U.S. Department
of Transportation

Federal Highway Administration

New York

New Jersey

LTPP Specific Pavement Studies

Construction Report on SHRP 340800,SPS-8 Project, The Port Authority of NY/NJ, JFK Airport, Spring of 1993

Report No. FHWA-TS-94-34-01

December 1994

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F.L. NJ SPS-8

TECHNICAL MEMORANDUM

Long-Term Pavement Performance

LTPP NORTH ATLANTIC REGIONAL OFFICE
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Tel (716) 632-0804 - Fax (716) 632-4808 - www STANTEC com/ltpp

To: FHWA - LTPP

Attention: Monte Symons

Date: October 4, 1999

From: Frank Meyer

Reference: **Corrections: Construction Report of SPS-8 340800, page 21**
FILE: 62050050-19

As part of a review of some data for the SPS-8 site in NJ, corrections to the Construction Report of the SPS-8 project 340800, prepared in December 1994 and distributed on March 7, 1995 (letter attached) are required Please find enclosed the corrected page 21 of the report which was edited to indicate the shift in the sampling location B2 on the subgrade layer

Please update your copy of the report with this ERRATUM SHEET and corrected page

Any questions please call

Regards

F. Meyer

Frank Meyer
LTPP NARO Principal Investigator

Copies Aramis Lopez LTPP
Gonzalo Rada TSSC
Frank Palise NJ DOT
Mike Lee NY/NJ Port Authority
Basel Abukhater NARO
Gabe Cimini NARO

ERRATA SHEET

for

LTPP Specific Pavement Studies

Construction Report on SHRP 340800, SPS-8 Project, The Port Authority of NY/NJ, JFK Airport, Spring of 1993

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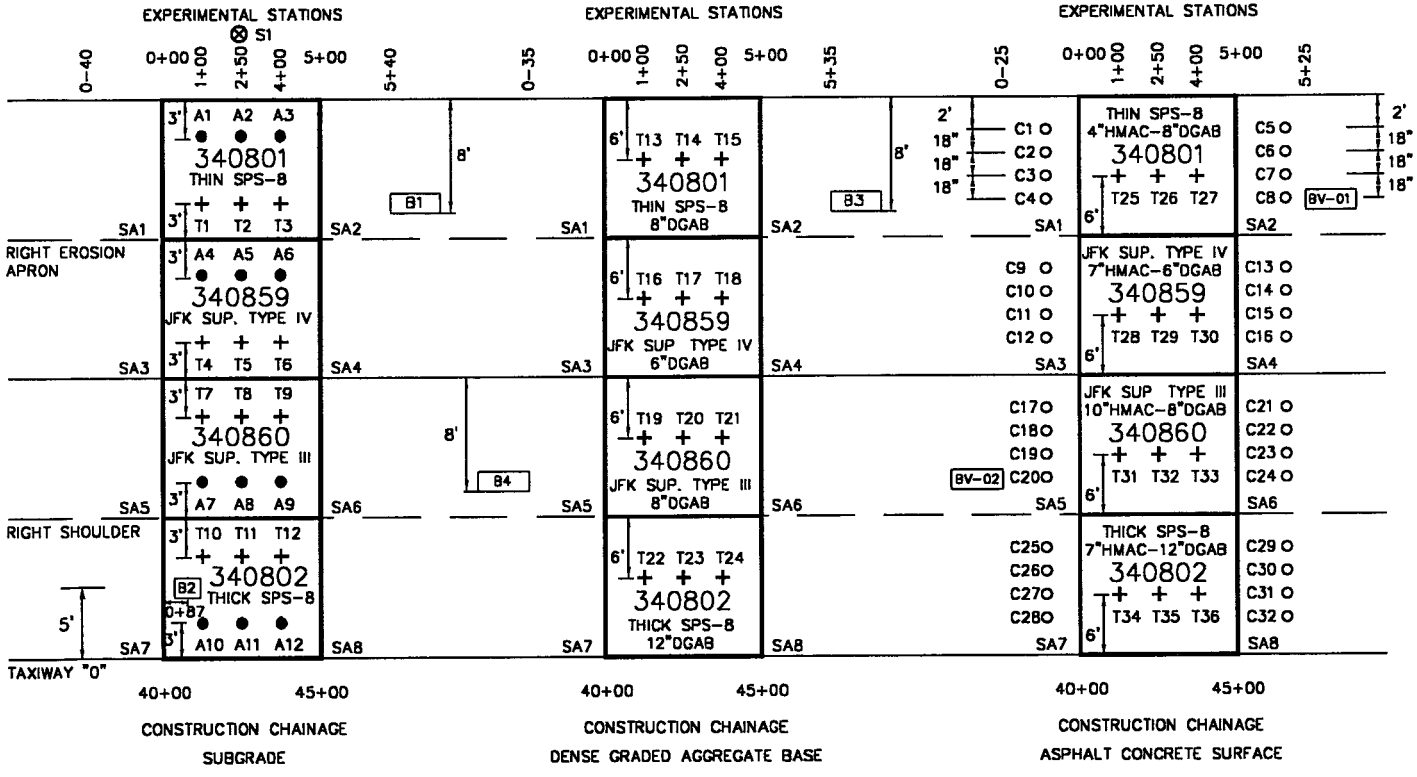
Page 21 Sampling Location B2 on the Subgrade Layer

Original Location Section 340860 station 0-40' offset 32' (from the edge of pavement at 340801)
Corrected Location Section 340802 station 0+87' offset 43' (from the edge of pavement at 340801)

October 4, 1999

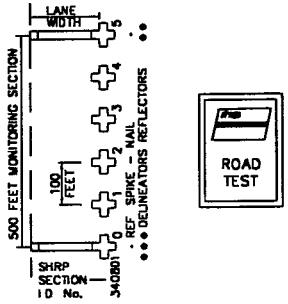
FHWA–LTPP SPS–8 NEW JERSEY SAMPLING PLAN
ENVIRONMENTAL EFFECTS IN THE ABSENCE OF HEAVY LOADS

PAVEMENT MANAGEMENT SYSTEMS LIMITED



MATERIALS SAMPLING AND TESTING PLAN LAYOUT

TYPICAL SITE SIGNING & MARKING



- ● SHELBY TUBE SAMPLING LOCATION (A1–A12)
- \+ NUCLEAR DENSITY/MOISTURE LOCATION (T1–T36,B1–B4,SA1–SA8)
- ⊗ SHOULDER PROBE LOCATION (S1)
- o 4" OD CORE (C1–C32)
- B1 BULK SAMPLES OF SUBGRADE (B1–B2)
- B3 BULK SAMPLES OF UNCOMPACTED DGAB (B3–B4)
- BV-01 BULK PLANT SAMPLES OF HMAC (BV-01 – BV-02)

THE PORT AUTHORITY OF NY AND NJ SPS-8
THE JOHN F KENNEDY INTERNATIONAL AIRPORT

PLOTDATE: OCT 04/99 | FHWA SPS-8 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

SPS-8-2

FIGURE 2. SITE LAYOUT PLAN FOR MATERIALS SAMPLING AND TESTING

SPS-8-2

PAVEMENT
MANAGEMENT
SYSTEMS

March 7, 1995
50451010-13.11.8

Mr. Monte Symons
Federal Highway Research Administration
LTPP, HNR-40
Turner Fairbanks Research Center
6300 Georgetown Pike Room F215
McLean, Virginia 22101-2296

RE: Report on Construction of the Port Authority of NY/NJ SPS-8 Project at JFK International Airport, Spring of 1993

Dear Mr. Symons:

Forwarded enclosed is a report on the construction during the Spring of 1993 of the SPS-8 project, identified as 340800 in the Long Term Pavement Performance program, by the Port Authority of NY/NJ at Taxiway "O" at the JFK International Airport.

The report is intended to form part of a composite LTPP report on the SPS-8 experiment, and therefore deals principally with certain specific elements and with deviations from the SPS-8 project guidelines. The materials and testing results from the Port Authority Laboratories and from the FHWA-LTPP Contractor Laboratories (Law Engineering in Atlanta, GA) and weather data supplied by the Port Authority, will be uploaded to the National Information Management Systems (NIMS) maintained by the Transportation Research Board (TRB) in Washington, DC.

Performance monitoring of the test sections is ongoing by the LTPP North Atlantic Regional office, and this data will also be uploaded to NIMS.

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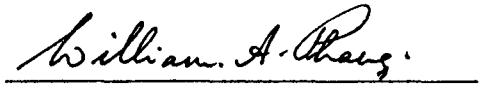
Should you have any questions or need further information, please do not hesitate to call this office.

Yours Sincerely,



William A. Phang
Program Manager
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WAP/tf

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LTPP Specific Pavement Studies

Construction Report on SHRP 340800, SPS-8 Project
The Port Authority of NY/NJ, JFK Airport, Spring of 1993

Report No. FHWA-TS-94-34-01

Prepared by

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Technical Report Documentation Page

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Pavement Management Systems Limited 415 Lawrence Bell Drive - Suite 3 Amherst, New York 14221	11. Contract or Grant No. DTFH61-92-C-00007

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15 Supplementary Notes

The report is a cooperative effort between The Port Authority of New York and New Jersey Materials Engineering Section Construction Division and Pavement Management Systems Limited LTPP North Atlantic Region Coordination Office
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16 Abstract

This report provides a description of the construction of an SPS-8 experimental section for the study of the environmental effects of asphalt concrete pavements in the absence of heavy loads conducted as part of the Long Term Pavement Performance (LTPP) program at JFK Airport west of Taxiway "O" in New York City, New York The construction of four asphalt concrete surface pavement test sections started on April 1, 1993 and was completed on June 9, 1993 The construction started with the subgrade preparation followed by laying of a dense graded aggregate base layer of different thicknesses, and then, paving using a Plant Mix Macadam Asphalt Concrete Base layer and an F A A Mix # 1 (AC-20) Asphalt Concrete Binder layer on the agency supplemental two sections Finally an F A A Mix # 3 (AC-20) Asphalt Concrete Surface layer was placed on all four sections The report contains a description of the non bound pavement layers preparation, the paving operations, the equipment used by the contractor, the field sampling and testing operations during and after construction, problems encountered during construction, specific site circumstances, deviations from the standard guidelines, and a summary of the initial data collection

17 Key Words	18 Distribution Statement
Monitoring, Survey, FWD, Profilometer, Longitudinal Dipstick	

19 Security Classif (of this report)	20 Security Classif (of this page)	21 No. of Pages	22 Price

Form DOT F 1700 7 (8-72) Facsimile

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Construction Report on SHRP 340800, SPS-8 Project, The Port Authority of NY/NJ, JFK Airport, Spring of 1993

I. Introduction

The Port Authority of NY/NJ SPS-8 project at JFK Airport is a study of the environmental effects of asphalt concrete pavements in the absence of heavy loads. The project lies in the wet-freeze environmental area with an inactive fine-grained subgrade. In addition to the two SHRP test sections of the main experiment, with a thin structure of 102 mm of asphalt concrete on 203 mm of granular base and a thick structure of 178 mm of asphalt concrete on 305 mm of granular base, there are two Port Authority supplemental sections The first is a type IV erosion design thin section with 178 mm of asphalt concrete on 152 mm of granular base and the second, a type III shoulder design thick section of 254 mm of asphalt concrete on 203 mm of granular base as shown in Table 1

The project is inside JFK Airport West of Taxiway "O" and East of a restricted service road, Figure 1 The Air France Cargo Building is on the other side of the restricted service road, and is on the South West corner of the SPS-8 site The four test sections are constructed next to each other in parallel starting at the construction chainage of 40+00 and ending at 45+00 The SHRP station 0+00 being at construction station 40+00, and the SHRP station 5+00 being at construction station 45+00 Each section is 150 meters long and 3.7 meters wide The four sections with the shoulders and the sampling areas form one block of 180 meters long and 15 meters wide

The project at JFK Airport, J F K I A - Relocation of Taxiways "I" and "O", Contract No JFK-220 067 (CA3-222 067), was advertised for bids using the Port Authority of NY/NJ standard contract administration and construction procedures The contract was awarded to Grace Industries Inc of Corona, New York and started in October 1992 with a project completion date of November 1994

A Pre-Construction Meeting was held at the Port Authority of NY/NJ Technical Center in New Jersey city on Thursday March 18, 1993 at 1000 hours. All Data Collection Guidelines, Material Testing and Sampling Guidelines, Laboratory Testing Guidelines, Weather Data Guidelines, and SPS-8 Construction Guidelines were handed to the Port Authority personnel by Mr Andrew Brigg and Mr Basel Abukhater of Pavement Management Systems North Atlantic Region Coordination Office At the meeting were Mr Harry Schmerl, Chief Civil Engineer, Mr Cas Bognacki, Engineer of Materials, Mr Frank Palise, NJ DOT, and Mr Neil O'Conner, JFK-REO Correspondences related to this meeting and other issues are provided in Appendix A

On site and in charge of the construction work were Mr Daniel Webber, Supervisor, and Mr Bill Hoermann, Inspector The Port Authority Coordinator and LTPP contact is Mr Fernando Medina who was also responsible for the material sampling and field testing, as

well as the laboratory testing. The Supervisor of the asphalt lab is Mr. John Varrone and the Supervisor of Soils Lab is Mr. Steve Cimbolic, both at the Port Authority Technical Center, Materials Engineering Division, 241 Erie Street, Room # 234, Jersey City, New Jersey 07310-1397.

Grace Industries asphalt mixing plant is a batch type plant model No. 6142-8, manufactured by McCarter of Morristown, Pennsylvania. It has the capacity of using recycled asphalt and to load off barges. The asphalt supplier is New York Trap Rock, Clinton Point, New York. The paving equipment used in the construction included a Duff Norton Co. of North Carolina CM2500-11 paver and Dynapac 10 2 ton and 15 6 ton double-drum vibratory steel wheel rollers For the earth works, a Dynapac 12 1 ton single-drum steel roller CA301D with hydraulic vibration was used. Weather information is supplied by an in-house weather monitoring system located in the Control Tower Management Office inside JFK Airport

II. Project Details

Layout

The two main SHRP SPS sections and the two Port Authority supplemental sections are laid in parallel next to each other unlike all other GPS and SPS sections which come in series following each other The two sections next to Taxiway "O" , one main SPS section 340802 and one supplemental 340860, have a thick pavement structure following the right shoulder specification design of the Port Authority The other two sections adjacent to the restricted service road, one main SPS section 340801 and one supplemental 340859, have a thin pavement structure following the right erosion apron Port Authority design specification, Figure 2 All the sections have the same beginning and ending stations as shown in Figure 2, where the experimental stations are shown in the upper part of the figure and the construction stations are shown in the lower part Table 1 also displays the construction station of each section including the sampling areas

Because of the special layout of this project, the zero offset location, from which all offset distances are measured, was at the edge of pavement of the 340801 section Thus the mid lane offset of 340801 is 1 8 m, the offset of the edge of 340859 is 3 7 m, the offset of the edge of 340860 is 7 2 m, the offset of the edge of 340802 is 10 8 m, and the far side edge of pavement of section 340802 next to Taxiway "O" is 14 4 m

Materials Field Sampling and Testing

Locations for field material sampling and testing are summarized in Figure 2 Two main stages of field material sampling and testing were involved here, first, during construction of the subgrade, aggregate base, and asphalt concrete pavement layers, and second, after construction of the final surface layer Table 2 summarizes the field testing on every layer, the number of tests, and the location designation Table 3 summarizes the material sampling for each of the layers, the number of samples collected, and sample location of each Table 4 is intended to show the number, quantity, and location of the bulk samples collected during construction, and to identify those to be used for testing as part of the SPS-8 experiment, and those to be sent to the Materials Reference Library The Port

Authority was involved in all field testing and sampling, and in carrying out most of the laboratory testing on the sampled material. The only two field tasks performed by another party were the splitspoon sampling and the shoulder augering. Both were done by Craig Test Boring Co., Inc. of Mays Landing, New Jersey Table 5 shows the dates of all the field testing and sampling activities throughout the construction and post construction periods. Table 6 lists the actual date as compared to the guidelines on initial monitoring measurements of SPS-8 sites.

The laboratory material testing plan is summarized in Table 7 for the different layers. The SHRP test designation and Protocol number for each test is tabulated and so are the number of tests per layer and material source or test location Aggregates extracted at the Port Authority Laboratory were shipped to the National Aggregate Association's Joint Research Laboratory (NAAJRL) for the Fine Aggregate Particle Shape Test, Designation No. AG05, Protocol P14A. In addition to the Port Authority Laboratory, part of the testing, especially the Resilient Modulus, will be performed by the FHWA-LTPP Contractor Laboratory, Law Engineering, Inc in Atlanta, Georgia

III. Construction

Table 8 lists all the dates of the construction activities for all the sections. The subgrade layer over all the sections was ready on April 4, 1993 except for part of section 340802 from station 0+70 and back to the beginning of the sampling area starting at 0-50 All the materials sampling and field testing were done according to plan except that the bulk sample B2 was taken at station 0+87 of 340802, rather than station 0-40 as originally planned

Subgrade Preparation

The contractor used a 12 1 ton single-drum Dynapac CA-301D roller with hydraulic vibration to compact the subgrade material The original ground was semi-level with no cut or fill sections Previously, part of the area must have been a paved service road, which explains the fact that a hard area was hit when the nuclear density operator was trying to insert the rod at location T11, station 2+50, offset 11 9 m in section 340802 Similar underlying material was detected between stations 2+50 and 3+75 offset 11 9 m of the same section The T11 location was shifted to station 2+49 offset 14 0 m Also, at split spoon test location, A9, at station 4+00, offset 10 1 m in section 340860, a black asphalt mix was detected at a depth of 1 1 meters At the subgrade bulk sample locations B1 and B2, big rocks were excavated as shown in by the photos (Appendix B, Figures B-1 and B-2) Similar big rocks were also detected at the split spoon location A6 in section 340859, which had to be shifted from offset 4 6 m to 4 4 m to avoid these rocks.

After finishing the subgrade layer, in-situ densities were measured with the nuclear gage by the Port Authority staff at 12 locations as indicated in Figure 2 Values of the meaured in situ densities and moisture contents are presented in Table 9 Also split spoon sampling was performed at another 12 locations and one shoulder probe augering was conducted, both by a sub-contractor, Craig Test Boring Co , Inc , of Mays Landing, New Jersey. Bulk and moisture subgrade samples were also collected from two locations by the Port

Authority staff. All the samples were taken by the Port Authority staff to their laboratory in the Technical Center (SHRP Laboratory Assigned Code 3422). Elevation shots were taken on April 8, 1993 by the contractor's staff, on top of the subgrade layer as shown in Figure 3, Elev 1.

Dense Graded Aggregate Base Preparation

For the dense graded aggregate base layer (DGAB), the contractor used a CAT 966E grader to spread the material and a 12.1 ton Dynapac VCR2 single-drum steel vibratory roller for compaction. The construction of this layer started on April 19, 1993 and was completed on April 20, 1993 Section 340802 had 305 mm of base layer which was laid in two equal lifts. In-situ densities were measured, using the nuclear gage, by the Port Authority staff at 12 locations as shown in Figure 2. Densities of the two supplemental sections were measured on April 27, 1993 prior to paving the Plant Mix Macadam (PMM) asphalt concrete layer, and on the two SHRP main sections on June 9, before paving the top surface asphalt concrete layer. Values of the meaured in situ densities and moisture contents are presented in Table 9. Two bulk and two moisture samples were collected from the sampling areas at locations B3 and B4 prior to compaction. Elevation shots were taken by the contractor's staff on top of the DGAB layer of all the sections on April 27, 1993, Figure 3, Elev 2 For the two main SHRP sections, elevation shots were taken again on June 8, 1993 along with the elevation shots of the PMM asphalt concrete base layer on the two supplemental sections, Figure 3, Elev 4

AC PMM Base Layer Preparation

The supplemental sections of the Port Authority were paved first with a plant mix macadam asphalt concrete base layer (job mix formula provided in Appendix A). The paving started on April 28, 1993 and was completed on April 29, 1993. The asphalt concrete paver used by the contractor for all his paving operations was a CM 2500-11 paver manufactured by Duff Norton Co of North Carolina Paving width was 3 7 meters. The thickness of the PMM base layer on 340860 was 152 mm, which was placed in two equal lifts The first lift was placed on April 28, 1993 and the second on April 29, 1993 One bulk sample of the mixture was collected as soon as the material was dropped from the hauling truck at station 3+80 of section 340859 Two Dynapac double-drum vibratory rollers were used for the compaction of all the asphalt concrete layers. First a breakdown 10 2 ton Dynapac CC42 was used followed by a finishing 15 6 ton CC50 roller Elevation shots were taken on top of the first lift of 340860 on April 29, 1993 before placing the second lift. On June 8, 1993 elevations shots were taken for all the sections, the two Port Authority supplemental sections with PMM on top and the two SHRP main sections with DGAB on top, Figure 3, Elev 4

AC Binder Layer Preparation

Only one supplemental section, 340860, had 51 mm of binder asphalt concrete mixture (job mix formula provided in Appendix A) This layer was placed early on the morning of June 10, 1993 before the Port Authority and SHRP personnel were on site. Bulk samples were collected from the plant on June 18, 1993 According to the contractor, elevation shots were taken on the top of this layer, but were misplaced and could never be found.

