LONG TERM PAVEMENT PERFORMANCE PROGRAM DIRECTIVE

For the Technical Direction Of The LTPP Program

Program Area:	**Monitoring**	**Directive Number:**	**AWS-l**
Date:	**September 12, 1994**	**Supersedes:**	**n/a**
Subject:	**Installation, Data Collection and Maintenance of Automated Weather Stations at SPS-l, 2 and 8 Projects**		

It is the intent of the FHWA LTPP Division to install an automated weather station (AWS) at each SPS-1, -2, and -8 project. This directive outlines activities that must be undertaken in connection with the automated weather stations at SPS-l, -2 and -8 projects. The specific activities covered by this directive include AWS site selection, site preparation, installation, data collection and maintenance.

AWS Site Selection

The location of the AWS must be such that it provides weather data representative of actual onsite conditions. The AWS shall be located within 3 km of the project site, but preferably within the length of the project.

Notes: If a highway agency facility such as a maintenance yard is nearby, but it is not within the prescribed distance of 3 km , the AWS can be located there as long as weather conditions at the facility are similar to those at the project site.

If project is located in a freeze area, access to AC power is a must in order to heat the AWS raingage. In such cases, the AWS can be located near the weigh-in-motion (WIM) installation.

Other site requirements include:

1. No obstructions within 30 m of the weather station; AWS should be located at a distance no less than four times the height of any nearby obstruction such as buildings, trees, etc.

2. Level terrain which is not subjected to standing water or flooding, snow drifts, and/or erosion

3. Ground that is not soft (swampy areas) or full of vegetation that would make access to the AWS difficult.

4. Grass cover or, where grass does not grow, the natural earth surface; if grass cover is used, then the grass must be mowed regularly.

5. Location that is not shaded.

6. Location that is, or can be made, secure to minimize risk of theft and/or vandalism.

RCOC staff shall work closely with the highway agency to identify the most suitable location for the AWS. A letter detailing the recommended location, along with a completed Data Sheet SPS_AWS_REQUEST, shall be submitted by the RCOC to the LTPP Regional Engineer for his review and approval. Maps, photographs, and/or other pertinent information that may help establish the desirability of the proposed AWS location shall be included with the letter. The RCOC letter shall be forwarded by the LTPP Regional Engineer to the FHWA LTPP Division along with his concurrence with the RCOC recommendation. Any deviations from the "standard" requirements shall be identified in the transmittal to FHWA.

AWS Site Preparation

AWS site preparation activities shall be completed by the highway agency or its contractors. These activities include:

1. Clearing site of debris.

2. Preparing, stabilizing, and/or grading site as necessary.

3. Constructing concrete foundations for tower-based weather station and tipping bucket raingage.

4. If project is located in freeze area, bringing AC power to heat the tipping bucket raingage.

5. Installing fence around the site to provide security [1.8 m (6 ft) high]

The "standard" AWS site layout is given in Figure 1. Deviations from this layout are permitted, but must be approved by the FHWA LTPP Division. Detailed drawings of the concrete foundations for the instrument tower and raingage are shown in Figures 2 through 5.

AWS Installation

The AWS packages will be provided by the FHWA LTPP Division, who will store them at the MRL facility in Reno, Nevada. The RCOC is responsible for coordinating the delivery of the AWS with Mr. Cal Berge, LTPP Western Regional Engineer, or his designee. The MRL is responsible for shipping costs associated with delivery of the AWS.

If the AWS is to be located at the project site, it shall be installed after preparation and grading of the AWS area has been completed and the security fence has been installed. In all cases, the AWS shall be installed and functional prior to placement of the pavement surface layer(s).

The actual installation of the weather station shall be completed by RCOC staff with assistance from highway agency personnel. Installation shall be done in accordance to the procedures specified in Campbell Scientific's "UT-3 Tower-Based Weather Station Installation Manual," dated July 1994. To help ensure that recommended procedures have been followed, Data Sheet AWS_SPS_INSTALL_1 - AWS Installation Checklist shall be completed during the course of the installation by the-RCOC installation team. Data Sheet AWS_SPS_INSTALL_2 - AWS Equipment and Installation Team shall also be completed by the RCOC installation team prior to leaving the site. This data sheet documents the actual equipment installed (including serial numbers), installation participants, and other pertinent information relative to the installation such as deviations from the "standard" AWS site layout.

Within one month after installation of the AWS, the RCOC shall submit a letter report to the FHWA LTPP Division documenting the installation of the weather station. This letter shall include Data Sheets AWS_SPS_INSTALL_1 and AWS_SPS_INSTALL_2, plus one or two photographs showing close-ups of the final AWS immediately after installation.

After completion of the AWS installation, but prior to leaving the site, the RCOC shall affix a log sheet -- Data Sheet SPS_AWS_LOG -- to the inside of the door of the instrumentation enclosure. Each time the station is visited, RCOC or highway agency personnel must indicate the date the station was visited, activity performed -- data uploading, AWS routine maintenance, AWS sensor calibration or replacement, or other -- and comments on any problems found or maintenance performed. This log must be filled during each visit.

AWS Data Collection

Retrieval of the weather data shall be done in accordance with the procedures specified in Campbell Scientific's "UT-3 Tower-Based Weather Station Installation Manual," dated July 1994. The RCOC is responsible for coordinating with the highway agency the responsibility of weather, data retrieval and some maintenance activities around the AWS area -- e.g., mowing of grass.

Retrieval of the weather data shall be performed at "routine" intervals, but shall never exceed six months. When retrieving data from the storage module, select **Option A** to collect **ALL** data.

Notes: Do not use Option U, which collects Uncollected data file.

Do not erase storage module after data collection.

