Project TTC Toronto

Passenger Information System (PIS)

Software Quality Assurance Plan (SQAP)

CDRL:	Spec Refs:	
Q302E / 163	TS S24.4 #163	

Prepared:	Tilo Fuchs	*(Signature on file)*	signed:	2013-01-15
	Software Quality Manager	Signature		yyyy-mm-dd
Verified:	Patric Wittwer	*(Signature on file)*	signed:	2013-01-15
	Project Manager	Signature		yyyy-mm-dd
Approved:	Martin Jaeggi	*(Signature on file)*	signed:	2013-01-15
	Managing Director	Signature		yyyy-mm-dd

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Revision History

Revision	Date (yyyy-mm-dd)	Initials	Description of Changes
00	2010-04-26	TiFu	First issue
01	2010-07-20	TiFu	Amended Sections 6.2.5 Functional Audits and 6.2.6 Physical Audits Amended Section 11 to clarify what SQA tasks relate to subcontractors Section 11.1 and 11.2: Change heading (“Stage” instead of “Phase”)
02	2010-09-09	PaWi	Several updates regarding review protocol from TTC: • Added TTC CDRL number on cover page • Added an explanation to the links in section 2.2
03	2011-03-03	TiFu	As a result of the SW audit held by Bombardier on 2010-12-03 in Gümligen: • In Section 4 Documentation, changed the responsibility for releasing SCMP and SVVP • In Section 3.1 Organization, added an explanation regarding independence of quality roles from the project • In Section 13, changed the date for the SQA training • in Section 5.6, changed statements related to metrics Section 1.1: Removed the statement that content related to BTE/PTE is preliminary
04	2011-03-11	TiFu	Bombardier review comments (dated 2011-03-10) included
05	2011-06-06	TiFu	Action item from Bombardier Software Audit (2011-05-30/-31) included: • Document reference [ACLSRC] updated (link to new working instruction) in Table 1: List of Guidelines Changed contact information of BT QA Engineer in Section 3.3.2
06	2013-01-15	TiFu	Bombardier review comments (dated 2013-12-18) included

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1 Purpose and Scope

1.1 Purpose

This document represents the Software Quality Assurance Plan (SQAP) for software development for the TTC Toronto project. Software Quality Assurance (SQA) is a formal process for evaluating and documenting the quality of the work products produced during each stage of the Software Development Lifecycle (SDLC). The primary objective of the SQA process is to ensure the production of high-quality work products according to stated requirements and established standards.

The intended audience of this plan includes QA Car Builder for review, TTC for approval and ANNAX engineering, project management, QA members and subcontractors who are involved in this project.

1.2 Scope

This SQA process is tailored to fit the software development effort and is related to the project planning and lifecycle description documents for the TTC Toronto project.

Software covered by this plan includes

- Development of software for the TTC Toronto LFLRV Passenger Information System (PIS)
- Development of software for the Portable Test Equipment (PTE) of the PIS (Comm./PIS PTE)
- Development of software for the Bench Test Equipment (BTE) of the PIS (Comm./PIS BTE)

1.3 SQA Objectives

The overall SQA objective is to deliver a quality product within the given project budget.

The methodology presented here is based on the Software Engineering Institute's (SEI) Capability Maturity Model Integration (CMMI) for Development (CMMI-DEV) and the Institute for Electrical and Electronics Engineers (IEEE) standards for Software Engineering. This SQA process:

- Describes the processes for deliverables, reviews and software testing.
- Defines standards to be applied during reviews of stage deliverables.
- Identifies the work products produced as a result of the review and testing efforts.

The Software Development Life Cycle (SDLC) defines a series of stages; each stage is defined as a separate operation with specific inputs and outputs. This SQAP implements assessments and reviews at specific points within each of these stages.

1.4 Software Configuration Items Covered

Software Configuration Items covered by this plan are listed in the ANNAX Software Project Management Plan for the TTC Toronto project [ASPMP], Section 1.1.1.1.

1.5 Applicable Life Cycle Phases

This SQAP applies to all stages of the Software Development Life Cycle (SDLC) as defined in the ANNAX Software Project Management Plan for the TTC Toronto project [ASPMP], Section 6.1.