AC Surface Layer Preparation

The same paving and compaction equipment was used for the surface layer as for the PMM base and binder courses. The mixing temperature was 325 F. The paving of this layer started and was completed on June 10, 1993. Section 340802 was paved in two lifts; the first was a 102 mm lift and the second was a 76 mm lift. Both were paved on the same day. The bulk sample for the surface layer was collected from the second lift at station 2+50 of section 340802 immediately after discharge from the hauling truck. In-situ densities were measured at 12 locations, covering the four sections, on August 12, 1993. Eight densities were also taken at the eight sampling areas on August 13, 1993. Values of the meaured in situ densities are presented in Table 9 Elevation shots were taken of all the sections on August 27, 1993, Figure 3, Elev 5 Cores of the asphalt concrete layers, from the sampling areas, were collected on September 9, 1993. Table 10 lists the thicknesses of all the cores collected on that day. Table 11 lists all the thicknesses as determined by the Rod and Level Elevations

According to the SPS-8 Construction Guidelines, the as-compacted thickness of the asphalt concrete (surface plus binder plus base) in the test sections shall be constructed to within $\pm$ 7 mm of the value specified in the experimental design (i e 102 $\pm$ 7 and 178 $\pm$ 7 mm). From Tables 10 and 11, it is obvious that more than one third of the cores are outside the limits. Sampling area 2 of 340801 at 5+25 , from which cores CA05 to CA08 were collected, is a low area because of the drainage and man holes present These locations are listed in Table 12 This is why all the cores taken from that area were outside the limit to the lower range The asphalt plant was visited on June 10, 1993, and samples were taken of the asphalt cement used in all the asphalt concrete layers

Figure 4 shows the location of four cores taken by the contractor inside the test sections This was done without the knowledge of the Port Authority staff who had given strict instructions to the contractor not to do any destructive testing in the 152.4 m length of each of the sections It was a mistake which could not be undone but Maintenance sheets have to be filled for this full patch operation by the agency personnel The holes were filled with a fast setting portland cement concrete mixture Also three manholes are present inside our sections The exact location of each of the core holes and manholes are listed in Table 12

The paving was extended 305 mm on the right hand side of the sections between Taxiway "O" and section 340802 thus considered as the right outer shoulder The same is also the case on the left side between section 340801 and the grass area separating the restricted service road and the test sections The grass area was also paved from station 4+55 5 towards the end of the test sections, and into the sampling area

Climatological Data Summary During Paving Days

Below are the Climatological data summary of the three days of paving that were extracted from the JFK Airport Local Climatological Data Monthly Summary Logs (Appendix B) On April 28, 1993 the maximum air temperature was 17 C at 1600 hours and the minimum was 4 C at 0400 hours The average for the whole day was 11 C and the departure from normal temperature was -2 C On April 29, 1993 the maximum air temperature was 20 C at 1300 hours and the minimum was 6 C at 0100 hours The

average air temperature for the whole day was 13 C and the departure from normal temperature was +1 C On June 10, 1993 the maximum air temperature was 32 C at 1600 hours and the minimum was 18 C at 0100 hours. The average for the whole day was 25 C and the departure from normal temperature was +5 C. No water equivalent or snow ice pellets precipitation was recorded during these days, except for traces of water equivalent precipitation recorded on June 10, 1993 at 2100 hours

IV. Post Construction Operations and Initial Performance

The site was marked on August 5, 1993 with the minimum amount of markings, as requested by FAA, to avoid any confusion to planes while landing. Figure 4 shows the paint marks used on the sections to identify the location of the beginning of each of the sections and at 30.5 m intervals.

Profilometer testing was performed on August 5, 1993 after marking the site. Because there was not enough distance before station 0+00 for the Profilometer to get to the required speed for the test, it was decided to start the Profilometer test at station 5+00 going towards 0+00, but only at 32 kph or even little less to be able to stop in the limited space available after station 0+00 To make sure that accurate IRI values are obtained, the Dipstick was used on December 8-10, 1993. IRI values of the Profilometer and the Dipstick matched up very well Plots of the elevation measurements from the Profilometer and the Dipstick of all four sites are presented in Figures 5 to 12. A second survey was also conducted by the Profilometer on September 12, 1994

The Falling Weight Deflectometer and Manual Distress Survey were performed on the site on September 8, 1993 No sign of any distress was detected in any of the sections on that day

On December 9 and 10, 1993 the Dipstick was used to measure the elevations in the longitudinal direction throughout the 152 4 m of each of the four sections The main reason behind this testing was that the leading distance before the sections was too short for the Profilometer to get the 80 kph speed or even the 72 or 56 kph speed The Profilometer was run at a speed of only 32 to 40 kph, and the test was performed starting at the 5+00 line driving towards the 0+00 line The IRI calculated from the Profilometer and the longitudinal Dipstick were very close, as is indicated in Table 13 There was no reason why this procedure can not be done every time the Profilometer visits the site

During the monitoring period, June to December 1993, the site was reported as having no obvious distresses and was performing satisfactorily

When the site was visited by the Profilometer crew in September 1994, permanent cones were found throughout Section 340802, thus this section could not be tested with the Profilometer and only the other three sections were The Dipstick have to be used for measuring the elevations at this 340802 site for IRI calculations The site was visited again in December 1994, a total of 11 cones were counted in section 340802, the first at station 0+33 and the last at station 4+98 5 The offset from the outside unpaved shoulder, near the service road and Air France Cargo Building, was 12 2 m, and from the inside paved shoulder next to Taxiway "O" was 2 4 m, as shown in the photo in Appendix B (Figure B-9)

Table 1 Site Layout, SPS-8, JFK Airport, Taxiway "O"

Construction Station	Length (m)	AC Thickness	Granular Base Thickness	Remarks	Section I.D.
39+50 45+50	182.9	102 mm Top	203 mm	Thin SPS-8 Right Erosion Outside Lane 3.7 m	**340801**
39+50 45+50	182 9	76 mm Top 102 mm PMM	152 mm	JFK Supplemental Right Erosion, Type IV Inside Lane 3.7 m	**340859**
39+50 45+50	182 9	51 mm Top 51 mm Binder 102 mm PMM	203 mm	JFK Supplemental Right Shoulder, Type III Inside Lane 3 7 m	**340860**
39+50 45+50	182 9	178 mm Top	305 mm	Thick SPS-8 Right Shoulder Outside Lane 3 7 m	**340802**

Table 2. Scope of Field Testing

Layer	Number of Tests	Location Designation
Asphalt Concrete Surface In-Situ Density (Nuclear Gage)	20	T25-T36, SA1-SA8
Unbound Base In-Situ Density and Moisture Content (NG)	12	T13-T24
Subgrade In-Situ Density and Moisture Content (NG)	12	T1-T12

Table 3 Scope of Material Sampling

Layer	Number of Samples	Sample Location
Asphalt Concrete		
Coring - 102 mm Diameter	32	C1-C32
AC Surface Bulk Sampling	1	B5
AC Binder Bulk Sampling	1	B6
AC Base Bulk Sampling	1	B7
(23 kg of each mix uncompacted)		from plant or roadway prior to compaction
Asphalt Cement (19 litre samples)	1	BC-01 from plant
Unbound Base		
Bulk Sampling (182 kg samples)	2	B3-B4
Moisture Content Samples	2	B3-B4
Subgrade		
Splitspoon Sampling (2 spoons per hole)	24	A1-A12
Bulk Sampling (182 kg samples)	2	B1-B2
Moisture Content Samples	2	B1-B2
Shoulder Auger Probes (Depth to Rigid Layer)	1	S1

Table 4. Bulk Material Sampling During Construction

A. Materials for Testing as Part of the SPS-8 Experiment

Material Description	Number of Samples	Quantity of Each Sample	Sample Location
AC Surface	1	1.5 - 19 litre pails	B5 - SA4 - 340859
AC Binder	1	2 - 19 litre pails	B6 - Mix Plant
AC Base	1	1 - 19 litre pail	B7 - SA7 - 340802
AC Cement	1	0 5 - 19 litre pail	Mix Plant

B Materials for Shipping to the SHRP Materials Reference Library

Material Description	Number of Samples	Quantity of Each Sample	Sample Location
AC Surface	1	1 5 - 19 litre pails	B5 - SA4 - 340859
AC Binder	1	1 - 19 litre pail	B6 - Mix Plant
AC Base	1	2 - 19 litre pails	B7 - SA7 - 340802
AC Cement	1	2.5 - 19 litre pails	Mix Plant

Table 5. Field Activities During and Post Construction

	SUBG	DGAB	PMM 1st lift	PMM 2nd lift	AC Binder	Top 1st lift	Top 2nd lift	AC Cement
In-Situ Density	4/5/93	4/27/93 6/8/93					8/12/93 8/13/93	
Split Spoon Sampling	4/5/93							
Shoulder Probe	4/5/93							
Bulk Sampling	4/5/93	4/19/93 4/20/93	4/28/93		6/18/93		6/10/93	6/18/93
Rod & Level Elevations *	4/8/93 *elev. #1*	4/27/93 *elev. #2* 6/8/93 *elev #4*	4/29/93 *elev. #3*	6/8/93 *elev. #4*			8/27/93 *elev. #5*	
Photos & Slides	4/6/93	4/19/93 4/20/93	4/28/93	4/29/93		6/10/93	9/8/93 9/9/93	
Road Site Markings							8/5/93	
Profilometer Testing							8/5/93	
FWD Testing							9/8/93	
MDS Survey							9/8/93	
102 mm Coring							9/9/93	
Longitudinal Dipstick							12/9/93 12/10/93	

* Note: Refer to figure 3 for elevation number locations

Table 6. Guidelines vs Actual Initial Monitoring Measurements Dates

Measurement Type	Monitoring Period After Construction	Monitoring Date as per the Guidelines - Construction Finished June 10, 1993	Actual Monitoring Date
Deflection	1-3 Months	July 10-Sep 10, 1993	September 8, 1993
Profile	< 2 Months	Before Aug 10, 1993	August 5, 1993
Distress Survey	< 6 Months	Before Dec 10, 1993	September 8, 1993
Friction	3-12 Months	Sep 10-June 10, 1994	March 24, 1994

Table 7 Field and Laboratory Material Testing

Test Type	SHRP Test Desig.	SHRP Prot-ocol	Tests per Layer	Material Source /Test Location	Comments
SUBGRADE					
Sieve Analysis	SS01	P51	2	B1-B2	
Classification and Type	SS04	P52	14	A1-A12, B1-B2	Visual only
Moisture/Density Relations	SS05	P55	2	B1-B2	
Resilient Modulus	SS07	P46	4	A3, A4, A7, A12	
Natural Moisture Content	SS09	P49	2	B1-B2	
Unconfined Comp Strength	SS10	P54	4	A2, A5, A8, A11	
In-Place Density		LTPP	12	T1-T12	
Depth to Rigid Layer		LTPP	1	S1	
UNBOUND GRAN. BASE					
Particle Size Analysis	UG01	P41	2	B3-B4	
Sieve Analysis (washed)	UG02	P41	2	B3-B4	
Moisture/Density Relations	UG05	P44	2	B3-B4	
Resilient Modulus	UG07	P46	2	B3-B4	
Classification	UG08	P47	2	B3-B4	
Natural Moisture Content	UG10	P49	2	B3-B4	
In-Place Density		LTPP	12	T13-T24	
AC SURFACE, BINDER, AND PMM BASE					
Core Exam /Thickness	AC01	P01	32	All Cores	
Bulk Specific Gravity	AC02	P02	32	All Cores	
Maximum Specific Gravity	AC03	P03	2	BV01, BV20, BV30	Bulk samples
AC% Extraction	AC04	P04	2	BV01, BV20, BV30	of HMAC
Moisture Susceptibility	AC05	P05	2	BV01, BV20	taken from
Creep Compliance	AC06	P06	1	C14	plant or
Resilient Modulus	AC07	P07	4	[C1-C3] [C9-C11] [C17-C19] [C25-C27]	roadway prior to compaction
Tensile Strength	AC07	P07	4	[C1-C4] [C9-C12] [C17-C20] [C25-C28]	
In-Place Density		LTPP	20	T25-T36, SA1-SA8	
ASPHALT CEMENT					
Abson Recovery	AE01	P21	2	BV01, BV20	
Penetration (50, 77, 90F)	AE02	P22	2	BV01, BV20, BV30	
Specific Gravity (60F)	AE03	P23	2	BV01, BV20, BV30	
Viscosity at 140F, 275F	AE05	P25	2	BV01, BV20, BV30	
EXTRACTED AGGREG.					
Specific Gravity					
Coarse Aggregate	AG01	P11	2	BV01, BV20, BV30	
Fine Aggregate	AG02	P12	2	BV01, BV20, BV30	
Gradation of Aggregate	AG04	P14	2	BV01, BV20, BV30	
Particle Shape NAA Test					
Fine Aggregate Shape	AG05	P14A	2	BV01, BV20, BV30	
Coarse Aggregate Shape	AG06	P14B	2	BV01, BV20, BV30	
ASPH. CEM.(from tanker)					
Penetration (50, 77, 90F)	AE02	P22	2	BC01 from plant	Bulk sample
Specific Gravity (60F)	AE03	P23	2	BC01 from plant	taken from
Viscosity at 140F, 275F	AE05	P25	2	BC01 from plant	plant

Table 8 Construction Geometrics and Dates

Section ID and Structure	Subgrade Completed mm/dd/yy	DGAB Completed mm/dd/yy	AC PMM Completed mm/dd/yy	AC Binder Completed mm/dd/yy	AC Top Completed mm/dd/yy
340801 102 mm AC TOP 0 mm AC BINDER 0 mm AC PMM 203 mm DGAB	04/04/93	04/19/93	-	-	06/10/93
340859 76 mm AC TOP 0 mm AC BINDER 102 mm AC PMM 152 mm DGAB	04/04/93	04/19/93	04/28/93	-	06/10/93
340860 51 mm AC TOP 51 mm AC BINDER 152 mm AC PMM 203 mm DGAB	04/04/93	04/20/93	1st lift 04/28/93 2nd lift 04/29/93	06/10/93	06/10/93
340802 178 mm AC TOP 0 mm AC BINDER 0 mm AC PMM 305 mm DGAB	04/06/93	04/20/93	-	-	1st lift 06/10/93 2nd lift 06/10/93

Table 9. Nuclear Gage In Situ Densities and Moisture Contents During and Post Construction

Section	340801			340859			340860			340802		
Layer	**Subg**	**DG-AB**	**AC Top**	**Subg**	**DG-AB**	**AC Top**	**Subg**	**DG-AB**	**AC Top**	**Subg**	**DG-AB**	**AC Top**
Date m/d/93	4/5	6/9	8/12 8/13	4/5	4/27	8/12 8/13	4/5	4/27	8/12 8/13	4/5	6/9	8/12 8/13
Depth from Surf. to top of layer	305 mm	102 mm	0 mm	330 mm	178 mm	0 mm	457 mm	254 mm	0 mm	483 mm	178 mm	0 mm
Density* kg/m^3												
Rod Depth	152 mm	152 mm	BS	152 mm	152 mm	BS	152 mm	152 mm	BS	152 mm	152 mm	BS
0-25			2539			2541			2541			2528
1+00	1988	2235	2507	2062	2335	2440	1930	2335	2508	1841	2254	2518
2+50	1932	2223	2520	2046	2344	2476	1808	2425	2518	1861	2345	2517
4+00	1959	2254	2465	1929	2300	2587	1813	2335	2587	1796	2345	2547
5+25			2573			2502			2536			2611
Moisture *												
	BS	BS		BS	BS		BS	BS		BS	BS	
0-25												
1+00	8 3	1 6		7 9	1 7		8 4	1 9		11 9	1 6	
2+50	10 1	1 9		8 5	2 4		14 0	1 9		11.7	1 9	
4+00	8 8	2 0		7 2	2 2		12 2	2.1		8.3	1 8	
5+25												

* Note: Density is either Direct Transmission (rod depth given in mm) or Back Scatter BS
Moisture is always Back Scatter BS

Table 10. Core Thicknesses from the Field Material Sampling and Testing Forms

		Before Section		After Section		Design Specs H ± 7 mm		
Section ID	**Offset m**	**Core #**	**Thickness H mm**	**Core #**	**Thickness H mm**	**Thickness H mm**	**Lower Limit**	**Upper Limit**
340801	0.61	CA01	94*	CA05	84*	102	95	109
	1.07	CA02	94*	CA06	84*			
	1.52	CA03	97	CA07	81*			
	1 98	CA04	97	CA08	86*			
340859	4.27	CA09	168*	CA13	165*	178	171	185
	4.72	CA10	170*	CA14	170*			
	5.18	CA11	168*	CA15	175			
	5 64	CA12	168*	CA16	173			
340860	7 92	CA17	241*	CA21	254	254	247	261
	8 38	CA18	254	CA22	251			
	8.84	CA19	254	CA23	262*			
	9.30	CA20	254	CA24	264*			
340802	11 58	CA25	165*	CA29	168*	178	171	185
	12.04	CA26	165*	CA30	173			
	12 50	CA27	170*	CA31	173			
	12 95	CA28	170*	CA32	175			

* Note: Outside specification limits of total design thickness +/- 7 mm.

Table 11. Layer Thicknesses from Rod and Level Elevations

		340801		340859			340860			340802	
SP H		203	102	152	102	76	203	152	51+51	305	178
LOC	Station	DGAB	SURF	DGAB	BASE	SURF	DGAB	BASE	Bm+Sur	DGAB	SURF
EOP	40+00									284	157
OWP		201	81	173	97	71	229	155	109	292	168
MID		193	79	183	102	74	234	163	109	272	178
IWP		201	91	183	104	66	211	170	94	272	180
CL		185		150	74	109					
EOP	40+50									292	178
OWP		208	89	152	107	76	216	152	107	323	185
MID		201	97	163	104	86	201	170	104	300	196
IWP		193	89	157	91	94	218	163	102	318	142
CL		173		157	89	104					
EOP	41+00									315	173
OWP		201	94	147	107	61	183	170	104	302	178
MID		201	97	150	102	66	203	163	109	305	170
IWP		180	91	142	102	71	213	157	102	300	168
CL		173		132	76	102					
EOP	41+50									257	173
OWP		201	94	173	97	71	218	147	109	315	178
MID		185	97	183	91	74	218	155	91	323	165
IWP		198	79	188	89	64	211	163	97	335	165
CL		157		170	51	119					
EOP	42+00									284	168
OWP		198	94	155	104	58	234	137	104	330	165
MID		196	91	163	104	61	216	155	102	323	165
IWP		188	86	180	107	56	208	163	94	325	170
CL		183		188	48	112					
EOP	42+50									241	185
OWP		203	97	163	119	66	208	165	104	300	193
MID		201	102	168	112	76	203	178	94	290	180
IWP		208	81	183	102	81	201	170	91	300	157
CL		188		170	91	102					
EOP	43+00									300	168
OWP		218	91	150	102	79	239	150	117	323	168
MID		193	107	155	102	76	239	150	109	320	170
IWP		196	97	168	94	79	262	137	104	325	152
CL		185		170	64	109					
EOP	43+50									257	193
OWP		188	81	178	94	86	226	142	109	264	196
MID		188	91	163	109	86	229	155	104	259	180
IWP		203	94	155	104	86	234	147	97	274	168
CL		201		163	56	109					
EOP	44+00									249	183
OWP		203	89	163	79	79	211	135	117	284	178
MID		188	81	152	94	81	224	147	112	305	163
IWP		198	89	142	89	89	226	152	97	320	155
CL		193		147	66	109					
EOP	44+50									257	201
OWP		203	79	173	112	81	218	155	107	284	198
MID		193	81	147	117	81	226	168	102	277	185
IWP		208	81	163	107	86	231	165	97	292	180
CL		173		163	66	112					
EOP	45+00									264	178
OWP		201	91	163	94	79	196	163	109	333	180
MID		208	91	135	102	86	211	152	109	310	173
IWP		216	79	142	81	94	211	140	104	318	170
CL		127		104	102	102					
AVG		193 *	89 *	160 *	94	84	218 *	155	104	295 *	175
MIN		127	79	104	48	56	183	135	91	241	142
MAX		218	107	188	119	119	262	178	117	335	201
DEV		0 6	0 3	0 6	0 7	0 6	0 6	0 4	0 3	1 0	0 5

* Note Outside specification limits of total design thickness +/- 7 mm

Table 12. Types and Locations of Obstructions on the SPS Sites

Type	Section ID	Station	Offset meters
102 mm Core Hole	340801	3+74 8	2.8
102 mm Core Hole	340860	4+20.3	10.3
102 mm Core Hole	340860	4+21.2	10.2
102 mm Core Hole	340860	4+48 2	10.6
Manhole	340859	3+80.4	5.5
Manhole	340801	4+31.8	2.8
Manhole	340801	4+84 6	0 2

Table 13. IRI Values from the Profilometer and Longitudinal Dipstick Surveys

	Profilometer		**Longitudinal Dipstick**	
Section ID	Date mm/dd/yy	Avg. IRI of 5 Runs m/km	Date mm/dd/yy	Avg. IRI of 2 Runs m/km
340801	08/05/93 09/12/94	3 225 3.179	12/10/93	3.183
340859	08/05/93 09/12/94	1 958 2.015	12/09/93	1.957
340860	08/05/93 09/12/94	1 502 1 484	12/09/93	1.429
340802	08/05/93	1 56	12/09/93	1.513

