Segment Management System

Tata Projects Limited

Software Requirement Specification (SRS)

The document details the summary of solution architecture and approach for the development of Segment Management System for Tata Projects Limited. The document is based on the inputs, system study, discussions and meeting held between BCI & Tata Projects Ltd. Teams.

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Revision History

REVISION NO.	DATE	PREPARED BY	REVIEWED BY	COMMENT
1.0	02-08-2022	Omkar Gaonkar	Ashutosh Kroria	SRS Document for Segment Management System

Abbreviations:

Name	**Abbreviation**
Bar Code India	BCI
Systems, Applications & Products in Data Processing	SAP

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1 SPECIFICATION ORGANIZATION

The objective of this document to provide the application to create a Segment Management System Application which will facilitate the automation of manual processes using AIDC Technology required in handling and managing Segments in its yard to fixtures and movement to implementation sites.

Section 1: Introduction

This section provides hardware requirements and documentation conventions.

Section 2: User Interface

This section depicts screen design and logic flow, and is categorized into two groups:

- Application Master Module
- Common Routine

Section 3: System Architecture

This section provides information of system architecture.

2 INTRODUCTION

2.1 INTENDED AUDIENCE AND READING SUGGESTIONS

The scope of the software would require the development of the front end application, client device application and communication server to transfer data from application to server. The document lays down the specifications of the middleware application, its architecture and infrastructure requirements.

The entire solution consists of followings:

1. Web Application

2. Communication Server Application

3. Mobile Device Application

2.2 PROJECT SCOPE

The scope of the application is to create a Segment Management System Application which will facilitate the automation of manual processes using AIDC Technology required in handling and managing Segments in its yard to fixtures and movement to implementation sites.

Using this application, it is possible to monitor and keep record of the Segment flow, analyze inventory and minimizes the risk of good Segment and rejected Segments. The solution will be proved beneficial for TATA Project and CRML as it aims to improve data accuracy, increase processing date and inspections, eliminates paper work, reduces time & effort required for the activity and provide instant inventory and other types of pertinent reports

The scope of the software would require the development of the front end application, client device application and communication server to transfer data from application to server. The document lays down the specifications of the middleware application, its architecture and infrastructure requirements.

The entire solution consists of followings:

- Web Application
- Mobile Device Application
- Communication Server Application

3 SOFTWARE/HARDWARE REQUIREMENTS

Below are the hardware and the software requirements of the application:

3.1 CLOUD SERVER CONFIGURATION

It is recommended that TATA Projects procure database server with expandable data storage capacity since the volume of data generated would increase with increase in the daily transactions. The exact amount of data generated shall be visible after pilot test of entire cycle of the system.

**Configuration details yet to be discussed with TATA IT team.*

3.2 COMPUTERS

Desktop would require following specifications:-

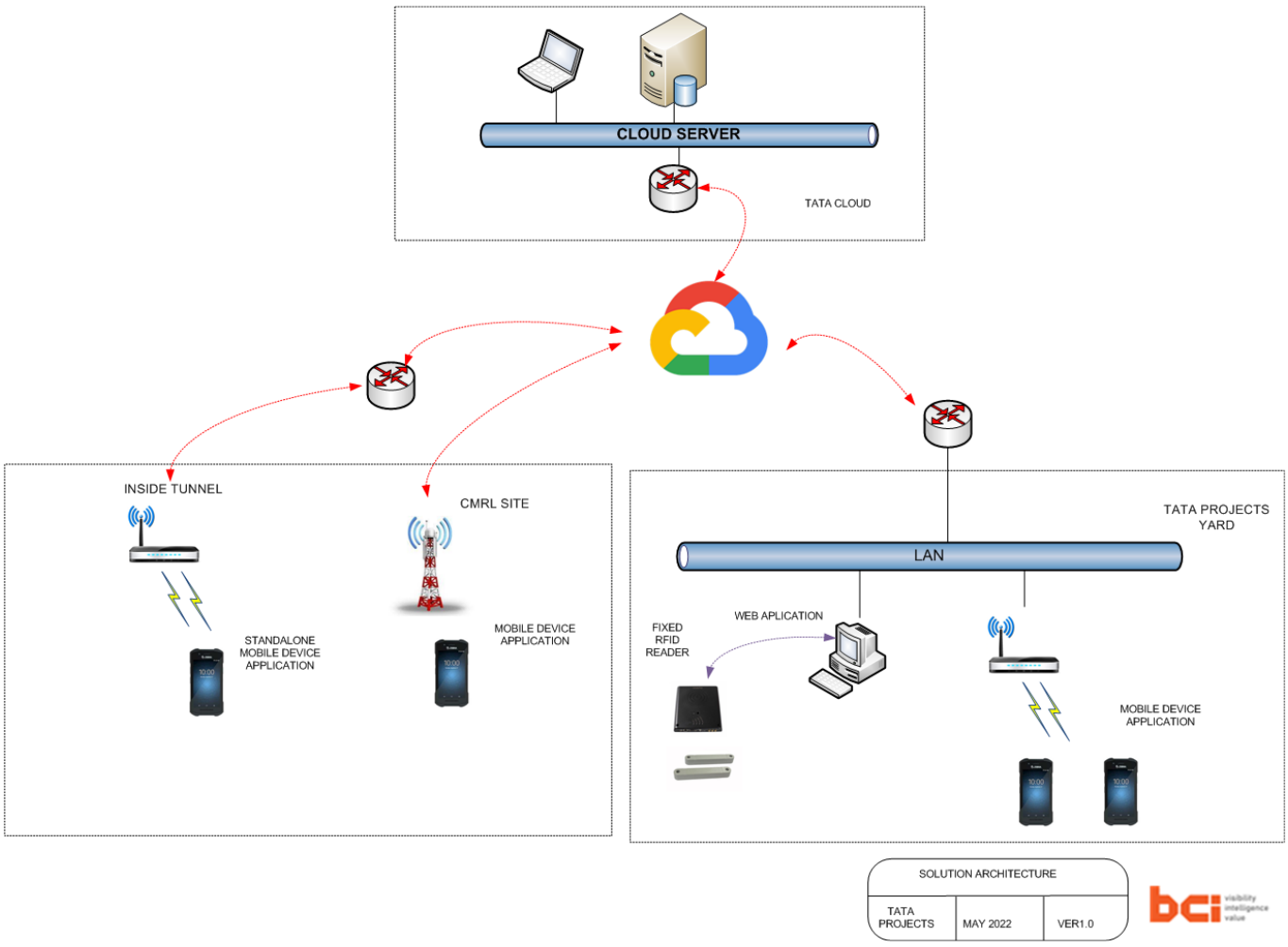
- I5/i7 Processor with Windows 10 operating System
- 8 GB RAM
- 100GB HDD
- Dot net Framework 4.5

3.3 HARDWARE REQUIREMENTS

Hardware required for the application:

- Innova RFID Tag – 80,000 Nos
- Android Handheld Terminals – 5 Nos
- USB RFID reader – 1 No.