2 Reference Documents

2.1 Internal Templates

All internal templates can be found under: G:\AXis\90_Internal\Vorlagen

2.2 Guidelines and Instructions

The following guidelines shall be applied. These documents can be found in the document library (http://ccpis.rd.ascom.ch/dokverwaltung/index.php?form=start; search for the document number) or via the Intranet (http://139.79.124.13/tikiwiki/tiki-index.php)

Note: The document library is available over the ANNAX Intranet and contains confidential information which we are unable to release to Bombardier and TTC. They will be made available for review at our site.

Table 1: List of Guidelines

Doc ID	Document Description
[ACGUIL]	299003XX, ANNAX Coding Guidelines
[ACLSRC]	Working instruction AA 037 Software delivery to the customer (German title: Arbeitsanweisung Software-Lieferung an Kunden)
[AMTIR]	100125XX, ANNAX Manual: “How to use the Problem Reporting System Mantis to generate a Test Incident Report”
[AGLPRC]	ANNAX internal guideline VA00 “Problem Reporting and Corrective Action”
[APIQR]	ANNAX internal process instruction “Quality Records” (German title: Verfahrensanweisung VA10 “Qualitätsaufzeichnungen”)

Note: The most recent version of the documents is applicable.

2.3 Standards

The following standards were used as guides to develop this SQA process. The standards were reviewed and tailored to fit the specific requirements of small database projects using the referenced SDLC:

Table 2: List of Standards

Doc ID	Document Description
[I1558]	IEEE Std 1558-2004 - IEEE Standard for Software Documentation for Rail Equipment and Systems
[I1058]	IEEE Std 1058-1998 - IEEE Standard for Software Project Management Plans
[I1012]	IEEE Std 1012-2004 - IEEE Standard for Software Verification and Validation
[I730]	IEEE Std 730-2002 - IEEE Standard for Software Quality Assurance Plans

Doc ID	Document Description
[CMMI-DEV]	CMMI for Development, Version 1.2, CMU/SEI-2006-TR-008

2.4 ANNAX Project Documents

The following ANNAX project documents are referenced within this document:

Table 3: List of ANNAX Project Documents

Doc ID	Document Description
[ASPMP]	299014XX, ANNAX Software Project Management Plan for the TTC Toronto project
[ASCMP]	299016XX, ANNAX Software Configuration Management Plan for the TTC Toronto project
[ASVVP]	299015XX, ANNAX Software Verification and Validation Plan for the TTC Toronto project
[ASPSW]	MS Project file: Schedule Planning Software (ANNAX internal document; German title: Terminplanung Software)
[ADRP]	201004XX, MS Project file: Developer Resource Plan (ANNAX internal document; German title: Ressourcenplan)

Note: The most recent version of the documents is applicable.

3 Management

3.1 Organization

The organizational chart below shows the organizational structure for the SW development only. The dotted line represents the independent reporting relationship of QA: The PIS Quality Manager and the roles shown in Figure 1 below the PIS Quality Manager are independent from the Project Manager; the PIS Quality Manager reports directly to the Steering Committee.

Preparation and maintenance of the SQAP is the responsibility of the Quality department.