Do not clear the storage module's data area after completion of data retrieval.

When retrieving data from the storage module, select any descriptive name for the root collection file name -- e.g., AZDOT.DAT (DAT extension is automatically appended to file name). When data retrieval is completed, rename the file using the following convention:

4 8 0 1 W 0 5 1 . 1 9 4
1 2 3 4 5 6 7 8 9 10 11 12

where characters

1 to 4	=	project identification (state code and experiment number); e.g. , "4801" for first SPS-1 project in Texas.
5	=	always "W" for AWS data.
6,7	=	day of the month on which data was uploaded; e.g. , "05" for fifth day of month
8,10	=	month on which data was uploaded; e.g., "11" for November (01 for January, 02 for February, etc.).
9	=	"."
11,12	=	last two digits of the year; e.g., "94" for 1994.

Three (3) complete backup copies of the AWS data file on floppy diskettes shall be made prior to leaving the site. Two backup copies are transmitted to the RCO along with any written comments or observations concerning the data -- i.e., bad or questionable data. The remaining copy will stay with the data collection team and serves as a backup should the copies sent to the RCO be lost or damaged.

Every six moths or less, the RCOCs shall mail a copy of the AWS data files (on floppy diskette) collected since the last transmittal to the FHWA LTPP Division for entry into the IMS. A list of the data files included in the floppy diskette and corresponding period of data coverage (start and end dates), shall be sent along with the transmittal letter to FHWA.

AWS Maintenance

The RCOC shall coordinate AWS maintenance activities with the highway agency. Routine maintenance around the AWS shall be the responsibility of the highway agency -- e.g., mowing inside and outside the AWS, routine checks for vandalism, removal of debris against the AWS fence, cleaning of AWS access road, etc.

The RCOC is required to perform the following maintenance activities every time the AWS site is visited (at least once per year):

1. Visual inspection of station

    a. Any sensor cables cut or broken?
    b. Any sensors show physical damage?

2. Inspection of Solar Sensor

    a. Is the solar sensor clean and free of debris?
        1. Clean sensor with water, soft bristle brush or dry air.
        2. BE CAREFUL NOT TO SCRATCH THE SURFACE OF THE SOLAR SENSOR
        3. Check to make sure the drain hole next to the surface of the sensor is clean from debris.

3. Rain Gauge

    a. Check for and remove any debris inside the rain gauge funnel.
    b. Be sure the screen inside the funnel is clean from bird nests or debris.
    c. Remove the Rain Gauge Funnel. The rain gauge is assembled in 2 pieces. The screws at the base of the rain gauge must be removed first.
    d. Be sure the funnel hole is not clogged with debris.
    e. Observe the tipping mechanism inside to be sure there are no spider webs or bugs that have caused the mechanism to freeze in one position.
    f. Tip the mechanism from side to side to be sure that it moves freely. Clean the tipping buckets if they have any dirt or dust accumulated. (Note: the test tips will be recorded by the weather station as rain).
    g. Be sure upon leaving the site that the rain gauge is level.

4. Wind Monitor

    a. Check for free horizontal movement of Wind Sensor.
    b. Check for free movement of propeller. (Note: do not use WD-40 or other lubricants on the bearings. These are special precision ball bearings that use a unique instrumentation oil).
    c. Verify that the propeller nut is secured to the shaft.

5. Temperature/Relative Humidity Probe

    a. Check to make sure the radiation shield and end cap on the sensor are free from debris.
    b. Check the sensor end-cap by removing the sensor from the radiation shield. The sensor is fastened by a plastic compression screw which screws into the shield.
    c. Check the screen for debris and clean by removing dirt or dust with a soft brush.
    d. Replace end-cap if still dirty.

6. Datalogger Enclosure

a. Open enclosure and inspect for any bugs, spider webs, or moisture.
b. Swap-out Desiccant packs with dry units.
c. Verify that the conduit putty is sealed firmly around sensor leads and that there is no daylight showing through the conduit hole. If there is, firmly press the putty around sensor leads and conduit hole.
d. Remove PSl2LA cover and check to see if the RED LED is lit. If it is not it may indicate there is a problem with the solar panel or charging circuitry.
e. Verify that there are no loose sensor leads going into the CRl0 Wiring Panel. If any are, firmly secure their screw terminals.
f. Connect the SC32A to the CRl0 and start Graph Term. Enter the Monitor Mode and check current sensor readings. Take note of any readings that show -99999. This is a characteristic of a faulty sensor or loose connection. Also verify the CRl0 Clock.

Calibration of AWS sensors shall be performed every two years. The RCOCs are required to develop a schedule for sensor calibration and replacement. The FHWA LTPP Division will provide one set of AWS sensors per region to interchange during calibration.

Finally, while not a part of the weather data collection effort, the RCOCs are required to obtain accurate AWS site location data -- latitude and longitude -- using the Global Positioning System (GPS) receivers that have been purchased under the LTPP program. Guidelines for the collection of AWS location data are attached to this directive, along with Data Sheet AWS_SPS_LOC - Global Positioning Measurements which is used to record the measurements.

Prepared by: Aramis Lopez, Jr.