4 SOLUTION ARCHITECTURE



5 User Interface Specification Conventions

This section specifies the user interface portion of the application.

Section Organization

The User Interface Specification presents screen displays or "**Dialogs**".

Documentation Conventions

This section incorporates illustrations of the application user interface. Each screen display "Dialog" consists of the screen display image, a process name, a paragraph documenting the processing required for the dialog, a paragraph listing the navigation options, and a table listing for each variable field on the dialog, its database source or destination, format, and any instructions required to process the field.

The following section contains a sample dialog with each area identified.

6 System Log

System shall maintain internal logs for application.

6.1 Error Logs

These logs will contain any errors encountered during runtime for faster resolution of any problem post deployment.

6.2 Audit Logs

These logs will monitor the activities of user who accessed the application, made changes to File/ Document and the time stamp of these activities.

7 ARCHITECTURAL DESIGN

Overall System consists of:

- Web Application
- Device Application
- Communication Server

7.1 WEB APPLICATION

A Web Application will be developed for performing transactions like Master Creations such as Location, Segment, Zone, Site, Quality Check, Segment Creation, RFID Tag in Mold, Concrete Pouring, De-molding and other activities.

7.2 DEVICE APPLICATION

This application will include transactions including Quality Check Inspection, Yard Movement, Dispatch Verification, Segment Loading and Verification, Segment Dispatch, Site Identification. Application will directly communicate with user input and process the request to communication server.

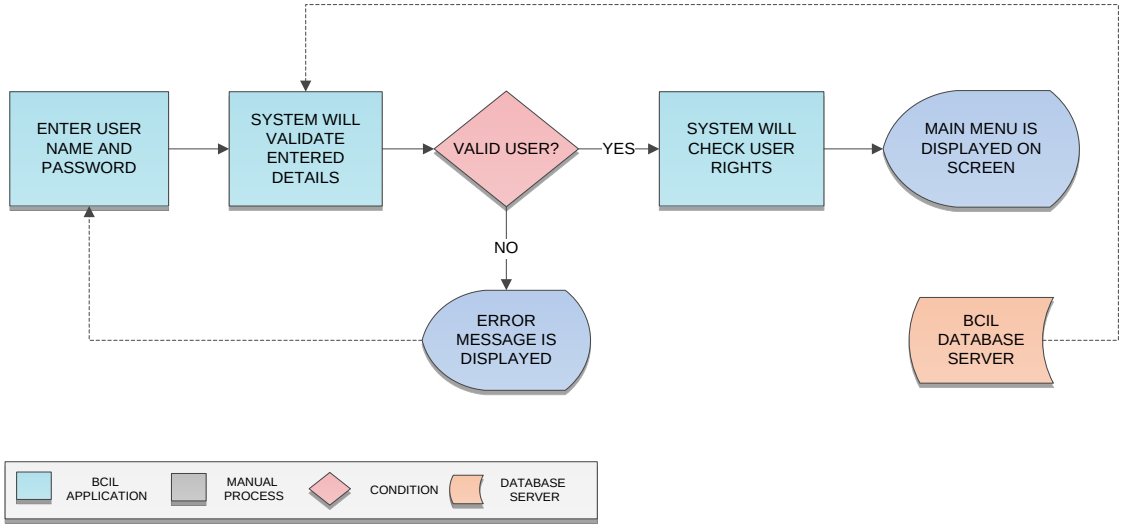
7.3 COMMUNICATION SERVER

This application will handle the device request in real time. Most of business logic on scanning will run on this module. Communication Server will run on single server with static IP.

8 APPLICATION MODULES

8.1 APPLICATION LOGIN- WEB & DEVICE APPLICATION

This login module will provide access to the application modules. Here the admin/user needs to enter the login detail to enter in the application and to perform the desired actions.



Process: User needs to enter the User Name/ID and Password in display fields and press the Login button. Application will validate the user credential.

User will be able to view only those screens/ modules of which he has been given access rights to.

Validation

- User Name/ ID will be unique for all users.
- User Name/ ID and Password length will be set.

After successful login application menu screen will appear; this screen will have the Master and Transaction options etc.

8.2 User Management

The module will let application administrator to manage the Users, and the rights assigned to the same; the rights will define authorized application access of users.

The User Management & Master data will be created using **Web Application.**

8.2.1 User Master

This module will let user to create application users who will access the application. The master will store the users' details in system.

Data Fields	1. User ID 2. User Name 3. Description 4. Password 5. Email 6. Address 7. Contact 8. Active/ Inactive
Process Steps	1. Enter required details i.e. User ID, User Name, Description, Password in system 2. Email, Address, Contact are optional data fields 3. Check the Active checkbox to make the user active 4. Click on Save button to save details in database 5. Newly added user will appear in data grid
Functions	1. Add, Edit/Update, Delete as per requirement 2. User ID and Password is used to access the application.
Role	Admin will create/ add user details via window application

8.2.2 User Rights/ Permission

This module will let admin to assign module / screen access rights to the application users. Once assigned, authorized users can access the application. Once permissions are assigned, user will be able to view only those screens/ modules of which he has been given access rights to by Admin.

Data Fields	1. User ID/ Name 2. Module /Screen Names
Process Steps	1. Admin will select User Name/ID. 2. Screen/ module names will appear in data grid along with checkbox. 3. Admin will check the checkbox against module/ screen to which selected User should be assigned access permissions. 4. Save and Update the details in database
Functions	Add, Edit/Update as per requirement
Role	Admin / Authorized User will assign access rights to the selected User

8.3 MASTERS

8.3.1 MOLD MASTER

The module will be used to view the Mold ID details downloaded from Customer Site

Data Fields	1. Mold type 2. Mold ID
Process Steps	1. Molding Master screen will be visible to authorized personnel only 2. BCI application will download Molding details from Customer database. 3. Downloaded Molding details such as, Mold ID, Molding type.
Functions	View details of the Molding Material and Mold Id.

8.3.2 SEGMENT MASTER

The module will be used to view the Segment details downloaded from Customer Site.

Data Fields	1. RFI Number 2. Ring Number 3. Mold ID 4. Segment Type 5. RFID TAG ID 6. Casting Yard Report Link 7. Erection Report at Site
Process Steps	1. Segment Master screen will be visible to authorized personnel only 2. BCI application will download Segment details from Customer database. 3. Downloaded RFI details such as RFI Number, Ring Number, Mold ID, Segment type, RFID TAG ID, Casting Yard Report Link and Erection Report will get displayed in data grid on screen.
Functions	View details of the RFI Segment and UHD RFID tags.