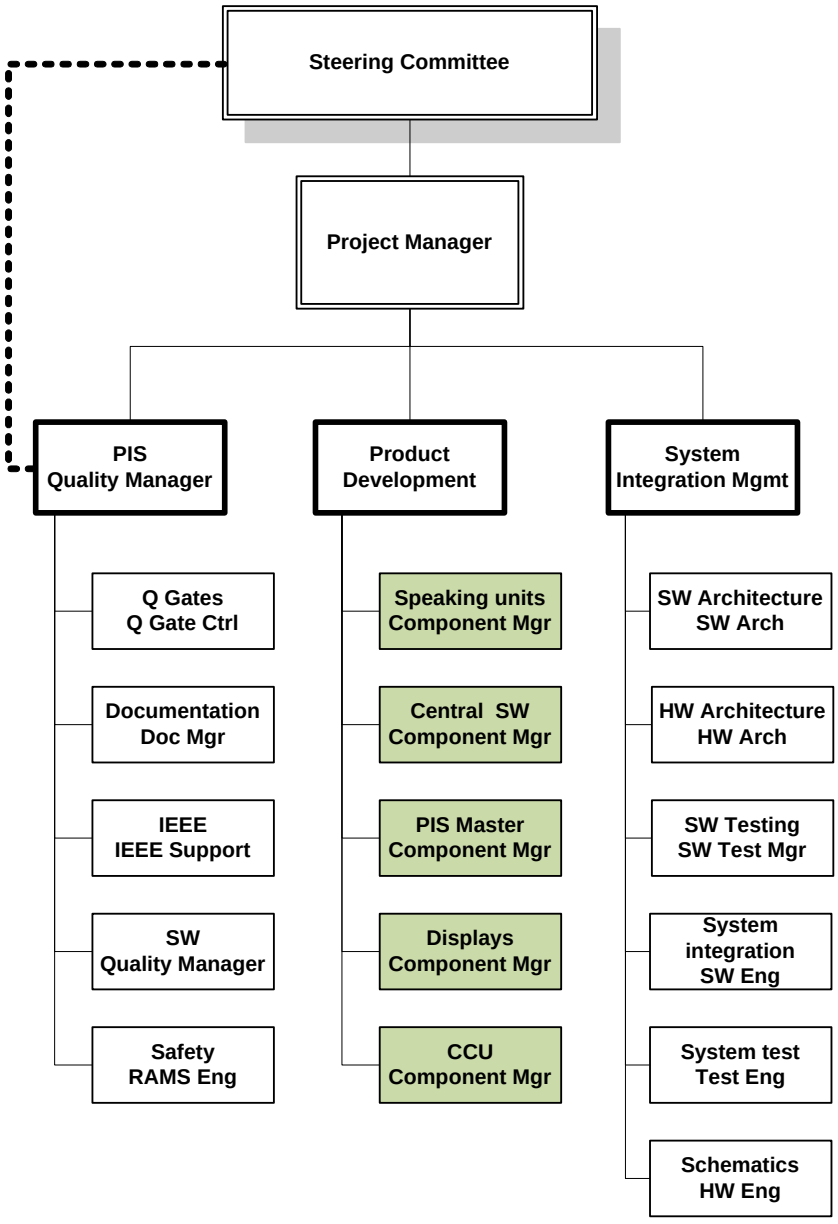

Figure 1: Organizational Chart Software

3.2 Tasks

3.2.1 SQA Tasks

Software Quality Assurance (SQA) is defined as a planned and systematic approach to the evaluation of the quality of and adherence to software product standards, processes, and procedures. SQA includes the process of assuring that standards and procedures are established and are followed throughout the software life cycle. Compliance with agreed-upon standards and procedures is evaluated through process monitoring, product evaluation, and audits.

The sections below lists all SQA tasks by development phase. Dates for the tasks are detailed in the ANNAX internal MS Project document Developer Resource Plan [ADRP].

3.2.1.1 Analysis Phase: Review System Functional Description (SFD), Software Requirements Specification (SRS), Software Requirements Traceability Matrix (SRTM), Software Acceptance Test Specification (SWATS)

Entry criteria: Notice To Proceed (NTP)

Exit Criteria: Full approval of all analysis documents

Roles and Responsibility: Engineering

Schedule: From NTP to FDR

3.2.1.2 Analysis Phase: Prepare Software Quality Assurance Plan (SQAP; this document) and Software Verification and Validation Plan (SVVP)

Entry criteria: Notice To Proceed (NTP)

Exit Criteria: Full approval of SQAP and SVVP

Roles and Responsibility: Quality department

Schedule: From NTP to PDR

3.2.1.3 Design Phase: Review Software Design Description

Entry criteria: Start of SW Design

Exit Criteria: Full approval of Software Design Description

Roles and Responsibility: Engineering

Schedule: Completed SDD

3.2.1.4 Implementation Phase: Perform In-Process Audit

Entry criteria: Start of SW implementation

Exit Criteria: End of warranty

Roles and Responsibility: Quality department

Schedule: At the discretion of the Software Quality Manager

3.2.1.5 Implementation Phase: Monitor/participate in Peer Code Reviews

Entry criteria: Start of implementation

Exit Criteria: End of warranty

Roles and Responsibility: Engineering

Schedule: Completion of SW for new release

3.2.1.6 Integration and Test Phase: Review Software Test Plan and Software Test Report

Entry criteria: Start of implementation

Exit Criteria: End of warranty

Roles and Responsibility: Quality department

Schedule: Completion of STP and STR

3.2.1.7 Integration and Test Phase: Perform Functional Audit

Entry criteria: Start of Integration and Test Phase

Exit Criteria: End of warranty

Roles and Responsibility: Quality department

Schedule: Prior delivery of the software release for Factory Acceptance Test

3.2.1.8 All Phases: Monitor/participate in peer reviews

Entry criteria: Notice To Proceed (NTP)

Exit Criteria: End of warranty

Roles and Responsibility: Quality department

Schedule: Document prepared or changed

3.2.2 Task Milestones and Schedule

See Section 3.2.1.1 to 3.2.1.8.

