

Project TTC Toronto

Passenger Information System

Configuration Management Plan (CMP)

CDRL:	Spec Refs:		
Q201B	TS S21.11		
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1 Introduction

This Configuration Management Plan (CMP) identifies the configuration management and control practices to be deployed for the TTC Toronto project impacting ANNAX.

The plan conforms to Bombardier's Supplier Configuration Management Requirements [QPS062] and is in-line with IEEE Standard 828 [I828] and ANSI/EIA-649 [EIA649]. The plan satisfies the requirements of the TTC Toronto Technical Specification [TS], Section 21.11.

The CMP applies to all activities and organizational units involved in the design, development and test for this project.

General remark: ANNAX has subcontracted only parts of the software development. Since subcontractor staff is integrated into the ANNAX project team, this CMP applies also to subcontractors. Specific stipulations regarding software are covered by the Software Configuration Management Plan [ASCMP].

1.1 Purpose

This document establishes the requirements for performance of configuration management for the TTC Toronto Passenger Information System documentation and hardware. For software, a separate Software Configuration Management Plan [ASCMP] exists.

The document defines the roles and responsibilities of the ANNAX staff, including suppliers in relation to configuration management of all appropriate documents and hardware. It applies specifically to the members of the project involved in the design, development and manufacture of PIS hardware.

1.2 Scope

The document identifies and communicates all internal Configuration Management (CM) processes and plans used by ANNAX and suppliers during PIS design, development and test.

1.2.1 Configuration Items Covered

Configuration Items (CI) covered by this CMP include documents, components and parts for the PIS, including Comm./PIS Portable Test Equipment and Comm./PIS Bench Test Equipment. Note: Information in this plan related to Comm./PIS BTE is subject to further commercial and technical clarification.

Line Replaceable Units (LRU) covered by this plan are listed in Section 1 of [ASFD].

1.2.2 CM Relationship to Other Configuration Management

The CMP shall be used in conjunction with the SCMP [ASCMP], covering software configuration management.

1.2.3 Life Cycle

This CMP applies to all life cycle phases of the TTC Toronto project from design to end of warranty.

1.2.4 Specific Limitations and Constraints

None.

1.3 Assumptions

It is assumed that barcoding details and delivery locations will be clarified in an early project phase.

1.4 Acronyms and Definitions

1.4.1 Acronyms

The following acronyms and definitions are used within this CMP.

Table 1: List of Acronyms and Definitions

Acronym	Definition
BTE	Bench Test Equipment
CI	Configuration Item
CCB	Configuration Control Board
CDRL	Contract Deliverable Requirement List
CM	Configuration Management
CMP	Configuration Management Plan
CR	Change Request
DBDD	Database Design Description
ECR	Engineering Change Request
FCA	Functional Configuration Audit
FAI	First Article Inspection
FDR	Final Design Review
ICD	Interface Control Document
LFLRV	Low Floor Light Rail Vehicle
LRU	Line Replaceable Unit
LRV	Light Rail Vehicle
Mantis	Problem Reporting Database used by ANNAX development department
PCA	Physical Configuration Audit
PDR	Preliminary Design Review
PIS	Passenger Information System
PRP	Project Realisation Plan
PTE	Portable Test Equipment
RTT	Requirements Traceability Table

Acronym	Definition
SCM	Software Configuration Management
SCMP	Software Configuration Management Plan
SPMP	Software Project Management Plan
SQAP	Software Quality Assurance Plan
SVD	Software Version Description
SW	Software
TS	Technical Specification [TS]
TTC	Toronto Transit Commission

1.4.2 Definitions

1.5 References

If no version/date is given, the most recent version of the document applies.

1.5.1 Internal Templates

The following templates are available as basis for the required documents:

General templates can be found under: J:\40_Dokumente\FIS-Intern\Vorlagen\

Project specific templates can be found under: J:\40_Dokumente\FIS-Intern\Vorlagen\Projects\TTC Toronto

1.5.2 Internal Guidelines

The following guidelines shall be applied. These documents can either be found

- in the document management system (Intranet: <http://www.axis.annax.ch/dokverwaltung>)
- on the ANNAX knowledge platform (Intranet: <http://www.axis.annax.ch>)
- in J:\80_Q-Management\20 Q-Dokumente\10 Freigegebene Dokumente\20 Prozesse\01 Allgemeine Prozesse Gümligen

Table 2: List of Guidelines

Doc ID	Document Description
[AUMMAN]	10012504, ANNAX User Manual "Mantis", (German title: "Bedienungsanleitung Mantis")
[APISDAD]	ANNAX internal process instruction "Storage of Documents and Data" (German title: Verfahrensanweisung VA09 "Ablage von Dokumenten und Daten")
[BLS]	Doc-ID 001572, Rev. 04, Bombardier Logistic Specification

1.5.3 Standards

The following standards were used as guides to develop this configuration management process.

