



# Planning Guidelines and Design Standards for Checked Baggage Inspection Systems



Version 9.0  
September 30, 2026  
File 2600.3



---

# **Planning Guidelines and Design Standards for Checked Baggage Inspection Systems**

Version 9.0

Date: September 30, 2026

This document was submitted on 9/15/2026 by:

Alex Fraguada-Pena, PGDS Lead and Type 1 Explosive Detection System Technology Manager, TSA

This document was approved on 9/30/2026 by:

Allison Stout, EBSP Program Manager, TSA

### VERSION HISTORY

| Version | Date               | Modifications                                                                                                                          |
|---------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 1.0     | October 10, 2007   | First published version                                                                                                                |
| 2.0     | January 31, 2009   | Update based on recommended follow-on studies and comments on Version 1.0                                                              |
| 3.0     | November 27, 2009  | Update based on recommended follow-on studies and comments on Version 2.0                                                              |
| 4.0     | July 15, 2011      | Update based on recommended follow-on studies and comments on Version 3.0                                                              |
| 4.1     | September 15, 2011 | Update based on recommended follow-on studies and comments on Version 4.0                                                              |
| 4.2     | May 2, 2014        | Update based on recommended follow-on studies and comments on Version 4.1                                                              |
| 5.0     | July 9, 2015       | Update based on need for clear differentiation between requirements and best practices, follow-on studies, and comments on Version 4.2 |
| 6.0     | September 29, 2017 | Update based on recommended follow-on studies and comments on Version 5.0                                                              |
| 7.0     | August 21, 2020    | Update based on recommended follow-on studies and comments on Version 6.0                                                              |
| 8.0     | December 30, 2022  | Update based on recommended follow-on studies and comments on Version 7.0                                                              |
| 9.0     | September 30, 2026 | Update based on recommended follow-on studies and comments on Version 8.0                                                              |

### DISCLAIMER

The Planning Guidelines and Design Standards (PGDS) for Checked Baggage Inspection Systems (CBISs) is being distributed under the sponsorship of the Transportation Security Administration (TSA) of the U.S. Department of Homeland Security (DHS) in the interest of information exchange. The U.S. Government assumes no liability for the contents or use of this document.

The purpose of the document is to present TSA's requirements and the best documented practices for implementing a high-performance and cost-effective CBIS. This document captures TSA's requirements for a CBIS project from the beginning stages of design through commissioning of the system. Best practices are meant to highlight practices that have proven successful during implementation and that TSA recommends for the Project Sponsor's consideration during the design and construction of a CBIS.

### COMPLIANCE LANGUAGE DEFINITIONS

When used in the PGDS, the terms Requirement, Best Practice, Guidance, and Support statements shall be defined as follows:

**Requirement** – a statement of mandatory practice. All requirement statements are presented in underlined text. The verb “shall” is used. The verbs “should” and “will” are not used in requirement statements.

**Best Practice and Guidance** – a recommendation, but not a mandatory practice. These statements are generated from lessons learned and are used to inform the reader of known effective practices that have proven successful during implementation. Best practice and guidance statements can be identified within the document using the verb “should”. The verbs “shall” and “will” are not used in best practice or guidance statements.

**Support** – an informational statement that does not convey any degree of mandate, recommendation, authorization, prohibition, or enforceable condition. The verbs “shall” and “should” are not used in support statements. The verb “will” can sometimes be used in support statements when referencing items that are the government's responsibility.

### PGDS APPLICABILITY

#### CURRENT VERSION

Designs for new CBISs shall comply with the requirements set forth in this version of the PGDS. See Chapter 4 for other project types and their PGDS compliance.

All CBIS will be tested according to functional and performance requirements effective at the time of testing. This will allow TSA to obtain the best set of test data to evaluate CBIS performance and recommend fixes or improvements to the system. For Operational Analysis Reports and CBIS that are being upgraded or changed, TSA reserves the right to evaluate the CBIS against the most current published PGDS version.



### PRIOR VERSIONS

CBIS project sponsors possessing TSA's formal confirmation of receipt of a complete 30% Detailed Design Package before this PGDS version's publication, remain governed by the PGDS in effect at confirmation. Projects that have passed the 30% Detailed Design phase with TSA approval—including systems under construction or in operation—must comply with the design standards in that approval, whether from earlier PGDS versions or pre-Version 1.0 standards.

### DELAYED OPENING OF CBIS

TSA reserves the right to require a project sponsor to resubmit the 30% Detailed Design Package under the requirements of the latest PGDS if the CBIS has not passed the Integrated Site Acceptance Test (ISAT), according to the PGDS version in effect at the time of the original 30% Detailed Design Package submittal, and within two years of TSA approval of the original 30% Detailed Design Package.

### INDUSTRY COLLABORATION AND COMMENTS

TSA has been collaborating with an Industry Working Group (IWG) that represents airlines, Baggage Handling System (BHS) designers, manufacturers, airlines, and consultants to finalize recommended changes to PGDS Version 8.0.

The PGDS is updated every two years to ensure that its guidance and standards reflect the current technology and operating environment. The IWG will continue to meet with TSA to maintain the collaboration and consider potential changes for incorporation into the next version of PGDS.

The public and industry are invited to submit comments to TSA's PGDS Mailbox at [PGDS@tsa.dhs.gov](mailto:PGDS@tsa.dhs.gov). Comments, as well as TSA proposed changes, will be shared with the IWG prior to each meeting and will be reviewed and discussed during the sessions. Any additional comments provided through the IWG will also be considered during these sessions.

The TSA values all comments from industry stakeholders, but only those comments determined to enhance and improve the PGDS will be incorporated in the next release of the PGDS. An example of the standard form for comments is provided in Appendix A, Section A.8.

The comment form can be found at the [SAM.gov website](https://www.sam.gov) using the search term "PGDS".

**CONTENTS**

**MAIN DOCUMENT**

**VERSION HISTORY ..... I**

**DISCLAIMER..... II**

**COMPLIANCE LANGUAGE DEFINITIONS ..... II**

**PGDS APPLICABILITY ..... II**

    Current Version ..... ii

    Prior Versions ..... iii

    Delayed Opening of CBIS ..... iii

**INDUSTRY COLLABORATION AND COMMENTS ..... III**

**CONTENTS..... IV**

    Main Document .....iv

    Appendices .....xiv

    Tablesxv

    Figures .....xvi

**ACRONYMS AND ABBREVIATIONS ..... XX**

**ACKNOWLEDGEMENTS..... XXII**

**SECTION I: CBIS CONCEPTS ..... 1-1**

**CHAPTER 1 : INTRODUCTION ..... 1-1**

    1.1 Purpose ..... 1-2

    1.2 Background ..... 1-4

    1.3 Organization ..... 1-5

    1.4 Key Changes from PGDS V8 to PGDS V9 ..... 1-6

## CONTENTS

|                                                            |            |
|------------------------------------------------------------|------------|
| <b>CHAPTER 2 : CHECKED BAGGAGE SCREENING PROCESS.....</b>  | <b>2-1</b> |
| 2.1 Screening Process Overview .....                       | 2-2        |
| 2.2 Level 1 — EDS .....                                    | 2-3        |
| 2.3 Level 2 — On-Screen Resolution .....                   | 2-4        |
| 2.4 Level 3 — Checked Baggage Resolution Area .....        | 2-4        |
| <b>CHAPTER 3 : CBIS TYPES AND EQUIPMENT .....</b>          | <b>3-1</b> |
| 3.1 CBIS Overview .....                                    | 3-2        |
| 3.2 CBIS Using Type I EDS.....                             | 3-3        |
| 3.2.1 In-Line CBIS.....                                    | 3-3        |
| 3.2.2 EDS Multiplexed Network .....                        | 3-7        |
| 3.3 CBIS Using Type II EDS.....                            | 3-8        |
| 3.3.1 Mini In-Line CBIS .....                              | 3-8        |
| 3.3.2 Stand-Alone EDS.....                                 | 3-10       |
| 3.4 CBIS Using ETD Units.....                              | 3-16       |
| 3.4.1 Primary Screening .....                              | 3-16       |
| 3.4.2 Alarm Resolution .....                               | 3-20       |
| 3.5 Other Baggage Conveying Systems and Technologies.....  | 3-20       |
| 3.5.1 Individual Carrier Systems .....                     | 3-20       |
| 3.5.2 Mobile Inspection Tables .....                       | 3-21       |
| 3.5.3 Advanced Tracking Technology .....                   | 3-21       |
| 3.5.4 Automatic Image Reconciliation System .....          | 3-21       |
| 3.5.5 Reconstructive Tracking .....                        | 3-22       |
| 3.5.6 Pre-Screening Baggage Storage / Prioritization ..... | 3-22       |
| 3.5.7 Cross-Belt Sorter .....                              | 3-23       |
| <b>SECTION II: CBIS PROJECTS .....</b>                     | <b>3-1</b> |
| <b>CHAPTER 4 : PROJECT PLANNING AND INITIATION.....</b>    | <b>4-1</b> |
| 4.1 CBIS Project Types .....                               | 4-2        |
| 4.1.1 New CBIS Projects .....                              | 4-2        |
| 4.1.2 Recapitalization.....                                | 4-2        |

# CONTENTS

|                                                          |                                                                        |            |
|----------------------------------------------------------|------------------------------------------------------------------------|------------|
| 4.1.3                                                    | Optimization .....                                                     | 4-3        |
| 4.1.4                                                    | PGDS Upgrades .....                                                    | 4-3        |
| 4.1.5                                                    | Expansion .....                                                        | 4-3        |
| 4.2                                                      | Stakeholder Roles and Responsibilities .....                           | 4-3        |
| 4.2.1                                                    | Project Stakeholders .....                                             | 4-3        |
| 4.2.2                                                    | Project Sponsor .....                                                  | 4-4        |
| 4.2.3                                                    | Integrated Local Design Team.....                                      | 4-4        |
| 4.2.4                                                    | TSA Headquarters .....                                                 | 4-5        |
| 4.3                                                      | Project Phases .....                                                   | 4-6        |
| 4.4                                                      | Design-Build Projects .....                                            | 4-7        |
| 4.5                                                      | Design Review Process.....                                             | 4-8        |
| 4.6                                                      | General Submittals Requirements .....                                  | 4-10       |
| 4.6.1                                                    | Supporting Data .....                                                  | 4-10       |
| 4.6.2                                                    | Requests for Variance .....                                            | 4-10       |
| 4.6.3                                                    | Submittals Formatting .....                                            | 4-10       |
| 4.6.4                                                    | Electronic File Naming Convention .....                                | 4-11       |
| 4.6.5                                                    | Design Review Comment Form.....                                        | 4-12       |
| 4.6.6                                                    | Submittals Checklist .....                                             | 4-12       |
| 4.7                                                      | TSA Funding.....                                                       | 4-12       |
| 4.7.1                                                    | Funding Application .....                                              | 4-12       |
| 4.7.2                                                    | Use of TSA-Approved Equipment .....                                    | 4-12       |
| 4.7.3                                                    | Invoicing and Earned Value Management.....                             | 4-13       |
| <b>CHAPTER 5 : SCHEMATIC DESIGN PHASE – PART 1 .....</b> |                                                                        | <b>5-1</b> |
| 5.1                                                      | Schematic Design Phase Overview .....                                  | 5-2        |
| 5.2                                                      | Project Sponsor and ILDT Schematic Design Phase Responsibilities ..... | 5-3        |
| 5.3                                                      | Schematic Design Phase Deliverables .....                              | 5-4        |
| 5.4                                                      | TSA Schematic Design Phase Responsibilities .....                      | 5-5        |
| 5.5                                                      | Baggage Screening Demand Determination.....                            | 5-5        |
| 5.5.1                                                    | Determine Current Checked Baggage Demand.....                          | 5-6        |
| 5.5.2                                                    | Project Future Baggage Demand .....                                    | 5-16       |
| 5.6                                                      | Baggage Screening Equipment Requirements Determination.....            | 5-18       |

## CONTENTS

|                                                         |                                                             |            |
|---------------------------------------------------------|-------------------------------------------------------------|------------|
| 5.6.1                                                   | Parameters and Assumptions.....                             | 5-19       |
| 5.6.2                                                   | EDS Equipment Requirements.....                             | 5-20       |
| 5.6.3                                                   | EDS Equipment Redundancy.....                               | 5-23       |
| 5.6.4                                                   | OSR Station Requirements .....                              | 5-24       |
| 5.6.5                                                   | Baggage Inspection Station Requirements .....               | 5-24       |
| 5.6.6                                                   | ETD Machine Requirements.....                               | 5-28       |
| 5.6.7                                                   | Accommodating Traffic Growth after the Design Year .....    | 5-29       |
| <b>CHAPTER 6 : SCHEMATIC DESIGN PHASE – PART 2.....</b> |                                                             | <b>6-1</b> |
| 6.1                                                     | Schematic Design Phase Part 2 Overview.....                 | 6-2        |
| 6.2                                                     | Alternatives Development and Evaluation.....                | 6-2        |
| 6.2.1                                                   | Alternatives Development.....                               | 6-2        |
| 6.2.2                                                   | Alternatives Evaluation and Selection .....                 | 6-8        |
| 6.3                                                     | Basis of Design Report.....                                 | 6-10       |
| 6.3.1                                                   | Project Requirements .....                                  | 6-10       |
| 6.3.2                                                   | Description of Operations .....                             | 6-11       |
| 6.3.3                                                   | Flow-Based Modeling .....                                   | 6-11       |
| 6.3.4                                                   | Alternatives Analysis.....                                  | 6-12       |
| 6.3.5                                                   | EDS to be Decommissioned.....                               | 6-12       |
| 6.4                                                     | Other Design Package Documents .....                        | 6-12       |
| 6.4.1                                                   | Design Drawings.....                                        | 6-13       |
| 6.4.2                                                   | Project Schedule.....                                       | 6-17       |
| 6.4.3                                                   | Phasing Plan.....                                           | 6-18       |
| 6.4.4                                                   | Screening Equipment Installation Guideline References ..... | 6-19       |
| 6.4.5                                                   | Conveyor Manifest.....                                      | 6-19       |
| 6.4.6                                                   | Specifications.....                                         | 6-20       |
| 6.4.7                                                   | Bid Documents.....                                          | 6-20       |
| 6.4.8                                                   | Stakeholder Notification .....                              | 6-21       |
| <b>CHAPTER 7 : DETAILED DESIGN PHASE .....</b>          |                                                             | <b>7-1</b> |
| 7.1                                                     | Detailed Design Phase Overview .....                        | 7-2        |
| 7.2                                                     | 30% Design .....                                            | 7-2        |
| 7.2.1                                                   | Project Sponsor and ILDT 30% Design Responsibilities.....   | 7-4        |

## CONTENTS

|                                                       |                                                                    |            |
|-------------------------------------------------------|--------------------------------------------------------------------|------------|
| 7.2.2                                                 | 30% Design Deliverables .....                                      | 7-5        |
| 7.2.3                                                 | TSA 30% Design Responsibilities .....                              | 7-5        |
| 7.2.4                                                 | Dynamic Modeling .....                                             | 7-6        |
| 7.3                                                   | 70% Design .....                                                   | 7-8        |
| 7.3.1                                                 | Project Sponsor and ILDT 70% Design Responsibilities .....         | 7-9        |
| 7.3.2                                                 | 70% Design Deliverables .....                                      | 7-10       |
| 7.3.3                                                 | TSA 70% Design Responsibilities .....                              | 7-11       |
| 7.3.4                                                 | Configuration Management .....                                     | 7-11       |
| 7.4                                                   | 100% Design .....                                                  | 7-13       |
| 7.4.1                                                 | Project Sponsor and ILDT 100% Design Responsibilities .....        | 7-14       |
| 7.4.2                                                 | 100% Design Deliverables .....                                     | 7-15       |
| 7.4.3                                                 | TSA 100% Design Responsibilities .....                             | 7-16       |
| 7.5                                                   | Contingency Planning .....                                         | 7-16       |
| 7.5.1                                                 | Type 1 Failures .....                                              | 7-17       |
| 7.5.2                                                 | Type 2 Failures .....                                              | 7-17       |
| 7.5.3                                                 | Type 3 Failures .....                                              | 7-18       |
| 7.5.4                                                 | Type 4 Failures .....                                              | 7-18       |
| 7.5.5                                                 | Recovery Transition .....                                          | 7-18       |
| <b>CHAPTER 8 : CONSTRUCTION PHASE .....</b>           |                                                                    | <b>8-1</b> |
| 8.1                                                   | Construction Phase Overview .....                                  | 8-2        |
| 8.2                                                   | Project Sponsor and ILDT Construction Phase Responsibilities ..... | 8-2        |
| 8.3                                                   | Construction Phase Deliverables .....                              | 8-3        |
| 8.4                                                   | TSA Construction Phase Responsibilities .....                      | 8-3        |
| 8.5                                                   | Meetings .....                                                     | 8-3        |
| 8.6                                                   | Construction Schedule .....                                        | 8-4        |
| 8.7                                                   | Training .....                                                     | 8-4        |
| 8.7.1                                                 | Training Deliverables .....                                        | 8-4        |
| 8.7.2                                                 | CBIS Use and Logistics Training .....                              | 8-5        |
| <b>CHAPTER 9 : TESTING AND EVALUATION PHASE .....</b> |                                                                    | <b>9-1</b> |
| 9.1                                                   | Testing and Evaluation Phase Overview .....                        | 9-2        |
| 9.2                                                   | Planning .....                                                     | 9-3        |

## CONTENTS

|                                                   |                                                     |             |
|---------------------------------------------------|-----------------------------------------------------|-------------|
| 9.3                                               | Pre-ISAT .....                                      | 9-4         |
| 9.4                                               | TRR .....                                           | 9-5         |
| 9.4.1                                             | CBIS Configuration Management Baseline .....        | 9-5         |
| 9.5                                               | ISAT .....                                          | 9-5         |
| 9.6                                               | Operational Run-in: Burn-in .....                   | 9-6         |
| 9.7                                               | Operational Run-in: Analysis .....                  | 9-7         |
| 9.8                                               | Configuration Management .....                      | 9-7         |
| 9.9                                               | Testing Process Variations .....                    | 9-9         |
| <b>CHAPTER 10 PROJECT CLOSEOUT PHASE .....</b>    |                                                     | <b>10-1</b> |
| 10.1                                              | Project Closeout Phase Overview .....               | 10-2        |
| 10.2                                              | Project Closeout Phase Deliverables .....           | 10-2        |
| 10.3                                              | Control System Configuration Documentation .....    | 10-2        |
| 10.3.1                                            | Closeout Submittal Format .....                     | 10-3        |
| 10.3.2                                            | Control System Architecture Drawing .....           | 10-4        |
| 10.3.3                                            | Lower-Level Network Configuration Information ..... | 10-4        |
| 10.3.4                                            | HMI Configuration .....                             | 10-4        |
| 10.3.5                                            | High-level Computer Configuration .....             | 10-5        |
| 10.3.6                                            | Programming and Configuration Software .....        | 10-5        |
| 10.3.7                                            | CBIS/ISAT Benchmark Data .....                      | 10-5        |
| <b>CHAPTER 11 : LIFECYCLE COST ANALYSIS .....</b> |                                                     | <b>11-1</b> |
| 11.1                                              | Cost Analysis Overview .....                        | 11-2        |
| 11.2                                              | Lifecycle Cost Analysis .....                       | 11-2        |
| 11.2.1                                            | LCCA Assumptions .....                              | 11-2        |
| 11.2.2                                            | Capital Costs .....                                 | 11-3        |
| 11.2.3                                            | Soft Costs .....                                    | 11-6        |
| 11.2.4                                            | O&M Costs .....                                     | 11-6        |
| 11.2.5                                            | Staffing Costs .....                                | 11-9        |
| 11.3                                              | Basis of Estimate (BOE) Document .....              | 11-9        |
| 11.3.1                                            | Purpose .....                                       | 11-10       |
| 11.3.2                                            | Executive Summary .....                             | 11-10       |
| 11.3.3                                            | Project Scope Description .....                     | 11-11       |

# CONTENTS

|                                                                                |                                                |             |
|--------------------------------------------------------------------------------|------------------------------------------------|-------------|
| 11.3.4                                                                         | Methodology Used to Prepare the Estimate ..... | 11-11       |
| 11.4                                                                           | Current Working Estimate Submissions .....     | 11-14       |
| 11.4.1                                                                         | Cost Estimate Breakouts .....                  | 11-16       |
| 11.4.2                                                                         | Cost Estimate Pricing Substantiation .....     | 11-17       |
| 11.4.3                                                                         | Allocable Costs .....                          | 11-17       |
| 11.5                                                                           | Estimate Reconciliation .....                  | 11-17       |
| 11.6                                                                           | Estimate Trending .....                        | 11-18       |
| <b>SECTION III: CBIS DESIGN REQUIREMENTS AND INDUSTRY BEST PRACTICES .....</b> |                                                | <b>11-1</b> |
| <b>CHAPTER 12 : CBIS DESIGN REQUIREMENTS .....</b>                             |                                                | <b>12-1</b> |
| 12.1                                                                           | CBIS Design Principles .....                   | 12-2        |
| 12.2                                                                           | CBIS Screening Throughput Capacity .....       | 12-3        |
| 12.2.1                                                                         | BHS Capacity .....                             | 12-3        |
| 12.2.2                                                                         | BHS Redundancy .....                           | 12-4        |
| 12.3                                                                           | Tail-to-Head Bag Spacing Requirement .....     | 12-4        |
| 12.4                                                                           | Bag Time-in-System .....                       | 12-5        |
| 12.5                                                                           | Bag Travel Time Requirements .....             | 12-5        |
| 12.6                                                                           | Bag Tracking .....                             | 12-5        |
| 12.6.1                                                                         | Positive Bag Tracking Requirements .....       | 12-5        |
| 12.6.2                                                                         | CBIS Bag Detection Requirements .....          | 12-9        |
| 12.6.3                                                                         | Bag Tag Identification Best Practices .....    | 12-10       |
| 12.7                                                                           | Conveyor System Design .....                   | 12-11       |
| 12.7.1                                                                         | CBIS Conveyor Subsystem Nomenclature .....     | 12-11       |
| 12.7.2                                                                         | Conveyor Inputs .....                          | 12-11       |
| 12.7.3                                                                         | Divert and Merge Requirements .....            | 12-12       |
| 12.7.4                                                                         | Baggage Allocation Methodology .....           | 12-12       |
| 12.7.5                                                                         | Conveyor System Design Best Practices .....    | 12-13       |
| 12.7.6                                                                         | Recirculation Loop Requirement .....           | 12-17       |
| 12.7.7                                                                         | Reinsertion Line Requirement .....             | 12-17       |
| 12.7.8                                                                         | Draft Curtains Requirement .....               | 12-17       |
| 12.7.9                                                                         | Stack Light Requirements .....                 | 12-17       |
| 12.7.10                                                                        | System Conveyable Items .....                  | 12-17       |



## CONTENTS

|                                                                        |                                                               |             |
|------------------------------------------------------------------------|---------------------------------------------------------------|-------------|
| 12.7.11                                                                | Oversize Bag Conveyance .....                                 | 12-18       |
| 12.7.12                                                                | Out-Of-Gauge Bag Conveyance.....                              | 12-18       |
| 12.8                                                                   | Fail-Safe Events .....                                        | 12-18       |
| 12.9                                                                   | EDS Daily Operational Test.....                               | 12-19       |
| 12.10                                                                  | Pre-EDS Bag Jam Rate.....                                     | 12-21       |
| 12.11                                                                  | EDS Maintainability .....                                     | 12-22       |
| 12.11.1                                                                | Service Access / Equipment.....                               | 12-22       |
| 12.11.2                                                                | EDS Part Replacement Provisions .....                         | 12-22       |
| 12.11.3                                                                | Environment.....                                              | 12-23       |
| 12.11.4                                                                | Storage and Spare Parts Access.....                           | 12-25       |
| 12.11.5                                                                | EDS Replacement .....                                         | 12-25       |
| 12.11.6                                                                | EDS Power Requirements.....                                   | 12-25       |
| 12.11.7                                                                | EDS Network and Connectivity.....                             | 12-26       |
| 12.12                                                                  | CBIS Reporting.....                                           | 12-29       |
| 12.12.1                                                                | Reporting Frequency Requirement.....                          | 12-29       |
| 12.12.2                                                                | Reporting Detail Requirements.....                            | 12-29       |
| 12.12.3                                                                | Daily Reporting Requirements.....                             | 12-33       |
| 12.12.4                                                                | BHS ID Log Report Requirements.....                           | 12-33       |
| 12.12.5                                                                | BHS Reporting During Maintenance .....                        | 12-34       |
| 12.13                                                                  | Mini In-line CBIS Requirements .....                          | 12-34       |
| 12.13.1                                                                | Fail-Safe Operation Requirements for a Mini In-Line CBIS..... | 12-34       |
| 12.13.2                                                                | Bag Travel Time Requirements .....                            | 12-35       |
| 12.14                                                                  | Baseline Testing Requirements .....                           | 12-36       |
| <b>CHAPTER 13 : ON-SCREEN RESOLUTION AREA PLANNING STANDARDS .....</b> |                                                               | <b>13-1</b> |
| 13.1                                                                   | OSRA Overview .....                                           | 13-2        |
| 13.2                                                                   | General Space Design .....                                    | 13-2        |
| 13.3                                                                   | Floor Plan .....                                              | 13-3        |
| 13.4                                                                   | Viewing Station Design.....                                   | 13-5        |
| 13.4.1                                                                 | Desk Specifications .....                                     | 13-6        |
| 13.4.2                                                                 | Chair Specifications .....                                    | 13-6        |
| 13.4.3                                                                 | Additional Requirements.....                                  | 13-6        |

# CONTENTS

|                                                                              |             |
|------------------------------------------------------------------------------|-------------|
| <b>CHAPTER 14 : CHECKED BAGGAGE RESOLUTION AREA PLANNING STANDARDS .....</b> | <b>14-1</b> |
| 14.1 CBRA Overview.....                                                      | 14-2        |
| 14.2 CBRA Layout.....                                                        | 14-2        |
| 14.3 Baggage Inspection Stations.....                                        | 14-3        |
| 14.3.1 BIS Ancillary Equipment .....                                         | 14-7        |
| 14.3.2 Baggage Removal Point.....                                            | 14-8        |
| 14.3.3 CBRA BHS Displays.....                                                | 14-9        |
| 14.4 CBRA Functionality .....                                                | 14-10       |
| 14.4.1 BIS Utilization.....                                                  | 14-10       |
| 14.4.2 Alarm Line Queuing .....                                              | 14-11       |
| 14.4.3 Baggage Removal Point Lag Timer.....                                  | 14-15       |
| 14.4.4 Scan Guns .....                                                       | 14-15       |
| 14.4.5 Baggage Process and Screening Timers .....                            | 14-15       |
| 14.4.6 Reinsert Line.....                                                    | 14-16       |
| 14.5 BSD Operations.....                                                     | 14-16       |
| 14.5.1 BSD Screens Design .....                                              | 14-16       |
| 14.5.2 BSD Statuses and High-level Processing Procedures .....               | 14-19       |
| 14.5.3 Station Disabled and Waiting for Bag Screens.....                     | 14-21       |
| 14.5.4 Bag Processing by Status.....                                         | 14-22       |
| 14.5.5 Manual Reinsertion .....                                              | 14-30       |
| 14.5.6 Bag Waiting Alerts .....                                              | 14-32       |
| 14.6 General CBRA Design Considerations .....                                | 14-33       |
| 14.6.1 Bag Storage Capacity .....                                            | 14-33       |
| 14.6.2 Architectural Features.....                                           | 14-34       |
| 14.6.3 CBRA Physical Space Requirements.....                                 | 14-34       |
| 14.6.4 Lighting .....                                                        | 14-35       |
| 14.6.5 Heating, Ventilation, and Air Conditioning .....                      | 14-35       |
| 14.6.6 Power and Communications.....                                         | 14-35       |
| 14.6.7 Connectivity to TSA Network .....                                     | 14-36       |
| 14.6.8 CBRA Noise Abatement .....                                            | 14-36       |
| 14.6.9 Ergonomic Design Dimensions.....                                      | 14-36       |
| 14.6.10 Conveyor System Crossovers and Catwalks .....                        | 14-36       |
| 14.6.11 Conveyor Belt End Points on Alarm Line .....                         | 14-37       |

# CONTENTS

|                                                                         |                                                        |             |
|-------------------------------------------------------------------------|--------------------------------------------------------|-------------|
| 14.6.12                                                                 | Design for Safety .....                                | 14-37       |
| <b>CHAPTER 15 : CBIS OPERATING AND MAINTENANCE BEST PRACTICES .....</b> |                                                        | <b>15-1</b> |
| 15.1                                                                    | CBIS Operating Best Practices .....                    | 15-2        |
| 15.1.1                                                                  | CBIS Remote Reporting Workstation .....                | 15-2        |
| 15.1.2                                                                  | CBIS Reporting Trends.....                             | 15-2        |
| 15.1.3                                                                  | CBIS Testing.....                                      | 15-3        |
| 15.1.4                                                                  | BHS O&M Contracts .....                                | 15-3        |
| 15.1.5                                                                  | Communications .....                                   | 15-3        |
| 15.2                                                                    | Maintenance Best Practices .....                       | 15-3        |
| 15.2.1                                                                  | Maintenance Responsibility Matrix .....                | 15-4        |
| 15.2.2                                                                  | Operator Training.....                                 | 15-4        |
| 15.2.3                                                                  | Frequency of Preventive Maintenance .....              | 15-4        |
| 15.2.4                                                                  | CBIS Environment .....                                 | 15-5        |
| 15.2.5                                                                  | Aligning BHS and EDS Preventive Maintenance .....      | 15-5        |
| 15.2.6                                                                  | BHS Maintenance Best Practice.....                     | 15-5        |
| <b>CHAPTER 16 : INFORMATION TECHNOLOGY SECURITY .....</b>               |                                                        | <b>16-1</b> |
| 16.1                                                                    | Cybersecurity Overview.....                            | 16-2        |
| 16.2                                                                    | NIST Controls .....                                    | 16-4        |
| 16.2.1                                                                  | Access Control (AC) .....                              | 16-4        |
| 16.2.2                                                                  | Assessment, Authorization, and Monitoring (CA).....    | 16-5        |
| 16.2.3                                                                  | Identification and Authentication (IA).....            | 16-6        |
| 16.2.4                                                                  | Media Protection (MP) .....                            | 16-6        |
| 16.2.5                                                                  | System and Information Integrity (SI) .....            | 16-7        |
| 16.2.6                                                                  | Systems and Communication Protection (SC) .....        | 16-7        |
| 16.3                                                                    | Network and Switch Fabric.....                         | 16-8        |
| 16.4                                                                    | Incident Handling and Response .....                   | 16-9        |
| 16.5                                                                    | Cybersecurity Reference .....                          | 16-9        |
| 16.6                                                                    | Advanced Surveillance Program Video Surveillance ..... | 16-10       |

## APPENDICES

|                                                                                    |            |
|------------------------------------------------------------------------------------|------------|
| <b>APPENDIX A : FORMS, TEMPLATES, OUTLINES AND EXAMPLES .....</b>                  | <b>A-1</b> |
| A.1 CBIS Use and Logistics Training Example.....                                   | A-3        |
| A.2 CBIS Operations Guide – Sample Outline .....                                   | A-5        |
| A.3 Baggage and Data Flow Chart Examples .....                                     | A-7        |
| A.4 CBIS Report Examples.....                                                      | A-10       |
| A.4.1 Daily CBIS Summary Report .....                                              | A-11       |
| A.4.2 Daily CBIS Bag Volume Report.....                                            | A-13       |
| A.4.3 CBIS Executive Summary Report.....                                           | A-14       |
| A.4.4 CBRA Executive Summary Report.....                                           | A-15       |
| A.4.5 PEC Tracking Report.....                                                     | A-16       |
| A.4.6 CBRA Bag Process Report.....                                                 | A-17       |
| A.4.7 CBRA Bag Report.....                                                         | A-18       |
| A.4.8 CBIS Hourly Throughput Report.....                                           | A-19       |
| A.4.9 CBIS Bag Spacing Report .....                                                | A-20       |
| A.4.10 CBIS Performance Report.....                                                | A-21       |
| A.5 PGDS Request for Variance (RFV) Form .....                                     | A-23       |
| A.6 CBIS Change Request (CCR) Form .....                                           | A-24       |
| A.6.1 CCR Example .....                                                            | A-25       |
| A.7 Field Data Reporting System (FDRS) Data Requests .....                         | A-27       |
| A.8 Industry Comment Template .....                                                | A-30       |
| <b>APPENDIX B : GENERIC EXAMPLES OF CHECKED BAGGAGE INSPECTION SYSTEMS .....</b>   | <b>B-1</b> |
| B.1 Introduction.....                                                              | B-2        |
| B.2 Methodology for Developing Generic Examples .....                              | B-2        |
| B.3 Generic Examples of Linear CBIS Design Concepts .....                          | B-3        |
| B.3.1 Linear CBIS Design Concept A .....                                           | B-4        |
| B.3.2 Linear CBIS Design Concept B .....                                           | B-6        |
| B.4 Generic Examples of Individual Carrier System-Based CBIS Design Concepts ..... | B-8        |
| B.4.1 Description of Individual Carrier System-based CBIS Design Concept C.....    | B-10       |
| B.4.2 Evaluation of Individual Carrier System-based CBIS Design Concept C.....     | B-10       |
| B.4.3 Description of Individual Carrier System-based CBIS Design Concept D.....    | B-12       |

## CONTENTS

|                                                                                   |                                                                           |            |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------|------------|
| B.4.4                                                                             | Evaluation of Individual Carrier System-Based CBIS Design Concept D ..... | B-12       |
| <b>APPENDIX C : GENERIC BHS AND CBIS RESPONSIBILITY MATRIX .....</b>              |                                                                           | <b>C-1</b> |
| <b>APPENDIX D : REFERENCES .....</b>                                              |                                                                           | <b>D-1</b> |
| D.1                                                                               | Transportation Security Administration .....                              | D-2        |
| D.2                                                                               | Other Federal Agencies.....                                               | D-3        |
| D.3                                                                               | Industry Guidance Documents .....                                         | D-4        |
| D.4                                                                               | Additional Cybersecurity Resources .....                                  | D-5        |
| <b>APPENDIX E : REQUIREMENTS LISTS.....</b>                                       |                                                                           | <b>E-1</b> |
| Applicability Requirements .....                                                  |                                                                           | E-2        |
| Chapter 3: CBIS Types and Equipment Requirements.....                             |                                                                           | E-2        |
| Chapter 4: Project Planning and Initiation .....                                  |                                                                           | E-3        |
| Chapter 5: Schematic Design Phase - Part 1 .....                                  |                                                                           | E-4        |
| Chapter 6: Schematic Design Phase - Part 2 .....                                  |                                                                           | E-8        |
| Chapter 7: Detailed Design Phase Requirements .....                               |                                                                           | E-13       |
| Chapter 8: Construction Phase Requirements.....                                   |                                                                           | E-17       |
| Chapter 9: Testing and Evaluation Phase Requirements .....                        |                                                                           | E-19       |
| Chapter 10: Project Closeout Phase Requirements .....                             |                                                                           | E-20       |
| Chapter 11: Lifecycle Cost Estimating Requirements .....                          |                                                                           | E-22       |
| Chapter 12: CBIS Design Requirements.....                                         |                                                                           | E-25       |
| Chapter 13: On-Screen Resolution Area Planning Standards and Requirements .....   |                                                                           | E-37       |
| Chapter 14: Checked Baggage Resolution Area Planning Standards Requirements ..... |                                                                           | E-38       |
| <br><b>TABLES</b>                                                                 |                                                                           |            |
| Table 3-1: Type I EDS.....                                                        |                                                                           | 3-3        |
| Table 3-2: EDS Networking Type Comparison .....                                   |                                                                           | 3-8        |
| Table 3-3: Type II EDS for Stand-Alone CBIS Configuration .....                   |                                                                           | 3-10       |
| Table 3-4: ETD for Primary Screening and Alarm Resolution .....                   |                                                                           | 3-16       |
| Table 5-1: Passenger Arrival Distributions.....                                   |                                                                           | 5-12       |
| Table 5-2: Summary of Input Data Needs and Potential Data Sources .....           |                                                                           | 5-14       |
| Table 5-3: Example Baggage Demand Projection.....                                 |                                                                           | 5-18       |
| Table 5-4: Assumed Design Values.....                                             |                                                                           | 5-20       |

## CONTENTS

|                                                                                                    |       |
|----------------------------------------------------------------------------------------------------|-------|
| Table 5-5: Required BIS for Systems with a Combined Alarmed + Reinsert + OOG Line .....            | 5-25  |
| Table 5-6: Required BIS for Systems with a Separate OOG Line .....                                 | 5-26  |
| Table 6-1: Required Drawing Elements for Specified Project Phases .....                            | 6-14  |
| Table 11-1: Estimated EDS/SVS/PVS/Network Procurement and Installation Costs .....                 | 11-4  |
| Table 11-2: Estimated ETD Procurement and Installation Costs .....                                 | 11-4  |
| Table 11-3: Components of Direct Installation Costs .....                                          | 11-4  |
| Table 11-4: EDS Annual Maintenance Costs .....                                                     | 11-7  |
| Table 11-5: Screening Equipment Electrical Consumption .....                                       | 11-8  |
| Table 11-6: Estimated Annual Incremental BHS O&M Costs for New Systems Without Existing CBIS ..... | 11-9  |
| Table 12-1: Baseline Testing Requirements .....                                                    | 12-36 |
| Table 14-1: List of Tools Needed for the Bag Inspection Process .....                              | 14-6  |
| Table 14-2: BSD Color Requirements .....                                                           | 14-17 |
| Table 14-3: Example of CBRA Accumulation .....                                                     | 14-33 |
| Table 15-1: TSA Procurement and Maintenance Responsibility Matrix .....                            | 15-4  |
| Table 16-1: ASP Recommended Fields of View .....                                                   | 16-10 |
| Appendix Table C-1: Generic BHS and CBIS Responsibility Matrix Revision 3 .....                    | C-2   |

