SunGuide[SM]:

Implementation Plan – TERL

SunGuide-IP-TERL-1.0.0

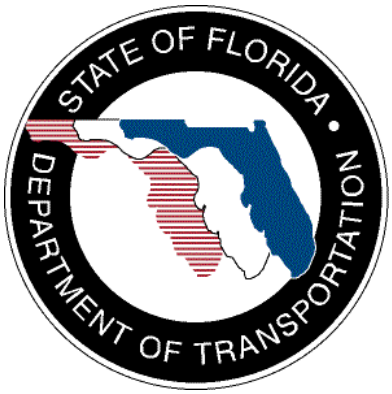

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Table of Contents

List of Acronyms

ARQ .....Advanced Ramp Queue
CCTV .....Closed Circuit Television
ConOps .....Concept of Operations
CSE .....Computer Sizing Estimates
DMS .....Dynamic Message Sign
EH .....Executive Handler
FDOT .....Florida Department of Transportation
GUI .....Graphical User Interface
HAR .....Highway Advisory Radio
IIS.....Internet Information Server
IM.....Incident Management
IMS .....Inventory Management Subsystem
IP .....Implementation Plan
ITS.....Intelligent Transportation Systems
IV&V .....Independent Verification and Validation
MCP .....Manual Control Panel
ML.....Main Lane
NTCIP .....National Transportation Communications for ITS Protocol
PLC .....Programmable Logic Controller
RMS .....Ramp Metering Subsystem
RQ.....Ramp Queue
RWIS.....Roadway Weather Information System
SATP.....Software Acceptance Test Plan
SDD.....Software Design Document
SICP .....Software Integration Case Procedures
SIP.....Software Integration Plan
SRS .....Software Requirements Specification
STP.....Software Test Procedures
SUM.....Software User's Manual
SwRI .....Southwest Research Institute
TCP/IP.....Transmission Control Protocol/Internet Protocol
TERL.....Traffic Engineering Research Laboratory
TMC.....Transportation Management Center
TSS.....Transportation Sensor Subsystem
TvT.....Travel Time
VDD.....Version Description Document
VS .....Video Switching
VW.....Video Wall

REVISION HISTORY

Revision	Date	Changes
1.0.0-Draft	October 2, 2006	Initial Release.
1.0.0	October 6, 2006	Revised server configurations; indicated SMTP server is optional; updated information regarding the roadgeek font and config.xml files.

1. Scope

1.1 Document Identification

This document serves as the Implementation Plan (IP) for the SunGuide[SM] software specific to the Traffic Engineering Research Laboratory (TERL). The TERL does not represent a "traditional" Traffic Management Center since it will not be regularly control a significant number of Intelligent Transportation System (ITS) devices; a result, this Implementation Plan is different from how SunGuide[SM] is deployed in the Districts because fewer servers are required to operate the system.

1.2 Project Overview

The Florida Department of Transportation (FDOT) is conducting a program that is developing SunGuide[SM] software. The SunGuide[SM] software is a set of Intelligent Transportation System (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[SM] software is to have a common software base that can be deployed throughout the state of Florida. The SunGuide[SM] software development effort is based on ITS software available from both the states of Texas and Maryland; significant customization of the software is being performed as well as the development of new software modules. The following figure provides a graphical view of the software to be developed:

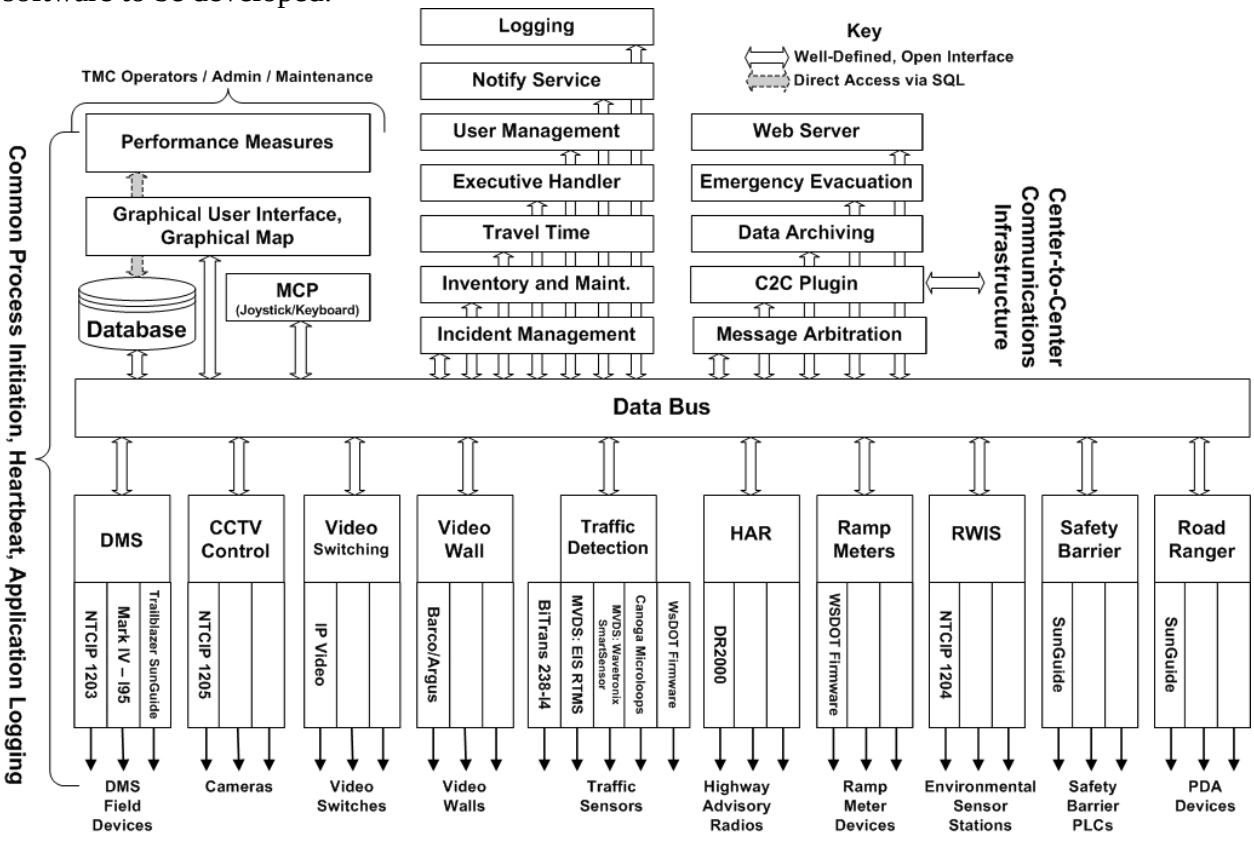

Figure 1.1 - High-Level Architectural Concept

The SunGuide[SM] development effort spans approximately two years. After the development, the software will be deployed to a number of Districts and Expressway Authorities throughout Florida and support activities will be performed.

1.3 Related Documents

The following documents were used to develop this document:

- SwRI Qualification Response: *Response to the Invitation to Negotiate (ITN): Statewide Transportation Management Center Software Library System, Negotiation Number: ITN-DOT-02/03-9025-RR,* SwRI Proposal No. 10-35924, dated: November 18, 2002.
- SwRI Technical Proposal: *Technical Proposal for Invitation to Negotiate (ITN): Statewide Transportation Management Center Software Library System, Negotiation Number: ITN-DOT-02/03-9025-RR,* SwRI Proposal No. 10-35924, dated: January 31, 2003.
- SwRI Cost Proposal: *Cost Proposal for Invitation to Negotiate (ITN): Statewide Transportation Management Center Software Library System, Negotiation Number: ITN-DOT-02/03-9025-RR,* SwRI Proposal No. 10-35924, dated: January 31, 2003.
- SwRI BAFO letter: *Southwest Research Institute® Proposal No. 10-35924, "Invitation to Negotiate (ITN): Statewide Transportation Management Center Software Library System", Reference: Negotiation Number: ITN-DOT-02/03-9025-RR*, dated: May 5, 2003.
- FDOT procurement document: *Invitation To Negotiate (ITN), Negotiation Number: ITN-DOT-02/03-9025-RR, Statewide Transportation Management Center Software Library System*, dated: October 21, 2002.
- FDOT Scope of Services: *Statewide Transportation Management Center Software Library System: Scope of Services*, September 22, 2003.
- FDOT Requirements Document: *Statewide Transportation Management Center Software Library System: Requirements Specification*, June 3, 2003.
- Southwest Research Institute, *TMC Software Study*, November 15, 2001.
- Southwest Research Institute, *Introduction to an Operational Concept For the Florida Statewide Library*, FDOT – OCD – 1.0, March 31, 2002.
- World Wide Web Consortium (W3) website: http://www.w3.org.
- SunGuide[SM] Project website: http://sunguide.datasys.swri.edu.