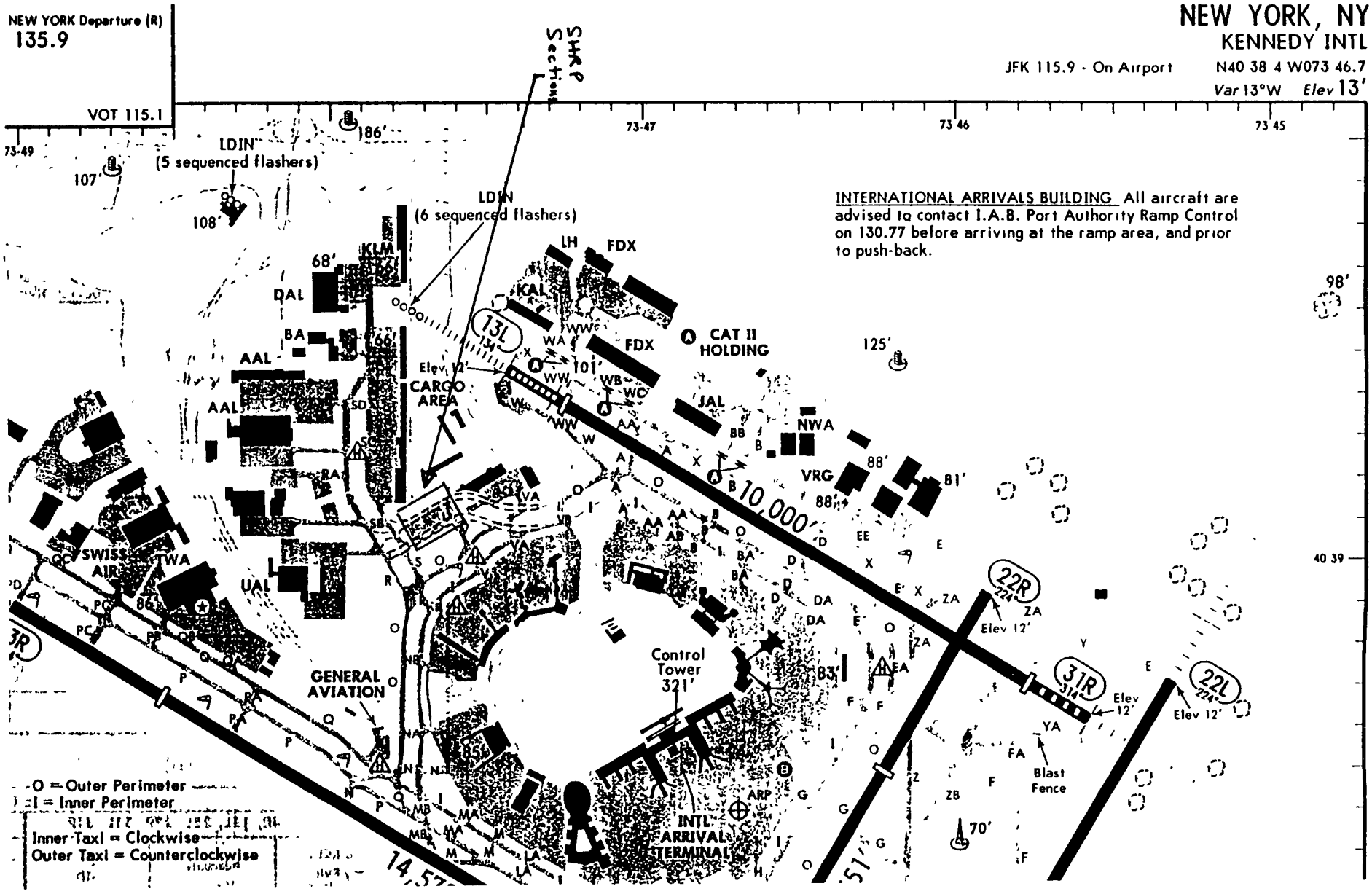


Figure 1 Site Location Map - SPS Section 340800

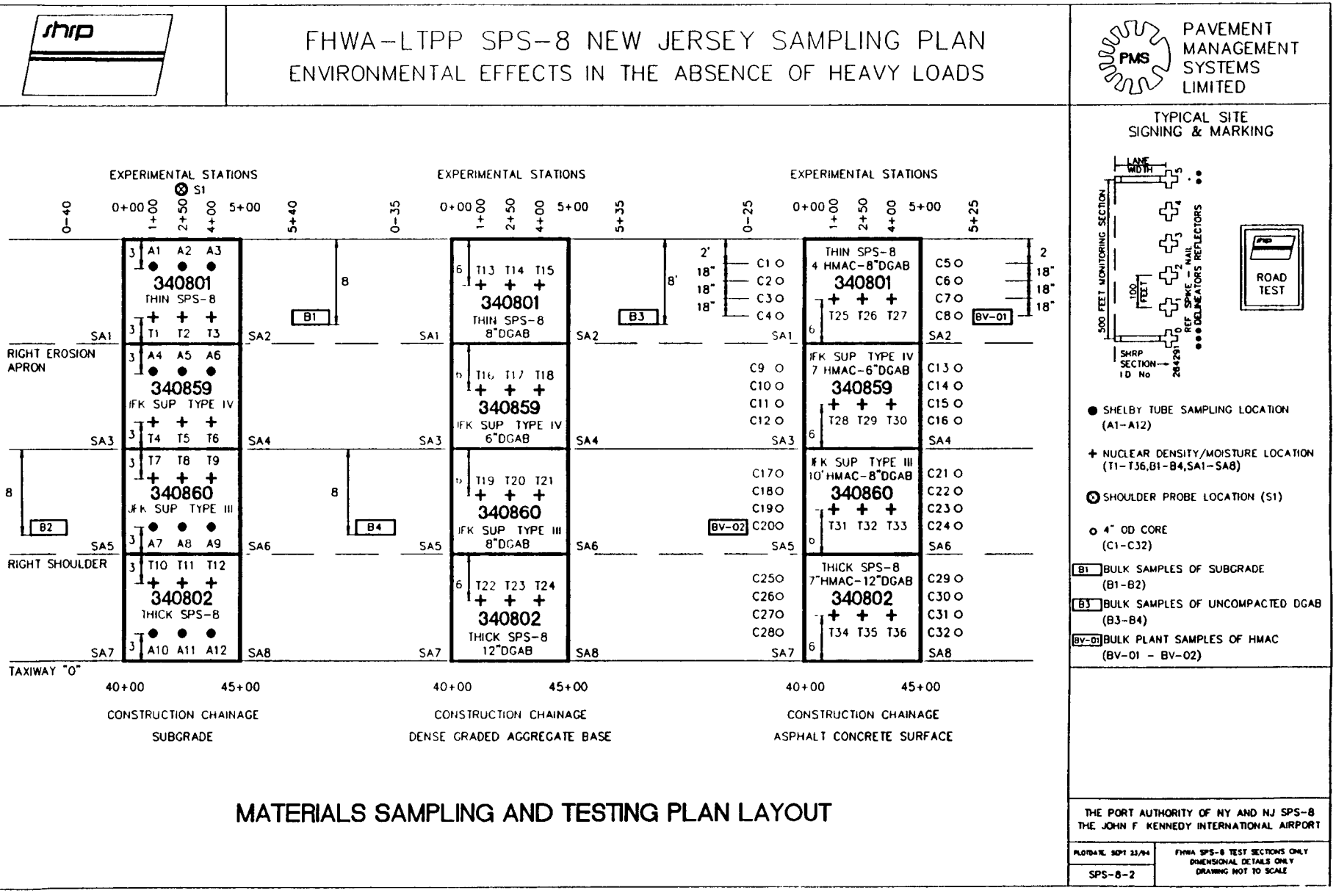
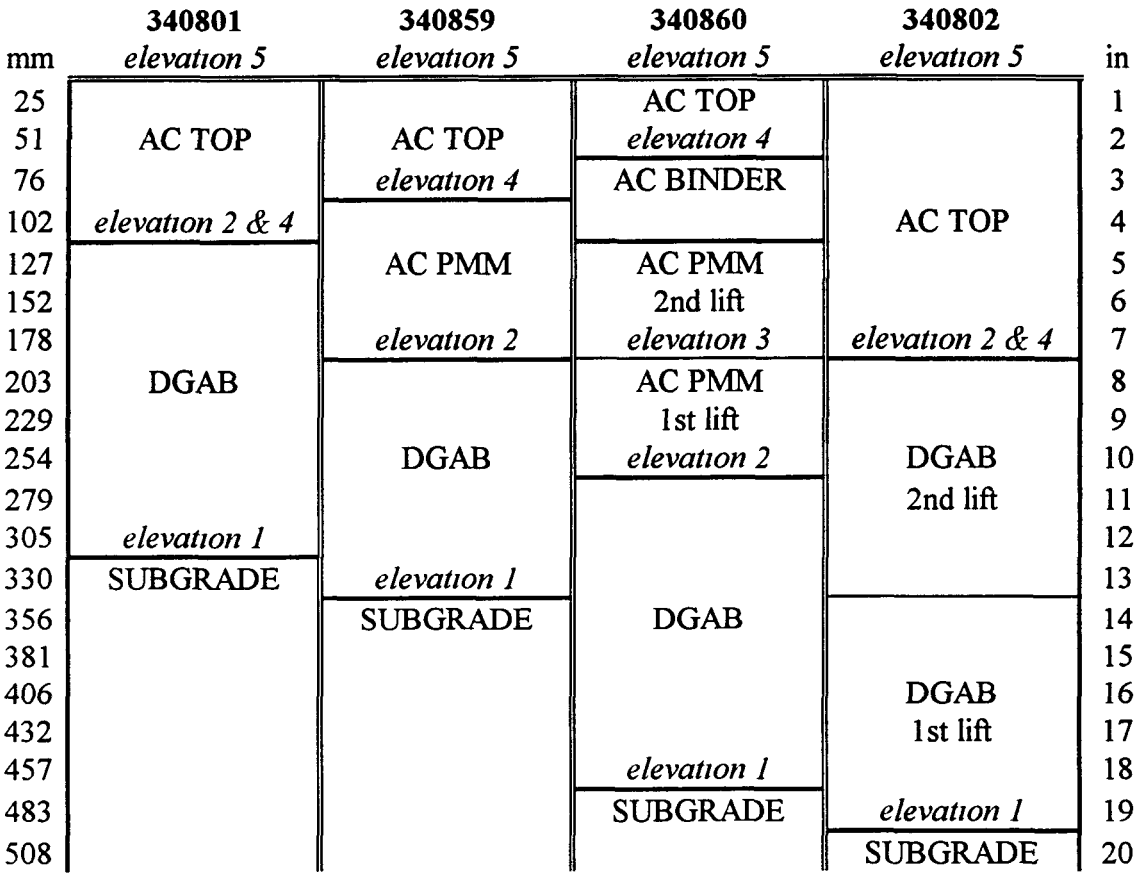


Figure 2 Site Layout Plan for Materials Sampling and Testing



Note Refer to table 5 for the dates of the five stages of the elevation measurements.

Figure 3 Pavement Structures and the Five Stages of Rod and Level Elevations

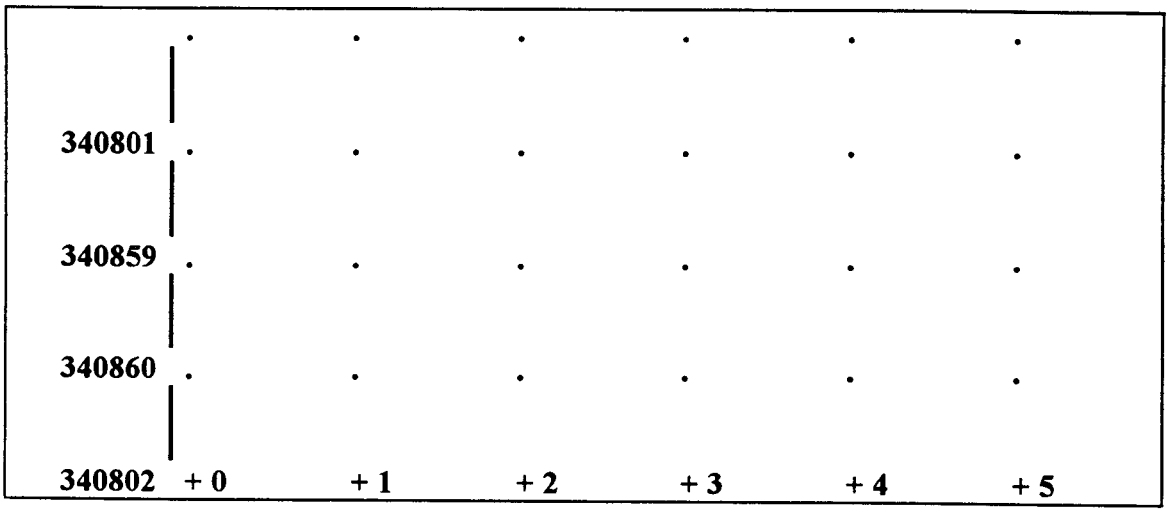


Figure 4 Site Marking Plan as Requested by F A A

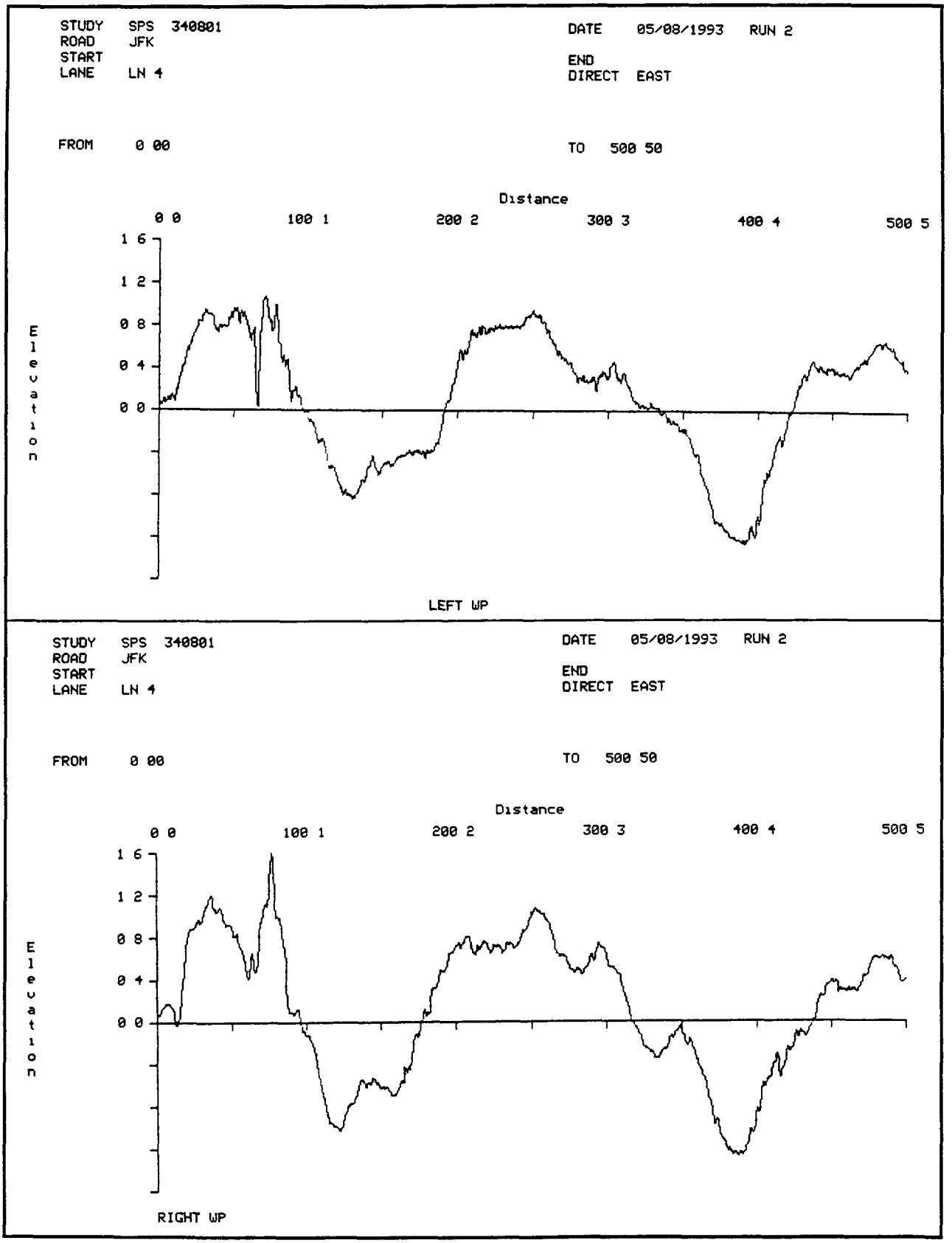


Figure 5 Elevation Measurements, Section 340801 as Collected with the Profilometer

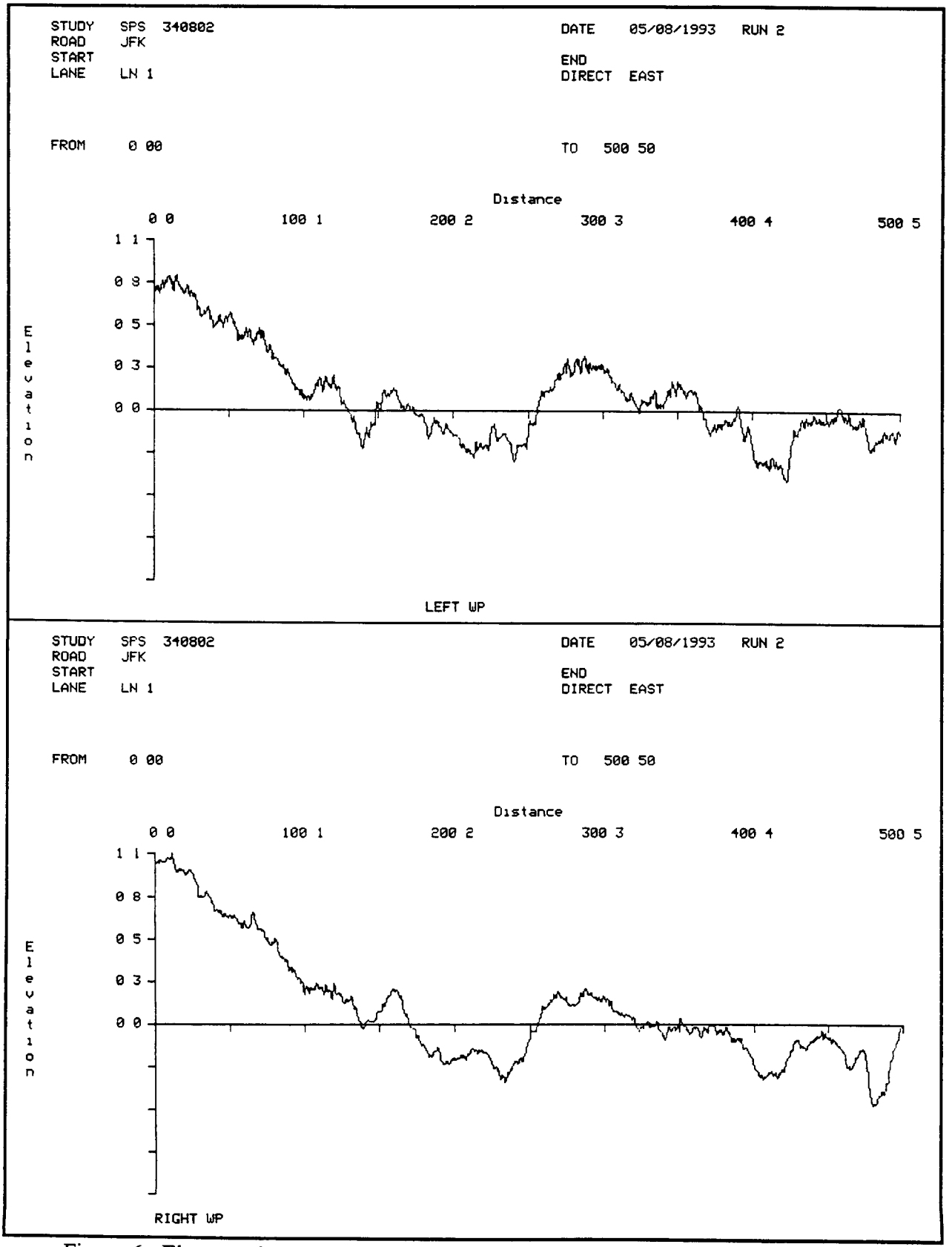


Figure 6 Elevation Measurements, Section 340802 as Collected with the Profilometer

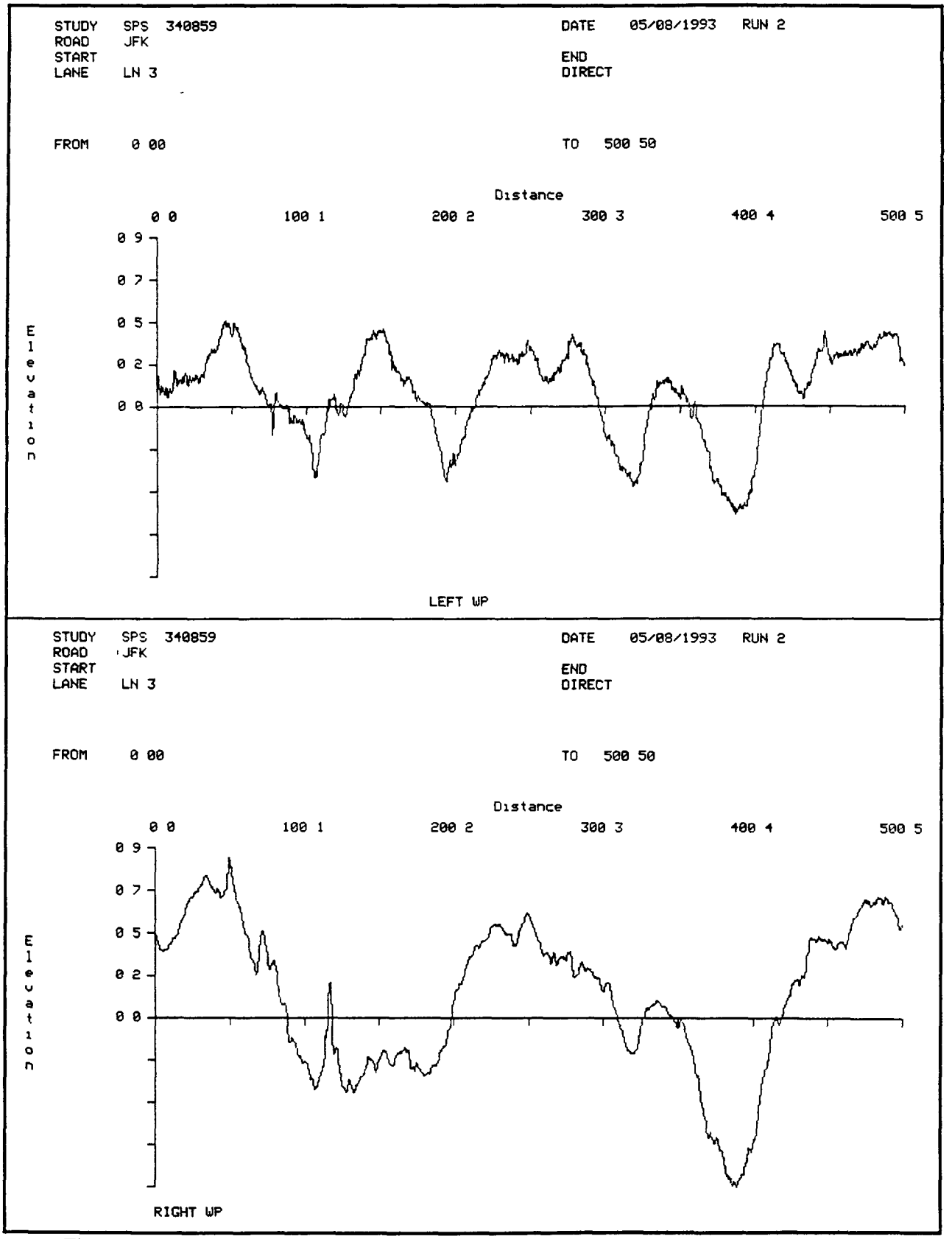


Figure 7 Elevation Measurements, Section 340859 as Collected with the Profilometer