## FIGURES

|                                                                                                     |      |
|-----------------------------------------------------------------------------------------------------|------|
| Figure 2-1: Generic In-Line Checked Baggage Inspection System .....                                 | 2-2  |
| Figure 2-2: Isometric View of Generic CBIS .....                                                    | 2-3  |
| Figure 3-1: Schematic Visualization of an In-Line CBIS Using Type I EDS .....                       | 3-4  |
| Figure 3-2: Leidos eXaminer 3DX 6700 and eXaminer 3DX 6700 ES Applicable System Type: In-line ..... | 3-5  |
| Figure 3-3: Smiths CTX 9800 Applicable System Type: In-line .....                                   | 3-6  |
| Figure 3-4: Example Mini In-Line Configuration .....                                                | 3-9  |
| Figure 3-5: Example Stand-Alone EDS Configuration .....                                             | 3-11 |
| Figure 3-6: Schematic Visualization of Stand-Alone EDS Configurations .....                         | 3-12 |
| Figure 3-7: Reveal CT-80DR+Applicable System Type: Stand-Alone .....                                | 3-14 |
| Figure 3-8: Smiths Detection CTX 5800 Applicable System Type: Stand-Alone .....                     | 3-15 |
| Figure 3-9: Schematic Visualization of an ETD Primary Screening System .....                        | 3-17 |
| Figure 3-10: Smiths IonScan 500DT Applicable System Type—Stand-Alone ETD .....                      | 3-18 |
| Figure 3-11: Leidos QS-B220 Applicable System Type—Stand-Alone ETD .....                            | 3-19 |

## CONTENTS

|                                                                                                                 |       |
|-----------------------------------------------------------------------------------------------------------------|-------|
| Figure 4-1: CBIS Project Design Phases .....                                                                    | 4-7   |
| Figure 4-2: Summary of Responsibilities During the Design Process .....                                         | 4-9   |
| Figure 4-3: Earned Value Management Graph .....                                                                 | 4-14  |
| Figure 5-1: Schematic Phase Process Flow .....                                                                  | 5-2   |
| Figure 5-2: Summary of Schematic Design Phase .....                                                             | 5-3   |
| Figure 5-3: Example 12-Month FDRS Peak 10-Minute Daily Volume, Ascending .....                                  | 5-7   |
| Figure 5-4: Earliness Distributions – Domestic Departures Before 8/9:00 A.M. and Off-Peak-After 8/9:00 AM ..... | 5-10  |
| Figure 5-5: Earliness Distribution – International Departures .....                                             | 5-11  |
| Figure 5-6: Lateness Distribution – International Recheck .....                                                 | 5-12  |
| Figure 5-7: ADPM Checked Baggage Flow .....                                                                     | 5-15  |
| Figure 5-8: Example Growth Rate Calculation .....                                                               | 5-17  |
| Figure 5-9: Example EDS Throughput Calculation .....                                                            | 5-22  |
| Figure 5-10: Example EDS Requirements Calculation .....                                                         | 5-23  |
| Figure 5-11: Example Oversize BIS Calculation .....                                                             | 5-27  |
| Figure 5-12: Example ETD Calculations .....                                                                     | 5-28  |
| Figure 6-1: Schematic Design Phase Alternatives Development and Evaluation .....                                | 6-3   |
| Figure 6-2: System Type Comparison .....                                                                        | 6-5   |
| Figure 7-1: Detailed Design Phase, 30% Design Process Flow .....                                                | 7-3   |
| Figure 7-2: Summary of 30% Detailed Design Phase .....                                                          | 7-4   |
| Figure 7-3: Detailed Design Phase, 70% Design Process Flow .....                                                | 7-8   |
| Figure 7-4: Summary of 70% Detailed Design Phase .....                                                          | 7-9   |
| Figure 7-5: Detailed Design Phase, 100% Design Process Flow .....                                               | 7-13  |
| Figure 7-6: Summary Of 100% Detailed Design Phase .....                                                         | 7-14  |
| Figure 8-1: Summary of Construction Phase .....                                                                 | 8-2   |
| Figure 9-1: Summary of Testing and Evaluation Phase .....                                                       | 9-3   |
| Figure 9-2: CBIS CM Process .....                                                                               | 9-8   |
| Figure 10-1: Summary of Project Closeout Phase .....                                                            | 10-2  |
| Figure 11-1: Sample Work Breakdown Structure .....                                                              | 11-12 |
| Figure 11-2: Current Working Estimate Summary .....                                                             | 11-15 |
| Figure 12-1: Example Static Deflector .....                                                                     | 12-15 |
| Figure 12-2: Example In-Line Fail-Safe Zone .....                                                               | 12-19 |
| Figure 12-3: Common OTK Access between two EDS .....                                                            | 12-21 |

## CONTENTS

|                                                                                                 |       |
|-------------------------------------------------------------------------------------------------|-------|
| Figure 12-4: EDS Maintenance and Environment Assessment.....                                    | 12-24 |
| Figure 12-5: Leidos Sample EDS Network Diagram .....                                            | 12-27 |
| Figure 12-6: Smiths Detection Sample EDS Network Diagram.....                                   | 12-28 |
| Figure 12-7: Mini In-Line Fail-Safe Designs.....                                                | 12-35 |
| Figure 13-1: Linear Viewing Stations Floor Plan.....                                            | 13-4  |
| Figure 13-2: U-Shaped Viewing Stations Floor Plan .....                                         | 13-5  |
| Figure 13-3: View Station Side View.....                                                        | 13-7  |
| Figure 14-1: Optimal CBRA Layout for Smaller Systems .....                                      | 14-3  |
| Figure 14-2: Example CBRA Baggage Inspection Station .....                                      | 14-4  |
| Figure 14-3: CBRA Baggage Inspection Station Cross Section .....                                | 14-5  |
| Figure 14-4: CBRA Workstation Elevation.....                                                    | 14-7  |
| Figure 14-5: Photo Eye Reflector Cover .....                                                    | 14-9  |
| Figure 14-6: BIS Utilization Example .....                                                      | 14-11 |
| Figure 14-7: Level 1 Queuing .....                                                              | 14-13 |
| Figure 14-8: Level 2 Queuing .....                                                              | 14-14 |
| Figure 14-9: Level 3 Queuing .....                                                              | 14-15 |
| Figure 14-10: Elements of Bag Status Display Screen.....                                        | 14-18 |
| Figure 14-11: High-level Procedure Per Bag Status.....                                          | 14-20 |
| Figure 14-12: Station Disabled (left side) and Station Enabled (right side) Screens .....       | 14-21 |
| Figure 14-13: Station Disabled (left side) and Manual Mode Activated (right side) Screens ..... | 14-22 |
| Figure 14-14: Cleared Bag Processing Screens and Sequence of Operations .....                   | 14-24 |
| Figure 14-15: Alarmed Bag Processing Screens and Sequence of Operations.....                    | 14-25 |
| Figure 14-16: Out-of-Gauge Bag Processing Screens and Sequence of Operations.....               | 14-26 |
| Figure 14-17: EDS ERRORED Bag Processing Screens and Sequence of Operations.....                | 14-27 |
| Figure 14-18: UNKNOWN Bag Processing Screens and Sequence of Operations .....                   | 14-28 |
| Figure 14-19: Unique Identifier Cell Messages.....                                              | 14-29 |
| Figure 14-20: Manual Reinsert – Out-of-Gauge Bag Screen .....                                   | 14-30 |
| Figure 14-21: Manual Reinsert – EDS Error Bag Screen .....                                      | 14-31 |
| Figure 14-22: Manual Reinsert – Unknown Bag Screen .....                                        | 14-31 |
| Figure 14-23: Example of Bag Waiting Alert for Alarm Bag Screen .....                           | 14-32 |
| Figure 16-1: Industrial Control System High-Level View .....                                    | 16-3  |



## CONTENTS

|                                                                                                      |      |
|------------------------------------------------------------------------------------------------------|------|
| Appendix Figure A-1: Baggage and Data Flow Chart with Upstream ATR .....                             | A-8  |
| Appendix Figure A-2: Baggage and Data Flow Chart with Downstream ATR.....                            | A-9  |
| Appendix Figure A-3: Daily CBIS Summary Report .....                                                 | A-11 |
| Appendix Figure A-4: Daily CBIS Summary Report Definitions.....                                      | A-12 |
| Appendix Figure A-5: Daily CBIS Bag Volume Report .....                                              | A-13 |
| Appendix Figure A-6: CBIS Executive Summary Report.....                                              | A-14 |
| Appendix Figure A-7: CBRA Executive Summary Report .....                                             | A-15 |
| Appendix Figure A-8: PEC Tracking Report .....                                                       | A-16 |
| Appendix Figure A-9: CBRA Bag Process Report.....                                                    | A-17 |
| Appendix Figure A-10: CBRA Bag Report .....                                                          | A-18 |
| Appendix Figure A-11: CBIS Hourly Throughput Report .....                                            | A-19 |
| Appendix Figure A-12: CBIS Bag Spacing Report .....                                                  | A-20 |
| Appendix Figure A-13: CBIS Performance Report .....                                                  | A-21 |
| Appendix Figure A-14: CBIS Performance Report Definitions .....                                      | A-22 |
| Appendix Figure A-15: PGDS Request for Variance Form.....                                            | A-23 |
| Appendix Figure A-16: CBIS Change Request (CCR) Form .....                                           | A-24 |
| Appendix Figure A-17: FDRS Request Process .....                                                     | A-28 |
| Appendix Figure A-18: FDRS Request Form.....                                                         | A-29 |
| Appendix Figure A-19: Industry Comment Form Template .....                                           | A-30 |
| Appendix Figure B-1: Linear CBIS Design Concept A.....                                               | B-4  |
| Appendix Figure B-2: Linear CBIS Design Concept B.....                                               | B-6  |
| Appendix Figure B-3: Generic Examples of Individual Carrier System Based CBIS Design Concept C ..... | B-9  |
| Appendix Figure B-4: Generic Examples of Individual Carrier System Based CBIS Design Concept D ..... | B-11 |

## ACRONYMS AND ABBREVIATIONS

### ACRONYMS AND ABBREVIATIONS

|      |                                       |        |                                            |        |                                                |
|------|---------------------------------------|--------|--------------------------------------------|--------|------------------------------------------------|
| ACWP | Actual Cost of Work Performed         | CAGR   | Compound Annual Growth Rate                | EVM    | Earned Value Management                        |
| ADPM | Average Day of the Peak Month         | CBIS   | Checked Baggage Inspection Systems         | FA     | False Alarm                                    |
| AIRS | Automatic Image Reconciliation System | CBRA   | Checked Baggage Resolution Area            | FAA    | Federal Aviation Administration                |
| APM  | Acquisition Program Management        | CBS    | Cross-Belt Sorter                          | FDRS   | Field Data Reporting System                    |
| ASP  | Advanced Surveillance Program         | CBTD   | Checked Baggage Technologies Division      | FIFO   | First In First Out                             |
| ATR  | Automatic Tag Reader                  | CCR    | CBIS Change Request                        | FIS    | Federal Inspection Service                     |
| BAC  | Budget at Completion                  | CCTV   | Closed Circuit Television                  | FOV    | Field of View                                  |
| BAM  | Baggage Allocation Methodology        | CI     | Control Interface                          | FSA    | Flight Schedule Analysis                       |
| BCWP | Budgeted Cost of Work Performed       | CM     | Corrective Maintenance                     | FSD    | Federal Security Director                      |
| BCWS | Budgeted Cost of Work Scheduled       | CONOPS | Concept of Operations                      | HAZMAT | Hazardous Materials                            |
| BDR  | Basis of Design Report                | CPI    | Cost Performance Index                     | HMI    | Human-Machine Interface                        |
| BHS  | Baggage Handling System               | CPU    | Central Processing Unit                    | HQ     | (TSA) Headquarters                             |
| BHSC | Baggage Handling System Contractor    | CRPG   | Checkpoint Requirements and Planning Guide | HSD    | High Speed Diverter                            |
| BIS  | Baggage Inspection Station            | CSV    | Comma-Separated Values                     | HVAC   | Heating, Ventilation, and Air Conditioning     |
| BMA  | Baggage Measurement Array             | CWE    | Current Working Estimate                   | IATA   | International Air Transport Association        |
| BOE  | Basis of Estimate                     | DBU    | Date of Beneficial Use                     | ICS    | Individual Carrier System                      |
| bph  | Bags per Hour                         | DHS    | Department of Homeland Security            | ID     | Identifier (or Identification)                 |
| BPT  | Baggage Process Timer                 | DSD    | Deployment and Sustainment Division        | ILDIT  | Integrated Local Design Team                   |
| BRP  | Baggage Removal Point                 | EAC    | Estimate at Completion                     | IMAC   | Installation, Move, Add and Change             |
| BSD  | Bag Status Display                    | EBSP   | Electronic Baggage Screening Program       | IRD    | Interface Requirements Document                |
| BSIS | Baggage Screening Investment Study    | EDS    | Explosive Detection System                 | ISAT   | Integrated Site Acceptance Test                |
| BST  | Baggage Screening Timer               | EDS-CP | EDS Competitive Procurement                | ISO    | International Organization for Standardization |
| BTT  | Bag Travel Time                       | ETD    | Explosives Trace Detection                 | IT     | Information Technology                         |
| CAD  | Computer-Assisted Design              |        |                                            | IWG    | Industry Working Group                         |
|      |                                       |        |                                            | LCCA   | Life Cycle Cost Analysis                       |

## ACRONYMS AND ABBREVIATIONS

|       |                                               |      |                                          |        |                                                 |
|-------|-----------------------------------------------|------|------------------------------------------|--------|-------------------------------------------------|
| LCS   | Life Cycle Support                            | PDF  | Portable Document Format                 | SV     | Schedule Variance                               |
| LEO   | Law Enforcement Officer                       | PE   | Photo Eye                                | SVS    | Secondary Viewing Station                       |
| LIT   | Lost in Track                                 | PEC  | Photoelectric Cell                       | TAF    | Terminal Area Forecast                          |
| MB    | Megabytes                                     | PF   | Power Factor                             | TCP/IP | Transmission Control Protocol/Internet Protocol |
| MCP   | Motor Control Panel                           | PGDS | Planning Guidelines and Design Standards | TIM    | Technical Interchange Meeting                   |
| MCS   | Master Control Station                        | PLC  | Programmable Logic Controller            | TRC    | Technical Review Committee                      |
| MIT   | Mobile Inspection Table                       | PM   | Preventive Maintenance                   | TRN    | Test Readiness Notification                     |
| MTBCF | Mean Time Between Critical Failures           | PMB  | Performance Management Baseline          | TRR    | Test Readiness Review                           |
| NC    | Non-Condensing                                | PNR  | Passenger Name Record                    | TSA    | Transportation Security Administration          |
| NEDS  | Networked Explosive Detection Systems         | PVS  | Primary Viewing Station                  | TSIF   | TSA Security Integration Facility               |
| NFPA  | National Fire Protection Association          | QLR  | Quick Look Report                        | TSL    | Transportation Security Laboratory              |
| O&M   | Operating and Maintenance                     | RFI  | Request for Information                  | TSM    | Transportation Security Manager                 |
| OEM   | Original Equipment Manufacturer               | RFID | Radio Frequency Identification           | TSO    | Transportation Security Officer                 |
| OIT   | Office of Information Technology              | RFV  | Request for Variance                     | TSR    | Test Summary Report                             |
| OOG   | Out-of-Gauge                                  | ROM  | Rough Order-of-Magnitude                 | UIC    | Unique Identifier Cell                          |
| OS    | Oversize                                      | SAT  | Site Acceptance Test                     | UPS    | Uninterruptible Power Supply                    |
| OSARP | On-Screen Alarm Resolution Protocol           | ScTP | Screened Twisted Pair                    | UTP    | Unshielded Twisted Pair                         |
| OSHA  | Occupational Safety and Health Administration | SIDA | Security Identification Display Area     | VAC    | Variance at Completion                          |
| OSR   | On-Screen Resolution                          | SOP  | Standard Operating Procedure             | VFD    | Variable Frequency Drive                        |
| OSRA  | On-Screen Resolution Area                     | SOW  | Scope of Work                            | VSU    | Vertical Sortation Unit                         |
| OTA   | Other Transactional Agreement                 | SSCP | System Services Control Point            | WBS    | Work Breakdown Structure                        |
| OTK   | Operational Test Kit                          | SSI  | Sensitive Security Information           | WLAN   | Wireless Local Area Network                     |
| OVT   | OSR Viewing Time                              | STIP | Security Technology Integrated Program   |        |                                                 |
|       |                                               | STZ  | Security Tracking Zone                   |        |                                                 |

### ACKNOWLEDGEMENTS

The following is a list of organizations whose staff contributed their valuable time and insights to developing the PGDS:

#### ***Airport Sponsors***

City of Atlanta, Department of Aviation  
City of Manchester, Aviation Department  
Dallas/Fort Worth International Airport  
Board  
Metropolitan Washington Airports  
Authority  
Port of Seattle, Aviation Division

#### ***Airlines***

American Airlines  
Delta Air Lines  
JetBlue Airways  
Northwest Airlines  
Southwest Airlines  
United Airlines

#### ***Federal Government Agencies and Contractors***

Consolidated Safety Services, Inc.  
National Institute of Occupational Health  
TSA Occupational Safety, Health, and  
Environment Division  
TSA Acquisition Program Management  
TSA Requirements and Capabilities  
Analysis  
TSA Security Operations

#### ***Baggage Handling System Designers/Consultants***

AECOM  
Alliant Technologies  
Beumer Corporation  
BNP Associates Inc.  
Brock Solutions  
CAGE Inc.  
ECRS  
Five Star Airport Alliance  
Faith Group  
G&T Conveyor Company Inc.  
Glidepath Group  
Gresham, Smith, & Partners  
Jacobs Engineering Group, Inc.  
Jervis B. Webb Company  
JSM and Associates  
Kasa Controls  
K2 Consulting  
Leonardo  
Logplan LLC  
Parsons Corporation  
Siemens Corporation  
Spider Integration Group  
Studdiford Technical Solutions LLC  
Swanson Rink  
Techflow  
TransSolutions, Inc.  
Vanderlande Industries

V2X, Inc.  
Vic Thompson Company

#### ***Security Equipment Manufacturers***

Analogic Corporation  
Leidos  
QuadriDox Inc.  
Rapiscan Systems  
Smiths Detection  
SureScan

#### ***Other Industry Contributors***

Abstract Group  
Airport Consultants Council  
AvAirPros  
International Association of Baggage  
System Companies  
Lockheed Martin  
Sabel Systems  
SIG Aviation  
SP Consulting LLC

#### ***PGDS Project Team***

Global Systems Technologies  
TSA Acquisition Program Management  
TSA Requirements and Capabilities  
Analysis  
TSA Security Operations

Cover page designed by CAGE Inc.

## **SECTION I: CBIS CONCEPTS**

### **CHAPTER 1: INTRODUCTION**

### **CHAPTER 2: CHECKED BAGGAGE SCREENING PROCESS**

### **CHAPTER 3: CBIS TYPES AND EQUIPMENT**



## **CHAPTER 1: INTRODUCTION**



## 1.1 Purpose

The purpose of the Planning Guidelines and Design Standards (PGDS) is to provide specific guidance on ways to implement a Checked Baggage Inspection System (CBIS) that are (1) less costly from both capital and lifecycle perspectives and (2) have higher performance than the previous generation existing systems. A Baggage Handling System (BHS) provides sortation and conveyance of checked baggage from airport inputs to baggage makeup areas. The CBIS, as part of the BHS, is the portion of the system located in the Security Tracking Zone (STZ). The STZ starts at the point at which the BHS acquires positive tracking of a bag, prior to the Explosive Detection System (EDS). This is normally at a Baggage Measurement Array (BMA), an Automatic Tag Reader (ATR), or a photo eye where the BHS Tracking Identifier (ID) is assigned. The STZ extends to the Clear Line diversion points and to the Baggage Removal Points (BRPs) in the Checked Baggage Resolution Area (CBRA).

The PGDS also establishes design requirements, clarifying the operational parameters that must be met. Additional best practice information is provided based on the lessons learned over years of designing and installing these systems.

To expedite the nationwide installation of CBISs in an equitable, sustainable, and cost-effective manner, as required by legislation, the PGDS:

- Establishes common design requirements and metrics to which all screening system designs must adhere.
- Consolidates collective industry experience and insights relating to best practices for planning, designing, and implementing baggage screening systems.
- Disseminates the latest information on screening technologies, in-line screening concepts, and screening protocols.
- Standardizes the methodologies for planning, designing, and evaluating various system design alternatives.

The PGDS not only emphasizes best practices associated with screening system layouts, but it also addresses other factors necessary to actively manage system costs and performance. The key objectives emphasized include the following:

- **Achieve the most cost-efficient solution**—Achieving long-term cost efficiency requires two key changes from typical past practices: (1) considering a wide range of alternatives rather than relying on a preconceived notion regarding which system would be best suited for a particular airport, and (2) assessing 20-year lifecycle costs to appropriately balance ongoing operations and maintenance (O&M) costs with upfront capital costs.
- **Define design requirements and best practices**—Clearly delineating the Transportation Security Administration's (TSA) requirements for CBISs and presenting industry best practices have proven effective at making sure those requirements are met once the system is operational.
- **Understand the complexity of in-line screening systems and avoid the common pitfalls of first-generation designs**—Baggage screening systems are complex, especially those with a high level of automation. Many different technologies for conveyance, tracking, and screening must all work together seamlessly to achieve an efficient and reliable CBIS. Lessons learned have been



incorporated into this document as best practices and are intended to inform designers of effective elements of design which have proven successful during implementation.

- **Develop principles for appropriate sizing of CBISs, including methods for estimating demand and equipment requirements—**The approach used to estimate demand and equipment needs for the initial system has a major effect on project costs. Many different approaches have been used over the last several years, with widely varying results. An overly conservative approach to estimating demand and equipment needs can result in prematurely eliminating potentially less costly screening alternatives. Underestimating demand and equipment needs can result in excessive occurrences of demand exceeding capacity and associated operational difficulties and security degradation. The PGDS provides TSA's approach for validating baggage screening demand and determining the equipment requirements for a given project.
- **Develop principles for providing equipment redundancy and establishing contingency operations—**Other important considerations for system sizing are EDS equipment redundancy and contingency operations. EDS equipment redundancy is designed into a system to attain the best operational availability from an EDS matrix. Additionally, projects are required to create a project-specific contingency plan agreed upon by all key stakeholders, including local TSA, airport, and airline personnel. The project-specific contingency plan defines how the CBIS will operate when screening equipment is unavailable, or a catastrophic system failure occurs.
- **Develop principles for accommodating growth beyond initial system sizing—**Systems are designed to accommodate demand up to five years beyond the Date of Beneficial Use (DBU). Additionally, space planning accounts for additional screening equipment up to 15 years beyond the Date of Beneficial Use.
- **Use an integrated and participatory approach to the planning, design, and implementation processes by involving all relevant stakeholders—**Stakeholder involvement is key to successful and cost-effective CBIS implementation. This involvement needs to occur at both the industry/federal government level and the local/airport level.
- **Upgrade the design review and approval process—**Utilizing lessons learned to improve the design review and approval process is important to support the objectives of cost management and increased quality for the screening systems.

The PGDS also addresses some aspects of the installation, testing, and commissioning of the CBIS. Requirements related to the operation and maintenance of CBISs are not within the scope of the PGDS, but some best practice information is included. Reimbursable and non-reimbursable expense information related to the Electronic Baggage Screening Program (EBSP) are also not in the PGDS, but are available in a separate policy memo called "Electronic Baggage Screening Program Policy—TSA Funding of Checked Baggage Inspection System Project Costs," which can be obtained at the [SAM.gov website](https://www.sam.gov) using the search term "PGDS".





### 1.2 Background

The PGDS was developed as an industry reference to promote cost-effective solutions and to define TSA requirements for CBISs. The PGDS is intended for airport operators, airlines, CBIS planners and designers, EDS and BHS vendors, CBIS-related service providers and additional stakeholders involved in the planning, design, commissioning, operation, and maintenance of CBISs.

PGDS Version 1.0, published on October 10, 2007, was prepared as part of the Baggage Screening Investment Study (BSIS), undertaken by TSA in 2006 in consultation with the aviation industry.

The BSIS was a direct response to the requirements included in the Intelligence Reform and Terrorism Prevention Act of 2004 (Section 4019d) and was intended to respond to directives in the 2005 Department of Homeland Security (DHS) Appropriations Act Conference Report and recommendations contained in the March 15, 2005, Government Accountability Office report. The EBSP framework was developed as the basis for the BSIS. The EBSP is a DHS acquisition program, under which the Checked Baggage Technologies Division (CBTD) within TSA's Acquisition Program Management (APM) receives funding for the execution of checked baggage screening projects.

As described in the EBSP Strategic Planning Framework submitted to Congress in February 2006, the primary goals of the EBSP Strategic Plan are to:

- Increase security through deploying EDS equipment to as many airports as practicable and implementing more labor-intensive Explosive Trace Detection (ETD) screening protocols at those locations where ETD will continue to be used for primary screening,
- Minimize EBSP lifecycle costs by deploying the best possible screening solutions at each airport, appropriately balancing capital investment and operating cost tradeoffs,
- Minimize impacts to TSA, Airports and Airline Operations through well-designed and well-placed EDS solutions,
- Provide a flexible security infrastructure platform for accommodating growing airline traffic and other industry changes over the next 20 years, and for addressing potential new threats.

Airport operators, airlines, designers, planners, and TSA provided many valuable industry comments on Version 1.0 of the PGDS during 2007 and 2008. Additionally, several follow-on studies were conducted to implement some of the next steps articulated in PGDS V2.0. Since then, TSA has completed several rounds of review processes, in which industry comments and PGDS studies were incorporated into successive published PGDS versions.

Since publication of the PGDS Version 5.0 in 2015, the industry and TSA have made a consolidated effort to emphasize performance-based requirements in the PGDS and clearly identify and differentiate between requirements and best practices within the document. The TSA formed an internal stakeholder group from various offices, divisions and branches called the PGDS Technical Review Committee (TRC) to review and address internal and external stakeholder recommendations and govern the PGDS. Industry created the PGDS Industry Working Group (IWG) to



create a forum for industry stakeholders to discuss relevant PGDS issues and collaborate with TSA. The result of the collaboration between these two groups and the updating, revision and review process is reflected in this version (V9.0) of the PGDS.

### 1.3 Organization

The PGDS is organized into three sections as follows:

- Section I: CBIS Concepts
  - Chapter 1: Introduction: Document Purpose, Background, Organization, and Key Changes from the previous version
  - Chapter 2: Checked Baggage Screening Process
  - Chapter 3: CBIS Types and Equipment
- Section II: CBIS Projects
  - Chapter 4: Project Planning and Initiation: project phases, stakeholder roles and responsibilities, the design review process, and TSA funding
  - Chapter 5: Schematic Design Phase, Part I: Baggage Screening Demand Estimation
  - Chapter 6: Schematic Design Phase, Part II: Alternatives Analysis and Preferred Concept Design Development
  - Chapter 7: Detailed Design Phase, including 30%, 70%, and 100% design reviews
  - Chapter 8: Construction Phase, including system change implementation
  - Chapter 9: Testing and Evaluation Phase
  - Chapter 10: Project Closeout Phase, including control configuration architecture documentation
  - Chapter 11: Lifecycle Cost Estimating
- Section III: CBIS Design Requirements and Industry Best Practices
  - Chapter 12: CBIS Design Standards and Requirements
  - Chapter 13: On-Screen Resolution Area Planning Standards and Requirements
  - Chapter 14: Checked Baggage Resolution Area Planning Standards and Requirements
  - Chapter 15: CBIS Operating and Maintenance Best Practices
  - Chapter 16: Information Technology Security



The PGDS also incorporates the following appendices:

- Appendix A: Forms, Templates, Outlines and Examples: CCR, RFV and FDRS request forms, Baggage and Data Flow Charts, CBIS reporting examples, and an outline for TSA training documentation required for operation of the CBIS
- Appendix B: Generic Examples of Checked Baggage Inspection Systems: Generic examples of linear CBIS design concepts and Individual Carrier System-based CBISs
- Appendix C: Generic BHS and CBIS Responsibility Matrix: Example of a responsibility matrix which ILDT can use to ensure all tasks are accounted for during new CBIS projects
- Appendix D: References
- Appendix E: Requirements Lists

#### 1.4 Key Changes from PGDS V8 to PGDS V9

| Section         | Section Title                                    | Changes                                                                         |
|-----------------|--------------------------------------------------|---------------------------------------------------------------------------------|
| Section 3.2.1   | In-Line CBIS                                     | Removed the 95% EDS derate requirement                                          |
| Section 3.5     | Other Baggage Conveying Systems and Technologies | Expanded subsections to include other technologies and promote innovation       |
| Section 4.6.2   | Request for Variance                             | Clarified RFV submittal process for Design vs Construction phases               |
| Chapters 5 & 6  | Schematic Design Phase                           | Combined the Pre-Design and Schematic phases into one Schematic Design phase    |
| Section 5.5.1   | Airport Screening Zones                          | Removed detailed Zone Scheming requirement and examples                         |
| Section 5.6.1.4 | Design Values                                    | Added a CBRA Reinsertion Rate                                                   |
| Section 5.6.3   | EDS Equipment Redundancy                         | Added new requirement for determining the quantity of redundant EDS             |
| Section 5.6.6   | ETD Machine Requirements                         | Separated the Oversize from the ETD calculations                                |
| Section 7.5     | Contingency Planning                             | Revised Contingency plan format and removed example in Appendix                 |
| Chapter 9       | Testing and Evaluation Phase                     | Revised Entire Chapter                                                          |
| Section 12.9    | Failsafe Events                                  | Revised method to determine the Failsafe zone                                   |
| Section 12.7.3  | Bag Length                                       | Removed bag length requirement and bag status                                   |
| Section 12.8.3  | Divert and Merge Requirements                    | Removed requirement for VSU configurations                                      |
| Section 12.11.6 | EDS Power Requirements                           | Removed Power System Engineering Analysis, added Power Conditioning requirement |
| Section 12.11.7 | EDS Network and Connectivity                     | Added Sample EDS Single Line Network Diagrams                                   |
| Section 12.14   | Baseline Testing Requirements                    | Added consolidated table with minimum baseline testing requirements             |



| Section        | Section Title                           | Changes                                                |
|----------------|-----------------------------------------|--------------------------------------------------------|
| Chapter 13     | On-Screen Resolution Area               | Revised Entire Chapter                                 |
| Section 14.4.7 | Serial Communication Requirements       | Removed provision for two-way communications           |
| Section 14.5.1 | BSD Screen Design                       | Removed “RBS” field from BSD                           |
| Chapter 16     | Information Technology Security         | Changed Cybersecurity requirements to best practices   |
| Appendix, A.3  | No-ATR Scenarios                        | Removed exception cases for “No-ATR” scenarios         |
| Appendix A     | Forms, Templates, Outlines and Examples | Provided updated forms for RFV, CCR, and FDRS requests |
| Appendix B     | Generic Examples of ICS Design Concepts | Included a fourth ICS system design concept            |
| Appendix C     | Appendix C                              | Added a “Generic BHS and CBIS Responsibility Matrix”   |



**CHAPTER 2: CHECKED BAGGAGE SCREENING PROCESS**



## 2.1 Screening Process Overview

The TSA utilizes a multi-level screening process to inspect checked baggage. In an in-line CBIS, screening operations are integrated with the outbound BHS, as shown in Figure 2-1 and Figure 2-2.

**Figure 2-1: Generic In-Line Checked Baggage Inspection System**

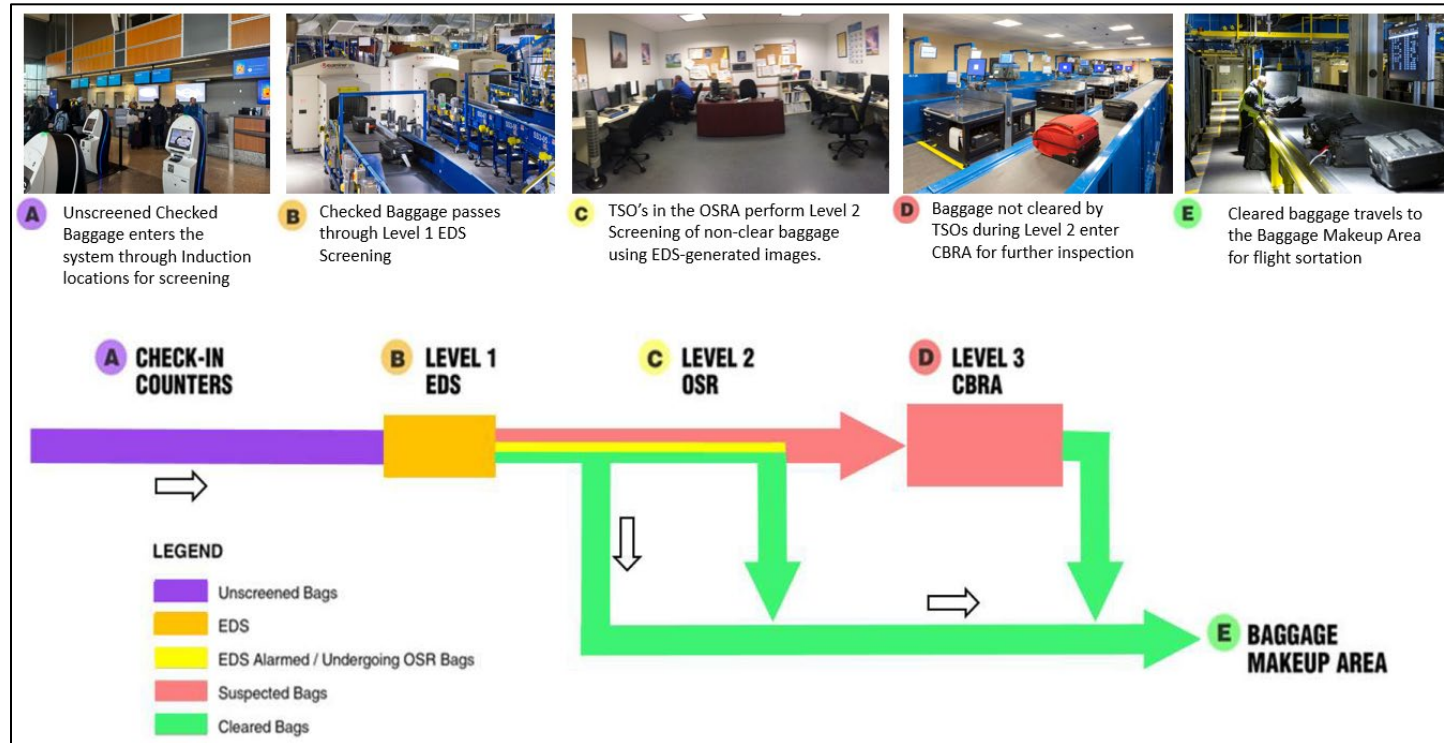
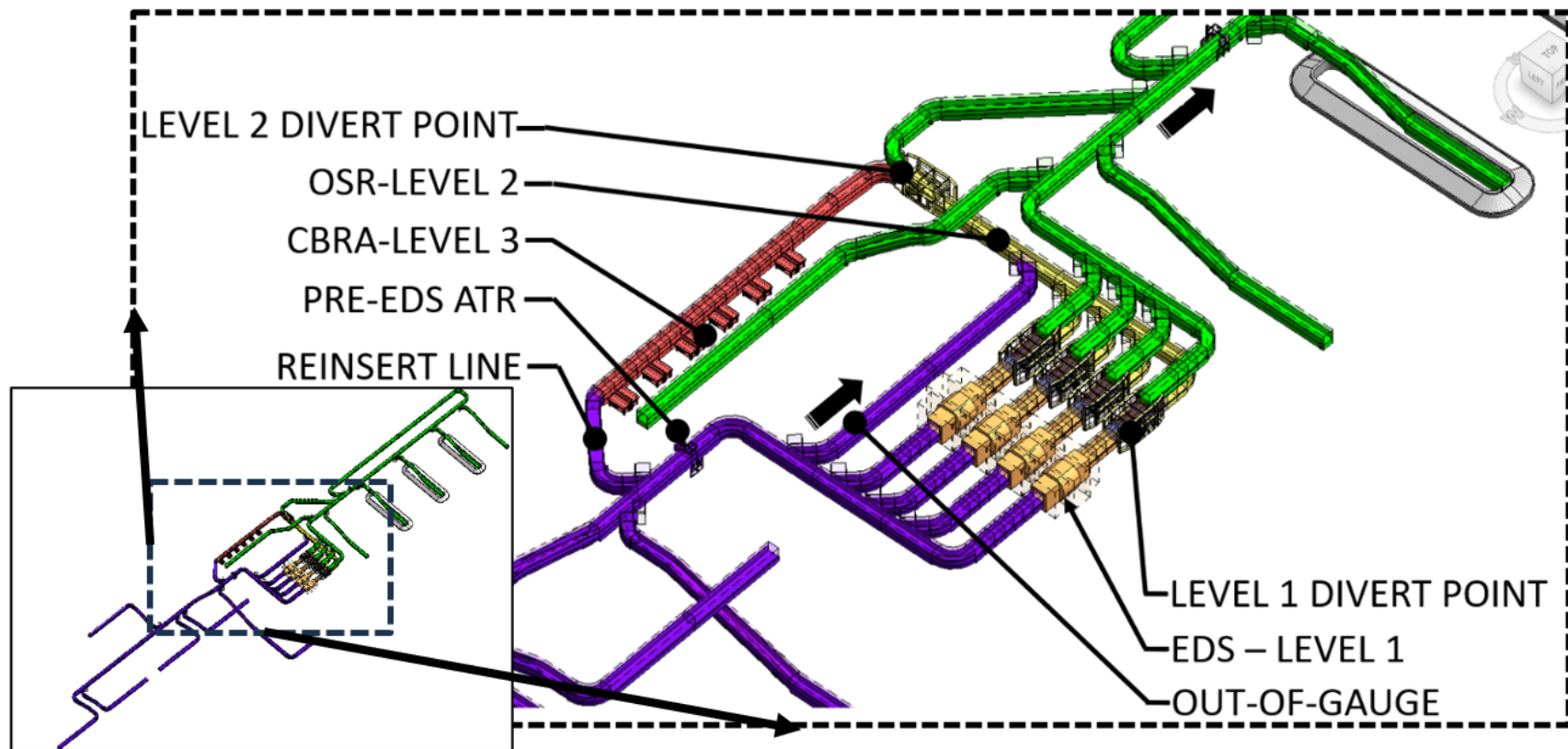


Figure 2-2: Isometric View of Generic CBIS



## 2.2 Level 1 — EDS

Passenger checked baggage is transported to a CBIS via conveyor systems for the initial Level 1 EDS inspection. The EDS generates an image used for security screening. The EDS assigns each bag exiting the scanner a Level 1 security status of Clear or Non-Clear. Cleared bags are diverted to the make-up area, while non-cleared bags continue to Level 2 screening.



