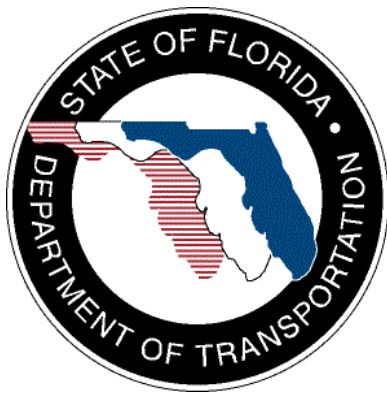


**SunGuide®:**

# **Implementation Plan for FDOT Pensacola Regional Transportation Management Center**

**SunGuide-IP-Pensacola-1.0.0 (Draft)**



Prepared for:  
Florida Department of Transportation  
Traffic Engineering and Operations Office  
605 Suwannee Street, M.S. 90  
Tallahassee, Florida 32399-0450  
(850) 410-5600

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## **List of Acronyms**

C2C.....	Center-to-Center
CCTV .....	Closed Circuit Television
ConOps .....	Concept of Operations
CSE.....	Computer Sizing Estimates
DMS .....	Dynamic Message Sign
EH.....	Executive Handler
EM.....	Event Management
FDOT.....	Florida Department of Transportation
GUI.....	Graphical User Interface
HAR.....	Highway Advisory Radio
IDS.....	Incident Detection System
IIS .....	Internet Information Server
IP .....	Implementation Plan
ITS .....	Intelligent Transportation Systems
IV&V .....	Independent Verification and Validation
MCP.....	Manual Control Panel
NTCIP .....	National Transportation Communications for ITS Protocol
RMS.....	Ramp Metering Subsystem
RPG .....	Response Plan Generator
RS .....	Reporting Subsystem
RTMC.....	Regional Traffic Management Center
RWIS .....	Roadway Weather Information System
SB .....	Safety Barrier
SDD .....	Software Design Document
SICP.....	Software Integration Case Procedures
SIP .....	Software Integration Plan
SRS .....	Software Requirements Specification
SUM .....	Software User's Manual
SwRI.....	Southwest Research Institute
TCP/IP .....	Transmission Control Protocol/Internet Protocol
TMC .....	Transportation Management Center
TSS .....	Transportation Sensor Subsystem
TvT .....	Travel Time
VDD .....	Version Description Document
VPN.....	Virtual Private Network

**REVISION HISTORY**

<b>Revision</b>	<b>Date</b>	<b>Changes</b>
1.0.0	October 11, 2010	Initial Release

## **1. Scope**

This section characterizes the scope of this document and project.

### **1.1 Document Identification**

This document serves as the Implementation Plan (IP) for the SunGuide® software deployment specific to the Regional Transportation Management Center (RTMC) and Freeway Management System (FMS) in Escambia and Santa Rosa Counties, Florida. This Implementation Plan was prepared for the initial deployment of SunGuide at a newly established RTMC, herein referred to as the Pensacola TMC. From this RTMC, an area wide Intelligent Transportation System (ITS) will be operated that consists of the RTMC and FMS.

A primary goal of the FMS is to provide the public with real-time information on current traffic conditions along Interstates 10 and 110. Concurrent with this service, the FMS operation will contribute to the reduction in congestion due to incidents, both planned (football games, local events, atypical holidays, etc.) and unplanned (hurricane evacuations, crashes, debris, etc.) through incident management activities and a Road Ranger service patrol program that will reduce the duration of disruptions and improve traffic flow.

### **1.2 Project Overview**

The FDOT is conducting a program that develops and maintains SunGuide software. The SunGuide software is a set of ITS software that allows the control of roadway devices as well as information exchange across a variety of transportation agencies. The goal of the SunGuide software program is to have a common software base that can be deployed throughout the state of Florida. The SunGuide software development effort was based on ITS software available from the state of Texas. In addition to the reuse of software (along with customization of this software), a number of new software modules have been developed specifically for the Florida Department of Transportation. Figure 1.1 provides a graphical view of the software.

