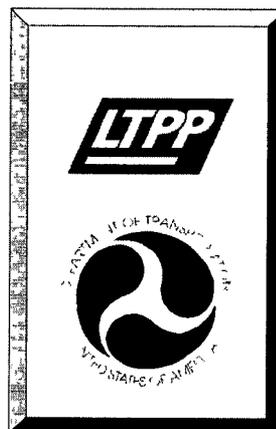


# Construction Report for Saskatchewan SPS-9A

DTFH61-96-C-00013

September 28, 1998



Submitted by

**ERES**  
CONSULTANTS, INC.



# Long-Term Pavement Performance

LTPP North Central Regional Office

505 West University Avenue - Champaign, IL 61820-3915 - Tel 888 367-3737 - Fax 217 356-3088 - [www.ncrco.com](http://www.ncrco.com)

September 28, 1998

Mr. Monte Symons, HNR-30  
FHWA-LTPP  
Turner-Fairbank Highway Research Center  
6300 Georgetown Pike  
McLean, Virginia 22101-2296

Re: SPS Construction reports

Dear Monte:

Please find enclosed one copy each of the following SPS Construction reports.

Saskatchewan SPS-9A  
Missouri SPS-9A

Ohio SPS-1  
Ohio SPS-2

These reports represent our first draft, and we would appreciate any comments or feedback you might have.

Please let me know if there any questions concerning these reports.

Sincerely,

Thomas P. Wilson, P.E.  
Co-Principal Investigator  
North Central Regional Coordination Office

enclosures

cc: A. Lopez, FHWA-LTPP (w/enclosures)

**SPS-9A Construction Report  
Yellow Head Highway, Westbound  
Radisson, Saskatchewan**

**Sections 900901 to 900903 and 900959 to 900962**

**Federal Highway Administration  
LTPP Division  
North Central Region**

Report Prepared By:  
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September 28, 1998

# Table of Contents

<b>1 PROJECT OVERVIEW.....</b>	<b>3</b>
1.1 EXPERIMENTAL CELL.....	3
1.2 SUMMARY OF SUPPLEMENTAL TEST SECTIONS.....	3
1.3 PROJECT LOCATION .....	3
1.4 TYPE OF ROADWAY AND TRAFFIC CHARACTERISTICS .....	4
1.5 ROADWAY GEOMETRY .....	4
1.6 INSTALLATION OF WEATHER STATION.....	4
1.7 INSTALLATION OF WIM.....	4
1.8 SCHEDULING FOR OPENING OF TRAFFIC .....	4
1.9 GENERAL PROBLEMS .....	4
1.10 PERSONNEL.....	5
<b>2 PROJECT DETAILS.....</b>	<b>6</b>
2.1 MATERIAL SAMPLING AND TESTING PLAN .....	6
2.2 CONSTRUCTION ACTIVITIES.....	6
2.3 GENERAL CONSTRUCTION REMARKS.....	7

## Attachments

- Attachment A: Project Location map
- Attachment B: Test Section Layout
- Attachment C: Material Sampling and Testing Plan
- Attachment D: Project Deviation Reports

# 1

## Project Overview

One goal of the Strategic Highway Research Project (SHRP) asphalt research program is the further development and refinement of performance-based specifications for asphalt binder and asphalt-aggregate mixtures. In order to be successful, it is necessary to validate the binder and mixture properties as important determinants of in-place pavement performance. The evaluation of innovative asphalt pavement materials also requires in-service testing under actual traffic and climate conditions.

The objectives of the SPS-9A study are as follows:

- To compare the SHRP binder selected based on the average maximum and minimum temperatures and the annual precipitation.
- To compare to local agency mix designs.
- Comparisons to an alternate binder selected to evaluate cases of thermal cracking or rutting.
- The comparison should involve three test sections in the core experiment with same pavement cross section.
- The study of additional test sections (supplemental sections), such as stone-matrix asphalt (SMA).

### 1.1 Experimental Cell

This project is located in the dry-freeze experimental zone. The average 7-day pavement design temperature maximum is 52 °C. The average minimum pavement design temperature is -40 °C. Average rainfall is less than 625 mm.

### 1.2 Summary of Supplemental Test Sections

In addition to the three cells meeting the basic SHRP requirements, four sections were built to accommodate one product supplied by each of four suppliers. Asphalt for sections 59 through 62 came from Moose Jaw Asphalt, Imperial Oil, Husky Oil and Koch, respectively.

### 1.3 Project Location

The test site is located on new westbound lanes of the Yellow Head Highway (Saskatchewan Highway 16) between the towns of Radison and Fielding. This is 75 km northwest of Saskatoon and 65 km southeast of North Battleford. See attachment A for project location maps.

The test sections are located between kilometers 3.9 and 6.4. See figure A-2.

#### 1.4 Type of Roadway and Traffic Characteristics

The project consisted of building two new lanes for westbound traffic. This expanded the roadway from a two-lane undivided highway to a four-lane divided highway. Table 1 shows the design traffic data.

Table 1. Design Traffic on Yellowhead Highway Westbound Lanes.

Est. 18k ESALS	912 ESAL / day	333,000 ESAL / year
Main Lane 92%	839 ESAL / day	306,000 ESAL / year
Passing Lane 8%	73 ESAL / day	27,000 ESAL / year
15-year Est. ESAL	5,000,000	
15-year Design ESAL	5,500,000	

#### 1.5 Roadway Geometry

The section is straight with no major intersections. The section is all fill with a minimum height of 1.0 m. The terrain is very slightly rolling with a maximum grade of roughly .3 percent. The site was laid out such that the three culverts fell in transition zones.

#### 1.6 Installation of Weather Station

Air and pavement sensors were installed during July 1997.

#### 1.7 Installation of WIM

The weight-in-motion equipment started operation in October 1996, when the road opened. The equipment was manufactured by International Road Dynamics. Their address is:

702 43<sup>rd</sup> Street East  
Saskatoon, Saskatchewan  
Phone: (306) 934-6777

The unit is a permanent fixture model TCC 500. It is located 876 m before the beginning of the first test section, at station 3+100.

#### 1.8 Scheduling for Opening of Traffic

Traffic was placed on this SPS-9A project in October 1996.

#### 1.9 General Problems

There were several delays due to rain, especially during July.

## **1.10 Personnel**

**Abdul Qayyum**  
**Research Engineer**  
**Engineering Services Division**  
**1630 Park Street**  
**Regina, Canada**  
**S4P 3V5**

**Barry Thomas**  
**Laboratory Chief**  
**Saskatchewan Highways and Transportation Lab**  
**Regina, Canada**

## **Project Details**

The Saskatchewan SPS-9A project consists of seven test sections. Three of these are the core SPS-9 sections, and four are supplemental. Attachment B shows the test site layout. Description of materials used are shown in figure B-1.

