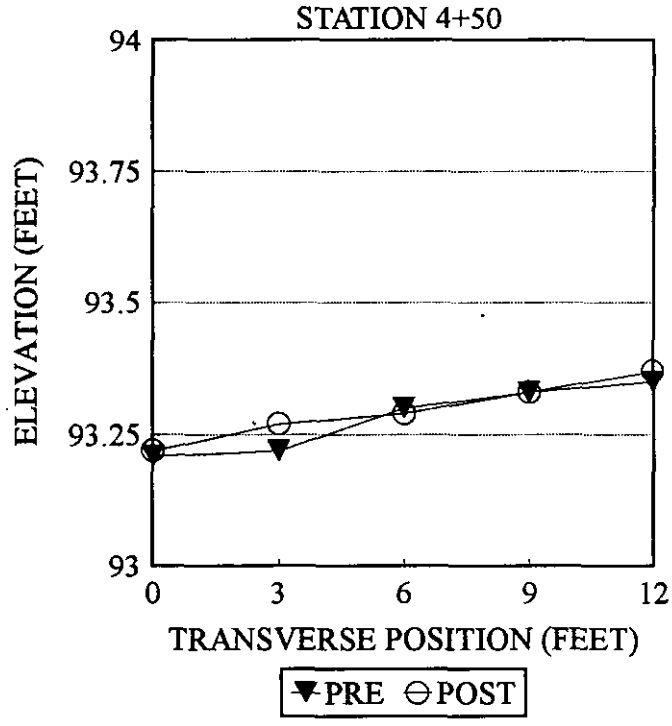

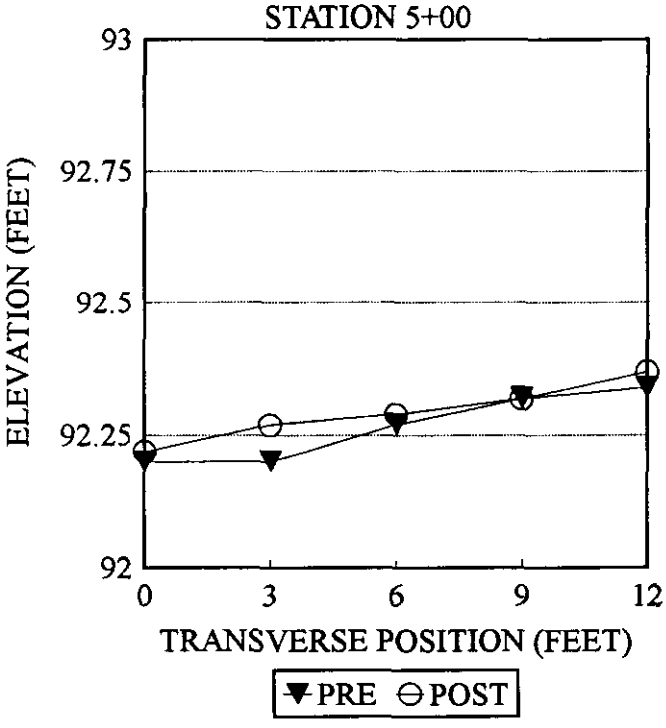

APPENDIX E

AVERAGE OVERLAY THICKNESSES

ALABAMA SPS-5, SECTION 010563

Trans.	Offset	0'	Overlay Depth (in.)	3'	Overlay Depth (in.)	6'	Overlay Depth (in.)	9'	Overlay Depth (in.)	12'	Overlay Depth (in.)
0+00	PRE	105.17	1.7	105.25	1.4	105.3	1.6	105.37	1.6	105.44	1.6
	POST	105.31		105.37		105.43		105.5		105.57	
0+50	PRE	104.39	1.6	104.43	1.8	104.49	1.9	104.57	1.8	104.7	1.2
	POST	104.52		104.58		104.65		104.72		104.8	
1+00	PRE	103.77	1.1	103.84	1.2	103.86	1.7	103.95	1.3	104.03	1.4
	POST	103.86		103.94		104		104.06		104.15	
1+50	PRE	103.23	1.3	103.29	1.4	103.33	1.7	103.41	1.4	103.49	1.3
	POST	103.34		103.41		103.47		103.53		103.6	
2+00	PRE	102.74	1.2	102.8	1.4	102.83	1.8	102.92	1.6	103.02	1.3
	POST	102.84		102.92		102.98		103.05		103.13	
2+50	PRE	102.27	1.4	102.34	1.6	102.38	1.9	102.45	1.7	102.54	1.6
	POST	102.39		102.47		102.54		102.59		102.67	
3+00	PRE	101.91	1.0	101.96	1.4	102.01	1.6	102.09	1.3	102.17	1.2
	POST	101.99		102.08		102.14		102.2		102.27	
3+50	PRE	101.54	1.0	101.6	1.3	101.65	1.6	101.74	1.2	101.82	1.3
	POST	101.62		101.71		101.78		101.84		101.93	
4+00	PRE	101.26	1.2	101.32	1.4	101.36	1.7	101.44	1.6	101.54	1.2
	POST	101.36		101.44		101.5		101.57		101.64	
4+50	PRE	101.07	1.1	101.13	1.3	101.16	1.6	101.23	1.4	101.32	1.2
	POST	101.16		101.24		101.29		101.35		101.42	
5+00	PRE	100.89	0.7	100.94	1.1	100.98	1.6	101.06	1.6	101.18	1.2
	POST	100.95		101.03		101.11		101.19		101.28	
Avg. Thick. (in.) =			1.4								
Anticipated Thick. (in.) =			2.0								