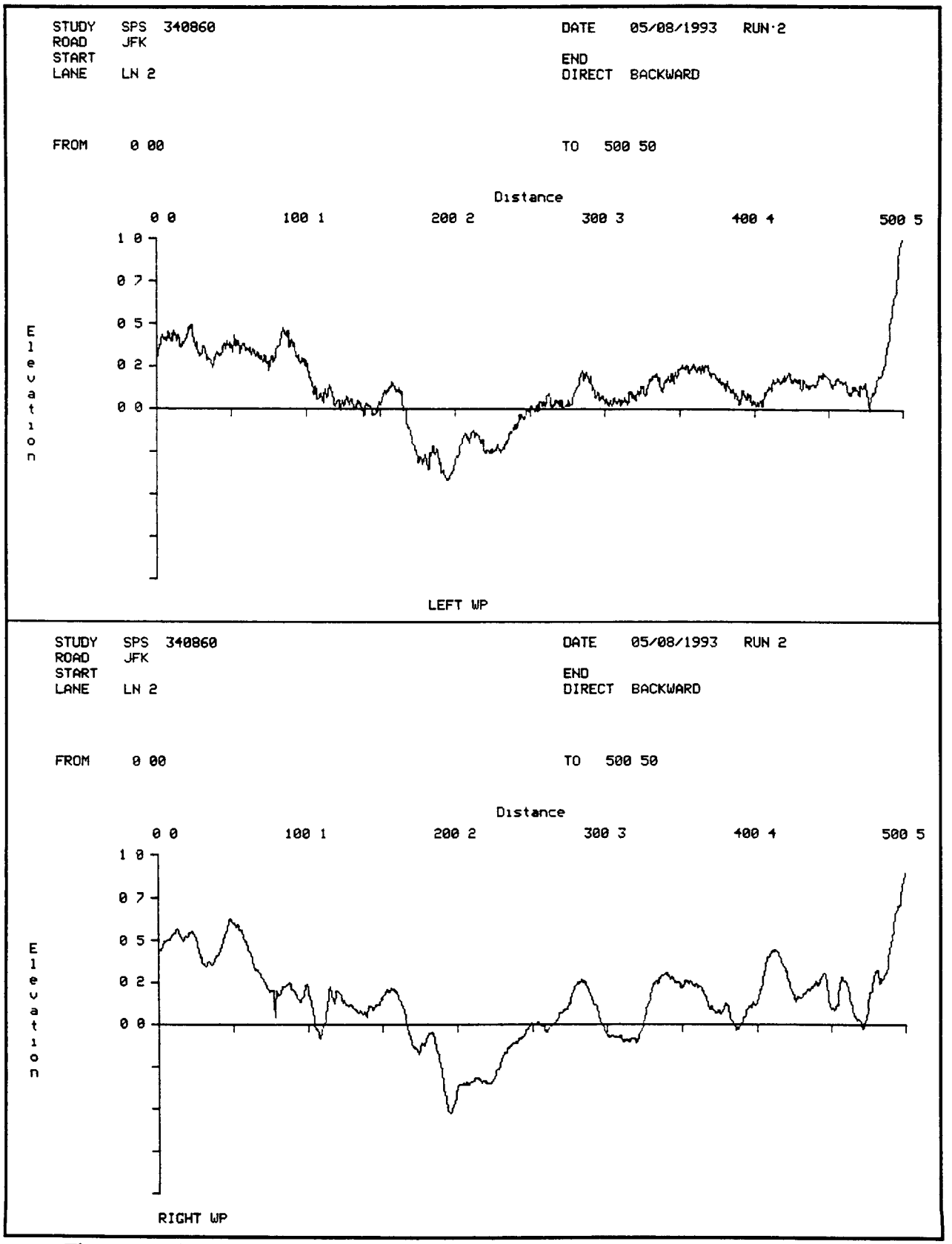


Figure 8 Elevation Measurements, Section 340860 as Collected with the Profilometer

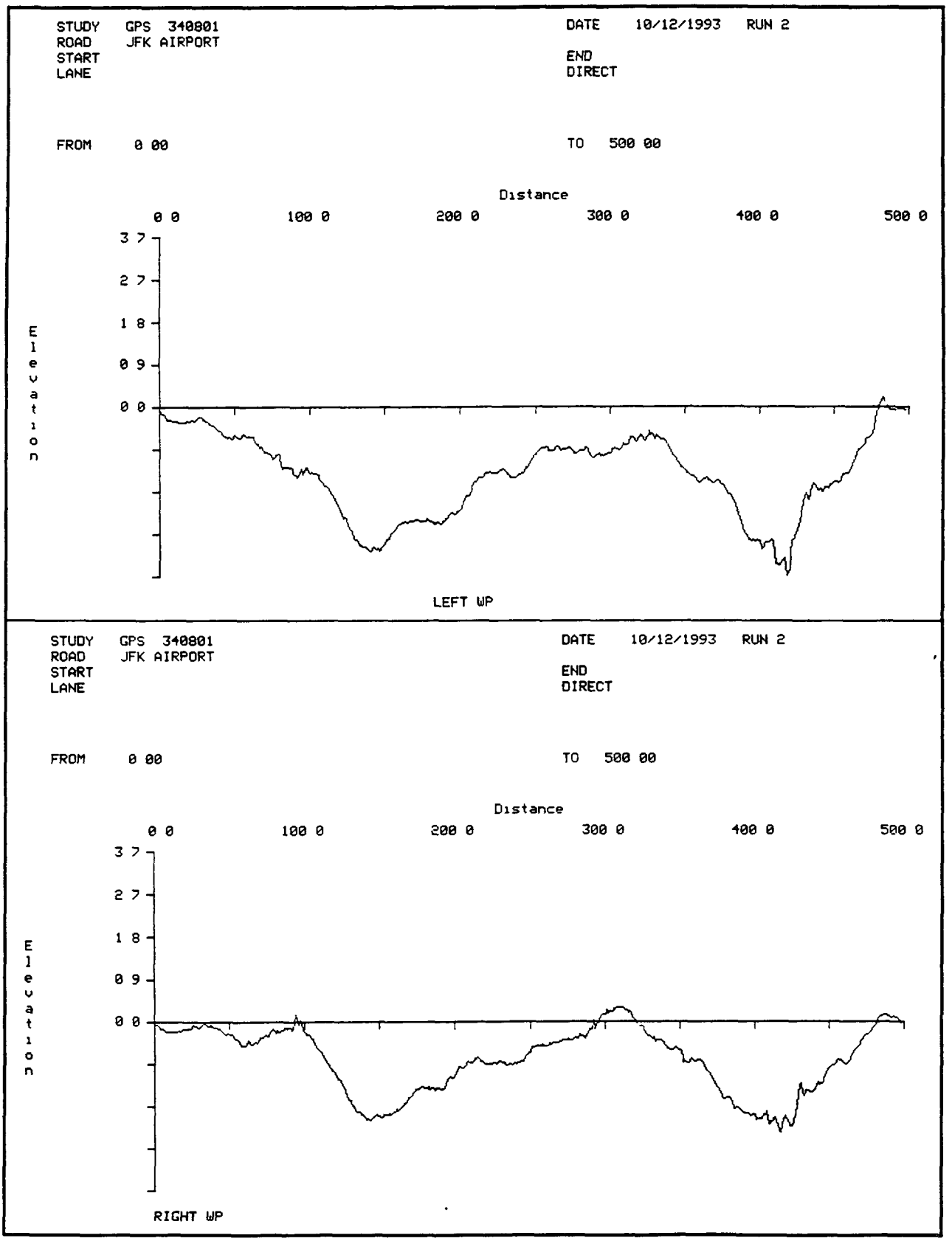


Figure 9 Elevation Measurements, Section 340801 as Collected with the Dipstick

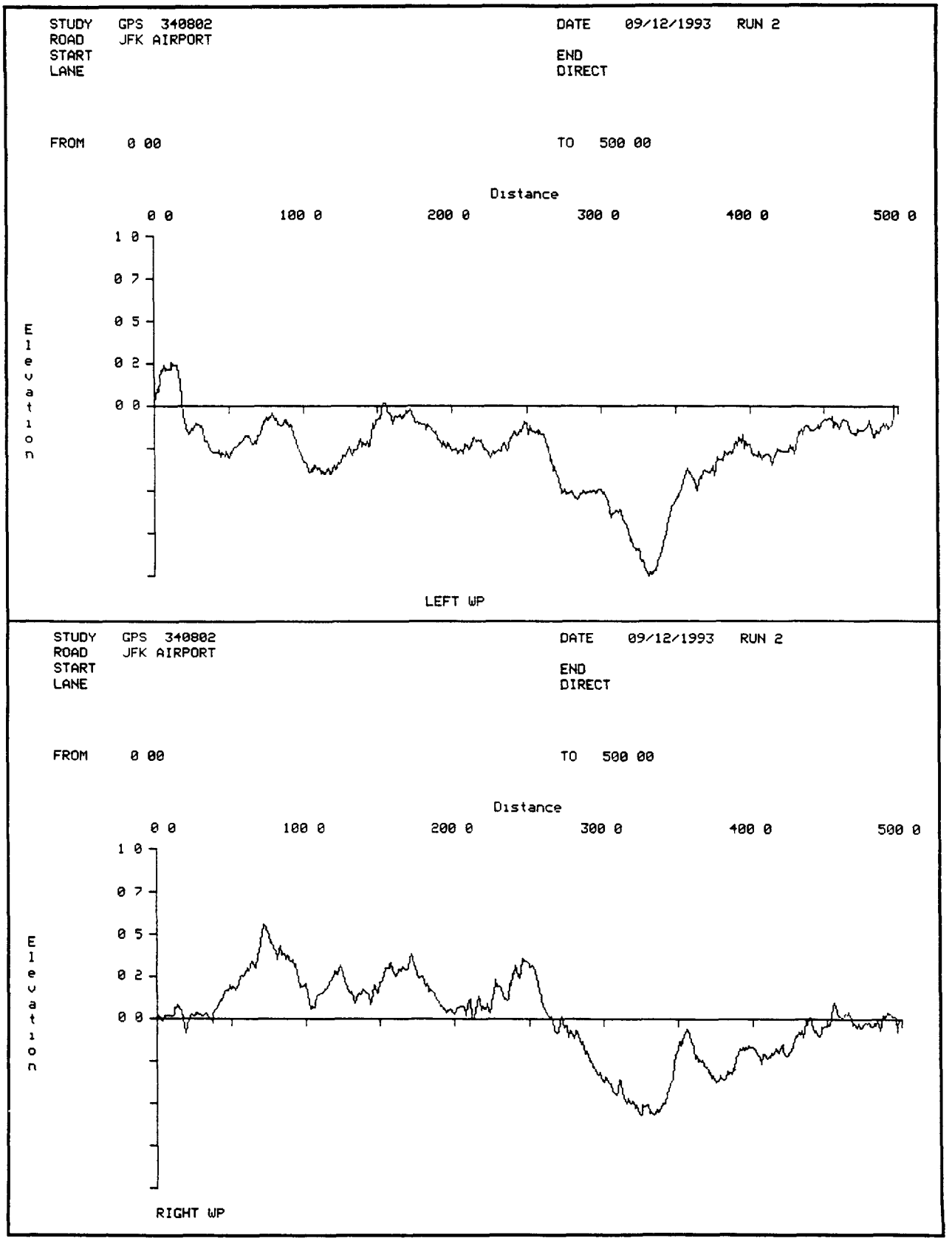


Figure 10 Elevation Measurements, Section 340802 as Collected with the Dipstick

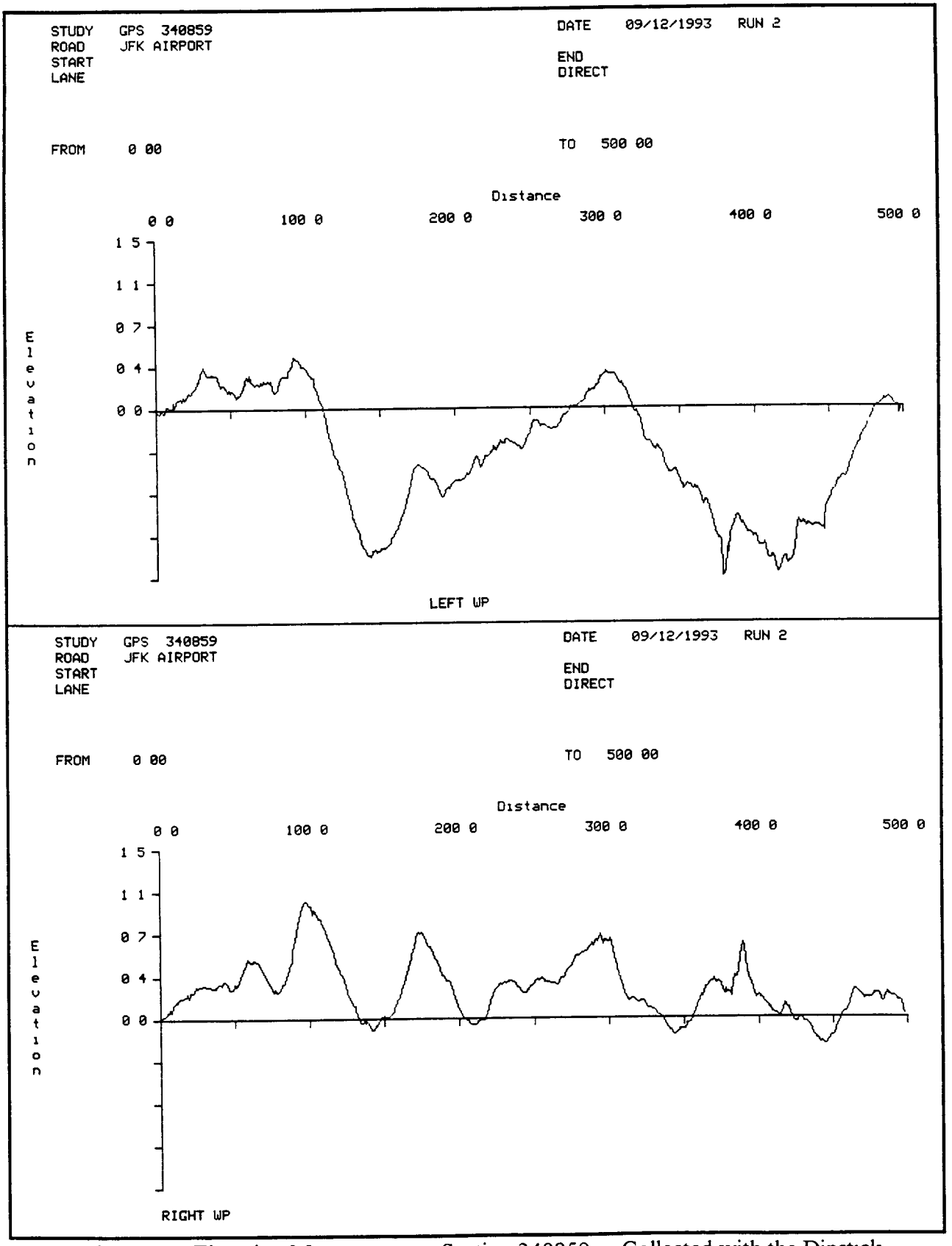


Figure 11 Elevation Measurements, Section 340859 as Collected with the Dipstick

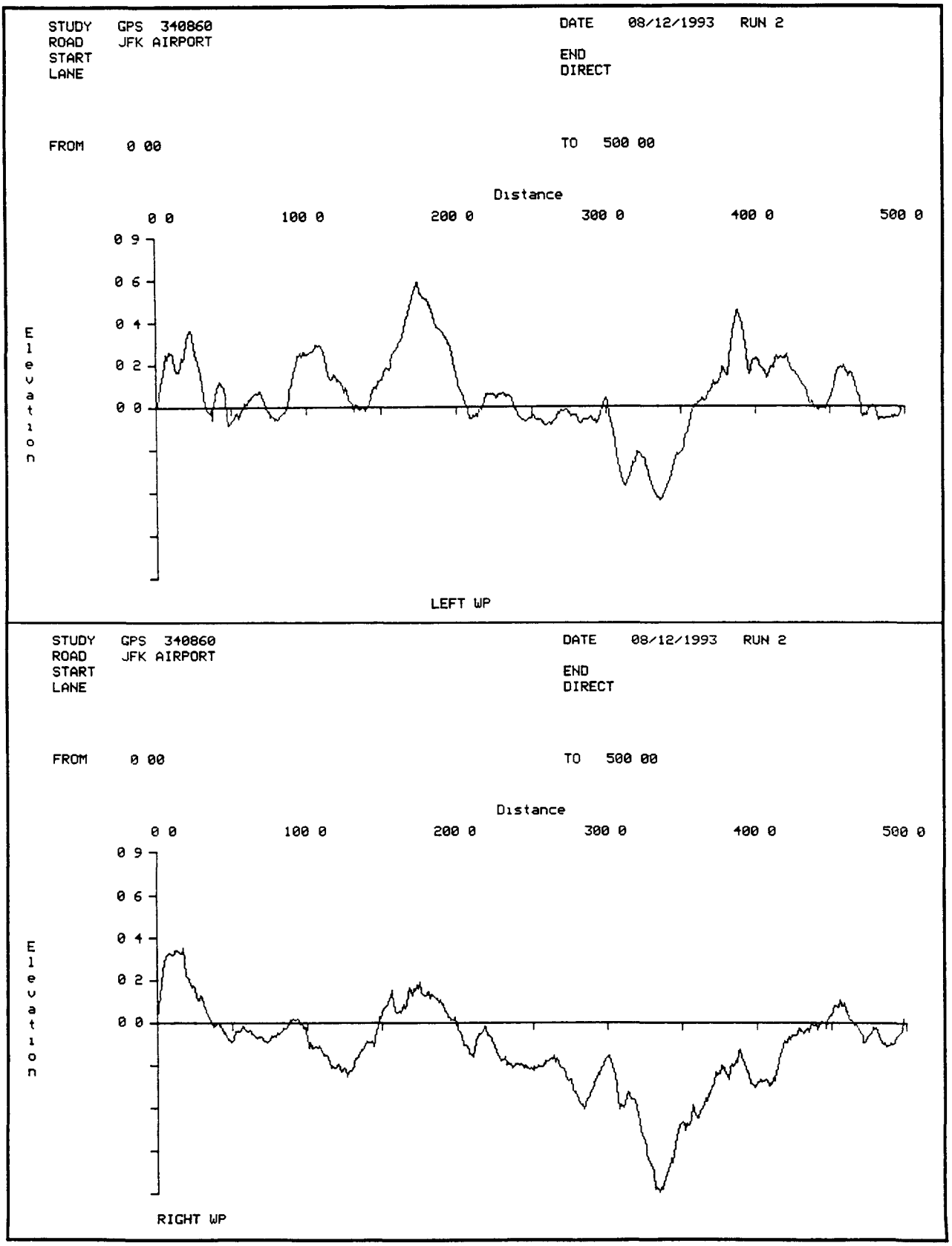


Figure 12 Elevation Measurements, Section 340860 as Collected with the Dipstick

APPENDIX A

Correspondence, Job Mix Formulas, and Climatological Data

MEMORANDUM

TO:	FILE	**DATE:**	March 23, 1993
FROM:	Andrew Brigg	**PROJECT:**	50450810
SUBJECT:	SPS 8 JFK NY/NJ Trip Report	**FILE:**	13.12.8
		COPIES TO:	See Below

Notes on meeting held in the Port Authority of NY-NJ Technical Center, Room 234, New Jersey City, NJ, ~~9~~ 10 am ~~Monday~~ Thursday March ~~15~~ 18, 1993.

ATTENDEES

Andrew Brigg	PMSL-NARO	(716) 632-0804
Basil Abukhater	PMSL-NARO	(519) 622-3005
Frank Pallse	NJ DOT	(908) 308-4022
Guy Zummo	PA Engineering	(212) 435-7518
Cas Bognacki	PA Engineering	(201) 216-2964
Yue Sun Chen	PA Engineering Temp	(212) 321-1244 (212) 435-8292
Harry Schmeri	PA Engineering Temp	(212) 321-1244 (212) 435-8290
Neil O'Conner	JFK-REO	(718) 656-4450

The SPS 8 project is located on the John F. Kennedy Airport facility relocation of Taxiways "I" and "O" Contract No. JFK-220.067 of The Port Authority of NY and NJ.

The following outlines discussion topics and details in Bullet form including action items:

- A pre-meeting review of proposed amendments to Phang/Zumo Layout Plan Memo (Feb. 18, 93) was held with Zumo/Brigg/Abukhater.
  All test sections will now be constructed within Section A adjacent and closest to West Restricted Service Road (Taxiway "O").

- Written Material Distributed:

  Data Collection Guidelines
  Material Testing Guidelines
  Lab Guide
  Weather Data Guidelines
  SPS-8 Guidelines (Complete)

- An overview of the program was given on the roles and participants of SHRP-FHWA and Regional Contractors (PMSL-NARO) including the proposed FHWA designated Lab contract, requirements (ie, Creep - M_R testing).