### **2.1 Material Sampling and Testing Plan**

The materials sampling and testing plans that were carried out during construction are shown in attachment C.

### **2.2 Construction Activities**

The following construction activities were performed during the construction of this project.

#### **Subgrade Preparation**

A 13.0-ton double drum pad foot measuring 1.52 m by 1.83 m was used for compaction. The lift thickness was typically 11 cm. This process was slower than anticipated due to graders that were too small to lift 10 cm of material. This stage of construction was started in early July and was completed, depending on section, in mid-July to early August. The large variability in completion date was due to several rainy days.

#### **Dense-Graded Aggregate Base (DGAB) Placement**

The base layer is roughly 20 cm thick and composed of crushed stone. It was placed between the dates of July 29 and August 24, 1996. Consolidation of the material was achieved by a 10-ton pneumatic tired compactor. Typically, the first lift was 11 cm thick, and the second lift was 9 cm thick. A common remark was that the base layer was too dry, but the workers were not sure if they should add water.

#### **Asphalt Concrete Plant**

The asphalt concrete plant for the project was produced in a MOD Pioneer 302 drum mix plant. The plant was located roughly 12.5 km from the test sections. Average haul time was 25 minutes.

## Asphalt Paving

The surface course was paved in late August 1996. The asphalt was placed using a Blaw Knox PF180H paver. The single-pass laydown width was 4.9 m. Two lifts were laid with a thickness of roughly 7 cm each. Longitudinal surface joints are located between lanes. Compaction was achieved in three steps. Initial passes were made by a double drum vibratory roller. A steel-wheel tandem roller performed the intermediate passes. The final compaction was made by a steel and pneumatic combination roller.

A tack coat of SS-1 asphalt (one part water to four parts asphalt) was applied between lifts. The SS-1 was placed at a rate of .125 L/m<sup>2</sup>.

## Thickness of Layers

Table 2 gives a summary of the layer thicknesses at each test site. These data were obtained from the construction data sheets layer thickness descriptions. These measurements were taken at 1.8 m from the outside lane edge.

Table 2. Layer thickness at each test site.

Section	Subbase (mm)	Base (mm)	Asphalt (mm)
900901	234.2	181.7	130.8
900902	249.2	194.2	95.0
900903	248.3	185.0	111.7
900959	230.0	201.7	114.2
900960	237.5	206.7	115.8
900961	230.0	199.2	121.7
900962	231.7	199.2	133.3

## 2.3 General Construction Remarks

The most common problem associated with the construction of this project was rain. Sections 1, 2, and 59 reported that there was a failure in the subgrade. In these cases the subgrade was lifted, mixed, dried, and repacked.

**Attachment A**  
**Project Location**

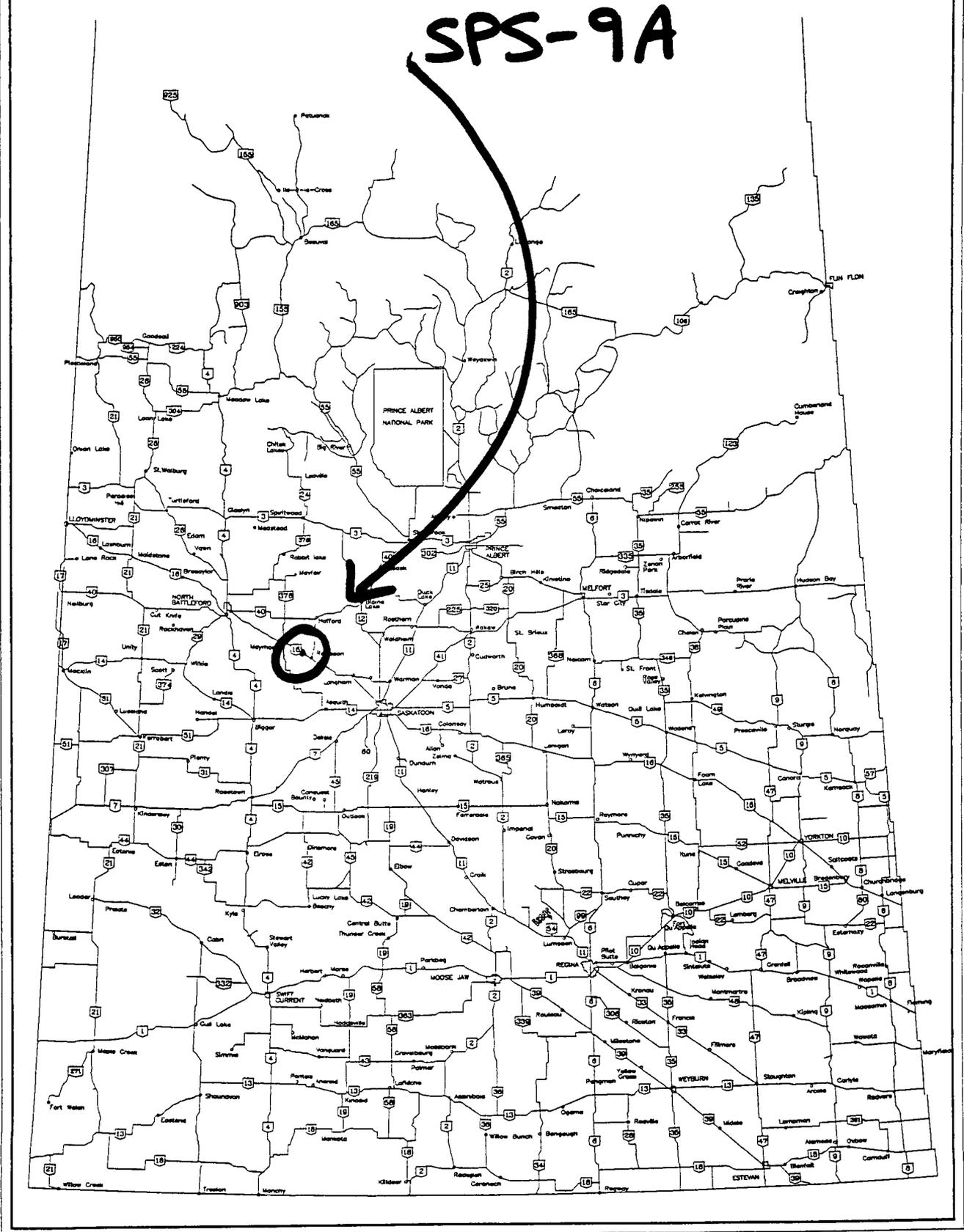


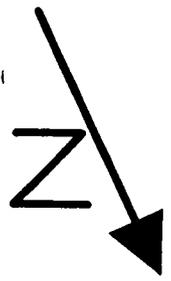
Figure A-1. General Project Location.