Table 3: List of Standards

Doc ID	Document Description
[EIA649]	EIA-649-A, October 2004 – National Consensus Standard for Configuration Management
[I828]	IEEE Std 828-2005 – IEEE Standard for Software Configuration Management Plans
[QPS062]	000-QPS-062, Rev. 04, Bombardier Supplier Configuration Management Requirements (TRD Version)

1.5.4 Project Documents

The following project documents are referenced within this document:

Table 4: List of Project Documents

Doc ID	Document Description
[TS]	Toronto Transit Commission Technical Specification - Design and Supply of Low Floor Light Rail Vehicles, Structured Multi-Phase Bid Process Edition, Rev. 2.0
[APRP]	ANNAX Project Realisation Plan for the TTC Toronto project (ANNAX internal document), Doc No 295037XX
[ARMP]	ANNAX Requirements Management Plan for the TTC Toronto Project, Doc No 2991019XX
[ASCIST]	ANNAX Software Configuration Item Summary Table for the TTC Toronto project, Doc No 299017XX
[ASFD]	ANNAX document Communications & Signs - System Functional Description , 215269XX
[ASCMP]	ANNAX Software Configuration Management Plan for the TTC Toronto project, Doc No 299016XX
[ASPMP]	ANNAX Software Project Management Plan for the TTC Toronto project, Doc No 299014XX
[ASPSW]	MS Project file: Schedule Planning Software (ANNAX internal document; German title: Terminplanung Software (ANNAX internal document))
[ASQAP]	ANNAX Software Quality Assurance Plan for the TTC Toronto project, Doc No, 299009XX

1.6 Maintenance

After internal review and approval, this CMP will be submitted to Bombardier/TTC for official approval. After Bombardier's/TTC's approval, the CMP will be placed under configuration management. Subsequent changes to the CMP will follow the stipulations in this CMP. The CMP will be updated by the Software System Integrator as needed.