Approved by:

Paul Teng
Chief, LTPP Division

SPS AWS INSTALLATON REQUEST FOR AUTOMATED WEATHER STATIONS DATA SHEET SPS_AWS_REQUEST	STATE CODE [__ __] LTPP SECTION ID [__ __ 0 0]

PROJECT LOCATION[1]	
Milepoint: __ __ __ __	Elevation (m): __ __ __ __
Latitude: __ __ ° __ __ ′ __ __ . __ ″	Longitude: __ __ ° __ __ ′ __ __ . __ ″

[1]Station 0 + 00 of the first test section located on the project

EXISTING WEATHER STATION[2]	
Name/Designation: _____	
Locations: _____	
Distance from Project (km): __ __ __	Elevation (m): __ __ __ __
Latitude: __ __ ° __ __ ′ __ __ . __ ″	Longitude: __ __ ° __ __ ′ __ __ . __ ″
Does it provide weather data representative of SPS project side? (Y/N): —	
Comments: _____	
Does it provide the same weather data elements as the “standard” SPS AWS? (Y/N): —	
Comments: _____	
Does it provide the weather data in the same format as the “standard” SPS AWS? (Y/N): —	
Comments: _____	
Additional Comments: _____	

[2] Use additional data sheets if more than one weather station is available

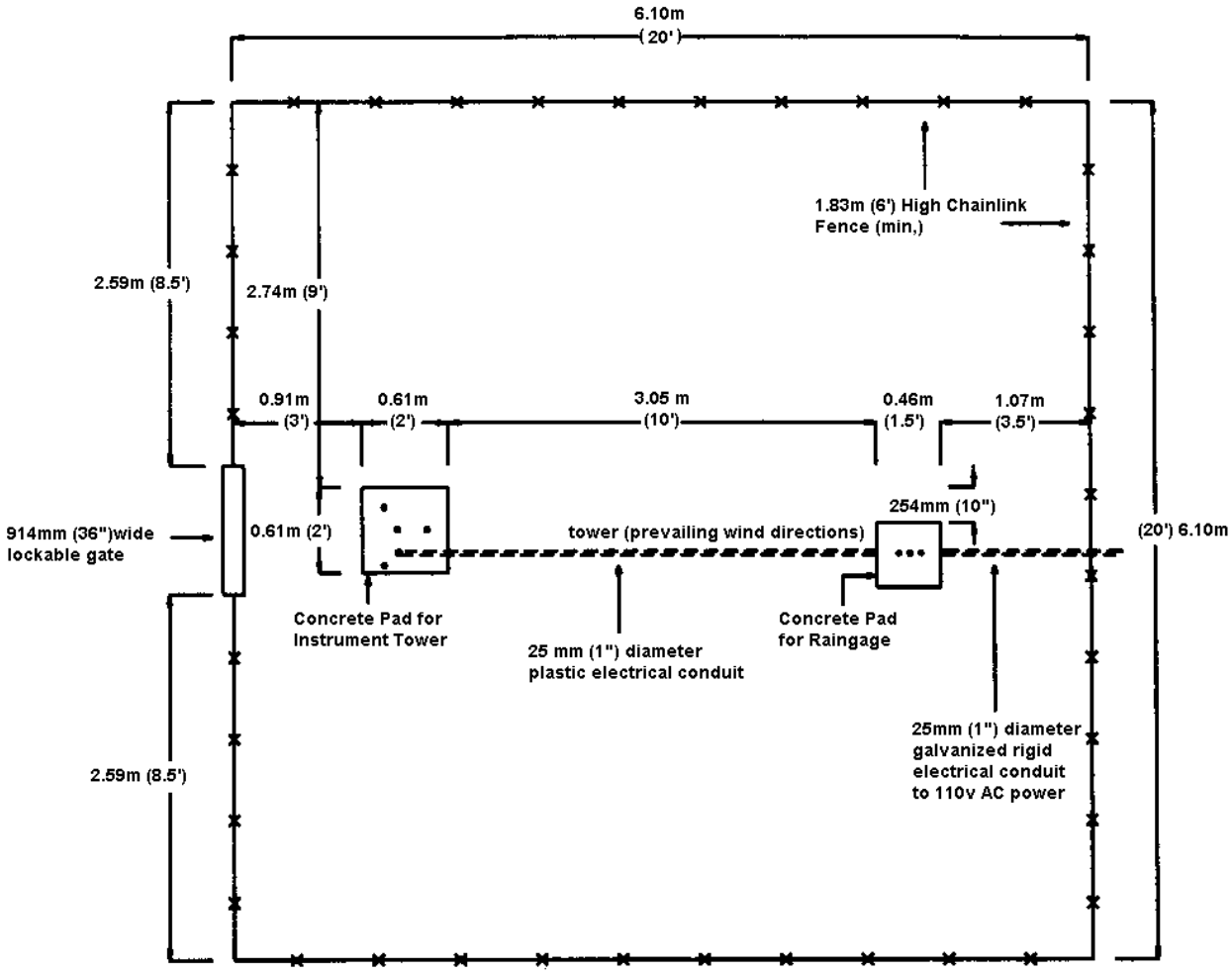
Based on the above information, we recommend:

_____ Use of following weather station to obtain the necessary climatic data. Weather Station (Name/Desingation):

_____

_____ Installation of an AWS at the project. Highway agency will provide the site and AWS installation support.

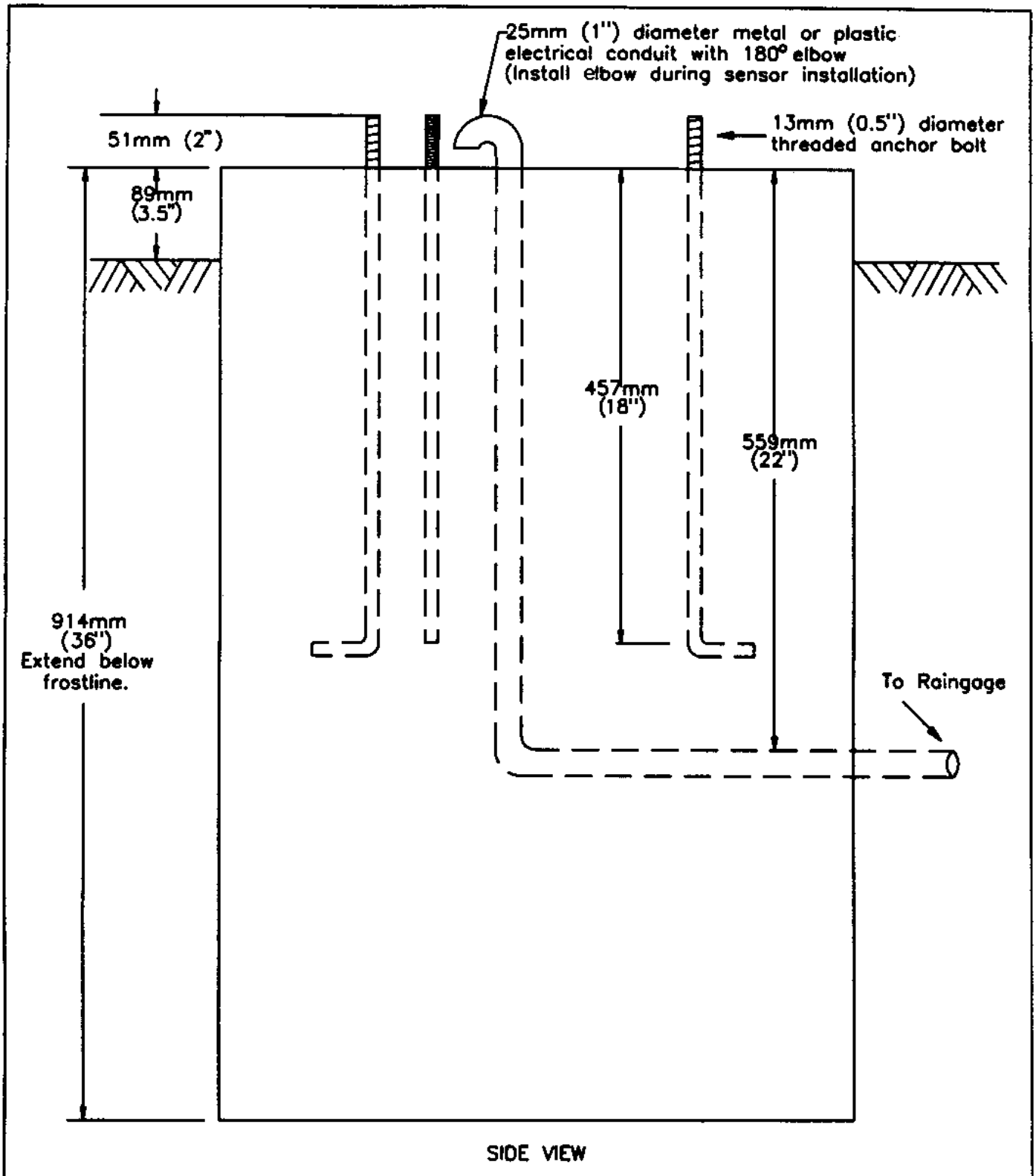
Prepared By: _____ Date (dd/mm/yyyy): __ __ / __ __ / __ __ __ __



Notes: (1) Do not place rain gauge "down wind" from tower (prevailing wind direction)

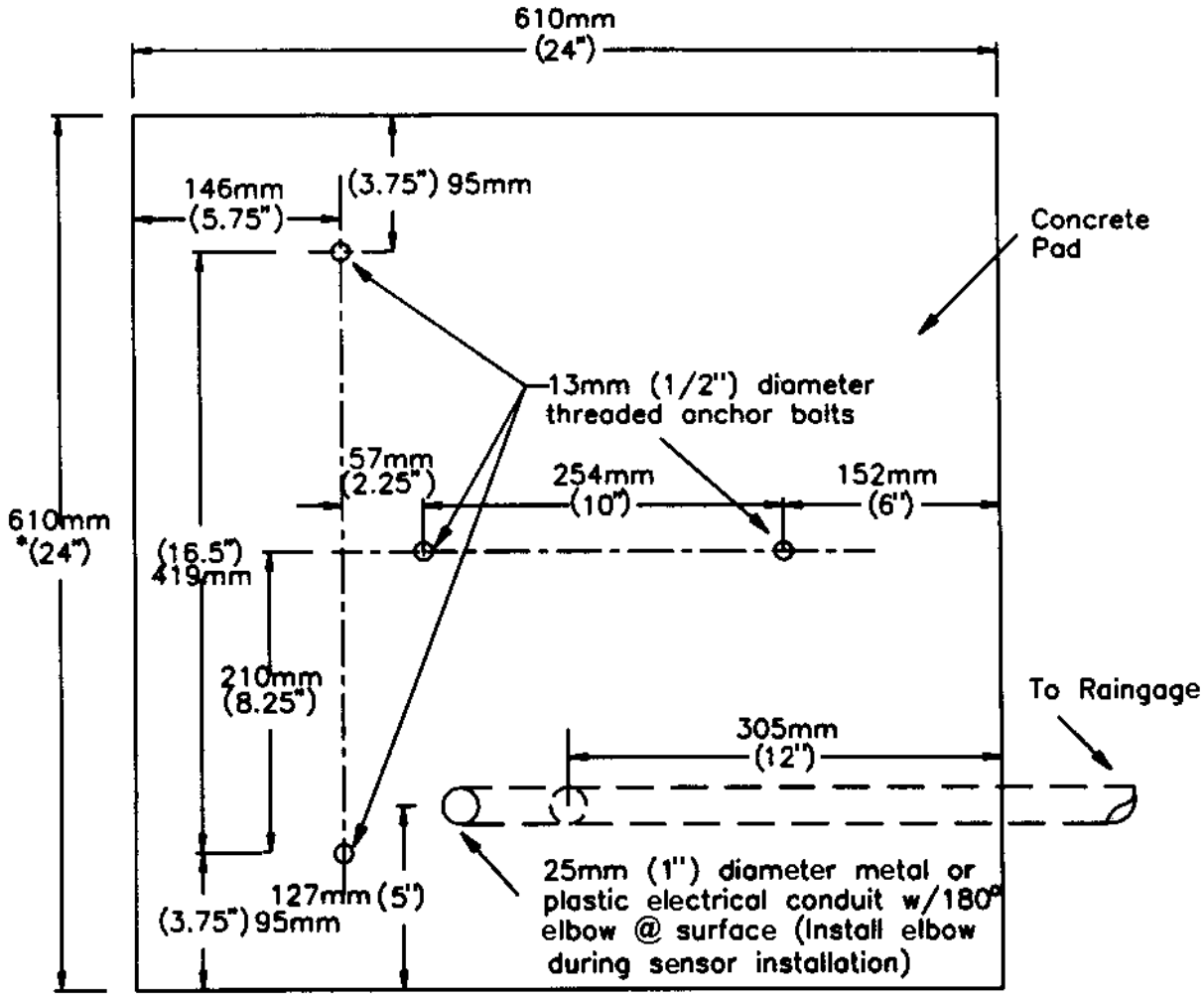
(2) Gate should be on north or south side to allow sensor bor to clear if tower hinged down