**Attachment B**  
**Test Section Layout**

**SPS-9A**  
**West of Saskatoon**  
**Saskatchewan**  
**C.S.16-25**  
**(Yellowhead Hwy)**  
**West Bound**  
**1996 Construction**

All Metric Units  
 Updated 10/08/96  
 WIM located at 3+100M



**NOTE:**  
 All Km.'s reflecting the  
Performance Area, do not  
include the Time Intervals  
for Coring.

<u>Limits In Km(including coring area)</u>	
Starts Km 3 900	Ends Km4 204
Starts Km 4 250	Ends Km4 550
Starts Km 4 600	Ends Km 4 905
Starts Km 4 929	Ends Km 5.275
Starts Km 5 730	Ends Km 6 035
Starts Km 6 065	Ends Km 6.370
Starts Km 6 800	Ends Km 7 105

<u>Test Sec No</u>
#900959
#900902
#900903
#900901
#900960
#900962
#900961

To  
 Saskatoon  
 75 KM  
 WIM  
 At  
 3 + 100

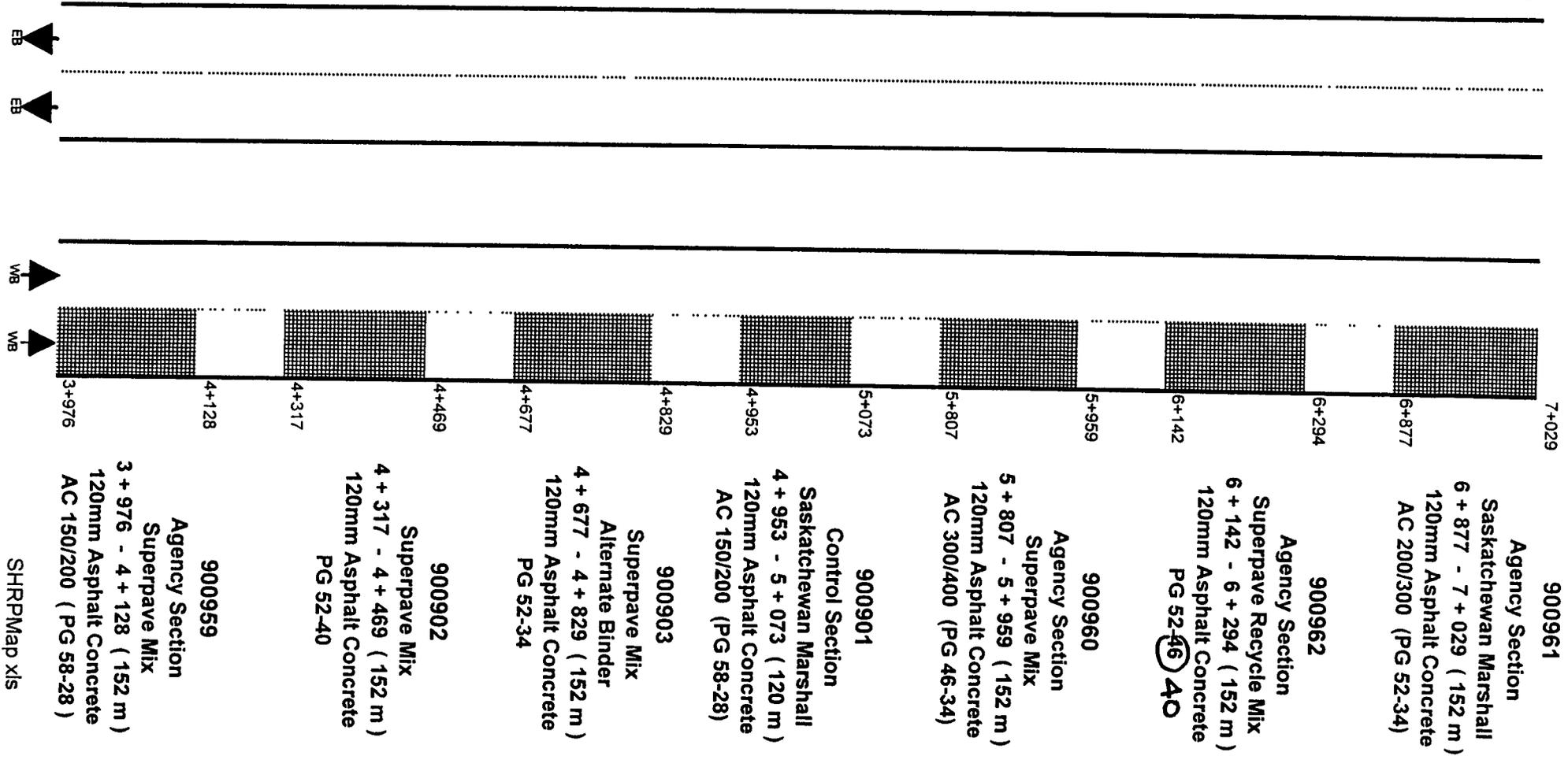


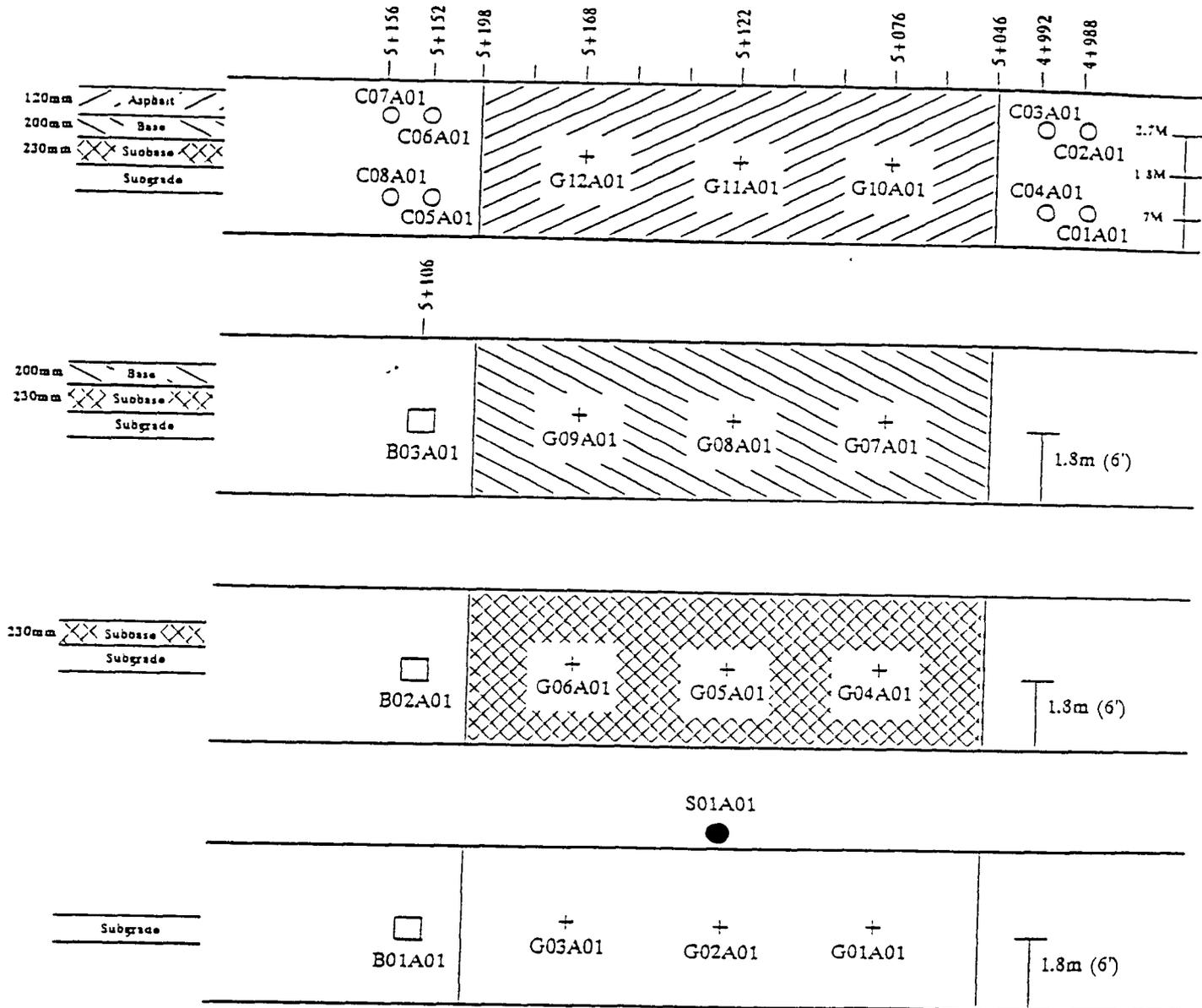
Figure B-1. Test Section Layout.

**Attachment C**

**Material Sampling and Testing Layout**

# Sampling and Testing Locations 900901 (All Layers) SPS-9A, HWY-16 WB Lane

All Metric Units



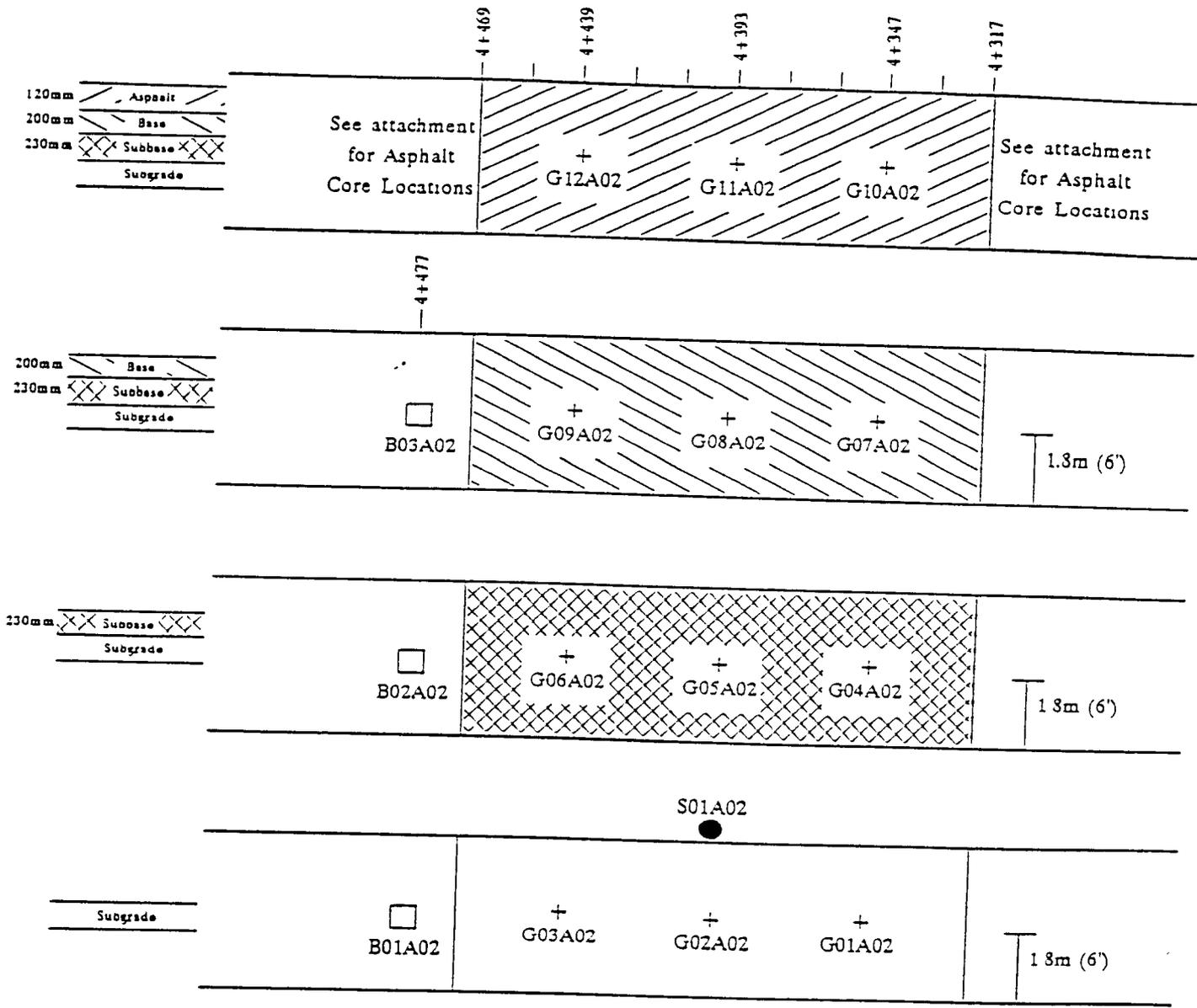
Updated 5/20/96  
 g:\ltp\bg\spas\900901.DS.ch3

- Shoulder Probe 6M (20ft)
- Bulk Sample Location (25Kg Bulk - 5Kg Moisture)
- IN SITU Density Testing
- Core Location 150mm (6in) Diameter (full depth core)

Figure C-1. Material Sampling and Testing Layout for Section 900901.