8.3.3 Location Master

This module will be used to save Location details in database and provide identification to them by unique RFID tag.

Data Fields	1. Location Code 2. Name 3. Location Type- Accepted, Rejected 4. Yard 5. Is Active Status i.e. Yes/ No
Process Steps	1. Enter Storage Location Code and Name. 2. Select Location Type i.e. Accepted or Rejected. 3. Enter Yard. 4. Select Is Active as Yes or No i.e. Storage location is active or not. 5. Save the details in database.
Functions	Add, edit/update and Delete Storage Location details as per requirement.

8.3.4 Zone Master

The module will be used to will be used to save the Zone details in database. The module will be used to add, edit or delete Zone details for segment materials.

Data Fields	1. Zone ID 2. Zone Description 3. Is Active i.e. Zone is Active or Not
Process Steps	1. User will enter Zone ID and Zone Description 2. Select 'Is Active' as Yes or No. 3. Save the details in database. 4. View Zone details: As user add Zone details, it will be reflected in data grid.
Functions	Add, Edit/Update, Delete as per requirement.

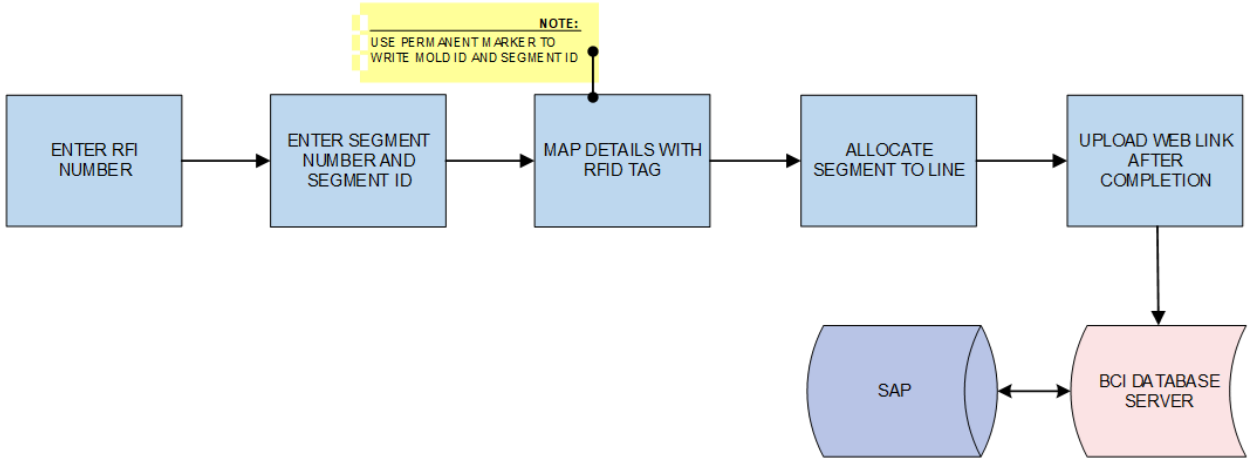
8.3.5 SITE MASTER

The module will be used for Site details where segment is deployed saved details in the database. User can add, edit and delete the Line details.

Data Fields	1. Site Code 2. Segment RFID Tag 3. Vehicle Number 4. Delivery Location 5. Is Active- Yes/ No
Process Steps	1. Enter RFI Number. 2. Scan the segment against dispatch plan. 3. Select Truck Number. 4. Enter delivery location.
Functions	Add, Edit/Update and Delete Line details as per requirement.

8.4 SEGMENT CREATIONS

8.4.1 SEGMENT PLANNING & RFID TAGGING



Activities

Module Description	This module will be used to provide facility to map RFI and Ring Number with the RFID Tag and allocate Segment to Line. Two web links will be uploaded after completion of Yard movement. ***This activity will be done using Web Application.***

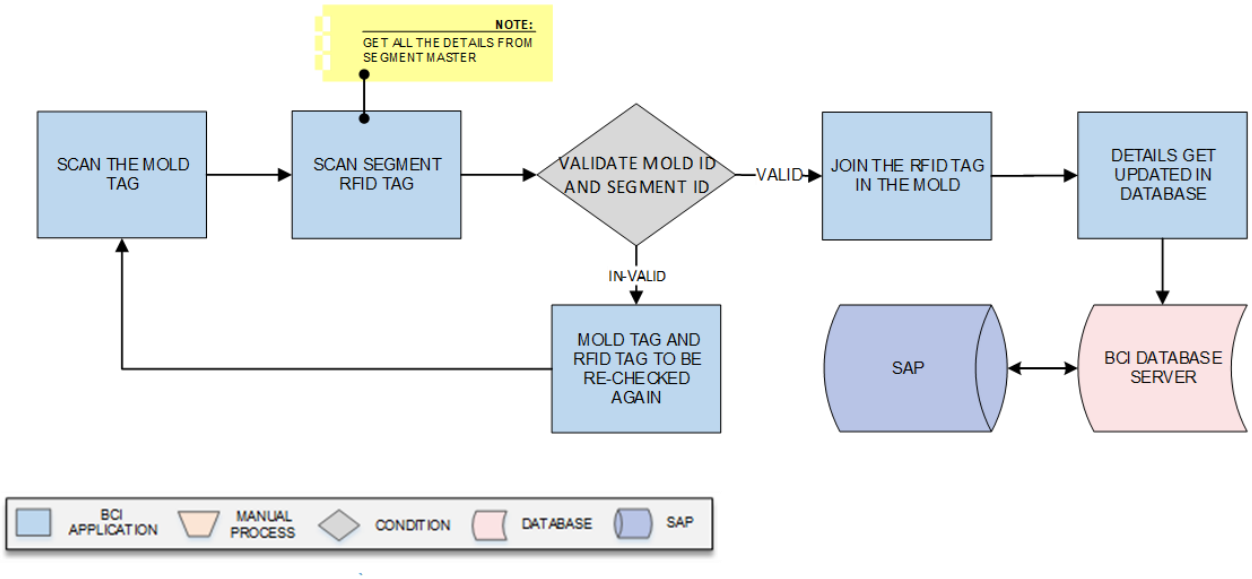
Pre-Conditions	1. Authorized access to the application. 2. Segment RFI number details provided from Customer database.

Process Steps	1. Select /enter RFI Number, Ring Number, and Segment ID. 2. Click on Map, the segment gets mapped with RFID Tag. 3. Corresponding permanent marker will be used to write Mold ID and Segment ID on it E.g. (M1S1 or Ring No.). 4. Segment gets allocated to line user by the system. 5. System will generate two web links which will get uploaded. 6. The links can be uploaded after completion of Yard Movement. 7. Update details in database.