3.3 Roles and Responsibilities

See Section 3.2.1.1 to 3.2.1.8. for the roles and responsibilities of the individual tasks.

3.3.1 Internal Roles and Responsibilities

Table 4: Internal Roles and Responsibilities

Role	Responsibility
R&D Director	Perform formal or informal reviews after completion of work packages and / or at the change of stages during the software life cycle
Engineering	Participate in peer reviews
Managing Director	Perform process reviews during monthly project reviews
Software Quality Manager	Monitor/participate in peer reviews Track corrective actions from reviews and audits to closure

3.3.2 External Roles and Responsibilities

Table 5: External Roles and Responsibilities

Customer	Bombardier Transportation
Role	Procurement
Contact person	Tamara Martin tamara.martin@ca.transport.bombardier.com +1 807 473 3419
Customer	Bombardier Transportation
Role	Software Quality Assurance EIT
Contact person	Thomas Molkoski thomas.molkoski@ca.transport.bombardier.com +1 807 475 1886

3.3.3 Escalation

Table 6: Escalation

ANNAX Level	Escalation Level	Customer Level
Project Manager	0 (Standard)	Procurement
ANNAX Managing Director	1	Procurement
ANNAX President	2	Procurement

3.3.4 Quality Assurance Estimated Resources

Effort and cost for SQA activities are planned as described in the Software Project Management Plan [ASPMP], Section 5.1.1.

4 Documentation

The software documentation for the TTC Toronto project has to be prepared in accordance with IEEE Std. 1558-2004 - IEEE Standard for Software Documentation for Rail Equipment and Systems [I1558]. This standard requires a set of documents with predefined names and structure. Furthermore, [I1558] precisely refers to other IEEE Software Engineering Standards which describe the purpose and scope of the documents and which will also be followed. See Table 8 in Documentation Standards.

Table 7 is a list of the software documents to be produced throughout the project and defines responsibilities for verifying and approving the respective document. All documents listed below will be in English.

Table 7: List of Software Documents for the TTC Toronto Project

Title	Preparation	Verification	Approval	To be Reviewed/Audit, Criteria described in
Software Project Management Plan (SPMP)	Project Manager	R&D Director	Managing Director	Section 6.2.8
Software Quality Assurance Plan (SQAP)	SW Quality Manager	Project Manager	Managing Director	Section 6.2.8
Software Configuration Management Plan (SCMP)	Software System Integrator	SW Quality Manager	Managing Director	Section 6.2.9
Software Verification and Validation Plan (SVVP)	SW Quality Manager	R&D Director	Managing Director	Section 6.2.4, Section 6.2.5
Software Verification and Validation Report (SVVR)	SW Quality Manager	R&D Director	Project Manager	Section 6.2.8
Software Requirements Specification (SRS)	Software Engineer	SW Quality Manager	R&D Director	Section 6.2.1, Section 6.2.5
Software Requirements Traceability Matrix (SRTM)	System Integration Manager	SW Quality Manager	Project Manager	Section 6.2.5

Title	Preparation	Verification	Approval	To be Reviewed/Audit, Criteria described in
Software Acceptance Test Specification (SWATS)	Software Test Manager	Software System Integrator	System Integration Manager	Section 6.2.5
Software Design Description (SDD)	Software Architect	Software Engineer	System Integration Manager	Section 6.2.2, Section 6.2.3
Software Test Plan (STP)	Software Test Manager	SW Quality Manager	Project Manager	Section 6.2.8
Software Test Report	Software Tester	SW Quality Manager	System Integration Manager	Section 6.3.1
Software Version Description (SVD)	Software Engineer	Software System Integrator	System Integration Manager	Section 6.2.5
Software User Manual (SUM)	Software Engineer	Software System Integrator	System Integration Manager	Section 6.3.1
Database Design Description (DBDD)	Software Architect	Software Engineer	System Integration Manager	Section 6.3.1
Software Configuration Items Summary Table (SCIST)	System Architect	Software System Integrator	R&D Director	Section 6.3.1
Software Code	Software Engineer	Software Architect	Software System Integrator	Section 6.3.1
System Functional Description	System Architect	R&D Director	Project Manager	Section 6.3.1
Interface Control Document	System Architect	R&D Director	Project Manager	Section 6.3.1
Software Executable Generation Procedure	Software Engineer	System Architect	Project Manager	Section 6.3.1