# Sampling and Testing Locations 900902 (All Layers) SPS-9A, HWY-16 WB Lane

All Metric Units



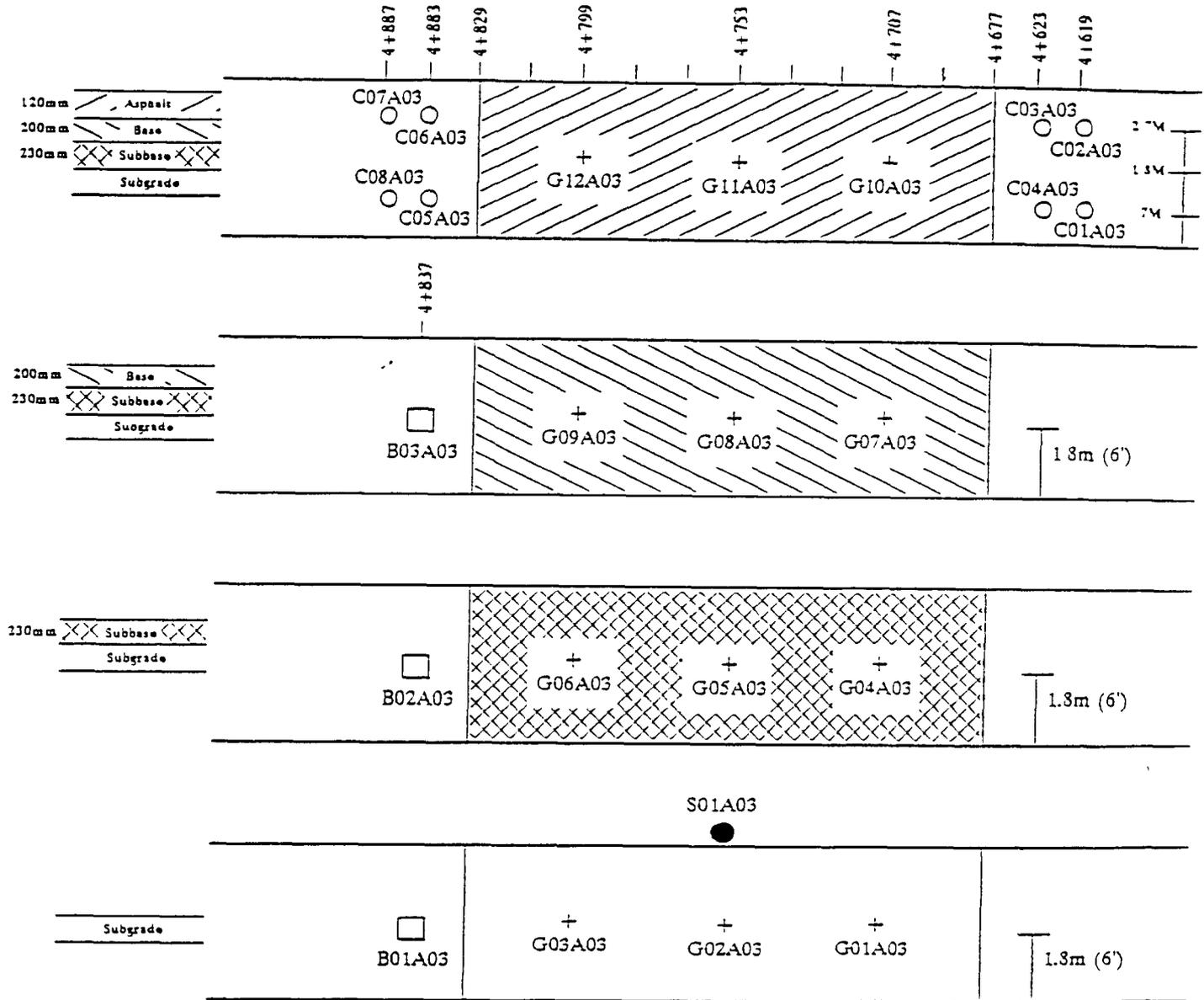
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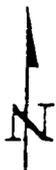
- Shoulder Probe 6M (20ft)
- Bulk Sample Location (25Kg Bulk - 5Kg Moisture)
- IN SITU Density Testing
- Core Location 150mm (6in) Diameter (full depth core)

Figure C-2. Material Sampling and Testing Layout for Section 900902.