### 2.3 Level 2 — On-Screen Resolution

In On-Screen Resolution (OSR), images of non-clear bags are inspected by a Transportation Security Officer (TSO) and assigned a Level 2 security screening status of Clear or Non-Clear. Cleared bags are diverted to the make-up area, while non-cleared bags continue to Level 3 screening.

The Level 2 screening typically takes place concurrently with baggage conveyance. CBIS configurations are designed to allow for a minimum of 45 seconds of travel time between the exit of the EDS and the second decision point. If a Level 2 disposition isn't available before a bag reaches the second decision point, the bag is automatically deemed non-clear and continues onto the CBRA line.

### 2.4 Level 3 — Checked Baggage Resolution Area

Bags traveling on the CBRA line are sent to a Baggage Inspection Station (BIS). TSOs inspect non-cleared bags using the image generated at Level 1 and the OSR dispositions from Level 2 to target objects of concern. When all objects have been inspected and cleared, the bag is assigned a Level 3 security status of Clear. The bag is transferred to the Clear Line and sent to the make-up area.

Bags that do not receive a Level 3 security status of Clear are considered Alarmed and must be processed by Law Enforcement Officers (LEOs).





**CHAPTER 3: CBIS TYPES AND EQUIPMENT**



### 3.1 CBIS Overview

This chapter provides information about CBIS types and their associated Concept of Operations (CONOPS), as well as screening equipment that can be used in various system types.

CBIS designs use two types of EDS for primary screening:

- EDS Type I:
  - Intended use case: integration of two or more EDS with the same baggage conveyance system and providing resource balancing across the EDS and shared network assets
  - Capable of screening bags at a rate no less than 400 bags per hour (bph)
- EDS Type II:
  - Intended use case: screening with one EDS and dedicated assets
  - Capable of screening bags at a rate of no less than 150 bph, but less than 400 bph, when operated in accordance with approved staffing levels

A CBIS with very low throughput may be designed to accomplish primary screening using only ETDs (ETD CBIS).

Within each CBIS type, several acceptable screening equipment models may be available with similar throughput rates, false alarm (FA) rates, and OSR rates. TSA-qualified models are identified in this chapter.

The tables at the beginning of each CBIS type subsection summarize the candidate screening equipment and throughput ranges for this screening equipment. Alarm rates and resolution rates for the listed EDS are SSI and denoted as such. Environmental restrictions for all EDS include Non-Condensing (NC) levels of humidity.

More detailed examples of generic concepts of baggage screening systems, operational assumptions for the generic baggage screening concepts, and best practices captured in these generic concepts are found in Appendix B.



## 3.2 CBIS Using Type I EDS

### 3.2.1 In-Line CBIS

In-line systems incorporate multiple input points that merge onto a mainline that feeds 2 or more EDS shunts. These high-capacity systems often incorporate an Out-of-Gauge (OOG) line, two divert points, and a centralized CBRA. Type I EDS used in this CBIS type are intended to provide solutions for airports that require fully integrated in-line systems designed to handle very high peak baggage screening demand.

The in-line CBIS design is required to allow EDS listed in Table 3-1 to achieve the throughput indicated under test conditions (see Section 12.2). Throughput values used during design for system sizing shall be based on a site-specific bag size, which may differ from the assumed 28" average bag size used in Table 3-1.

**Table 3-1: Type I EDS**

| Classification | Product                     | False Alarm Rate | OSR Clear Rate | Belt Speed (ft/min) | Idealized Throughput (28" bag with 12" spacing) | Current Status     |
|----------------|-----------------------------|------------------|----------------|---------------------|-------------------------------------------------|--------------------|
| EDS-CP         | Leidos eXaminer 3DX 6700 ES | SSI              | SSI            | 39.4                | 709                                             | Qualified (EDS-CP) |
| EDS-CP         | Smiths CTX-9800 DSi         | SSI              | SSI            | 39.4                | 709                                             | Qualified (EDS-CP) |

**Notes:**

- False Alarm Rate can vary from airport to airport, so the project sponsor should contact their TSA Project Coordinator for airport-specific alarm rate data.
- OSR Clear Rate can vary from airport to airport, so the project sponsor should contact their TSA Project Coordinator for airport-specific data.
- Idealized throughput is based on uniform 12" bag spacing and 28" test bags in a controlled testing environment. A blended domestic/international bag length should be used during CBIS design (see Section 5.6.2).
- "Qualified (EDS-CP)" is defined as those systems that have successfully completed detection Certification, TSA Security Integration Facility (TSIF) Evaluation, and Operational Test and Evaluation against EDS Competitive Procurement (EDS-CP) requirements and may be available for procurement by TSA. Project sponsors should ask their TSA Project Coordinator to confirm availability of specific models with TSA's Checked Baggage Technology Division.
- The information included in this table is current as of the publication date of this document. To obtain the most up-to-date information on qualified EDS, e-mail [PGDS@tsa.dhs.gov](mailto:PGDS@tsa.dhs.gov).



Figure 3-1 shows a schematic visualization of an In-line CBIS with Type I EDS.

**Figure 3-1: Schematic Visualization of an In-Line CBIS Using Type I EDS**

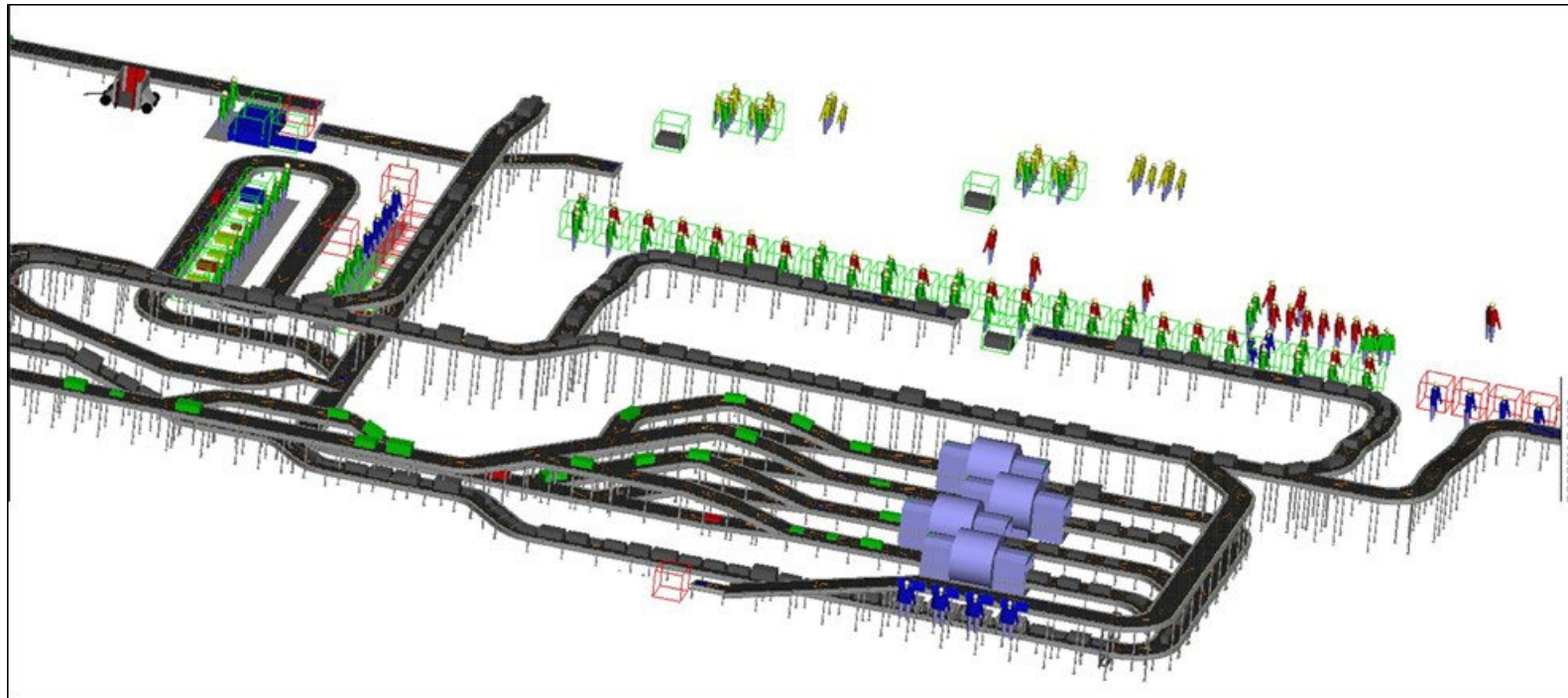
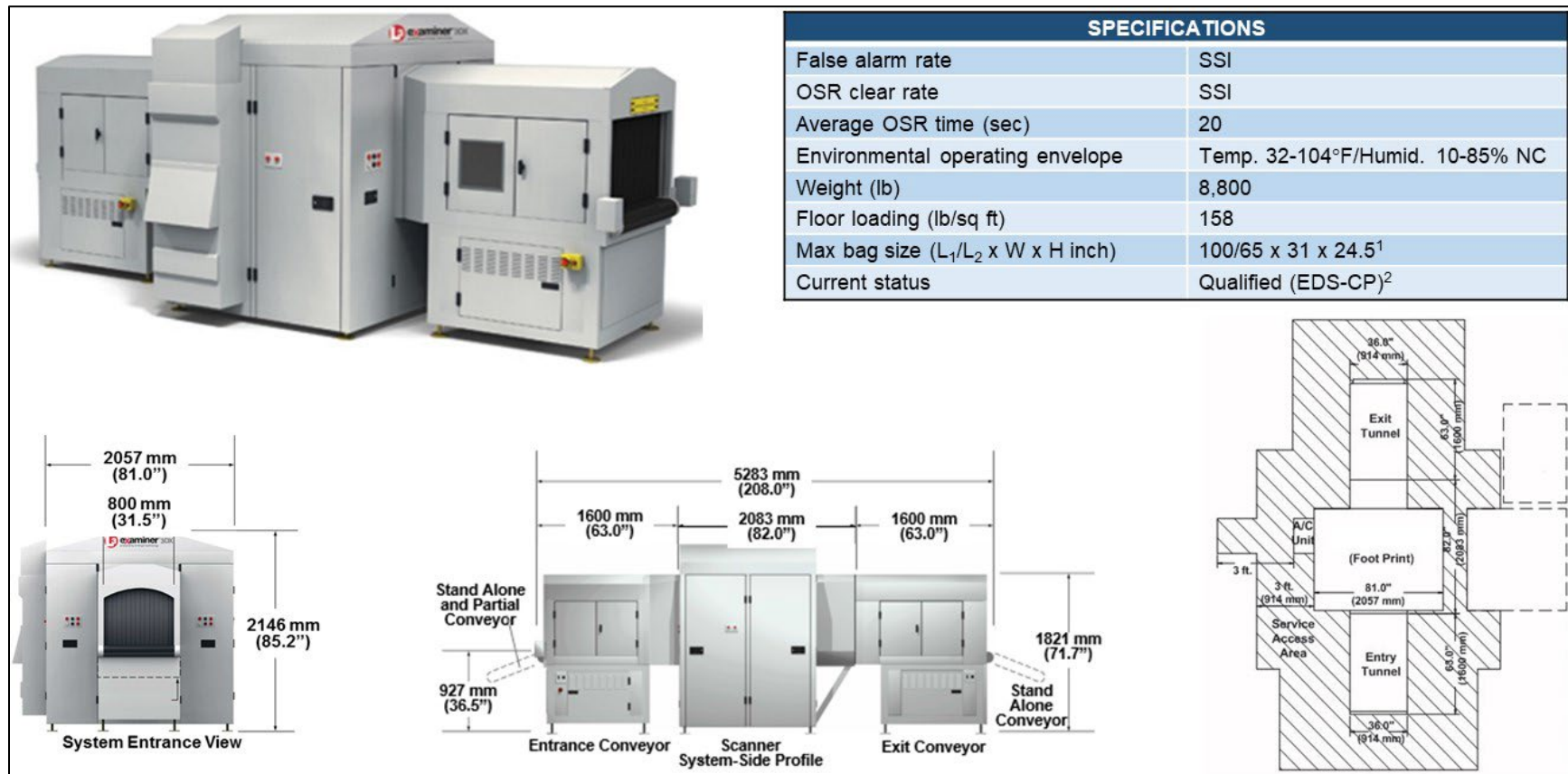


Figure 3-2 and Figure 3-3 provide graphical representations and summarize equipment assumptions for current qualified Type I EDS.

Figure 3-2: Leidos eXaminer 3DX 6700 and eXaminer 3DX 6700 ES Applicable System Type: In-line

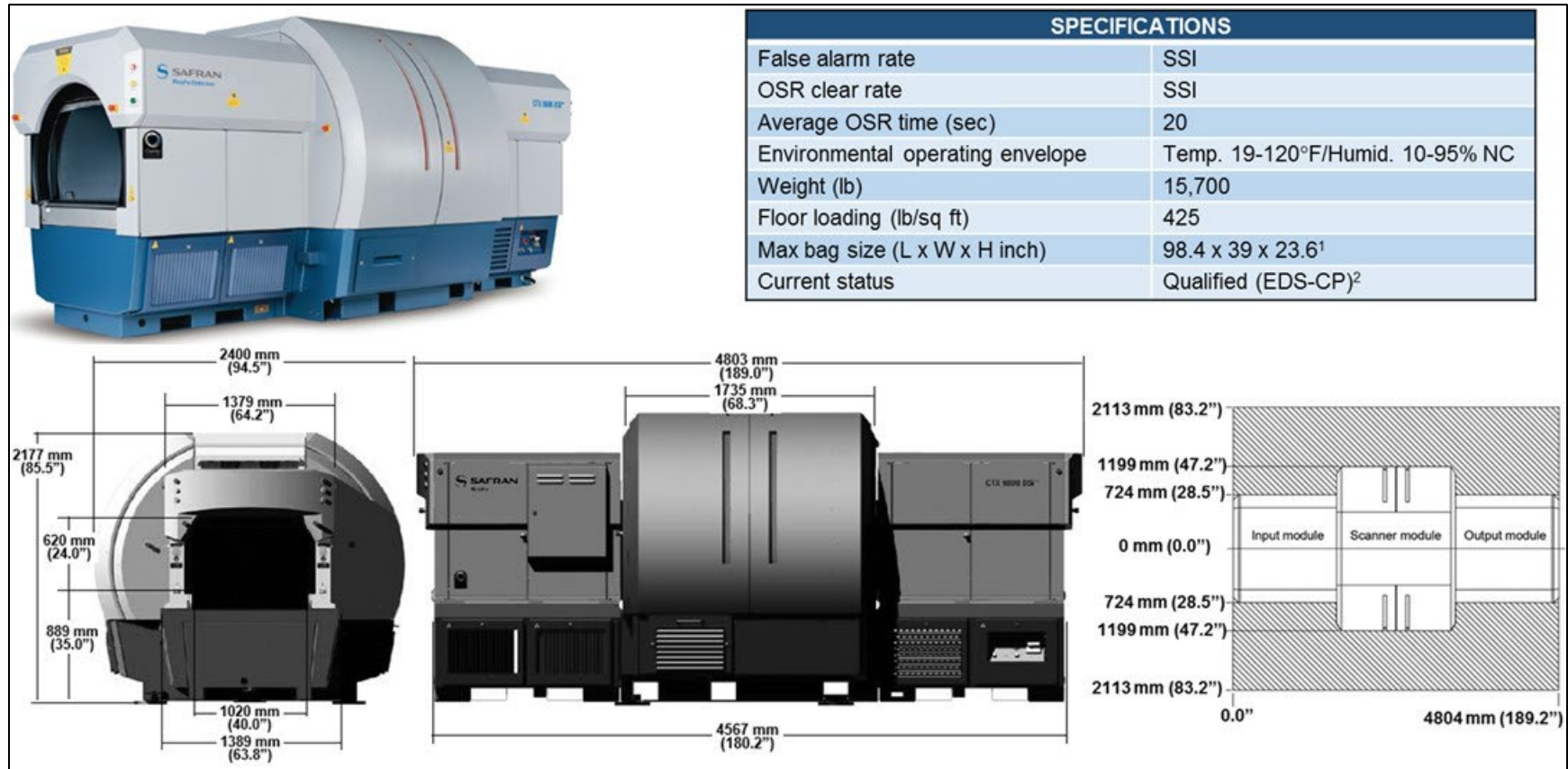


Notes:

1. Due to the shape of the unit's opening, the maximum height will drop with increasing bag width.
2. "Qualified (EDS-CP)" is defined as those systems that have successfully completed Detection Certification, TSIF Evaluation, and Operational Test and Evaluation against EDS-CP requirements and are available for procurement by TSA.
3. L<sub>1</sub> = Maximum bag length EDS can scan
4. L<sub>2</sub> = Standard bag length EDS can scan



Figure 3-3: Smiths CTX 9800 Applicable System Type: In-line



Notes:

1. Due to the shape of the unit's opening, the maximum height will drop with increasing bag width.
2. Qualified (EDS-CP)<sup>2</sup> is defined as those systems that have successfully completed Detection Certification, TSIF Evaluation, and Operational Test and Evaluation against EDS-CP requirements and are available for procurement by TSA.





### 3.2.2 EDS Multiplexed Network

For a CBIS size of two EDS or more, TSA deploys EDS in a multiplex network configuration. This configuration allows two or more EDSs to communicate with two or more network elements such as viewing stations, a network Master Control Station (MCS), or a printer. A typical multiplex network consists of servers, racks, switches, cables, Uninterruptible Power Supplies (UPS), EDS components, and various other hardware and software components that are required to establish the Multiplex Network configuration.

A multiplex network transmits bag images and threat data from EDS to one of several Primary Viewing Stations (PVS) for Level 2 resolution and to one of several Secondary Viewing Stations (SVS) for Level 3 resolution. Other EDS multiplexed network capabilities include server redundancy, network size scalability, Transmission Control Protocol / Internet Protocol (TCP/IP) utilization, network fault monitoring, network configurations and settings management, user database management, image archive and recall features, and Field Data Reporting System (FDRS) data access.

The following list represents the potential EDS multiplex network configuration On-Screen Resolution Area (OSRA) options for a fully integrated and networked CBIS.

- **Dedicated OSRA**—can be used in new in-line, recapitalization, and existing multiple-CBIS zone projects where each screening zone is supported with a dedicated multiplexed network server physically located in separated OSRA rooms.
- **Split OSRA**—can be used in CBIS expansions, recapitalization, and EDS upgrade projects where two separate networks are co-located together in the same physical OSRA (or room). This configuration will require dedicated network servers and MCS for each screening zone co-located within the OSRA (or room).
- **Consolidated OSRA**—can be used in CBIS expansions, recapitalization, and EDS upgrade projects where two or more dedicated OSRAs are networked together. This configuration may require EDS component upgrades and requires a split OSRA (or room) initially while the existing OSR network elements are transitioned to the new network.

Table 3-2 compares characteristics of the three networking types.



Table 3-2: EDS Networking Type Comparison

| Factor                                      | Dedicated OSRA                                               | Split OSRA                                                   | Consolidated OSRA                                                 |
|---------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------|
| Staffing per EDS                            | Baseline                                                     | Higher Than Baseline                                         | Lower Than Baseline                                               |
| EDS network hardware requirements per EDS   | Baseline                                                     | Higher Than Baseline                                         | Baseline                                                          |
| Network infrastructure requirements per EDS | Baseline                                                     | Higher Than Baseline                                         | Lower Than Baseline                                               |
| Operational redundancy                      | Baseline                                                     | Baseline                                                     | Lower Than Baseline                                               |
| Advantages                                  | Separate operations for all zones                            | Separate operations, CBIS phasing, network reliability       | Staffing savings per EDS, less hardware, network size scalability |
| Disadvantages                               | Increased staffing and dedicated infrastructure requirements | Increased staffing and dedicated infrastructure requirements | Redundant network fail-over fault                                 |

### 3.3 CBIS Using Type II EDS

Type II EDS are designed for situations with lower throughput than those using Type I EDS. Two CBIS configurations use Type II EDS: mini in-line and stand-alone.

#### 3.3.1 Mini In-Line CBIS

A mini in-line design is a cost-effective solution for an airport or bag zone with low bag screening throughput needs. Advantages include reduced space requirements, capital and operational costs, and construction time.

Mini in-line designs are tailored to site-specific needs, demographics, and operations, resulting in a unique configuration for nearly every design.

The system's ability to queue bags is minimized because of its smaller footprint. As a result, system diebacks are expected to occur for short periods of time but can be minimized with proper analysis and bag flow control.





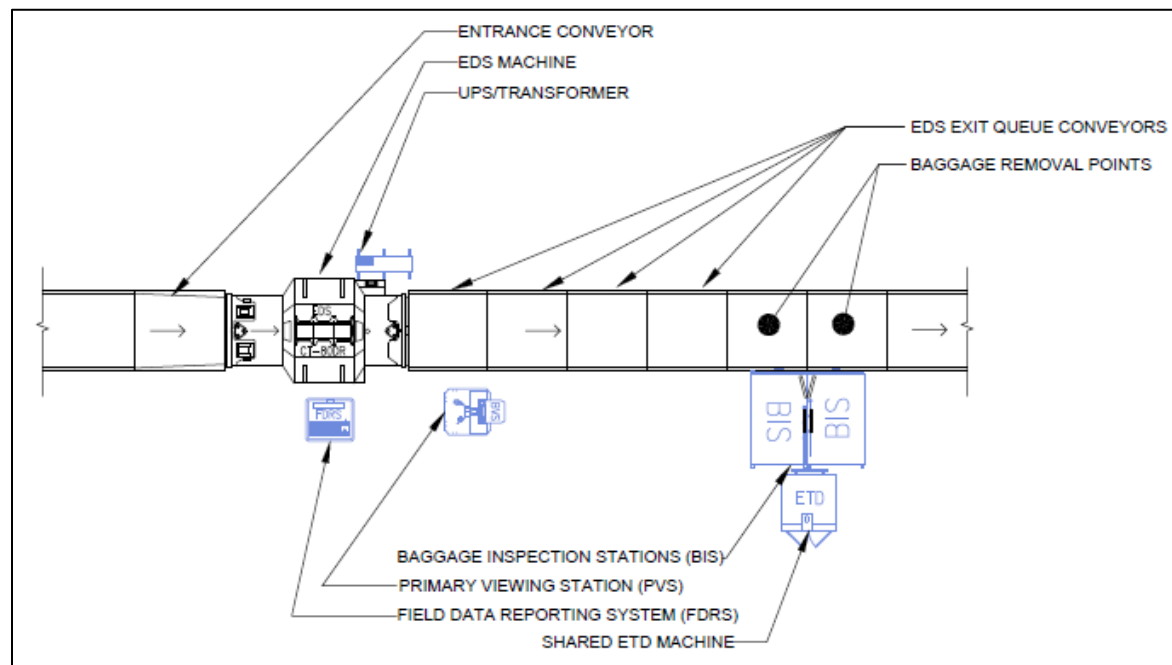
A mini in-line design is defined by the following criteria:

- Single Type II EDS configuration
- No redundant EDS

Contingency alternatives will be considered on a case-by-case basis and must be discussed with the TSA. Most airports have multiple mini in-line systems located near each other that may serve as redundant systems for each other in the event of an EDS or BHS failure. If other nearby systems are not available, the TSA will analyze the baggage profile to determine other viable and cost-effective alternatives to ensure that operations continue during any system failures, such as additional ETDs, inspection stations, etc. There are currently no qualified EDS for use in a mini in-line solution.

Figure 3-4 shows an example of a mini in-line solution.

**Figure 3-4: Example Mini In-Line Configuration**



### 3.3.2 Stand-Alone EDS

In small airports or in larger airports with low baggage volumes in specific zones, one or more stand-alone EDS may be the most cost-effective option. Qualified Type II EDS for stand-alone configurations are listed in Table 3-3. Type II EDS are prohibited in Oversize screening areas unless TSA-approved with a Request for Variance (RFV).

**Table 3-3: Type II EDS for Stand-Alone CBIS Configuration**

| Classification | Models              | False Alarm Rate | OSR Clear Rate | Average OSR Time (sec) | Throughput (bags/hour) | Current Status     |
|----------------|---------------------|------------------|----------------|------------------------|------------------------|--------------------|
| EDS-CP         | Reveal CT-80DR+(S)  | SSI              | SSI            | 30                     | 200-225                | Qualified (EDS-CP) |
| EDS-CP         | Reveal CT-80DR+(L)  | SSI              | SSI            | 30                     | 180-200                | Qualified (EDS-CP) |
| EDS-CP         | Reveal CT-80DR+(XL) | SSI              | SSI            | 30                     | 160-180                | Qualified (EDS-CP) |
| EDS-CP         | Smiths CTX 5800     | SSI              | SSI            | 20                     | 277                    | Qualified (EDS-CP) |

**Notes:**

1. False Alarm Rate based on System Evaluation Reports or FDRS data from fielded systems and intended to be used as a national average. Airport-specific data may be available from the TSA Project Coordinator.
2. OSR Clear Rate based on values used for TSA staffing and intended to be used as a national average. Airport-specific data may be available from the TSA Project Coordinator.
3. Throughput value based on operational data analyzed from FDRS reports of fielded equipment.
4. "Qualified (EDS-CP)" is defined as those systems that have successfully completed Detection Certification, TSIF Evaluation, and Operational Test and Evaluation against EDS-CP requirements and may be available for procurement by TSA. Project sponsors should ask their TSA Project Coordinator to confirm availability of specific models with TSA's Checked Baggage Technology Division.
5. Given the limited available field data at the time of this publication, the CTX 5800 "as fielded" throughput value provided here is based on acquisition method (3D volumetric), belt speed, and TSO staffing constraints in Standalone configuration.

The information included in this table is current as of the publication date of this document. To obtain the most up-to-date information on qualified EDS, e-mail [PGDS@tsa.dhs.gov](mailto:PGDS@tsa.dhs.gov).



As shown in Figure 3-5 and Figure 3-6, a stand-alone EDS operates similar to lobby screening nodes installed today at many Category X and Category I airports; however, where possible, stand-alone equipment should be installed in baggage makeup areas or other appropriate locations to reduce lobby congestion. This CBIS type is relatively labor intensive, but minimal capital investment is required to install the system and support the operation. Note that no redundant stand-alone EDS will be provided by TSA.

**Figure 3-5: Example Stand-Alone EDS Configuration**

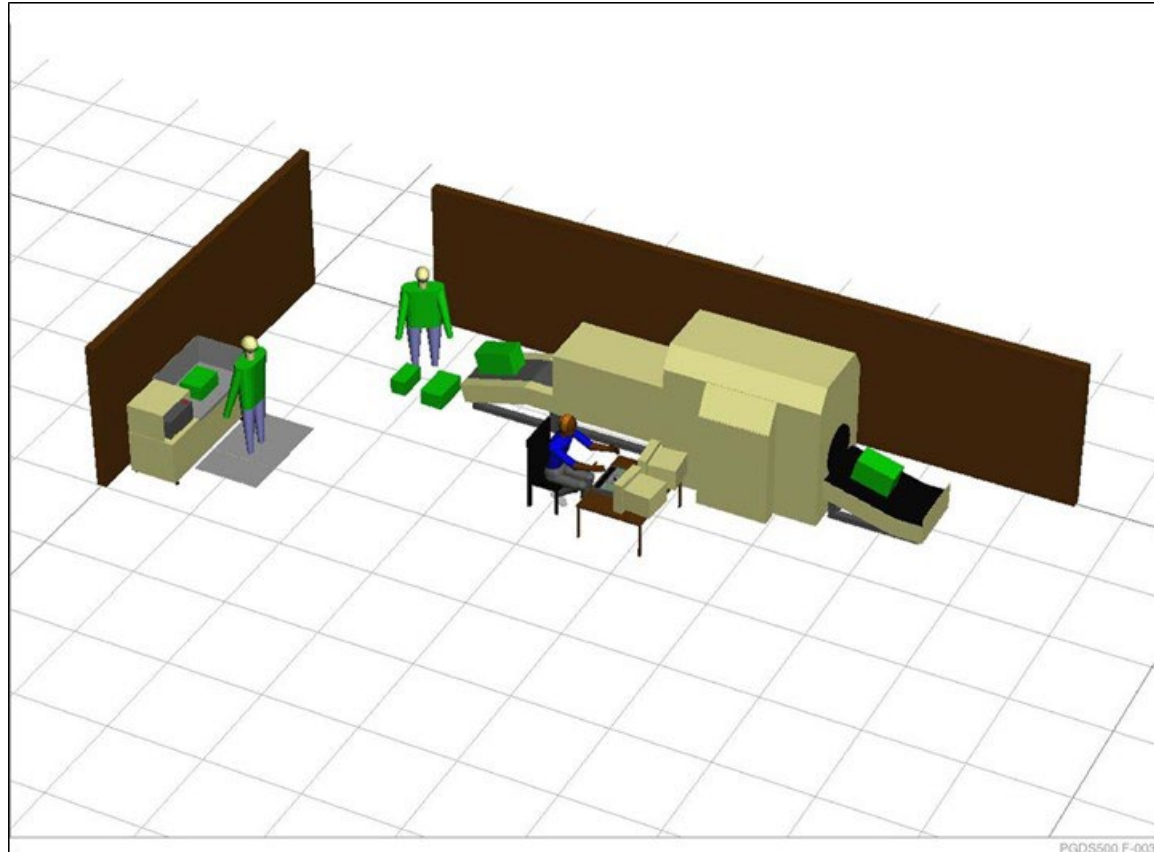
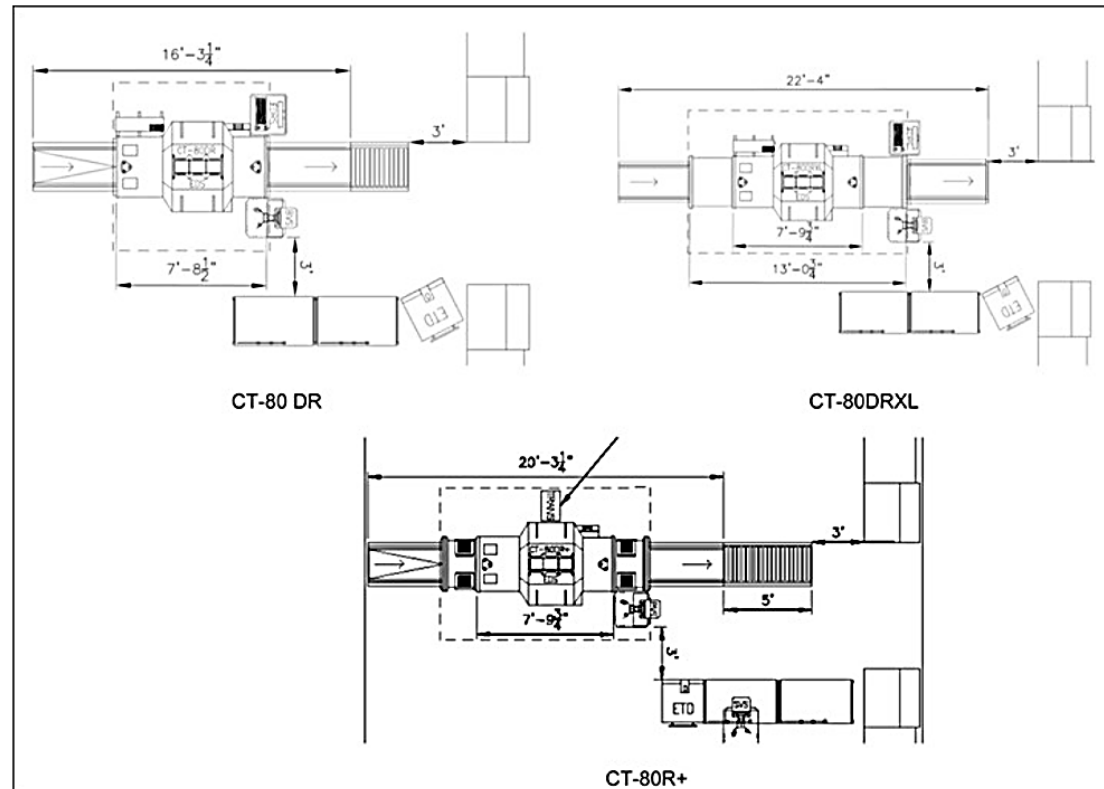


Figure 3-6: Schematic Visualization of Stand-Alone EDS Configurations



Stand-alone EDS layout designs shall ensure TSA personnel do not carry baggage more than 8 feet, as validated by the local Federal Security Director (FSD), for the purposes of picking up a bag for screening or returning a screened bag to the aircraft operator.

A stand-alone system option would significantly reduce up-front capital costs by using currently available EDS in locations where no economic justification exists to design and implement an in-line system.

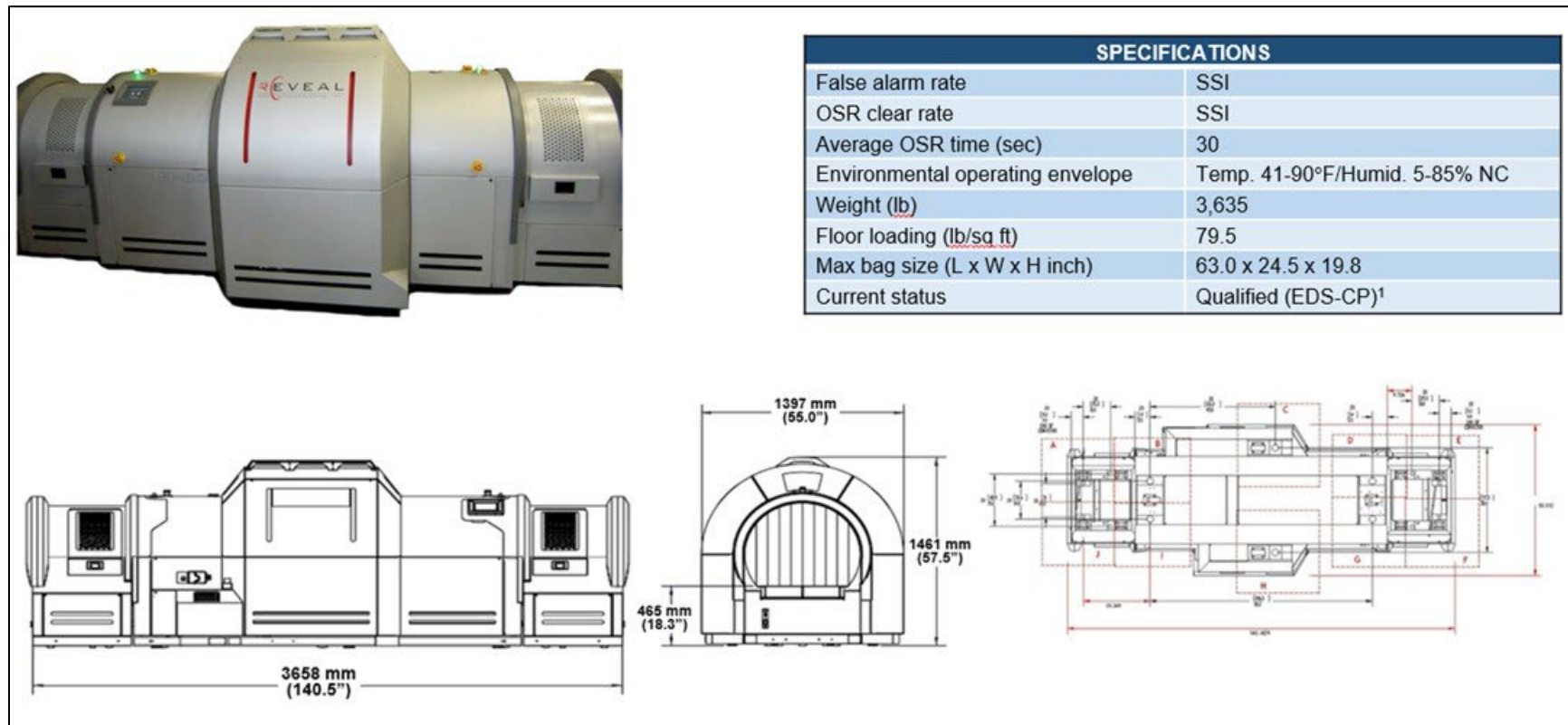
Most stand-alone EDS may be installed with either flat or incline/decline conveyor belts at the entrance and exit of the unit. The preferred configuration of these belts may vary from site to site, and the availability may vary from model to model. Refer to the EDS Original Equipment Manufacturer (OEM) Installation Guide for the available options associated with each model.