5 Standards, Practices, Conventions, and Metrics

5.1 Documentation Standards

Table 8: List of Documentation Standards

Document(s)	Applicable Standard	Standard ID
All documents with the exception of SFD and ICD documents	IEEE Std 1558-2004 - IEEE Standard for Software Documentation for Rail Equipment and Systems	[I1558]
SPMP	IEEE Std 1058-1998 - IEEE Standard for Software Project Management Plans	[I1058]
SVVP SVVR	IEEE Std 1012-2004 - IEEE Standard for Software Verification and Validation	[I1012]
SQAP	IEEE Std 730-2002 - IEEE Standard for Software Quality Assurance Plans	[I730]
SRS	IEEE Std 830-1998 - IEEE Recommended Practice for Software Requirements Specifications	[I830]
SCMP	IEEE Std 828-2005 - IEEE Standard for Software Configuration Management Plans	[I828]
SDD	IEEE 1016-1998 - IEEE Recommended Practice for Software Design Descriptions	[I1016]
DBDD SVD SUM	EIA/IEEE J-STD- 016-1995 Trial-Use Standard for Information Technology Software Life Cycle Process Software Development Acquirer-Supplier Agreement (withdrawn)	[EIA016]
STP STPr STR	IEEE 829-1998 - IEEE Standard for Software Test Documentation	[I829]
SFD ICD SRTM	None	N/A

5.2 Design Standards

The common Tool “Enterprise Architect” and the rules of UML shall be used. Unified Modeling Language (UML) is a standardized general-purpose modelling language in the field of software engineering. UML includes a set of graphical notation techniques to create visual models of software-intensive systems.

5.3 Coding Standards

The coding shall follow the ANNAX Coding Guidelines [ACDGL].

5.4 Commentary Standards

The commentary shall follow the ANNAX Coding Guidelines [ACDGL].

5.5 Testing Standards and Practices

Refer to the Software Verification and Validation Plan [ASVVP].

5.6 SQA Product and Process Metrics

As a minimum, the following SQA metrics will be collected and reported:

- Number and status of corrective actions from process reviews and audits
- Number and status of anomalies from software verification and validation tasks

6 Reviews and Audits

6.1 Purpose

This section defines the reviews and audits to be conducted during the project.

6.2 Minimum Requirements

This section defines the minimum requirements for reviews and audits. Details for reviews are given in the ANNAX Software Verification and Validation Plan [ASVVP]

6.2.1 Software Specification Review

The software specification review will be performed as a formal technical review of the Software Requirements Specification (SRS). Refer to Section 6.3.1.

6.2.2 Architecture Design Review

The architecture design Review will be performed as a formal technical review of the Software Design Description (SDD). Refer to Section 6.3.1.

6.2.3 Detailed Design Review

The detailed design review will be performed as a formal technical review of the Software Design Description (SDD), once the document has been updated and the detailed design has been described. Refer to Section 6.3.1.

6.2.4 Verification and Validation Plan Review

The verification and validation plan review will be performed as a formal technical review of the Software Verification and Validation Plan for the TTC Toronto project [ASVVP]. Refer to Section 6.3.1.

6.2.5 Functional Audit

A functional audit will be held prior delivery of the software release for Factory Acceptance Test. The functional audit verifies that requirements specified in the SRS have been met. The SRTM will serve as a tool to check which requirements and changes have been implemented.

The functional audit will be performed as a meeting, witnessed and documented by the Software Quality Manager. As a minimum, the following documents will be reviewed:

- Software Requirements Specification
- Software Design Description
- Software Requirements Traceability Matrix
- Software Acceptance Test Procedure
- Software Version Description

Minutes of the audit will be taken.