# Sampling and Testing Locations 900903 (All Layers) SPS-9A, HWY-16 WB Lane

All Metric Units



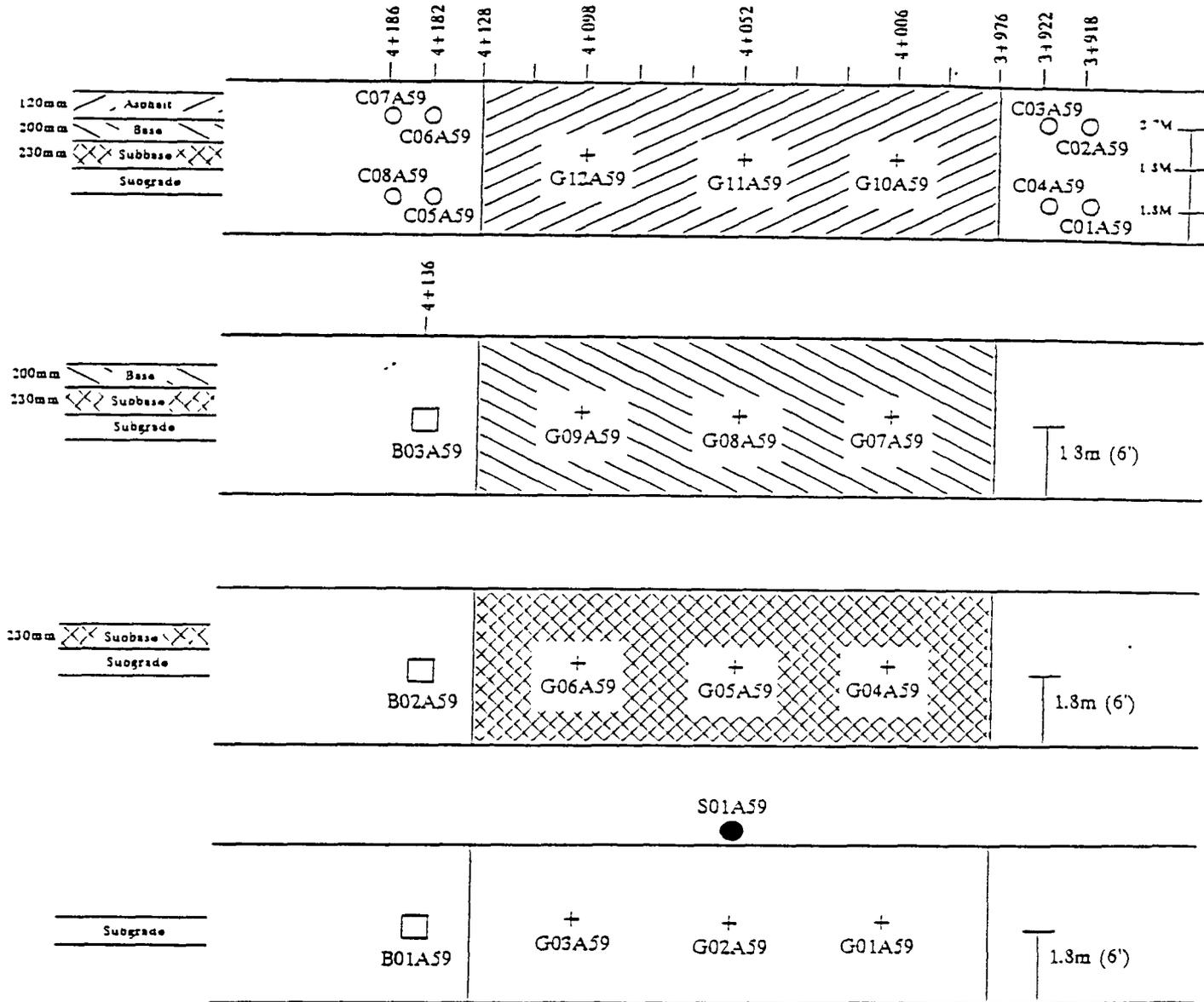
  
 Updated 5/20/96  
 g:\tpp\hg\psi\900903\DS.ch3

-  Shoulder Probe 6M (20ft)
-  Bulk Sample Location (25Kg Bulk - 5Kg Moisture)
-  IN SITU Density Testing
-  Core Location 150mm (6in) Diameter (full depth core)

Figure C-3. Material Sampling and Testing Layout for Section 900903.

# Sampling and Testing Locations 900959 (All Layers) SPS-9A, HWY-16 WB Lane

All Metric Units



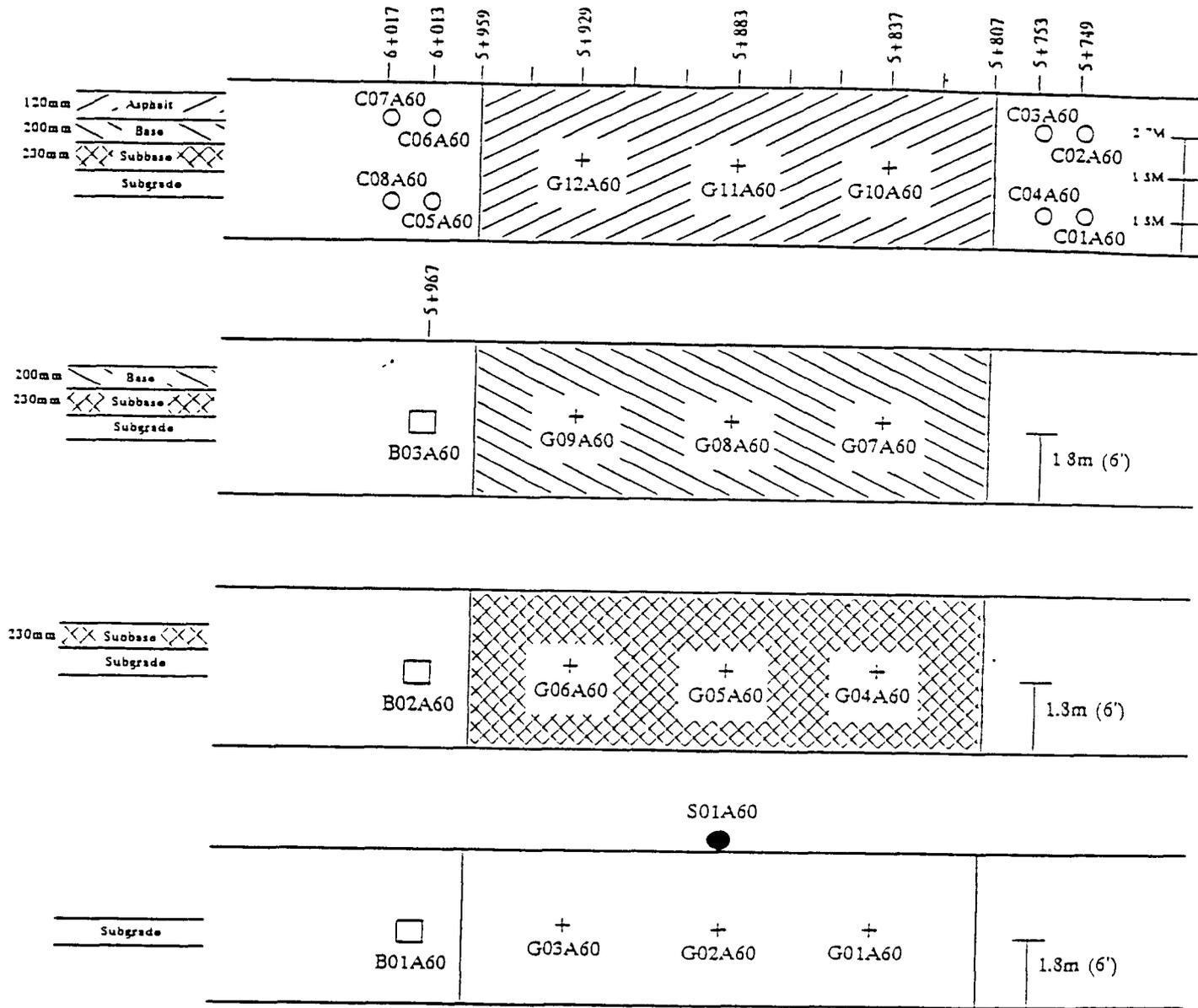
  
 Updated 5/20/96  
 g:\ltp\hgs\ps\900959DS.ch3

-  Traffic
- Shoulder Probe 6M (20ft)
  - Bulk Sample Location (25Kg Bulk - 5Kg Moisture)
  - + IN SITU Density Testing
  - Core Location 150mm (6in) Diameter (full depth core)

Figure C-4. Material Sampling and Testing Layout for Section 900959.