EDS-CP EDS can recall bag images on Secondary Viewing Stations (SVS) for Level 3 screening. The CONOPS for these EDS may include the use of visual light indicators, conveyor functionality, search list criteria, and manual bag ID entry. Most legacy EDS do not have dedicated SVS capability, and TSOs will follow local procedures for alarm resolution with ETD. Accordingly, each deployment layout for legacy EDS must accommodate the footprint required for alarm resolution dictated by local policy. A key consideration is the space necessary to support multiple TSOs assigned to the EDS traveling between the Primary Viewing Station (PVS) and alarm resolution work areas. Silent duress alarms shall be installed at all stand-alone EDS Checked Baggage screening areas located in the public space. Reference latest [Checkpoint Requirements and Planning Guide](#) (CRPG), Duress Alarm Requirements, for more details.

Figure 3-7 and Figure 3-8 provide graphical representations and summarize equipment assumptions for current and future stand-alone EDS that are not already presented as part of the mini in-line CBIS type.



Figure 3-7: Reveal CT-80DR+Applicable System Type: Stand-Alone

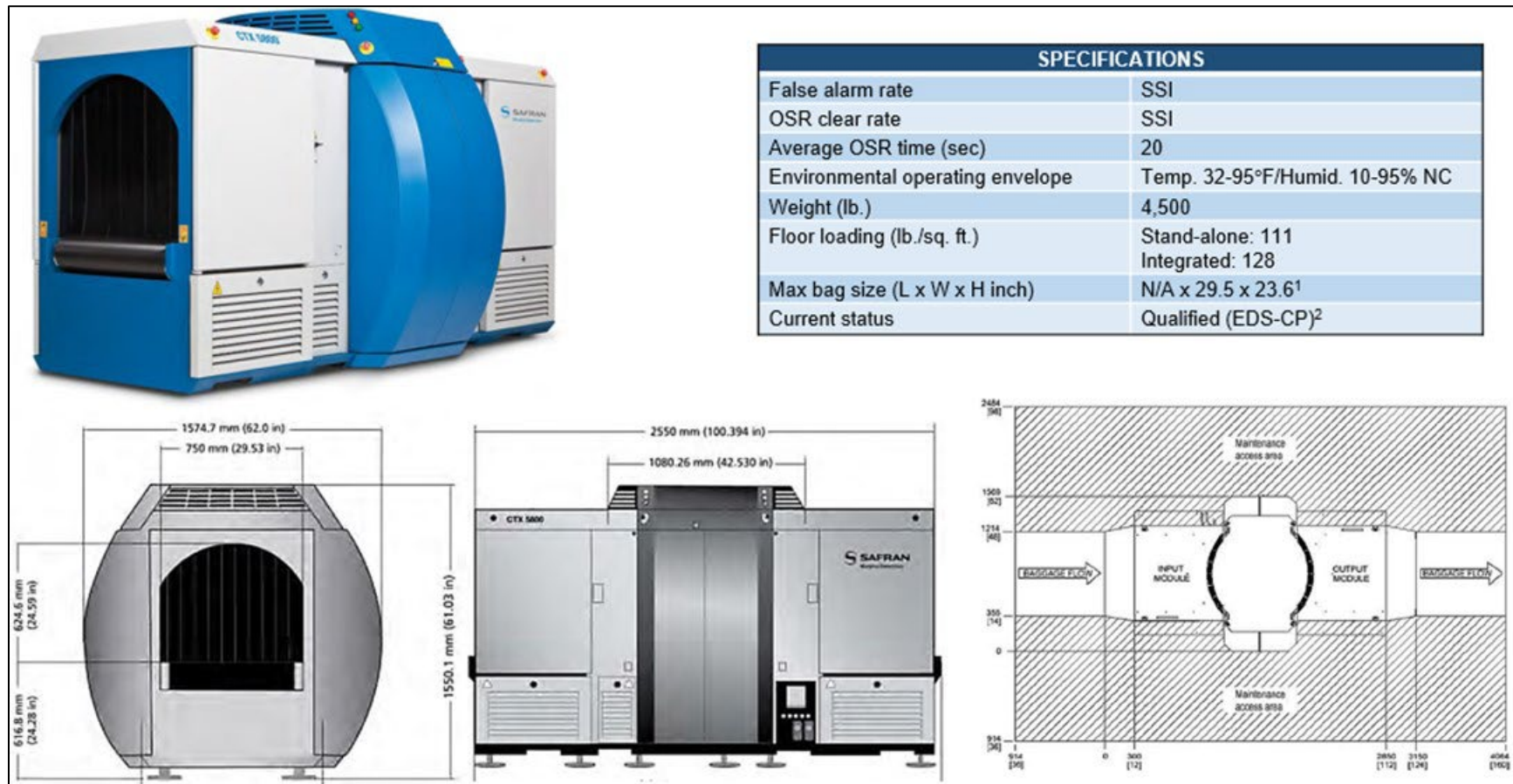


Notes:

1. Due to the shape of the unit's opening, the maximum height will drop with increasing bag width.
2. "Qualified (EDS-CP)" is defined as those systems that have successfully completed detection Certification, TSIF Evaluation, and Operational Test and Evaluation against EDS-CP requirements and are available for procurement by TSA.
3. L1 = Standard
4. L2 = Long
5. L3 = XL



Figure 3-8: Smiths Detection CTX 5800 Applicable System Type: Stand-Alone



**Notes:**

1. Due to the concave opening of the EDS, the maximum height will drop with increasing bag width. System does not have a limitation on the allowable length of bags.
2. "Qualified (EDS-CP)" is defined as those systems that have successfully completed Detection Certification, TSIF Evaluation, and Operational Test and Evaluation against EDS-CP requirements and are available for procurement by TSA.





## 3.4 CBIS Using ETD Units

ETD equipment is currently used for primary screening and for resolution of EDS alarms. ETD systems qualified for both applications are listed in Table 3-4.

**Table 3-4: ETD for Primary Screening and Alarm Resolution**

| Classification | Model                | False Alarm Rate | Max Avg Analysis Time (sec) | Full Open Search Screening Method Throughput (bph) | Directed Search Screening Method Throughput (bph) | Oversize Screening Method Throughput (bph) | Current Status |
|----------------|----------------------|------------------|-----------------------------|----------------------------------------------------|---------------------------------------------------|--------------------------------------------|----------------|
| Current        | Smiths IONSCAN 500DT | SSI              | 8                           | Domestic: 22.5<br>International: 19.8              | Domestic: 20.9<br>International: 18.7             | Domestic: 19.5<br>International: 13.8      | Qualified      |
| Current        | Leidos QS-B220       | SSI              | 8                           | Domestic: 22.5<br>International: 19.8              | Domestic: 20.9<br>International: 18.7             | Domestic: 19.5<br>International: 13.8      | Qualified      |

Notes:

1. Qualified = Certified to the 2012 Trace Detection Standard by the Transportation Security Laboratory (TSL) for use in Checkpoint and Checked Baggage screening.
2. The information included in this table is current as of the publication date of this document. To obtain the most up-to-date information on qualified ETDs, e-mail [PGDS@tsa.dhs.gov](mailto:PGDS@tsa.dhs.gov).

### 3.4.1 Primary Screening

ETD equipment can currently be used for 100% checked baggage screening in lobbies, baggage makeup areas, or other appropriate locations when no EDS is present.

ETDs can also be used for primary screening of baggage that cannot be screened using an EDS, including OOG, Oversize (OS), and fragile items. OOG is defined as exceeding the maximum baggage dimensions that can physically be screened by the EDS. OS is defined as exceeding the maximum conveyable baggage dimensions of the standard-width BHS conveyors.

As ETD screening is the most labor-intensive screening method and has the lowest throughput compared with all other screening methods, ETD primary screening is typically only appropriate in lieu of EDS screening at airport zones with low baggage volumes. Typical screening capacity for stand-alone ETD CBIS types is less than 100 bph. Silent duress alarms shall be installed at all ETD primary screening systems located in the public space. Reference latest [CRPG](#), Duress Alarm Requirements, for more details.





A schematic view of an ETD-only system for primary screening is shown in Figure 3-9.

**Figure 3-9: Schematic Visualization of an ETD Primary Screening System**

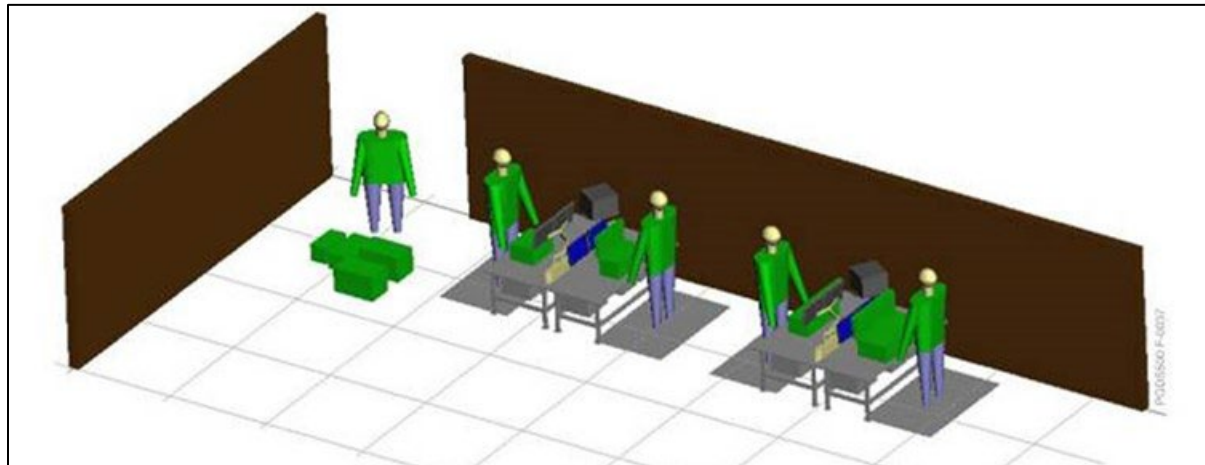


Figure 3-10 and Figure 3-11 provide graphical representations and summarize equipment assumptions for ETD machines.

Figure 3-10: Smiths IonScan 500DT Applicable System Type—Stand-Alone ETD

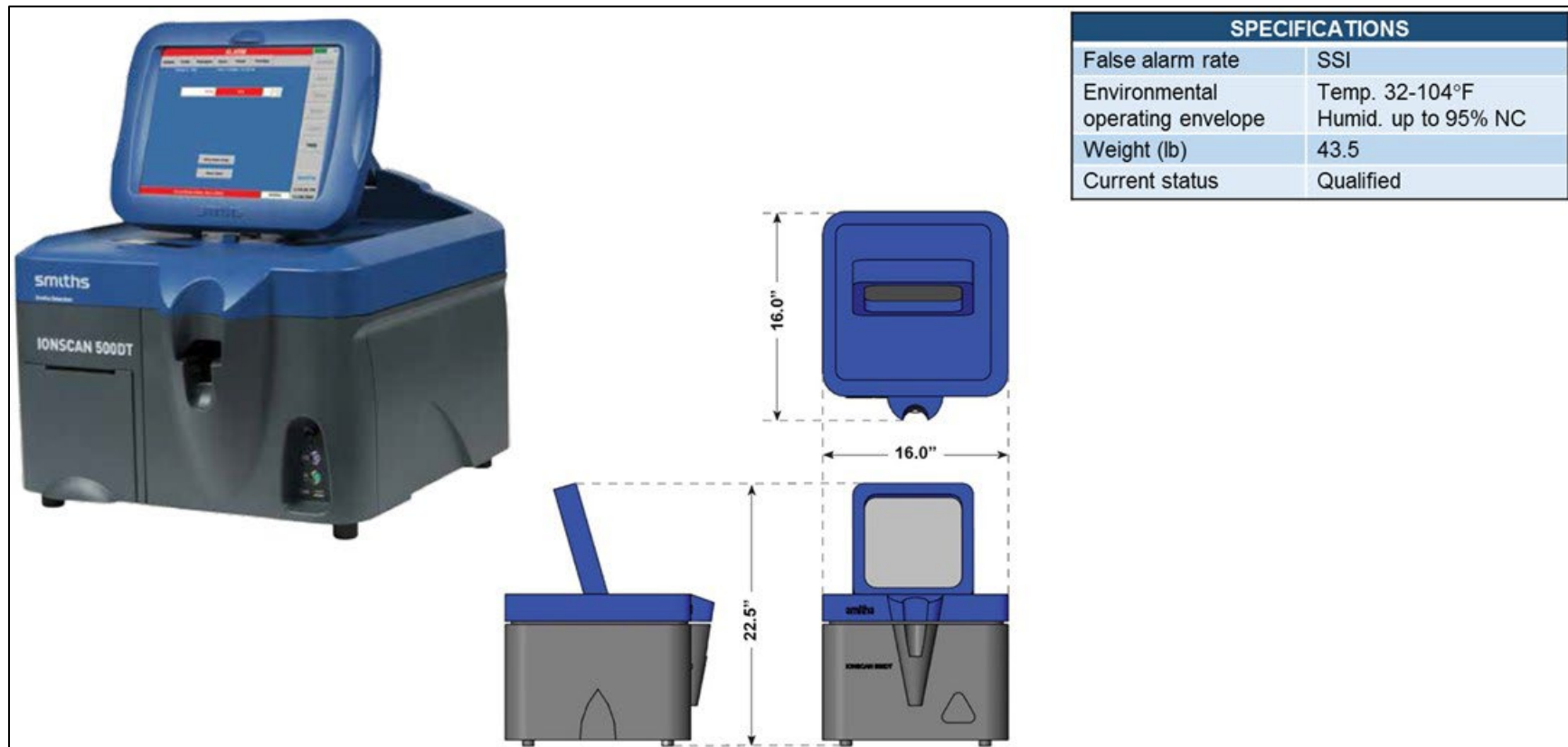


Figure 3-11: Leidos QS-B220 Applicable System Type—Stand-Alone ETD



### 3.4.2 Alarm Resolution

ETD equipment is used in the Directed Search Screening Method to screen EDS-alarmed bags that have not been cleared by operators using an OSR protocol based on viewing bag images. This method is focused on identifying and locating objects within baggage that have triggered EDS alarms. If a bag image is not available for an EDS-alarmed bag, a full open search may be employed by the TSA screener.

### 3.5 Other Baggage Conveying Systems and Technologies

The previous discussions have assumed the traditional “friction belt on slider bed” baggage conveyance technology, but there are alternate types of baggage system technologies that utilize other means to accomplish the same goals.

#### 3.5.1 Individual Carrier Systems

An Individual Carrier System (ICS) is a baggage handling technology used to transport checked baggage between check-in, security screening, sortation, and aircraft make-up areas. Unlike conventional conveyor systems, an ICS places each bag onto a dedicated carrier that transports the bag throughout the screening process. Each carrier has a unique identification that is associated with the bag's IATA tag, enabling the baggage handling system to continuously track the bag's location and destination. This reduces problems associated with unstable, irregular, or soft-sided bags and allows higher transport speeds and more predictable spacing between bags.

There are two types of ICS technology implementation for CBIS: (1) the bag stays inside the carrier throughout screening and (2) the bag is handed over from a carrier to and from the EDS for Level 1 screening. The two types of ICS concepts are presented in Appendix B to provide planners with a broad range of potential CBIS concepts for consideration during the Schematic Design Phase. More details on the ICS concept application are found in Appendix B.

For systems in which bags remain in carriers during EDS screening, TSA requires a certification assessment of the carriers against the latest TSA-qualified EDS configuration baseline for the applicable EDS model to ensure the carrier does not negatively impact the approved detection, false alarm rate, or OSR performance. The Project Sponsor shall ensure the EDS-carrier configuration is approved, and a TSA approval letter is issued before submission of the 100% design package. The ICS OEM shall coordinate the certification assessment with the EDS OEM as part of its research and development process and provide the applicable carriers to the EDS OEM for testing. The Project Sponsor, in coordination with the ICS OEM, shall monitor changes to the approved carrier or applicable TSA-qualified EDS configuration baseline throughout the construction phase. Any changes to the approved carrier or TSA-qualified EDS configuration baseline shall require a certification reassessment.

Type 1 ICS designs directly reduce EDS capacity due to the increase in length of carrier over individual bags. The Project Sponsor shall consider the decreased capacity during the design phases and never allow an EDS throughput below 400 bph. The average ICS carrier size shall be no



larger than two standard deviations above the airport-specific average bag length, plus additional carrier length beyond maximum bag loading size required for operations specified by the ICS manufacturers (typically 6 inches).<sup>1</sup>

### 3.5.2 Mobile Inspection Tables

A Mobile Inspection Table (MIT) may be used to transport bags to the TSOs for inspection in the CBRA. The MIT consists of a tabletop integrated into an automated cart that transports bags along a path of magnetic tape affixed to the floor. Bags are loaded onto the MIT automatically and are delivered directly to the TSOs for inspection. The bag remains on the MIT during inspection and is positively tracked with the MIT. The MIT utilizes RFID transponders to positively update its position. After inspection, the bag is automatically delivered to the clear line conveyor system for sortation or driven directly to the make-up area. Error bags can be sent to a reinsertion line.

### 3.5.3 Advanced Tracking Technology

This section describes enhanced tracking methodologies that may be implemented in a CBIS to improve system performance and security. The effectiveness of these technologies has been tested at the TSA Integration Facility and select U.S. airports.

If an Integrated Local Design Team (ILDT) proposes the use of any enhanced tracking methods, the methods must be reviewed and approved by TSA prior to implementation. Enhanced tracking methods shall have the ability to be disabled from the Human-Machine Interface (HMI). Technologies included in the following sections are just examples of possible techniques; other variations may exist. Any alternative innovative technologies may be submitted to TSA for consideration in future versions of PGDS.

### 3.5.4 Automatic Image Reconciliation System

Automatic Image Reconciliation System (AIRS) technology is an enhanced imaging, baggage identification, positive tracking, and security enhancement system. AIRS has been installed within the baggage screening area at Dallas Love Field airport, the TSIF, and the SICK System Development Facility in Stoughton, MA. This applied technology is a major enhancement over current BHS tracking capabilities, allowing for a more secure and efficient CBIS. AIRS is not a trademark, nor is this technology owned by any single manufacturer.

AIRS is designed to capture and positively match the unique exterior characteristics of each bag created by color image camera technology, like facial recognition. Additional layers of validation are integrated into AIRS with the capture of dimensional properties based on industry standard dimensioning systems and laser/matrix camera array technology for International Air Transport Association (IATA) bag tag identification.

The highly advanced bag matching algorithms developed for AIRS identify and track each bag in real time and store each image sequentially in a database. AIRS stores and associates multiple data points for each bag: the identity of a bag, its exact location in the CBIS (in conjunction with the

---

<sup>1</sup> Based on national average bag lengths, the standard deviations are 5.3" for domestic and 4.7" for international.



information used by the BHS to track each bag), and recognition of exterior physical bag characteristics including color and dimensions. Lost-in-tracking errors are mitigated by reacquiring and validating the identity and security status of each bag.

AIRS also supports additional speed and efficiency in the CBRA when the technology is applied from the exit of each EDS to the CBRA divert point. A touch screen terminal in the CBRA allows TSOs to view the external characteristics of the bag to support its location for screening.

### 3.5.5 Reconstructive Tracking

All CBIS are required to include a positive bag tracking system that continuously monitors both the location and electronic data of every bag within the system. However, the reliability of this tracking is influenced by the mechanical components of the BHS and the physical properties of the bags themselves, which can occasionally result in lost tracking events.

Reconstructive tracking is designed to address these occurrences by analyzing the sequence of known tracking events before and after an error condition, enabling the system to restore tracking information when specific criteria are met.

This approach relies on a set of predefined programming rules that identify patterns, such as missing or delayed bags, at key locations within the CBIS where tracking may be interrupted. Through these rules, the system can logically reconstruct tracking data and reestablish the bag's status within the system. For instance, if a sequence of bags is detected at one photo eye, but a subsequent photo eye registers an unexpected or delayed bag, reconstructive tracking can infer the bag's identity and restore its tracking record.

For example, if bags 1, 2, 3, 4, and 5 are positively identified at photo eye AL-11, and then at photo eye AL-12, bags 1, 2, xx, 4, and 5 are detected, the Programmable Logic Controller (PLC) uses predefined rules to determine that "xx" corresponds to bag 3. The PLC then reassigns bag 3's original data to "xx," allowing the system to continue tracking the bag with its correct information.

Implementation of reconstructive tracking requires the PLC code to incorporate clear rules and conditions under which tracking restoration is permitted. All reconstructive tracking logic and associated rules must be thoroughly documented within the system design documents.

Note: Partial Content provided courtesy of the Jervis B. Webb Company.

### 3.5.6 Pre-Screening Baggage Storage / Prioritization

The TSA has softened its stance on supporting pre-screening, short-term baggage storage in CBIS designs. This change allows for small-scale, short-term bag storage, typically not exceeding 30 minutes, to enhance operational flexibility during short peak periods. Unlike comprehensive Early Bag Storage (EBS) systems, this approach could be considered for targeted, brief use and require less Airport space and capital investment to implement. By addressing high-demand intervals, this concept might be used to mitigate unexpected growth and unplanned baggage surges, or to potentially reduce system sizing. Additionally, it supports the potential prioritization of bag screening based on real-time flight departure status,



enabling TSA and airline partners to minimize delays for imminent departures. Airports and stakeholders are encouraged to consult with TSA to assess applicability and explore potential short-term baggage storage solutions.

### 3.5.7 Cross-Belt Sorter

Cross-Belt Sorter (CBS) technology is a solution utilized in BHS to facilitate efficient, accurate, and high-capacity sorting of passenger baggage within airport environments. The cross-belt sorter consists of a series of individual conveyor belts, known as cross-belts, mounted perpendicular to a continuous loop or track. Each cross-belt operates independently, allowing for precise lateral movement of baggage items to designated output locations such as chutes, makeup carousels, or security screening shunts. This technology enables rapid and reliable sorting by dynamically directing bags to their assigned destinations based on real-time tracking and control systems. Cross-belt sorters can handle a wide range of baggage sizes and shapes, providing gentle and secure transfers that minimize the risk of damage. Their modular design supports scalability and flexibility, making them suitable for airports of varying sizes and throughput requirements. Cross-belt sorter systems are recognized for their ability to enhance operational efficiency, reduce manual handling, and improve overall system reliability. Airports implementing cross-belt sorters may benefit from improved baggage flow, reduced congestion, and increased system resilience, supporting both current and future operational needs.



### **SECTION II: CBIS PROJECTS**

**CHAPTER 4: PROJECT PLANNING AND INITIATION**

**CHAPTER 5: SCHEMATIC DESIGN PHASE – PART 1**

**CHAPTER 6: SCHEMATIC DESIGN PHASE – PART 2**

**CHAPTER 7: DETAILED DESIGN PHASE**

**CHAPTER 8: CONSTRUCTION PHASE**

**CHAPTER 9: TESTING AND EVALUATION PHASE**

**CHAPTER 10: PROJECT CLOSEOUT PHASE**

**CHAPTER 11: LIFECYCLE COST ESTIMATION**





## **CHAPTER 4: PROJECT PLANNING AND INITIATION**



### 4.1 CBIS Project Types

Most baggage screening projects fall into one of five categories—New CBIS, Recapitalization, Optimization, PGDS Upgrade, and Expansion. The design requirements for the project are in part dependent on which type of project is being undertaken. Similarly, the ability for TSA to provide funding is also dependent on the type of project.

#### 4.1.1 New CBIS Projects

New CBIS projects are any in-line screening systems that are built without needing to modify an existing CBIS. New CBIS projects are generally at greenfield sites, such as a new terminal, a newly created CBIS within an existing terminal, or can occur when an existing system is completely removed and replaced.

New CBIS projects are expected to fully comply with the design standards and requirements in the PGDS.

#### 4.1.2 Recapitalization

Recapitalization projects are TSA-initiated and based on the expectation of existing screening equipment becoming technically obsolete. The scope of a Recapitalization project is limited specifically to those actions necessary to remove the existing screening equipment and integrate new screening equipment into an existing system.

Recapitalization projects are limited to the replacement of the screening equipment, while maintaining existing EDS throughput. The scope of Recapitalization projects is defined by TSA in advance. Any additional work that an airport would like to conduct beyond the Recapitalization scope is considered optimization activity.

A Recapitalization project does not need to fully comply with PGDS requirements since it is not intended to fix known issues in the existing system. A Recapitalization project must only comply with PGDS as it relates to installation and configuration of new screening equipment. Similarly, due to the reduced scope of a Recapitalization project, the design process may not require all four phases of design.

Prior to the start of construction at EDS Recapitalization sites, TSA may choose to conduct a Baseline ISAT testing to document the status of the CBIS as it relates to safety, security, and efficiency. The extent of the Baseline ISAT testing may include any test deemed necessary by TSA.



### 4.1.3 Optimization

Optimization projects are airport-initiated modifications to an existing CBIS for any reason other than screening equipment recapitalization. Any changes made to the system as part of the optimization must comply with PGDS requirements. However, it is not required to bring the rest of the existing system (i.e., portions that are not receiving optimization) up to PGDS compliance. PGDS applicability will be determined based on project scope.

### 4.1.4 PGDS Upgrades

PGDS Upgrade projects are TSA-initiated efforts to close gaps between existing system capabilities and current PGDS requirements. Any changes made to the system as part of the PGDS upgrade must comply with PGDS requirements. However, it is not required to bring the rest of the existing system (i.e., portions that do not receive upgrades) up to PGDS compliance. PGDS applicability will be determined based on each project's scope.

Required design submittals for a PGDS upgrade will depend on the scope and complexity of the upgrades to be done but typically will not require all four phases of design.

### 4.1.5 Expansion

Expansion projects are limited to efforts that add screening equipment to an existing system that is designed to be expanded. This primarily refers to in-line systems originally built with additional shunts for future EDS installation. Expansion projects are generally not required to be compliant with current PGDS version, as the system may have been built to a previous version of the document.

The number of design phases required for an Expansion project will be dependent on the scope and complexity of the expansion.

## 4.2 Stakeholder Roles and Responsibilities

### 4.2.1 Project Stakeholders

The project stakeholders list should be customized to reflect the relevant stakeholders at the specific airport, including external stakeholders associated with the project, and should include the following individuals representing primary functional areas:

- **Airport**—Engineering, Operations, Information Technology (IT), Maintenance, Planning and Design, Project Management, and others, as appropriate
- **Air Carriers**—Headquarters, Operations, Corporate Real Estate, IT, Maintenance, Engineering, Planning, Security Technology Officers, Station Managers, and others, as appropriate



- **TSA**—Local and National (Headquarters [HQ]) TSA

The following additional project stakeholders or designers will be included in some phases of the process:

- **Law Enforcement**—Local law enforcement (the entity responsible for procedures to handle alarmed bags not cleared at level 3 screening in the CBRA by ETD)
- **Technology Vendors**—EDS equipment providers and manufacturers

Project stakeholders should be periodically briefed on the progress of the planning and design effort.

### 4.2.2 Project Sponsor

The Project Sponsor is assumed to be an airport owner or operator and primary point of contact with the TSA. Key responsibilities of the Project Sponsor include:

- Initiation and execution of CBIS planning and design
- Formation of the ILDT and selection of a professional planning and design team. If an ILDT is not formed, the Project Sponsor shall assume the responsibilities of the ILDT.
- Application for TSA funding
- Identification of a point of contact who is responsible for stakeholder outreach during each phase of the project
- Submission of design packages to TSA and participation in design review meetings
- Submission of RFVs to TSA requesting exemption from any PGDS requirements that cannot be met
- Initiation and execution of construction, as well as testing and commissioning of the CBIS
- Operation and maintenance of the non-EDS portion of the CBIS

### 4.2.3 Integrated Local Design Team

As part of the design process, an ILDT that includes representatives of the above-mentioned stakeholders should be formed. In addition, the ILDT should include a professional planning and design team comprised of architects, engineers, planners, CBIS designers, cost estimators, contractors, safety professionals and project managers. The ILDT is also likely to include specialty consultants, such as simulation analysts, on an as-needed basis.

Key benefits of the ILDT include:

- Facilitation of overall project coordination and information sharing between all project stakeholders throughout the life of the project



- Improved coordination of contingency plans and continuity of operations
- Representation of all project stakeholders in the decision-making process
- A spirit of collaboration among stakeholders, which facilitates stakeholder buy-in from the early phases of the project

Responsibilities of the ILDT include:

- Development of alternative screening concepts, evaluation of those concepts, and generation of design drawings and submittals
- Development of Requests for Variance (RFVs) - ILDTs assess specific local conditions affecting the CBIS design, as well as the requirements to be met by the CBIS design and if the ILDT concludes that any process, performance, or design requirement set forth in this PGDS cannot be met by the CBIS design due to local constraints, the ILDT can petition TSA via the Project Sponsor for an exemption. (See Section 4.6.2 for requirements related to RFVs.)
- Submission of CBIS Change Requests (CCRs) - See Section 9.8 for requirements related to CCRs. The PGDS CCR Form is in Appendix A, Section A.6)

If Passenger Facility Charge funding is contemplated, regular communication with the local Federal Aviation Administration (FAA) should be included in the ILDT planning process, since TSA does not provide such communication or coordination.

The responsibilities of individual ILDT members must be fully understood and properly integrated to ensure the effective design and implementation of the optimal screening system.

### 4.2.4 TSA Headquarters

Representatives from TSA Headquarters will be responsible for reviewing and approving or rejecting design submittals. TSA will determine funding eligibility and prioritization as well as assess issues related to occupational safety, health, and the environment.

Typical TSA Headquarters representatives include individuals from Acquisition Program Management: Planning, Deployment and Sustainability (DSD) and Testing and Evaluation (T&E) Division.

Key responsibilities of TSA Headquarters include:

- Creation of a regular forum for exchanging lessons learned as implementation moves forward and regularly updating the PGDS
- Reviews of technical and operational designs
- Assessment of the impact of potential screening protocol changes
- Communication of design best practices to the aviation industry



- Ebsp management, including providing periodic updates to the Strategic Plan as warranted by technology or other critical changes and making best efforts to provide the TSA resources needed for the project
- Providing a stakeholder forum to brainstorm operation and policy issues as needed
- Providing Field Data Reporting System (FDRS) data upon request

### 4.3 Project Phases

All projects shall follow the project phasing sequence: Schematic Design Phase, Detailed Design Phase, Construction Phase, Testing and Commissioning Phase, and Project Closeout Phase. Chapters 5–10 describe each phase's objectives, stakeholder responsibilities, activities, and deliverables in detail. An overview of the activities occurring in each phase is below:

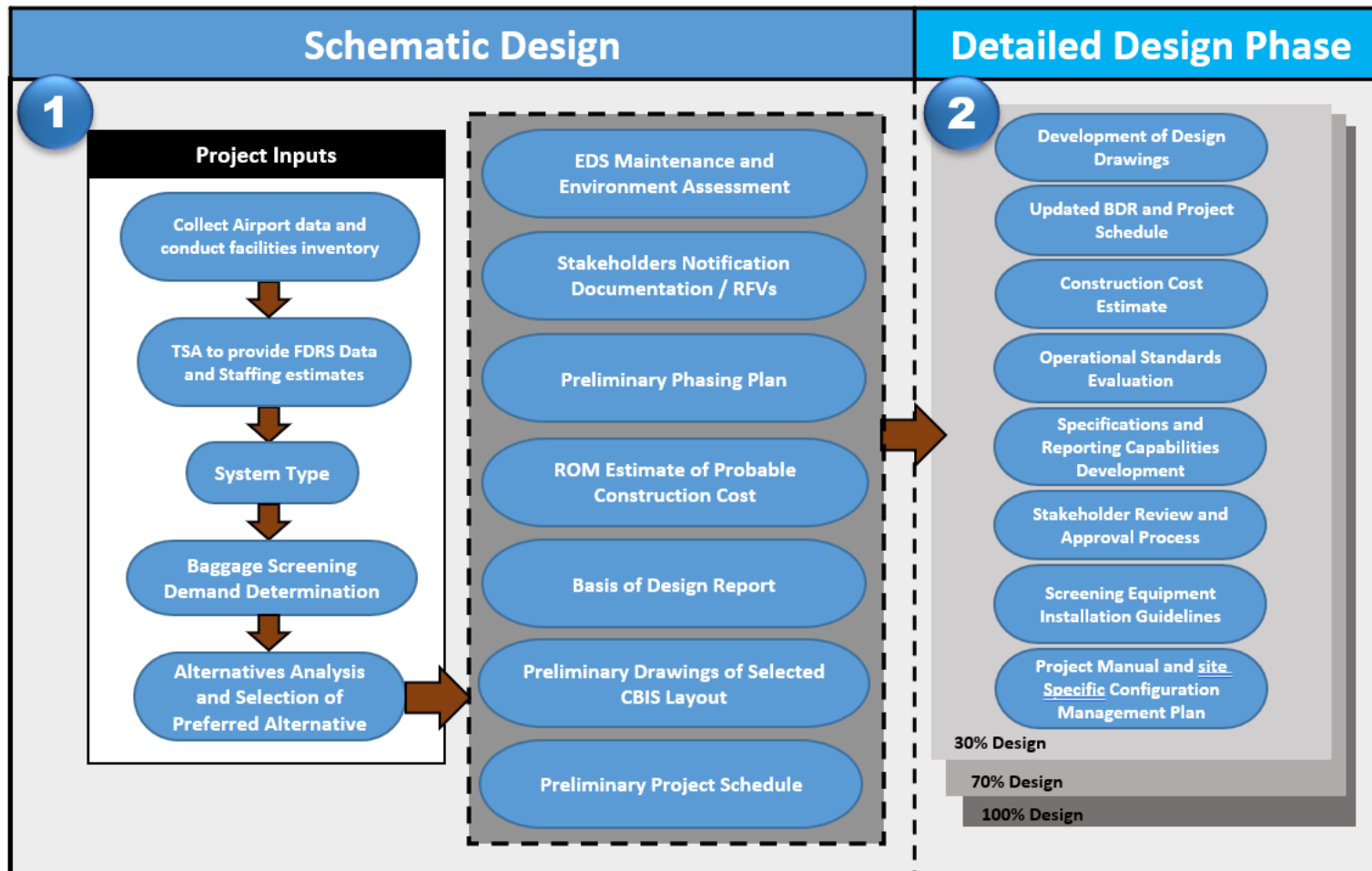
- **Schematic Design Phase**—the design-year baggage screening demand is estimated, and a recommended set of conceptual alternatives is developed. This involves identifying existing baseline conditions and selecting a preferred alternative through a process of developing and analyzing a range of candidate alternatives. The Schematic Design Phase is also used to further develop and refine the preferred alternative, including initial development of initial design drawings, Rough-Order-of-Magnitude (ROM) construction cost estimates, and program schedule, resulting in an approved Basis of Design Report (BDR). Documentation of the Preferred Alternative analysis and selection process shall be included (only for Schematic Design Phase) as an Appendix in the BDR.
- **Detailed Design Phase**—the Detailed Design Phase is used to refine and finalize detailed design drawings, ROM construction cost estimates, and program schedules. Three sub-phases are used as milestones: 30%, 70%, and 100% design.
- **Construction Phase**—the CBIS is constructed following the 100% detailed design documents. Any changes to the approved documents are submitted to TSA for review and approval. Schedules for construction, equipment delivery, and testing are finalized. Training is also included in the construction phase prior to the testing and commissioning of the system.
- **Testing and Evaluation Phase**—All required tests are conducted before the system is commissioned.
- **Project Closeout Phase**—All final as-built documentation is submitted.

TSA may, at its discretion, allow the Project Sponsor to forgo certain project phase submissions. The Project Sponsor may also request to forgo project phases through the RFV process detailed in Section 4.6.2.

Figure 4-1 summarizes the schematic design, and Detailed Design Phases described in the PGDS.



Figure 4-1: CBIS Project Design Phases



#### 4.4 Design-Build Projects

Sponsors of projects anticipated for completion through a design-build contract, regardless of the design percentage at which the design-build contract is expected to be awarded, shall provide all documentation outlined in the PGDS.



Documentation shall be provided in accordance with a schedule coordinated by the Project Sponsor and TSA to ensure applicability of the intended system to the guidelines and standards presented in the PGDS.

Additionally, shop drawings and 70% progress drawings shall be provided for CBISs being constructed through design-build contracts to demonstrate that the system being constructed conforms to the design reviewed and approved by TSA.

### 4.5 Design Review Process

The following TSA stakeholders are involved in the design review process:

- design reviewers
- site leads,
- engineering staff,
- lifecycle support staff
- local TSA
- TSA Project Coordinator.