Authors of documents will be responsible to revise documents if corrective action should be found necessary. After revision, the Software Quality Manager will verify the corrections.

The audit will be considered to be passed only when all corrections have been implemented.

6.2.6 Physical Audit

A physical audit will be held to verify internal consistency of the software and its documentation, and their readiness to release.

Physical audits will be held whenever an official configuration management baseline is drawn. All configuration items (e.g. documents, code) to be placed in the respective baseline shall be checked for consistency. The Software Quality Manager shall be invited to attend the audit, and shall receive and store minutes of the audit meeting. The minutes shall define corrective actions. The audit will be considered to be passed only when all corrections have been implemented.

6.2.7 In-process Audit

In-process audits of samples of the design will be held to verify the consistency of the design. In-process audits will be held at the discretion of the Software Quality Manager on an as-needed basis.

6.2.8 Managerial Reviews

Managerial reviews are conducted on a monthly basis and involve the responsible Project Manager, the Software Quality Manager, and the Managing Director of the local subsidiary.

The goal of the managerial review is:

- To report the actual state of the project to the management
- To inform about potential risk which need the involvement of the management
- To control that the project follows the internal processes and guidelines
- To review the execution of all of the actions and the items identified in this SQAP

It is the Software Quality Manager responsibility to report quality issues and to track corrective action defined in the managerial reviews.

6.2.9 Software Configuration Management Plan Review

The software configuration management plan review will be performed as a formal technical review of the ANNAX Software Configuration Management Plan for the TTC Toronto project [ASCMP]. Refer to Section 6.3.1.

6.2.10 Post-implementation Plan Review

The post-implementation plan review will be performed as an integral part of the lessons learned meeting in the course of the project closeout.

6.3 Other Reviews and Audits

6.3.1 Formal Technical Reviews

For each project deliverable subject to customer submittal, formal reviews shall be conducted after the development team has informally agreed that the deliverable content is accurate.

The time/date of each review is defined by the responsible person for the task/document being reviewed.

The scope and participants of the review is defined by the system architect and mutually agreed by the Project Manager. The Software Quality Manager will be invited to such formal reviews, and will either participate in the review meeting or, as a minimum, monitor the review and closure of corrective actions.

For documentation of the review results, the internal review template shall be used. All items must be categorized according the rules defined in the review template.

The review can have one of the three following results:

- Review object is **Approved** without remarks.
- Review object is **Approved with corrections**: Several issues with low or medium severity have been found and must be corrected before final approval. Another review is not needed.
- Review object is **Not approved**: One or more issues with high severity have been found. Or, upon decision by Review Team, if several middle severity issues are raised, the review might also not be approved. The issues must be corrected, and the review needs to be repeated.

6.3.2 Informal Technical Reviews

Additionally to formal technical reviews, informal technical reviews will be performed as needed. Such reviews do not require formal procedure.

7 Test

All testing is - in accordance with [I1558], Table A.2 - described in the ANNAX Software Verification and Validation Plan for the TTC Toronto project [ASVVP].

8 Problem Reporting and Corrective Action

See ANNAX internal guideline “Problem Reporting and Corrective Action” [AGLPRC].

9 SQA Tools, Technologies, and Methodologies

MANTIS is the tool used for change management and for bug tracking.

10 Media Control

Media control is - in accordance with [I1558], Table A.2 - described within the ANNAX Software Project Management Plan for the TTC Toronto project [ASPMP].

Physical storage mechanisms are described in Section 3.1.3.4 of the ANNAX Software Configuration Management Plan.

11 Supplier Control

As expressed in Section 7.7 of [ASPMP], subcontractors will have to follow the same process as defined for ANNAX internal development. Therefore, the majority of SQA tasks described in the other sections of this SQAP also apply - with the explanations given below - to subcontracted work.

In particular, for all subcontracted work, all software documentation related SQA activities will be performed. The following SQA tasks do not apply to subcontracted work but rather to the software project as a whole:

- Verification and validation plan review
- Software configuration management review
- Post-implementation plan review
- Managerial review

11.1 Analysis Stage

As part of the Request for Quotation, ANNAX will provide potential subcontractors a preliminary Software Requirements Specification.