2 CM Management

2.1 Organization

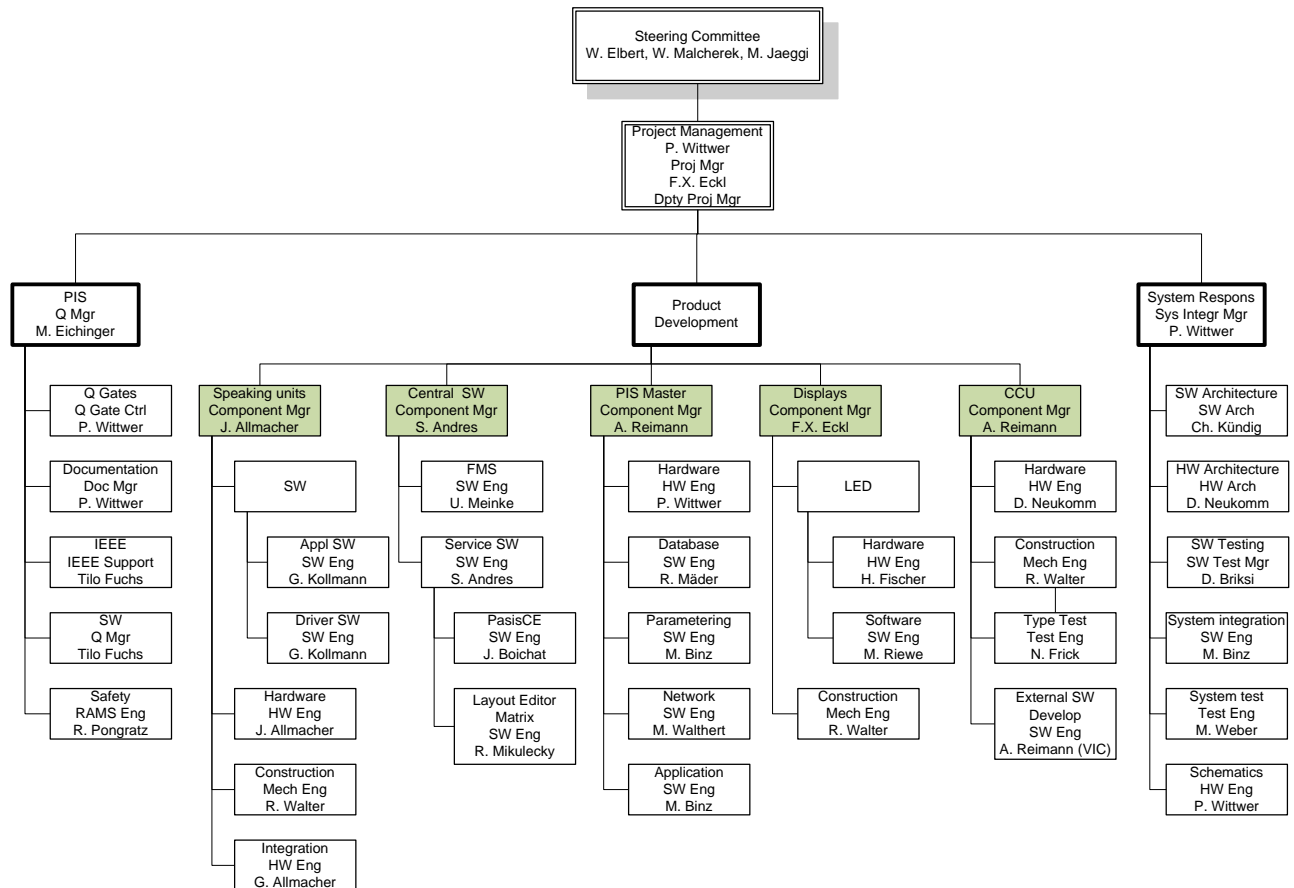


Figure 1: ANNAX Organization

2.2 CM Responsibilities

There are three main entities involved in performing CM activities:

- Software System Integrator
- Documentation Manager
- Configuration Control Board (CCB)

The Software System Integrator will plan and monitor CM activities and will prepare and update, as needed, the CMP.

If and when changes to documentation are required, as a result of a change request, the Document Manager will be required to attend a CCB session. This holds true for both internal and external documentation.

The Document Manager and the Software System Integrator will ensure that the revision control process is executed properly and that updated versions are documented correctly and stored.

The CCB is responsible of approving proposed changes. The composition of the CCB will depend on the severity of the proposed change as described in Table 5.

Severity categories are defined in Table 6.

Table 5: CCB Composition

Proposed Change Severity	Mandatory CCB Members
Minor	Software System Integrator, Project Manager, Document Manager, System Integration Manager (in case of requirement changes)
Major	Software System Integrator, Project Manager, Document Manager, Business Manager (in case of requirement changes)

Table 6: Severity Categories

Change Severity	Criteria
Major	<p>A change that affects specified and approved requirements for product OR</p> <p>A change, after establishment of the baseline for the product design or implementation of the product design, that affects compatibility with interfacing products, including such products as test equipment, support equipment and associated software, and products furnished by a customer or that affects one or more of the following:</p> <ul style="list-style-type: none"> delivered operation or servicing instructions; required calibration to the extent that product identification should be changed; interchangeability or substitutability of replaceable products, assemblies, or components; change to add a previously non-qualified supplier, where supplier selection is specified; user skills or user physical attributes; operator or maintenance training; and requires retrofit of delivered products; e.g., by product recall, modification kit installation, attrition, replacement during maintenance using modified spares.
Minor	A change that does not impact the above criteria and would otherwise be classified as minor, but does impact cost/price to customer(s), including incentives and fees, guarantees, warranties, and contracted deliveries or milestones.

2.3 Applicable Policies, Directives, and Procedures

The following documents apply to CM within this project:

- Bombardier's Supplier Configuration Management Requirements [QPS062]
- ANNAX Process Instruction "Storage of Documents and Data" [APISDAD]
- ANNAX User Manual "Mantis" [AUMMAN]

2.4 Management of the CM Process

2.4.1 Anticipated Cost of the CM Process

Cost management is described in the ANNAX Software Project Management Plan [ASPMP].

2.4.2 Independent Surveillance of CM Activities

CM activities will be surveyed by the PIS Quality Manager.

2.4.3 Risk Identification

Risk identification is described in the ANNAX Project Realisation Plan [APRP].

2.4.4 Risk Management

Risk management is described in the ANNAX Project Realisation Plan [APRP].