1.4 Contacts

The following are contact persons for the SunGuide[SM] software project:

- Elizabeth Birriel, ITS Central Office, elizabeth.birriel@dot.state.fl.us, 850-410-5606
- Trey Tillander, FDOT SunGuide[SM] Project Manager, trey.tillander@dot.state.fl.us, 850-410-5617
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- Steve Dellenback, SwRI Project Manager, sdellenback@swri.org, 210-522-3914
- Robert Heller, SwRI Software Project Manager, rheller@swri.org, 210-522-3824

The following are contacts that will be used by the SunGuide[SM] software project team to assure consistency with other FDOT projects and FDOT procedures:

- Liang Hsia, FDOT TERL, liang.hsia@dot.state.fl.us, 850-410-5615
- John Fain, FDOT, Comptroller, john.fain@dot.state.fl.us, 850-921-7332

2. Deployment Details

The following documents should be available to FDOT staff as they prepare for a SunGuide[SM] deployment (the most recent versions are available on the project web site):

- Computer Sizing Estimates (CSE)
- Concept of Operations (ConOps)
- Software Requirements Specification (SRS)
- Software Design Document (SDD)
- Version Description Document (VDD)
- Software User's Manual (SUM)
- Software Integration Plan (SIP)
- Software Acceptance Test Plan (SATP)
- Software Integration Case Procedures (SICP)

2.1 Subsystems To Be Installed

The following SunGuide[SM] subsystems will be installed for the deployment at the TERL:

- Administrative Editor
- Executive Handler
- Status Logger
- Data Bus
- Graphical User Interface/Map (GUI)
- Closed Circuit Television (CCTV)
- Dynamic Message Sign (DMS)
- Video Switching (VS)
- Video Wall (VW)
- Transportation Sensor Subsystem (TSS)
- Incident Management (IM)
- Ramp Metering (RM)
- Roadway Weather Information Systems (RWIS)
- Highway Advisory Radio (HAR)
- Data Archive (DA)
- Safety Barrier (SB)
- Web Server (WS)
- Emergency Evacuation (EE)
- Center-to-Center (C2C)
- Maintenance Management Subsystem (MMS)

2.2 FDOT: Before Software Installation

The following sections describe the activities that FDOT staff needs to perform prior to the SunGuide[SM] software deployment.

2.2.1 Servers

The following table is extracted from the SunGuide[SM] *Computer Sizing Estimates* document and is used to quantify the number of SunGuide[SM] application servers required based on the

subsystems to be installed. The TERL is a unique installation in that it is not an operational deployment, as a result, when this table was filled out the data was entered with a perspective of deploying each of the available SunGuide[SM] subsystems (i.e. have "one" of everything). This allows TERL to be a test and demonstration facility.