ALABAMA SPS-5, SECTION 010506

Trans.	Offset	0'	Overlay Depth (in.)	3'	Overlay Depth (in.)	6'	Overlay Depth (in.)	9'	Overlay Depth (in.)	12'	Overlay Depth (in.)
0+00	PRE	102.28	2.4	102.31	2.9	102.33	3.4	102.4	3.1	102.46	3.1
	POST	102.48		102.55		102.61		102.66		102.72	
0+50	PRE	102.7	2.4	102.73	3.1	102.77	3.4	102.84	3.2	102.9	3.2
	POST	102.9		102.99		103.05		103.11		103.17	
1+00	PRE	103.1	2.9	103.15	3.2	103.18	3.5	103.25	3.5	103.3	3.4
	POST	103.34		103.42		103.47		103.54		103.58	
1+50	PRE	103.53	3.0	103.59	3.2	103.61	3.7	103.68	3.5	103.76	3.1
	POST	103.78		103.86		103.92		103.97		104.02	
2+00	PRE	103.94	2.5	104	2.9	104.04	3.1	104.1	3.2	104.16	3.1
	POST	104.15		104.24		104.3		104.37		104.42	
2+50	PRE	104.37	2.6	104.41	3.0	104.46	3.2	104.52	3.1	104.59	2.9
	POST	104.59		104.66		104.73		104.78		104.83	
3+00	PRE	104.77	2.4	104.84	2.5	104.87	3.0	104.93	3.0	104.97	3.4
	POST	104.97		105.05		105.12		105.18		105.25	
3+50	PRE	105.18	2.8	105.24	3.0	105.28	3.1	105.35	3.0	105.39	3.2
	POST	105.41		105.49		105.54		105.6		105.66	
4+00	PRE	105.54	2.6	105.6	3.0	105.64	3.4	105.7	3.2	105.77	3.0
	POST	105.76		105.85		105.92		105.97		106.02	
4+50	PRE	105.87	2.6	105.94	2.6	105.99	3.1	106.05	3.1	106.1	3.4
	POST	106.09		106.16		106.25		106.31		106.38	
5+00	PRE	106.25	2.4	106.31	2.8	106.35	3.0	106.41	3.1	106.47	3.0
	POST	106.45		106.54		106.6		106.67		106.72	