3 CM Activities

3.1 Configuration Identification

3.1.1 Identifying Configuration Items

3.1.1.1 Configuration Items

Configuration Items (CI) covered by this CMP include documents, components and parts for the PIS, including Comm./PIS Portable Test Equipment (PTE) and Comm./PIS Bench Test Equipment (BTE).

Document CIs include requirements, design and operational documents like specifications, design descriptions, drawings, listings, operation procedures, spare parts list, etc.

Components and parts CIs include parts Line Replaceable Units (LRU), and delivery lots.

3.1.1.2 Baseline Definition

As a major baseline, a design baseline called “product baseline” according to [QPS062], S9.6, shall be established, with the following definition:

For the purposes of change control, the design baseline for the PIS shall be established when design approval is granted at Final Design Review (FDR). Changes beyond FDR that affect the design characteristics agreed to, or presented at the FDR, shall be submitted for approval. The baseline shall be established at First Article Inspection (FAI). Changes beyond FAI shall be documented in the form of engineering change proposals and shall be submitted for approval. (Refer to [TS] S21.11.1.5, S21.11.1.6).

Baseline traceability will be granted by using a MS Excel worksheet containing all configuration items and their modification level.

3.1.2 Naming Configuration Items

3.1.2.1 Documentation

All project documentation files will be named by a unique prefix consisting of an 8-digit number created by the document management system “Dokumentenverwaltung”, succeeded by an underscore sign (“_”).

The first digit of the prefix will be “2” for documentation.

The last two digits constitute the version of the document, starting with “00” for the first version, followed by “01” for the first revision. There are no specific rules for the remainder of the file name.

Example:

29901600_SCMP_TTC Toronto.doc.

3.1.2.2 Parts

Labelling of parts shall be in accordance with Bombardier Logistic Specification [BLS]. Part numbers will be defined by ANNAX Engineering in the course of the development process.

If form, fit or function of serialized parts should be modified after FAI, the modification level will be changed and identified by a label on the part, with alphabetical letters (A to Z), with the current modification level stroked through as described in [QPS062], S10.5. A name plate sample template for a serialized part is attached to this CMP (Attachment B).

Serialization will apply to all line replaceable parts (LRUs), because thus TTC requirements (TS S25) and Bombardier requirements [QPS062] are satisfied.

A product structure identifying parent/child relationship will be submitted to Bombardier as a Serialized Items Spreadsheet (based on the template provided from Bombardier).

3.1.2.3 Software

Naming of software releases will follow the stipulations in [ASCMP]. Names of Software Configuration Items will be assigned by the ANNAX System Architect and will be documented in the Software Configuration Items Summary Table [ASCIST]. Each software release submitted to Bombardier will be accompanied by a Software Version Description (SVD). The SVD will identify the software being released and describe the changes and improvements brought to the software, known anomalies and their effect, interface compatibility and installation processes including testing to be performed after submittal to Bombardier/TTC.

3.1.3 Acquiring Configuration Items

Documentation will be stored in the document management system "Dokumentenverwaltung".