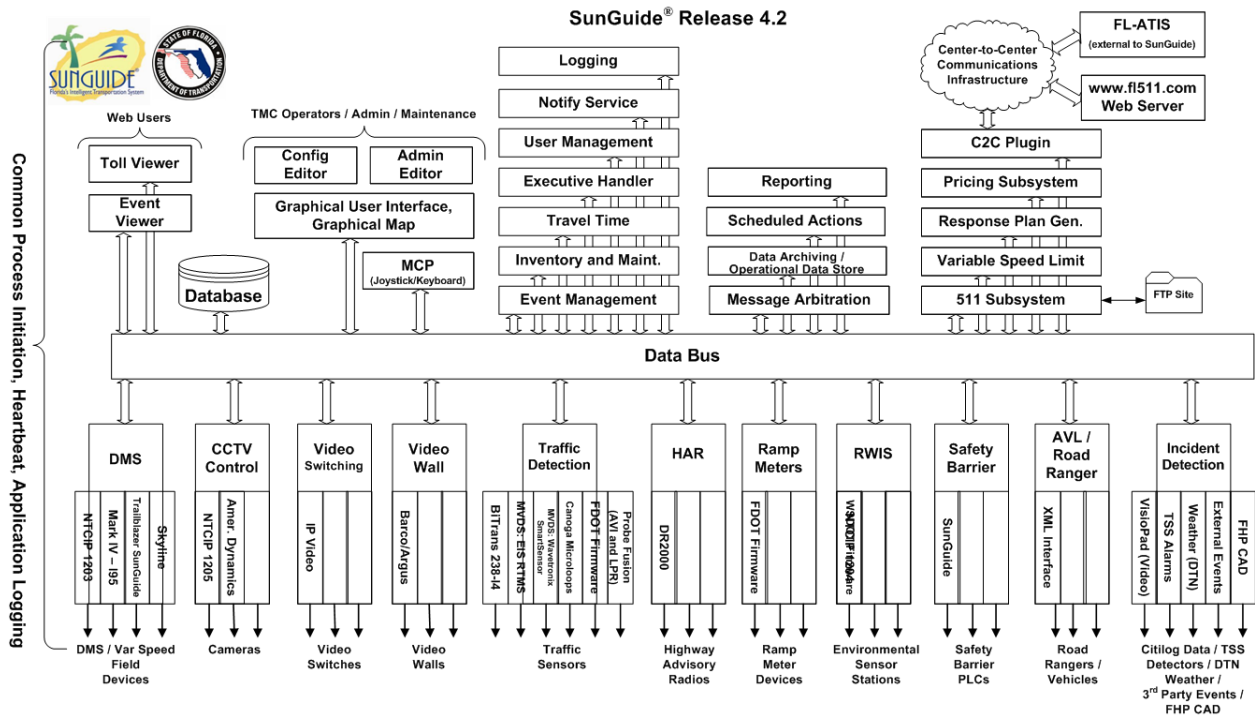


Figure 1.1 - High-Level Architectural Concept

### 1.3 Related Documents

A number of documents that describe the SunGuide software are available on the project Web site. Many of these documents were used to produce this document. The “Reading Room” of the project Web site should be reviewed:

<http://sunguide.datasys.swri.edu>

### 1.4 Contacts

The following are primary contact persons for the SunGuide software project:

- Elizabeth Birriel, ITS Section, Traffic Engineering and Operations Office, [elizabeth.birriel@dot.state.fl.us](mailto:elizabeth.birriel@dot.state.fl.us), 850-410-5606
- Arun Krishnamurthy, FDOT SunGuide Project Manager, [arun.krishnamurthy@dot.state.fl.us](mailto:arun.krishnamurthy@dot.state.fl.us), 850-410-5615
- Khue Ngo, PBS&J Project Manager, [khue.ngo@dot.state.fl.us](mailto:khue.ngo@dot.state.fl.us), 850-410-5579.
- David Chang, PBS&J Project Advisor, [David.Chang@dot.state.fl.us](mailto:David.Chang@dot.state.fl.us), 850-410-5622
- Robert Heller, SwRI Project Manager, [rheller@swri.org](mailto:rheller@swri.org), 210-522-3824
- Tucker Brown, SwRI Software Project Manager, [tbrown@swri.com](mailto:tbrown@swri.com), 210-522-3035

The following are contacts for other organizations that are expected to be involved with this deployment:

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- Elizabeth Bitting, Transcore ITS, [Elizabeth.Bitting@transcore.com](mailto:Elizabeth.Bitting@transcore.com), 813-951-6399
- Jonathan Tursky, Transcore ITS, [jonathan.tursky@transcore.com](mailto:jonathan.tursky@transcore.com), 813-249-9057 ext 105



## **2. Deployment Details**

The following documents should be available to Pensacola TMC staff and their representatives as they prepare for a SunGuide deployment (the most recent versions are available on the project Web site):

- Computer Sizing Estimates (CSE)
- Software Requirements Specification (SRS)
- Software Design Document (SDD)
- Version Description Document (VDD)
- Software User's Manual (SUM)
- Software Integration Plan (SIP)
- Software Integration Case Procedures (SICP)
- Administrator Training Slides
- Operator Training Slides
- Installation Notes
- FL-ATIS Style Guide

### **2.1 Subsystems To Be Installed**

The following SunGuide subsystems will be installed for the initial deployment at the Pensacola Traffic Management Center:

- Administrative Editor (AE)
- Center-to-Center (C2C)
- Closed Circuit Television (CCTV)
- Data Bus (DB)
- Data Archive (DA)
- Dynamic Message Sign (DMS)
- Event Management (EM)
- Executive Handler (EH)
- Graphical User Interface/Map (GUI)
- Highway Advisory Radio (HAR)
- Incident Detection (IDS)
- Message Arbitration (MAS)
- Notify Manager
- Reporting Subsystem (RS)
- Response Plan Generator (RPG)
- Roadway Weather Information System (RWIS)
- Scheduled Actions (SAS)
- Status Logger (SL)
- Transportation Sensor Subsystem (TSS)
- Travel Time (TvT)
- Video Switching (VS)
- Video Wall (VW)

## 2.2 Pensacola TMC: Before Software Installation

The following sections describe the activities that Pensacola TMC staff (or their consultants) needs to perform prior to the SunGuide software deployment. To assist in installation planning, the SunGuide *Computer Sizing Estimate (CSE)* document should be referenced. This document can be found at the project Web site: <http://sunguide.datasys.swri.edu>. The document is located in the “Various Documents” section of the “Reading Room”. Note: if funding allows, workstation performance can be enhanced if the fastest possible workstations can be procured.

### 2.2.1 Servers

This section characterizes the server configuration requirements and recommendations for SunGuide.

#### 2.2.1.1 Sizing

This section discusses the Southwest Research Institute<sup>®</sup> (SwRI<sup>®</sup>) recommended installation of the SunGuide software on dedicated SunGuide servers. All servers will be running Windows 2003, Standard Edition.

##### 2.2.1.1.1 Recommendations

The contents of the following tables are based on information furnished to SwRI by Elizabeth Bitting of Transcore and provide device counts for the phases currently planned. (Note: A spreadsheet for providing a detailed listing of current devices is included in Appendix A).

SunGuide Device Types	Deployment
DMS TCP/IP connected signs	12
DMS Dialup connected signs	0
CCTV Cameras	40
Video Decoders	0
TSS EIS Detectors	88
RWIS TCP/IP Stations	1
Highway Advisory Radio Controllers	0
TSS AVI “Tag readers”	0
Safety Barrier Cable System ITS Devices	0
Metered Ramps	0
Video Wall	1

SunGuide User Activities	Deployment
Active SunGuide Users	2
CCTV Users Simultaneously Controlling Cameras	2
CCTV Users Simultaneously Switching Video	2
Simultaneous Active Events	10

The following table is extracted from the SunGuide *Computer Sizing Estimates* document and is used to quantify the number of SunGuide application servers required based on the subsystems to be installed.