Avg. Thick. (in.) = 3.0
Anticipated Thick. (in.) = 4.0

ALABAMA SPS-5, SECTION 010507

Trans.	Offset	0'	Overlay Depth (in.)	3'	Overlay Depth (in.)	6'	Overlay Depth (in.)	9'	Overlay Depth (in.)	12'	Overlay Depth (in.)
0+00	PRE	103.9	5.2	103.98	5.5	104.03	5.5	104.09	5.5	104.16	5.2
	POST	104.33		104.44		104.49		104.55		104.59	
0+50	PRE	104.16	5.3	104.2	5.6	104.25	5.8	104.31	5.6	104.36	5.5
	POST	104.6		104.67		104.73		104.78		104.82	
1+00	PRE	104.41	5.5	104.46	5.6	104.5	5.8	104.56	5.5	104.6	5.4
	POST	104.87		104.93		104.98		105.02		105.05	
1+50	PRE	104.66	5.8	104.71	5.9	104.76	5.9	104.83	5.4	104.86	5.6
	POST	105.14		105.2		105.25		105.28		105.33	
2+00	PRE	104.88	5.5	104.92	5.5	104.95	5.8	105	5.6	105.04	5.5
	POST	105.34		105.38		105.43		105.47		105.5	
2+50	PRE	105.17	5.2	105.19	5.8	105.21	6.0	105.27	5.8	105.3	5.5
	POST	105.6		105.67		105.71		105.75		105.76	
3+00	PRE	105.37	5.3	105.39	5.6	105.41	5.9	105.48	5.5	105.54	5.3
	POST	105.81		105.86		105.9		105.94		105.98	
3+50	PRE	105.62	5.0	105.65	5.6	105.67	6.1	105.74	6.0	105.82	-6.4
	POST	106.04		106.12		106.18		106.24		105.29	
4+00	PRE	105.87	5.0	105.9	5.8	105.92	6.1	105.99	5.6	106.06	5.6
	POST	106.29		106.38		106.43		106.46		106.53	
4+50	PRE	106.12	5.0	106.17	5.4	106.18	6.0	106.26	5.8	106.34	5.5
	POST	106.54		106.62		106.68		106.74		106.8	
5+00	PRE	106.36	5.3	106.41	5.3	106.46	5.5	106.52	5.5	106.58	5.3
	POST	106.8		106.85		106.92		106.98		107.02	
Avg. Thick. (in.) =			5.3								
Anticipated Thick. (in.) =			7.0								

ALABAMA SPS-5, SECTION 010504

Trans.	Offset	0'	Overlay Depth (in.)	3'	Overlay Depth (in.)	6'	Overlay Depth (in.)	9'	Overlay Depth (in.)	12'	Overlay Depth (in.)
0+00	PRE	100.59	4.7	100.65	4.3	100.75	4.2	100.82	4.2	100.9	4.1
	POST	100.98		101.01		101.1		101.17		101.24	
0+50	PRE	100.89	4.2	100.96	4.3	101.03	4.4	101.09	4.6	101.15	4.6
	POST	101.24		101.32		101.4		101.47		101.53	
1+00	PRE	101.07	4.3	101.14	4.6	101.23	4.3	101.28	4.4	101.35	4.6
	POST	101.43		101.52		101.59		101.65		101.73	
1+50	PRE	101.29	4.1	101.36	4.3	101.44	4.2	101.5	4.3	101.56	4.3
	POST	101.63		101.72		101.79		101.86		101.92	
2+00	PRE	101.52	4.0	101.59	4.2	101.69	3.8	101.74	4.1	101.82	4.1
	POST	101.85		101.94		102.01		102.08		102.16	
2+50	PRE	101.75	4.0	101.82	4.1	101.9	4.1	101.96	4.2	102.04	4.1
	POST	102.08		102.16		102.24		102.31		102.38	
3+00	PRE	101.93	3.5	102	3.8	102.09	3.8	102.15	4.1	102.23	4.1
	POST	102.22		102.32		102.41		102.49		102.57	
3+50	PRE	102.13	3.5	102.19	4.0	102.27	4.2	102.32	4.6	102.4	4.4
	POST	102.42		102.52		102.62		102.7		102.77	
4+00	PRE	102.22	4.2	102.28	4.6	102.36	4.6	102.41	4.7	102.47	4.7
	POST	102.57		102.66		102.74		102.8		102.86	
4+50	PRE	102.32	4.3	102.36	4.9	102.45	4.7	102.5	5.2	102.57	5.3
	POST	102.68		102.77		102.84		102.93		103.01	
5+00	PRE	102.39	4.2	102.45	4.7	102.55	4.7	102.63	4.7	102.73	4.7
	POST	102.74		102.84		102.94		103.02		103.12	