The design review process consists of the following steps for each design phase:

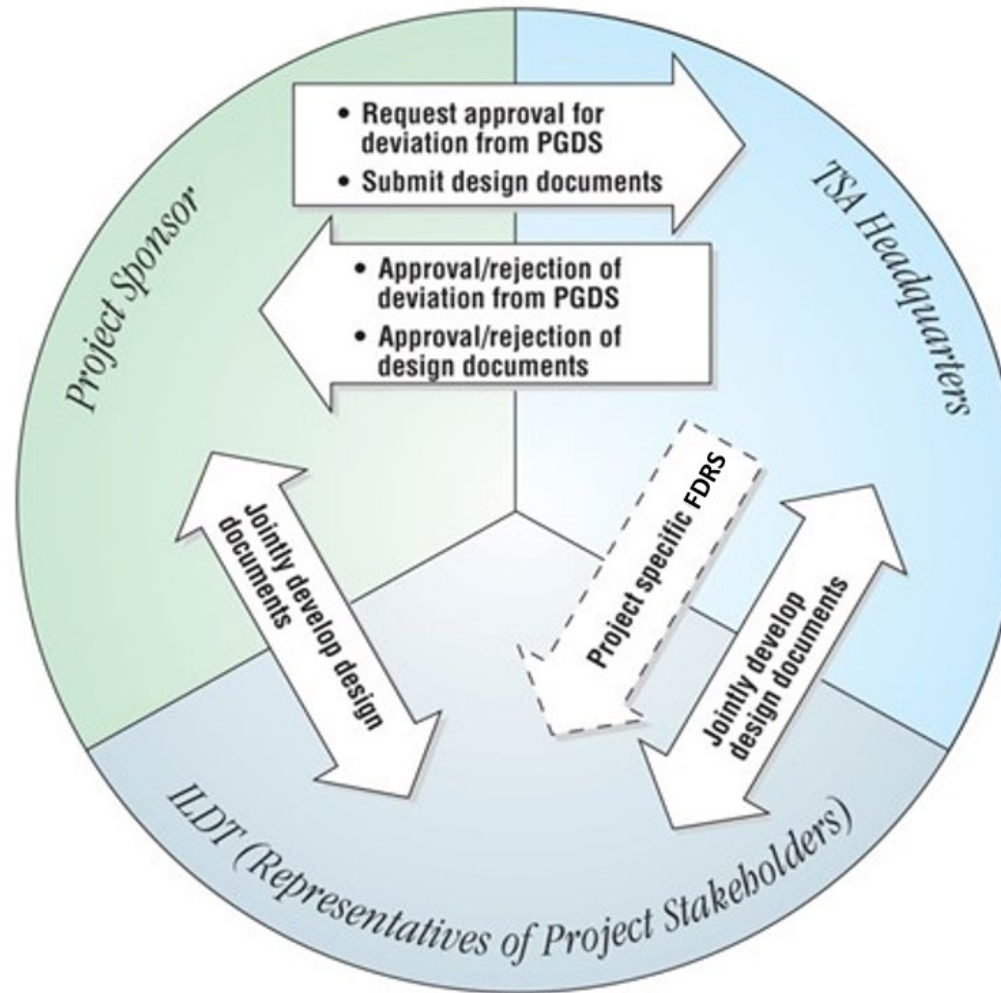
- The Project Sponsor submits the design submittals to the TSA via e-mail at [CBTPlanning@tsa.dhs.gov](mailto:CBTPlanning@tsa.dhs.gov).
- After reviewing the Project Sponsor's submittal, if TSA determines additional data is needed, the TSA instructs the Project Sponsor to provide any missing information to the TSA design review team.
- Following receipt of the requested data, TSA will complete the review process and provide the Project Sponsor with written review comments. The review is followed by a Design Review Notification (DRN) meeting or teleconference call between the TSA, the Project Sponsor, and the CBIS Designer to discuss TSA's comments. At the conclusion of the DRN meeting, the TSA will accept or reject the submittal. Rejected submittals are resubmitted for an additional review by the TSA.

Figure 4-2 summarizes the interactions between the Project Sponsor, ILDT, and TSA Headquarters in the design review process.





Figure 4-2: Summary of Responsibilities During the Design Process



### 4.6 General Submittals Requirements

Requirements in this section apply to all CBIS project phase submittals.

#### 4.6.1 Supporting Data

During the entirety of the CBIS project phases:

- All formulas and calculations used shall be submitted.
- All PGDS or other TSA-provided rates and numbers shall be used in all submittals unless a RFV is submitted to and approved by TSA.
- All rates and numbers supplied in submittals shall be accompanied by all the supporting numbers and calculations.

#### 4.6.2 Requests for Variance

An RFV is required whenever the CBIS design cannot meet a PGDS requirement. The PGDS RFV Form is found in Appendix A. RFVs submitted during design phase are sent to TSA Planning branch at [CBTPlanning@tsa.dhs.gov](mailto:CBTPlanning@tsa.dhs.gov) e-mail. RFVs submitted during construction or testing phases are submitted to the TSA Coordinator and [BASEteam@tsa.dhs.gov](mailto:BASEteam@tsa.dhs.gov). The following is required for RFVs during the design process.

- The Project Sponsor shall submit an RFV for any PGDS requirement that cannot be met.
- The ILDT shall assess all implications of an exemption from any requirements set forth in the PGDS due to local constraints and supply full documentation supporting the RFV to the project sponsor.
- Design package submittals shall include documentation of all RFVs associated with the CBIS project.

If CBIS design requirements described in Chapter 12 cannot be met, the TSA Design Review Team will notify the EBSP Program Manager and Life Cycle Support (LCS) Manager to determine the lifecycle support impact on the EDS equipment.

#### 4.6.3 Submittals Formatting

All submittals shall be made electronically, in print-ready Portable Document Format (PDF), unless otherwise noted, and shall include the following:

- The front page and footer section shall include the title of the design and the applicable PGDS version.
- Each design package shall begin with a table of contents.



- All chapters/submittals shall be indexed electronically within the file.
- Each chapter shall be identified with an electronic PDF bookmark.
- PDF file size shall not exceed 20 megabytes (MB) for any individual submittal item.

### 4.6.4 Electronic File Naming Convention

The electronic file names shall conform to the following convention:

ABC XXXX LOCATION YYYYMMDD TYPE DESCRIPTION. EXT

Where:

- ABC is the FAA airport identifier
- XXXX is the IATA airport identifier
- LOCATION is a unique description of the project location such as T1, NODE1, etc.
- YYYYMMDD is the file date represented as year, month, and day, utilizing leading zeroes where applicable
- TYPE is the file type as follows:
  - NARR is a narrative
  - PLC is a PLC program
  - NET is a network configuration
  - DWG is a drawing
  - VFD is a Variable Frequency Drive (VFD) configuration
  - IDX is an index
  - HMI is an HMI configuration
  - LIST is a spreadsheet list
  - FIRM is a firmware listing
- DESCRIPTION is a free text field to describe the file contents
- EXT is the file extension



### 4.6.5 Design Review Comment Form

TSA's Design Review Team provides comments on submittal items requiring additional information or correction to the Project Sponsor in the Design Review Comment Form. The Project Sponsor shall provide written responses to each TSA comment and shall include a reference to the submittals sections where changes were made to address comments.

### 4.6.6 Submittals Checklist

To support consistency and transparency in design package submittals and reviews, TSA has developed a Submittals Checklist. The Submittals Checklist is not required, but TSA recommends its use and inclusion with each design package submission.

The Submittals Checklist consolidates the requirements for submittal content and format from multiple locations in the PGDS into a single document to simplify verifying completeness, eliminate repetition, and more clearly illustrate the progression in level of detail through the project phase submittals. The checklist serves as a traceability matrix to address requirements in the submittal, to help design package developers and reviewers verify that all requirements for each phase submittal have been satisfied. The checklist also includes references to the relevant section of the PGDS for each content requirement to ensure that designers and reviewers can agree on design requirements and a basis for any questions that may arise.

The Submittals Checklist is an Excel workbook that is obtained by e-mailing [PGDS@tsa.dhs.gov](mailto:PGDS@tsa.dhs.gov).

## 4.7 TSA Funding

### 4.7.1 Funding Application

Airports with an eligible in-line CBIS project may request TSA funding in support of the CBIS design and construction. The two-step application process consists of the submission of (1) a ReMAG request and (2) an application. Guidance and Frequently Asked Questions (FAQs) on the funding and application processes can be found on [TSA's Electronic Baggage Screening Program website](#). For more information on TSA's funding policy, see the Electronic Baggage Screening Program Policy Memo—TSA Funding of Checked Baggage Inspection System Project Costs on the [Sam.gov](http://Sam.gov) website using the search term "PGDS".

### 4.7.2 Use of TSA-Approved Equipment

When TSA funds the design and construction of a CBIS project, the project sponsor shall design their CBIS for incorporation of TSA-qualified EDS and ETD units.



If the airport is not using TSA funding for either the design or construction of a project, the airport may choose to design for a TSA-certified EDS, rather than a TSA-qualified EDS throughout the design process. However, TSA will only approve a 100% design to move forward to construction if it is designed using TSA-qualified equipment identified in Chapter 3. The airport assumes the cost and schedule risk that if no qualified equipment exists or has been procured at that time, the airport may need to either redesign the system to use available qualified equipment or delay construction of the system until new qualified equipment becomes available.

### 4.7.3 Invoicing and Earned Value Management

Invoices or requests for payment should include a summary page presented in the same format as the current working cost estimate (see Section 11.4) to allow for ease of tracking and comparing actual expenses to agreed-upon costs. For invoicing instructions, refer to the Project Other Transactional Agreement (OTA).

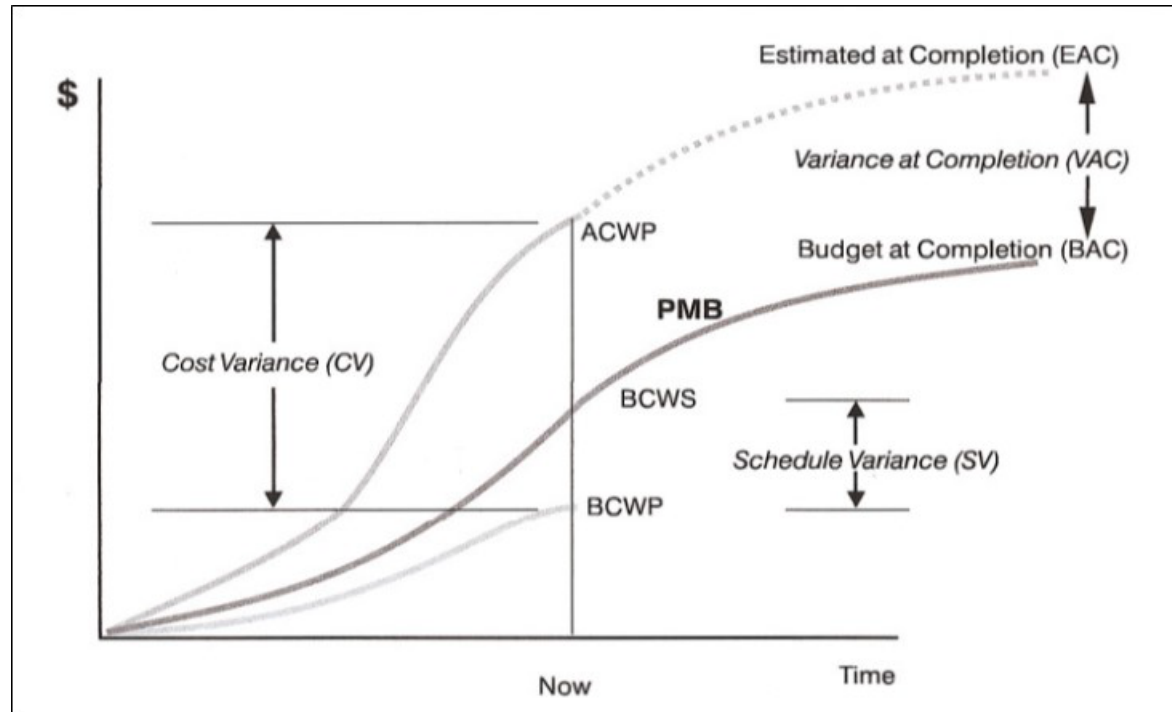
Because the practice of Earned Value Management (EVM) and the equation's ability to measure cost performance are widely accepted, airport sponsors, airlines, and other organizations requesting funding support from TSA should provide a current EVM analysis. This analysis should identify work completed to date and include a forecast of the work anticipated to be completed during the next month or invoicing period, whichever is longer. The EVM data should be representative of the entire project scope in the Work Breakdown Structure (WBS) format, using the most current cost-loaded project schedule. Estimates with EVM calculations submitted for funding reimbursement request purposes should include, at a minimum, the following EVM elements:

- Budgeted Cost of Work Scheduled (BCWS) – Representative of all costs, including indirect costs that are planned or scheduled. A well-designed schedule usually reflects these planned costs as a traditional S-curve shape
- Actual Cost of Work Performed (ACWP) Representative of all costs, including indirect costs charged against activities that are completed
- Budgeted Cost of Work Performed (BCWP) – More traditionally described as “earned value,” these costs are representative of the direct and indirect costs for activities that are completed; these costs are distinct from the BCWS, which is for activities that are planned to be completed
- Budget at completion (BAC)
- Estimate at completion (EAC)
- Performance Management Baseline (PMB)
- Schedule variance (SV)
- Variance at completion (VAC)
- Cost performance index (CPI) (which equals  $BCWP \div ACWP$ )



The BCWS, ACWP, and BCWP provide the mechanics for a full analysis of project progress and performance in the EVM environment. The projections of EAC, SV, and VAC will be derived from these initial investments where the EAC for the data on the date compiled is calculated as  $EAC = ((BAC - BCWP) \div CPI) + ACWP$ . Note that  $CPI = BCWP \div ACWP$ ; good cost performance produces a CPI greater than 1. Figure 4-3 shows the relationship between the EVM variables and values.

Figure 4-3: Earned Value Management Graph



## **CHAPTER 5: SCHEMATIC DESIGN PHASE – PART 1**

### **BAGGAGE SCREENING DEMAND DETERMINATION**



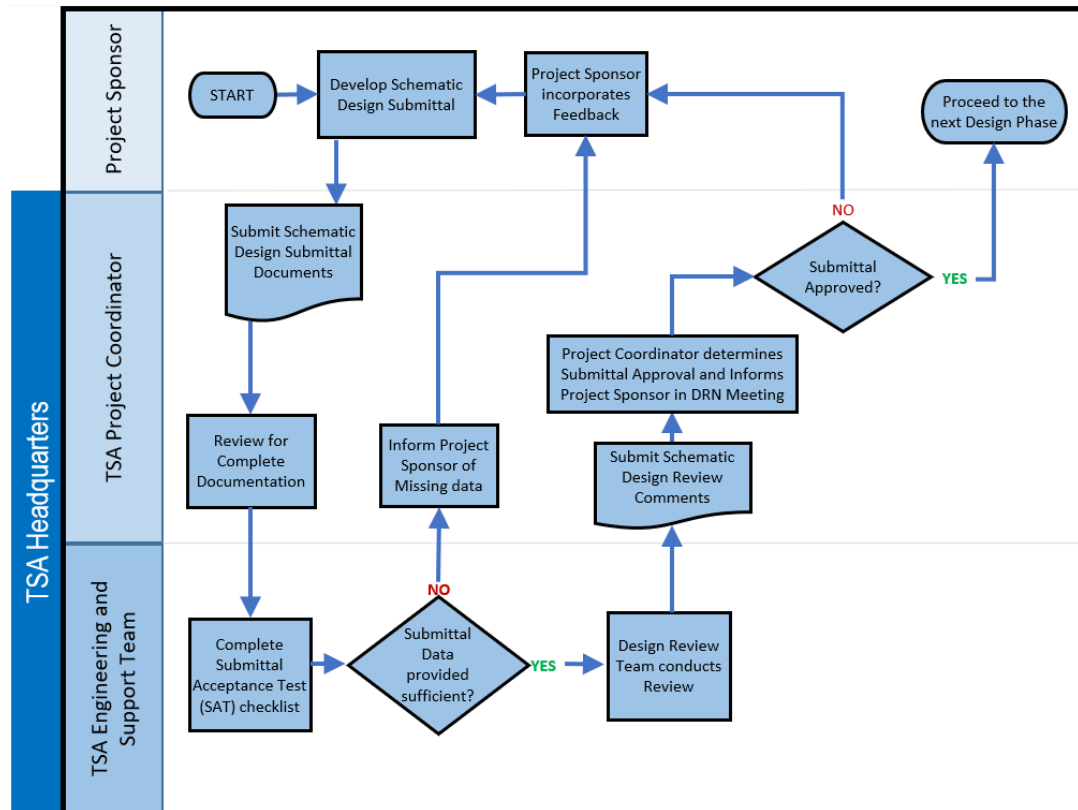
## 5.1 Schematic Design Phase Overview

The Schematic Design Phase requires: the identification of existing baseline conditions; estimation of design-year baggage screening demand; and development, analysis, selection, and initial refinement of the preferred alternative.

The Schematic Design phase is broken into two parts: Part 1 is covered in this chapter and is concentrated on determining the baggage screening demand; Part 2 (Chapter 6) includes an alternatives analysis followed by the refinement of the preferred alternative.

A process flow chart of the Schematic Design Phase is displayed in Figure 5-1.

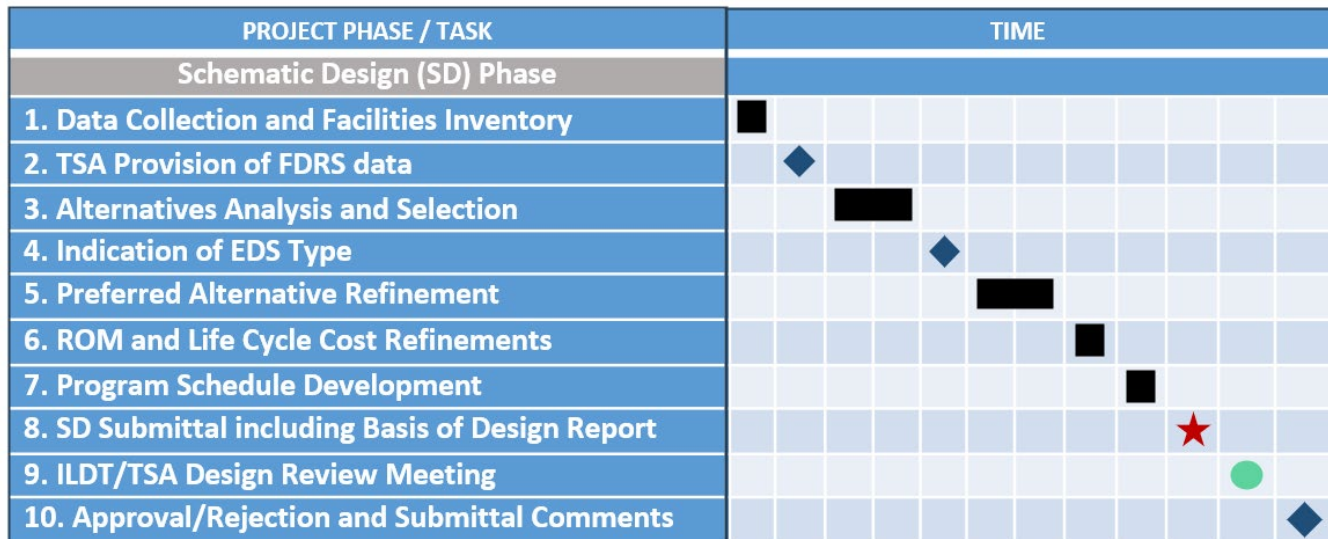
**Figure 5-1: Schematic Phase Process Flow**





A key document in the Schematic Design Submittal to TSA is the Basis of Design Report (BDR), describing the preferred alternative, with the process and rationale used in its selection. To satisfy TSA requirements, sufficient documentation to indicate that a reasonably diverse range of PGDS-compliant alternatives was explored and that the preferred alternative is operationally viable, meets level-of-service requirements, and is the most cost-effective solution. This analysis of alternatives shall be included as an Appendix in the BDR. The following sections summarize the Project Sponsor and ILDT tasks and deliverables as well as TSA's responsibilities for the Schematic Design Phase.

**Figure 5-2: Summary of Schematic Design Phase**



Note: The Timetable does not reflect task duration

■ ILDT Task ★ ILDT Deliverable to TSA ◆ TSA Responsibility ● ILDT/TSA Meeting

## 5.2 Project Sponsor and ILDT Schematic Design Phase Responsibilities

The tasks involved in the Schematic Design Phase that are the responsibility of the Project Sponsor and ILDT are outlined below:

- Collect necessary data, conduct a facilities inventory, and participate in a project expectation meeting with TSA
- Request, receive and review available FDRS. Using the FDRS as a starting point helps to shorten the design process and possibly nullify the need for a Flight Schedule Analysis (FSA) (see Section 5.5.1.2)

- Develop Preliminary screening alternatives as described in Section 6.2. These screening alternatives should be like the system types described in Chapter 3
- Analyze the alternatives by conducting qualitative and high-level quantitative assessments (e.g., spatial analyses, assessment of compatibility with airline business models), including security screening equipment requirements (see Section 5.6)
- Obtain TSA staff, equipment, and maintenance cost estimates to perform the lifecycle cost analysis
- Perform ROM evaluations, including 20-year lifecycle cost analyses (see Chapter 11)
- Select the preferred alternative, which is the alternative that is operationally viable, meets the level-of-service requirements, and has the lowest present value lifecycle costs
- Further develop and refine the preferred alternative, including the initial development of design drawings
- Develop a more detailed ROM construction cost estimate to be incorporated into the lifecycle cost analysis performed in the Schematic Design Phase
- Develop a program schedule
- Send an e-mail request to TSA for expected EDS model. EDS availability and characteristics are subject to the outcome of TSA's competitive procurement and production lead times
- Submit the Schematic Design Phase Submittal including BDR to TSA
- Participate in a meeting with the TSA Design Review Team in the event the Project Sponsor/ILDT requires clarification on the comments and disposition of the submittal. Receive comments on the Schematic Design Submittal documents and formal approval or rejection

### 5.3 Schematic Design Phase Deliverables

The Schematic Design package shall include the deliverables below:

- **Basis of Design Report** (Section 6.3)
  - Detailed project requirements (Section 6.3.1)
  - EDS make, model, and quantity that will be provided by TSA (Section 3.2.1)
  - Preliminary description of operations (Section 6.3.2)
  - Flow-based modeling assumptions and results (Section 6.3.3)
  - List of legacy EDSs to be decommissioned (Section 6.3.5)
  - Analysis of Alternatives – in Appendix (Sections 6.2)
- **Preliminary layout drawings of the CBIS** (Section 6.4.1)



- **Preliminary phasing plan** (Section 6.4.3)
- **Preliminary project schedule** (Section 6.4.2)
- **ROM estimate of probable construction costs (LCCA)** (Chapter 11)
- **EDS Maintenance and Environment Assessment of environmental conditions that will exist in the designed CBIS and environmental requirements of EDS** (Section 12.11.3)
- **Contingency plan** (Section 7.5, only applicable to mini in-lines at this phase)
- **Stakeholder notification documentation** (Section 6.4.7)
- **Approved and in-process RFVs** (Section 4.6.2)

The Submittals Checklist (Section 4.6.6) is recommended but not required.

### 5.4 TSA Schematic Design Phase Responsibilities

At the beginning of the Schematic Design Phase, TSA will initiate a project expectation meeting with the Project Sponsor and ILDT. If available, TSA will provide the historical EDS FDRS data, and the analysis required to render the baggage design 10-minute rate.

As part of the review process during the Schematic Design Phase, TSA Headquarters is expected to provide the Project Sponsor with the following:

- A Design Review Notification (DRN) Meeting with the Project Sponsor, ILDT, and TSA project coordinators
- Formal approval or rejection and comments on the Schematic Design submittal

### 5.5 Baggage Screening Demand Determination

The intent of the baggage screening demand analysis is to ensure that systems are designed to meet the baggage demands of at least 95% of the days as expressed by the peak 10 minutes of each day in the calendar year. Where designing for the 95<sup>th</sup> percentile does not provide sufficient capacity as determined by the TSA and the Project Sponsor, alternative design days can be used with TSA approval.

This section documents the methodology used to determine the design demand required to size optimal screening systems within an airport. As explained in detail in the following paragraphs, the steps below summarize the methodology:

1. Determine current checked baggage demand
2. Project future baggage demand



To aid the project sponsor in determining the baggage demand through this methodology, the TSA will provide FDRS, when requested and available, for the given airport. This information may include data that will assist the project sponsor in determining the design day baggage rate (see Section 5.5.1) and equipment requirements (see Section 5.6). The Project Sponsor may choose to use this information as a guide throughout the analysis or as a justification to shorten the required analysis.

### 5.5.1 Determine Current Checked Baggage Demand

There are two methods for estimating current demand, one using FDRS data and the other based on the FSA. If available, the TSA will supply FDRS to assist the ILDT in their determination of current baggage rate demands. This FDRS data consists of historical empirical FDRS data that has been cultivated to yield the peak 10 minutes of every day of the preceding year, individual EDS processing rates (by minute or 10-minute rolling bins), and Staff Allocation Model data (yielding some values for parameters such as bags/passenger/airline, hourly rates, etc.).

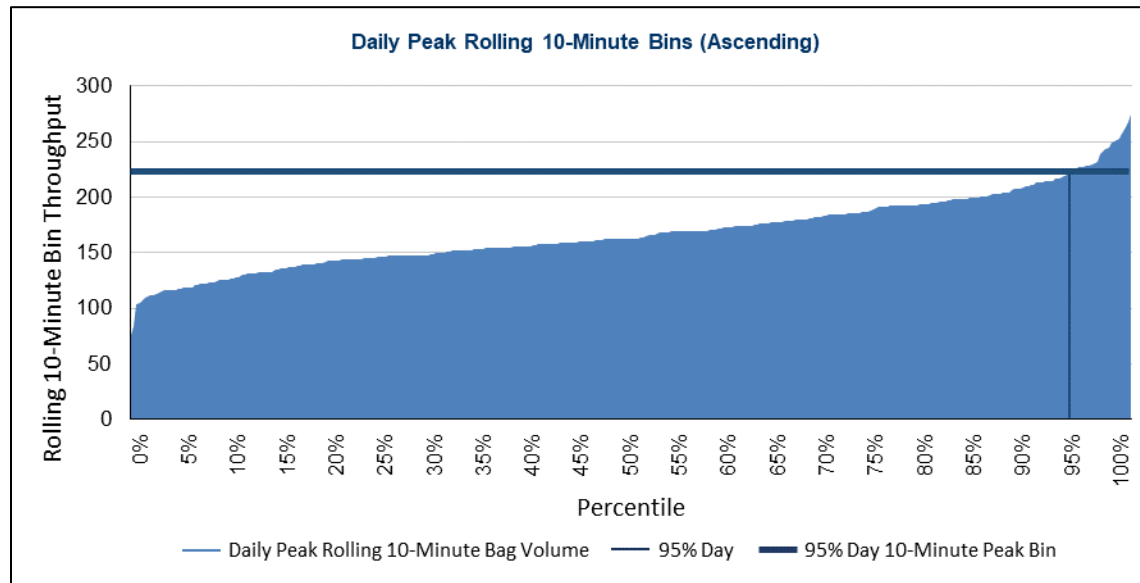
If available, FDRS data provided by TSA shall be used to determine the current 95<sup>th</sup> percentile peak 10-minute demand for each CBIS. If FDRS is not available, the FSA methodology shall be used to derive the Average Day Peak Month (ADPM) peak 10-minute demand for each CBIS.

#### 5.5.1.1 Field Data Reporting System Analysis Methodology

FDRS data provides an actual measure of current baggage demand. The peak 10-minute volume from each day is graphed from smallest to largest to identify the 95<sup>th</sup> percentile value for the CBIS, as illustrated in Figure 5-3. The 95<sup>th</sup> percentile value is used for the Current Demand design value.



Figure 5-3: Example 12-Month FDRS Peak 10-Minute Daily Volume, Ascending



The Current Demand value of 225 bags/10 minutes in the above example is used throughout the rest of this chapter in related example calculations.

No FSA is required when using the FDRS methodology. However, flight schedules (in Excel format) or another basis for deriving the Domestic-to-International ratio for each CBIS must be submitted.

### 5.5.1.2 Flight Schedule Analysis Methodology

The FSA method of estimating checked baggage demand analyzes the ADPM flight schedule to identify the peak ten-minute demand. The FSA method should only be used if FDRS is unavailable or is found to be non-representative of actual baggage demand for some reason.

#### (1) Identify ADPM

The ADPM is determined from originating bags and international recheck bags for the CBIS. Historical flight schedules are typically used to determine ADPM; however, if enplanement growth is expected after CBIS construction, the ILDT can submit the planned future flight schedule to TSA for approval. Only validated and TSA-approved flight schedules shall be used to determine ADPM.

- The total number of *monthly* originating bags and international recheck bags for all airlines in a 12-month period shall be obtained and the peak month identified. The month with the maximum combined number of originating and international recheck bags is referred to as the peak month.
- The total number of *daily* originating and international recheck bags for all airlines during the peak month shall be calculated, and a mathematical average shall be derived. The day on which the number of originating and international recheck bags is closest to the calculated mathematical average is the ADPM.

### (2) Flight Schedule

Once the ADPM has been determined, that day's flight schedule shall be provided in MS Excel format. To identify outbound baggage demand, flight schedules shall only contain information on departing flights from the subject airport. Flight schedules shall specify for each flight:

- destination
- flight departure time
- flight number
- published carrier
- operator
- aircraft type
- number of seats

To derive international recheck baggage demand, the arrival schedule of international flights whose passengers will be connecting to domestic flights shall be provided. Baggage arriving from international destinations where security screening protocols differ from those used by TSA are re-screened at the first United States port of entry before being loaded onto any domestic flight.

### (3) Load Factors

A load factor is the percentage of seats on a flight occupied by ticketed passengers. Load factors vary by flight (e.g., by airline, time of day, and destination), by day of the week, and by season. Because of the variance in load factors, it is important to obtain the most accurate data that reflects the specific conditions of the selected ADPM directly from the airlines if possible.

In addition, load factors on international arrival flights must be obtained to derive international recheck baggage demand.



#### (4) Originating and Connecting Passenger Percentages

Originating passengers are passengers whose itinerary begins at the subject airport; an originating passenger checks in with the appropriate airline and proceeds through the security screening checkpoint to the departure gate. Like load factors, the percentage of originating passengers may vary by flight (e.g., by time of day, destination, and airline), by day of the week, and by season.

Domestic flights departing from the airport prior to 9 a.m. typically have significantly higher percentages of originating passengers than those departing after 9 a.m. because of the nature of connecting passenger traffic. In general, the first arrival bank of domestic flights permits very few passengers to connect with flights departing from the airport prior to 9 a.m.; therefore, most of the passengers on those flights are originating passengers. Thus, the percentage of originating passengers before 9 a.m. is close to 100%; after 9 a.m. the percentage ranges from 5% to 100%.

Because of the wide variance in originating passenger percentages, it is important to obtain the most accurate data that reflects the specific conditions of the ADPM at the subject airport directly from the airlines if possible.

The percentage of passengers arriving on international flights and connecting to domestic flights shall be used to derive international recheck baggage demand.

The estimated number of **originating passengers** shall be calculated by multiplying the number of seats by the load factor and by the percentage of originating passengers' assumptions for the ADPM.

$$\text{Originating Passengers} = \text{Number of Seats} \times \text{Load Factor} \times \text{Percentage of Originating Passengers}$$

The estimated number of **connecting passengers** from international to domestic flights shall be calculated by multiplying the number of arriving seats by the load factor, and by the percentage of connecting passengers' assumptions for the ADPM.

$$\begin{aligned} \text{Connecting Passengers for International to Domestic Flights} \\ = \text{Number of Arriving Seats} \times \text{Load Factor} \times \text{Percentage of Connecting Passengers} \end{aligned}$$

#### (5) Passenger Arrival Distributions

Passenger arrival distributions specify the percentages of originating and international recheck passengers arriving at the airport a specific number of minutes prior to their flight departure. These distributions are used to determine the flow of passengers checking bags for each flight. The flows for each flight are added together to generate an overall passenger flow over the course of the design day.

Where possible, and with TSA's concurrence, arrival distributions should be airport-specific and obtained directly from the airlines. If airport-specific data is not available, the earliness distributions in this section should be used.

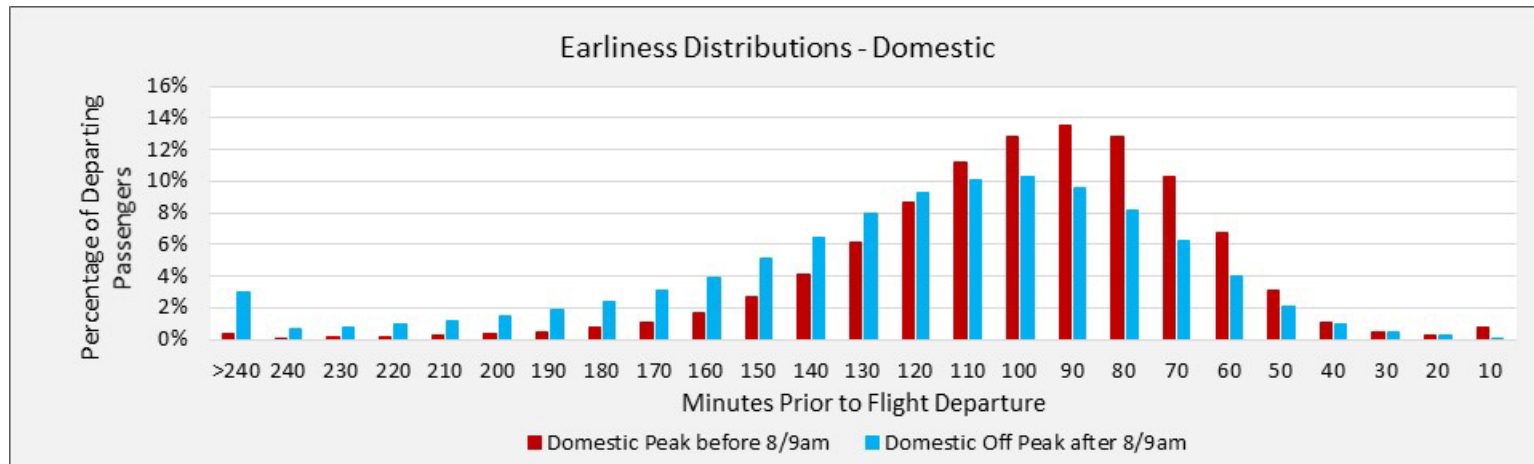


**Domestic Earliness Distributions:** Significant differences exist in the earliness distributions between passengers on domestic flights departing before 8/9:00 a.m. and after 8/9:00 a.m. Earliness distributions for flights departing in the morning are generally of shorter duration and thus more peaked; therefore, it is important to use the appropriate earliness distributions to accurately derive actual baggage flows.

The distribution for flights departing before 8/9:00 a.m.(peak) hours exhibits higher peaking characteristics and has a much shorter duration than the distribution for flights departing after 8/9:00 a.m. (off-peak) hours.

The domestic earliness distributions are shown in Figure 5-4.

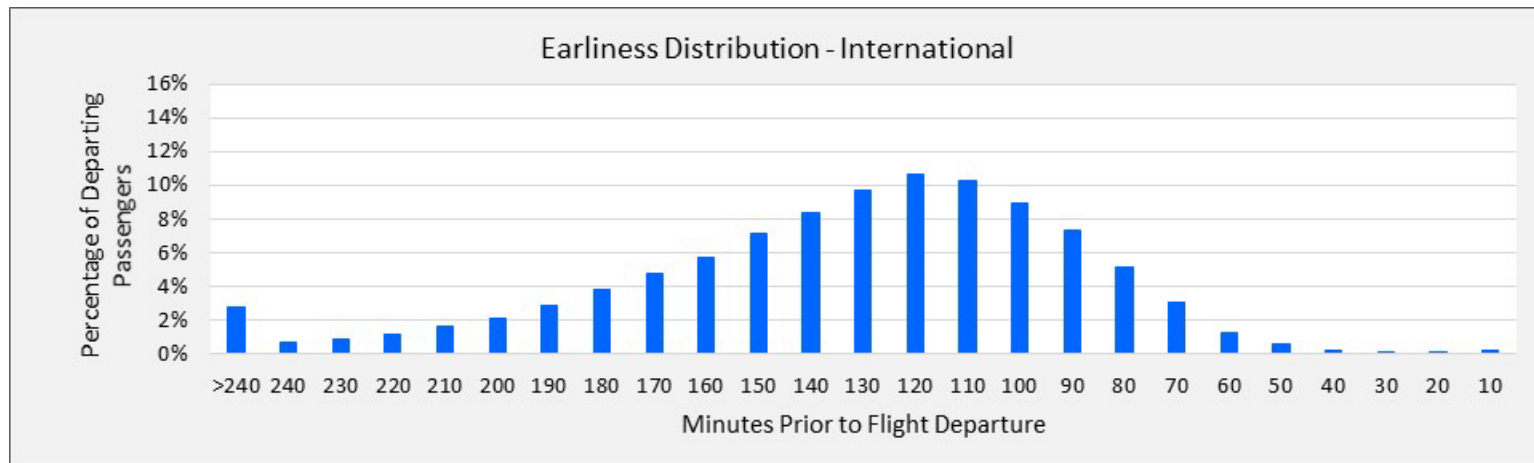
**Figure 5-4: Earliness Distributions – Domestic Departures Before 8/9:00 A.M. and Off-Peak-After 8/9:00 AM**



**International Earliness Distributions:** The distribution variance for international departures is higher than for domestic departures and a larger percentage of international passengers arrive at the airport earlier than for domestic flights. The International earliness distributions are shown in Figure 5-5.