## Implementation Plan

<b>SunGuide Subsystem</b>	<b>Number of Servers Required</b>	<b>Pensacola TMC Deployment</b>
<b>Status Logger</b>	0.1	<b>0.1</b>
<b>Data Bus</b>		
Base system up to 500 ITS devices	0.5	<b>0.5</b>
Over 500 devices	0.5	
<b>User Interface</b>		
For every 10 users simultaneously logged in	0.5	<b>0.5</b>
<b>DMS (includes MAS)</b>		
Base subsystem	0.5	<b>0.5</b>
For every 100 TCP/IP connected signs	0.5	<b>0.5</b>
For every 50 dialup signs (assumes 5 modems)	0.5	
<b>CCTV Control (includes Manual Control Panel [MCP])</b>		
Base subsystem	0.25	<b>0.25</b>
For every 10 users simultaneously controlling cameras	0.25	<b>0.25</b>
<b>Video Switching</b>		
Base subsystem	0.5	<b>0.5</b>
For every 10 users simultaneously switching video	0.1	<b>0.1</b>
<b>Video Wall</b>		
Base subsystem	0	<b>0</b>
For each Barco/Argus Controller	0	<b>0</b>
<b>Transportation Sensor Subsystem (TSS)</b>		
Base subsystem	0.25	<b>0.25</b>
For every 300 detectors	0.5	<b>0.5</b>
<b>Event Management</b>		
Base subsystem for up to 20 concurrent events	0.25	<b>0.25</b>
For each 20 concurrent events over the base amount	0.25	
<b>Ramp Metering</b>		
Base subsystem	0.5	<b>0</b>
For every 20 ramps	0.25	
<b>Roadway Weather Information System (RWIS)</b>		
Base subsystem	0.25	<b>0.25</b>
For every 50 TCP/IP connected sensors	0.25	<b>0.25</b>
<b>Highway Advisory Radio (HAR)</b>		
Base subsystem	0.25	<b>0</b>
For every 50 HARs	0.1	
<b>Archive</b>		
Base subsystem	0.5	<b>0.5</b>
<b>Safety Barrier</b>		
Base Subsystem	0.1	<b>0</b>
For every 50 Barriers	0.1	
<b>Travel Time (TvT)</b>		

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SunGuide Subsystem	Number of Servers Required	Pensacola TMC Deployment
Base Subsystem	0.5	0.5
<b>Web Servers (should be protected with a firewall)</b>		
General Web server	1	1
C2C interface server	0.5	0.5
Emergency Evacuation	0.5	
Maintenance Management Systems	0.5	
<b>Total SunGuide Application Servers Needed</b>		<b>7.2</b>

The above analysis suggests that seven servers would be needed to support the SunGuide installation. The sizing estimates in the *Computer Sizing Estimates* were based on best engineering judgment. After several installations it is clear that the estimates were conservative; therefore, there is no reason to believe that the planned number of servers will not suffice.

SwRI recommends that 100 GB of disk space be reserved for the SunGuide application common storage. An additional 200 GB of disk space is recommended for the Oracle database files, based on a three-year projection of database growth.

### 2.2.1.1.2 Planned

The SunGuide installation will be supported by five servers. The SunGuide Oracle database will be installed on two servers with 6 GB RAM each. In addition, those two servers will redundantly host the SunGuide application services shown in the figure below as DB/AS. Three other servers with 6 GB RAM each will exclusively host the SunGuide application services.

The SunGuide software will be installed and configured on the following machines (the recommendations are based on the estimated number of devices provided by Pensacola TMC representatives):

Subsystem	Application Server			
	DB/AS	1	2	3
Administrative Editor (AE)	✓			
Center-to-Center (C2C)			✓	
Closed Circuit Television (CCTV)				✓
Data Bus (DB)	✓			
Data Archive (DA)		✓		
Dynamic Message Sign (DMS)		✓		
Event Management (EM)			✓	
Executive Handler (EH)	✓	✓	✓	✓
Graphical User Interface/Map (GUI)	✓			
Highway Advisory Radio (HAR)			✓	
Incident Detection (IDS)				✓
Message Arbitration (MAS)		✓		
Notify Manager	✓			
Reporting Subsystem (RS)		✓		

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Response Plan Generator (RPG)			✓	
Roadway Weather Information System (RWIS)		✓		
Scheduled Actions (SAS)				✓
Status Logger (SL)	✓			
Transportation Sensor Subsystem (TSS)			✓	
TSS RTMS Driver				✓
TSS-2 (Probe Fusion Driver)				✓
Travel Time (TvT)			✓	
Video Switching (VS)				✓
Video Wall (VW)				✓

The proposed distribution of SunGuide “application subsystems” across servers is preliminary. During operations, the subsystems and driver performance should be carefully monitored for CPU, IO, paging performance or saturation. Of specific concern are the DMS and Transportation Sensor Subsystem (TSS) subsystems and corresponding drivers. If the performance of these subsystems and corresponding drivers is less than desirable, additional drivers can be introduced to spread the processing loads.

### 2.2.1.2 Hardware & Network Configuration

Due to the client/server nature of the SunGuide software, TCP/IP is used to exchange data between application servers. Because of the Web-based implementation of the SunGuide user interface, each SunGuide workstation requires TCP/IP access to the SunGuide application servers. Pensacola TMC staff or their representatives need to verify that TCP/IP connectivity exists between all SunGuide application servers and SunGuide workstations and ensure that they are on the same or a trusted domain.