SPS Automated Weather Station	Figure 1. AWS Site Layout



SPS Automated Weather Station

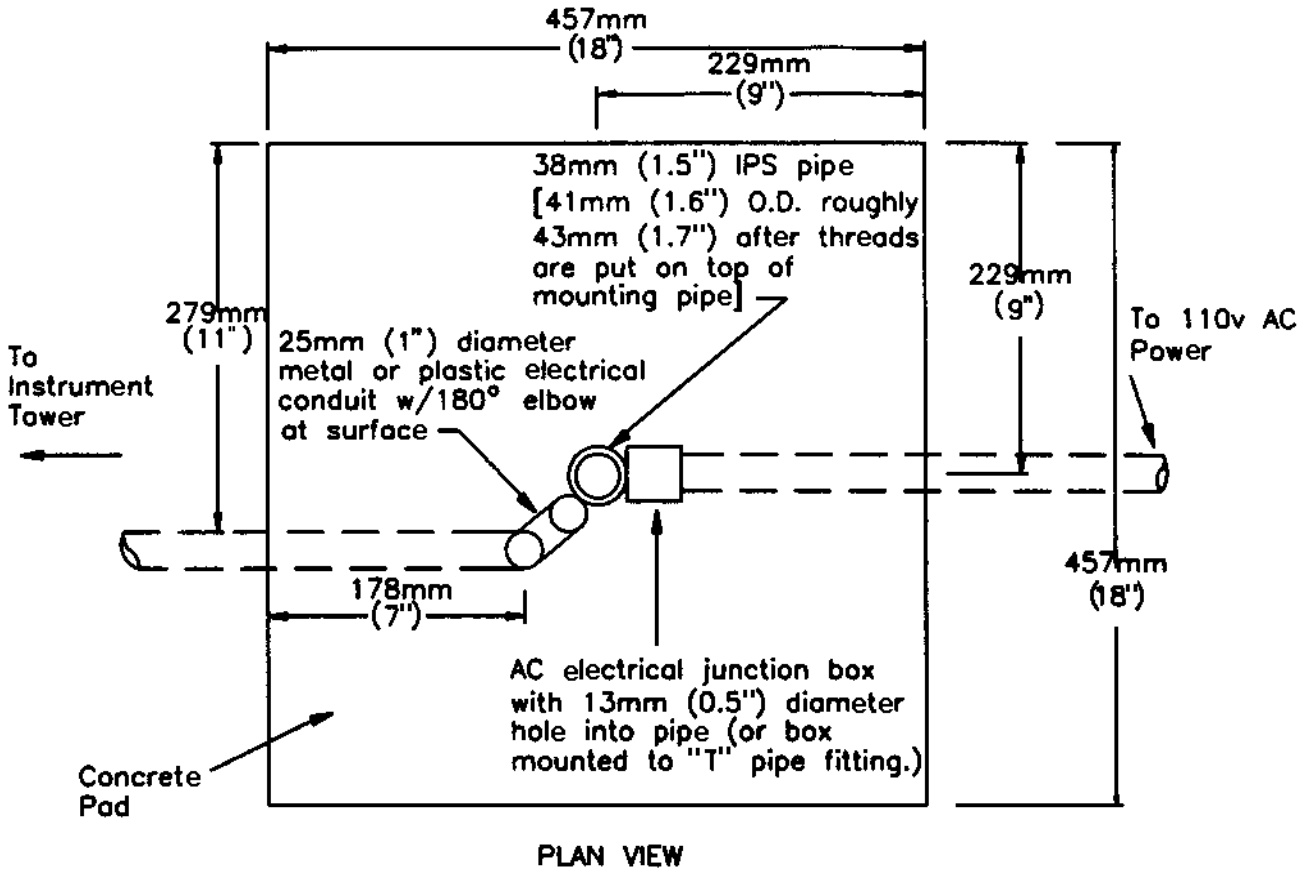
Figure 2. Layout of Instrument Tower Foundation