- PA. NY-NJ to allow provision for sampling, handling, storage and shipment of Lab Samples (including Creep, M_R).

- PMSL-NARO will provide oversite assistance (ie, Abukhater) for Site Material Sampling and testing activities during construction.

- PMSL will revise the testing plans as per Phang/Zumo Memo (dated Feb. 18, 93) A.S.A.P. to reflect meeting changes.

- Preparations of the base are currently underway in the form of 1st stage earthworks (Cut Fill Grading) and DGABC construction will start within the next 2 weeks.
  The base will require a consolidation period with paving scheduled for Fall of 93.

- PMSL-NARO is to co-ordinate plate bearing tests and or FWD deflection testing of Subgrade and base layers [SPS Directive S-4 (P59)]. JFK contact Neal O'Conner, PMSL contact Brandt Henderson.

- Guy Zummo/Neal O'Conner to check contractor or consultant requirements for PMSL onsite insurance coverage requirements.

- Suggested accomodations, use airport hotels - Heavy Traffic in the JFK area.
  Clearance for FWD/Drilling operations required - NO AIRFIELD ACCESS without pilot vehicle and or authorized airport designate. No Traffic Control required, however site access blackout times in effect.
  (Arrangements to be made with Neal O'Conner JFK-REO).

- Tour conducted of the Laboratory facilities at The Port Authority Technical Center. Frank Palise (NJ DOT) to give assistance with production and protocol implementation (ie, exchange of information liaison).
  PMSL to provide 4 1/4" I.D. Core barrels if required for Sampling operations. [PA. NY-NJ to provide sampling and testing equipment and manpower including Lab work].

- Reviewed and stressed the importance of following prescribed protocols, with particular inference on site numbering and referencing. Outlined link between Field, Lab and IMS (RIMS/RIMS) data elements and systems.

- Frank Palise (NJ DOT) outlined details and presented a Draft of the 'Memorandum of Agreement' between NJ DOT and PA. NY-NJ (copy retained by PMSL) for information.

- PMSL-NARO to provide Nuclear Density gauge correllation requirements.

Attachments
1. Memorandum Agreement
2. Meeting Location Map
3. Pre-Meeting Fax Details
4. Revised Layout Sketch (Draft)
5. Full Set Construction Plans (On File Storage)

Distribution to:
I. Pecnik
B. Phang
B. Henderson
B. Abukhater

PAVEMENT MANAGEMENT SYSTEMS

MEMORANDUM

TO:	Guy Zummo Port Authority NY-NJ	**DATE:**	March 29, 1993
FROM:	Andrew Brigg	**PROJECT:**	50450810
SUBJECT:	FHWA-LTPP SPS-8 Proposed Layout Changes	**FILE:**	13.12.8
		COPIES TO:	See Below

Further to our recent telephone conversation on Wednesday March 17, 1993 please find enclosed proposed layout changes and design criteria for the JFK SPS-8 experimental project.

- SPS-8 Layout Taxiway '0' Section A Table
- Material Sampling and Testing Plan Layouts
  1) Asphalt Concrete Surface
  2) Dense Graded Aggregate
  3) Base Subgrade
- Note configuration of test section widths, both SPS sections are proposed at 12' lane width to emulate a typical Highway Section.
- Due to a protocol change in supplementary section numbering sequences, section 340811 and 340812 will be re-assigned as 340859 and 340860 respectively.

Could you please review the proposed changes and provide any necessary comments or edits that may be required, to either Bill Phang or myself.

In closing PMSL latest indication from Neal O'Conner (JFK-REO) is that April 12th is the earliest upset date to conduct onsite testing. This would include FWD, Nuclear Density and Subgrade Sampling.

Basil Abukhater will coordinate the field sampling operations with yourself and Neal O'Conner as required.

Distribution to:
B. Phang
I.J. Pecnik
B. Abukhater
B. Henderson
D. Marshall

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N Y 14221
TEL (716) 632 0804
FAX (716) 632-4808

PAVEMENT
MANAGEMENT
SYSTEMS

July 2, 1993
50450910-13.12.8

Mr. Harry Schmerl
Chief Civil Engineer
The Port Authority of New York and New Jersey
P.A. Technical Center, Materials Engineering Division
241 Erie Street, Room 234
Jersey City, New Jersey 07310-1397

RE: PA NY & NJ SPS-8 Materials Sampling Plan Revised May 20, 1993

Dear Harry,

The materials sampling and testing plan for the SPS-8 project at J.F.K. International Airport provided to you under cover of a letter dated February 18, 1993 is no longer valid because of changes in layout of the test section.

The enclosed revised plans, dated May 19-25, 1993 are based on actual construction events and field sampling and testing.

For purposes of identification in the FHWA-LTPP data base, the PA NY & NJ laboratory is assigned the laboratory number 3422.

Yours Sincerely,
PAVEMENT MANAGEMENT SYSTEMS LTD.

William A. Phang

W.A. Phang, D. Eng.
Program Manager, FHWA-LTPP

BP/tf

c.c. I J. Pecnik
B. Abukhater
G. Zummo
F Palise NJ DOT

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PAVEMENT
MANAGEMENT
SYSTEMS

July 16, 1993
50450910-13.8

Mr. Aramis Lopez
FHWA-LTPP Division
Turner Fairbanks Resource Center HNR-40
6300 Georgetown Pike Room F215
Maclean, Virginia 22101-2296

RE: SPS-8 at JFK Airport - Laboratory Testing

Dear Aramis,

The materials and testing guidelines for SPS-8, August 1992 require penetration tests on Abson recovered asphalt cements at temperatures of 50° F, 77° F, and 90° F These test are to be done using SHRP Protocol P22.

Protocol P22 however defines penetration tests at 77° F and at 115° F

This memo is to confirm that as advised by Jonathan Groeger, PCS/Law, the requirements of Protocol P22 are to be followed. Mr. Fernando Medina of the PA of NY and NJ was verbally notified of this determination.

Yours Sincerely,
PAVEMENT MANAGEMENT SYSTEMS LTD.

William A. Phang

W.A. Phang, D. Eng.
Program Manager, FHWA-LTPP

c.c. I J. Pecnik
J. Groeger
F. Medina - P A. of NY and NJ
D Ingberg
C. Berge
H Wheeler
B. Abukhater

BP/tf

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N Y 14221
TEL (716) 632-0804
FAX (716) 632-4808

PAVEMENT MANAGEMENT SYSTEMS

February 10, 1994
50450910-12.11.2

Mr. Fernando Medina
Materials Engineer
New York/New Jersey Port Authority
241 Erie Street, Room 234
Jersey City, New Jersey 07310-1397

RE: FHWA Contractor Lab Testing

Dear Fernando,

The FHWA is in the process of designating material testing efforts. Toward this end, they have requested the Regional office to provide a list of all samples which remain to be tested.

Accordingly, please inform the Regional office by Thursday, February 17, 1994 of all core samples which your agency has retained, and which will ultimately be tested by the FHWA contract laboratory Specifically, asphalt resilient modulus, creep compliance, and bulk and maximum specific gravity testing are designated for the FHWA laboratory. Applicable samples are likely from certain SPS projects and overlay projects.

Also, please provide the name, address, and telephone number of a contact person, with whom the FHWA lab can communicate in regard to testing these materials.

Once again, thank you for your continued support.

Yours Sincerely,
PAVEMENT MANAGEMENT SYSTEMS LIMITED

Dennis A. Morian

Dennis A. Morian, P.E.
Project Engineer

DM/tf

c.c. I J. Pecnik

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N.Y. 14221
TEL. (716) 632-0804
FAX (716) 632-4808

THE PORT AUTHORITY OF NY & NJ

Engineering Department
Materials Engineering Division
Room 234
241 Erie Street
Jersey City, N.J. 07310-1397

(201) 216-2941
(212) 435-7000

Fax (201) 216-2949

Mr. Dennis A. Morian, P.E.0
Pavement Management Systems Limited
415 Lawrence Bell Drive
Unit #3
Amherst, N.Y. 14221

March 1, 1994

Re: FHWA/SHRP - Contractor Laboratory Designation

Dear Dennis,

In response to your letter dated February 10, 1994 and received February 18, 1994, be informed that the Port Authority Materials Devision currently holds 32 core samples obtained from SPS - 08. The cores are stored in double sealed plastic bags and are ready to be shipped to the designated locations.

Contact me for any question concerning this SHRP test section at (201) 216-2711.

Sincerely,

Fernando Medina
Assistant Civil Engineer

cc: J. Marsano

PAVEMENT
MANAGEMENT
SYSTEMS

September 13, 1994
50451010-13.12.8

Mr. Fernando Medina
Assistant Civil Engineer
The Port Authority of New York and New Jersey
Engineering Department
Materials Engineering Division
241 Erie Street, Room 234
Jersey City, New Jersey 07310-1397

RE: SPS-8 PA NY & NJ - JFK Airport, Taxiway 'O'
Tracking Tables for Laboratory Testing of Materials

Dear Mr. Medina:

Forwarded enclosed are laboratory testing tracking tables for materials samples taken from the SPS-8 test sections.

The FHWA-LTPP Contractor Laboratory which is to carry out resilient modulus testing and other materials identification and moisture/density tests is:-

Law Engineering, Inc.
396 Plasters Avenue, NE
Atlanta, GA 30324
c/o Mr. Richard Boudreau, (404) 817-0242; fax, (404) 872-5927

Please package and ship pre-paid, the materials samples listed in Tables 4A, 5A, and 6A.

Table 7 is a listing of materials which are to be sent to the Materials Reference Library (MRL) in Sparks, NV. It is realized that at the time of construction, it was unknown that samples for the MRL were needed. However, whatever part of the samples identified in Table 7 remain after tests you carry out, should be packaged for shipment to the MRL. Arrangements for transportation will be made by Mr. Andrew Brigg, Nichols Consulting Engineers, Telephone; (702) 358-7574. It would be appreciated if you can include copies of the relevant tracking tables with shipments of samples.

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N Y 14221
TEL (716) 632-0804
FAX (716) 632-4808

Tables 4, 5, and 6, list laboratory tests to be carried out on each materials sample listed for subgrade, unbound granular base, asphalt concrete and asphalt cement binder, by the Port Authority. Table 4A, 5A, and 6A, list tests to be carried out by the FHWA-LTPP Contractor Laboratory, Law Engineering, Atlanta, GA. These tables are a continuation of the initial materials sampling and testing plans prepared prior to construction.

Should you have questions or need clarification, please call me at (716) 632-0804, or Basel Abukhater at (519) 622-3005.

Yours Sincerely,

William A. Phang

William A. Phang
Program Manager, FHWA-LTPP
Pavement Management Systems Limited

WAP/tf

enclosures

C.C. I.J. Pecnik
B. Abukhater
D. Morian

* Note. Letter + Tracking tables
Also Sent to G. Zummo, PA of NY + NJ

PAVEMENT
MANAGEMENT
SYSTEMS

September 14, 1994
50451010-13.11.8

Mr. Guy Zummo
The Port Authority of New York and New Jersey
World Trade Center
73 South Street
New York City, New York 10048

Dear Mr. Zummo:

Dr. Phang of this office, has recently prepared and sent to you the tracking tables needed for Laboratory testing of materials obtained at the NJ SPS-8 project. In that documentation he has requested that a copy of the tables be submitted along with the samples that are to be shipped to Law Engineering, the FHWA-LTPP Contractor Laboratory.

Included with your shipment of samples and Lab tracking tables, the Laboratory requests that a copy of the Field Materials Sampling and Testing Logs be submitted as well. I have enclosed with this letter a complete set of MS & T documentation for that purpose.

When you ship the materials to Law Engineering in Atlanta, it would be appreciated if you would contact me at the NARO office and advise of your shipping date so that I may update my tracking system.

If you have any questions on the above mentioned materials, please contact Dr. Phang or myself at (716) 632-0804.

Yours Sincerely,

Lois Egloff
Technical Coordinator
Pavement Management Systems Limited

LE/tf

C.C. F. Medina, w/attachment
W.A. Phang, w/o attachment
I.J. Pecnik, w/o attachment
B. Abukhater, w/o attachment

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N Y 14221
TEL. (716) 632-0804
FAX (716) 632-4808

September 30, 1994

Mr. Bill A Phang
Program Manager, FHWA - LTPP
415 Lawrence Bell Drive
Unit #3
Amhest, NY 14221

RE: SPS-8 PA NY & NJ - JFK Airport T/W'O' Samples Distribution

Dear Mr. Phang:

As per your instructions detailed on the letter forwarded to me; dated 09/13/94, all the specimens were organized and arranged 09/28/94, to be shipped to Law Engineering, Inc and Materials reference library(MRL) in Georgia and Nevada respectively.

The following list will detailed the samples shipped:

DESTINATION	TEST I.D.	SAMPLE #	LOCATION	QUANTITY
Law Eng., Inc.	340801	BS 01	B1	300LBS. (5 60LBS 5Gal. Buckets)
"	340802	BS 02	B2	300LBS. (5 60LBS. 5Gal. Buckets)
"	340801	BG 01	B3	300LBS (5 60LBS 5Gal. Buckets)
"	340860	BG 02	B-4	300LBS. (5 60LBS 5Gal. Buckets)
"	3408--	CA01-CA23	--	3 Boxes
MRL	340859	BV 30	--	2-5 Gallons Bucket
"	340860	BV 01	--	1-5 " "
"	340802	BV 20	--	1 1/2-5 Gallon Bucket
"	340800	BC 01	--	3-5 " "

Note: MS01-(Moisture Jar Sample), MS02-(Moisture Jar Sample), MG01-(Moisture Jar Sample), MG02-(Moisture Jar Sample)

Were used by the Port Authority's Soil's Laboratory and discarded

Should you have any questions, I could be reached at (718)244-7631

Sincerely,

Fernando Medina
Associate Civil Engineer

cc C Bognacki, B Abukhater, A Brigg, R Boudreau
FM.vc

TO: JOHN Z
WTC MAILROOM

9/29/94

RE: DETAILED SHIPMENT TO GEORGIA & NEVADA FROM PATC,
JERSEY CITY - MATERIALS ENGINEERING DIVISION

CHARGE #: A3 - 330-954 TO BE RECEIVED BY: 10/16/94

TO: MR. RICHARD BOUDREAU
LAW ENGINEERING, INC.
396 PLASTERS AVENUE, NE
ATLANTA, GA 30324

CONTAINER TYPE	# OF PACKAGES	WEIGHT	CONTENT
5 GALLON BUCKET	20	64 LBS.	AGGREGATES
12"X24" CARTON BOX	1	58 LBS.	ASPHALT SAMPLES
12"X24" CARTON BOX	1	55 LBS	ASPHALT SAMPLES
12"X24" CARTON BOX	1	70 LBS.	ASPHALT SAMPLES
	TOTAL	1463 ≈ 1465 LBS.	

TO: MR. ANDREW BRIGG
MRL
1625 CRANE WAY
SPARKS, NV 89431

CONTAINER TYPE	# OF PACKAGES	WEIGHT	CONTENT
5 GALLON BUCKET	4	35 LBS.	ASPHALT SAMPLES
5 GALLON BUCKET	1	40 LBS.	ASPHALT SAMPLES
5 GALLON BUCKET	1	55 LBS.	ASPHALT SAMPLES
5 GALLON BUCKET	2	61 LBS.	ASPHALT SAMPLES
	TOTAL	357 LBS.	

FROM: FERNANDO MEDINA
THE PORT AUTHORITY OF NY & NJ
MATERIALS ENGINEERING DIVISION
241 ERIE STREET, ROOM 234
JERSEY CITY, NJ 07310-1397

JOHN, THANK YOU FOR YOUR HELP. I CAN BE REACHED AT (718) 244-7637.

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

MATERIALS ENGINEERING SECTION / CONSTRUCTION DIVISION

SUBMITTED ASPHALT CONCRETE JOB MIX FORMULA

JOB DESCRIPTION: J.F.K.I.A.- Relocation of Taxiways "I" And "O"
CONTRACT NUMBER: JFK-220.067 (CA3-222.067)
MIX TYPE: Plant Mix Macadam Base Course (Section I-02561)
CONTRACTOR: Grace Industries, Inc.
SUPPLIER: Grace Asphalt, Corona, N.Y.
PLANT TYPE: Batch Plant
LOT SIZE: 1600 Tons Or A Minimum Of One Test Per Day

JOB MIX FORMULA GRADATION (% PASSING)

SIEVE SIZE	J.M.F. GRADATION	GENERAL SPECIFICATION	JOB TOLERANCE
1 1/2"	100.0	100	100 (+/- 4)
1"	98.7	90 - 100	95 - 100 (+/- 4)
3/4"	73.9	60 -80	70 - 78 (+/- 4)
1/2"	37.7		34 - 42 (+/- 4)
3/8"	26.1	15 - 40	22-30 (+/- 4)
# 4	9.3	0 - 10	5 - 13 (+/- 4)
ASPHALT CEMENT	2.80	2.5 - 3.1 (Extraction)	2.5 - 3.1 (+/- 0.3)
		(Printout)	2.75 - 2.85 (+/- 0.05)

MARSHALL DESIGN CRITERIA

	DESIGN	REQUIREMENTS
STABILITY		1000 Minimum
FLOW (0.01")		
AIR VOIDS (%)		
VOIDS FILLED WITH ASPHALT (%)		
VOIDS IN MINERAL AGGREGATE (%)		

MATERIAL SOURCES

TYPE / SIZE	J.M.F. %	MANUFACTURER / LOCATION	APPROVED
BIN # 4 - 3/4" STONE	60.3 %	New York Trap Rock, Clinton Point, N.Y.	Yes
BIN # 3 - 3/8" STONE	28.2 %	New York Trap Rock, Clinton Point, N.Y.	Yes
BIN # 2 - 1/4" STONE	0.0 %	New York Trap Rock, Clinton Point, N.Y.	Yes
BIN # 1 - (100%) STONE SAND	8.7 %	New York Trap Rock, Clinton Point, N.Y.	Yes
FILLER	0.0 %	Reclaimed Fines and Limestone Products	Yes
ASPHALT CEMENT AC-20	2.8 %	Exxon, Linden, N.J.	Yes

REMARKS: The approval is based upon the previous satisfactory performance of a similar Job Mix Formula on Contract Number JFK-630. The final acceptance will be based upon the satisfactory performance of the Job Mix Formula during the first day of plant production.

JOB MIX FORMULA: Approved

DATE: 10/20/92

ASPHALT LABORATORY SUPERVISOR

ENGINEER OF MATERIALS

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

MATERIALS ENGINEERING SECTION / CONSTRUCTION DIVISION

SUBMITTED ASPHALT CONCRETE JOB MIX FORMULA

JOB DESCRIPTION: J.F.K.I.A.- Relocation of Taxiways "I" And "O"
CONTRACT NUMBER: JFK-220.067 (CA3-222.067)
MIX TYPE: F.A.A. Mix # 1 (AC-20) Bottom Course (Section I-02561)
CONTRACTOR: Grace Industries, Inc.
SUPPLIER: Grace Asphalt, Corona, N.Y.
PLANT TYPE: Batch Plant
LOT SIZE: 1600 Tons Or A Minimum Of One Test Per Day

JOB MIX FORMULA GRADATION (% PASSING)

SIEVE SIZE	J.M.F. GRADATION	GENERAL SPECIFICATION	JOB TOLERANCE	
1 1/4"	100.0	100	100	(+/- 4)
1"	98.2	90 - 95	94 - 100	(+/- 4)
3/4"	83.8	70 - 84	80 - 88	(+/- 4)
1/2"	65.2		61 - 69	(+/- 4)
3/8"	57.4	46 - 60	53 - 61	(+/- 4)
# 4	40.8	34 - 44	37 - 45	(+/- 4)
# 8	30.6	23 - 31	27 - 35	(+/- 4)
# 16	18.8		15 - 23	(+/- 4)
# 30	12.4	10 - 14	8 - 16	(+/- 4)
# 50	8.2		4 - 12	(+/- 4)
# 100	4.8	4 - 12	3 - 7	(+/- 2)
# 200	2.9	3 - 6	1 - 5	(+/- 2)
ASPHALT CEMENT	* 4.00	4.3 - 5.7 (Extraction)	3.7 - 4.3	(+/- 0.3)
		(Printout)	3.95 - 4.05	(+/- 0.05)

* The asphalt cement % is lower than the specified range due to the use of stone sand.

MARSHALL DESIGN CRITERIA

	DESIGN	REQUIREMENTS
STABILITY	2280	1800 Minimum
FLOW (0.01")	8.5	8 - 16
AIR VOIDS (%)	5.5	3.5 - 6.5
VOIDS FILLED WITH ASPHALT (%)	63.6	60 - 70
VOIDS IN MINERAL AGGREGATE (%)	15.2	12 Minimum

MATERIAL SOURCES

TYPE / SIZE	J.M.F. %	MANUFACTURER / LOCATION	APPROVED
BIN # 4 - 3/4" STONE	33.6 %	New York Trap Rock, Clinton Point, N.Y.	Yes
BIN # 3 - 3/8" STONE	18.2 %	New York Trap Rock, Clinton Point, N.Y.	Yes
BIN # 2 - 1/4" STONE	6.7 %	New York Trap Rock, Clinton Point, N.Y.	Yes
BIN # 1 - (100%) STONE SAND	36.5 %	New York Trap Rock, Clinton Point, N.Y.	Yes
FILLER	1.0 %	Reclaimed Fines and Limestone Products	Yes
ASPHALT CEMENT AC-20	4.0 %	Exxon, Linden, N.J.	Yes

REMARKS: The approval is based upon the previous satisfactory performance of a similar Job Mix Formula on Contract Number JFK-660. The final acceptance will be based upon the satisfactory performance of the Job Mix Formula during the first day of plant production.