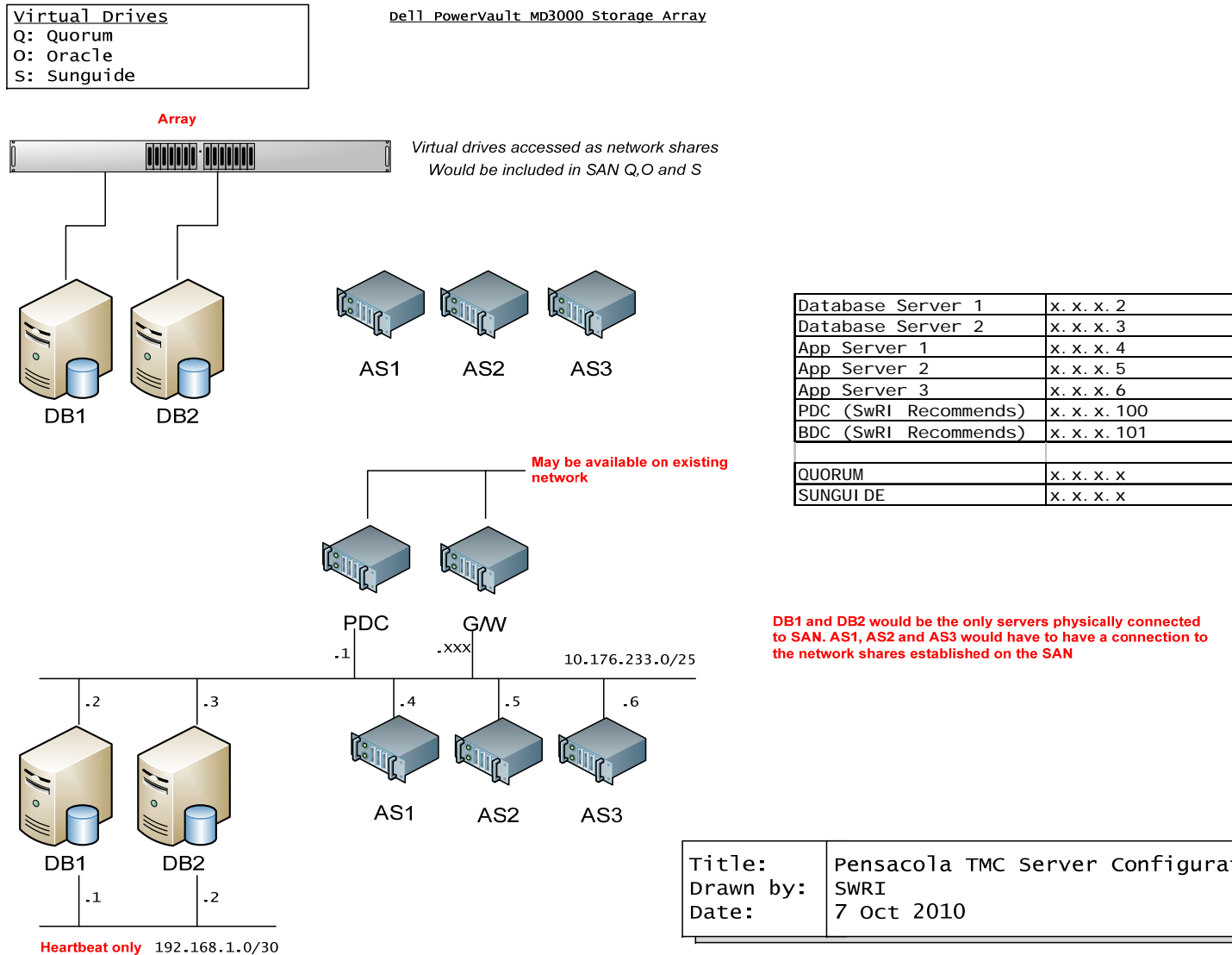
Based on specifications provided for the hardware available for this deployment, SwRI recommends the following configuration. The actual configuration of servers and network is left to Pensacola TMC discretion, as long as the requirements laid out in this document are met.

The MD3000 storage array is recommended to be RAID 5 or RAID 6. RAID 6 is preferred if a minimum of five hard drives are available. The SunGuide database and application servers are recommended to be RAID 10.

As shown in the diagram below, the two database servers, DB1 and DB2, would be the only servers physically connected to SAN. The remaining application servers, AS1, AS2 and AS3, would require a connection to the network shares established on the SAN.

In the diagram below, it is expected that a primary domain controller (PDC) and a gateway (G/W) will be in place. Where and how the heartbeat shown on the diagram is configured is left to Pensacola TMC discretion. It is only depicted to show support for the clustered database servers.

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DB1 and DB2 would be the only servers physically connected to SAN. AS1, AS2 and AS3 would have to have a connection to the network shares established on the SAN

**Figure 2.1 – Hardware & Network Configuration**

### **2.2.2 Server Preparation**

The following operating system software needs to be installed on all of the servers before the software installation team arrives on-site:

- Microsoft Standard Server 2003 with all current updates from Microsoft

Should antivirus software be installed on the servers, there are no requirements to exclude any SunGuide directories from antivirus scanning. However, Pensacola TMC FDOT staff may want to consider excluding Oracle data files, as it can slow things down considerably.

The software installation team assumes that the SOC will have licenses and installation media available for the following products:

- Microsoft Standard Server 2003
- Oracle 11g, version 11.1.0.7

The following software is required to be installed on the two SunGuide database/application servers before the software installation team arrives on-site:

- IIS (Microsoft installation disk)

All five SunGuide servers should have the following software installed before the software installation team arrives on site:

- ASP.NET 2.0 (this is usually installed as part of Microsoft IIS)

The following software is recommended to be installed on the servers before the software installation team arrives on-site:

- Two servers will be configured as database servers:
  - Oracle 11g Server, version 11.1.0.7
- All servers will be configured as application servers:
  - Oracle 11g Client, version 11.1.0.7

### **2.2.3 Workstations**

The following software must be installed on each workstation that will access the SunGuide software:

- Microsoft Windows 7
- Microsoft Internet Explorer 8.0

Additionally, workstations will need to have “Buffer Overflow Protection” disabled on their antivirus software to ensure that the map will load correctly. Not all antivirus software provides this option; please check with the software vendor.

### **2.2.4 Center to Center Preparation**

If C2C communication will be used to communicate information to the FL511 Web site, some coordination is required with the Web site developers to help with data integration and connectivity with the Web site. Pensacola TMC staff will need to work with FLATIS developers to decide upon an appropriate Center ID for the installation. Also, network connectivity will

## Implementation Plan

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need to be established between the TMC and the FLATIS Center to Center server. This will not be necessary if no data will be published to the FL511 Web site.