Post-Conditions	1. Segment details will get saved in the database. 2. Segment allocated to line user.

Validations	1. An alert should be displayed in case invalid RFI number is entered. 2. An alert should be displayed in case Segment details not mapped with RFID. 3. An alert should be displayed in case invalid Segment Code is selected. 4. An alert message is displayed in case of any error / invalid activity.

8.4.2 RFID TAG MOLDING



Activities

Module Description	This module is Segment Molding is done based on the RFID tag confirmation. System will be validated with RFID tag and start the concrete pouring.

Pre-Conditions	1. Material should have MOLD ID tags. 2. Mold to be iron cased with tag attached to it.

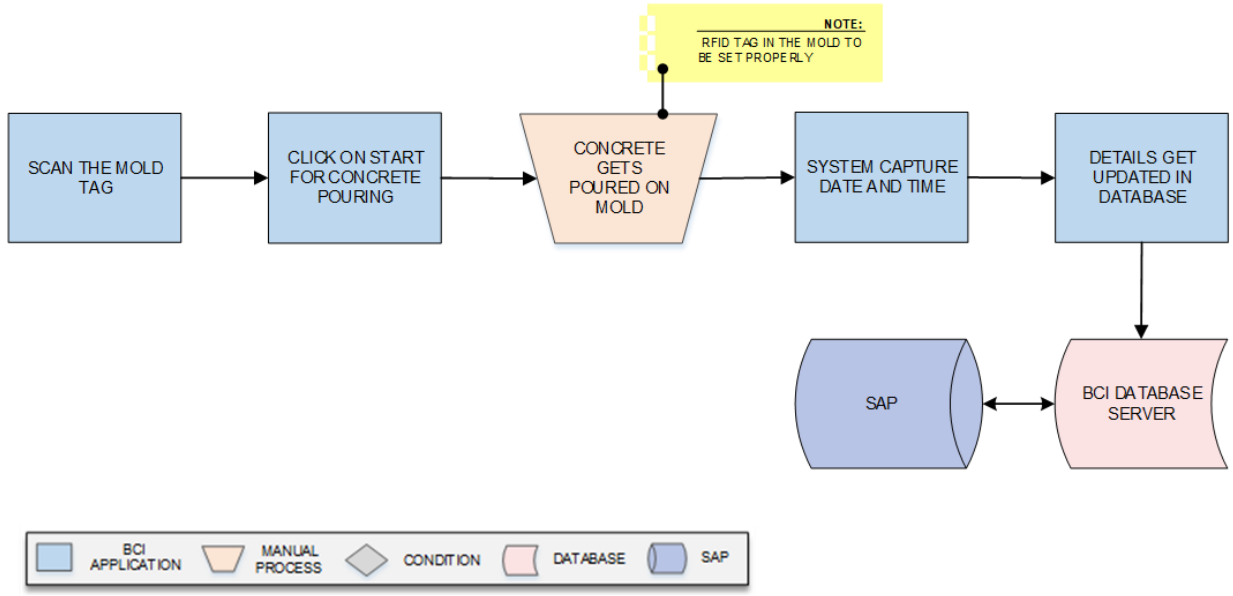
Process Steps	1. Scan the Mold Tag Number. 2. Scan the Segment of the RFID Tag. 3. System validate the Mold ID and Segment ID. **Incase Mold ID and Segment not matched to be rechecked again.* 4. Validated RFID Tag to be join in the Mold Rod. 5. Details will be saved in the database.

Post-Conditions	1. Segment details will get saved in the database. 2. Segment RFID tag attached with the molding material.

Validations	1. An alert should be displayed in case Mold Tag not scanned. 2. An alert should be displayed in case Segment details not mapped with RFID.

	3. An alert should be displayed in case invalid Segment Code is selected. 4. An alert message is displayed in case of any error / invalid activity.

8.4.3 Concrete Pouring



Activities

Module Description	This module process the concrete pouring after confirmation by the molding team. It is based on the concrete vehicle availability segment pouring operation will be take place. The details of the molding with concrete gets saved in database.

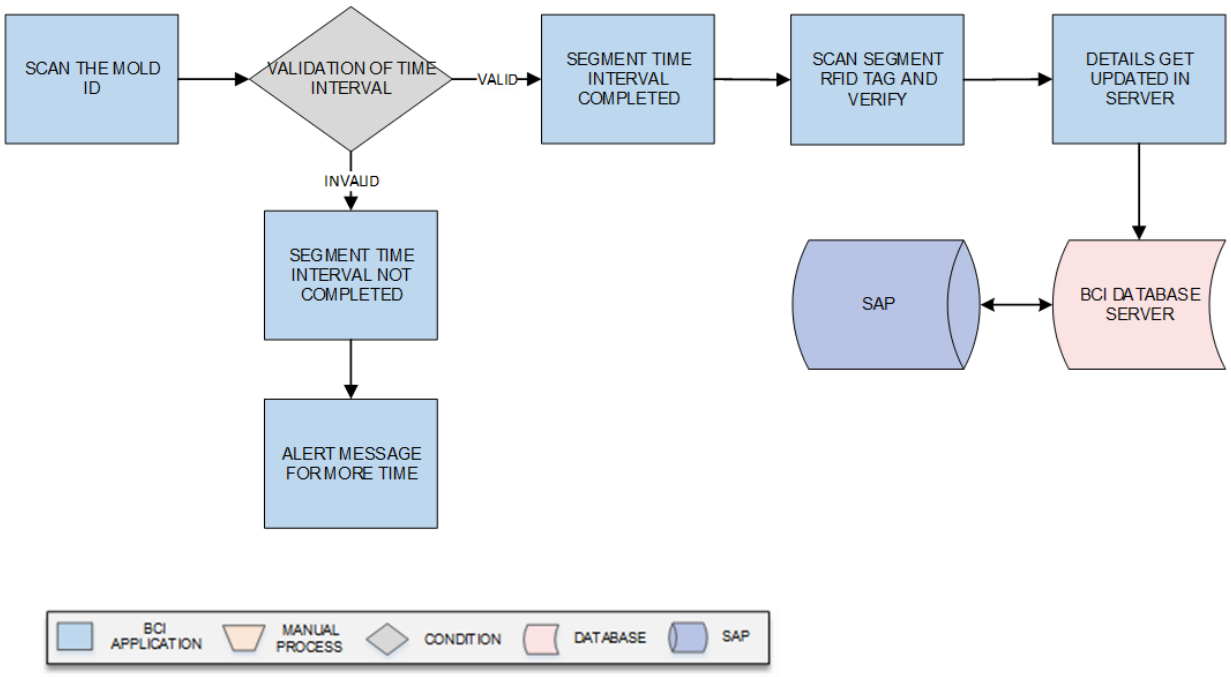
Pre-Conditions	1. Concrete poring should be properly put on RFID tag. 2. Read Mold RFID Tag to capture process timestamp and start pouring concrete in molding

Process Steps	1. Scan the Mold ID after the RFID tagging process. 2. Click on the Start button the Concrete pouring is put on mold.. 3. System will capture the date and time of the process. **Concrete on mold to be poured properly on RFID tag.* 4. Details gets saved in database and stored in SAP.

