SunGuide™:

Software Quality Assurance Plan

SunGuide-SQAP-1.0.0

Prepared for:

Florida Department of Transportation
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June 10, 2004
### Document Control Panel

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List of Acronyms

BAFO......................Best and Final Offer
C2C.........................Center to Center
CAR.........................Corrective Action Report
CM..........................Configuration Management
DMS..........................Dynamic Message Sign
DOT..........................Department of Transportation
FDOT.........................Florida Department of Transportation
HAR..........................Highway Advisory Radio
IQS..........................Institute Quality System
ITS..........................Intelligent Transportation Systems
ITN..........................Invitation to Negotiate
KPA..........................Key Process Area
PIWS..........................Process Improvement Web Site
PM..........................Project Manager
QA..........................Quality Assurance
QRS..........................Quality Reporting System
RWIS..........................Roadway Weather Information System
SDP..........................Software Development Plan
SE..........................Software Engineering
SPI..........................Software Process Improvement
SPM..........................Software Project Manager
SPR..........................Software Problem Report
SPS..........................Software Process Specialist
SQA..........................Software Quality Assurance
SQAP..........................Software Quality Assurance Plan
SPM..........................Software Project Manager
SW-CMM......................Software Capability Maturity Model
SwRI..........................Southwest Research Institute
TMC..........................Traffic Management Center
W3..........................World Wide Web
# REVISION HISTORY

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| 1.0.0     | June 10, 2004   | Revised in response to comments from the FDOT. These revisions include:  
  a. Replacement of STMCSLS with SunGuide.  
  b. Revision of the title page including new SunGuide logo, new FDOT office  
  c. Updated Acronym list  
  d. Expanded section 1.1 including a paragraph noting this document applies to process not product  
  e. Update the reference documents list including the TMC software study, CONOPS, W3 website, and SunGuide website  
  f. Removed Chester Chandler from the list of contacts  
  g. Added white space between the items in the numbered list in section 2.1. Added reason for missing scheduled surveillance to item 9.  
  h. Added footnote in section 2.2 to again highlight the difference between a CAR and an SPR. |
1. Scope

1.1 Document Identification

This document serves as the Software Quality Assurance Plan (SQAP) for the SunGuide Software. It is to be used by Southwest Research Institute® (SwRI®) to provide software quality assurance for the SunGuide project. The contents of this document also are incorporated by reference into the Software Development Plan (SDP) for the project.

The QA function monitors compliance with the software development process as described in the SDP, which reflects a project instantiation of the SwRI SE Project Improvement Web Site (PIWS). The QA function is not responsible for product quality, that is the role of the testing phases of the program. Likewise the Corrective Action Report (CAR) system, which is described herein is not for reporting or resolving problems with product. These concepts/limitations need to be understood in order to understand this document.

1.2 Project Overview

The Florida Department of Transportation (FDOT) is conducting a program that is developing SunGuide software. The SunGuide 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 software is to have a common software base that can be deployed throughout the state of Florida. The SunGuide 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:
The SunGuide 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:


Software Quality Assurance Plan

- 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.

1.4 Contacts

The following are contact persons for the SunGuide software project:
- Liang Hsia, FDOT Project Manager, liang.hsia@dot.state.fl.us, 850-410-5615
- John Bonds, Senior ITS Specialist, jbonds@pbsj.com, 408-873-2514
- David Chang, ITS Specialist, David.Chang@dot.state.fl.us, 850-410-5622
- Steve Dellenback, SwRI Project Manager, sdellenback@swri.org, 210-522-3914
- Robert Heller, SwRI Software Project Manager, rheller@swri.org, 210-522-3824
- Charlie Wallace, PBF Deputy Project Manager, WallaceC@pbworld.com, 352-374-6635
- John Schumitz, PBF Software Project Manager, schumitz@pbworld.com, 301-816-1852

The following are contacts that will be used by the SunGuide software project team to assure consistency with other FDOT projects and FDOT procedures:
- Dan Baxter, PB Farradyne, FDOT C2C Project, baxter@pbworld.com, 407-587-7809
- David Lambert, University of North Florida, RWIS, jlambert@unf.edu, 904-620-3881
- Bob Colins, PBS&J, Emergency Evacuation, bobcolins@pbsj.com, 850-575-1800
- John Fain, FDOT, Comptroller, john.fain@dot.state.fl.us, 850-921-7332
- Jerry Bloodgood, McCain, Ramp Metering
- Leslie Jacobson, PB Farradyne, Ramp Metering, jacobsonl@pbworld.com, 206-382-5290
2. Software Quality Assurance Activities

2.1 Surveillance

Software Quality Assurance (SQA) surveillance will focus on process implementation and compliance with the process as documented in the SDP. The intent of surveillance is to objectively verify adherence of project activities to the SDP, Software Engineering (SE) Software Development Procedures, and contract. These surveillances shall be conducted in accordance with the SQA Procedures found in the SwRI Software Engineering process.

Surveillance's will be conducted bi-monthly, at a minimum. The initial surveillance will be conducted 30 days into the project. SQA will provide a copy of the project’s surveillance schedule to the SPM at the initial surveillance. A copy of the updated surveillance checklist and schedule will be provided at each surveillance.

Surveillance is generally conducted as a meeting with the SPM and select developers (one on one), wherein evidence is presented from the project that demonstrates compliance.