### 2.2.5 Device Protocol Compliance

For the devices being deployed, Pensacola TMC staff, need to verify that the protocol used by the devices to be controlled by the SunGuide software is compliant to the protocols on the SunGuide project Web site. At this time, this includes the following protocols:

Subsystem	Protocol Reference
CCTV Control	NTCIP 1205 v01.08 Amendment 1 v01.08 (August 2004)
CCTV Control	American Dynamics SD Ultra VII camera firmware version 2.03, dated January 24, 2006
CCTV Control	American Dynamics SD Ultra 8 camera firmware version 1.09, FPGA version 2006/10/31 15:18
DMS	NTCIP 1203, FDOT MIB (Sep 2001)
DMS	Mark IV - I95: Document Number A316111-102 REV. A8 (June 26, 2001)
DMS	SunGuide Trailblazer
HAR	Highway Information Systems DR2000
RWIS	NTCIP 1204 v02.18 (April 2004)
Traffic Detection	EIS RTMS, Issue 2 (April 2003)
Traffic Detection	Wavetronix RTMS: SS105 SmartSensor Data Protocol V2.02
Traffic Detection (AVI)	SIRIT Identity Flex Title 21
Traffic Detection (AVI)	TransCore Allegro IT2020
Traffic Detection (LPR)	PIPS P357 Video Processor
Traffic Detection (LPR)	Inex Zamir
Video Switching: IP Video	VBrick 4200/5200
Video Switching: IP Video	Teleste IDP301/IDE301
Video Switching: IP Video	Coretec VCX2400D/VCX2400E
Video Switching: IP Video	iMpath i1000/i4100
Video Switching: IP Video	Cornet Technology iVDO Streamer 2/4D / iVDO Streamer 2/4E
Video Wall	Barco/Argus Apollo

In addition to verifying the protocols are compliant, the Pensacola TMC staff needs to verify the TCP/IP connectivity to the field devices prior to the on-site installation activities being performed. This can most simply be accomplished by using “ping” to verify that the device is accessible from the server room using the network that the SunGuide servers will be utilizing.

Past history from previous new SunGuide installations indicates that approximately 80% of deployment efforts are spent on device connectivity (future upgrades do not take this level of effort). In new deployments wiring issues, device configuration issues and network issues have been shown to take a lot of time to resolve. Any effort prior to the deployment using “test software” (often provided by the vendors) to communicate to the devices from computers in the control center can reduce the installation efforts.



### **2.2.6 Network Infrastructure**

The following sections describe the larger network infrastructure that must be in place prior to installation of the SunGuide software.

During the installation activities, a VPN (Virtual Private Network) connection should be configured that will allow SwRI staff to access the Pensacola TMC computers from remote locations. This will facilitate any troubleshooting (the VPN can only be provided with Pensacola TMC approval).

#### **2.2.6.1 Devices**

Early in the development of requirements for SunGuide, FDOT made the decision that the devices should be connected via TCP/IP to the SunGuide application servers. There are a number of techniques to connect traditional serial ITS devices so that they can be accessed via TCP/IP, these techniques include the use of a terminal server (a box that has a TCP/IP connection and has multiple serial ports) or a port server (a box that has a TCP/IP connection and a single serial port). The only exception to the use of TCP/IP access is that DMS devices can be accessed via a modem or directly through a serial port if the connection is made through a Windows “COM” port on the SunGuide application server running the DMS device driver.

#### **2.2.6.2 Network Services**

As the SunGuide software is configured, it will need access to various “standard” servers (e.g., a time server) that may be installed as part of the SunGuide installation or may be available as part of the Pensacola TMC network. The following network services need to be available and the details (e.g., host names, addresses) need to be available during the SunGuide software configuration:

- SMTP Mail Server (optional): The SunGuide Notify Manager needs to be able to send emails on major system events so SMTP mail server access is required.
- DNS Server (optional): The SunGuide applications utilize TCP/IP to exchange data and the applications can use either IP addresses or host names in their configuration files. Note that the use of DNS is preferred because using explicit IP addresses is less flexible than using hostnames.
- Time Server (optional): It is recommended that all SunGuide computers (workstations and servers) be synchronized to a common time source as it is desirable during diagnostics to have the same time on all SunGuide systems. Interaction with FL-ATIS may require access to a time server.

### **2.2.7 Device Worksheets**

The following sections describe the information that must be collected about each device that is to be utilized by the SunGuide software.

#### **2.2.7.1 Notes:**

- When entering latitude/longitude values, a full 8 digits of precision must be entered as coordinates are stored in micro degrees, which require 8 digits. SunGuide has a 30-character limit for device short names and descriptions are limited to 256 characters.

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- Appendix A of this document has a worksheet to provide device information, the information requested in the following tables is best presented in an Excel worksheet format.

### 2.2.7.2 CCTV Worksheet

The following data needs to be collected for each CCTV to be configured:

Camera Name	Unique name of camera
Center Id	Unique name of center where camera resides, same as the one used for C2C communication
Protocol	Specifies the protocol (values: SNMP, SNMP(PMPP)) for camera
Poll Process	Name of driver for camera
Manufacturer	Manufacturer of camera
Location Description	Description of where camera resides
Roadway	Roadway of where camera resides
Direction	Direction of roadway where camera is installed
Latitude	Latitude of where camera resides
Longitude	Longitude of where camera resides
Op Status	Operational status (values: Active, Error, Failed, OutOfService) of camera
Address Type1	Address type (values: pmppAddress, commAddress) for camera, if pmppAddress then camera uses SNMP (PMPP); if commAddress then camera uses SNMP
Address Type2	Specific address type (values: portServerAddress) of Address Type 1
Address	Device address of camera
Port Server IP	IP address for the port server where camera resides
Port Server Port Number	Port number for the port server where camera resides
Community Name	Community name for camera (SNMP)
Attach to Video Device	If selected, additional IP video parameters for attached encoder must be supplied.