Post-Conditions	1. Keep concrete in molding for strengthening. 2. Auto-data updating on server in real time.

Validations	1. An alert should be displayed in case concrete is over poured in mold. 2. An alert message is displayed in case of any error / invalid activity.

8.4.4 DE-MOLDING



Activities

Module Description	In these module it states, after concrete pour into segment, the mold will be de-mold after 18 hours of concrete pouring. After 18 hours application will allow for de-molding. In case user try to de-mold before the set time, application shall give alerts. ***It will be a device application device.***

Pre-Conditions	1. Concrete poring should be properly put on RFID tag. 2. Read Mold RFID Tag when molding process is complete.

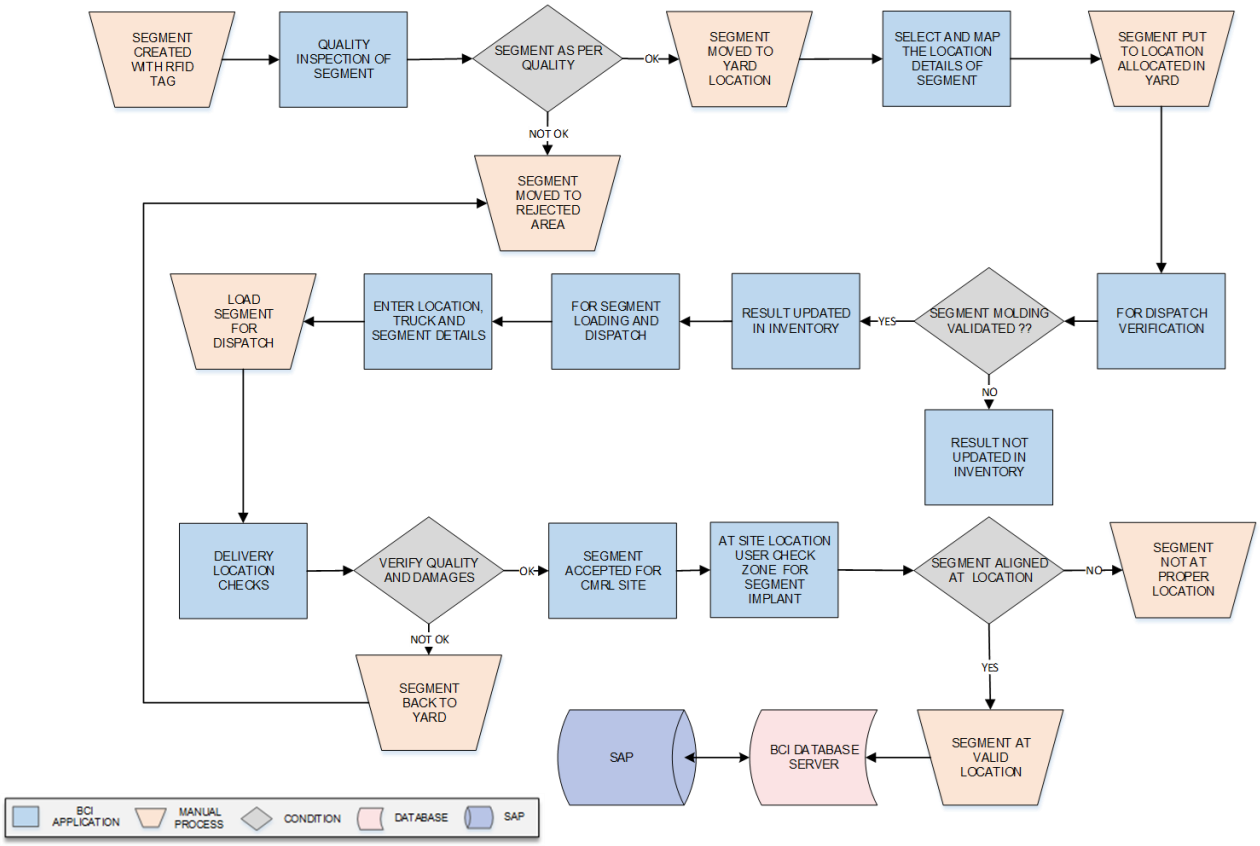
Process Steps	1. Scan the marked Mold ID after concrete poured on it. 2. System will be validated when concrete was poured into the particular mold. 3. If the time interval is not completed it will give alert to the User. 4. Scan the Segment RFID and verify the details. 5. Corresponding details will get updated in database

Post-Conditions	1. Keep concrete in molding for strengthening. 2. System will validate the time interval based on Demolding Strength.

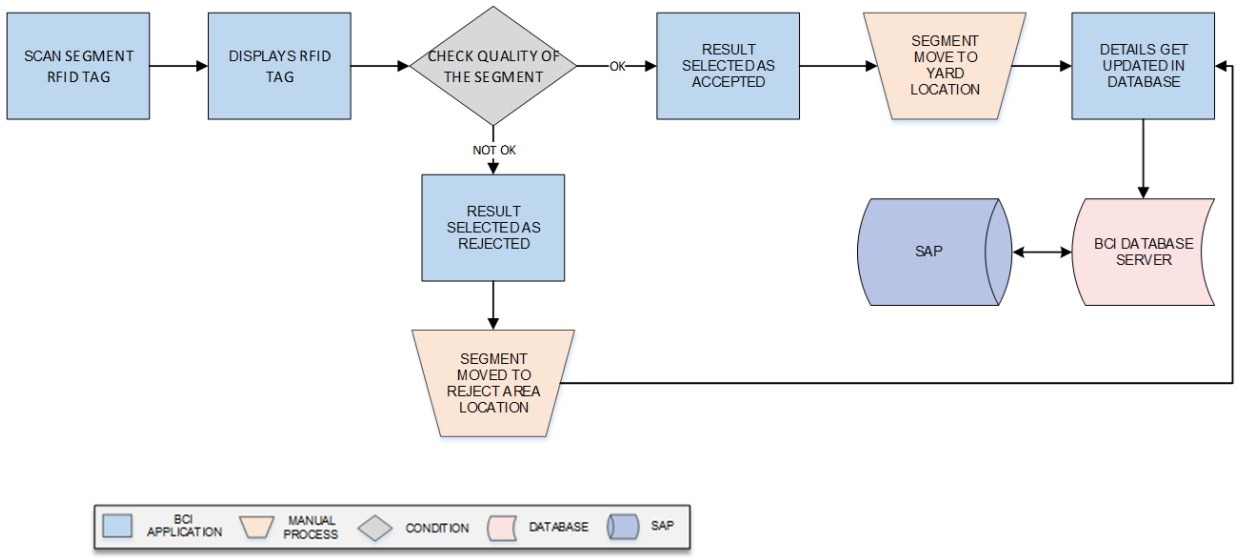
Validations	1. In case time interval is not complete, an error / alert message will be displayed. 2. Alert should be displayed if de-molding timing is more. 3. An alert message is displayed in case of any error / invalid activity.