JOB MIX FORMULA: Approved

DATE: 10/20/92

ASPHALT LABORATORY SUPERVISOR

ENGINEER OF MATERIALS

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

MATERIALS ENGINEERING DIVISION

SUBMITTED ASPHALT CONCRETE JOB MIX FORMULA

JOB DESCRIPTION: J.F.K.I.A.- Relocation of Taxiways "I" And "O"
CONTRACT NUMBER: JFK-220.067 (CA3-222.067)
MIX TYPE: F.A.A. Mix # 3 (AC-20) Top and Overlay Course (Section I-02561)
CONTRACTOR: Grace Industries, Inc.
SUPPLIER: Grace Asphalt, Corona, N.Y.
PLANT TYPE: Batch Plant
LOT SIZE: 1600 Tons Or A Minimum Of One Test Per Day

JOB MIX FORMULA GRADATION (% PASSING)

SIEVE SIZE	J.M.F. GRADATION	GENERAL SPECIFICATION	JOB TOLERANCE
1"	100.0	100	100 (+/- 4)
3/4"	100.0	100	100 (+/- 4)
1/2"	91.9	90 - 99	88 - 96 (+/- 4)
3/8"	82.8	74 - 88	79 - 87 (+/- 4)
# 4	48.6	50 - 60	45 - 53 (+/- 4)
# 8	39.5	41 - 49	36 - 44 (+/- 4)
# 16	23.9	31 - 39	20 - 28 (+/- 4)
# 30	14.4	23 - 30	10 - 18 (+/- 4)
# 50	9.1	16 - 21	5 - 13 (+/- 4)
# 100	5.8	6 - 16	4 - 8 (+/- 2)
# 200	3.4	3 - 6	1 - 5 (+/- 2)
ASPHALT CEMENT	5.20	5.0 - 6.0 (Extraction)	4.9 - 5.5 (+/- 0.3)
		(Printout)	5.15 - 5.25 (+/- 0.05)

MARSHALL DESIGN CRITERIA

	DESIGN	REQUIREMENTS
STABILITY	2394	1800 Minimum
FLOW (0.01")	10.5	8 - 16
AIR VOIDS (%)	3.7	3 - 5
VOIDS FILLED WITH ASPHALT (%)	77.6	65 - 80
VOIDS IN MINERAL AGGREGATE (%)	16.3	15 Minimum

MATERIAL SOURCES

TYPE / SIZE	J.M.F. %	MANUFACTURER / LOCATION	APPROVED
BIN # 4 - 5/8" STONE	7.6 %	New York Trap Rock, Clinton Point, N.Y.	Yes
BIN # 3 - 3/8" STONE	28.4 %	New York Trap Rock, Clinton Point, N.Y.	Yes
BIN # 2 - 1/4" STONE	19.0 %	New York Trap Rock, Clinton Point, N.Y.	Yes
BIN # 1 - (100%) STONE SAND	39.3 %	New York Trap Rock, Clinton Point, N.Y.	Yes
FILLER	0.5 %	Reclaimed Fines	Yes
ASPHALT CEMENT AC-20	5.2 %	Citgo, Bayonne, N.J.	Yes

REMARKS: The approval is based upon the verification of the Job Mix Formula at the suppliers plant by The Port Authority of New York and New Jersey, Materials Engineering Section. The final acceptance will be based upon the satisfactory performance of the Job Mix Formula during the first day of plant production.

JOB MIX FORMULA: Approved

DATE: 10/11/93

ASPHALT LABORATORY SUPERVISOR

ENGINEER OF MATERIALS

ISSN 0198-3628

APR 1993
NEW YORK (JFK AP), NY
NEA SER CONT MET OFC
RM. 2309 TAB #50

INQUIRIES/COMMENTS CALL
(704) 271-4800

INT'L ARRIVALS BLDG

LOCAL CLIMATOLOGICAL DATA

Monthly Summary

LATITUDE 40° 39'N LONGITUDE 73° 47'W ELEVATION (GROUND) 13 FEET TIME ZONE EASTERN 94789

APR 1993
NEW YORK (JFK AP), NY

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65°F HEATING (SEASON BEGINS WITH JUL)	COOLING (SEASON BEGINS WITH JAN)	WEATHER TYPES 1 FOG 2 HEAVY FOG 3 THUNDERSTORM 4 ICE PELLETS 5 HAIL 6 GLAZE 7 DUSTSTORM 8 SMOKE, HAZE 9 BLOWING SNOW	SNOW ICE PELLETS OR ICE ON GROUND AT 0700 INCHES	PRECIPITATION WATER EQUIVALENT (INCHES)	SNOW, ICE PELLETS (INCHES)	AVERAGE STATION PRESSURE IN INCHES ELEV. 22 FEET ABOVE M.S.L.	WIND (MPH) RESULTANT DIR.	RESULTANT SPEED	AVERAGE SPEED	PEAK GUST SPEED	PEAK GUST DIRECTION	FASTEST 1-MIN SPEED	FASTEST 1-MIN DIRECTION	SUNSHINE MINUTES	SUNSHINE PERCENT OF TOTAL POSSIBLE	SKY COVER (TENTHS) SUNRISE TO SUNSET	SKY COVER (TENTHS) MIDNIGHT TO MIDNIGHT
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
01	48	39	44	-2	43	21	0	1 3	0	1 62	0.0	29.690	07	15 7	17 2	37	E	29	05			10	10
02	40	37	39*	-7	37	26	0	1	0	0 02	0 0	29.720	05	9 6	9 7	21	NE	16	05			10	10
03	47	38	43	-4	32	22	0	1	0	0.02	0.0	29.950	32	11.7	12 4	30	NW	23	32			10	10
04	46	36*	41	-6	27	24	0		0	0 00	0 0	30 140	33	11.9	12 6	25	NW	20	31			8	7
05	51	37	44	-3	33	21	0		0	0 00	0.0	30 210	12	0 5	7 2	18	N	14	20			8	7
06	52	38	45	-3	32	20	0		0	0.00	0.0	30.200	07	9 6	11 3	28	E	18	07			10	10
07	59	38	49	1	29	16	0		0	0 00	0 0	30.200	07	8.2	10 8	20	NE	16	05			5	4
08	61	39	50	2	35	15	0		0	0 00	0.0	30.140	09	2 4	6 9	18	S	12	16			7	6
09	57	45	51	3	46	14	0	2	0	0 00	0 0	30.030	10	8.6	9.1	21	E	15	10			10	10
10	58	47	53	4	51	12	0	2	0	0 11	0.0	29 605	14	13 2	13 9	31	SE	23	14			10	10
11	66	47	57	8	43	8	0	2	0	0.09	0.0	29.630	34	12 8	13 8	28	N	20	34			5	6
12	58	43	51	2	37	14	0		0	0 00	0 0	29 710	35	15 6	15.9	31	N	24	35			6	7
13	62	41	52	2	39	13	0		0	0.00	0.0	29.880	36	10 3	12 6	31	N	22	01			5	6
14	58	44	51	1	40	14	0		0	0 01	0.0	30.000	21	1.1	9.0	18	S	15	19			6	8
15	52	46	49	-1	48	16	0	1	0	T	0.0	30 030	13	7 7	8 1	20	SE	15	17			10	10
16	57	50	54	3	52	11	0	1 3	0	0.53	0.0	29.890	17	18 3	18 4	39	S	30	16			10	10
17	64	48	56	5	45	9	0	2	0	T	0.0	29 700	26	10.6	14.9	33	S	21	29			8	8
18	60	43	52	1	35	13	0		0	0.00	0.0	29.940	30	8.4	12 0	32	NW	23	29			3	4
19	60	45	53	1	44	12	0		0	0.00	0 0	29.985	20	12.7	12.9	28	S	22	20			3	3
20	58	48	53	1	48	12	0		0	0.00	0 0	29.970	19	18 4	18 5	38	S	29	19			8	8
21	61	49	55	3	49	10	0		0	0.02	0.0	29.810	19	9 7	10 4	26	S	22	19			7	8
22	55	43	49	-4	46	16	0	2	0	0 31	0 0	29 430	27	2 1	12 2	26	NW	20	33			10	10
23	58	39	49	-4	33	16	0		0	T	0.0	29.540	30	19 1	19 4	39	NW	29	30			10	8
24	66	49	58	5	36	7	0		0	T	0.0	30 090	23	7.0	12.3	25	NW	17	19			7	6
25	59	49	54	1	48	11	0		0	0 00	0.0	30.020	19	16 0	16 2	31	S	24	20			7	7
26	61	44	53	-1	50	12	0	1 3	0	0 33	0.0	29.895	20	1 2	13 2	38	N	28	02			10	10
27	60	41	51	-3	33	14	0	1	0	T	0.0	30.205	02	11 6	14.7	32	N	23	02			2	3
28	62	39	51	-3	32	14	0		0	0 00	0 0	30.330	09	3.0	7 4	18	NE	14	19			2	1
29	68	43	56	1	34	9	0		0	0 00	0 0	30 160	12	1 8	7 5	14	S	13	19			2	3
30	71*	47	59*	4	45	6	0		0	0 00	0 0	30 080	18	3 9	5 5	16	S	14	19			9	7
SUM	1735	1292				TOTAL 428	TOTAL 0	NUMBER OF DAYS		TOTAL 3 06	TOTAL 0.0	FOR THE MONTH 29 940	15	0	12 2	39	NW	30	16	TOTAL	% FOR POSSIBLE	SUM 218	SUM 217
AVG	57 8	43 1	50 5	DEP 0 0	AVG 40 1	DEP -1 1	DEP 0	PRECIPITATION ≥ 01 INCH 10		DEP -0 84						DATE 23*		DATE 16		POSSIBLE (min)		AVG	AVG

NUMBER OF DAYS				SEASON TO DATE TOTAL	TOTAL	SNOW ICE PELLETS		GREATEST IN 24 HOURS AND DATES			GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE
MAXIMUM TEMP ≥ 90°	MINIMUM TEMP ≤ 32°	≤ 32°	≤ 0°	DEP 4816	DEP 0	≥ 1 0 INCH 0		PRECIPITATION	SNOW, ICE PELLETS		0
0	0	0	0	-138	1	THUNDERSTORMS 3		1 63	01-02	0 0	
						HEAVY FOG 5					
						CLEAR 5	PARTLY CLOUDY 9	CLOUDY 16			

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE
T TRACE AMOUNT
+ ALSO ON EARLIER DATE(S)
HEAVY FOG: VISIBILITY 1/4 MILE OR LESS
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA

DATA IN COLS 6 AND 12-15 ARE BASED ON 21 OR MORE OBSERVATIONS AT HOURLY INTERVALS. RESULTANT WIND IS THE VECTOR SUM OF WIND SPEEDS AND DIRECTIONS DIVIDED BY THE NUMBER OF OBSERVATIONS. COLS 16 & 17 PEAK GUST - HIGHEST INSTANTANEOUS WIND SPEED ONE OF TWO WIND SPEEDS IS GIVEN UNDER COLS 18 & 19: FASTEST MILE - HIGHEST RECORDED SPEED FOR WHICH A MILE OF WIND PASSES STATION (DIRECTION IN COMPASS POINTS) FASTEST OBSERVED ONE MINUTE WIND - HIGHEST ONE MINUTE SPEED (DIRECTION IN TENS OF DEGREES). ERRORS WILL BE CORRECTED IN SUBSEQUENT PUBLICATIONS.

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER

Kenneth D Wadleigh
DIRECTOR
NATIONAL CLIMATIC DATA CENTER

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL ENVIRONMENTAL SATELLITE, DATA AND INFORMATION SERVICE
NATIONAL CLIMATIC DATA CENTER ASHEVILLE NORTH CAROLINA

OBSERVATIONS AT 3-HOUR INTERVALS

APR 1993 94789
NEW YORK (JFK AP), NY

HOUR L.S.T.	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISIBILITY WHOLE MILES	VISIBILITY 16THS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW POINT °F	REL HUMIDITY %	WIND DIRECTION	WIND SPEED (KNOTS)
APR 1st											
01	10	55	9		R	46	44	42	86	11	12
04	10	8	5		RF	44	44	43	96	10	19
07	10	8	1	8	TRWF	46	46	46	100	09	19
10	10	9	4		RF	48	48	47	96	05	12
13	10	5	8			46	46	46	100	06	13
16	10	5	8			46	46	45	96	06	11
19	10	5	9			44	43	42	93	05	16
22	10	8	9		RW	41	40	39	93	04	14
APR 2nd											
01	10	8	10			40	39	38	93	06	8
04	10	7	12			39	38	37	93	06	11
07	10	5	1	8	LF	37	37	37	100	06	9
10	10	7	6		F	38	38	37	96	05	11
13	10	8	8			39	38	36	89	04	8
16	10	12	7			40	38	36	86	04	7
19	10	9	6		F	38	37	36	93	04	6
22	10	8	6		F	38	37	36	93	05	5
APR 3rd											
01	10	8	6		F	38	37	36	93	07	4
04	10	7	5		F	38	38	37	96	00	0
07	10	23	10		RW	41	40	38	89	33	9
10	10	15	11		RW	41	40	38	89	32	13
13	10	35	20			47	41	32	56	33	13
16	10	40	20			45	38	29	54	32	20
19	9	44	20			43	37	27	53	34	15
22	4	UNL	20			41	35	24	51	32	17
APR 4th											
01	5	UNL	20			39	34	25	57	31	14
04	0	UNL	20			37	32	24	59	31	9
07	5	UNL	20			38	33	24	57	30	10
10	8	55	20			44	37	27	51	33	10
13	10	40	20			44	38	29	56	35	11
16	9	55	20			45	39	29	54	35	14
19	10	50	20			43	37	27	53	35	12
22	8	50	20			42	37	28	58	34	8
APR 5th											
01	0	UNL	20			40	36	29	65	35	5
04	2	UNL	20			37	34	30	76	36	6
07	8	UNL	15			39	36	31	73	01	6
10	7	UNL	15			50	42	30	46	00	0
13	7	UNL	15			48	42	33	56	20	12
16	9	UNL	15			48	42	33	56	20	6
19	10	UNL	20			43	39	33	68	12	4
22	10	UNL	20			41	39	35	79	13	3
APR 6th											
01	10	250	20			39	37	35	86	04	6
04	10	220	15			39	36	32	76	05	9
07	10	220	15			40	35	28	62	05	11
10	10	220	15			50	42	30	46	06	15
13	10	200	20			47	42	35	63	12	11
16	10	200	15			47	42	35	63	12	10
19	10	230	15			43	40	35	74	11	6
22	10	UNL	20			42	37	29	60	05	7
APR 7th											
01	10	UNL	20			39	36	31	73	04	9
04	10	UNL	20			38	33	25	60	03	10
07	7	UNL	20			41	35	26	55	05	14
10	6	UNL	20			51	42	30	45	04	12
13	4	UNL	20			57	45	29	34	08	11
16	3	UNL	20			55	44	30	39	17	7
19	0	UNL	20			46	39	29	52	13	9
22	0	UNL	20			45	39	31	58	10	8
APR 8th											
01	0	UNL	20			42	36	28	58	02	6
04	1	UNL	15			41	36	29	62	36	7
07	8	UNL	13			44	38	30	58	04	6
10	3	UNL	15			56	46	35	45	04	10
13	9	UNL	15			55	47	39	55	21	9
16	8	UNL	15			55	47	37	51	13	9
19	9	UNL	20			46	42	38	74	15	5
22	8	250	15			46	44	41	83	00	0
APR 9th											
01	10	5	8			46	45	44	93	00	0
04	10	5	6		F	46	46	46	100	06	3
07	10	3	1		F	46	46	46	100	06	6
10	10	230	10			56	51	47	72	12	7
13	10	230	15			56	50	43	62	11	11
16	9	210	20			54	51	48	80	10	11
19	10	210	15			49	48	46	90	11	11
22	10	11	13			49	48	46	90	10	9
APR 10th											
01	10	1	0	6	F	48	48	48	100	12	12
04	10	1	0	2	F	50	50	50	100	12	9
07	10	3	1		F	51	51	51	100	13	12
10	10	2	1	8	F	55	54	53	93	13	12
13	10	50	12			56	55	54	93	16	18
16	10	3	3		F	51	51	51	100	16	13
19	10	2	0	8	F	48	48	48	100	22	5
22	10	3	4		F	50	50	50	100	17	6
APR 11th											
01	10	2	0	4	F	48	48	48	100	17	3
04	10	13	20			49	48	46	90	36	13
07	10	21	20		RW	47	45	43	86	35	16
10	10	100	25			55	49	43	64	34	13
13	10	UNL	25			63	53	44	50	34	9
16	10	UNL	25			63	53	43	48	30	15
19	10	UNL	20			57	49	40	53	32	11
22	10	UNL	20			51	45	38	61	35	9
APR 12th											
01	8	37	15			47	43	37	68	36	12
04	6	35	15			45	41	37	74	33	8
07	2	UNL	15			45	41	36	71	34	15
10	2	UNL	15			53	46	38	57	34	13
13	9	40	15			55	47	39	55	34	11
16	10	40	13			53	46	39	59	34	15
19	10	32	15			48	43	37	66	36	16
22	9	100	20			44	41	36	74	01	16
APR 13th											
01	10	43	20			43	40	36	76	34	12
04	10	31	15			42	40	38	86	35	16
07	7	33	20			44	41	37	77	35	19
10	4	UNL	20			53	46	38	57	01	14
13	2	UNL	20			58	49	40	51	35	13
16	7	55	20			61	51	41	48	02	10
19	4	UNL	20			52	47	42	69	16	5
22	5	UNL	20			49	46	42	77	27	4
APR 14th											
01	10	35	20			48	43	38	69	36	9
04	10	32	15			46	42	37	71	02	6
07	4	UNL	13			46	42	36	68	01	9
10	2	UNL	12			53	46	37	55	35	6
13	8	UNL	11			57	49	41	55	21	9
16	9	140	11			50	46	41	71	19	8
19	10	95	12			47	45	42	83	20	10
22	10	65	12		RW	47	46	45	93	19	7
APR 15th											
01	10	49	10			47	47	46	96	15	3
04	10	60	10			47	46	45	93	00	0
07	10	32	10			49	47	44	83	11	7
10	10	24	12			52	49	46	80	12	9
13	10	7	5		F	50	49	48	93	11	11
16	10	5	6		F	50	50	50	100	12	7
19	10	4	4		F	50	50	50	100	14	10
22	10	4	5		F	50	50	50	100	13	6
APR 16th											
01	10	7	7			50	50	50	100	16	10
04	10	4	6		F	50	50	50	100	16	9
07	10	200	7			51	51	50	96	17	12
10	10	5	7			54	52	51	90	17	11
13	10	130	9			56	54	52	87	17	18
16	10	27	8			54	53	52	93	16	18
19	10	36	8			55	53	52	90	16	24
22	10	20	2	8	TRWF	53	53	53	100	17	23
APR 17th											
01	10	4	4		RWF	53	53	53	100	17	15
04	10	2	0	4	LF	49	49	49	100	17	9
07	10	1	0	1	F	49	49	49	100	19	10
10	7	30	13			60	57	54	81	26	15
13	5	UNL	15			62	54	46	56	29	17
16	8	50	15			61	51	42	50	28	14
19	6	65	20			57	48	39	51	29	13
22	10	80	20			54	47	39	57	30	16
APR 18th											
01	8	90	25			47	42	36	66	29	13
04	0	UNL	25			44	39	32	63	31	15
07	10	37	20			44	38	30	58	32	15
10	4	UNL	20			50	41	29	45	30	14
13	1	UNL	20			54	45	33	45	33	10
16	0	UNL	20			59	48	36	47	34	10
19	0	UNL	20			47	44	40	77	18	10
22	7	UNL	20			46	44	42	86	00	0

MAXIMUM SHORT DURATION PRECIPITATION

TIME PERIOD (MINUTES)	5	10	15	20	30	45	60	80	100	120	150	180
PRECIPITATION (INCHES)	0 08	0 16	0.19	0.24	0 32	0 37	0.45	0 56	0 69	0 83	0 99	1 07
ENDED DATE	01	01	01	01	01	01	01	01	01	01	01	01
ENDED TIME	0811	0811	0815	0821	0831	0717	0728	0728	0812	0831	0831	0843

THE PRECIPITATION AMOUNTS FOR THE INDICATED TIME INTERVALS MAY OCCUR AT ANY TIME DURING THE MONTH. THE TIME INDICATED IS THE ENDING TIME OF THE INTERVAL. DATE AND TIME ARE NOT ENTERED FOR TRACE AMOUNTS.