The following data need to be provided for IP video (both encoders and decoders):

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Video Device IP Address	IP address for encoder
Restricted	Applicable only for decoders
Workstation	Applicable only for decoders, select if a workstation is configured for this video destination.
Video Device Type	Type (IP video device) of video device, encoder or decoder
IP Streaming Driver ID	Unique IP video switch driver name, determined at the time of installation.
Card Number	Card number for VBrick encoder
Manufacturer	Manufacturer (values: Coretec, iMpath, Teleste, VBrick) of encoder
Model	Model of encoder or decoder
Streaming Type	Streaming type (values: ES, transport, program, mpeg)
Secondary Interface	Secondary interface for VBrick which enables users to maximize number of inputs
Snapshot Requested	Determines if snapshots are generated for encoder

### 2.2.7.3 DMS Worksheet

The following data needs to be collected for each DMS to be configured:

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Sign Name	Unique name of DMS
Center Id	Unique name of center where DMS resides
Protocol	Specifies the protocol (values: SNMP, SNMP(PMPP), MarkIV, SunGuide (for Trailblazers)) for DMS
Connection Type	Specifies how the DMS is connected to the network (values: Direct, Modem, Long Distance Modem)
Poll Process	Name of driver for DMS
Packet Timeout	Amount of time the driver will wait on a response from a DMS before timing out (recommended time is 5 seconds)
Packet Retry Limit	How many times a packet is attempted before it errors out, for most signs the recommended number is 2, for signs prone to errors, this can be increased
Command Retry Limit	How many times a command is attempted before it errors out, a command consists of multiple packets. Recommended number is 1
Op Status	Operational status (values: Active, OutOfService) of DMS
Type	Values: Fiber Optic, LED, Flip-Disk, Shutter
Manufacturer	Values: FDS, IDI, MarkIV, Telespot, Skyline
Number of Lines	Number of displayable lines
Beacons	Whether the sign has beacons, if so, specify the beacon address
Day Brightness Level	The numeric value for brightness setting in the daytime
Night Brightness Level	The numeric value for brightness setting in the nighttime
Font	The font configured on the sign.
Sign Type	Type of sign. The possible values are: Char, LineMatrix, or FullMatrix.
Sign Use	How the sign is used: General, VSL, Toll Rate, Toll Lane Status, or Trailblazer
Location Description	A text field describing the location of the DMS
Roadway	Roadway on which this DMS resides
Direction	The direction of the roadway on which this DMS resides
Latitude	Latitude of where this DMS resides
Longitude	Longitude of where this DMS resides
Number of Columns	Number of characters that can be displayed using a normal font
Beacon Address	The address on which the sign receives activate/deactivate beacon requests
Address Type 1	Address type (values: PMPP, SunGuide, MarkIV) for DMS, if PMPP then DMS protocol should be SNMP (PMPP); if SunGuide or MarkIV, then DMS uses same protocol name
Address Type 2	Specific address type (values: Direct, PortServer, Dialup, UDP Port Server) of Address Type 1
Address	Device address of DMS (drop address)

The following data need to be provided for DMSs connected via a TCP/IP connection (Port Server):

IP Address	IP address for the port server where DMS resides
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Port Number	Port number for the port server where DMS resides
Community Name	Community name for DMS (SNMP)

The following data need to be provided for DMSs connected via a UDP Port Server:

IP Address	IP address for the port server where DMS resides
Port Number	Port number for the port server where DMS resides
Read Community Name	Read community name for DMS (SNMP)
Write Community Name	Write community name for DMS (SNMP)

The following data need to be provided for DMSs connected directly via a serial port (Direct):

Communications port	Communications port to which the DMS is connected
Baud Rate	This should match the baud rate of the DMS
Data Bits	This should match the data bits the DMS is expecting
Stop Bits	This should match the stop bits the DMS is expecting
Parity	This should match the parity the DMS is expecting

The following data need to be provided for DMSs connected via a modem:

Phone Number	Phone number for the DMS, should include any prefix needed for dialing
Baud Rate	This should match the baud rate of the DMS

### 2.2.7.4 HAR Worksheet

The following data need to be provided for HAR radios:

Name	Unique name of radio
Manufacturer	Manufacturer of the radio
Control Number	Phone number of the device
Access Code	Required device # for the HAR
Header Slot	If there is some preferred "header message" for preceding each of the actual messages, its message number would be configured here. The actual message is configured within the HAR.
Footer Slot	If there is some preferred "footer message" for trailing each of the actual messages, its message number would be configured here. The actual message is configured within the HAR
Default Message Slot	Default Message is what plays when the message is 'terminated' from within SunGuide (It would still be wrapped by the header/footer if set).
Roadway	Roadway of where radio resides.
Direction	Direction of roadway where radio is installed
Location Description	Description of where radio resides
Latitude	Latitude of where radio resides
Longitude	Longitude of where radio resides

### 2.2.7.5 RWIS Worksheet

The following data needs to be collected for each RWIS to be configured:

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Sign Name	Unique name of RWIS
Protocol	Should be NTCIP (only version supported)
Connection Type	Specifies how the device is connected to the network (values: Direct, Modem, Long Distance Modem)
Op Status	Operational status (values: Active, OutOfService) of device
Manufacturer	Name of manufacturer
Location Description	A text field describing the location of the device
Roadway	Roadway on which this device resides
Direction	The direction of the roadway on which this device resides
Latitude	Latitude of where this device resides
Longitude	Longitude of where this DEVICE resides
Address Type 1	Address type (values: PMPP) for device, if PMPP then device protocol should be SNMP (PMPP)
Address Type 2	Specific address type (values: Direct, PortServer, Dialup) of Address Type 1
Address	Device address of device
Port Server IP	IP address for the port server where device resides
Port Server Port Number	Port number for the port server where device resides
Community Name	Community name for device (SNMP)

### 2.2.7.6 Route Worksheet

The following data need to be provided for each Highway (Route) to be in the deployment:

Roadway Description	Textual description of the roadway (route)
Short Name	Short text name that will be seen by the operators
Directions	The directions that the roadway runs (can be multiple directions)
Cross Streets (multiple entries)	Textual descriptions of cross streets (that intersect the roadway); typically a roadway will have multiple cross streets
Latitude	Latitude of the intersection between the roadway and the cross street
Longitude	Longitude of the intersection between the roadway and the cross street

### 2.2.7.7 TSS Worksheet

The following data needs to be collected for each Transportation Sensor Subsystem (TSS) detector to be configured.