8.5 RM OPERATIONS

Operation at glance:



8.5.1 Quality Inspection



Activities

Module Description	This module compliance quality, validation and quality result management. Quality Inspection module is important tool to prevent the non-satisfactory goods to be stored in the segment production. ***This activity will be done using Device Application.***

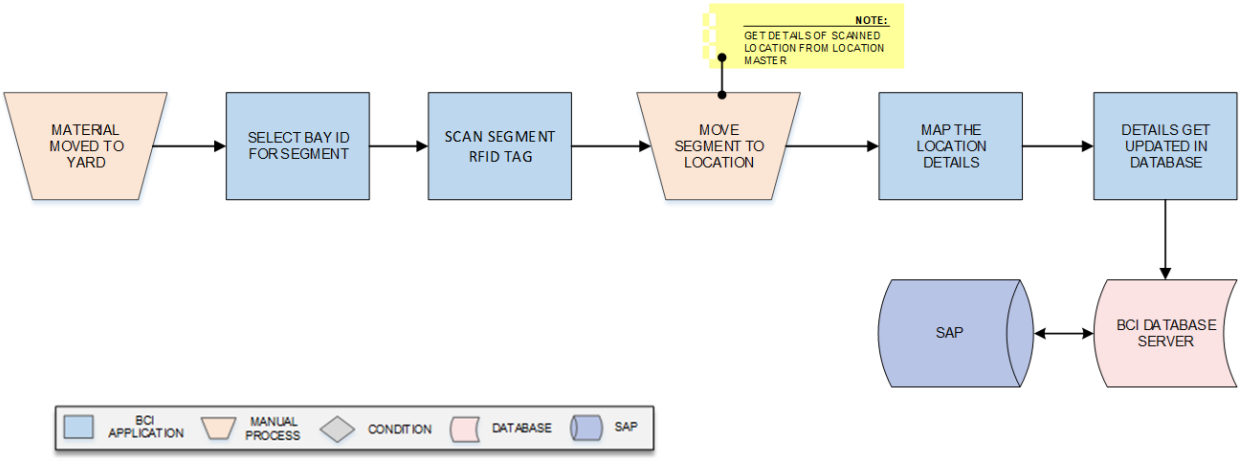
Pre-Conditions	1. QC personal should check Segment produced against defined parameters. 2. QC personal should check the de-molding time before quality. 3. Segment should have RFID tag inside molding.

Process Steps	1. Scan the Segment RFID tag. 2. Display RFID tag details in the system. 3. User will check quality of the Segment against set parameters. 4. If Segment Quantity is “OK”: a. User will enter/ select result as ‘’*Accepted*’’ b. Move Segment to Yard Location for storage. 5. If Segment Quantity is “NOT OK”: a. User will enter/ select result as ‘’ Rejected’’. b. Move Segment to rejection area Location. 6. The quality check details gets updated in the database.

Post-Conditions	1. All accepted Segments shall be moved to Yard Location. 2. All rejected Segments will be moved to Yard Rejection Location.

Validations	1. An alert message is displayed in case of any error / invalid activity. 2. An alert message is displayed in case Segment details is not available in list. 3. Authorized access to the QC application check. 4. Quality Check should be updated against RFI number.

8.5.2 YARD MOVEMENT



Activities

Module Description	This module will let the user to place Segment in yard bay or location. This will be help in optimizing the yard storage space effectively.

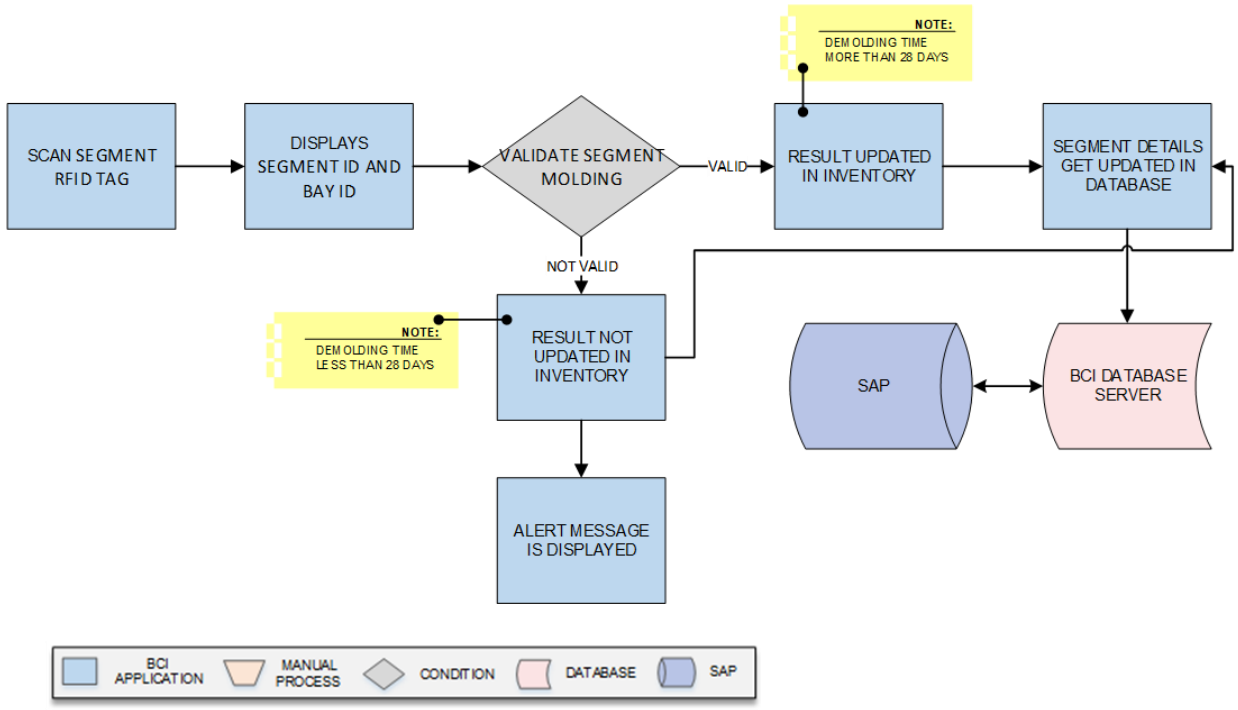
Pre-Conditions	1. Once Quality team accepted the segment it can be moved to yard. 2. Select Bay ID and scan Segment RFID tags and placed it bay.