SunGuide[SM] Subsystem	Number of Servers Required	TERL Deployment
Status Logger	0.1	0.1
Data Bus		
Base system up to 500 ITS devices	0.5	0.5
Over 500 devices	0.5	0
User Interface		
For every 10 users simultaneously logged in	0.5	0.5
DMS (includes MAS)		
Base subsystem	0.5	0.5
For every 100 TCP/IP connected signs	0.5	0.5
For every 50 dialup signs (assumes 5 modems)	0.5	0
CCTV Control (includes Manual Control Panel [MCP])		
Base subsystem	0.25	0.25
For every 10 users simultaneously controlling cameras	0.25	0.25
Video Switching		
Base subsystem	0.50	0.5
For every 10 users simultaneously switching video	0.1	0.1
Video Wall		
Base subsystem	0.25	0.25
For each Barco/Argus Controller	0.1	0.1
TSS		
Base subsystem	0.25	0.25
For every 300 detectors	0.5	0.5
Incident Management		
Base subsystem for up to 20 concurrent incidents	0.25	0.25
For each 20 concurrent incidents over the base amount	0.25	0
Ramp Metering		
Base subsystem	0.50	0.50
For every 20 ramps	0.25	0.25
Roadway Weather Information System (RWIS)		
Base subsystem	0.25	0.25
For every 50 TCP/IP connected sensors	0.25	0.25
Highway Advisory Radio (HAR)		
Base subsystem	0.25	0.25
For every 50 HARs	0.1	0.1
Archive		
Base subsystem	0.5	0.5
Safety Barrier		
Base Subsystem	0.1	0.1

SunGuide℠ Subsystem	Number of Servers Required	TERL Deployment
For every 50 Barriers	0.1	0.1
Travel Time (TvT)		
Base Subsystem	.0.5	0.5
Web Servers (should be protected with a firewall)		
General Web server	1.0	1.0
Center-to-Center interface server	0.5	0.5
Emergency Evacuation	0.5	0.5
Maintenance Management Systems	0.5	0.5
Total SunGuide℠ Application Servers Needed		**9.85**

The above analysis suggests that 9.85 servers would be needed to support the SunGuide℠ installation (this if it were to be an operation center). Southwest Research Institute® (SwRI®) has demonstrated many times that ALL of SunGuide℠ can operate on two relative low capability laptops. Given the research and test nature of the TERL, SwRI recommends that four (4) servers be used for the deployment.

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

- Microsoft Standard Server 2003 (no service packs) with all current updates from Microsoft

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

- Microsoft Standard Server 2003
- Oracle 10g, version 10.1.0.2.0
- Barco Apollo API

The SunGuide℠ software will be installed and configured on the following machines (the recommendations are based on the current number of devices and the number of devices expected in the future):

- SG-SVR-01:
  - Oracle 10g
  - Connection Manager
  - Notify Manager
  - GUI Preference Manager
  - User Interface (IIS)
  - Data archiving
- SG-SVR-02:
  - Status Logger
  - DMS (and drivers)
  - MAS
  - Inventory Maintenance Systems

    - Travel Time
    - Safety Barrier
    - Incident Management
- SG-SVR-03:
    - Databus
    - MCP Manager
    - MCP
    - Video Wall
    - CCTV (and drivers)
    - Video Switching
    - TSS (and drivers)
    - Ramp Metering
    - RWIS (and drivers)
- SG-SVR-04: (this may be exposed to Districts or agencies outside of the TERL for data exchange):
    - Center-to-Center infrastructure
    - Web Server (IIS)
    - Emergency Evacuation Server

As previously indicated, all of the applications servers could be combined to a single server if there are limits on available servers. SwRI would recommend installing the C2C components and web servers on a separate computer in the event that the TERL wishes to exchange data with outside systems (this configuration is easier to protect with a firewall).

2.2.2 Workstations

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

- Microsoft Windows XP, Service Pack 2
- Microsoft Internet Explorer 6.01 or greater
- Adobe SVG Viewer 3.0 (can be downloaded at no charge from the Adobe website)

2.2.3 Device Protocol Compliance

For the devices being deployed, FDOT needs to verify that the protocol used by the devices to be controlled by the SunGuide[SM] software is compliant to the following protocols (these have been tested with SunGuide[SM] at the SwRI development laboratory):

Subsystem	Protocol Reference
DMS	NTCIP 1203, FDOT MIB (Sep 2001)
DMS	Mark IV - I95: Document Number A316111-102 REV. A8 (June 26, 2001)
DMS	SunGuide Trailblazer
CCTV Control	NTCIP 1205 v01.08 Amendment 1 v01.08 (August 2004)
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