Detector Name	Unique name of detector
Center Id	Unique name of center where detector resides
Driver Name	Name of driver for the detector (e.g., BiTrans, RTMS)
Poll Cycle	Time in seconds between device polls
Type	Type of detector (e.g., Loop, Radar, AVI or LPR)
Protocol	Specifies the protocol (see the protocols supported on the project Web site)
Op Status	Operational status (values: Available or Offline)

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Location Description	Description of where detector resides
Roadway	Roadway of where detector resides
Direction	Direction of roadway where detector is installed
Latitude	Latitude of where detector resides
Longitude	Longitude of where detector resides
Address	Device address of detector
Port Server IP	IP address for the port server where detector resides
Port Server Port Number	Port number for the port server where detector resides

The following data needs to be collected for each lane that is to be configured:

TSS Link Name	A link should be created to represent the traffic segment corresponding to the detector in each direction for non-probe detectors, and from upstream detector to downstream detector for probe detectors.
TSS Lanes (non-probe detectors)	For each link, the name of each lane associated with the link; for each lane the zone number and description needs to be identified (e.g., which detection zone is associated with a lane).
Length (probe detectors)	The length of the link in miles
Number of Lanes (probe detectors)	For each link, the number of lanes to be displayed
Zones	The zones associated with the detector for this link.
Downstream Detector	The downstream detector for tag matches along this link. Downstream zones must be specified as well
Speed Limit	The speed limit of the link
Publish Link	If the link is to be published to the FL 511 Web site

The following data needs to be collected for each link that will have an alarm threshold to be configured:

TSS Link	The name of the links that will be defined in the system.
Threshold Value(s)	What the speed and occupancy values should be for each threshold (this includes a start and end time) value to be defined.

### 2.3 SwRI: Software Installation

The following sections describe the activities that SwRI staff will perform to install the SunGuide software. This description is applicable to non-virtualized environments. It is possible that a single application servers can be configured following the described process, then it can be cloned and edited (host name, etc.) to reflect its final configuration. Pensacola TMC staff or their representatives should be available to monitor and observe the software installation process.

#### 2.3.1 Software Installation

In order to install the SunGuide application software, the following steps will be performed by the software installation team:

- In a common directory with a share point accessible to all of the SunGuide application servers the following files will be installed:

- Install master configuration file, which is named config.xml and edit the contents to match the TMC network configuration
- Install XML schemas used by the SunGuide applications
- Create a database for the SunGuide application
- Execute the database creation scripts to prepare the database for installation of the SunGuide applications
- Using the installation instructions in the SunGuide *Version Description Document* (VDD) and installation notes install the SunGuide applications. Any patches released subsequent to the release of the full installation CD need to be installed (in order) after the installation CD is executed

Two SunGuide system administration applications do not execute in a browser environment. These applications should be installed on workstations that may be used to diagnose the health and status of the system; details of the application are contained in the SUM. SwRI will install the following applications on workstations as directed by Pensacola TMC staff or their representatives:

- Executive Handler viewer: provides an overview of currently operating SunGuide applications.
- Status Logger viewer: provides the ability to review the SunGuide application log files.

The installation team will also install the components needed to run the SunGuide application on the operator workstations. This includes:

- Adobe SVG Viewer 3.03 (can be downloaded at no charge from the Adobe Web site)
- Microsoft .NET Framework 2.0
- .NET security permissions
- Highway Shield Font

### 2.3.2 Software Configuration

After the SunGuide software is installed, various configuration activities need to occur; the software installation team will perform the following configurations:

- Install and configure Status Logger on a single SunGuide application server (the SunGuide applications will log to this one instance of Status Logger)
- Install and configure Executive Handler server on all SunGuide application servers
- Modify the IIS to restrict access to the SunGuide Admin utility to users as requested by Pensacola TMC Staff or their representatives

The SunGuide GUI is designed to load GUI components for the SunGuide applications. The loading (and overall performance) of the GUI can be improved if the GUI components associated with subsystems not installed is removed. The software installation team will remove the GUI components for the subsystems that were not installed; this is done because when the GUI is installed it includes the components for ALL SunGuide subsystems, this removal is done so that users do not see menu options for subsystems, which are not installed and configured.



### 2.3.3 C2C Configuration

During the SunGuide software configuration, the C2C interfaces need to be configured so that the Pensacola TMC deployment can exchange information and command requests (assuming operators have the appropriate permissions) with other control centers and FL-ATIS, if required. To achieve this exchange of data a TCP/IP path must be established between the cooperating centers, this requires agencies to make appropriate modifications to firewall and other network appliances that may restrict this type of data flow. The following SunGuide C2C components will be installed on the Pensacola TMC servers:

- C2C Plug-in Publisher
- C2C Plug-in Subscriber
- C2C Extractor
- C2C Provider
- C2C Command Receiver (if necessary)

The C2C interface should then be tested to assure that the software is properly configured; this testing will be performed using the C2C Test Suite.

## 2.4 SwRI / Pensacola TMC: Post Software Installation (Configuration)

The following sections describe the activities that the Pensacola TMC staff or their representatives will need to work with SwRI to perform after the SunGuide software deployment. SwRI staff will be available to perform much of this configuration and assist and work with the staff to accomplish the rest. SwRI recommends that the Pensacola TMC SunGuide administrator and at least one SunGuide operator work with SwRI during this process.

### 2.4.1 Populate Tables

The following tables need to be populated in SunGuide:

- User Management:
  - Users
  - Groups
  - Workstations
- CCTV:
  - Device Tables
- DMS:
  - Device Tables
  - Approved Words
- HAR
  - Device Tables
- RWIS:
  - Device Tables
- Transportation Sensor Subsystem (TSS):
  - Alarm Thresholds
  - Device Tables
  - Detector Maps
  - Poll Cycles
- Event Management:

- Activity Types
- Agencies
- Agencies Contacts
- Comment Types
- Event Status Types
- Event Types
- Injury Types
- Organizations
- Location Configuration
- Mailing Lists
- Mailing Lists Contacts
- Procedural Errors
- Response Plans
- Vehicle Tracking
- Weather Conditions
- Reporting Subsystem:
  - Reports
  - Reporting Groups
- Data Archive: Properties
- Miscellaneous: Centers

The SunGuide *Manual* (SUM) and Administrator Training slides should be consulted on use of these editors. To aid in future configuration, for any device that does not have an entry at least one entry for every possible device will be added; this will help illustrate how future entries should be structured (naming, option selection, etc.) and also verify that the Admin editor can read and write information to the appropriate tables.