PAGE 2

OBSERVATIONS AT 3-HOUR INTERVALS

APR 1993 NEW YORK (JFK AP), NY 94789

HOUR L S T	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISIBILITY WHOLE MILES	VISIBILITY 16THS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW POINT °F	REL HUMIDITY %	WIND DIRECTION	WIND SPEED (KNOTS)
APR 19th											
01	0	UNL	20			46	43	40	80	20	3
04	0	UNL	15			47	44	41	80	21	8
07	4	UNL	12			51	47	43	74	22	6
10	7	UNL	12			55	50	45	69	19	9
13	4	UNL	13			59	53	47	65	19	17
16	0	UNL	13			58	52	47	67	19	18
19	5	UNL	12			56	51	47	72	19	17
22	6	UNL	15			52	48	44	74	21	13
APR 20th											
01	3	UNL	15			50	47	44	80	19	9
04	4	UNL	13			49	48	46	90	18	8
07	8	250	9			50	49	48	93	19	9
10	8	UNL	10			55	51	48	77	18	15
13	7	UNL	11			57	53	49	75	19	23
16	9	UNL	12			56	52	49	78	19	25
19	10	UNL	10			53	50	48	83	19	24
22	10	UNL	12			51	50	48	90	19	18
APR 21st											
01	10	UNL	12			51	50	48	90	19	19
04	6	UNL	10			50	49	48	93	20	12
07	7	250	8			51	50	49	93	20	11
10	8	250	9			55	52	49	80	19	13
13	9	70	10			56	53	50	80	19	5
16	6	120	12			57	53	50	78	17	7
19	10	75	11			53	51	50	90	00	0
22	10	45	10			51	51	50	96	14	8
APR 22nd											
01	10	17	11			51	51	50	96	16	4
04	10	5	6		RF	52	52	51	96	14	9
07	10	3	0	12	RWF	50	50	50	100	17	8
10	10	4	5		F	52	52	52	100	16	9
13	10	3	2		F	51	51	51	100	18	11
16	10	16	12			53	49	46	77	32	10
19	10	25	20			49	44	38	66	34	14
22	10	28	20			44	39	33	65	31	16
APR 23rd											
01	10	37	20			43	38	31	63	31	16
04	10	23	13		R	40	38	35	82	30	17
07	9	35	20			44	39	32	63	31	20
10	10	31	15		RW	44	41	36	74	30	21
13	10	28	20		RW	46	42	38	74	31	19
16	10	140	20			52	42	29	41	32	20
19	8	95	20			56	46	25	45	29	9
22	0	UNL	25			56	45	31	39	29	12
APR 24th											
01	0	UNL	25			56	44	29	36	31	12
04	0	UNL	25			49	41	30	48	30	10
07	2	UNL	20			55	44	31	40	31	9
10	8	UNL	20			63	51	38	40	33	6
13	8	UNL	20			65	54	43	45	23	10
16	10	140	20			57	48	37	47	19	14
19	10	220	20			51	45	38	61	17	13
22	10	95	20		RW	50	46	41	71	19	12
APR 25th											
01	7	100	15			50	46	42	74	16	7
04	9	120	12			50	48	46	86	19	13
07	3	UNL	10			51	49	46	83	19	10
10	5	UNL	12			56	52	48	75	19	15
13	7	UNL	12			59	54	50	72	19	15
16	9	250	11			54	52	50	86	19	20
19	10	250	11			53	51	50	90	19	14
22	10	UNL	11			52	51	50	93	19	14
APR 26th											
01	10	UNL	10			52	52	51	96	20	14
04	10	250	7			51	51	50	96	19	15
07	10	250	6		F	51	52	51	93	19	11
10	10	80	7			57	54	51	81	19	8
13	10	25	7		RW	55	54	53	93	16	6
16	10	8	7			55	54	53	93	18	4
19	10	50	15			50	50	49	96	03	17
22	10	12	10			46	46	45	96	01	21
APR 27th											
01	10	11	10		R	43	42	41	93	01	16
04	10	16	15			41	39	37	86	01	19
07	7	110	20			42	38	33	71	01	18
10	3	UNL	20			49	42	33	54	02	20
13	0	UNL	20			56	45	30	37	01	17
16	0	UNL	20			60	45	26	27	01	11
19	0	UNL	20			47	43	38	71	17	10
22	0	UNL	20			44	41	37	77	16	3
APR 28th											
01	0	UNL	20			43	40	35	74	00	0
04	0	UNL	15			40	38	34	79	04	6
07	0	UNL	20			45	40	32	61	05	9
10	0	UNL	20			54	42	26	34	03	11
13	1	UNL	15			55	46	36	49	19	12
16	5	UNL	15			56	46	34	44	19	8
19	5	UNL	15			49	42	33	54	15	8
22	0	UNL	20			47	41	32	56	00	0
APR 29th											
01	0	UNL	20			46	40	33	61	02	6
04	0	UNL	20			47	41	33	58	01	7
07	0	UNL	15			50	40	26	39	06	11
10	0	UNL	15			60	45	26	27	06	7
13	1	UNL	13			61	50	37	41	19	9
16	6	UNL	13			59	50	40	50	20	9
19	7	UNL	12			56	46	35	45	18	5
22	4	UNL	20			51	45	38	61	00	0
APR 30th											
01	3	UNL	20			51	47	42	72	00	0
04	1	UNL	20			47	44	40	77	00	0
07	10	UNL	8			55	47	38	53	00	0
10	10	UNL	12			69	56	45	42	00	0
13	10	UNL	12			66	55	45	47	20	10
16	9	UNL	15			63	55	48	58	18	8
19	9	250	15			57	54	51	81	14	8
22	6	UNL	15			52	50	48	86	22	6

APRIL 28

APRIL 29

WEATHER CODES

*	TORNADO	SW	SNOW SHOWERS	GF	GROUND FOG
T	THUNDERSTORM	SG	SNOW GRAINS	BD	BLOWING DUST
Q	SQUALL	SP	SNOW PELLETS	BN	BLOWING SAND
R	RAIN	IC	ICE CRYSTALS	BS	BLOWING SNOW
RW	RAIN SHOWERS	IP	ICE PELLETS	BY	BLOWING SPRAY
ZR	FREEZING RAIN	IPW	ICE PELLET SHOWERS	K	SMOKE
L	DRIZZLE	A	HAIL	H	HAZE
ZL	FREEZING DRIZZLE	F	FOG	D	DUST
S	SNOW	IF	ICE FOG		

CEILING' UNL INDICATES UNLIMITED
WIND DIRECTION DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS, INDICATED IN TENS OF DEGREES FROM TRUE NORTH' 1 F . 09 FOR EAST, 18 FOR SOUTH 27 FOR WEST AN ENTRY OF 00 INDICATES CALM
SPEED THE OBSERVED AVERAGE ONE-MINUTE VALUE. EXP RESSED IN KNOTS (MPH=KNOTS X 1 15)

SUMMARY BY HOURS

HOUR L S T	AVERAGES SKY COVER (TENTHS)	AVERAGES STATION PRESSURE (INCHES)	AVERAGES TEMPERATURE AIR TEMP °F	AVERAGES TEMPERATURE WET BULB °F	AVERAGES TEMPERATURE DEW POINT °F	AVERAGES REL HUMIDITY %	AVERAGES WIND SPEED (MPH)	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED (MPH)
01	7	29.94u	46	43	40	80	9 9	36	0.7
04	7	29 930	45	42	39	82	10.8	01	1 9
07	7	29 960	47	43	39	77	12 5	02	3.2
10	7	29 960	53	47	40	65	12 7	01	2.3
13	7	29 930	55	48	42	65	14 1	19	3.0
16	8	29 910	54	48	41	65	13 8	20	2 5
19	8	29 930	50	45	41	73	12 5	16	2 9
22	7	29 960	48	44	40	77	10 8	25	0 7

REFAX
TO: BASEL A.
FROM: F. MEDINA A-18 1/20/95

NATIONAL CLIMATIC DATA CENTER
FEDERAL BUILDING
37 BATTERY PARK AVE
ASHEVILLE, NORTH CAROLINA 28801-2733

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

FIRST CLASS
POSTAGE AND FEES PAID
NOAA
PERMIT G-19

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

APR 1993 94789
NEW YORK (JFK AP), NY
USCOMM - NOAA - ASHEVILLE, NC 700

DATE	A.M. HOUR ENDING AT												P.M. HOUR ENDING AT												DATE
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
01	T	T	0.02	0.01	0.07	0.15	0.42	0.25	0.33	0.02	0.01	0.01	T									T	0.28	0.05	01
02	0.01					T	0.01	T	T													T			02
03			T				T	T	T	0.02											T				03
04																									04
05																									05
06																									06
07																									07
08																									08
09																									09
10						T	T		0.03							0.01	0.01	0.02	T		0.04	T			10
11			T	T	0.05	0.03	0.01	T																	11
12																									12
13																									13
14																				T	0.01	T	T	T	14
15														T	T	T									15
16																				0.02	0.13	0.32	0.06		16
17	T	T		T	T																				17
18																									18
19																									19
20																									20
21																							1	0.02	21
22	0.01	T	0.14	0.02	0.02	T	0.07	0.01	0.03	0.01			T	T	T										22
23		T	T	T	T	T				T	T	T													23
24																						T	T		24
25																									25
26												T	0.06	T			0.03	0.14	T	0.05	0.04	0.01		T		26
27	T	T	T	T																					27
28																									28
29																									29
30																									30

ISSN 0198-3628

JUN 1993
NEW YORK (JFK AP), NY
NEA SER CONT NET OFC
RM. 2309 TAB #50

INQUIRIES/COMMENTS CALL
(704) 271-4800

INT'L ARRIVALS BLDG

LOCAL CLIMATOLOGICAL DATA

Monthly Summary

LATITUDE 40° 39'N LONGITUDE 73° 47'W ELEVATION (GROUND) 13 FEET TIME ZONE EASTERN 94789

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65°F HEATING (SEASON BEGINS WITH JUL)	COOLING (SEASON BEGINS WITH JAN)	WEATHER TYPES 1 FOG 2 HEAVY FOG 3 THUNDERSTORM 4 ICE PELLETS 5 HAIL 6 GLAZE 7 DUSTSTORM 8 SMOKE, HAZE 9 BLOWING SNOW	SNOW ICE PELLETS OR ICE ON GROUND AT 0700 INCHES	PRECIPITATION WATER EQUIVALENT HUNDREDTHS	SNOW, ICE PELLETS TENTHS	AVERAGE STATION PRESSURE IN INCHES ELEV. 22 FEET ABOVE M.S.L.	WIND (M.P.H.) RESULTANT DIR	RESULTANT SPEED	AVERAGE SPEED	PEAK GUST SPEED	PEAK GUST DIRECTION	FASTEST 1-MIN SPEED	FASTEST 1-MIN DIRECTION	SUNSHINE MINUTES	SUNSHINE PERCENT OF TOTAL POSSIBLE	SKY COVER (TENTHS) SUNRISE TO SUNSET	SKY COVER (TENTHS) MIDNIGHT TO MIDNIGHT
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
01	73	59	66	1	44	0	1	1	0	0.13	0.0	29.725	32	10.0	13.3	28	NW	22	33			6	5
02	67	54	61	-4	42	4	0		0	0.00	0.0	29.900	23	8.4	11.0	23	S	20	20			9	8
03	71	58	65	-1	53	0	0		0	0.00	0.0	29.830	22	9.5	10.5	18	S	15	19			6	7
04	72	57	65	-1	51	0	0		0	0.02	0.0	29.835	22	2.3	7.9	20	N	15	20			8	9
05	63	54*	59*	-7	55	6	0	1	0	0.17	0.0	29.880	10	6.5	7.5	20	E	14	10			10	10
06	71	56	64	-3	49	1	0	1	0	0.00	0.0	29.900	32	10.4	11.4	29	NW	20	32			7	6
07	80	56	68	1	49	0	3		0	0.00	0.0	29.980	28	8.4	8.8	23	W	17	29			7	6
08	75	60	68	1	55	0	3	1	0	T	0.0	29.970	17	6.6	7.9	16	S	13	17			5	6
09	79	62	71	3	64	0	6	1 3 8	0	0.20	0.0	29.860	20	5.3	6.7	31	NW	17	31			7	8
10	89	65	77	9	61	0	12	1	0	T	0.0	29.810	28	12.3	12.9	30	W	23	28			7	7
11	86	67	77	9	54	0	12		0	0.00	0.0	29.940	34	12.0	12.9	30	NW	20	32			3	3
12	73	61	67	-2	56	0	2		0	0.00	0.0	30.190	12	2.6	7.2	14	NE	14	02			5	4
13	72	57	65	-4	57	0	0		0	0.00	0.0	30.230	19	6.4	7.3	17	S	14	19			1	0
14	75	60	68	-1	58	0	3		0	0.00	0.0	30.140	21	9.1	9.8	22	S	16	19			1	1
15	75	62	69	0	62	0	4		0	0.00	0.0	30.030	20	12.5	12.7	30	S	23	18			7	7
16	85	65	75	5	56	0	10		0	0.00	0.0	30.110	30	2.2	6.8	14	NW	10	02			4	6
17	79	61	70	0	57	0	5	1	0	0.00	0.0	30.210	18	3.6	7.5	17	S	12	19			2	3
18	78	64	71	1	65	0	6	1 8	0	0.00	0.0	30.120	20	9.8	10.0	24	S	18	19			0	0
19	95*	69	82*	12	68	0	17	1 9	0	T	0.0	30.010	27	6.5	8.5	22	NW	14	29			6	7
20	78	68	73	2	66	0	8	1 3 8	0	0.33	0.0	30.100	11	6.7	7.5	17	SE	13	15			7	8
21	80	67	74	3	68	0	9	23 8	0	0.17	0.0	29.890	21	6.2	7.8	22	SW	14	31			10	10
22	89	69	79	8	59	0	14	1 8	0	0.00	0.0	29.710	30	12.4	14.0	30	NW	21	33			4	4
23	83	63	73	1	40	0	8		0	0.00	0.0	29.960	35	13.1	13.9	30	NW	20	34			3	2
24	80	64	72	0	48	0	7		0	0.00	0.0	30.220	21	3.4	9.1	21	SW	16	21			4	3
25	77	63	70	-2	59	0	5		0	0.00	0.0	30.200	20	10.6	11.4	25	S	17	19			0	0
26	78	64	71	-1	65	0	6		0	0.00	0.0	30.020	20	12.4	12.8	30	S	24	20			3	1
27	77	67	72	-1	65	0	7	3	0	0.13	0.0	29.915	19	1.6	6.4	14	E	12	20			8	8
28	83	67	75	2	64	0	10		0	0.00	0.0	29.840	21	9.6	10.8	24	SW	18	20			5	6
29	84	70	77	4	62	0	12		0	T	0.0	29.900	15	1.9	6.2	14	SE	12	14			9	10
30	84	70	77	4	62	0	12		0	0.00	0.0	29.950	16	2.0	6.1	16	S	12	17			7	8
SUM	2351	1879				TOTAL 41	TOTAL 182	NUMBER OF DAYS		TOTAL 1.15	TOTAL 0.0	29.980	FOR THE MONTH 24	3.6	9.5	31	NW	24	26	TOTAL	Σ FOR MONTH	SUM 161	SUM 165
AVG.	78.4	62.6	70.5	DEP. 1.1	AVG. 57.1	DEP -12	DEP 41	PRECIPITATION ≥ .01 INCH 7		DEP -2.50						DATE 9		DATE 26		POSSIBLE	SUNRISE	AVG. 5.4	AVG. 5.5

NUMBER OF DAYS MAXIMUM TEMP ≥ 90°	MAXIMUM TEMP ≤ 32°	MINIMUM TEMP ≤ 32°	MINIMUM TEMP ≤ 0°	SEASON TO DATE TOTAL	SEASON TO DATE DEP
1	0	0	0	4925	227
-246	63				

SNOW, ICE PELLETS ≥ 1.0 INCH	0
THUNDERSTORMS	4
HEAVY FOG	1
CLEAR 8	PARTLY CLOUDY 16	CLOUDY 6

GREATEST IN 24 HOURS AND DATES PRECIPITATION	SNOW, ICE PELLETS
1.50	31-01	0.0	-

GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE: 0

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
T TRACE AMOUNT
+ ALSO ON EARLIER DATE(S)
HEAVY FOG VISIBILITY 1/4 MILE OR LESS
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA

DATA IN COLS 6 AND 12-15 ARE BASED ON 21 OR MORE OBSERVATIONS AT HOURLY INTERVALS. RESULTANT WIND IS THE VECTOR SUM OF WIND SPEEDS AND DIRECTIONS DIVIDED BY THE NUMBER OF OBSERVATIONS COLS 16 & 17 PEAK GUST - HIGHEST INSTANTANEOUS WIND SPEED ONE OF TWO WIND SPEEDS IS GIVEN UNDER COLS 18 & 19 FASTEST MILE - HIGHEST RECORDED SPEED FOR WHICH A MILE OF WIND PASSES STATION (DIRECTION IN COMPASS POINTS). FASTEST OBSERVED ONE MINUTE WIND - HIGHEST ONE MINUTE SPEED (DIRECTION IN TENS OF DEGREES) ERRORS WILL BE CORRECTED IN SUBSEQUENT PUBLICATIONS.

ERRATA - FEB 1993 - CORRECT HEATING DEGREE DAYS DEPARTURES TO READ - MTH: 50 SEASON: -151

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER

Kenneth D Hadeen
DIRECTOR
NATIONAL CLIMATIC DATA CENTER

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OBSERVATIONS AT 3-HOUR INTERVALS

JUN 1993 94789
NEW YORK (JFK AP), NY

HOUR (LST)	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISIBILITY WHOLE MILES	VISIBILITY 16THS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW POINT °F	REL HUMIDITY %	WIND DIRECTION	WIND SPEED (KNOTS)
JUN 1st											
01	10	12	5		RF	60	60	60	100	20	10
04	10	2	1		RF	59	58	58	97	23	7
07	9	37	10			59	55	52	78	32	15
10	5	UNL	15			65	55	47	52	32	13
13	4	UNL	20			72	55	40	32	33	19
16	4	UNL	20			70	54	38	31	31	10
19	3	UNL	20			68	51	33	27	34	10
22	1	UNL	20			62	48	32	33	34	10
JUN 2nd											
01	0	UNL	20			58	46	32	38	34	7
04	0	UNL	20			55	45	33	44	30	7
07	9	130	15			59	48	35	41	30	6
10	10	130	13			62	52	42	48	25	8
13	10	UNL	15			66	53	40	39	24	12
16	9	250	15			64	55	47	54	20	17
19	10	250	15			60	54	48	65	21	13
22	10	110	15			60	56	53	78	20	7
JUN 3rd											
01	7	200	15			59	53	48	67	25	9
04	9	85	15			59	55	51	75	25	9
07	10	250	8			60	56	52	75	25	10
10	10	130	12			65	56	48	54	23	8
13	9	130	12			70	58	48	46	24	9
16	1	UNL	13			67	61	56	68	20	11
19	2	UNL	12			62	59	56	81	19	13
22	9	250	11			60	58	56	87	19	8
JUN 4th											
01	10	140	11			61	58	56	84	23	6
04	10	85	12			62	57	53	73	26	3
07	10	65	8		R	59	55	52	78	01	7
10	10	65	13			58	54	50	75	02	6
13	3	UNL	15			71	55	43	34	00	0
16	8	UNL	15			66	56	48	53	19	10
19	10	130	12			62	56	51	67	20	11
22	10	130	13			60	56	52	75	00	0
JUN 5th											
01	10	220	13			57	55	54	90	00	0
04	7	250	11			56	55	54	93	00	0
07	10	80	5		F	59	58	57	93	12	6
10	10	70	13		RW	60	58	56	87	11	7
13	10	50	15			62	57	53	73	11	11
16	10	7	2	8	RF	57	56	56	97	09	9
19	10	7	2	8	RF	58	57	57	97	09	8
22	10	7	2	8	LF	59	58	58	97	05	5
JUN 6th											
01	10	3	2		F	56	56	56	100	35	9
04	9	60	6		F	57	56	55	93	30	7
07	1	UNL	20			62	56	50	65	31	12
10	7	70	20			67	57	49	53	31	14
13	9	47	20			67	56	47	49	32	13
16	10	60	20			68	56	46	45	35	10
19	7	75	20			66	55	46	49	34	12
22	2	UNL	20			62	55	49	63	27	6
JUN 7th											
01	0	UNL	20			60	55	50	70	28	9
04	3	UNL	20			57	52	48	72	26	7
07	8	130	13			60	55	50	70	25	6
10	10	120	15			68	57	48	49	29	8
13	3	UNL	15			76	59	44	32	29	15
16	5	UNL	15			80	61	47	31	30	10
19	5	UNL	15			76	61	50	40	27	8
22	8	85	15			67	60	54	63	28	5
JUN 8th											
01	8	UNL	15			63	59	55	75	00	0
04	8	130	15			60	57	54	81	05	6
07	5	UNL	13			67	59	53	61	22	4
10	2	UNL	11			74	62	53	48	16	8
13	2	UNL	15			74	61	51	45	16	11
16	5	UNL	15			71	60	51	49	17	9
19	10	80	10			65	61	58	78	17	9
22	10	45	7		RW	64	62	61	90	21	8
JUN 9th											
01	10	27	5		F	64	63	62	93	20	7
04	10	2	1		F	63	62	62	97	00	0
07	10	120	2		F	64	63	63	97	00	0
10	0	UNL	2		H	74	69	66	76	24	10
13	5	UNL	6		H	78	70	66	67	20	11
16	10	45	12		TRW	72	68	65	79	03	8
19	9	120	11			69	66	64	84	20	6
22	10	75	8			68	67	66	93	20	9
JUN 10th											
01	5	UNL	5		F	66	65	64	93	25	3
04	7	UNL	4		F	69	68	67	93	25	7
07	8	UNL	7			72	68	65	79	25	10
10	6	UNL	10			83	70	63	51	28	14
13	5	UNL	15			88	69	57	35	28	20
16	5	UNL	15			89	69	57	34	28	15
19	8	65	15			85	68	58	40	29	11
22	7	70	15			83	66	55	38	33	9
JUN 11th											
01	0	UNL	20			77	64	55	47	31	7
04	9	250	20			74	63	56	54	30	6
07	6	250	15			76	65	57	52	32	9
10	0	UNL	20			81	65	55	41	34	11
13	1	UNL	20			84	65	52	33	31	14
16	4	UNL	20			84	65	53	35	33	15
19	0	UNL	20			75	63	54	48	35	13
22	0	UNL	20			70	60	53	55	36	12
JUN 12th											
01	0	UNL	20			66	59	53	63	03	8
04	8	120	20			63	57	53	70	02	7
07	2	UNL	20			66	59	54	65	04	8
10	8	250	20			70	62	56	61	10	5
13	7	250	20			70	63	59	68	19	9
16	6	UNL	15			70	63	59	68	13	6
19	0	UNL	20			65	60	56	73	19	7
22	1	UNL	20			63	59	56	78	17	3
JUN 13th											
01	0	UNL	20			60	58	56	87	00	0
04	0	UNL	15			58	56	55	90	08	3
07	3	UNL	11			65	61	58	78	12	3
10	0	UNL	12			68	62	58	71	21	7
13	0	UNL	15			72	62	55	55	20	10
16	0	UNL	15			71	61	54	55	19	12
19	0	UNL	15			66	61	57	73	19	7
22	0	UNL	15			64	61	59	84	20	5
JUN 14th											
01	0	UNL	15			62	60	59	90	22	4
04	2	UNL	15			60	59	58	93	24	5
07	2	UNL	13			65	62	59	81	25	7
10	0	UNL	10			71	63	58	64	21	9
13	1	UNL	15			73	65	60	64	20	9
16	1	UNL	15			73	61	52	48	19	10
19	0	UNL	15			68	62	58	71	19	13
22	0	UNL	15			65	62	59	81	21	7
JUN 15th											
01	0	UNL	15			62	60	59	90	22	5
04	7	21	10			62	61	60	93	22	6
07	9	UNL	8			67	64	62	84	21	4
10	9	UNL	15			73	67	63	71	19	8
13	7	UNL	15			75	67	62	64	19	19
16	2	UNL	13			73	66	62	69	19	18
19	6	UNL	12			70	65	61	73	19	16
22	8	UNL	15			66	64	62	87	21	10
JUN 16th											
01	10	32	12			68	64	62	81	18	4
04	3	UNL	10			67	66	65	93	29	6
07	0	UNL	12			72	64	58	62	34	7
10	3	UNL	15			80	64	53	29	36	5
13	7	UNL	15			83	64	51	33	27	8
16	5	UNL	15			82	63	50	33	06	5
19	8	UNL	15			77	63	54	45	18	7
22	7	UNL	15			68	62	58	71	16	3
JUN 17th											
01	8	UNL	20			67	60	54	63	04	6
04	4	UNL	15			63	57	52	68	04	5
07	3	UNL	15			67	59	52	59	03	6
10	3	UNL	13			78	63	52	41	36	3
13	2	UNL	13			74	64	57	56	19	9
16	2	UNL	13			73	65	59	62	19	9
19	0	UNL	13			69	65	63	81	19	10
22	0	UNL	6		F	67	65	64	90	20	5
JUN 18th											
01	0	UNL	9			66	63	61	84	19	5
04	0	UNL	8			65	63	61	87	21	6
07	0	UNL	6		H	68	64	62	81	21	8
10	0	UNL	6		H	75	69	65	71	20	7
13	0	UNL	7			75	70	67	76	18	9
16	0	UNL	8			75	70	67	76	19	15
19	0	UNL	6		H	72	69	67	84	20	13
22	2	UNL	6		F	70	68	66	87	20	6

MAXIMUM SHORT DURATION PRECIPITATION

TIME PERIOD (MINUTES)	5	10	15	20	30	45	60	80	100	120	150	180
PRECIPITATION (INCHES)	0.14	0.20	0.22	0.24	0.28	0.32	0.33	0.33	0.33	0.33	0.33	0.33
ENDED DATE	20	20	20	20	20	20	20	20	20	20	20	20
ENDED TIME	2238	2242	2248	2253	2302	2316	2331	2331	2331	2331	2331	2331

THE PRECIPITATION AMOUNTS FOR THE INDICATED TIME INTERVALS MAY OCCUR AT ANY TIME DURING THE MONTH. THE TIME INDICATED IS THE ENDING TIME OF THE INTERVAL. DATE AND TIME ARE NOT ENTERED FOR TRACE AMOUNTS.