Figure 5-5: Earliness Distribution – International Departures

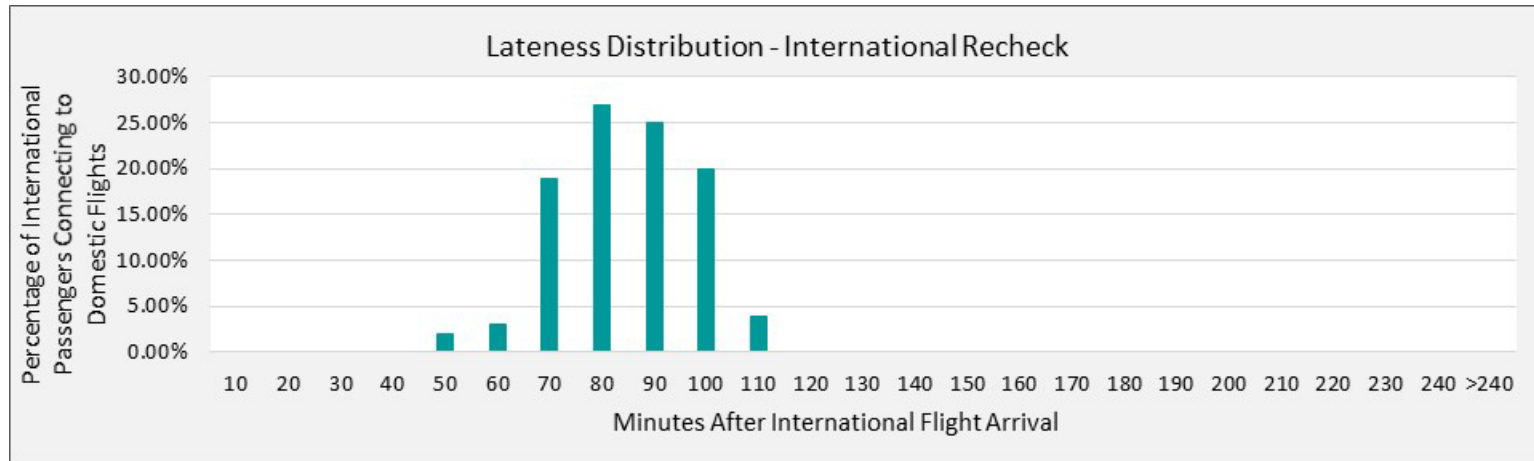


**Lateness Distributions:** A lateness distribution for international recheck passengers specifies the percentage of passengers that exit the Federal Inspection Services facility a specific number of minutes after their flights have landed. Specifically, the lateness distribution is applied to international recheck passengers that need their bags screened. Passengers arriving from international destinations where security screening is not conducted according to TSA protocols and who are connecting to domestic flights need to have their bags screened at the first port of entry into the United States before they are loaded onto any domestic flight.

Lateness distributions have a much shorter duration than earliness distributions because all passengers deplane upon arrival within a relatively short period of time for any given flight. For this reason, the international recheck baggage flows show marked peaks and have very short durations, as shown in Figure 5-6.



Figure 5-6: Lateness Distribution – International Recheck



The data underlying the passenger arrival distribution graphs in this section are compiled in Table 5-1. These values should only be used if airport-specific data is not available.

Table 5-1: Passenger Arrival Distributions

| Minutes Before Departure/<br>After Arrival | Earliness<br>Peak Domestic<br>Before 8/9:00 a.m. | Earliness<br>Off-peak Domestic<br>After 8/9:00 a.m. | Earliness<br>International | Lateness<br>Federal Inspection<br>Services Flight |
|--------------------------------------------|--------------------------------------------------|-----------------------------------------------------|----------------------------|---------------------------------------------------|
| 0 to 10                                    | 0.80%                                            | 0.06%                                               | 0.22%                      | 0.00%                                             |
| 10 to 20                                   | 0.26%                                            | 0.30%                                               | 0.11%                      | 0.00%                                             |
| 20 to 30                                   | 0.42%                                            | 0.48%                                               | 0.15%                      | 0.00%                                             |
| 30 to 40                                   | 1.10%                                            | 0.98%                                               | 0.28%                      | 2.00%                                             |
| 40 to 50                                   | 3.08%                                            | 2.10%                                               | 0.61%                      | 3.00%                                             |
| 50 to 60                                   | 6.71%                                            | 4.03%                                               | 1.32%                      | 19.00%                                            |
| 60 to 70                                   | 10.34%                                           | 6.19%                                               | 3.08%                      | 27.00%                                            |
| 70 to 80                                   | 12.87%                                           | 8.16%                                               | 5.13%                      | 25.00%                                            |
| 80 to 90                                   | 13.54%                                           | 9.59%                                               | 7.37%                      | 20.00%                                            |
| 90 to 100                                  | 12.79%                                           | 10.25%                                              | 8.93%                      | 4.00%                                             |



| Minutes Before<br>Departure/<br>After Arrival | Earliness<br>Peak Domestic<br>Before 8/9:00 a.m. | Earliness<br>Off-peak Domestic<br>After 8/9:00 a.m. | Earliness<br>International | Lateness<br>Federal Inspection<br>Services Flight |
|-----------------------------------------------|--------------------------------------------------|-----------------------------------------------------|----------------------------|---------------------------------------------------|
| 100 to 110                                    | 11.21%                                           | 10.08%                                              | 10.28%                     | 0.00%                                             |
| 110 to 120                                    | 8.70%                                            | 9.25%                                               | 10.69%                     | 0.00%                                             |
| 120 to 130                                    | 6.13%                                            | 7.95%                                               | 9.75%                      | 0.00%                                             |
| 130 to 140                                    | 4.11%                                            | 6.44%                                               | 8.40%                      | 0.00%                                             |
| 140 to 150                                    | 2.66%                                            | 5.09%                                               | 7.12%                      | 0.00%                                             |
| 150 to 160                                    | 1.69%                                            | 3.94%                                               | 5.74%                      | 0.00%                                             |
| 160 to 170                                    | 1.10%                                            | 3.06%                                               | 4.75%                      | 0.00%                                             |
| 170 to 180                                    | 0.72%                                            | 2.36%                                               | 3.81%                      | 0.00%                                             |
| 180 to 190                                    | 0.46%                                            | 1.83%                                               | 2.92%                      | 0.00%                                             |
| 190 to 200                                    | 0.32%                                            | 1.43%                                               | 2.17%                      | 0.00%                                             |
| 200 to 210                                    | 0.22%                                            | 1.14%                                               | 1.62%                      | 0.00%                                             |
| 210 to 220                                    | 0.15%                                            | 0.92%                                               | 1.19%                      | 0.00%                                             |
| 220 to 230                                    | 0.11%                                            | 0.74%                                               | 0.90%                      | 0.00%                                             |
| 230 to 240                                    | 0.08%                                            | 0.62%                                               | 0.71%                      | 0.00%                                             |
| >240                                          | 0.41%                                            | 3.01%                                               | 2.77%                      | 0.00%                                             |
| Total                                         | 100%                                             | 100%                                                | 100%                       | 100%                                              |

### (6) Checked Bags per Passenger

The average number of checked bags per originating passenger varies by airline, by destination, and by time of year. Extensive in-field data collection efforts and specific data provided by the airlines for a 2019 study demonstrate that the number of checked bags per passenger is:

- Average of 0.7 checked bags per originating passenger for domestic flights
- Average of 1.0 checked bags per originating passenger serving international markets
- Average of 1.0 recheck bags per international-to-domestic connecting passenger

These are very generic ranges, and planners should obtain and substantiate locally collected specific values for the types of carriers and markets served. Planners should consider protocol modifications, such as the one prohibiting and subsequently limiting liquids in carry-on baggage that may also affect these ratios.



The estimated number of originating checked bags shall be calculated by multiplying the estimated number of originating passengers by the number of checked bags per passenger assumptions for the ADPM.

$$\text{Originating Checked Bags} = \text{Number of Originating Passengers} \times \text{Number of Checked Bags per Originating Passenger}$$

The estimated number of international recheck bags shall be calculated by multiplying the estimated number of connecting passengers from international to domestic flights by the number of international recheck bags per passenger assumptions for the ADPM.

$$\begin{aligned} \text{International Recheck Bags} \\ = \text{Number of Connecting Passengers} \times \text{Number of International Recheck Bags per Connecting Passenger} \end{aligned}$$

The earliness and lateness distributions are used to derive the flows of originating and international recheck bags throughout the day.

Table 5-2 summarizes several potential sources of the key input data used to derive ADPM baggage flows.

**Table 5-2: Summary of Input Data Needs and Potential Data Sources**

| Data                                 | Sources                                                                                                 |
|--------------------------------------|---------------------------------------------------------------------------------------------------------|
| Scheduled airline activity           | Official Airline Guides, Inc.<br>Seabury Airline Planning Group Database<br>Airport sponsor<br>Airlines |
| Charter airline activity             | Airport sponsor<br>Charter Airlines                                                                     |
| Airline boarding load factors        | U.S. Department of Transportation<br>Airlines                                                           |
| Percentage of originating passengers | U.S. Department of Transportation<br>Airlines                                                           |
| Earliness and lateness distributions | Airlines<br>In-field surveys                                                                            |
| Checked bags per passenger           | Airlines<br>In-field surveys                                                                            |
| Historical baggage data              | TSA                                                                                                     |
| Enhanced Staffing Model Data         | TSA                                                                                                     |

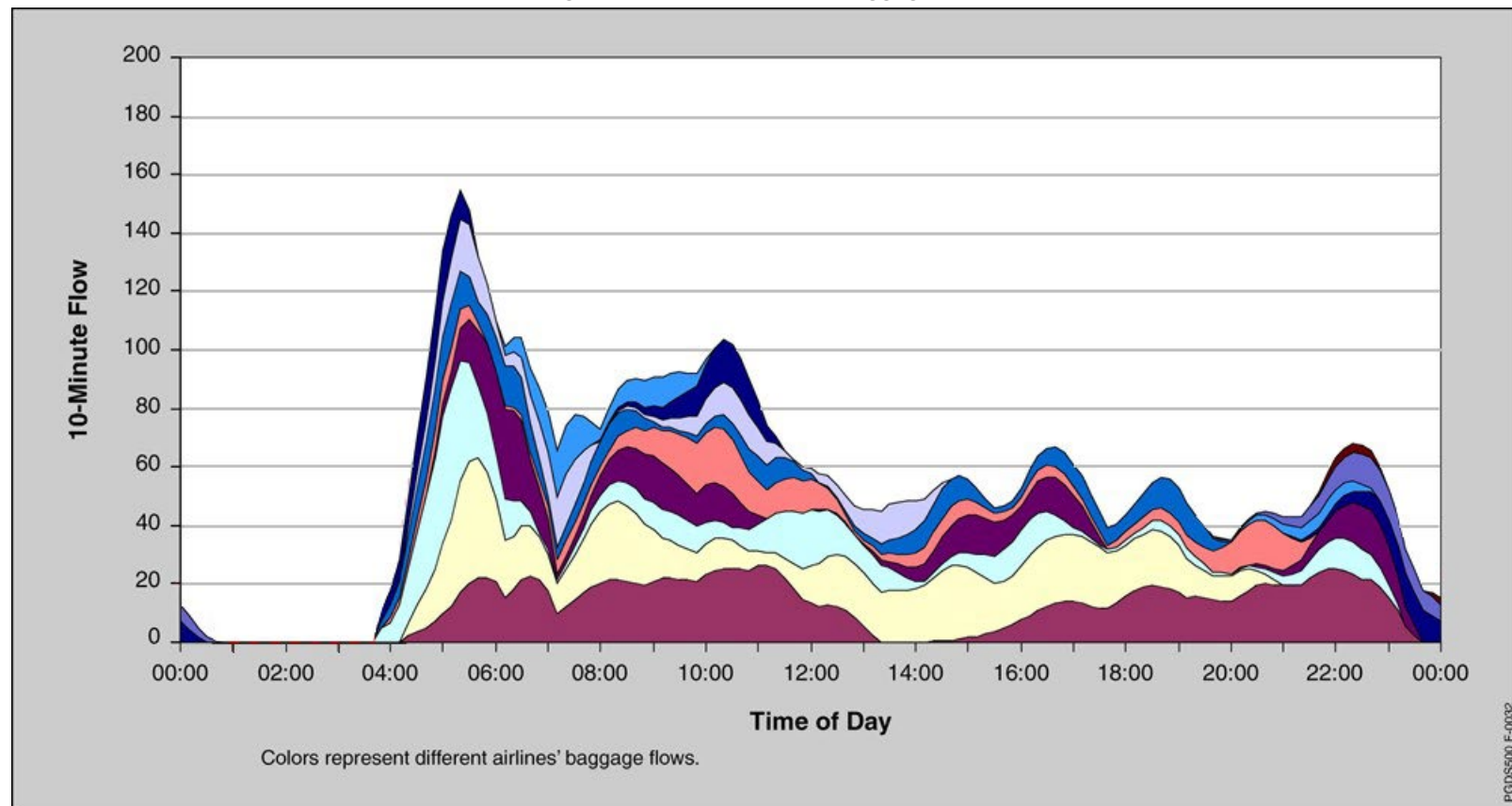


### (7) Identify Peak Demand

The final product of the Flight Schedule Analysis will show the combined baggage flow by 10-minute bin over the ADPM for all associated airlines. The highest 10-minute bin is used for the Current Demand design value. The ratio of International and Domestic bags in the peak 10-minutes shall be used in CBIS equipment calculations.

Figure 5-7 shows the 10-minute ADPM checked baggage flow by airline for an example airport. Each airline is represented by a different color in this figure. This figure is meant for reference only and is not meant to depict the actual curve smoothness developed using the ADPM process.

Figure 5-7: ADPM Checked Baggage Flow



### (8) Validation of Flight Schedule-Driven Demand

The FSA methodology should be validated with actual daily baggage counts for the relevant airlines. If a significant discrepancy in total daily baggage (for the ADPM) is found between the two sources, then planners should consult with the Project Sponsor to resolve the discrepancy.

#### 5.5.2 Project Future Baggage Demand

The Current Demand value identified through the FDRS or FSA methodology must be projected to reflect expected future growth in demand and ensure CBIS designs are sized adequately. There are two primary future demand values used in the CBIS design.

- **Design Year Demand** is the basis for CBIS equipment requirements calculations. Current baggage demand shall be projected to the Design Year to determine screening equipment requirements. The Design Year for equipment requirements shall be five years after the initial DBU for a given baggage screening system (i.e., DBU+5 years). This assumption is based on current TSA policy for system approval. Thus, if a system is scheduled to become operational in 2023, the Design Year for that system will be 2028.
- **Space Planning Demand** is used to ensure there will be space in the CBIS if additional equipment is needed to meet demand 15 years after DBU. Current Demand shall be projected to DBU+15 for space planning purposes. Designers should consider infrastructure and other requirements associated with the additional (DBU+15) equipment to accept the equipment more easily later. This planning includes space for EDSs (Section 5.6), OSR stations (Section 5.6.4), and CBRA stations (Section 14.3).

Baggage demand projections can be based on the FAA Terminal Area Forecast (TAF) or on the specific airport's Master Plan forecast (if the Master Plan is current). However, the use of a Master Plan for forecast growth can only be used to limit future growth and cannot exceed the TAF growth rate. In general, the FAA must approve the forecast used to determine the Design Year baggage demands. If, for any reason, local airport and airline staff and their consultants believe that the TAF or the Master Plan forecasts do not properly represent expected growth at the airport, they shall provide a revised forecast and detailed explanation of the reasons that the FAA-approved forecast is not acceptable to TSA for approval. The demand cannot be higher than the activity level that can be supported by the terminal gates for which the CBIS is designed.

The growth rate from the TAF or Master Plan forecast can be applied in one of two ways:

- Directly applied across a growth period, or
- Uniformly applied to the existing baggage demand.

If actual yearly enplanement growth is not provided in the TAF or Master Plan data through DBU+15, a uniform growth rate or extrapolation can be used.



An example of uniform growth rate calculation is below.

The Compound Average Growth Rate (CAGR) is calculated using the following formula:

$$CAGR = \left( \left( \frac{\text{Future Year Enplanements}}{\text{Current Year Enplanements}} \right)^{\frac{1}{\text{Future Year} - \text{Current Year}}} \right) - 1$$

A growth rate calculation over an example date range is shown in Figure 5-8:

Figure 5-8: Example Growth Rate Calculation

| Example TAF Enplanements |             |          |         |
|--------------------------|-------------|----------|---------|
| Fiscal Year              | Air Carrier | Commuter | Total   |
| 2018                     | 36,753      | 208,569  | 245,322 |
| 2019                     | 37,437      | 215,393  | 252,830 |
| 2020                     | 38,233      | 222,732  | 260,965 |
| 2021                     | 39,111      | 230,418  | 269,529 |
| 2022                     | 40,056      | 238,371  | 278,427 |
| 2023                     | 41,054      | 246,513  | 287,567 |
| 2024                     | 42,094      | 254,794  | 296,888 |
| 2025                     | 43,167      | 263,160  | 306,327 |
| 2026                     | 44,270      | 271,599  | 315,869 |

Current

DBU

DBU+5

$$CAGR = \left( \left( \frac{315,869}{245,322} \right)^{\frac{1}{2026-2018}} \right) - 1$$

$$= 1.2876^{\frac{1}{8}} - 1 = 3.21\%$$



Applying the example growth rate starting with the current demand from the example FDRS chart in Section 5.5.1.1 through DBU+15 yields the Design Year Demand (DBU+5) and Space Planning Demand (DBU+15) shown in Table 5-3:

Table 5-3: Example Baggage Demand Projection

| Fiscal Year | Compound Annual Growth Rate | Demand    |           | Planning Year              |
|-------------|-----------------------------|-----------|-----------|----------------------------|
|             |                             | 10 min    | bph       |                            |
| 2018        |                             | 225.00    | 1350.00   | Current Year               |
| 2019        | 1.0321                      | 232.22    | 1393.34   |                            |
| 2020        | 1.0321                      | 239.68    | 1438.06   |                            |
| 2021        | 1.0321                      | 247.37    | 1484.22   | DBU                        |
| 2022        | 1.0321                      | 255.31    | 1531.87   | DBU+1                      |
| 2023        | 1.0321                      | 263.51    | 1581.04   | DBU+2                      |
| 2024        | 1.0321                      | 271.97    | 1631.79   | DBU+3                      |
| 2025        | 1.0321                      | 280.70    | 1684.17   | DBU+4                      |
| 2026        | 1.0321                      | 289.71    | 1738.23   | DBU+5 Design Year          |
| 2027        | 1.0321                      | 299.01    | 1794.03   | DBU+6                      |
| ...etc...   | ...etc...                   | ...etc... | ...etc... | ...etc...                  |
| 2035        | 1.0321                      | 384.99    | 2309.96   | DBU+14                     |
| 2036        | 1.0321                      | 397.35    | 2384.11   | DBU+15 Space Planning Year |

## 5.6 Baggage Screening Equipment Requirements Determination

During the Schematic Design Phase, the focus is on determining how many EDS, OSR stations, and BISs are required, given a certain airline grouping, CBIS type, and EDS equipment type. The EDS, OSR, and CBRA equipment requirements and associated screening demand shall be listed in the Basis of Design Report, from DBU through DBU+15 years. These equipment requirements shall be shown in a chart with 1-year increments expressed as calculated values (to the nearest tenth of a decimal point) as well as the rounded values. The equipment requirements for 10 additional years past Design year (DBU+5) years shall be used to support space allocation planning in CBRA and OSRA.

Equipment requirements shall be revalidated 12 months prior to equipment delivery. If EDS equipment type changes, the construction start date is delayed, or if the Construction Schedule causes delays more than 12 months beyond the expected DBU, then a revalidation of EDS and CBRA requirements shall be submitted.





**5.6.1 Parameters and Assumptions****5.6.1.1 False Alarm Rate and OSR Clear Rate**

The range of expected annual average false alarm rates for EDS can vary based on domestic flights at the low end and international flights at the high end with varying bag content.

False alarm rates for international flights are typically higher as checked bags for these flights tend to be bigger and have a higher ratio of alarms per bag due to relatively dense or highly cluttered bag content.

The OSR clear rate and clear time estimates are based on approved TSA alarm resolution protocol as well as expected EDS image quality and alarm resolution tools provided to screeners on EDS bag viewing stations or threat resolution interfaces.

**5.6.1.2 Out-of-Gauge and Oversize Screened Baggage**

OOG bags are those which exceed the maximum dimensions allowed by the EDS. The percentage of OOG bags is based on the specific EDS model selected for the CBIS. The airport-specific OOG percentage may differ from the national average based on the unique mix of bag sizes and types specific to the airport. For example, with the Leidos eXaminer 3DX, at maximum width of 32 inches the maximum height of a bag is 14 inches and at a width of 21.5 inches the maximum height of the bag is 21.5 inches.

Oversize (OS) bags are items that are too large to be conveyed by the standard width conveyors selected for the CBIS. These are generally delivered to the CBRA through a separate larger wider conveyor line or hand-delivered to a screening location.

**5.6.1.3 EDS Error and Lost-In-Track Baggage**

EDS error bags are items that errored in the EDS and tracked to the CBRA with an EDS Error status. These bags can either be reinserted or manually screened as determined by the TSO.

Lost-In-Track (LIT) bags are bags that are not tracked properly post-EDS. These bags may have received a decision by the EDS but are sent to CBRA because the original tracking ID is lost. Depending on the screening system, these bags may be reconciled in the CBRA using the IATA bag tag and a hand scanner.



#### 5.6.1.4 Design Values

Site-specific design values are always preferred over assumed values for EDS system sizing. The use of the assumed values in Table 5-4 is allowed only in the absence of site-specific data and when accompanied by supporting data deemed acceptable to the Project Coordinator.

**Table 5-4: Assumed Design Values**

| Design Parameter   | Assumed Values                                   |
|--------------------|--------------------------------------------------|
| EDS Errored Rate   | 1%                                               |
| Lost-In-Track Rate | 2% with connected Reinsertion Line or 1% without |
| Reinsertion Rate   | 1.5%                                             |
| Oversize Rate      | 2%                                               |
| Out-of-Gauge Rate  | 2%                                               |
| Average Bag Length | Domestic 29.3", International 30.2"              |

#### 5.6.2 EDS Equipment Requirements

The following key inputs are needed to determine EDS equipment requirements:

- Design Year Demand, calculated as described in Section 5.5.2
- Adjustment percentages and formulas
  - OOG and OS bag percentages
  - Reinserted bag percentage
  - Surge factor (only applicable to FSA-derived Design Year Demand)
- Ratio of domestic to international flights
- CBIS type and EDS equipment type (a list of system types, EDS equipment types, and EDS throughputs is provided in Chapter 3)

The following steps to calculate EDS requirements are described in detail in this section:

1. Adjust the Design Year Demand to determine EDS Demand
2. Calculate EDS throughput
3. Calculate the number of EDS required to meet EDS Demand at the EDS throughput rate



In determining EDS equipment requirements, the 10-minute demand of the Design Year (DBU+5) shall be used.

### 5.6.2.1 Determine EDS Demand

Design Day Demand does not always equal EDS Demand. EDS Demand is determined using one of the three conditions below:

- **If FDRS data from an in-line system is being used to derive demand for a new in-line system**, EDS Demand is equal to Design Day Demand. (Plus Reinsert Bags if existing system does not include a Reinsertion Line)
- **If the Design Year Demand was derived using the FSA methodology**, EDS Demand equals Design Year Demand multiplied by a surge factor (minus OS minus OOG plus Reinsert bags).
  1. Calculate a surge factor to account for random variability in the expected average demand and ensure that equipment requirements are not undersized. For mini in-line systems, the application of a surge factor may not be required; this will be at TSA's discretion. The surge factor is derived from an assumed arrival Poisson process distribution. The surge factor accounts for random variability in the expected average 10-minute-based demand and ensures that equipment requirements are not undersized. The following formula shall be used to calculate the surge factor:

$$\text{Surge Factor} = \frac{\text{Adjusted Design Year Demand} + 2\sqrt{\text{Adjusted Design Year Demand}}}{\text{Adjusted Design Year Demand}}$$

2. Multiply the Adjusted Design Year Demand by the Surge Factor to find the EDS Demand.
  3. Subtract bags that will not pass through the EDS (OS and OOG), then add Reinsert bags.
- If FDRS data from a standalone system is being used to derive demand for a new in-line system, EDS Demand equals Design Year Demand plus Reinsert bags.

### 5.6.2.2 Calculate EDS Throughput

Throughput is a function of the expected EDS model data and applicable domestic/international blended average bag length. EDS throughput rates shall be calculated using the following formula:

$$\text{Throughput}_{EDS} = \frac{\text{EDS Belt Speed} \times 60}{(29.3 \text{ in} \times \% \text{ Domestic}) + (30.2 \text{ in} \times \% \text{ International}) + \text{Bag Spacing}}$$

where **Throughput<sub>EDS</sub>** = Number of bags screened per hour by the EDS.



Note: EDS throughput for ICS designs shall be calculated based upon the carrier size and the minimum spacing requirements.

An example of the EDS throughput calculation for the Leidos eXaminer 6700 ES with a 70% / 30% ratio of Domestic to International bags is shown in Figure 5-9.

**Figure 5-9: Example EDS Throughput Calculation**

**Assumptions**

EDS Belt Speed = 39.4 fpm for  
eXaminer 6700 ES  
% Domestic = .70  
% International = .30  
Avg Domestic Bag Length = 29.3 in  
Avg International Bag Length = 30.2 in  
Bag Spacing = 12 in

$$\begin{aligned} \text{Throughput}_{EDS} &= \frac{EDS \text{ Belt Speed} \times 60}{(29.3 \text{ in} \times \% \text{ Domestic}) + (30.2 \text{ in} \times \% \text{ International}) + \text{Bag Spacing}} \\ &= \frac{39.4 \text{ fpm} \times 60}{(2.4 \text{ ft} \times .70) + (2.5 \text{ ft} \times .30) + 1 \text{ ft}} \\ &= 682.4 \text{ bph} \end{aligned}$$

### 5.6.2.3 Calculate Number of EDS Required

The number of EDS required shall be calculated as follows:

$$N_{EDS} = \frac{EDS \text{ Demand} \times 6}{\text{Throughput}_{EDS}}$$

where:

**N<sub>EDS</sub>** = Number of EDS

**EDS Demand** = 10-minute demand that will be screened by EDS

**Throughput<sub>EDS</sub>** = Number of bags screened per hour by the EDS.

The resulting number is rounded up to the next whole number of EDS. However, if the calculated EDS value yields less than or equal to 0.1 of an EDS, a Technical Interchange Meeting (TIM) will be scheduled to determine the most appropriate rounding conditions.

Continuing the example with projected demand from Section 5.5.2 and EDS throughput from Section 5.6.2.2, the number of EDS required would be calculated as shown in Figure 5-10.



Figure 5-10: Example EDS Requirements Calculation

| Assumptions                                          | Number of EDSs for Design Year (DBU+5)                                                                                                            | Number of EDSs for Space Planning (DBU+15)                                                                                                        |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Design Year EDS<br>Demand = 289.71<br>bags/10 min    | $N_{EDS} = \frac{EDS\ Demand \times 6}{Throughput_{EDS}}$ $= \frac{289.71 \times 6}{682.4}$ $= 2.55 \text{ rounds to } \mathbf{3\ EDS\ machines}$ | $N_{EDS} = \frac{EDS\ Demand \times 6}{Throughput_{EDS}}$ $= \frac{397.35 \times 6}{682.4}$ $= 3.49 \text{ rounds to } \mathbf{4\ EDS\ machines}$ |
| Space Planning EDS<br>Demand = 397.35<br>bags/10 min |                                                                                                                                                   |                                                                                                                                                   |
| EDS Throughput =<br>682.4                            |                                                                                                                                                   |                                                                                                                                                   |
|                                                      |                                                                                                                                                   |                                                                                                                                                   |

As screening systems are sized to meet demand 95% of the time, screening demand will, at times, exceed capacity over the course of the year.

### 5.6.3 EDS Equipment Redundancy

For in-line systems, the TSA supplies redundant EDS to ensure operational resilience and maintain security integrity during equipment failures, maintenance, or emergencies. EDS equipment is expected to achieve 98% operational availability. However, this goal diminishes as the number of EDS per CBIS increases. Therefore, after estimating EDS equipment requirements based on peak-hour baggage demand, the ILDT shall determine the quantity of redundant EDS using the following thresholds:

- A CBIS with six or fewer non-redundant EDS requires **one** dedicated redundant EDS.
- A CBIS with seven or more non-redundant EDS requires **two** dedicated redundant EDS.

These thresholds assume that system designs are efficient and meet PGDS requirements. Inefficient designs will negatively impact operational availability and should be avoided. The TSA does not provide additional redundant EDS to compensate for inefficient designs.

For mini in-line systems, EDS redundancy is not provided due to limited space and the intent to minimize upfront costs. Instead, these systems rely on collocated mini in-lines or a manual screening process to manage equipment failures or maintenance activities.



### 5.6.4 OSR Station Requirements

The number of OSR stations ( $N_{OSR}$ ) required shall be equal to the number of EDS including any redundant EDS.

For certain system types, the OSRA can be centralized and remotely located. The degree of centralization can also vary from totally centralized OSRA that serves the entire airport to separate OSRAs dedicated to each CBIS. If the system type supports a remotely located OSRA, several considerations should guide the selection of the appropriate degree of system centralization, including TSA staffing, space requirements, and IT infrastructure requirements.

Continuing the example above, assuming the system qualifies for a redundant EDS, four OSR stations will be required for a CBIS with three non-redundant EDS and one redundant EDS; however, the OSRA should be designed to accommodate five OSR stations, since four non-redundant EDS are projected to be required to meet EDS demand at DBU+15.

### 5.6.5 Baggage Inspection Station Requirements

The total number of BISs required for screening is divided into two categories: BISs required for the processing of Alarmed, OOG, and Reinserted bags, and BISs required to screen Oversize bags. These values are combined for total BIS required, as shown in the formula below.

$$N_{BIS} = (N_{Alarmed} + N_{OOG} + N_{Reinsert}) + N_{OS}$$

#### 5.6.5.1 Baggage Inspection Stations for Alarmed, Reinsert, and OOG Processing

The number of BISs to be installed shall be based on the number of non-redundant EDS.

For systems processing Alarmed+Reinsert+OOG bags on the same lines, the number of BISs to meet demand shall be calculated as follows:

- For a strictly Domestic operation, 4 BISs are allocated per non-redundant EDS.
- For a strictly International operation, 4.5 BISs are allocated per non-redundant EDS.
- For operations that include a percentage of International destinations in the peak hour, the number of BISs per non-redundant EDS is pro-rated between 4 and 4.5 according to the Domestic/International ratio.
- The calculated number of BISes is half-rounded, where greater than or equal to 0.5 rounds up, and less than 0.5 rounds down.

For systems with separate Alarmed+Reinsert lines and OOG lines, the number of BISs to meet demand shall be calculated as follows:



- For a strictly Domestic operation, 3.3 BISs are allocated per non-redundant EDS for Alarmed+Reinsert bag processing and 0.7 BISs are allocated per non-redundant EDS for OOG bag processing.
- For a strictly International operation, 3.6 BISs are allocated per non-redundant EDS for Alarmed+Reinsert bag processing and 0.9 BISs are allocated per non-redundant EDS for OOG bag processing.
- For operations that include a percentage of International destinations in the peak hour, the number of BISs per non-redundant EDS for each group of lines is pro-rated between the values above according to the Domestic/International ratio.
- Rounding for the two groups of lines is as follows:
  - For Alarmed+Reinsert bag processing, the calculated number of BISs is half-rounded, where greater than or equal to 0.5 rounds up, and less than 0.5 rounds down.
  - For the OOG bag processing, the calculated number of BISs is rounded like the EDS rounding methodology; greater than or equal to 0.1 rounds up, and less than 0.1 rounds down.

For systems that do not use default average bag lengths as specified in Table 5.4, an RFV shall be submitted to deviate from the BIS-per-EDS requirement specified in this section.

An example calculation for the number of BISs needed in a system processing Alarmed+Reinsert+OOG bags on the same lines is illustrated in Table 5-5.

**Table 5-5: Required BIS for Systems with a Combined Alarmed + Reinsert + OOG Line**

| Non-Redundant EDS Qty | 100% Domestic / 0% International | 70% Domestic / 30% International | 0% Domestic / 100% International |
|-----------------------|----------------------------------|----------------------------------|----------------------------------|
| 1                     | 4                                | 4.2 (rounds to 4)                | 4.5 (rounds to 5)                |
| 2                     | 8                                | 8.3 (rounds to 8)                | 9                                |
| 3                     | 12                               | 12.5 (rounds to 13)              | 13.5 (rounds to 14)              |
| 4                     | 16                               | 16.6 (rounds to 17)              | 18                               |
| 5                     | 20                               | 20.8 (rounds to 21)              | 22.5 (rounds to 23)              |

Continuing our example from earlier, 13 BISs are required to process Design Year Alarmed+Reinsert+OOG bags for a CBIS with three non-redundant EDS and a 70% / 30% Domestic-to-International ratio. For space planning purposes, with four EDSs projected to meet EDS Demand at DBU+15, the CBRA should be designed to accommodate up to 17 non-Oversize BISs.

Table 5-6 illustrates calculations for systems with a separate OOG line, where the BIS allocation is separated into Alarmed+Reinsert BIS and OOG BIS.



Table 5-6: Required BIS for Systems with a Separate OOG Line

| Non-Redundant EDS Qty | Alarmed + Reinsert               |                                  |                                  | OOG                              |                                  |                                  |
|-----------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
|                       | 100% Domestic / 0% International | 70% Domestic / 30% International | 0% Domestic / 100% International | 100% Domestic / 0% International | 70% Domestic / 30% International | 0% Domestic / 100% International |
| 1                     | 3.3 (rounds to 3)                | 3.5 (rounds to 4)                | 3.6 (rounds to 4)                | 0.7 (rounds to 1)                | 0.7 (rounds to 1)                | 0.9 (rounds to 1)                |
| 2                     | 6.7 (rounds to 7)                | 6.8 (rounds to 7)                | 7.2 (rounds to 7)                | 1.3 (rounds to 2)                | 1.5 (rounds to 2)                | 1.8 (rounds to 2)                |
| 3                     | 10.0 (rounds to 10)              | 10.3 (rounds to 10)              | 10.7 (rounds to 11)              | 2.0 (rounds to 2)                | 2.2 (rounds to 3)                | 2.8 (rounds to 3)                |
| 4                     | 13.3 (rounds to 13)              | 13.7 (rounds to 14)              | 14.3 (rounds to 14)              | 2.7 (rounds to 3)                | 2.9 (rounds to 3)                | 3.7 (rounds to 4)                |
| 5                     | 16.6 (rounds to 17)              | 17.1 (rounds to 17)              | 17.9 (rounds to 18)              | 3.4 (rounds to 3)                | 3.7 (rounds to 4)                | 4.6 (rounds to 5)                |

If the system had separate Alarmed+Reinsert lines and OOG lines with three non-redundant EDS, ten BISs would be allocated for Alarmed+Reinsert bag processing and three BISs would be allocated for OOG bag processing. For space planning purposes, with four EDS projected to meet EDS Demand at DBU+15, the CBRA should be designed to accommodate 14 BISs for Alarmed+Reinsert bag processing and three BISs for OOG bag processing.

The BIS allocation design values include risk mitigation against future changes in the EDS false alarm rate, OSR clear rate, or both that could increase bags to CBRA. TSA may approve an RFV to design using a higher ratio of BIS to EDS if the airport determines that their CBRA demand is unusually high.

### 5.6.5.2 Oversize Baggage Inspection Station Requirements

The number of BIS required to process Oversize bags shall be calculated using the following equation:

$$N_{OS} = \frac{N_{EDS} \times \text{Throughput}_{EDS} \times \% OS}{(Rate_{OS Domestic} \times \% Domestic) + (Rate_{OS International} \times \% International)}$$

Where:

$N_{EDS}$  = number of non-redundant EDS





**Throughput<sub>EDS</sub>** = throughput of the EDS

**% OS** = percentage of OS bags

**Rate<sub>OS Domestic</sub>** = rate at which TSOs resolve domestic OS baggage via OS search

**Rate<sub>OS International</sub>** = rate at which TSOs resolve international OS baggage via OS search

The OS requirement value is rounded up and then added to the rounded Alarmed+Reinsert+OOG value if OS screening is performed in CBRA or treated separately if OS screening is performed outside of CBRA.

Figure 5-11 shows example Oversize BIS requirement calculations using the values from the example equipment calculations throughout this section.