3.2 Configuration Control

The change request process is described in Figure 2

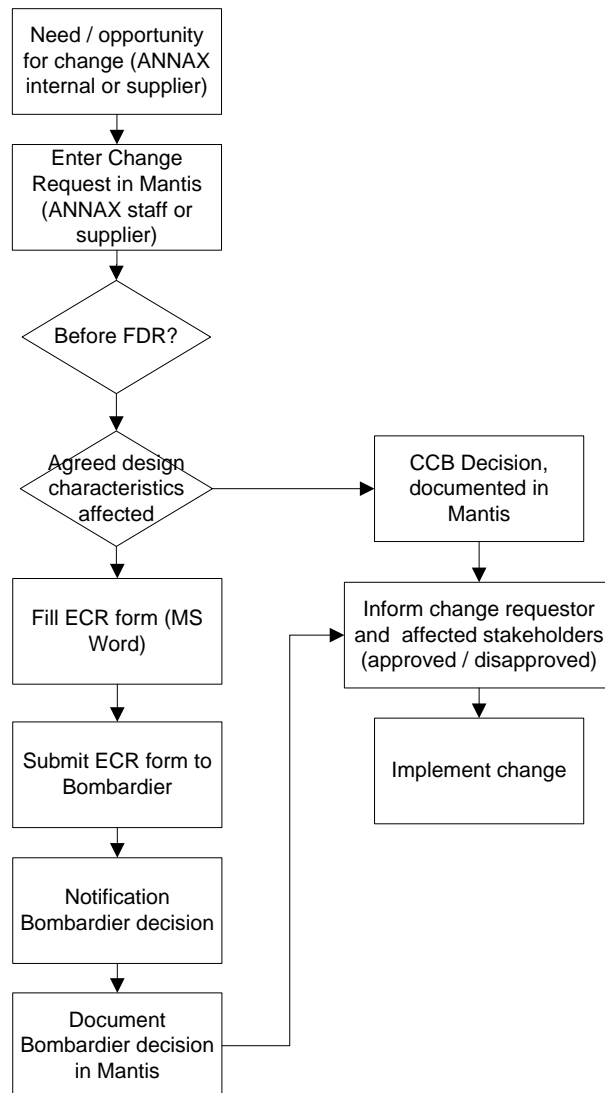


Figure 2: Change Request Process Overview

3.2.1 Requesting Changes

Change Request (CRs) may be external (customer and suppliers) or internal Change Requests. All CRs will be managed within the bug tracking/change request tool Mantis. It is the Project Manager's responsibility to collect and enter external CRs in Mantis and to request and monitor suppliers to enter their CRs into Mantis. Internal CRs may be entered by any ANNAX staff.

Internal CRs after design baseline (FDR/FAI) must be approved by Bombardier before implementation. Such changes shall be requested using an Engineering Change Request (ECR)

form sheet which will be sent to Bombardier procurement. An ECR template is attached to this CMP (Attachment A). ECRs will have a unique alphanumeric identifier ending with a four-digit sequential numbers (refer to [QPS062], section 10.2), and an overview of the ECRs and their status will be maintained.

3.2.2 Evaluating Changes

The Software System Integrator will act as the “Manager” within Mantis and will evaluate the CR.

3.2.3 Approving or Disapproving Changes

All changes will be approved or disapproved by the CCB as described in Section 2.2.

3.2.4 Implementing Changes

After a change has been implemented, the implementing person will mark the CR as resolved and provide in Mantis additional information related to the CR implementation.

3.3 Configuration Status Accounting

Status accounting will be performed using the Requirements Traceability Table (RTT) as described in the ANNAX Requirements Management Plan [ARMP].

3.4 Configuration Evaluation and Reviews

ANNAX will conduct Functional and Physical Configuration Audits at ANNAX’ premises ([QPS062], S12.0). Configuration audits may occur at the same time as the FAI.

3.4.1 Functional Configuration Audit

Functional Configuration Audits (FCA) shall be conducted on the first production unit.

The objective will be to verify the item and system performance against its approved configuration documentation (Technical Description). Test data for the FCA will be that collected from the test of the item that is to be formally accepted or released for production.

ANNAX will submit, for Bombardier’s approval, a FCA agenda 15 days before the activity. The following data will be described in the agenda:

- Time, date and location of the audit
- End-item identification (part number/serial number).

ANNAX will issue an audit report.

FCA open action item will be tracked for closure. Proof of closure shall be submitted for Bombardier’s approval.

3.4.2 Physical Configuration Audit

Physical Configuration Audit (PCA) shall be conducted after FCA.

During this activity engineering drawings shall be proofed by direct comparison of drawing data or design to the physical characteristics of the first production unit. Drawing and revision shall be captured to define product baseline.

Bombardier shall issue an audit report.

PCA open action item shall be tracked for closure. Proof of closure shall be submitted to Bombardier for approval.

3.5 Interface Control

Interfaces of the PIS to other systems are described in Interface Control Documents (ICD). CRs related to ICDs are subject to CR Management like any other design or specification document.

4 CM Schedule

4.1 CM Sequence and Dependencies

SCM sequence and dependencies are incorporated in the ANNAX MS Project schedule [ASPSW]]

4.2 CM Milestones and Schedule

Refer to the ANNAX MS Project schedule [ASPSW]

5 CM Resources

5.1 Tools

The following tools will be used for CM:

Table 7: CM Tools

SCM Tool Name	Purpose
Mantis for internal use	Change request and bug tracking system for internal use
Mantis for external use	Change request and bug tracking system for external (customer and supplier) use
Dokumentenverwaltung	Electronic document management
Infra	Logistics, parts lists, product structure plan

5.1.1 Configuration Management of Tools

Configuration status accounting will be performed using an MS Excel worksheet. This worksheet will be used to capture the status of documentation and tools used for development.

5.2 Techniques

No specific CM techniques will be used.

5.3 Methodologies

No specific CM methodologies will be used.