# Sampling and Testing Locations 900960 (All Layers) SPS-9A, HWY-16 WB Lane

All Metric Units

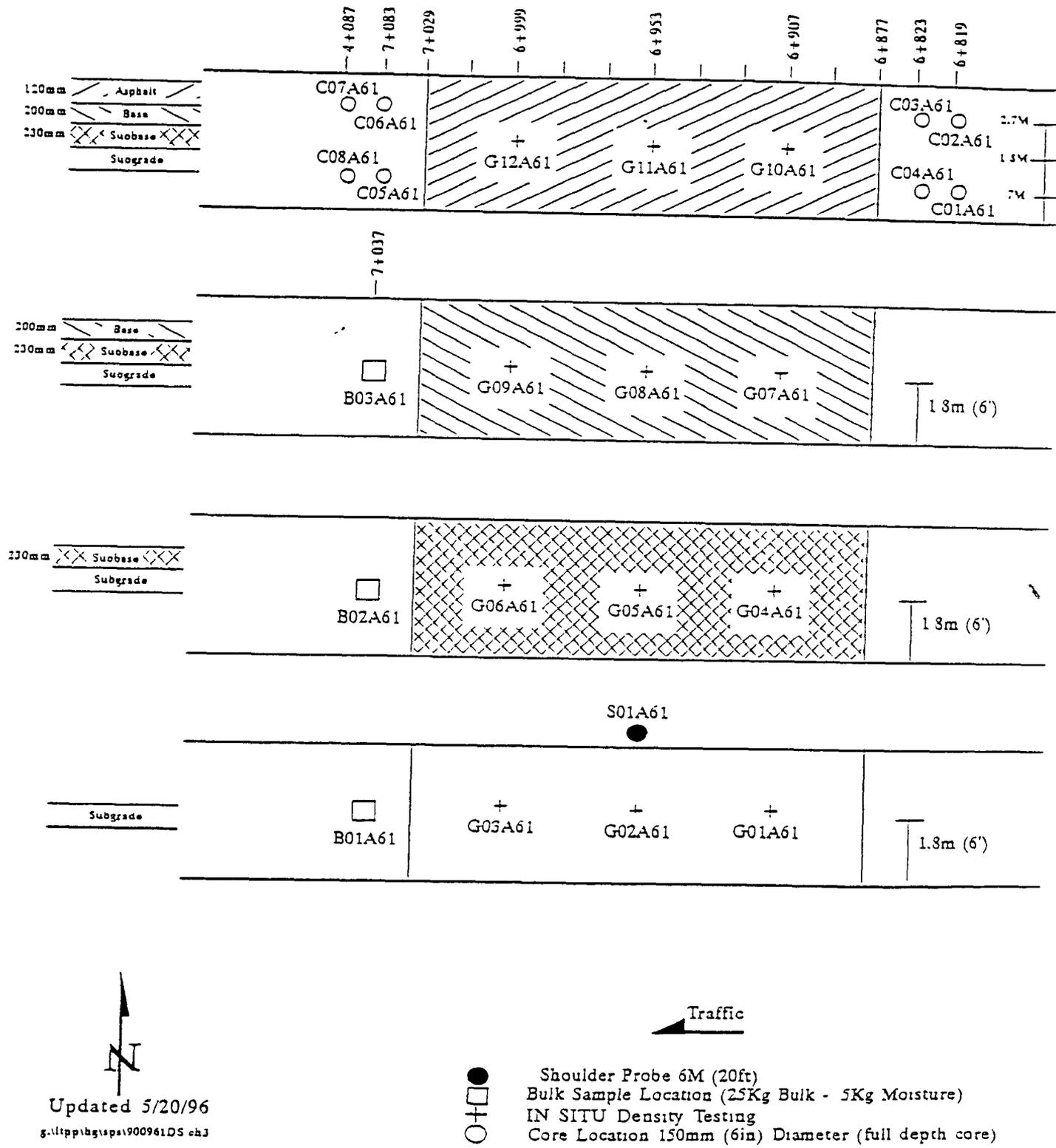


Updated 5/20/96  
g:\tpp\bgups\900960DS eb3

- Shoulder Probe 6M (20ft)
- Bulk Sample Location (25Kg Bulk - 5Kg Moisture)
- ⊕ IN SITU Density Testing
- Core Location 150mm (6in) Diameter (full depth core)

Figure C-5. Material Sampling and Testing Layout for Section 900960.

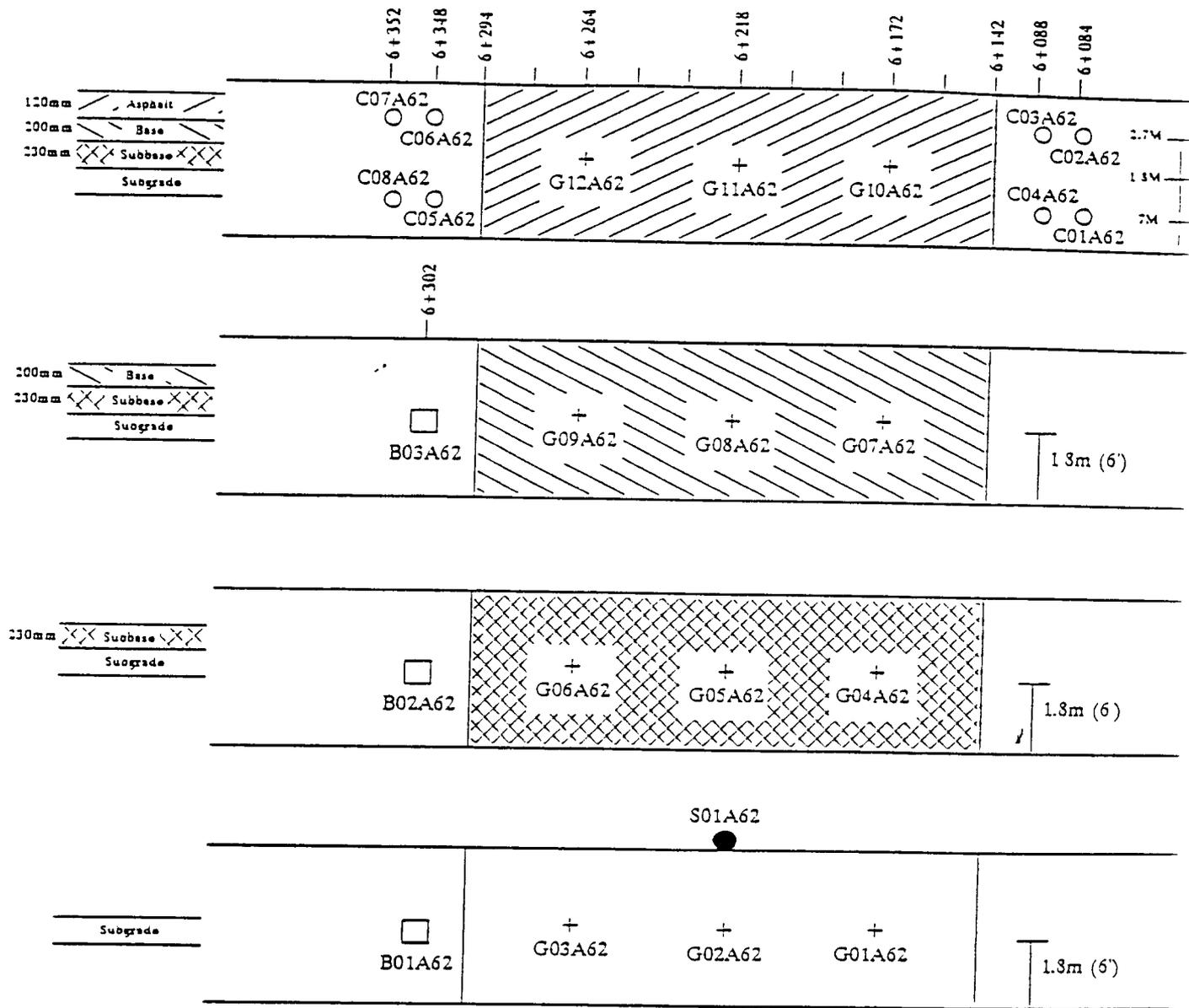
Sampling and Testing Locations  
 900961 (All Layers)  
 SPS-9A, HWY-16 WB Lane