Avg. Thick. (in.) = 4.3
Anticipated Thick. (in.) = 5.0

ALABAMA SPS-5, SECTION 010505

Trans.	Offset	0'	Overlay Depth (in.)	3'	Overlay Depth (in.)	6'	Overlay Depth (in.)	9'	Overlay Depth (in.)	12'	Overlay Depth (in.)
0+00	PRE	103.51	1.4	103.59	1.8	103.69	1.6	103.75	1.9	103.85	1.4
	POST	103.63		103.74		103.82		103.91		103.97	
0+50	PRE	103.42	1.6	103.5	1.7	103.61	1.7	103.68	1.9	103.78	1.7
	POST	103.55		103.64		103.75		103.84		103.92	
1+00	PRE	103.38	1.3	103.45	1.7	103.55	1.4	103.61	1.7	103.72	1.3
	POST	103.49		103.59		103.67		103.75		103.83	
1+50	PRE	103.38	1.1	103.45	1.4	103.54	1.2	103.6	1.6	103.68	1.4
	POST	103.47		103.57		103.64		103.73		103.8	
2+00	PRE	103.37	0.7	103.44	1.2	103.56	0.8	103.61	1.0	103.69	1.1
	POST	103.43		103.54		103.63		103.69		103.78	
2+50	PRE	103.33	1.0	103.38	1.3	103.49	1.0	103.54	1.2	103.6	1.2
	POST	103.41		103.49		103.57		103.64		103.7	
3+00	PRE	103.27	0.7	103.33	1.2	103.44	1.0	103.51	1.1	103.57	1.2
	POST	103.33		103.43		103.52		103.6		103.67	
3+50	PRE	103.29	0.7	103.35	1.2	103.45	1.1	103.5	1.3	103.58	1.2
	POST	103.35		103.45		103.54		103.61		103.68	
4+00	PRE	103.28	0.8	103.34	1.3	103.45	1.1	103.51	1.3	103.59	1.4
	POST	103.35		103.45		103.54		103.62		103.71	
4+50	PRE	103.3	1.3	103.37	1.6	103.46	1.4	103.52	1.9	103.6	1.8
	POST	103.41		103.5		103.58		103.68		103.75	
5+00	PRE	103.26	1.4	103.34	1.7	103.45	1.6	103.52	1.9	103.6	2.0
	POST	103.38		103.48		103.58		103.68		103.77	
Avg. Thick. (in.) =			1.4								
Anticipated Thick. (in.) =			2.0								

ALABAMA SPS-5, SECTION 010502

Trans.	Offset	0'	Overlay Depth (in.)	3'	Overlay Depth (in.)	6'	Overlay Depth (in.)	9'	Overlay Depth (in.)	12'	Overlay Depth (in.)
0+00	PRE	101.63	1.4	101.7	1.8	101.79	1.4	101.84	1.8	101.9	2.0
	POST	101.75		101.85		101.91		101.99		102.07	
0+50	PRE	101.81	1.2	101.86	1.4	101.95	1.4	101.99	1.7	102.05	1.7
	POST	101.91		101.98		102.07		102.13		102.19	
1+00	PRE	101.98	1.0	102.04	1.3	102.12	1.1	102.16	1.6	102.22	1.6
	POST	102.06		102.15		102.21		102.29		102.35	
1+50	PRE	102.17	1.1	102.22	1.4	102.31	1.3	102.35	1.8	102.43	1.7
	POST	102.26		102.34		102.42		102.5		102.57	
2+00	PRE	102.39	1.0	102.45	1.2	102.53	1.1	102.57	1.6	102.63	1.6
	POST	102.47		102.55		102.62		102.7		102.76	
2+50	PRE	102.64	1.0	102.7	1.0	102.77	0.8	102.8	1.2	102.84	1.4
	POST	102.72		102.78		102.84		102.9		102.96	
3+00	PRE	102.86	0.7	102.89	1.0	102.95	1.0	102.97	1.3	103	1.4
	POST	102.92		102.97		103.03		103.08		103.12	
3+50	PRE	102.99	0.8	103.03	1.1	103.1	1.0	103.13	1.3	103.18	1.4
	POST	103.06		103.12		103.18		103.24		103.3	
4+00	PRE	103.18	0.8	103.21	1.2	103.28	1.1	103.32	1.3	103.37	1.3
	POST	103.25		103.31		103.37		103.43		103.48	
4+50	PRE	103.34	1.2	103.38	1.3	103.45	1.2	103.49	1.3	103.53	1.4
	POST	103.44		103.49		103.55		103.6		103.65	
5+00	PRE	103.49	1.2	103.53	1.2	103.59	1.1	103.61	1.6	103.64	1.9
	POST	103.59		103.63		103.68		103.74		103.8	