OBSERVATIONS AT 3-HOUR INTERVALS

JUN 1993
NEW YORK LGA AP, NY

HOUR L.S.T.	SKY COVER (TENTHS)	CEILING IN HUNDREDS OF FEET	VISIBILITY WHOLE MILES	VISIBILITY TENTHS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW POINT °F	REL HUMIDITY %	WIND DIRECTION	WIND SPEED (KNOTS)
JUN 19th											
01	3	UNL	5		F	70	68	66	87	20	6
04	10	250	4		F	72	69	68	87	24	6
07	6	130	3		H	77	72	70	79	20	3
10	4	UNL	8			92	74	65	41	32	12
13	3	UNL	9			93	74	65	40	32	9
16	9	65	9			89	74	67	48	21	9
19	10	95	10			80	73	69	69	27	11
22	4	UNL	10			75	72	70	85	25	7
JUN 20th											
01	7	UNL	12			77	69	65	67	06	5
04	10	130	12			72	68	65	79	00	0
07	9	130	6		H	72	68	66	82	09	6
10	5	UNL	7			77	70	66	69	11	9
13	3	UNL	7			78	70	65	64	13	8
16	6	250	7			73	68	65	76	13	8
19	10	4	1	8	F	69	67	66	90	12	4
22	10	8	4		F	70	68	66	87	07	7
JUN 21st											
01	10	4	2	8	F	69	68	67	93	14	9
04	10	1	0	4	F	67	67	67	100	18	4
07	10	3	1		F	69	68	68	97	00	0
10	10	3	1		F	72	70	69	90	25	8
13	10	130	1	8	H	75	72	70	85	20	8
16	9	130	5		H	76	71	69	79	18	7
19	10	47	8		T	76	69	65	69	30	7
22	10	40	4		RHF	69	68	67	93	21	6
JUN 22nd											
01	10	230	4		F	69	68	67	93	26	8
04	10	110	4		F	70	68	67	90	28	10
07	0	UNL	9			75	68	64	69	29	8
10	6	36	10			80	69	62	54	31	12
13	4	UNL	12			84	70	62	48	27	14
16	6	55	15			88	70	59	38	31	12
19	0	UNL	12			82	62	48	31	33	18
22	0	UNL	13			73	59	48	41	34	16
JUN 23rd											
01	0	UNL	15			68	57	48	49	33	11
04	0	UNL	15			64	55	46	52	33	10
07	0	UNL	20			66	54	43	43	33	14
10	1	UNL	20			72	55	40	32	36	17
13	0	UNL	20			80	57	36	21	35	15
16	7	UNL	20			83	59	37	19	36	11
19	3	UNL	20			79	57	37	22	02	11
22	3	UNL	20			73	56	40	30	01	9
JUN 24th											
01	0	UNL	20			68	55	43	41	03	6
04	4	UNL	20			64	54	44	48	36	5
07	7	UNL	20			70	57	46	42	02	8
10	6	UNL	20			79	59	43	28	06	5
13	4	UNL	20			79	61	46	31	22	9
16	6	UNL	20			76	64	55	48	19	13
19	1	UNL	20			72	59	49	44	21	12
22	0	UNL	20			67	59	53	61	24	5
JUN 25th											
01	0	UNL	20			65	56	48	54	24	5
04	0	UNL	20			63	60	57	81	23	6
07	1	UNL	15			69	63	58	68	24	6
10	0	UNL	15			74	63	56	54	19	9
13	0	UNL	15			76	67	62	62	18	11
16	0	UNL	15			76	67	61	60	18	13
19	0	UNL	15			71	65	61	71	19	14
22	0	UNL	15			67	64	62	84	22	9
JUN 26th											
01	0	UNL	15			66	62	59	78	24	6
04	0	UNL	15			65	63	62	90	22	6
07	8	13	8			68	66	64	87	23	7
10	4	UNL	12			75	69	65	71	19	10
13	3	UNL	12			77	71	67	71	20	17
16	2	UNL	12			76	71	68	76	19	17
19	5	UNL	12			74	70	68	82	19	17
22	7	250	10			68	67	66	93	21	9
JUN 27th											
01	10	230	12			67	66	65	93	19	3
04	10	130	11			69	67	66	90	00	0
07	10	40	7		TRW	67	65	63	87	35	9
10	10	65	11			72	68	65	79	36	5
13	8	100	12			73	67	64	74	17	8
16	8	UNL	11			74	68	64	77	21	7
19	8	UNL	10			71	67	65	81	18	6
22	4	UNL	9			68	67	66	93	21	5
JUN 28th											
01	7	UNL	10			68	66	65	90	21	4
04	3	UNL	8			68	66	64	87	22	5
07	6	UNL	7			73	68	65	76	21	6
10	4	UNL	11			81	71	66	60	25	7
13	2	UNL	11			81	72	67	63	18	11
16	2	UNL	12			79	68	61	54	20	15
19	8	250	12			74	66	61	64	20	14
22	10	110	13			70	69	64	82	27	11
JUN 29th											
01	10	200	13			74	69	66	76	25	7
04	9	120	13			73	69	66	79	27	4
07	9	110	10			74	69	66	76	13	3
10	9	250	12			80	68	61	52	02	7
13	8	250	13			82	67	58	44	08	3
16	10	140	13			78	64	55	45	14	10
19	10	140	13			71	67	64	79	19	4
22	10	120	13			71	66	63	76	22	3
JUN 30th											
01	10	110	12			71	67	64	79	15	3
04	10	80	7			70	67	65	84	00	0
07	7	110	11			73	66	61	66	02	9
10	3	UNL	15			80	65	56	44	13	5
13	10	130	13			79	68	62	56	17	10
16	8	UNL	12			78	68	62	58	20	8
19	9	250	12			75	67	62	64	19	5
22	10	130	12			73	67	64	74	00	0

WEATHER CODES

*	TORNADO	SW	SNOW SHOWERS	GF	GROUND FOG
T	THUNDERSTORM	SG	SNOW GRAINS	BD	BLOWING DUST
Q	SQUALL	SP	SNOW PELLETS	BN	BLOWING SAND
R	RAIN	IC	ICE CRYSTALS	BS	BLOWING SNOW
RW	RAIN SHOWERS	IP	ICE PELLETS	BY	BLOWING SPRAY
ZR	FREEZING RAIN	IPW	ICE PELLET SHOWERS	K	SMOKE
L	DRIZZLE	A	HAIL	H	HAZE
ZL	FREEZING DRIZZLE	F	FOG	D	DUST
S	SNOW	IF	ICE FOG		

CEILING: UNL INDICATES UNLIMITED
WIND DIRECTION DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS INDICATED IN TENS OF DEGREES FROM TRUE NORTH I E , 09 FOR EAST, 18 FOR SOUTH 27 FOR WEST AN ENTRY OF 00 INDICATES CALM
SPEED: THE OBSERVED AVERAGE ONE-MINUTE VALUE, EXPRESSED IN KNOTS (MPH=KNOTS X 1 15)

SUMMARY BY HOURS

HOUR L S T	AVERAGES SKY COVER (TENTHS)	AVERAGES STATION PRESSURE (INCHES)	AVERAGES TEMPERATURE AIR TEMP °F	AVERAGES TEMPERATURE WET BULB °F	AVERAGES TEMPERATURE DEW POINT °F	AVERAGES REL HUMIDITY %	AVERAGES WIND SPEED (MPH)	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED (MPH)
01	5	29.970	65	61	57	77	6.6	25	2.4
04	6	29.975	64	61	58	81	5.9	27	3.3
07	6	30.000	67	62	58	72	7.9	30	3.2
10	5	30.000	74	64	57	58	9.9	28	3.2
13	5	29.980	76	64	56	52	12.7	23	6.0
16	5	29.950	75	64	56	55	12.6	20	6.0
19	5	29.960	71	63	57	65	11.9	21	5.7
22	5	29.990	68	62	58	74	7.9	24	3.2

NATIONAL CLIMATIC DATA CENTER
FEDERAL BUILDING
37 BATTERY PARK AVE
ASHEVILLE, NORTH CAROLINA 28801-2733

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

FIRST CLASS
POSTAGE AND FEES PAID
NOAA
PERMIT G-19

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES) JUN 1993 94789 NEW YORK (JFK AP), NY USCOMM - NOAA - ASHEVILLE, NC 650

DATE	A.M. HOUR ENDING AT												P.M. HOUR ENDING AT												DATE
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
01	0.02	0 02	0 05	0.02	0 01	0 01																			01
02																									02
03																									03
04						T	0 01	T	0 01 T	T T	T				0.05	0 04	0 03	0 03	T	0 01	T	T	0 01	T	04
05																									05
06																									06
07																				T	T	T	T		07
08																									08
09		T	T		T	0 01		T								0 17	0 02				T				09
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20						T	T													T	0 09	0 08	T		20
21																									21
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25																									25
26																									26
27				T			0 04	0 09																	27
28																							T	T	28
29						T	T																		29
30																									30

TOTAL P.009

APPENDIX B

Photographs

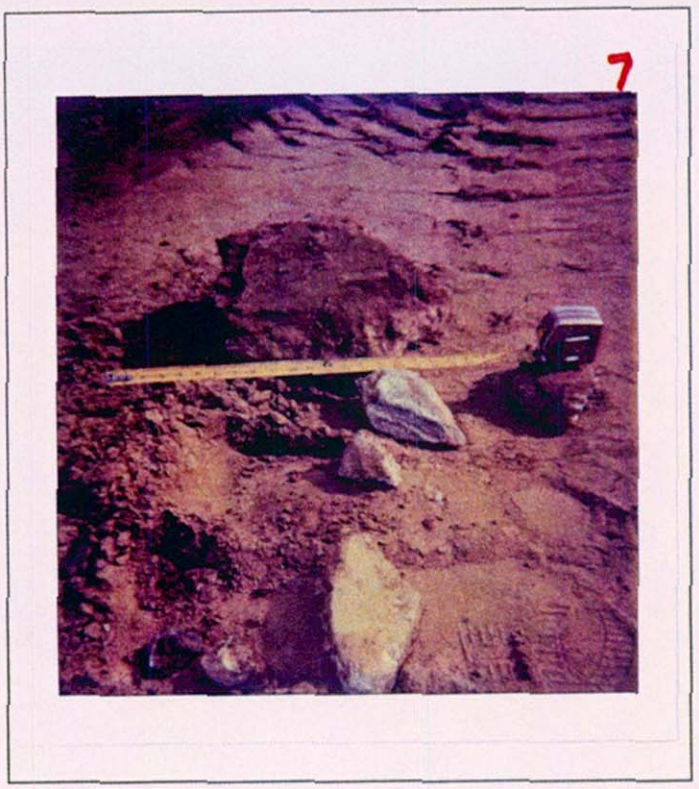

Figure B-1. Rocks and Other Objects as Found in Bulk Sample Location B1

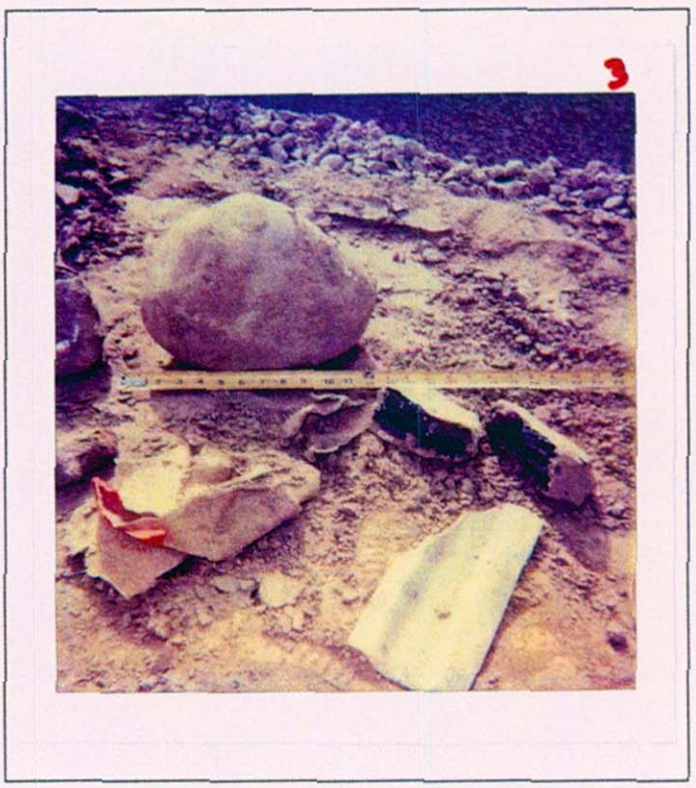

Figure B-2. Rocks and Other Objects as Found in Bulk Sample Location B2

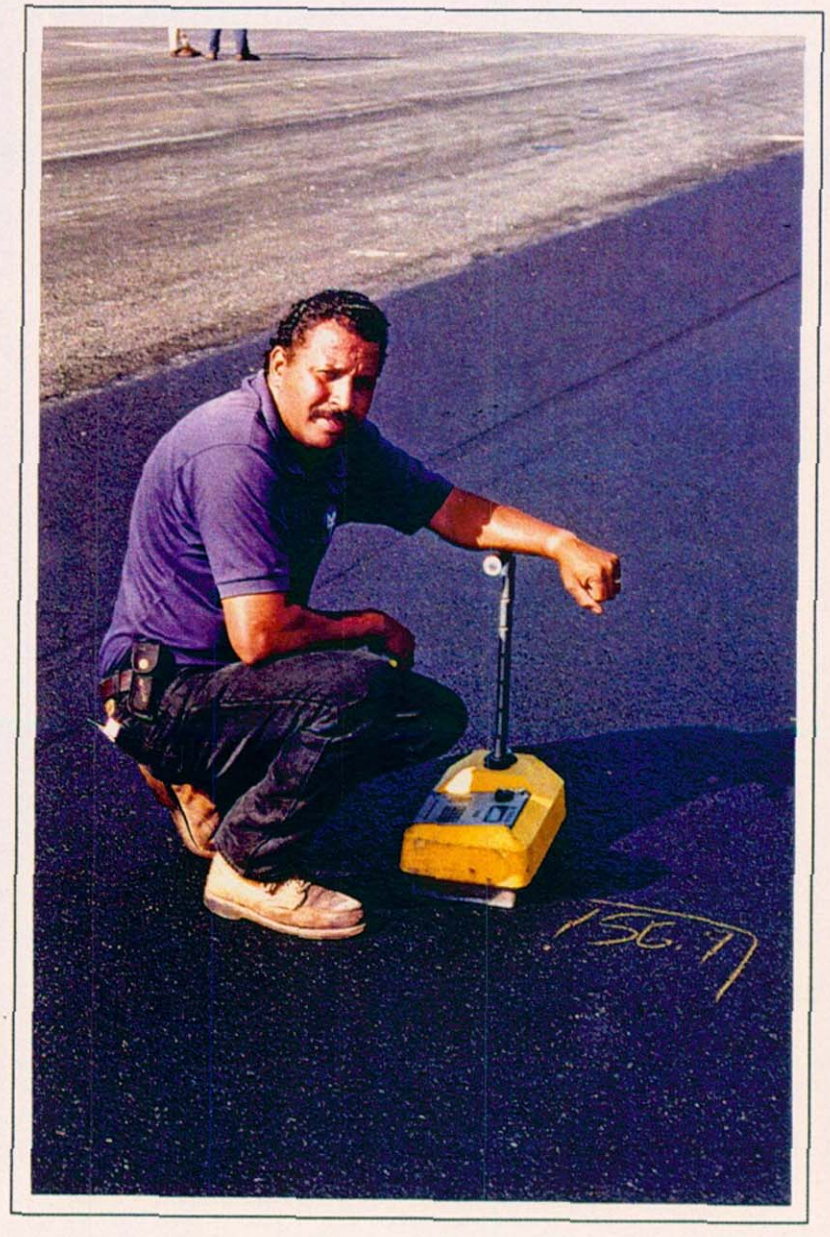

Figure B-3. Density Testing Using Nuclear Gage

Figure B-4. Measuring Elevations on the PMM Layer of the Two Supplemental Sections

Figure B-5. Lined up Cores Showing Different Pavement Thicknesses

Figure B-6. *Minimum Site Markings as Requested by F.A.A.*

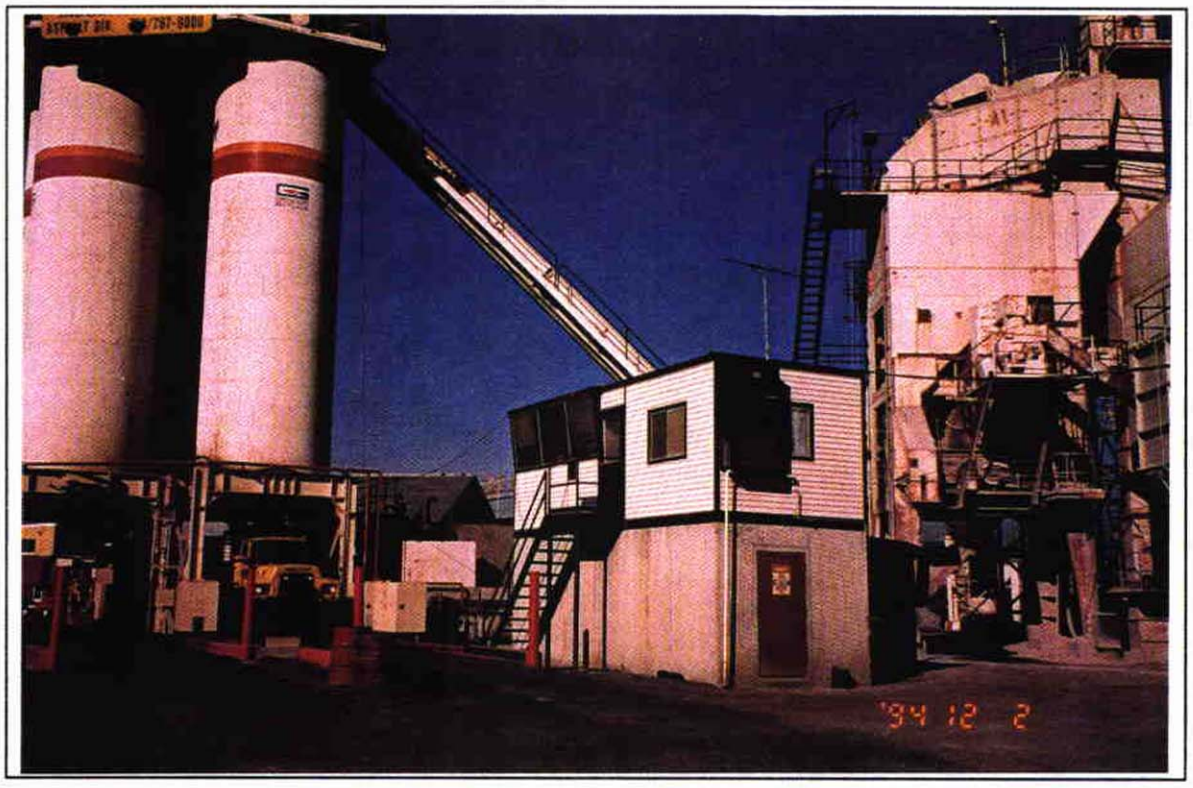

Figure B-8. Asphalt Plant from where All Paving Material was Used

Figure B-9. Permanent Cones in Section 340802 as Taken on December 2, 1994