After subcontract award, the subcontractor will refine the SRS and will start filling and maintaining a portion of the SRTM (related to their scope of work). Prior to start of the design phase, ANNAX and the subcontractor will review the SRS and the SRTM for correctness and consistency. The Software Quality Manager has to be informed and will receive review minutes.

11.2 Design Stage

During the design phase, the subcontractor will produce a SDD, using a template provided by ANNAX. The SDD will be updated if necessary during the Implementation and Integration & Test stages. The purpose of the SDD is to accurately define the scope, structure, and high-level functionality of the application under design. Prior to start of the implementation phase, a joint review attended by ANNAX and the subcontractor will be performed. The final approval of the design step is the sole decision of ANNAX.

11.3 Implementation Stage

After implementation of the software, ANNAX and the subcontractor will perform a joined review. This review will verify that

- Code is written according to the ANNAX internal coding guidelines [ACGUIL]
- Design Diagrams contained in the SDD are updated
- The SRTM is updated
- Tests related to the implemented requirements are specified
- Release notes according to ANNAX internal guidelines are written.

The Software Quality Manager will be invited to attend the review and will receive minutes of the review meeting.

11.4 Integration & Test Stage

During integration & test stage, the subcontractor will test the software produced during implementation stage and will:

- Create test report based on the test specification
- Write test incident reports in the Mantis tool (refer to [AMTIR]) based on the test results
- Update the SRTM

The review of the integration & test stage is always a joint review together with the subcontractor. The review can include the review of the documents but be extended to further steps like a code walkthrough, additional tests or other method of quality assurance. The final approval of the integration and test stage step is the sole decision of ANNAX. The Software Quality Manager will be invited to attend the review and will receive minutes of the review meeting.

12 SQA Records, Collection, Maintenance, and Retention

Records of SQA tasks will be collected and stored on the project network drive G:\AXis\10_Kunden\Bombardier. Retention of SQA records will be at least 10 years. Refer to ANNAX internal process instruction “Quality Records” [APIQR].

13 Training

The TTC Toronto project team members will receive a training to carry out the SQA tasks, especially reviews, described in this SQAP. This training is scheduled for February, 2011 and will focus on knowledge needed by the testing personnel..

14 Risk Management

Project risks, including but not limit to risks related to SQA, are listed the ANNAX internal Project Realisation Plan and handled according to Section 5.4 of the ANNAX Software Project Management Plan [ASPMP].

15 Glossary

15.1 Acronyms

Table 9: List of Acronyms

Term/Acronym	Definition
BT	Bombardier Transportation
BTE	Bench Test Equipment
CDR	Conceptual Design Review
CDRL	Contract Deliverable Requirement List
CMMI	Capability Maturity Model Integration
CMMI-DEV	CMMI for Development
DBDD	Database Design Description
FAI	First Article Inspection
FDR	Final Design Review
ICD	Interface Control Document
IEEE	Institute for Electrical and Electronics Engineers
LFLRV	Low Floor Light Rail Vehicle
LRV	Light Rail Vehicle
Mantis	Problem Reporting Database used by ANNAX development department
N/A	Not Applicable
PDR	Preliminary Design Review
PIS	Passenger Information System
PRP	Project Realisation Plan
PTE	Portable Test Equipment
R&D	Research & Development
RTM	Requirements Traceability Matrix
SCIST	Software Configuration Items Summary Table
SCMP	Software Configuration Management Plan
SDD	Software Design Description
SDLC	Software Development Lifecycle
SEI	Software Engineering Institute of the Carnegie Mellon University, Pittsburgh, PA
SFD	System Functional Description
SPMP	Software Project Management Plan
SQA	Software Quality Assurance

Term/Acronym	Definition
SQAP	Software Quality Assurance Plan
SRS	Software Requirements Specification
SRTM	Software Requirements Traceability Matrix
STP	Software Test Plan
STR	Software Test Report
SVVP	Software Verification and Validation Plan
SVVR	Software Verification and Validation Report
SW	Software
SWATS	Software Acceptance Test Speciation
TIR	Test Incident Report
TS	Technical Specification [TS]
TTC	Toronto Transit Commission
UML	Unified Modeling Language

15.2 Definitions

None.

16 SQAP Change Procedure and History

The Software Quality Manager will review the SQAP for necessity of change at a minimum every three months and will revise the SQAP if needed.