Avg. Thick. (in.) = 1.3
Anticipated Thick. (in.) = 2.0

ALABAMA SPS-5, SECTION 010503

Trans.	Offset	0'	Overlay Depth (in.)	3'	Overlay Depth (in.)	6'	Overlay Depth (in.)	9'	Overlay Depth (in.)	12'	Overlay Depth (in.)
0+00	PRE	107.75	3.8	107.82	4.0	107.91	4.0	107.98	4.1	108.05	4.1
	POST	108.07		108.15		108.24		108.32		108.39	
0+50	PRE	107.52	4.1	107.59	4.3	107.69	4.1	107.76	4.2	107.83	4.2
	POST	107.86		107.95		108.03		108.11		108.18	
1+00	PRE	107.41	3.5	107.45	4.1	107.54	3.8	107.59	4.1	107.64	4.3
	POST	107.7		107.79		107.86		107.93		108	
1+50	PRE	107.19	3.4	107.23	3.6	107.31	3.4	107.35	3.8	107.39	4.0
	POST	107.47		107.53		107.59		107.67		107.72	
2+00	PRE	106.65	3.7	106.74	3.8	106.84	3.6	106.9	3.8	106.98	4.0
	POST	106.96		107.06		107.14		107.22		107.31	
2+50	PRE	106.23	3.6	106.32	3.8	106.42	3.5	106.48	3.6	106.58	3.5
	POST	106.53		106.64		106.71		106.78		106.87	
3+00	PRE	105.84	3.5	105.9	3.6	105.97	3.6	106.02	3.7	106.07	3.8
	POST	106.13		106.2		106.27		106.33		106.39	
3+50	PRE	105.23	3.7	105.3	4.0	105.39	3.7	105.45	3.8	105.52	4.0
	POST	105.54		105.63		105.7		105.77		105.85	
4+00	PRE	104.65	4.0	104.72	4.2	104	13.8	104.87	4.3	104.93	4.6
	POST	104.98		105.07		105.15		105.23		105.31	
4+50	PRE	103.97	4.1	104.04	4.2	104.15	4.0	104.22	4.2	104.29	4.4
	POST	104.31		104.39		104.48		104.57		104.66	
5+00	PRE	103.12	4.0	103.18	4.6	103.29	4.4	103.37	4.4	103.45	4.6
	POST	103.45		103.56		103.66		103.74		103.83	

Avg. Thick. (in.) = 4.1
Anticipated Thick. (in.) = 5.0

ALABAMA SPS-5, SECTION 010508

Trans.	Offset	0'	Overlay Depth (in.)	3'	Overlay Depth (in.)	6'	Overlay Depth (in.)	9'	Overlay Depth (in.)	12'	Overlay Depth (in.)
0+00	PRE	105.03	5.3	105.07	5.8	105.12	5.6	105.17	5.8	105.25	5.4
	POST	105.47		105.55		105.59		105.65		105.7	
0+50	PRE	103.97	5.4	104.02	5.6	104.06	6.0	104.11	6.0	104.19	5.6
	POST	104.42		104.49		104.56		104.61		104.66	
1+00	PRE	102.83	5.2	102.91	5.3	102.94	5.6	103	5.8	103.08	5.5
	POST	103.26		103.35		103.41		103.48		103.54	
1+50	PRE	101.7	5.2	101.76	5.6	101.82	5.8	101.87	6.0	101.98	5.5
	POST	102.13		102.23		102.3		102.37		102.44	
2+00	PRE	100.58	5.5	100.65	5.6	100.7	5.9	100.77	5.8	100.86	5.4
	POST	101.04		101.12		101.19		101.25		101.31	
2+50	PRE	99.44	5.4	99.51	5.5	99.56	6.0	99.64	5.9	99.73	5.6
	POST	99.89		99.97		100.06		100.13		100.2	
3+00	PRE	98.28	5.3	98.36	5.5	98.41	6.0	98.5	5.8	98.6	5.5
	POST	98.72		98.82		98.91		98.98		99.06	
3+50	PRE	97.19	5.6	97.26	6.0	97.34	6.0	97.44	5.8	97.52	5.8
	POST	97.66		97.76		97.84		97.92		98	
4+00	PRE	96.09	5.5	96.17	5.8	96.22	6.1	96.32	6.0	96.42	5.8
	POST	96.55		96.65		96.73		96.82		96.9	
4+50	PRE	95.05	5.2	95.09	5.9	95.16	5.9	95.24	5.8	95.32	5.6
	POST	95.48		95.58		95.65		95.72		95.79	
5+00	PRE	94.02	5.5	94.1	5.5	94.16	5.9	94.27	5.5	94.39	5.4
	POST	94.48		94.56		94.65		94.73		94.84	