5.4 Personnel

CM tasks will be performed by all project members. The Software System Integrator has the overall CM responsibility.

5.5 Training

No specific CM training is required for this project.

5.6 Environment and Infrastructure

Neither special environment nor infrastructure is required for SCM tasks for this project.

5.7 CM Cost Management

CM costs are managed as other project costs.

6 CMP Maintenance

6.1 CMP Monitoring

It is the Software System Integrator's responsibility to monitor the CMP and update the document whenever necessary.

6.2 CMP Revision and Approval

The Software System Integrator is responsible of revising the CMP. Internal approval and release of the CMP shall follow the stipulations in the ANNAX Software Quality Assurance Plan [ASQAP], Section 4. Major changes require formal approval by both Bombardier and TTC.

6.3 CMP Change Distribution

After changes, the new CMP revision will be distributed to:

- Bombardier/TTC
- Subcontractors
- Project team members.

Attachment A: Engineering Change Request Form

ENGINEERING CHANGE REQUEST (ECR)		DATE OF REQUEST []
		ECR NUMBER []
1) PROJECT NAME []	1) CUSTOMER NAME <Customer Name>	1) PROJECT NUMBER []
1) REQUESTOR NAME []	1) REQUESTOR ORGANIZATION []	1) REQUESTOR PHONE/EMAIL []
2) CHANGE AFFECTS (Check all box(es) that apply)		
<input type="checkbox"/> HW	<input type="checkbox"/> SW (CHANGE/NEW RELEASE)	<input type="checkbox"/> USER SKILLS OR USER PHYSICAL ATTRIBUTES
<input type="checkbox"/> DELIVERED OPERATION OR SERVICING INSTRUCTIONS	<input type="checkbox"/> OPERATOR OR MAINTENANCE TRAINING	<input type="checkbox"/> NEW SUPPLIER (WHERE SUPPLIER SELECTION IS SPECIFIED)
<input type="checkbox"/> INTERCHANGEABILITY OR SUBSTITUTEABILITY OF REPLACEABLE PARTS/COMPONENTS.		<input type="checkbox"/> PRICE/COST TO CUSTOMER
3) CHANGE CLASSIFICATION (Check the box that applies)		
<input type="checkbox"/> Major (Fill in all fields in this form)	<input type="checkbox"/> Minor (Fill in at least the following fields: 1), 2), 3), 4.1), 4.2), 4.4), 4.5))	
4) DESCRIPTION OF CHANGE (Accompanying documentation must be attached separately)		
4.1 Title of Change: []		
4.2 Summary of the Proposed Change []		
4.3 Detailed description of the Proposed Change []		
4.4 Reason and justification for the change; consequence of not doing the change: []		
4.5 Proposed change effectivity by serial number or by date: []		
4.6 Product(s), major components, interfacing products affected: []		
4.7 Contract and configuration documents affected: []		
4.8 Effects on specified performance, operation, maintenance, servicing, operation and maintenance training, spare and		

Engineering Change Request Form (cont'd).

repair parts, specific tools, support equipment, test equipment and maintenance equipment:	
<input type="text"/>	
4.9 Change implementation and delivery schedule:	
<input type="text"/>	
4.10	Alternatives, if any:
<input type="text"/>	
4.11	Detailed Field Modification Instructions:
<input type="text"/>	

REQUEST FOR CHANGE DECISION	
ANNAX CCB DECISION <i>(Check the appropriate box)</i>	
<input type="checkbox"/> APPROVED	<input type="checkbox"/> APPROVED W/ CONTINGENCIES
<input type="checkbox"/> DEFERRED	<input type="checkbox"/> NOT REQUIRED
<input type="checkbox"/> DENIED	
<Customer Name> CCB DECISION <i>(Check the appropriate box)</i>	
<input type="checkbox"/> APPROVED	<input type="checkbox"/> APPROVED W/ CONTINGENCIES
<input type="checkbox"/> DEFERRED	<input type="checkbox"/> NOT REQUIRED
<input type="checkbox"/> DENIED	
COMMENTS <i>(Attach additional sheets if required)</i>	
<input type="text"/>	
FINAL SIGNOFFS <i>(Signature implies that all sign-offs are complete and that supporting artifacts have been provided)</i>	
ANNAX CCB CHAIRPERSON (SIGNATURE / DATE)	<Customer Name> CCB CHAIRPERSON (SIGNATURE / DATE)

Attachment B: Sample Name Plate