Process Steps	1. Select the Bay ID from the yard location. 2. Scan the Segment RFID tag to be placed. 3. Place the Segment at scanned location availability. 4. Update Location-material mapping details in database. 5. Save the details in the database.

Post-Conditions	1. Auto- data updating in real time Segment Inventory.

Validations	1. Segment tracking at highly detailed level 2. An alert message is displayed in case of any error/ invalid activity. 3. An alert message is displayed in case Segment ID and Bay ID is not integrated with application. 4. An alert message is displayed in case System is not connected.

8.5.3 DISPATCH VERIFICATION



Activities

Module Description	The module checks the Segment will be verified and checked whether segment curing is for 28 days. Based on this, it will be help to dispatch segment for site implementation. ***This activity will be done using Device Application.***

Pre-Conditions	1. Select RFI Number and scan Segments against Dispatch Plan, Select Truck No. 2. Create Delivery challan by entering RFI Number, Segment ID, Quantity, Destination details etc in Web Application.

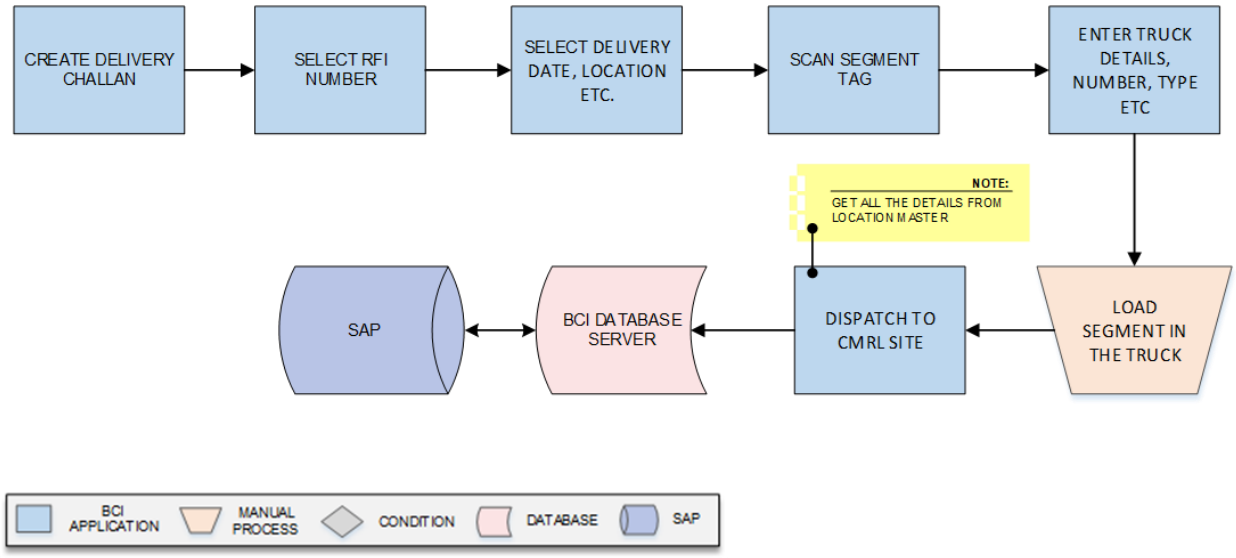
Process Steps	1. User will scan Segment RFID. 2. Segment ID and Bay ID will be displayed. 3. System will be validated for 28 days before molded. 4. If valid (28 days over) updated in Inventory 5. If invalid (less than 28 days) it will not updated in inventory and alert is displayed. 6. Segment details will be updated in the database.

Post-Conditions	1. Load the segments and load into Vehicle for dispatch to CMRL Site.

	2. User should be able to view the Dispatch details before sending to Customer.

Validations	1. An alert message is displayed in case of any error/ invalid activity. 2. An alert message is displayed in case Segment ID and Bay ID is not integrated with application. 3. An alert message is displayed in case System is not connected. 4. An alert message is displayed in case Serial Number is not marked on Segment due to any error. 5. An alert message is displayed in case Molding is not set for less than 28 days.

8.5.4 Segment Loading and Dispatch to Site



Activities

Module Description	The module will be used to pick the Segment that will be dispatched to destination from Yard against Delivery Challan and details for the same will be update the corresponding details in database. ***This activity will be done using Device Application.***

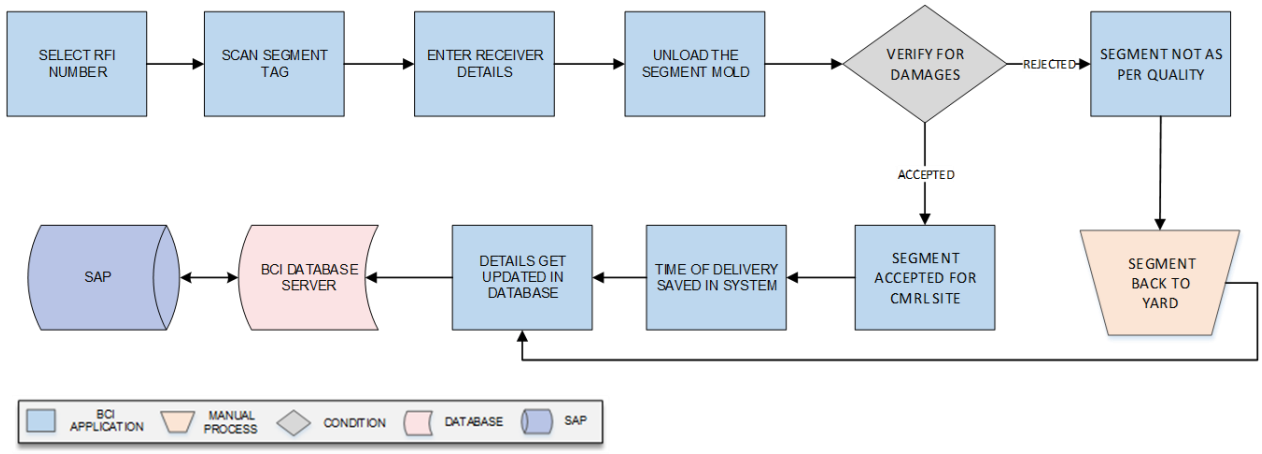
Pre-Conditions	1. Segment should have RFID barcode marked. 2. Scan Segment RFID and check Quality 3. Delivery details to be verified.