Subsystem	Protocol Reference
Video Switching: IP Video	Cornet Technology iVDO Streamer 2/4D / iVDO Streamer 2/4E
Video Wall	Barco/Argus Apollo
Traffic Detection	BiTrans B238-I4
Traffic Detection	EIS RTMS, Issue 2 (April 2003)
Traffic Detection	Wavetronix RTMS: SS105 SmartSensor Data Protocol V2.02
Traffic Detection	Canoga Microloops, TM-2003-8 (June 2003)
HAR	Highway Information Systems DR2000
Ramp Meters	WSDOT 170 Firmware
RWIS	NTCIP 1204 v02.18 (April 2004)

2.2.4 Network Infrastructure

The following sections described the network infrastructure that must be in place prior to installation of the SunGuide[SM] software.

2.2.4.1 Hardware

Due to the client/server nature of the SunGuide[SM] software, TCP/IP is used to exchange data between application servers. Due to the web based implementation of the SunGuide[SM] user interface, each SunGuide[SM] workstation requires TCP/IP access to the SunGuide[SM] application servers. FDOT needs to verify that TCP/IP connectivity exists between all SunGuide[SM] application severs and SunGuide[SM] workstations.

Early in the development of requirements for SunGuide[SM], FDOT made the decision that the devices should be connected via TCP/IP to the SunGuide[SM] 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[SM] application server running the DMS device driver.

It is FDOT’s responsibility to provide all necessary network hardware and cables to provide the required connectivity.

2.2.4.2 Software

As the SunGuide[SM] software is configured, it will need access to various network servers that may be installed as part of the SunGuide[SM] installation or may be available as part of the greater FDOT network. The following network services need to be available and the details (e.g., host names, addresses) need to be available during the SunGuide[SM] software configuration:

- SMTP Mail Server (optional): The SunGuide[SM] 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[SM] 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[SM] computers be synchronized to a common time source as it is desirable during diagnostics to have the same time on all SunGuide[SM] systems.

2.2.5 Device Worksheets

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

2.2.5.1 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
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 must be supplied.

The following data need to be provided for IP video:

Video Device IP Address	IP address for encoder
Blackout	Determines if camera restricted
Video Device Type	Type (IP video device) of video device for encoder
IP Streaming Driver ID	Unique IP video switch driver name
Card Number	Card number for VBrick encoder
Manufacturer	Manufacturer (values: Coretec, iMpath, Teleste, VBrick) of encoder
Model	Model of encoder

Streaming Type	Streaming type (values: elementary, transport, program) for encoder
Secondary Interface	Secondary interface for VBrick encoder which enables users to maximize number of inputs for encoder
Snapshot Requested	Determines if snapshots are generated for encoder

2.2.5.2 DMS Worksheet

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

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
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) of Address Type 1
Address	Device address of DMS
Community Name	Community name for DMS (SNMP)

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

IP Address	IP address for the port server where DMS resides
Port Number	Port number for the port server where DMS resides

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

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

2.2.5.3 American Dynamics Keyboard Worksheet

The following data needs to be collected for each American Dynamics keyboard to be configured:

Identifier	Unique name of the keyboard
User ID	Unique user name to be associated with the keyboard
Password	Password that is encrypted using MD5 hashing
Keyboard Type	Either “AD2088” or “ADCC300” depending on the model to be supported
IP Address	IP address of the keyboard
Port Number	Port number of the keyboard (this is related to the IP address)

2.2.5.4 Barco Video Wall Worksheet

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

URL for WSDL	The URL where the Apollo API was installed (e.g., http://newton/ApolloAPI if the machine that host the Apollo software is name "Newton")

2.2.5.5 TSS 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
Lat Lon	Latitude and longitude of the intersection between the roadway and the cross street

The following data needs to be collected for each 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 or Radar)
Protocol	Specifies the protocol (values: EIS, Wavetronix, BiTrans)
Op Status	Operational status (values: Available or Offline)
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	The name of the links that will be defined in the system; links will have an association to detectors.
TSS Lanes	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).

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.