Avg. Thick. (in.) = 5.7
Anticipated Thick. (in.) = 7.0

ALABAMA SPS-5, SECTION 010509

Trans.	Offset	0'	Overlay Depth (in.)	3'	Overlay Depth (in.)	6'	Overlay Depth (in.)	9'	Overlay Depth (in.)	12' Overlay Depth (in.)
0+00	PRE	95.23	3.0	95.28	3.4	95.34	3.4	95.41	3.0	
	POST	95.48		95.56		95.62		95.66		
0+50	PRE	95.58	3.1	95.66	3.1	95.72	2.9	95.78	2.9	
	POST	95.84		95.92		95.96		96.02		
1+00	PRE	96.07	3.2	96.15	3.1	96.21	3.0	96.27	3.0	
	POST	96.34		96.41		96.46		96.52		
1+50	PRE	96.715	3.2	96.78	3.4	96.88	2.5	96.94	2.6	
	POST	96.98		97.06		97.09		97.16		
2+00	PRE	97.475	3.5	97.52	3.5	97.6	3.0	97.65	2.9	
	POST	97.77		97.81		97.85		97.89		
2+50	PRE	98.4	3.7	98.43	3.7	98.49	3.2	98.54	2.9	
	POST	98.71		98.74		98.76		98.78		
3+00	PRE	99.23	3.2	99.25	3.5	99.3	3.2	99.35	3.0	
	POST	99.5		99.54		99.57		99.6		
3+50	PRE	100	3.5	100.07	3.4	100.1	3.5	100.19	3.0	
	POST	100.29		100.35		100.39		100.44		
4+00	PRE	100.92	3.1	100.95	3.2	100.99	3.0	101.05	2.8	
	POST	101.18		101.22		101.24		101.28		
4+50	PRE	101.67	3.4	101.71	3.5	101.75	3.5	101.83	2.8	
	POST	101.95		102		102.04		102.06		
5+00	PRE	102.3	3.4	102.37	3.4	102.43	3.1	102.53	2.6	
	POST	102.58		102.65		102.69		102.75		

Avg. Thick. (in.) = 3.2

Anticipated Thick. (in.) = 4.0

ALABAMA SPS-5, SECTION 010564

Trans.	Offset	0'	Overlay Depth (in.)	3'	Overlay Depth (in.)	6'	Overlay Depth (in.)	9'	Overlay Depth (in.)	12'	Overlay Depth (in.)
0+00	PRE	101.43	0.7	101.48	0.9	101.49	1.2	101.55	1.1		
	POST	101.49		101.55		101.59		101.64			
0+50	PRE	100.66	1.2	100.72	1.3	100.77	1.2	100.82	1.3		
	POST	100.76		100.82		100.87		100.93			
1+00	PRE	99.935	0.9	99.965	1.1	100	1.2	100.04	1.2		
	POST	100.01		100.06		100.1		100.14			
1+50	PRE	99.04	0.8	99.07	1.2	99.1	1.2	99.17	1.0		
	POST	99.11		99.17		99.2		99.25			
2+00	PRE	98	1.2	98.08	1.0	98.12	1.0	98.2	0.6		
	POST	98.1		98.16		98.2		98.25			
2+50	PRE	97.14	1.0	97.18	1.0	97.21	0.8	97.24	0.8		
	POST	97.22		97.26		97.28		97.31			
3+00	PRE	96.18	0.7	96.2	1.1	96.2	1.3	96.25	1.0		
	POST	96.24		96.29		96.31		96.33			
3+50	PRE	95.09	1.0	95.14	1.1	95.17	1.3	95.22	1.2		
	POST	95.17		95.23		95.28		95.32			
4+00	PRE	94.1	1.1	94.13	1.2	94.16	1.3	94.22	1.0		
	POST	94.19		94.23		94.27		94.3			
4+50	PRE	93.11	1.3	93.15	1.4	93.21	1.0	93.245	1.0		
	POST	93.22		93.27		93.29		93.33			
5+00	PRE	92.09	1.6	92.13	1.7	92.16	1.6	92.2	1.4		
	POST	92.22		92.27		92.29		92.32			

Avg. Thick. (in.) = 1.1
Anticipated Thick. (in.) = 2.0

APPENDIX F

PHOTOGRAPHS

Photo 1. The Milling Operation on Recycled Test Sections

Photo 2. Milled Tailings Free of Large Delaminated Sheets

Photo 3. Surface of Milled Section (With 84″ Cutting Head) Prior to Sweeping

Photo 4. Mechanical Sweeper Prior to Tack Coat

Photo 5. Milled Surface Free of Debris After Sweeping

Photo 6. A Tacked Surface Prior to Construction of A Leveling Course

Photo 7. Construction of a Leveling Course (Recycled Test Section)

Photo 8. Breakdown Roller on Leveling Course

Photo 9. Recycled Material Too Hot (300°F) for Compaction

Photo 10. Breakdown of Virgin Surface