**Figure 5-11: Example Oversize BIS Calculation**

**Assumptions**

Design Year # EDS = 3

Space Planning # EDS = 4

EDS Throughput = 682.4

% OS bags = .02

% Domestic = .70

% International = .30

Domestic OS Bag

Processing Rate = 19.5 bph

International OS Bag

Processing Rate = 13.8 bph

**Number of OS BISs for Design Year (DBU+5)**

$$\begin{aligned}
 N_{os} &= \frac{N_{EDS} \times \text{Throughput}_{EDS} \times \% OS}{(\text{Rate}_{OS Domestic} \times \% Domestic) + (\text{Rate}_{OS International} \times \% International)} \\
 &= \left( \frac{3 \times 682.4 \times .02}{(19.5 \times .70) + (13.8 \times .30)} \right) \text{rounded up} \\
 &= 2.30 \text{ rounds up to 3 OS BISs}
 \end{aligned}$$

**Number of OS BISs for Space Planning (DBU+15)**

$$\begin{aligned}
 N_{os} &= \frac{N_{EDS} \times \text{Throughput}_{EDS} \times \% OS}{(\text{Rate}_{OS Domestic} \times \% Domestic) + (\text{Rate}_{OS International} \times \% International)} \\
 &= \left( \frac{4 \times 682.4 \times .02}{(19.5 \times .70) + (13.8 \times .30)} \right) \text{rounded up} \\
 &= 3.07 \text{ rounds up to 4 OS BISs}
 \end{aligned}$$



A CBIS with three non-redundant EDS and a 70% / 30% ratio of Domestic to International bags would require three BISs for processing Oversize bags in addition to the 13 for non-Oversize bag processing in the Design Year. For space planning purposes, the number of OS BISs moves up to four as the number of EDS increases to four at DBU+15.

### 5.6.6 ETD Machine Requirements

BISs for Alarmed, OOG, and Reinsert bags are in the CBRA. BISs for Oversize bag screening can be located outside of the CBRA, e.g., in the lobby. In general, an ETD machine is shared between two BISs because the amount of time the ETD machine is used during the total screening process for a bag is relatively short. Thus, the ratio of BISs to ETD equipment is typically two to one. If OS bag screening is conducted outside of the CBRA, the ETD requirements are calculated separately for CBRA and the OS screening area.

The number of ETD machines required shall be calculated as the number of BISs divided by two; fractional results are rounded up to the next whole number. Calculations using the example values from the previous section are shown in Figure 5-12.

Figure 5-12: Example ETD Calculations

| Number of ETDs for Design Year (DBU+5)                                                                          |                                                                                                      |                                                                    |
|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| All BISs in CBRA                                                                                                | OS Screening Outside of CBRA                                                                         |                                                                    |
| $N_{ETD} = \frac{(N_{Alarmed} + N_{Reinsert} + N_{OOG}) + N_{OS}}{2}$ $= (13 + 4)/2$ $= 8 \text{ ETDs}$         | $N_{ETD} = \frac{(N_{Alarmed} + N_{Reinsert}) + N_{OOG}}{2}$ $= (10 + 3)/2$ $= 6.5$ rounds to 7 ETDs | PLUS $N_{ETD} = \frac{N_{OS}}{2}$ $= 3/2$ $= 1.5$ rounds to 2 ETDs |
| Number of ETDs for Space Planning (DBU+15)                                                                      |                                                                                                      |                                                                    |
| All BISs in CBRA                                                                                                | OS Screening Outside of CBRA                                                                         |                                                                    |
| $N_{ETD} = \frac{(N_{Alarmed} + N_{Reinsert} + N_{OOG}) + N_{OS}}{2}$ $= (17 + 4)/2$ $= 10.5$ rounds to 11 ETDs | $N_{ETD} = \frac{(N_{Alarmed} + N_{Reinsert}) + N_{OOG}}{2}$ $= (14 + 3)/2$ $= 8.5$ rounds to 9 ETDs | PLUS $N_{ETD} = \frac{N_{OS}}{2}$ $= 4/2$ $= 2 \text{ ETDs}$       |



Continuing the example from the preceding section, the number of ETDs required for this CBIS in the Design Year would be  $13 \div 2 = 6.5$  rounds up to seven ETDs for non-Oversize screening. For Oversize screening, two ETDs are calculated, for both Design year and Space Planning scenarios.

When estimating TSO throughput for a remote OSRA, assume one dedicated viewing station per TSO.

### 5.6.7 Accommodating Traffic Growth after the Design Year

The equipment requirements documented above are based on a design demand for five years beyond the screening system DBU (i.e., DBU+5 years). It is likely that the initial system will have some excess capacity because EDS equipment requirements are rounded up and equipment will not necessarily reach 100% utilization after five years. This excess capacity should be used to accommodate as much traffic growth as possible before additional costs are incurred to expand the CBIS.

For future planning, the ILDT needs to consider the space required for future growth.

While increased system utilization may accommodate some additional demand, designers should also seek to provide low-cost flexibility options in the system to incorporate one or more of the following capacity enhancements:

- Upgraded software, hardware, or both to improve throughputs of installed equipment.
- Replacement of installed equipment with higher-throughput EDS and necessary modifications to the BHS to support these EDS (including providing access to and from the equipment).
- Addition of new equipment and associated BHS infrastructure.

In practice, a combination of one or more of the above approaches could be used. The choice of how additional capacity is to be provided will depend on the constraints of the terminal, the degree of certainty about future traffic growth, the overall capacity of the terminal, and the optimal system type to be installed.

Several examples of how additional capacity could be provided for specific system types are provided below:

- **In-Line CBIS** – These systems could be designed with sufficient queuing capacity, variable frequency drives, and other components to support replacement of EDS to accommodate traffic growth. Alternatively, designs could preserve space for additional equipment or provide areas where low-cost modifications to facilities might be possible to install additional EDS. The choice will depend on local traffic, spatial and operational considerations, and lifecycle cost projections.
- **Mini In-Line CBIS** – As this system type is based on minimal BHS modifications, it is likely that the BHS of a mini in-line system will not support significantly higher-throughput EDS equipment without significant modifications. Therefore, growth beyond DBU+5 years can be accommodated by (1) new EDS and associated BHS infrastructure, (2) upgrading the BHS (and possibly the EDS) to support higher throughputs.



To determine when and if additional capacity will be required, baggage demand and system performance should be monitored and projected on an annual basis. Planners would then be able to anticipate the need for additional capacity and perform any necessary analyses to determine the most cost-effective approach to enhancing system capacity.

As discussed in more detail in Chapter 11, planners should conduct a 20-year lifecycle cost analysis for each screening alternative identified and the preferred alternative should be spatially feasible as well as have relatively low lifecycle cost. The lifecycle cost analysis should include an assessment of the overall costs of different approaches for accommodating growth.

While CBIS screening equipment may be replaced during the 20-year lifecycle to meet operational needs, 20 years is the proper analysis period for the purposes of lifecycle cost analysis. This is needed to properly assess economic trade-offs between the more capital intensive in-line CBIS with the more labor-intensive stand-alone CBIS. The 20-year analysis period is also the assumed useful life of the BHS equipment.



**CHAPTER 6: SCHEMATIC DESIGN PHASE – PART 2**

**ALTERNATIVES ANALYSIS AND PREFERRED ALTERNATIVE DESIGN DEVELOPMENT**



## **6.1 Schematic Design Phase Part 2 Overview**

During the second part of the Schematic Design Phase, the work produced in Part 1 is used to further develop and refine the preferred alternative, including initial development of concept-level design drawings, program schedule, and ROM construction cost estimates. The BDR is the primary product of the Schematic Phase and is used to document the alternatives analysis as well as the initial development of the preferred alternative. In the design package that must be submitted during this phase, increased emphasis is placed on economic analysis, contingency operations plan, and conformance with operational performance standards. Detailed requirements associated with the BDR, and other Part 2 activities are shown in the subsequent sections.

## **6.2 Alternatives Development and Evaluation**

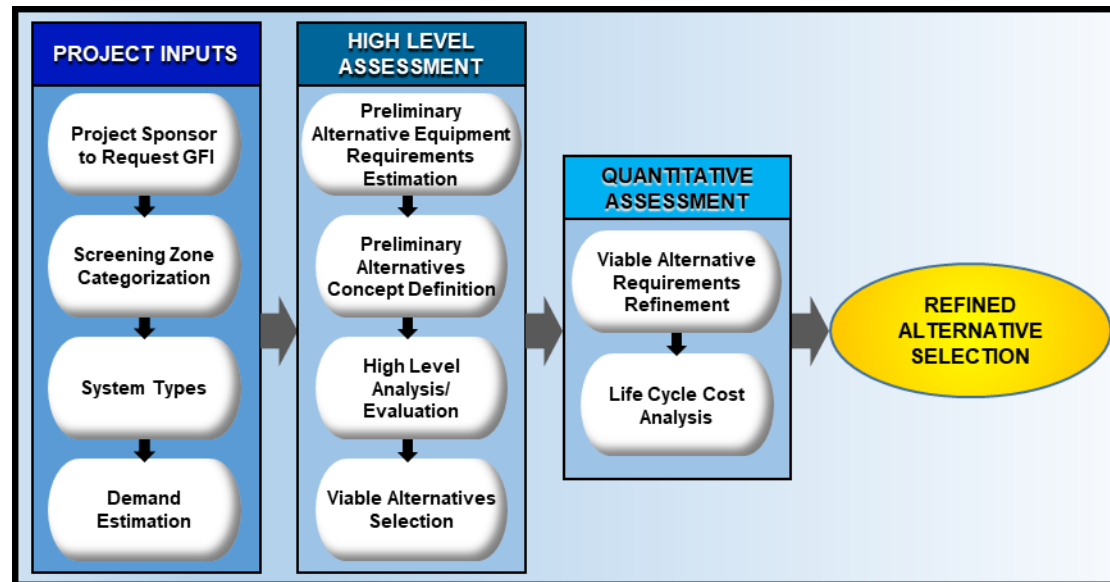
### **6.2.1 Alternatives Development**

Several elements of the planning process are presented together in this section enabling planners to develop and evaluate various screening solution alternatives for a particular airport or terminal.



Figure 6-1 summarizes the alternatives development and evaluation process to be carried out during the Schematic Phase.

Figure 6-1: Schematic Design Phase Alternatives Development and Evaluation



When developing the BDR and associated analysis of alternatives, planners shall follow the requirements listed in Sections 5.2 (Project Sponsor and ILDT Responsibilities), 5.6 (Baggage Screening Equipment Requirements Determination), and Chapter 11 (Lifecycle Cost Estimating). Planners should develop optimally scaled screening alternatives considering the following:

- **Airport Spatial Data**—Terminal configurations, airline assignments, and architectural constraints that will affect the categorization into screening zones
- **CBIS Capacity Data**—Data related to the number and type of screening systems and screening equipment (see Section 5.6)
- **Baggage Screening Demand Data**—Factors affecting current and future baggage flow into the CBIS, such as existing infrastructure including ticket counter and curbside check-in positions, numbers of gates, and runway capacities (see Section 5.2)
- **Cost Data**—Equipment, infrastructure, O&M, and staffing costs (see Chapter 11)



Planners are required to develop various alternatives based on conditions at the specific airport. An initial high-level assessment identifies spatially and operationally feasible alternatives. Spatially and operationally feasible alternatives shall be evaluated based on a 20-year lifecycle cost analysis detailed in Chapter 11 for implementing, maintaining, and replacing the screening system.

The methodology for developing alternatives, assumptions for assessing the cost effectiveness of the alternatives, and the evaluation process for selecting the preferred alternatives are discussed in this section.

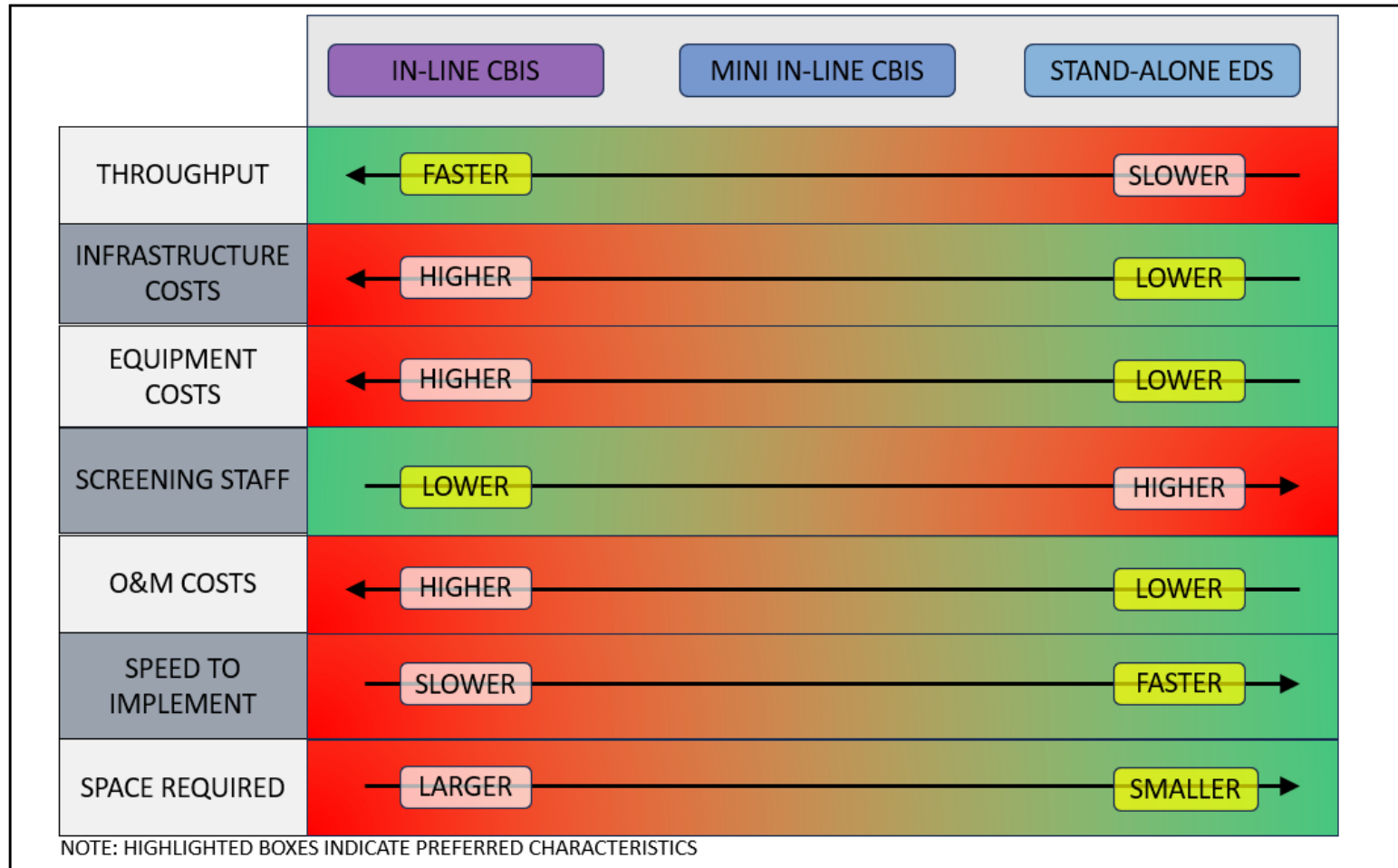
### 6.2.1.1 CBIS Type Selection

Several screening system types could serve demand in each screening zone. The CBIS types defined in Chapter 2 provide different tradeoffs between upfront capital costs and recurring staffing and O&M costs, as illustrated in Figure 6-2 and summarized below:





Figure 6-2: System Type Comparison



- **In-Line CBIS**—In-line systems are likely to be used in centralizing screening zones that serve one or more airlines. They are generally the most efficient from the perspective of EDS and staff utilization. However, the centralized nature of these systems may require more complex conveyor arrangements and extensive building modifications; therefore, associated upfront capital investment and O&M costs may be high. These systems may contain extensive buffering space and sections of conveyor allowing for sufficient OSR time. This system type corresponds to the Qualified Type I EDS as specified in the TSA Procurement Specification (see Section 3.2.1).
- **Mini In-Line CBIS**—Mini in-line systems are decentralized systems that incorporate a simpler conveyor design and require a smaller footprint. These systems are likely to be located closer to airline ticket counters or baggage make-up devices. Travel times are thus reduced, as is the likelihood of improper baggage sortation. However, staff and equipment utilization for a mini in-line system is typically lower than for an In-Line system given the lower demand placed on the system and more peaked load requirements. As a result of lower facility and conveyor modification impacts, capital and O&M costs are expected to be lower for mini in-line systems than for in-line CBIS types (see Section 3.2.2).
- **Stand-Alone EDS**—For facilities with very low throughput requirements or where architectural conditions may render other systems cost prohibitive, a solution based on a stand-alone EDS (see Chapter 3 for a list of stand-alone EDS) may be the most economical. A conveyor infrastructure is not required with a stand-alone EDS and, therefore, no significant incremental increase in airport/airline O&M costs is expected. These systems offer an even lower capital cost on a per EDS basis but are also less efficient in terms of staff and EDS utilization than System Type 2 (see Section 3.3.2).

Centralized screening zones require a fully automated in-line system. Smaller in-line systems or mini in-line systems are typically better suited for more decentralized zones (such as bag rooms accommodating one or more airlines). Mini in-line systems and stand-alone systems are typically better suited for highly decentralized zones.

### 6.2.1.2 Alternatives Baggage Screening Demand Estimation

Once the alternatives are defined, planners estimate baggage screening demand for each alternative as explained in detail in Section 5.5.

### 6.2.1.3 Alternatives Equipment Requirements Estimation

The Design Year baggage flow and the selected system types are used to calculate equipment requirements as explained in detail in Section 5.6.

For each alternative proposed, planners shall determine the CBIS type (e.g., in-line, mini In-line, stand-alone) and number of EDS required for each screening zone.



### 6.2.1.4 Alternatives Concept Definition

Screening alternatives should be developed based on the type of screening equipment and number of EDS required which, in turn, are based on the screening demand and system types initially selected.

Planners are encouraged to develop as many screening alternatives as possible within the existing physical constraints.

These initial concepts do not require a high level of detail; however, planners should be able to qualitatively assess potential impacts on existing facilities and operations.

- Tradeoff Between Upfront Capacity and Incremental Capacity
  - Specifically, planners should assess the tradeoffs between (1) incurring additional upfront costs to increase design flexibility for accommodating future demand growth, and (2) accommodating growth based on modifying the initial system incrementally over the 20-year analysis period for the purposes of conducting alternative analysis using 20-year lifecycle cost assessment. This tradeoff assessment may indicate, for instance, that systems at critical airports (such as airline hubs) should be designed with additional space to accommodate future EDS.
  - Airport planners typically assess the capacity of functional components at an airport (e.g., ticket counters, gates, runways) to determine the ultimate capacity of the terminal. The ultimate terminal or airport capacity shall be the upper limit for demand estimates for the purposes of CBIS design. For example, if a 20-year demand analysis indicates that additional ticket counters, gates, or runway capacity is required beyond that available in the current terminal or airport, then planners would assume that such requirements are beyond the scope of the CBIS design. Capital-intensive expansions to accommodate additional demand at other airport functional components should also include consideration of additional baggage screening capacity to accommodate future growth of baggage demand beyond the ultimate capacity considered in the CBIS design.
- Contingency Planning
  - Even though a contingency plan is required only for mini in-lines at the Schematic Design Phase, planners should consider the implications of potential mitigation measures regarding the development of alternatives early on, as some measures could affect the alternative system layout and level of complexity. A more detailed explanation of the contingency planning process is included in Section 7.5.



### 6.2.2 Alternatives Evaluation and Selection

Once alternative concepts have been developed, a high-level assessment should be conducted to determine which alternatives are viable and should be considered in the lifecycle cost analysis. The lifecycle cost analysis will provide present value costs for each viable alternative to ensure the alternatives can be evaluated quantitatively based on these costs and the preferred alternatives selected.

#### 6.2.2.1 Qualitative and Quantitative High-Level Assessment

A high-level assessment is a broad evaluation that incorporates both qualitative and quantitative factors to help planners and stakeholders identify viable alternatives for consideration. The criteria for this assessment vary depending on the airport and should be developed in close collaboration with project stakeholders. Common evaluation criteria include:

- **Customer Level of Service:** The effect of each alternative on the passenger's experience at the airport
- **Operational Impact:** The reliability and maintainability of Explosive Detection System (EDS) equipment, potential contingency procedures for equipment failures during peak periods, and overall effects on airline operations
- **Economic Impact:** The costs incurred by the Transportation Security Administration (TSA), airport operators, and airlines, including expenses related to staffing, implementation, and maintenance
- **Design Considerations:** How the alternative integrates with existing facilities and its feasibility for construction, expansion, and commissioning
- **Ergonomic Considerations:** Accessibility for personnel, including stairs, ladders, space constraints, and any required manual baggage handling requirements

Using these and other relevant criteria, planners and stakeholders can assess potential alternatives, discard unfeasible options and refine the remaining choices for further analysis. Once the list of feasible alternatives is narrowed down, a lifecycle cost analysis is conducted to compare long-term financial impacts and determine the most suitable option.

However, the alternative with the lowest cost may not necessarily be the best choice. The final decision should be informed by measurable data, qualitative insights, and sound judgment to ensure the selection aligns with operational efficiency and strategic goals.



### 6.2.2.2 Selecting the Preferred Alternative

Alternatives shall be evaluated based on the present value of total lifecycle costs, defined as the present value of the annual sum of capital, O&M, and staffing costs. Costs should be separated by stakeholder (e.g., TSA, airport operator, and airline) for transparency in the evaluation process.

For the purposes of estimating the present value of these costs, planners shall use the 20-year Real Interest Rate on Treasury Notes and Bonds of Specified Maturities found in the latest version of the Office of Management and Budget Circular No. A-94, Appendix C, as the real discount rate. This discount rate corresponds to guidance from the Office of Management and Budget for projects that accrue costs or benefits to governmental and nongovernmental parties. Discounting of lifecycle costs is necessary to ensure that all alternatives are compared on a standardized basis. The discount rate is meant to reflect the time value of money (cash received today is worth more than the same amount of cash received tomorrow because of the opportunity to invest that cash in other projects), and the risk associated with uncertain future cash flows.

The formula below can be used to calculate the present value cost of the screening system alternative.

$$PV = \left( \frac{C1}{(1+r)^1} \right) + \left( \frac{C2}{(1+r)^2} \right) + \dots + \left( \frac{C20}{(1+r)^{20}} \right)$$

where C1 is the total cost in year 1 and r is the real discount rate.

The total cost (C1) includes (but is not limited to) the following cost categories:

- EDS capital costs.
- BHS equipment (Vertical Sortation Units (VSUs), High Speed Diverters (HSDs), conveyors etc.) capital costs.
- BHS maintenance costs.
- TSA staffing costs.
- Overall energy consumption costs.
- Inbound and outbound baggage handling costs.

Once the costs of all concept-level alternatives have been developed to include the full present value lifecycle costs, alternatives shall be ranked based on present value lifecycle costs and the lowest-cost alternative that meets all other requirements shall be selected as the preferred



alternative. Other higher-cost alternatives may be carried forward for further development and evaluation in the Schematic Design Phase with approval from TSA and the ILDT.

The least expensive design may not be the most efficient for all concerned. The ILDT should present their position as to why a particular alternative is more efficient compared with another.

### 6.3 Basis of Design Report

Once the preferred alternative has been selected the BDR provides increasing levels of detail as the CBIS design progresses through the design phases. Refer to the PGDS sections indicated for detailed requirements.

The BDR shall include, as designated for each phase:

- Detailed project requirements (Section 6.3.1)
- Description of Operations (Section 6.3.2)
- Flow-based modeling assumptions and results, including time-in-system and Bag Travel Time (BTT) analyses (Section 6.3.3)
- Alternatives Analysis - Appendix (Sections 6.2.2)
- List of legacy EDS to be decommissioned (Section 6.3.5)

#### 6.3.1 Project Requirements

Project requirements describe detailed information specific to the approved alternative and factors affecting its construction and operation.

The project requirements discussion shall include, at minimum:

- A system evaluation of the approved alternative
- Specific reference to the EDS type that TSA approved
- Indication of preferred equipment model and quantity at Schematic Design and specific reference to equipment TSA has committed to provide in subsequent phases
- Constructability technical memoranda documenting project-specific issues for each discipline, including CBIS design and architectural, structural, mechanical, plumbing, electrical, and communications considerations
- Planning assumptions including Space Planning (DBU+15) design intent



- Demolition requirements describing what will need to be removed for the CBIS project to move forward

### 6.3.2 Description of Operations

The description of operations discusses how the CBIS and its component parts work and how the system integrates with the airport BHS.

At the Schematic Design Phase, the description of operations shall describe the Preliminary operational concept.

At the 30% Detailed Design Phase, the Description of Operations shall describe, at a high level:

- How the overall CBIS is intended to work, with references to how requirements in Chapter 12 will be met
- How OSRA is intended to work, with references to how requirements in Chapter 13 will be met
- How CBRA is intended to work, with references to how requirements in Chapter 14 will be met
- How the CBIS integrates with the airport BHS, including contrasting baggage rates and controls methodology

At the 70% Detailed Design Phase, the Description of Operations shall describe:

- Refinements to the 30% design Description of Operations
- Detailed OS and OOG Description of Operations
- Operational description of how the “no-lift” policy will be met in the CBRA
- Description of Operations of how non-conveyable items (pets, etc.) will be processed

At the 100% Detailed Design Phase, the Description of Operations shall include final refinements to all topics covered in the 70% Design Description of Operations.

### 6.3.3 Flow-Based Modeling

From the Schematic Design Phase forward, flow-based modeling is used to validate planning assumptions, justify design elements such as the number of mainlines, analyze bag time in system, and confirm sufficient bag travel time for OSR.

The flow-based modeling discussion shall:



- Identify the paths used for the high-level flow-based modeling calculations on plan view drawings
- Identify the assumptions used for the flow modeling
- Provide time-in-system analysis results including maximum baggage time in system by calculating the longest time that
  - An in-gauge bag will travel through the system as measured from the natural points of bag induction through an EDS, into and out of the CBRA
  - An OOG bag will travel from natural induction into and out of the CBRA
- Provide bag travel time analysis results to demonstrate adequate time for OSR

For these calculations, planners should assume constant bag flow based on the design speeds from induction to CBRA with no provision for jams, faults, or halting for merging or diverting.

For complicated system designs, dynamic modeling may prove beneficial and can be performed at the Project Sponsor's discretion. Dynamic modeling is discussed in Section 7.2.4.

### 6.3.4 Alternatives Analysis

For the schematic design phase only, all documentation supporting the analysis and selection of the preferred alternative shall be included in the BDR appendix, including conceptual layouts, ROM construction cost estimates, and any other supporting materials used in the decision making process.

### 6.3.5 EDS to be Decommissioned

The project sponsor shall submit a list of EDS equipment, by make, model, and serial number, that will be decommissioned after the proposed in-line system is operational.

## 6.4 Other Design Package Documents

Requirements for other documents submitted as part of the design package and not described elsewhere in the PGDS are provided in the sections below.





### 6.4.1 Design Drawings

Design drawings are submitted during the design, construction, and closeout project phases that illustrate detailed structural, mechanical, electrical, and other engineering aspects of the CBIS design.

- All drawing packages shall begin with a cover sheet and index.
- Each discipline shall submit drawing files (pdf) -grouped together by discipline- with an easily identifiable filename identifier (BHS, Mech, Elec, Arch, FP, etc.).
- Each drawing shall have a title box. The drawing title box shall be clearly labeled with a construction phase number, where applicable.
- Each drawing shall include a legend.
- Each drawing shall label conveyors and components, if known.
- Each drawing package submittal shall include an enlarged single-sheet plan view of the CBIS and an enlarged single-sheet plan view of the CBRA.
- Drawings shall be 1/4" scale for elevation views and 1/8" scale for plan views, except for the BIS plan view, which shall be enlarged to 1/2" scale.

Design drawings are refined and updated in each design phase. Failure to properly update drawings to reflect changes from one phase submittal to the next could result in the design package being rejected by the TSA review team and returned to the project sponsor for correction.

In the Construction Phase, TSA shall be provided with courtesy copies of shop and installation drawings to ensure the original intent of the design as reviewed up to and including the 100% design review submittal process

Prior to the closeout phase, drawings are submitted in PDF format. Closeout phase drawings are submitted in both PDF and native format (e.g., AutoCAD).

Schematic Design Phase, Detailed Design Phase, and Closeout Phase drawings shall include the elements in Table 6-1 marked as "Required" for the indicated project phase.



**Table 6-1: Required Drawing Elements for Specified Project Phases**

| Drawing Element                                | Related PGDS Section   | Schematic Design | 30% Design  | 70% Design  | 100% Design | Closeout    |
|------------------------------------------------|------------------------|------------------|-------------|-------------|-------------|-------------|
| CBIS plan views, showing at minimum:           | (see below)            | (see below)      | (see below) | (see below) | (see below) | (see below) |
| EDS locations                                  | Chapter 12, Appendix B | Required         | Required    | Required    | Required    | Required    |
| OSRA location(s) and spatial dimensions        | 13.2                   | Required         | Required    | Required    | Required    | Required    |
| CBRA location and spatial dimensions           | 14.6                   | Required         | Required    | Required    | Required    | Required    |
| IT cabinets and closets                        | 12.11.7                | Required         | Required    | Required    | Required    | Required    |
| BHS control room or control center location    | 15.1                   | Optional         | Optional    | Required    | Required    | Required    |
| Outlined conveyors and right of ways           | 12.7                   | Required         | Required    | Required    | Required    | Required    |
| Conveyor delineations, especially near the EDS | 12.7                   | Optional         | Required    | Required    | Required    | Required    |
| Conveyor ID labels                             | 12.7                   | Optional         | Required    | Required    | Required    | Required    |
| Inclines and declines                          | 12.7.5.2               | Required         | Required    | Required    | Required    | Required    |
| EDS pedestals, if needed                       | 3.3.1                  | Optional         | Required    | Required    | Required    | Required    |
| EDS removal route                              | 12.11.5                | Optional         | Required    | Required    | Required    | Required    |
| Locations of quick disconnect conveyors        | 12.11.5.1              | Optional         | Required    | Required    | Required    | Required    |
| ATRs, BMAs                                     | 12.6.1.1               | Required         | Required    | Required    | Required    | Required    |
| O&M-related access                             | 12.11.1                | Required         | Required    | Required    | Required    | Required    |
| Storage for spare parts and tools              | 12.11.4                | Optional         | Required    | Required    | Required    | Required    |
| Catwalks, platforms, and ladders               | 14.6.10                | Optional         | Optional    | Required    | Required    | Required    |



| Drawing Element                                                                 | Related PGDS Section | Schematic Design | 30% Design  | 70% Design  | 100% Design | Closeout    |
|---------------------------------------------------------------------------------|----------------------|------------------|-------------|-------------|-------------|-------------|
| Stairways intended for TSA personnel                                            | 14.6.10              | Optional         | Optional    | Required    | Required    | Required    |
| Motor Control Panel (MCP) locations                                             | 10.3.2               | Optional         | Required    | Required    | Required    | Required    |
| Motor and drive package locations                                               | 14.6.12              | Optional         | Optional    | Required    | Required    | Required    |
| CBIS/OSRA/CBRA egress plan                                                      | 14.6.3               | Optional         | Optional    | Required    | Required    | Required    |
| Notable interference issues                                                     | Chapters 12-15       | Optional         | Optional    | Required    | Required    | Required    |
| OSRA plan views, including at minimum:                                          | (see below)          | (see below)      | (see below) | (see below) | (see below) | (see below) |
| OSRA layout                                                                     | 13.3                 | Required         | Required    | Required    | Required    | Required    |
| Entrances and exits                                                             | 13.2                 | Optional         | Required    | Required    | Required    | Required    |
| Workstation arrangement                                                         | 13.4                 | Optional         | Required    | Required    | Required    | Required    |
| CBRA plan views, including at minimum:                                          | (see below)          | (see below)      | (see below) | (see below) | (see below) | (see below) |
| Conveyor delineations                                                           | 12.7                 | Optional         | Required    | Required    | Required    | Required    |
| Design prints indicating how the "no lift" policy is to be met                  | 14.2                 | Optional         | Required    | Required    | Required    | Required    |
| BRPs and insertion positions in relation to workstations and TSO movement space | 14.3.2               | Required         | Required    | Required    | Required    | Required    |
| Layout for OS and OOG bags                                                      | 12.7.11, 12.7.12     | Required         | Required    | Required    | Required    | Required    |
| Shrouding materials                                                             | 14.6.12              | Optional         | Required    | Required    | Required    | Required    |
| Flooring material                                                               | 14.6.2               | Optional         | Required    | Required    | Required    | Required    |
| Lighting design                                                                 | 14.6.4               | Optional         | Required    | Required    | Required    | Required    |
| Noise reduction design                                                          | 14.6.8               | Optional         | Required    | Required    | Required    | Required    |



| Drawing Element                                                               | Related PGDS Section | Schematic Design | 30% Design  | 70% Design  | 100% Design | Closeout    |
|-------------------------------------------------------------------------------|----------------------|------------------|-------------|-------------|-------------|-------------|
| Bag Inspection Stations (level 3 alarm resolution stations)                   | 14.3                 | Required         | Required    | Required    | Required    | Required    |
| ETD locations and mounting options                                            | 14.3                 | Optional         | Required    | Required    | Required    | Required    |
| Footprints for proper installation of stairs and ladders                      | 14.6.10              | Optional         | Required    | Required    | Required    | Required    |
| Elevation views, showing at minimum:                                          | (see below)          | (see below)      | (see below) | (see below) | (see below) | (see below) |
| Floor and wall penetrations                                                   | 14.6.2               | Optional         | Required    | Required    | Required    | Required    |
| Steep gradients                                                               | 12.8.6               | Optional         | Required    | Required    | Required    | Required    |
| Congested areas                                                               | Chapters 12-15       | Optional         | Required    | Required    | Required    | Required    |
| Top of Bed approximate elevations                                             | 12.7, 14.3.2         | Optional         | Required    | Required    | Required    | Required    |
| Vertical dimensions of the CBIS (cross section)                               | 12.11.1              | Optional         | Required    | Required    | Required    | Required    |
| CBRA vertical space provisions                                                | 14.2, 14.6           | Optional         | Required    | Required    | Required    | Required    |
| CBRA BISS                                                                     | 14.3                 | Optional         | Required    | Required    | Required    | Required    |
| Electrical                                                                    | (see below)          | (see below)      | (see below) | (see below) | (see below) | (see below) |
| Power pole locations                                                          | 12.11.6              | Optional         | Required    | Required    | Required    | Required    |
| EDS Power Conditioning Device locations                                       | 12.11.6              | Optional         | Optional    | Required    | Required    | Required    |
| E-stops near the EDSs with associated zones and control stations              | 12.6.1.2             | Optional         | Optional    | Required    | Required    | Required    |
| E-stops in CBRA with associated zones and control stations                    | 14.3.1               | Optional         | Optional    | Required    | Required    | Required    |
| Device locations (photo eyes, shaft encoders, audio, and visual alarms, VFDs) | 10.3.3               | Optional         | Optional    | Required    | Required    | Required    |



| Drawing Element                                                                  | Related PGDS Section | Schematic Design | 30% Design  | 70% Design  | 100% Design | Closeout    |
|----------------------------------------------------------------------------------|----------------------|------------------|-------------|-------------|-------------|-------------|
| Control station locations                                                        | 12.10, 14.4, 14.6    | Optional         | Optional    | Required    | Required    | Required    |
| Control device details                                                           | 12.10, 14.4, 14.6    | Optional         | Optional    | Required    | Required    | Required    |
| Other drawings, including:                                                       | (see below)          | (see below)      | (see below) | (see below) | (see below) | (see below) |
| Plan view of existing structures and conditions                                  | 6.4.1                | Required         | Required    | Required    | Required    | Required    |
| Heating, Ventilation, and Air Conditioning (HVAC)                                | 6.4.4                | Optional         | Required    | Required    | Required    | Required    |
| Fire suppression                                                                 | 12.11.3              | Optional         | Required    | Required    | Required    | Required    |
| Special systems (e.g., camera system, access control)                            | 16.6                 | Optional         | Required    | Required    | Required    | Required    |
| Phasing drawings                                                                 | 6.4.3                | Required         | Required    | Required    | Required    | Required    |
| Plans for demolition of existing BHS                                             | 6.4.3                | Required         | Required    | Required    | Required    | Required    |
| Plan view PDF drawing of the entire system from baggage infeed to make up device | Chapters 12-15       | Required         | Required    | Required    | Required    | Required    |

### 6.4.2 Project Schedule

The project schedule shall include, at a minimum, the following milestones:

- Design OTA Period of Performance Start
- Design Consultant Notice to Proceed
- Schematic design delivery to TSA for review
- Schematic design – TSA review



- 30% Design delivery to TSA for review
- 30% Design – TSA review
- 70% Design delivery to TSA for review
- 70% Design – TSA review
- 100% design delivery to TSA for review
- 100% design – TSA review
- RFP release
- Bid selection process completion
- Design OTA Period of Performance end
- EDS Delivery (if phased delivery is planned, provide delivery dates per phase)
- Permanent Power provided to EDS
- EDS Installation (if phased installation is planned, provide installation dates per phase)
- Testing (Site Acceptance Test (SAT), Pre-ISAT testing, Test Readiness Review (TRR), ISAT, Live Operations, and Run-In period)
- EDS decommission dates

Additional detailed construction phase milestones are listed in Section 8.6.

### 6.4.3 Phasing Plan

Phasing refers to the grouping and timing of CBIS construction activities. Well-planned phasing ensures that construction activities occur in an efficient order and avoids conflicts between activities that cannot occur at the same time. Effective phasing helps airports mitigate operational impacts during construction. Phasing can also support putting the new CBIS into operation in increments.