Updated 5/20/96  
 g:\tpp\bg\sp\900961.DS ch3

Figure C-6. Material Sampling and Testing Layout for Section 900961.

Sampling and Testing Locations  
900962 (All Layers)  
SPS-9A, HWY-16 WB Lane



  
 Updated 5/20/96  
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-  Shoulder Probe 6M (20ft)
-  Bulk Sample Location (25Kg Bulk - 5Kg Moisture)
-  IN SITU Density Testing
-  Core Location 150mm (6in) Diameter (full depth core)

Figure C-7. Material Sampling and Testing Layout for Section 900962.

**Attachment D**  
**Project Deviation Reports**

<b>LTPP SPS Project Deviation Report Project Summary Sheet</b>		State Code	9	0
		Project Code	0	9
			0	0
<b>Project Classification Information</b>				
SPS Experiment Number: SPS-9		State or Province: Saskatchewan		
LTPP Region:		<input type="checkbox"/> North Atlantic	<input checked="" type="checkbox"/> North Central	<input type="checkbox"/> Southern
		<input type="checkbox"/> Western		
Climate Zone:		<input checked="" type="checkbox"/> Dry-Freeze	<input type="checkbox"/> Dry-No Freeze	<input type="checkbox"/> Wet-Freeze
		<input type="checkbox"/> Wet-No Freeze		
Subgrade Classification:		<input checked="" type="checkbox"/> Fine Grain	<input type="checkbox"/> Coarse Grain	? <input type="checkbox"/> Active (SPS-8 Only)
Project Experiment Classification Designation (SPS 1, 2, & 8):				
Construction Start Date: July 1996		Construction End Date: August 1996		
FHWA Incentive Funds Provided to Agency for this Project:				<input checked="" type="checkbox"/> Yes
<b>Deviation Summary</b>				
Site Location Deviations:		<input checked="" type="checkbox"/> No Deviations	<input type="checkbox"/> Minor Deviations	<input type="checkbox"/> Significant Deviations
Construction Deviations:		<input type="checkbox"/> No Deviations	<input checked="" type="checkbox"/> Minor Deviations	<input type="checkbox"/> Significant Deviations
<b>Data Collection and Processing Status Summary</b>				
Inventory Data (SPS 5,6,7, & 9):		<input checked="" type="checkbox"/> Complete Submission	<input type="checkbox"/> Incomplete	<input type="checkbox"/> Data Not Available
Materials Data:		<input checked="" type="checkbox"/> All Scheduled Samples Obtained and Tested	<input type="checkbox"/> Incomplete	
Construction Data:		<input checked="" type="checkbox"/> All Required Data Obtained	<input type="checkbox"/> Incomplete / Missing Data Elements	
Historical Traffic Data: (NA)		<input checked="" type="checkbox"/> All Required Historical Estimates Submitted (SPS 5, 6, 7, & 9)	<input type="checkbox"/> Required Estimates Not Submitted	
Traffic Monitoring Equipment:		<input checked="" type="checkbox"/> WIM Installed On-Site	<input type="checkbox"/> AVC Installed On-Site	
		<input type="checkbox"/> ATR Installed On-Site	<input type="checkbox"/> No Equipment Installed	
Traffic Monitoring:		<input type="checkbox"/> Preferred	<input type="checkbox"/> Continuous	<input checked="" type="checkbox"/> Minimum
		<input type="checkbox"/> Below Minimum	<input type="checkbox"/> Site Related	
Traffic Monitoring Data:		<input checked="" type="checkbox"/> Monitoring Data Submitted	<input type="checkbox"/> No Monitoring Data Submitted	
FWD Measurements:		<input type="checkbox"/> Pre-construction Tests Performed	<input type="checkbox"/> Construction Tests Performed	
		<input checked="" type="checkbox"/> Post-construction Tests Performed		
Profile Measurements:		<input type="checkbox"/> Pre-construction Tests Performed	<input checked="" type="checkbox"/> Post-construction Tests Performed	
Distress Measurements		<input type="checkbox"/> Pre-construction Tests Performed	<input checked="" type="checkbox"/> Post-construction Tests Performed	
Maintenance and Rehab. Data:		<input checked="" type="checkbox"/> Complete Submission	<input type="checkbox"/> Incomplete	<input type="checkbox"/> Data Not Available
Friction Data:		<input checked="" type="checkbox"/> Complete Submission	<input type="checkbox"/> Incomplete	<input type="checkbox"/> Data Not Available
<b>Report Status</b>				
Materials Sampling and Test Plan:		<input type="checkbox"/> Document Prepared	<input checked="" type="checkbox"/> Final Submitted To FHWA	
Construction Report:		<input checked="" type="checkbox"/> Document Prepared	<input type="checkbox"/> Final Submitted To FHWA	
AWS: (SPS 1, 2, & 8) NA		<input checked="" type="checkbox"/> AWS Installed	<input type="checkbox"/> AWS Installation Report Submitted to FHWA	



<b>LTPP SPS Project Deviation Report</b> <b>Other Deviations</b>	State Code Project Code	<u>  </u> <u>  </u> <u>  </u> <u>  </u>	<u>  </u> <u>  </u> <u>  </u> <u>  </u>
		<u>  0  </u> <u>  9  </u> <u>  9  </u> <u>  0  </u>	<u>  0  </u> <u>  0  </u> <u>  0  </u> <u>  0  </u>

- Comments Pertain to All Test Sections on Project
- Comments Pertain Only to Section(s): (Specify) \_\_\_\_\_

**Other Deviation Comments**

None known.







**Submitted by**

**ERES**  
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**ERES Project No. 95-075-R1**