Process Steps	1. The Delivery Challan details get created by user. 2. Select RFI Number, Delivery Date, Location etc. 3. Scan the Segment Tag and map with dispatch details. 4. Enter Truck details i.e. Number, Type etc. 5. Load and dispatch segments and dispatch to CMRL Site. 6. Save corresponding details in database.
Post-Conditions	1. Segment which are picked can be move for loading. 2. Segment should get updated as per database.

Validations	1. An alert should be displayed in case segment not marked is scanned. 2. An alert should be displayed if Dispatch details is not available in list. 3. An alert should be displayed if wrong segment is picked. 4. An alert will be displayed if Picked segment quantity entered is more than the quantity stated in segment loading and dispatch list.

8.6 Segment Site Identification Operations

8.6.1 Segment Delivery & Quality Inspection



Activities

Module Description	This module will be used after dispatch from yard, truck will reach the destination, and Segment will be unloaded at implementation site. In case of any damaged Segment shall be returned to yard. The module will help user to update the Segment delivery details in database. ***This activity will be done using device and Web Application.***

Pre-Conditions	1. Scan Segment RFID and check Quality. 2. Update Segment Status based on quality – Accepted for Erection or Rejected.

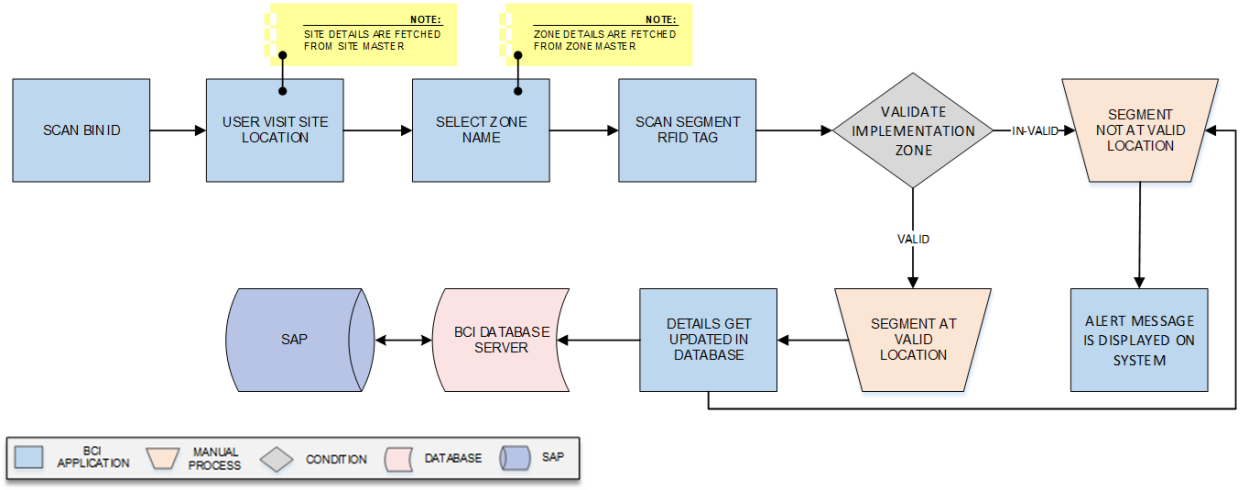
Process Steps	1. Select the RFI no from the list. 2. Scan the Segment barcode. 3. Enter the receiver personnel details. 4. Unload segment from the transport vehicle. 5. Verify the segments for any damages while transportation. 6. In case of any damage send the segments back to the Yard location. 7. The time of delivery will captured by the system. 8. Corresponding details will be updated in database.

Post-Conditions	1. All accepted Segments shall be moved to Tunnel Location. 2. All rejected Segments will be moved to Yard Rejection Location.

	3. Segment received details will get saved in the database.

Validations	1. System will validate input data i.e. text field values and selections. 2. An alert/ error message will be displayed in case invalid / duplicate barcode is being scanned. 3. An alert message is displayed in case of any error / invalid activity.

8.6.2 SITE IDENTIFICATION



Activities

Module Description	This module will be used to validate after erection for the particular zone. CMRL officials will confirm to zone allocated, corresponding details will be updated. When Wi-Fi/ network connectivity is available, details will be updated in the database. ***This activity will be done using Device Application.***

Pre-Conditions	1. Tata/CMRL Inspection Personnel visit the Implementation Site. 2. Select Zone Area and scan 1 Segment RFID tag.

Process Steps	1. Select the Bin ID from dropdown list. 2. Customer will visit for implementation location at site. 3. Select the Zone Name for the segments. 4. Scan Segment RFID tag. 5. System will validate the implementation zone with database. 6. If implementation is at valid locations, Official will confirm with digital signature. *In case location is invalid, alert is displayed.* 7. Update corresponding details in the database.

Post-Conditions	1. System will validate the Grouping ID. 2. Segment details are verified by officials and Saved into the database.

Validations	1. An alert message is displayed in case of any error / invalid activity.

	2. System will validate input data i.e. text field values and selections 3. Segment validation with implemented Zone/ location 4. System will validate Confirmation with digital signature.

9 SRS Scope Change Process

9.1 Before Sign Off

Any changes in SRS need to be informed in writing by Tata Projects Ltd. It will be incorporated / confirmed only after doing detailed feasibility study by BCI.

- If any change is out of scope then this would be done as a CR post feasibility and priority will be decided based on mutual agreement.
- Once the change is developed , any further change in the same would be considered as a CR

9.2 After Sign Off

Any changes in proposed solution after approval of this document by Tata Projects Ltd. are subjected to confirmation from BCI, taking feasibility constraints into account. These changes will be incorporated (if any) into the solution only after delivering proposed solution & may be charged as extra.

- Any change in the proposed solution due to customer system design or process will be considered as CR
- Any process which is not mentioned in this document will not be considered as “mutual understanding or default presence or standard practice”.

The changes in proposed solution before & after acceptance will be mutually agreed and duly signed and accepted by Tata Projects Ltd. & BCI.

9.3 SRS Acceptance

Agreed and Accepted by Tata Projects Ltd. and Bar Code India

For Tata Projects Limited	**For Bar Code India (BCI)**
Name:	**Name:**
Designation:	**Designation:**
Department:	**Department:**