2.2.5.6 Tvt Worksheet

The following data need to be provided for each travel time destination to be in the deployment:

Destination name	Used for displaying the name on a device for a travel time message.

The following data need to be provided for each travel time message template to be in the deployment:

Template name	Describes the template.
Number of destinations	Number of destinations represented in this template.
Message template text	The message template contains tags and free text used to describe the travel time message. For example: [DEST1] [NEW LINE] [DIST1] [TVT1][NEW LINE] AT [TIME] would translate to this message: PALMETTO-EXIT 7 7 MI 13-16 MIN AT 2:46 PM

The following data needs to be collected for each travel time link to be configured:

Travel time link name	Name of the travel time link.
Link description	Description of the link.
Associated TSS links	TSS links that supply data for this travel time link.

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

Device id	Name of the device for which to setup the template.
Message template	The template to use for this device.
Destination data	Which destinations and travel time links are used for this device template.
Enabled	Whether travel times should be enabled for this device.

The following data needs to be collected for travel time options:

Frequency	How often travel time messages should be generated.
Message priority	What message priority should be used for the messages.

2.2.5.7 Ramp Metering Subsystem (RMS) Worksheet

The following roadway and controller configuration should be gathered for both a TSS Detector and an RMS controller. A TSS Detector must be created first with Links/Lanes uniquely identifying which are for Advanced Ramp Queue (ARQ), Ramp Queue (RQ) and Main Lane (ML). These will be used to associate as fuzzy lanes by the RMS Subsystem and is necessary to properly link the RMS and TSS subsystems. The basic configuration information for these subsystems is an exact mirror.

The following data needs to be collected for each 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, WsDotTss) Note: Specify WsDotTss
Poll Cycle	Time in seconds between device polls
Type	Type of detector (e.g., Loop or Radar)
Protocol	Specifies the protocol (values: EIS, Wavetronix, BiTrans) Note: Select BiTrans
Op Status	Operational status (values: Available or Offline)
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 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
Lat Lon	Latitude and Longitude of the intersection between the roadway and the cross street

The following data needs to be collected for each RMS controller to be configured:

Controller Name	Unique name of the controller, must match the related TSS detector
Driver Name	The name of the driver for the controller (e.g., Bitran-170)
Protocol Name	The name of the protocol being used. (Current values: Bitran-170)
Location Description	Textual description of the location the controller resides
Roadway	Roadway where the controller resides
Direction	Direction of roadway where the controller resides
Latitude	Latitude where the controller resides
Longitude	Longitude where the controller resides
Milepost	Milepost nearest the controller
Cross street	Cross street nearest the controller
Number of Metering Lanes	The number of metering lanes in the ramp configuration
Op Status	Operational Status (values: Active or Offline)
Poll Cycle	Time in seconds between device polls
Default Poll Cycle	Default value for poll cycle
Address Type	Type of address connection (values: Port Server or Direct)
Address	The device address of the controller
Port Server IP	IP address for the port server where controller resides
Port Server Port Number	Port number for the port server where the controller resides

At this point, the defaults for firmware parameters, fuzzy algorithms, central Time of Day configuration, and an initial metering lane configuration are configured. The controller must still have the fuzzy lanes configured, firmware parameters updated to include lane and loop configurations. Firmware parameters are configured from the GUI.

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

TSS Link Id	The name of the links that will be configured for fuzzy lane inputs
TSS Lanes	For each link, the Lane of the link to associate
Lane Type	The fuzzy lane type. The required inputs for the fuzzy logic are US, DS, RQ, ARQ, ML

The following data needs to be collected for each Fuzzy Parameter to be configured:

Rule Weights	Values for the Rule weights used by the fuzzy logic algorithms
Fuzzy Metering Params Name	The fuzzy metering pram name (values: OC, SP, DO, DS, QO, AQO, MR)
Limit values	The high and low limits for each parameter
Metering Lane Number	The metering lane number that the parameters apply to

Finally, the loop values must be assigned to the controllers. This is accomplished by accessing the loop data values on the Firmware Params dialog. For each controller, select the value that pertains to the selected loop. There is a possible 40 loop inputs. The Advanced Ramp Queue, Ramp Queue and Mainline loop numbers associate with the related TSS detector zone assignment (Example: RMC_D6_01 Controller Loop 1 is assigned as a Mainline Metering Station, TSS Detector RMC_D6_01 Lane RMC_D6_01-ML::RMC_D6_01-ML-lane 1 is assigned to zone 1. RMC_D6_01-ML::RMC_D6_01-ML-lane 1 is associated as a fuzzy lane input for ML). In addition various firmware parameters may need to be set for proper metering to occur.