PLAN VIEW

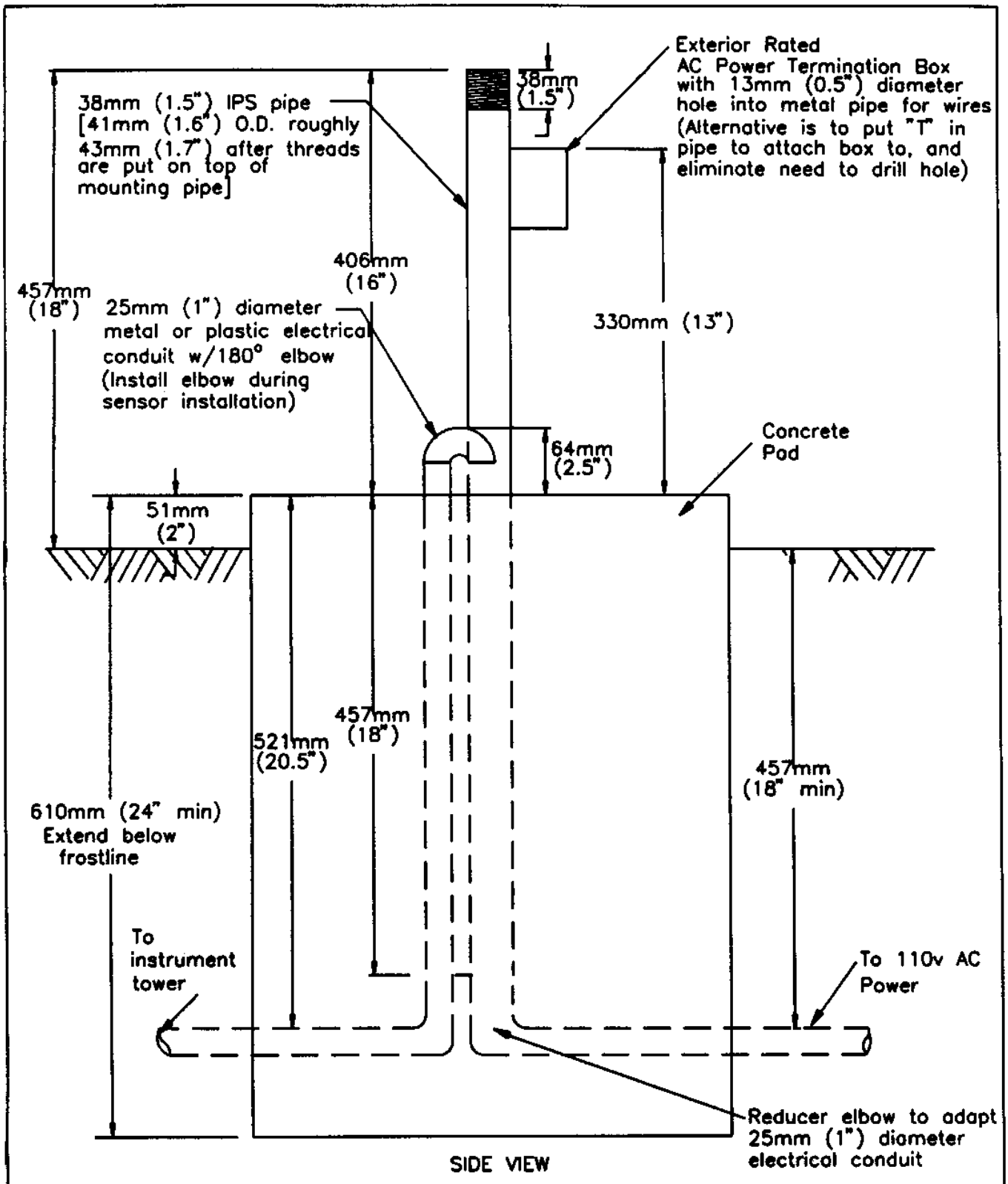
* 762mm (30") diameter tube form can also be used for placing PCC.

SPS Automated Weather Station	Figure 3. Layout of Instrument Tower Foundation



* 610 mm (24") diameter tube form can also be used for placing PCC.

SPS Automated Weather Station	Figure 4. Layout of Raingage Foundation



SPS Automated Weather Station	Figure 5. Layout of Raingage Foundation

SPS AWS INSTALLATION AWS INSTALLATION CHECKLIST DATA SHEETS SPS_AWS_INSTALL_1 (Page 1)	STATE CODE [__ __] LTPP SECTION ID [__ __ 0 0]

1. UT-3 Base Installation (page 3-1). [__ __]

2. UT-3 Tower Installation (page 3-2). [__ __]

3. Install 0l9ALU Horizontal Crossarm Mount (page 4-1). [__ __]

4. Perform Tower Grounding (page 3-3). [__ __]

5. Install 025 Pyranometer Crossarm Stand, LI2003S Pyranometer Base & Leveling Fixture and LI200S Pyranometer (pages 4-2 & 5-3). [__ __]

6. Install the RM Young Wind Monitor on 1" NU-RAIL of 019ALU (page 5-2). [__ __]

7. Check height of Wind Monitor (Measure from Center of Prop. To Ground: Should be approximately 10 feet ±4"). May require adjustment of the 12" Mast inserted in the 1" Nu-Rail. [__ __]

8. Install 41002 12-Plate Gill Radiation Shield & HMP35C Air Temp & RH Probe (pages 4-1, 4-2 & 5-4). [__ __]

9. Install the ENC12/14 Instrumentation Enclosure & Attach Wire to Ground Lug (page 6-1). [__ __]

10. Mount the MSX10 Solar Panel to the UT -3 Tower (page 7-3). [__ __]

11. Install the PS12LA Battery and Power Connections to the CRl0 Leave switch in the OFF position (pages 7-2 & 7-3) [__ __]