SQA surveillances will be conducted as follows:

1. Develop a surveillance checklist to be used as a guide during surveillance. The surveillance checklist will be based on the project's approved SDP, the Software Development Procedures, applicable standards and methods, and previous surveillance activities, (e.g. follow-up action items). The checklist covers each of the project specific key process areas (KPAs) of the Software Capability Maturity Model (SW-CMM).
2. Schedule surveillance with the SPM and/or other affected groups and individuals, (e.g., project manager, SE Archive administrator).
3. Examine applicable records, reports, and work products designated in the SDP.
4. Interview project personnel and other affected groups and individuals.
5. Review previously identified action items or Corrective Action Reports (CAR) and verify corrective action as appropriate.
6. Compare observations to the requirements annotated on the surveillance checklist.
7. Identify "good practices". Good practices are unique project methodologies of accomplishing a software process. They are documented (e.g., submit Process Feedback) by the SQA representative and discussed with the SPM.
8. Nonconforming conditions will be documented and tracked.
9. Document the surveillance results on a SwRI Form-QA-125, Institute Quality Assurance Surveillance Report. Surveillance will normally be conducted within the month assigned. Surveillance that deviates outside the scheduled month will be recorded in the surveillance report. The reason for missing scheduled surveillance should be included, along with an impact statement on the development schedule.
10. Attach the completed surveillance checklist, if any, to the Institute QA Surveillance Report.

11. Issue a copy of the approved Surveillance Report to the Software Process Improvement (SPI) Sponsor, appropriate Director, appropriate section manager, section secretary, Software Process Specialist (SPS), SPM, and other affected groups or individuals (if any).

Surveillance-related documentation will be maintained in the SQA files.

2.2 Corrective Action

This section describes the process for tracking and resolving non-compliance issues (i.e., non-compliance with PIWS, SDP, or contractual requirements) identified during SQA surveillance activities or from repeated project issues (unresolved). The Institute Quality Systems (IQS) Quality Reporting System (QRS), Corrective Action Reports (CARs), shall be used to track these issues. The QRS is maintained by IQS to assign CAR numbers and track response due dates and action target dates for completion. The QRS includes provisions so that the CAR initiator or other assigned personnel may notify the persons responsible for action of upcoming due dates.

1. Non-compliance issues may be identified by any staff member by notifying the SQA Representative (email is preferred). A CAR shall be initiated through the QRS which provides number assignment, disposition status, and completion tracking. The SQA Representative shall complete the Identification portion of the report. The description shall identify the requirement and characteristics that are not satisfied. The SQA Representative shall also assign a person responsible for responding to the CAR and response due date (usually 14 days after initiation of the report).

2. The SQA Representative shall take the efforts necessary to fully explain to the person responsible for corrective or preventive action the nature of the CAR, the expected investigations and analyses, and possible corrective measures.

3. The CAR shall be transmitted to the person responsible for corrective or preventive action by email. Copies of the CAR shall be distributed to the immediate supervisor of the person responsible for corrective or preventive action and IQS Records.

4. The person responsible for action shall propose remedial action to correct the specific deficiencies identified, if applicable. Generally, the remedial action will seek to restore the affected activities to compliance with requirements. However, if restoration to full compliance is not appropriate, justification shall be provided in the CAR.

5. Corrective action shall be proposed to address adverse conditions. The action shall be appropriate for the root cause identified through the investigation. Corrective and preventive actions typically involve procedural changes and retraining, which establish a new baseline for the affected activity. The actions shall be sufficient to address the range

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1 A CAR is utilized to track process non-compliance as opposed to a Software Problem Report (SPR) which is used to track a non-compliance with a technical software requirement. Treatment, tracking and resolution of SPRs is not within the scope of this document.
of activities and personnel affected. The person responsible for action shall specify a
target date for completion of the actions.

6. The SQA Representative shall review the investigation of the condition, the proposed
remedial, corrective and preventive actions, as appropriate, and the proposed target dates
to determine their adequacy and timeliness. If the responses are acceptable, the Institute
QA manager (with the concurrence of the responsible Section Manager) will sign and
date the CAR. The CAR shall be sent to IQS Records for holding until verification and
the QRS shall be updated to reflect the response date, approval date, and target dates for
completion.

7. If the CAR response does not provide adequate investigation, corrective actions, or
appropriate completion dates, the person responsible for corrective action shall be
contacted so that adequate response can be obtained. The response due date may be
adjusted by the SQA Representative or SE Section Manager to allow for a revised
response.

8. If the specified remedial, corrective or preventive action cannot be completed by the
target date for completion, an extension to the target date may be requested. Requests
shall be evaluated by the SQA Representative to determine their potential adverse impact
on activities. If the request is acceptable, the revised date shall be identified in the
comments block of the CAR and initialed and dated by the Institute QA manager. The
QRS shall also be updated by IQS Records staff.

9. At the target date for completion of the action, the SQA Representative shall determine
the status. If the action has not been completed, appropriate SE management shall be
notified of the delinquency. If the actions have been completed, verification should be
completed within two weeks.

10. Verification of the completion of the specified actions shall be conducted by surveillance
or other appropriate means. The verification shall address completion of the specified
actions and determine their effectiveness. If the action is not sufficient or effective,
additional actions shall be taken to satisfactorily close the CAR. As necessary, SE
management shall be contacted to obtain sufficient action.

11. Verification activities for remedial, corrective and preventive action shall be documented
in the Verification portion of the CAR. These should briefly describe the verification
methods used and refer to surveillance reports, as applicable. In lieu of direct recording,
e-mail message hard copies may be attached to the CAR and serve as verification
documentation.

12. The CAR shall be considered closed when all required actions have been completed and
verified.

13. CAR status shall be tracked as follows:
   a. SPM - Discuss and report corrective action status in Project Reviews. Also notify
      the SQA representative as to progress on the corrective action efforts.
   b. SQA Representative - Report trends in CARs whenever noticed to the Software
      Process Improvement Working Group (SPIWG).
   c. SQA Quarterly Status Reports shall indicate the number of CARs open from the
      previous quarter, the number issued during the quarter, the number closed during
      the quarter, and the number remaining open at the end of the quarter.

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3. Notes

None.