2.2.5.8 Safety Barrier Worksheet

The following data needs to be collected for each Safety Barrier station to be configured:

Safety Barrier Station Name	Unique name of Safety Barrier station
Driver	Name of driver for station
Roadway	Roadway of where station resides
Direction	Direction of roadway where station is installed
Location Description	Description of where station resides
Latitude	Latitude of where station resides
Longitude	Longitude of where station resides
PLC ID	Identifying number of the Programmable Logic Controller (PLC)
Unit ID	Identifying number of the Safety Barrier Station
Op Status	Operational Status (values: Active, Failed, Error or OutofService)
Lamp Status	Normal, Barrier Event, Failed
Switch State	Normal, Barrier Event, Failed
Address	Device address of station
Port Server IP	IP address for the port server where station resides
Port Server Port Number	Port number for the port server where station resides

2.2.5.9 RWIS Worksheet

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

RWIS Station Name	Unique name of RWIS station
Center Id	Unique name of center where station resides
Protocol	Must be NTCIP (SNMP)
Driver	Name of driver for station
Manufacturer	Manufacturer of station
Op Status	Operational status (values: Active, Error, Failed, OutOfService) of station
Location Description	Description of where station resides
Roadway	Roadway of where station resides
Direction	Direction of roadway where station is installed
Latitude	Latitude of where station resides
Longitude	Longitude of where station resides
Address Type1	Address type PMPP
Address Type2	Specific address type: portServer
Address	Device address of station
Port Server IP	IP address for the port server where station resides
Port Server Port Number	Port number for the port server where station resides
Community Name	Community name for station (SNMP)

2.2.5.10 HAR Worksheet

The following data needs to be collected for each HAR radio to be configured:

HAR Radio Name	Unique name of radio
Center Id	Unique name of center where radio resides
Protocol	Must be DR 2000
Driver	Name of driver for radio
Manufacturer	Manufacturer of radio
Op Status	Operational status (values: Active, Error, Failed, OutOfService) of radio
Control Number	Control number for the radio
Access Code	Access code for the radio
Location Description	Description of where radio resides
Roadway	Roadway of where radio resides
Direction	Direction of roadway where radio is installed
Latitude	Latitude of where radio resides
Longitude	Longitude of where radio resides
Beacons	Does / does not have beacons
Header slot	Number of header slots
Footer slot	Number of footer slots
Default message slot	Number of the default message slot

2.2.5.11 IMS Worksheet

The following data needs to be collected for each IMS vendor.

Vendor Name	Vendor name
Vendor Website	Vendor website
Contacts	Specific contacts at the listed vendor
Equipment Type For Contact	Equipment for which contact is responsible
Address	Address of vendor (address line 1, line 2, city, state, postal code, etc.)
Telephone	Vendor telephone number
Email	Vendor email address

The following data needs to be collected for each IMS location

Name	Name of location
Type	Install type, other, repair shop, warehouse
Description	Type of location
Roadway	Roadway on which location is located.
Direction	Roadway direction (N, S, E, W)
Latitude	Latitude in micro degrees of location
Longitude	Longitude in micro degrees of location

The following data needs to be collected for each IMS piece of equipment.

Manufacturer	Equipment manufacturer
Serial Number	Equipment serial number
Firmware Version	Firmware version installed in equipment
Location	Location of equipment
Installation Date	Date equipment installed at location
Model	Model number of equipment

2.3 SwRI: Software Installation

The following sections describe the activities that SwRI staff will perform to install the SunGuide[SM] software. SwRI will need administrative level access to any computer on which SunGuide[SM] software or Oracle is to be installed. FDOT staff should be available to monitor and observe the software installation process.