12. Connect the MSX10 solar Panel to the PS12LA (ports Labeled CHG & CHG, Red LED should light-up). (page 7-2). [__ __]

13. Install Raingauge, run sensor wires through conduit to station. [__ __]

14. Perform sensor to Datalogger wiring on the CR10 Wiring Panel & secure with wire ties. (page 8-1 & Attached Wiring Diagram). [__ __]

15. Load Program into SM192. (Attached Software Sheet). [__ __]

SPS AWS INSTALLATION AWS INSTALLATION CHECKLIST DATA SHEETS SPS_AWS_INSTALL_1 (Page 2)	STATE CODE [__ __] LTPP SECTION ID [__ __ 0 0]

16. Install the SM192 Solid State Storage Module (page 9). [__ __]

17. Install Desiccant, Humidity Indicator & Conduit Putty (page 11-1). [__ __]

18. Connect the SM192 to the CR10 via the Blue 9-Pin Serial Cable (Model SC-12). [__ __]

19. Turn the PS12LA Power Switch to the ON Position to Boot CR10 and Auto-Upload the Datalogger Weather Station Program (takes approx. 30 seconds). [__ __]

20. Connect PC.to Datalogger via SC32A Interface. Load Graph Term to set CR10 Clock and verify sensor measurement. (Attached Software Sheet). [__ __]

21. Disconnect Computer Interface then Close & Lock Enclosure Lid. [__ __]

Note: page number in parenthesis refers user to appropriate place in Campbell Scientific's "UT -3 Tower-Based Weather Station Installation Manual, July 1994," where installation activity in question is described.

Prepared by: _____ Date (dd/mm/yyyy): __ __ / __ __ / __ __ __ __

SPS AWS INSTALLATION AWS EQUIPMENT & INSTALLATION DATA SHEET SPS_AWS_INSTALL_2 (Page 1)	STATE CODE [__ __] LTPP SECTION ID [__ __ 0 0]

Installation Date (dd/mm/yyyy): [_ _ / _ _ / _ _ _ _]

AWS Site Location: _____

_____

_____

Distance from SPS Project (km): [__ __]

Highway Agency Contact(s): _____

_____

List of Equipment:

Equipment Types	Model Number	Serial Number
Vaisala Air Temp & Relative Humidity Probe	HMP35C	[__ __ __ __ __ __]
R. M. Young Wind Speed & Wind Direction probe	05103	[__ __ __ __ __]
Li-Cor Pyranometer (Solar Radiation)	LI200X	[__ __ __ __ __ __ __]
NovaLynx Tipping Bucket Raingage Heated? (Y/N) [___]	260-2500-12	[__ __ __ __]
Data Logger	CR10	[__ __ __ __ __]
Solid State Storage Module	SM192	[__ __ __ __ __]
12VDC Power Supply	PS12LA	[__ __ __ __]
Solar Panel	MSX10	[__ __ __ __ __ __ __ __ __ __ __ __ __]

SPS AWS INSTALLATION AWS EQUIPMENT AND INSTALLATION DATA SHEETS SPS_AWS_INSTALL_2 (Page 2)	STATE CODE [__ __] LTPP SECTION ID [__ __ 0 0]

Installation Team:

Name	Agency

Deviations from “Standard” AWS Site Layout: _____

_____

_____

_____

_____

Installation Problems: _____

_____

_____

_____

_____

ATTACH DRAWINGS, FIGURES, PHOTOGRAPHS AND/OR OTHER INFORMATION AS NECESSARY TO DOCUMENT DEVIATIONS FORM ESTABLISHED PROCEDURES OR PROBLEMS

Prepared by: _____ Employer: _____

SPS AWS INSTALLATION AWS DATA COLLECTION/MAINTENANCE LOG DATA SHEETS SPS_AWS_LOG	STATE CODE [__ __] LTPP SECTION ID [__ __ 0 0]

PLEASE INDICATE THE DATE THE SECTION WAS VISITED, ACTIVITY PERFORMED — DATA UPLOADING, AWS ROUTINE MAINTENANCE, AWS SENSOR CALIBRATION OR REPLACEMENT, OTHER — AND COMMENTS ON ANY PROBLEMS FOUND OR MAINTENANCE PERFORMED

Date (dd/mm/yyyy)	Activity	Comments
__ __/__ __/__ __ __ __	Installation	
__ __/__ __/__ __ __ __		
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SPS AUTOMATED WEATHER STATIONS (AWS) LOCATION DATA COLLECTION PLAN

Accurate AWS location data --latitude and longitude -- are critical to the LTPP program. To gather these data, the LTPP program will make use of the Global Positioning System (GPS) receivers that have been purchased by the Regional Coordination Office Contractors (RCOCs), Guidelines for the collection of AWS location data are provided below:

- Location measurements shall be performed in conjunction with normally scheduled profile measurements. For off-shore test sections and in special circumstances, location measurements can be performed in conjunction with other measurements.

- Location measurements shall be made when the profiler (or alternate vehicle) first arrives at the SPS site to allow for repeat measurements if necessary. If the AWS is not located within the length of the SPS project, the profiler shall first go to the AWS site and perform GPS measurements before commencing other LTPP related monitoring activities.

- Location measurements shall be performed in accordance with the guidelines provided by the GPS receiver manufacturer. The operator shall verify that the unit contains adequately charged batteries. When in use, the unit shall be set to metric measurements in the setup menu.

- Location measurements shall be performed directly at the AWS site, inside the security fence, or if this is not possible, within 5 m of the fenced-in area.

- If the EPE is greater than 200 m or a measurement was not obtained, the GPS operator shall make a second set of measurements at least 15 minutes after the initial readings were made. If the EPE is still greater than 200 m or a measurement has not been obtained, complete all other planned activities at the site (for the day) and then perform a third set of measurements at the end of the monitoring period. If the EPE is still high or a measurement has not been obtained, perform one last set of measurements.