### 2.4.2 Create Map Links

Each implementation of SunGuide must have a Map Link layer created; this layer is used by the operator map to display instrumented sections of roadway as well as highway shields. This layer is displayed in conjunction with the DynaMap shape file data to provide a complete looking map on the operator workstation. The SUM has a section titled “Map Administration with Link Editor” that explains the use of this software. Additionally, the Map Link Editor component of the Operator Map should be used to create the shields that should be displayed.

### 2.4.3 DMS Linking File

A device linking file needs to be created so that DMS devices can be selected for recommended Event response plans. The SUM describes how to create this file using the SunGuide Device Linking Editor component of the Operator Map.

## 2.5 SwRI: Testing

Once the configuration is complete and equipment is made available, a series of ad hoc tests will be performed to verify software operation. Software test procedures will be provided that will document the testing to be performed and pass/fail criteria. Areas that will be tested / exercised include:

- CCTV:

- Control of CCTV devices
- DMS:
  - Devices being polled
  - Control of DMS devices
  - DMS devices showing on map with status information
- HAR:
  - Communication with devices
- RWIS Devices:
  - Devices being polled
  - RIWS data showing up on map
- Transportation Sensor Subsystem (TSS) Devices:
  - Devices being polled
  - TSS data showing up on map
- Video Wall Devices:
  - Switching videos to different viewers on the wall
  - Creating and changing video wall layouts
- Event Management:
  - Event Creation
  - Event Management
  - Response Plan Generation
- Reporting Subsystem:
  - Generate reports
- Various:
  - Test C2C Plug-in using XML tester to receive data
  - Verify Data Archive is configured to store TSS data (note that this subsystem will not be used in the short term but will be configured for future use)

## 2.6 Training

Training will be conducted in the Pensacola TMC as the installation is performed; the training will be a hands-on that occurs during the installation and configuration activities as well as a formal class. The following training will be provided to the operations personnel during the installation and configuration:

- Administrator Training - the intent of the System Administration/Deployment training is to prepare personnel to install/configure the SunGuide software and administer the SunGuide system on a daily basis. The following topics will be addressed during the hands-on training:
  - Installation procedures
  - Backup procedures
  - Recovery procedures
  - Modifying hardware configurations
  - Tailoring of the system environment
  - Starting/stopping/restarting the system
  - Troubleshooting:
    - Executive Handler
    - Status Logger

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- Workstation installation
- Operator Training - the intent of the Operator/User Interface course is to prepare personnel to use the SunGuide system on a daily basis in a typical operational mode. The course will include the following topics:
  - ATIS
  - Center-to-Center (C2C)
  - Closed Circuit Television (CCTV)
  - Data Bus (DB)
  - Data Archive (DA)
  - Dynamic Message Sign (DMS)
  - Event Management (EM)
  - Executive Handler (EH)
  - Graphical User Interface/Map (GUI)
  - Highway Advisory Radio (HAR)
  - Incident Detection (IDS)
  - Message Arbitration (MAS)
  - Notify Manager
  - Performance Measures
  - Reporting Subsystem (RS)
  - Response Plan Generator (RPG)
  - Roadway Weather Information System (RWIS)
  - Scheduled Actions (SAS)
  - Status Logger (SL)
  - Transportation Sensor Subsystem (TSS)
  - Travel Time (TvT)
  - Video Switching (VS)
  - Video Wall (VW)

The training format consists of:

- Classroom instruction using PowerPoint presentation (4 hours)
- Hands-on instruction using Pensacola TMC SunGuide System (4 hours)

The operator training will be conducted at the Pensacola TMC during non-operational hours, if necessary.

## 2.7 Deployment Schedule

The following schedule is proposed for the deployment. The SunGuide installation schedule is to be determined. The installation team will need access to hardware devices throughout the implementation process. Note: if activities complete early, then with agreement between all parties (Pensacola TMC staff, their representatives, and SwRI), the timing for the following events may be modified to shorten the overall deployment schedule.

Day	Tasks	Documentation	Resources Needed
1	<ul style="list-style-type: none"> <li>• Planning meeting</li> <li>• Verification of pre-installation</li> <li>• Oracle software and database installation</li> <li>• SunGuide database installation</li> <li>• Crystal Reports installation</li> </ul>	VDD 3.3: Preparing SunGuide Servers VDD 3.4: SunGuide Database Installation VDD 3.5: Crystal Reports Run-time Installation	<ul style="list-style-type: none"> <li>• Internet access</li> <li>• Network access</li> <li>• User accounts to access network and servers.</li> </ul>
2	<ul style="list-style-type: none"> <li>• IIS Configuration</li> <li>• SunGuide application installation</li> <li>• Center to Center application installation</li> </ul>	VDD 3.6: Application Installation VDD 3.7: Center-to-Center Installation and Setup	<ul style="list-style-type: none"> <li>• Internet access</li> <li>• Network access</li> </ul>
3	<ul style="list-style-type: none"> <li>• SunGuide application configuration</li> <li>• Import of devices into SunGuide</li> <li>• Installation verification through test procedures</li> <li>• Verification of training environment and client workstation setup</li> </ul>	VDD 3.8: Configuration Software Users Manual (SUM) Installation Notes	<ul style="list-style-type: none"> <li>• Internet access</li> <li>• Network access</li> </ul>
4	<ul style="list-style-type: none"> <li>• Issue troubleshooting and resolution</li> <li>• Administrator training</li> </ul>	Administrator Training Presentation	<ul style="list-style-type: none"> <li>• Network access</li> <li>• Two projectors, if possible, one for presentation and one to display application</li> <li>• Internet access</li> </ul>
5	<ul style="list-style-type: none"> <li>• Operators/User training</li> <li>• Wrap-Up Meeting</li> </ul>		<ul style="list-style-type: none"> <li>• Projector</li> <li>• Internet access</li> <li>• Network access</li> </ul>

### **3. Notes**

None.

**Appendix A**  
**Device Listing Worksheets**

**Device listings are contained and maintained in spreadsheets by the Pensacola TMC staff. They are not reproduced herein.**