2.3.1 Server Preparation

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

- Database server:
  - Oracle 10g server, version 10.1.0.2.0
- Application servers:
  - Oracle 10g Client, version 10.1.0.2.0
  - IIS (Microsoft installation disk)
  - ASP.NET (this installed as part of Microsoft IIS)
- Barco Video Wall Driver:
  - Apollo API (version 1.7)

2.3.2 Workstation Preparation

The following software needs to be installed on the workstations before the software installation team arrives on-site:

- Adobe SVG Viewer (must be acquired from Adobe.com)

2.3.3 Software Installation

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

- In a common directory with a share point accessible to the SunGuide^{SM} application servers the following files will be installed:
  - Install master configuration file which is named config.xml and edit the contents to match the FDOT network configuration
  - Install XML schemas used by the SunGuide^{SM} applications
- Execute the database creation scripts to prepare the database for installation of the SunGuide^{SM} applications
- Using the installation instructions in the SunGuide^{SM} *Version Description Document* (VDD) install the SunGuide^{SM} applications

Two SunGuide^{SM} 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 FDOT:

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

2.3.4 Software Configuration

After the SunGuide^{SM} 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^{SM} application server (the SunGuide^{SM} applications will log to this one instance of Status Logger)
- Install and configure Executive Handler server on all SunGuide^{SM} application servers

- Modify the IIS to restrict access to the SunGuide[SM] Admin utility to users specified by FDOT

The SunGuide[SM] GUI is designed to load GUI components for the SunGuide[SM] 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.

2.4 FDOT: Post Software Installation

The following sections describe the activities that FDOT staff need to perform after the SunGuide[SM] software deployment. SwRI staff will be available to assist and work with FDOT staff to accomplish these activities.

2.4.1 Populate Tables

Based on the equipment installed at the TERL, the following tables need to be populated using the SunGuide[SM] Administration tool:

- User Management:
  - Users
  - Groups
  - Workstations
- DMS:
  - Device Tables
  - Approved Words
- CCTV:
  - Device Tables
- TSS:
  - Device Tables
  - Detector Maps
- Video Switching:
  - Device Tables
- Video Wall:
  - Device Tables
- Ramp Metering:
  - Device Tables
- HAR:
  - Device Tables
- RWIS:
  - Device Tables
- Safety Barrier:
  - Device Tables
- Incident Management:
  - Contacts
- Miscellaneous:
  - Centers

The SunGuide[SM] *Software User's Manual* (SUM) should be consulted on use of these editors.

2.4.2 Create Map Links

Each implementation of SunGuide^{SM} 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 should be used to create the shields that should be displayed.

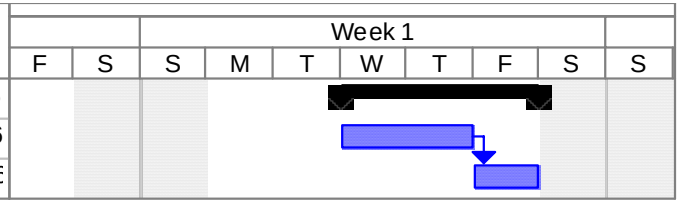
2.5 FDOT/SwRI: Testing

No formal testing is planned during the TERL installation because the TERL will be executing the Independent Validation and Verification that are being developed by FDOT. SwRI will not be participating in these testing activities at the TERL due to budget limitations.

2.6 Deployment Schedule

The following schedule is proposed for the deployment. The installation team will need access to hardware devices throughout the implementation process. Note that if activities complete early and FDOT and SwRI agree, the timing for the following events may be modified to shorten the overall deployment schedule.

ID	Task Name	Duration	Start	Finish
1	**Server Configuration**	**3 days**	**Wed 10/11/06**	**Fri 10/13/06**
2	Install Software	2 days	Wed 10/11/06	Thu 10/12/06
3	Perform ad hoc testing	1 day	Fri 10/13/06	Fri 10/13/06



3. Notes

None.