  Noted:
  (1) No more than four sets of measurements per visit shall be performed at a given AWS location.

  (2) If multiple sets of measurements are required, the minimum time interval between readings shall be 15 minutes.

  (3) If after four rounds of measurements the EPE is still greater than 200 m, record the set of measurements that had the lowest EPE value on Data Sheet AWS_SPS_LOC and provide notes on the comment line on the number of measurements performed. RCOCs

shall keep track of those AWS sites for which no measurements were obtained or an EPE value less than 200 m was not achieved so additional measurements can be made during future visits.

- Location measurements shall be recorded on Data Sheet SPS_AWS_LOC - Global Positioning Measurements (attached to this document). Data elements in this data sheet include: State Code, LTPP Section ID, GPS Instrument Type and Model Name, Measurement Date, Latitude, Longitude, Elevation, Dilution of Precision (DOP), Estimated Position Error (EPE), Comments, Preparer, and Employer.

  Noted: (1) only latitude and longitude shall be entered into the IMS; elevation measurements shall be used by the RCOCs to check the reasonableness of the data currently stored in the IMS; all other data elements shall be used for quality control purposes by the RCOCs.

  (2) instructions for completing this data sheet are attached to the form.

Should the RCOCs have any questions regarding the collection of AWS location data with the GPS receivers, they should contact:

Monte Symons, Federal Highway Administration, LTPP Division
Phone: (703) 285-2730; Fax: (703) 285-2767

or

Gonzalo R. Rada, LTPP Technical Support Contractor, PCS/Law Engineering
Phone: (301) 210-5105; Fax: (301) 210-5032

SPS AUTOMATED WEATHER STATIONS (AWS)
GLOBAL POSITIONING MEASUREMENTS
DATA SHEET SPS_AWS_LOC

This data sheet is to be filled out in the field for each SPS-1, -2 or -8 AWS site for which latitude and longitude measurements are made using Global Positioning System (GPS) receivers. Latitude and longitude data entered in this sheet will be stored in the IMS.

STATE CODE: the state code is a number used to identify the state or Canadian province in which the LTPP pavement section, hence AWS, is located (see Table A.1; Appendix A for codes).

LTPP SECTION ID: the LTPP section ID is a four-digit identification number assigned by SHRP or the FHWA LTPP Division. This number is used to facilitate the computer filing of the projects and will identify the section in the field. It will be cross-referenced with the State assigned ID.

1. *GPS Instrument Tye and Model Name:* space is provided to enter type and model of GPS receiver used to measure latitude and longitude. This information is not entered into the IMS.

2. *Measurement Date:* a set of numbers to identify the day, month and year in which latitude and longitude measurements were made with the GPS receiver. The format for this data element is dd/mm/yyyy; e.g., 03/04/1994 for GPS measurements made on April 3, 1994, 20/12/1996 for GPS measurements made on December 20, 1996. This information is not entered into the IMS.

3. *Latitude:* latitude of AWS, as determined from the GPS measurement, in degrees, minutes and seconds to the nearest tenth of a second. (Note: North or South direction is not entered on this data sheet, since it is assumed to be North; however, direction will be included in the IMS at a future date to allow for sections in the Southern Hemisphere).

4. *Longitude:* longitude of AWS, as determined from the GPS measurement, in degrees, minutes and seconds to the nearest tenth of a second. (Note: West or East direction is not entered on this data sheet, since it is assumed to be West; however, direction will be included in the IMS at a future date to allow for sections in the Eastern Hemisphere).

5. *Elevation:* elevation of the AWS, as determined from the GPS measurement, in meters to the nearest meter. This information is not entered into the IMS.

6. *Dilution of Precision (DOP):* measure of satellite geometry quality and relative accuracy of the GPS measurement. The DOP ranges from 1.0 (best) to 9.9 (worst), with value entered to the nearest tenth. This information is not entered into the IMS, but is used by the RCOCs for quality control purposes.

7. *Estimated Position Error (EPE):* overall measure of position accuracy computed using the DOP, signal and data quality, receiver tracking status and other factors. The EPE is expressed in meters, with value entered to the nearest meter. This information is not entered into the IMS, but is used by the RCOCs for quality control purposes.

8. *Comments:* space is provided to enter any pertinent comments related to the latitude and longitude measurements using the GPS receiver. This information is not entered into the IMS.

PREPARER: space is provided to enter the name of the GPS operator who made the latitude and longitude measurements. This information is not entered into the IMS, but is used by the RCOCs for quality control purposes.

EMPLOYER: space is provided to enter the name of the GPS operator employer . This information is not entered into the IMS.

SPS AWS LOCATION GLOBAL POSITIONING MEASUREMENTS DATA SHEETS SPS_AWS_LOC	STATE CODE [__ __] LTPP SECTION ID [__ __ 0 0]

1. GPS Instrument Type and Model Name _____

2. Measurement Date (dd/mm/yyyy) __ __ / __ __ / __ __ __ __

3. Latitude (Degrees, Minutes, Seconds) [__ __ ° __ __ ′ __ __ . __ ″]

4. Latitude (Degrees, Minutes, Seconds) [__ __ ° __ __ ′ __ __ . __ ″]

5. Elevations (meters) __ __ __ __.

6. Dilution of Precision (DOP) __ . __

7. Estimated Position Error (EPE, meters) __ __ __ __

8. Comments

_____

_____

_____

Notes:

(1) Only data elements in brackets are entered into the IMS.
(2) Use project ID with 00 for last two digits.

OPERATOR _____ EMPLOYER _____