Phasing plans shall include:

- Plan view drawing package showing conveyor layout and BHS/EDS components of the CBIS (i.e., ATRs, BMAs, EDS, CBRA BRPs) at each construction phase
- Brief description of the state of the system represented in each phase drawing, including:
  - The major functional changes of the CBIS in each phase (e.g., what components are removed/replaced, what major additions are made to the network or subsystems)



- Whether the CBIS will be used operationally following each phase, and a brief description of how operations would be conducted (e.g., which induct points, which screening lines, is CBRA temporary or final configuration, etc.)
- Number and type of each EDS populating screening lines in each phase
- Schedule showing when each phase is anticipated amongst other major activities impacting the system state by the Baggage Handling System Contractor (BHSC) and EDS OEM (e.g., high level of demolition and construction, networking, and integration work, etc.)

### 6.4.4 Screening Equipment Installation Guideline References

Submittals shall reference EDS OEMs site-installation and integration guides (including document name, date, and revisions) and describe how requirements for the satisfactory accommodation of the selected screening equipment will be met, including requirements for EDS ancillary equipment and their respective spaces.

HVAC requirements (EDS, CBRA, OSRA, IT closets, etc.) associated with spaces housing screening equipment and associate ancillary equipment shall also be confirmed.

### 6.4.5 Conveyor Manifest

Starting at the 30% Design Phase, the conveyor manifest shall list for each planned conveyor in the system:

- Conveyor identifier
- Approximate conveyor length
- Conveyor speed

Starting at the 70% Design Phase, the conveyor manifest shall include:

- Conveyor motor sizing
- Conveyor motor amperage
- Total amperage requirements



### 6.4.6 Specifications

Project specifications provide contractual work and workmanship requirements for contractors building the CBIS. Specifications describe the scope of the work to be performed, as well as materials, installation methods, and quality control measures to be used in performing the work. Specifications are required beginning at the 70% design phase.

- Project specifications shall make explicit reference to TSA-specified CBIS design performance requirements in Chapters 12-14.
- Project specifications shall reference current commissioning requirements outlined in Chapter 12 and Chapter 9.
- Project specifications shall include detailed BIS requirements.

### 6.4.7 Bid Documents

Bid documents, if they are submitted at the 100% Design Phase (See Section 7.4.1) shall include:

- Cover sheet with noted stakeholders, project locale, title, dates, revision block
- Drawing index
- Legend sheet
- Mechanical
  - Conveyor manifest sheets
  - Plan views, including catwalk, stairs, and egress
  - Elevation views
  - Project specific/standard details
  - Phasing drawings
  - Demolition requirements
- Electrical
  - Control stations/devices/MCP locations
  - E-stop zones, with relevant control station
- Demolition and phasing plans
- EDS unit removal route as well as all other O&M-related access
- CBRA plans





### 6.4.8 Stakeholder Notification

Project sponsors are responsible for ensuring that stakeholders are notified of the project status and any significant developments or decisions are documented. Project Sponsors are encouraged to facilitate coordination meetings involving both Local TSA IT and Real Estate as early in the design process as possible. Design package submittals shall include documentation that project stakeholders have been periodically briefed on the progress of the planning and design effort. All project e-mails, meeting minutes, or other records documenting decisions or changes in project scope or status shall be included as part of the Stakeholder Notification.



## **CHAPTER 7: DETAILED DESIGN PHASE**



### 7.1 Detailed Design Phase Overview

During the Detailed Design Phase, the BDR is refined and development of the detailed design drawings, contingency plans, ROM construction cost estimates, and the program schedule begins. Three sub-phases are to be used as milestones: 30% Design, 70% Design, and 100% Construction Documents.

Tasks, deliverables, TSA responsibilities, and meetings for the Detailed Design Phase are addressed in the following sections.

### 7.2 30% Design

A process flow chart of the 30% Design Phase is displayed in Figure 7-1.



Figure 7-1: Detailed Design Phase, 30% Design Process Flow

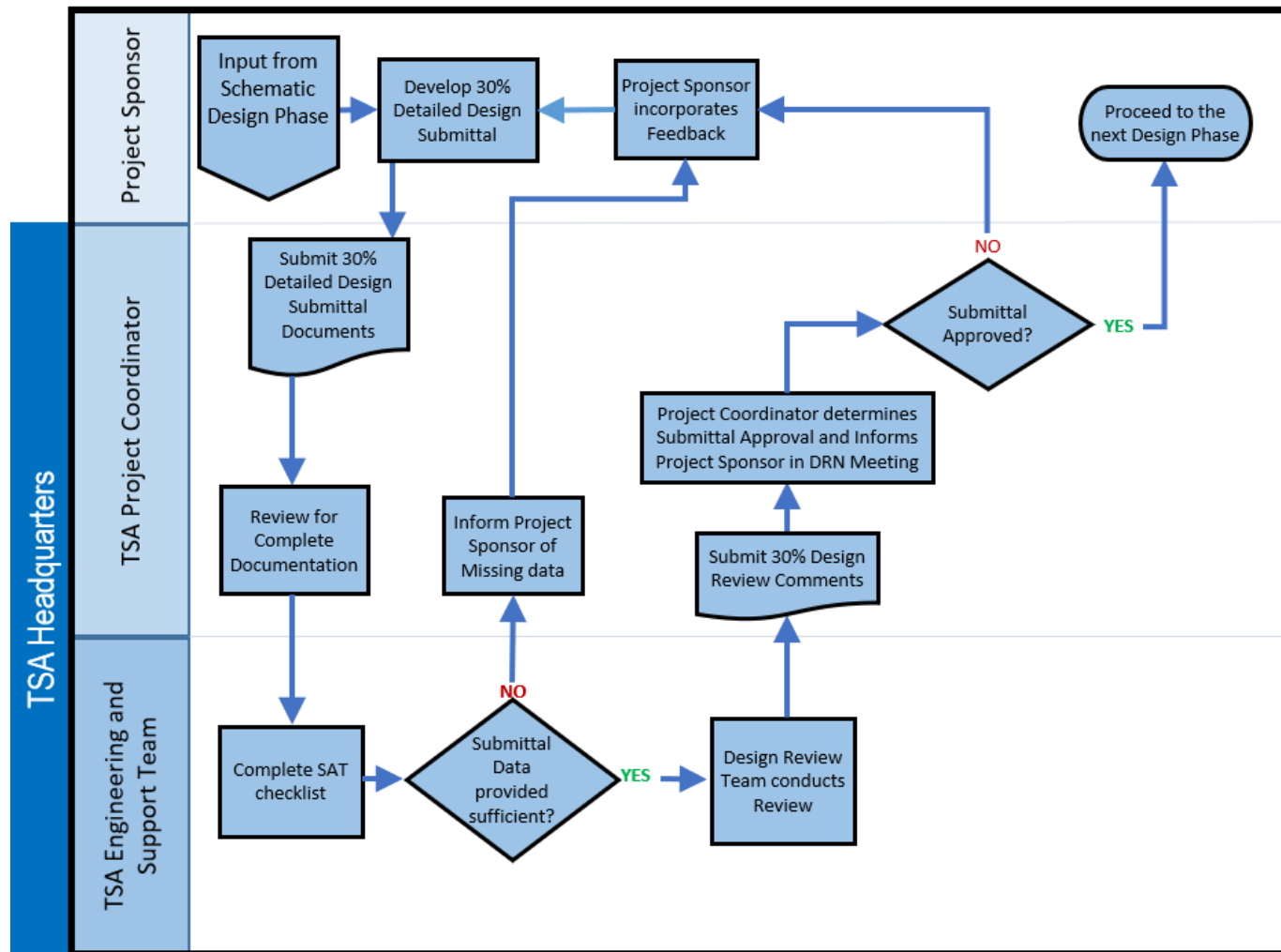


Figure 7-2 summarizes ILDT tasks, deliverables, TSA responsibilities and meetings for the 30% Detailed Design Phase.

**Figure 7-2: Summary of 30% Detailed Design Phase**

| PROJECT PHASE / TASK                            | TIME |   |   |   |   |   |  |   |   |  |
|-------------------------------------------------|------|---|---|---|---|---|--|---|---|--|
| 30 % Detailed Design Phase                      |      |   |   |   |   |   |  |   |   |  |
| 1. Detailed design drawings refinement          | ■    |   |   |   |   |   |  |   |   |  |
| 2. 30% Current Working Estimate and LCCA        |      | ■ |   |   |   |   |  |   |   |  |
| 3. Program Schedule Update                      |      |   | ■ |   |   |   |  |   |   |  |
| 4. Updated Indication of expected EDS Type      |      |   |   | ◆ |   |   |  |   |   |  |
| 5. 30% Detailed Design Submittal                |      |   |   |   | ★ |   |  |   |   |  |
| 6. ILDT/TSA Design Review Meeting               |      |   |   |   |   | ● |  |   |   |  |
| 7. Approval/Rejection and Submittal Comments    |      |   |   |   |   |   |  | ◆ |   |  |
| 8. TSA memo regarding 30% Approval requirements |      |   |   |   |   |   |  |   | ◆ |  |

Note: The Timetable does not reflect task duration

■ ILDT Task    ★ ILDT Deliverable to TSA    ◆ TSA Responsibility    ● ILDT/TSA Meeting

## 7.2.1 Project Sponsor and ILDT 30% Design Responsibilities

The tasks that are the responsibility of the Project Sponsor and ILDT involved in the 30% Detailed Design sub-phase are outlined below:

- Create the Detailed Design based on the TSA-approved BDR
- Develop 30% level current working estimate and any updates to the LifeCycle Cost Analysis (LCCA)
- Update the Preliminary program schedule developed in the Schematic Design Phase
- Obtain an updated indication of expected EDS equipment types from TSA
- Submit the 30% Design deliverables specified below
- Participate in a meeting with the TSA Design Review Team in the event the Project Sponsor/ILDT requires clarification on the comments and disposition of the submittal

- Receive comments on the 30% Design submittals and formal approval/rejection from TSA

### 7.2.2 30% Design Deliverables

The 30% Design package shall include the following documents, which shall be delivered both in the native format (Word, Excel, etc.) and as a PDF file (hard copies are not required):

- **Updated BDR** (Section 6.3) with emphasis on:
  - Updated project requirements (Section 6.3.1)
  - Refined flow-based modeling assumptions and results (Section 6.3.3)
  - Detailed discussion of operations (Section 6.3.2)
- **Preliminary Drawings** for mechanical, electrical, plumbing, fire protection, and special systems (Section 6.4.1)
- **Updated Preliminary phasing plan** (Section 6.4.3)
- **Updated project schedule** (Section 6.4.2)
- **Basis of Estimate, 30% Current Working Estimate, and, if applicable, updated LCCA** (Chapter 11)
- **Contingency plan** (Section 7.5; *only* applicable to mini in-lines at this phase)
- **Baggage and data flow charts** (detailed data flow and examples are in Appendix A, Section A.3)
- **Conveyor manifest** (Section 6.4.5)
- **Screening Equipment Installation Guideline References** (Section 6.4.4)
- **Outline of Reporting Capabilities** to be provided by the CBIS (12.12) (see Appendix A, Section A.4 for examples of detailed reports)
- **National Environmental Policy Act form** (Section IV of TSA form 2602-1)
- **Stakeholder notification documentation** (Section 6.4.7)
- **Approved and in-process RFVs** (Section 4.6.2)

The Project Sponsor provides responses to submission comments from TSA's Design Review Team on the Design Review Comment Form, as appropriate (Section 4.6.5). The Submittals Checklist (Section 4.6.6) is recommended but not required.

### 7.2.3 TSA 30% Design Responsibilities

As part of the review process at the end of the 30% Design sub-phase, TSA Headquarters is expected to provide the Project Sponsor with the following:



- EDS model and quantities
- A Design Review Meeting with the TSA project coordinators
- Formal approval or rejection and comments on the 30% Design submittals

*Note: Ad hoc meetings should be convened as soon as possible with all affected parties to resolve issues that arise during the 30% Design phase.*

### 7.2.4 Dynamic Modeling

Dynamic modeling is not required, but could be helpful in the Detailed Design Phase for larger systems, providing designers with the ability to:

- Finalize the detailed components of the baggage handling and screening system (e.g., number of queuing belts, conveyor speeds, exact location of merge and diversion points, exact amount of buffering required)
- Assist baggage designers with PLC specifications and requirements
- Refine the evaluation of system performance
- Visualize the final design to assist with stakeholder review and approval

Commercial and proprietary modeling packages can be used for the Detailed Design Phase.

If dynamic modeling is used, the modeling provider shall submit to the Project Sponsor and the TSA Project Coordinator all programming parameters that may be used to adjust the model including but not limited to:

- Bag distribution methodology
- Belt speeds
- Merge windows
- Spacer/bag gap timers
- Jam timer
- Space programmed between bags for diverting
- Bag spacing at vertical sortation units
- All statistical distributions used

When developing CBIS modeling, it is recommended that the following approach be used to verify the performance of CBIS designs and to ensure standardization of modeling development. Using a commonly accepted approach during modeling development will enable more efficient use of the modeling results and improve the screening solutions.



The CBIS modeling should include CBRA operations (i.e., conveyors leading to CBRA, bags queuing within CBRA, screening process, and bag reinsertion into the CBIS).

The following standards and methodology should be used during the development of any modeling:

- Begin with a layout of the CBIS, including accurate conveyor lengths, equipment used, and conveyor belt speeds.
- Program system control logic, including transfers, merges, belt speeds, and bag spacing designed for the EDS equipment being used.
- Use the design day flight schedule and other assumptions (load factors, earliness distributions, etc.) developed during the Schematic Design phase regarding the flight schedule to determine baggage rate profile for the specific airport.
- Assume that the redundant EDS (see Section 5.6.3) is operational for the entire modeling period.
- Several models should be developed for the design day to explore the effect of random variabilities.
- For systems using laser scanners, assume a no-read or misread rate of 2.0%. For systems using RFID scanners, assume a no-read or misread rate of 1.0%.
- Identify potential locations for jams throughout the system and program realistic jam rates. If historical data is available on jam rates by system location, then that information should be used. For new systems, an overall 0.5% jam rate can be applied to occur randomly at baggage transition points within the system

Whenever possible, planners should obtain specific and updated ETD and OSR processing distributions from TSA. However, if these distributions are not available, the following distributions can be used:

- **Time to clear bag jams** – Use a triangular probability distribution to simulate the clearing of jams, with a minimum time value of 0.5 minute, most likely time value of 1.5 minutes, and maximum time value of 5.0 minutes.
- **OSR** protocol for EDS alarmed bags – Use a normal distribution where the mean is 20.0 seconds, the standard deviation is 7.5 seconds, the minimum value is 5.0 seconds, and the maximum value is 45.0 seconds.
- **ETD** protocol for Oversize bags – Use a gamma distribution. Distribution parameters are considered SSI. Please contact TSA to obtain required information.
- **ETD** directed search of EDS alarmed bag – Use a gamma distribution. Distribution parameters are considered SSI. Please contact TSA to obtain site specific required information.
- If possible, **baggage size** (length, width, height, and weight) should be distributed based on data collection at the airport or data provided by the airport operator or airlines. When actual data are unavailable, the national average design values in Section 5.6.1.4 should be used.



## 7.3 70% Design

A process flow chart of this 70% Detailed Design Phase is displayed in Figure 7-3.

**Figure 7-3: Detailed Design Phase, 70% Design Process Flow**

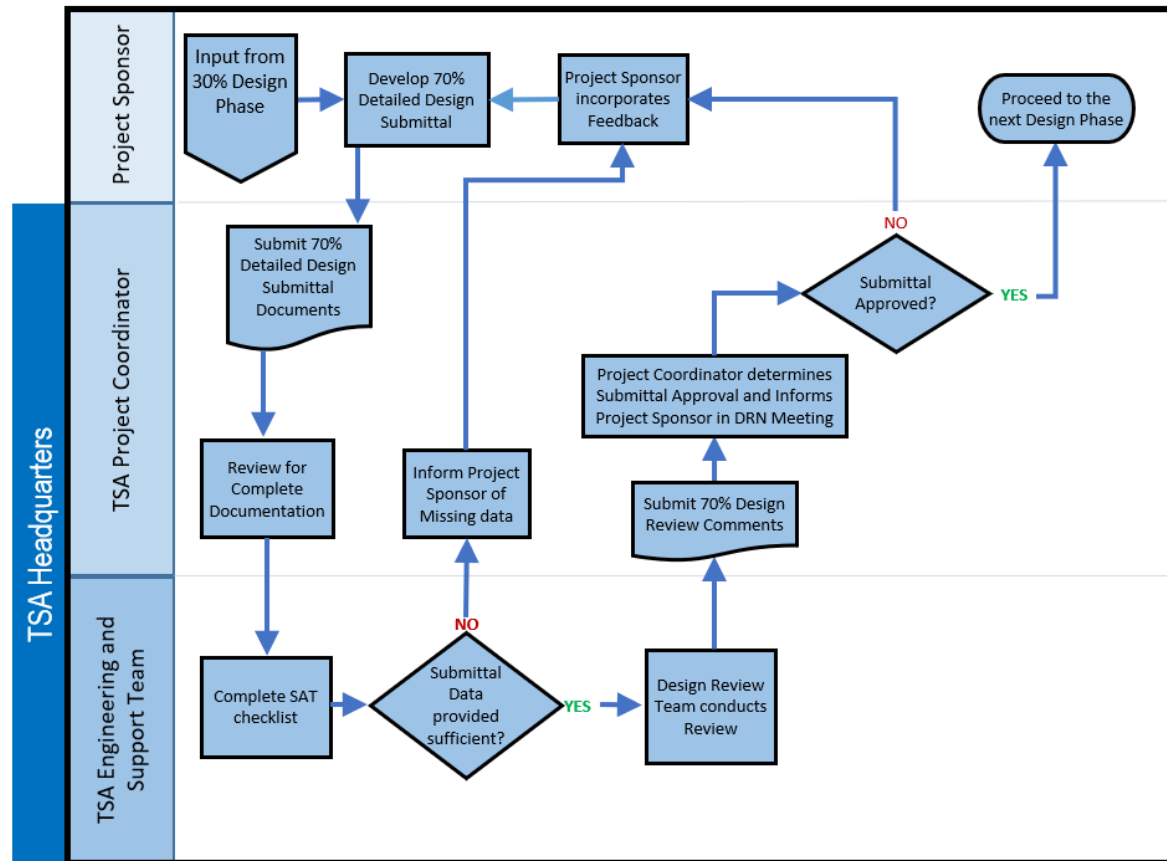
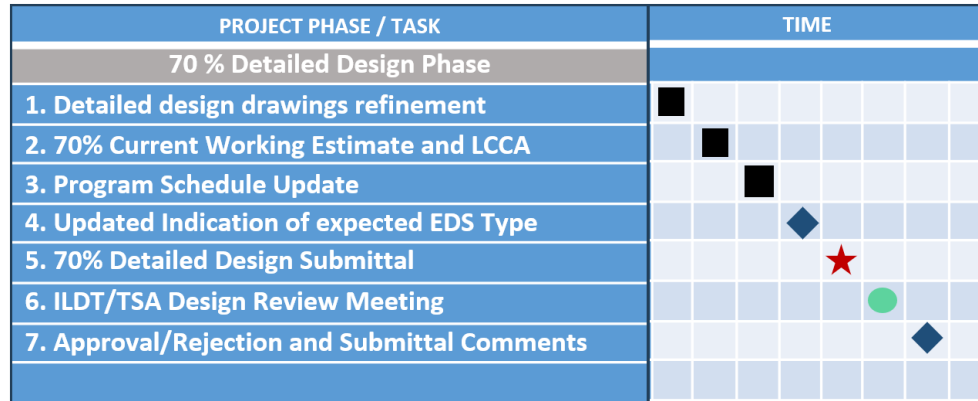


Figure 7-4 summarizes ILDT tasks, deliverables, TSA responsibilities and meetings for the 70% Detailed Design Phase.

**Figure 7-4: Summary of 70% Detailed Design Phase**



Note: The Timetable does not reflect task duration

■ ILDT Task ★ ILDT Deliverable to TSA ◆ TSA Responsibility ● ILDT/TSA Meeting

### 7.3.1 Project Sponsor and ILDT 70% Design Responsibilities

The tasks that are the responsibility of the Project Sponsor and ILDT involved in the 70% Detailed Design sub-phase are outlined below:

- Refine detailed design drawings based on TSA comments on the 30% Design submittals
- Refine current working estimate and update LCCA
- Update the Preliminary program schedule developed in the 30% Design sub-phase
- Obtain an updated indication of expected equipment type from TSA
- Submit the 70% Design Deliverables specified below
- Participate in a meeting TSA Design Review Team in the event the Project Sponsor or ILDT requires clarification on the comments and disposition of the submittal
- Receive TSA comments on the 70% Design submittals and formal approval or rejection from TSA

### 7.3.2 70% Design Deliverables

Simple mini in-line designs are exempt from this detailed design sub-phase. However, all 70% detailed design deliverables (except dynamic simulation) are required as part of the 100% Design sub-phase.

The 70% Design package shall include the following documents:

- **Updated BDR** (Section 6.3) with emphasis on:
  - Updated project requirements (Section 6.3.1)
  - Refined flow-based modeling assumptions and results (Section 6.3.3)
  - Refined detailed discussion of operations (Section 6.3.2)
- **70% Design Drawings** for mechanical, electrical, plumbing, fire protection, and special systems (Section 6.4.1)
- **Updated phasing plan** (Section 6.4.3)
- **Updated project schedule** (Section 6.4.2)
- **Basis of Estimate, 70% Current Working Estimate, and, if applicable, updated LCCA** (Chapter 11)
- **Preliminary contingency plan** (see Section 7.5)
- **Baggage and data flow charts** (detailed data flow and examples are in Appendix A, Section A.3)
- **Updated conveyor manifest** (Section 6.4.5)
- **Screening Equipment Installation Guideline References** (Section 6.4.4)
- **Manufacturer information for Power Conditioning Devices** (Section 12.11.6)
- **Outline of Reporting Capabilities** to be provided by the CBIS (12.12) (see Appendix A, Section A.4 for examples of detailed reports generated)
- **National Environmental Policy Act form** (Section IV of TSA form 2602-1)
- **Draft Site-Specific Configuration Management Plan** (Section 7.3.4)
- **70% Specifications** (Section 6.4.6)
- **Stakeholder notification documentation** (Section 6.4.7)
- **EDS Network Diagram** (Section 12.11.7)
- **BHS and CBIS Responsibility Matrix** (See Appendix C)
- **Approved and in-process RFVs** (Section 4.6.2)



The Project Sponsor provides responses to submission comments from TSA's Design Review Team on the Design Review Comment Form, as appropriate (Section 4.6.5). The Submittals Checklist (Section 4.6.6) is recommended but not required.

### 7.3.3 TSA 70% Design Responsibilities

As part of the review process at the end of the 70% Design sub-phase, TSA Headquarters is expected to provide the Project Sponsor with the following:

- A Design Review Meeting with the Project Sponsor, ILDT, and TSA project coordinators
- Formal approval or rejection and comments on the 70% Design submittals
- Confirmation of exact equipment to be delivered and approximate delivery schedule

*Note: Ad hoc meetings should be convened as soon as possible with all affected parties to resolve issues that arise during the 70% Design phase.*

### 7.3.4 Configuration Management

The Site-Specific Configuration Management Plan includes documentation of the screening system boundaries; delineated areas of responsibility between TSA, the Project Sponsor, and the airlines (if they are not the Project Sponsor); and procedures for documenting and informing relevant parties of modifications to the CBIS after submission of documentation to the TSA.

The Configuration Management Plan shall follow the outline below:

- 1 Introduction
  - 1.1 Background
  - 1.2 Purpose
  - 1.3 Configuration Management Defined
- 2 Organizational Construct – Configuration and Organization Integration Baseline
  - 2.1 Airport Roles and Responsibilities
  - 2.2 TSA Roles and Responsibilities
  - 2.3 Airlines Roles and Responsibilities
- 3 Configuration Control: Management, Organization, and Responsibilities



### 4 Configuration Control Board

#### 4.1 Purpose

#### 4.2 Organization and Membership

#### 4.3 Change Request Process and Protocol

#### 4.4 Communications Management Plan

##### 4.4.1 Post Commissioning Change Management

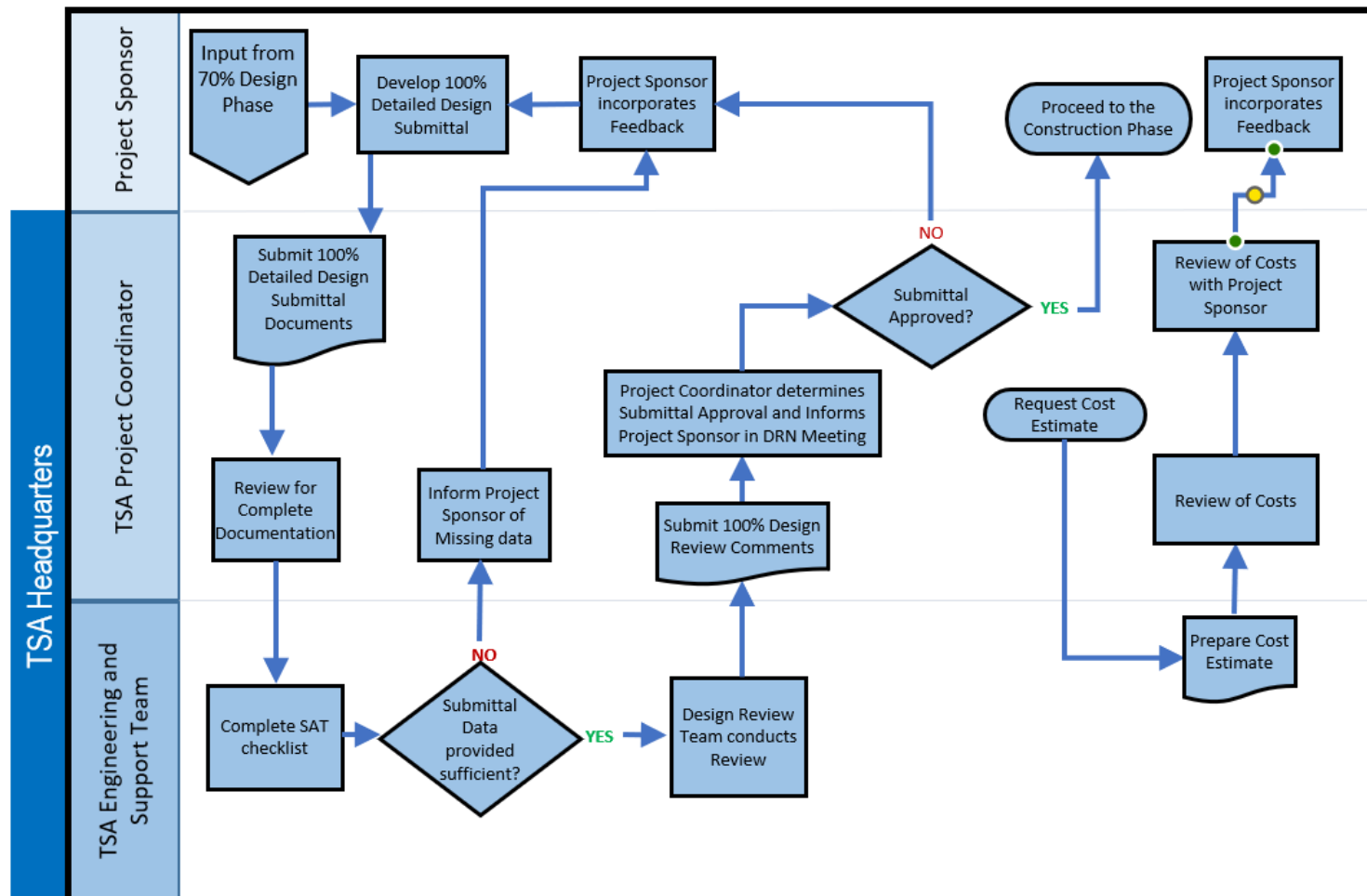
##### 4.4.2 Documentation and Audit



## 7.4 100% Design

A process flow chart of the 100% Detailed Design Phase is displayed in Figure 7-5.

Figure 7-5: Detailed Design Phase, 100% Design Process Flow

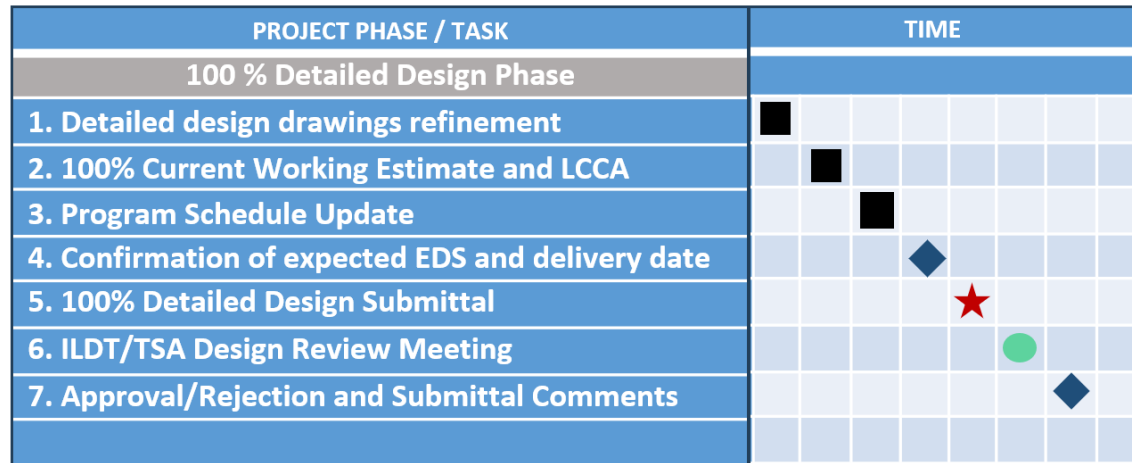


Footnote: A Cost Estimate may be requested at the TSA Project Coordinator's discretion at any time during the design process



Figure 7-6 summarizes tasks, deliverables, TSA responsibilities and meetings for the 100% Detailed Design Phase.

**Figure 7-6: Summary Of 100% Detailed Design Phase**



Note: The Timetable does not reflect task duration

■ ILDT Task    ★ ILDT Deliverable to TSA    ◆ TSA Responsibility    ● ILDT/TSA Meeting

## 7.4.1 Project Sponsor and ILDT 100% Design Responsibilities

The tasks that are the responsibility of the Project Sponsor and ILDT involved in the 100% Detailed Design sub-phase are outlined below:

- Refine and finalize detailed design drawings based on TSA comments on the 70% Design submittals
- Refine and finalize 100% level current working estimate and LCCA
- Update the Preliminary program schedule developed in the 70% Design sub-phase
- Confirm with TSA the exact equipment to be delivered and expected delivery schedule
- Submit the 100% Design deliverables specified below
- Participate in a meeting with the TSA Design Review Team in the event the Project Sponsor or ILDT requires clarification on the comments and disposition of the submittal
- Receive TSA comments on the 100% Design submittals and formal approval/rejection from TSA



- Provide a final report detailing the lifecycle support impacts for airport facilities that do not meet the Design Best Practices and Standards
- Ensure that the construction contractor builds according to the final, TSA-Approved 100% design, drawings, and specifications.
  - If the project will be bid for construction after the 100% design, include the bid documents as part of the 100% design deliverables.
  - If a construction contract is awarded before the 100% design is complete (such as in design/build or CMAR projects), alternative methods may be used to meet this requirement. In such cases, the Project Sponsor must notify TSA of how compliance will be ensured

### 7.4.2 100% Design Deliverables

The 100% Design package shall include the following documents:

- **Final BDR** (Section 6.3) with emphasis on
  - Final project requirements (Section 6.3.1)
  - Final flow-based modeling assumptions and results (Section 6.3.3)
  - Final detailed discussion of operations (Section 6.3.2)
- **100% Design Drawings or Bid Documents** for mechanical, electrical, plumbing, fire protection, and special systems (Section 6.4.1)
- **Final phasing plan** (Section 6.4.3)
- **Updated project schedule** (Section 6.4.2)
- **Final Basis of Estimate, 100% Current Working Estimate, and, if applicable, updated LCCA** (Chapter 11)
- **Final contingency plan** (Section 7.5)
- **Baggage and data flow charts** (detailed data flow and examples are in Appendix A, Section A.3)
- **Final conveyor manifest** (Section 6.4.5)
- **Screening Equipment Installation Guideline References** (Section 6.4.4)
- **Outline of Reporting Capabilities** to be provided by the CBIS (12.12)
- **National Environmental Policy Act form** (Section IV of TSA form 2602-1)
- **Final Site-Specific Configuration Management Plan** (Section 7.3.4)
- **100% Specifications** (Section 6.4.6)
- **Stakeholder notification documentation** (Section 6.4.7)





- Updated EDS Network Diagram (12.11.7)
- Updated BHS and CBIS Responsibility Matrix (Appendix C)
- Approved RFVs (Section 4.6.2)

The Project Sponsor provides responses to submission comments from TSA's Design Review Team on the Design Review Comment Form, as appropriate (Section 4.6.5). The Submittals Checklist (Section 4.6.6) is recommended but not required.

### 7.4.3 TSA 100% Design Responsibilities

As part of the review process at the end of the 100% Design sub-phase, TSA Headquarters is expected to provide the Project Sponsor with the following:

- Confirmation of the exact equipment to be delivered and the expected delivery schedule
- A Design Review Meeting with the Project Sponsor, ILDT, and TSA project coordinators
- Formal approval or rejection and comments on the 100% Design submittals

*Note: Ad hoc meetings should be convened as soon as possible with all affected parties to resolve issues that arise during the 100% Design phase.*

### 7.5 Contingency Planning

Like any technology, the BHS, CBIS, and EDS are all susceptible to failures throughout its lifecycle. The failures may vary from individual components needing quick repairs, to system wide failures that may take hours to correct. Consequently, it is essential for airports to adopt a proactive strategy and generate a contingency plan to quickly respond to potential disruptions to the screening process or airport operations. The project sponsor, ILDT, TSA FSD, TSA HQ, Airlines, and all other relevant stakeholders shall mutually develop a comprehensive contingency plan during the CBIS design process.

The **screening process** refers to the three screening levels executed by TSA to clear bags prior to being loaded onto an aircraft. The **airport operations** refer to the normal process of accepting baggage from passengers, placing them into the BHS, and letting the automated process take place without intervention.

The contingency plan is a document that outlines the specific actions to be taken in response to unforeseen failures, ensuring a prompt response and smooth recovery. The contingency plan should specifically address the following subjects:



- Approving Authorities – A representative from the airport and TSA should provide authorization to activate specific contingency procedures. The specific names and contact venue must be specified along with secondary approvers if the primary point of contact is not available.
- Communication Plan – Defines the communication method and codes to notify all stakeholders of the failure and contingency procedure to use.
- Airport Map – Identifies any portering routes, staging areas, alternative screening locations, and other important locations for execution of each contingency procedure.
- Roles and Responsibilities – List of stakeholders taking part in the contingency procedures along with their respective tasks.
- Recovery Transition – Describes the methodical steps taken to transition from the contingency procedures to the normal screening process and airport operations.

Each contingency should address four primary types of failures which are detailed below.

### 7.5.1 Type 1 Failures

Type 1 failures do not impact the normal screening process or airport operations. These are considered minor issues that can be overcome by the built-in resiliency of the CBIS design. A few examples include single security shunt failure, noncritical diverter failure, and single makeup unit failure. During a Type 1 failure:

- The TSA does not need to be notified or involved.
- The airlines do not need to be notified or involved.
- The EDS OEM do not need to be notified or involved.
- The normal BHS routing may be temporarily adjusted while the O&M Team executes the repairs.

### 7.5.2 Type 2 Failures

Type 2 failures do not impact the normal screening process but do have a slight impact on airport operations due to decreased screening capacity or excessive invalid arrivals going to CBRA. Either condition may require adjustments to the normal airline and/or TSA process. A few examples include two or more security shunts failure during peak times, ticket counter conveyor failure, significant system dieback, and CBIS clear line failure (forcing all bags to the OSR line, and thus, leading to higher CBRA Invalid Arrivals (IA)). During a Type 2 failure:

- The TSA is made aware and may need a temporary boost in CBRA staffing (if available) or reallocation from other staffed locations due to the rerouting of bags to an adjacent CBIS.
- The airlines are made aware and may need to move operations to working TCs or transport bags to a different load point.



- The EDS OEM is notified and executes repairs if the failure is related to the EDS.
- The O&M Team temporarily adjusts BHS routing, executes repairs, and assists with transferring bags from faulted conveyors to adjacent ones.

### **7.5.3 Type 3 Failures**

Type 3 failures negatively impact the normal screening process and airport operations due to complete loss of EDS screening (but not the BHS), forcing TSA to execute mitigation procedures. Type 3 failure requires bypassing the EDS screening (EDS units incorporate a “pass-through” mode that allows it to function as a normal conveyor), and thus, require a significant adjustment to screening, staffing, and operations. A few examples include EDS network crash, EDS server failure, and EDS network power loss. During a Type 3 failure:

- The TSA is made aware and needs to increase staffing in CBRA (if available), conduct screening in multiple areas, and execute/monitor mitigation procedures.
- The airlines are made aware and begin staging, prioritizing, and portering baggage when needed.
- The EDS OEM is notified and executes repairs to the EDS network.
- The O&M Team adjusts BHS routing and assists with portering of bags.

### **7.5.4 Type 4 Failures**

Type 4 failures completely change the normal screening process and airport operations due to complete loss of the BHS. In this situation, the airport is unable to transport bags to/from the EDS, and to/from the CBRA requiring significant manual intervention. This situation is rare and usually happens if there is a significant power loss. During a type 4 failure:

- The TSA is notified and relocates to an alternative screening area to execute/monitor mitigation procedures.
- The airlines are notified and begin staging, prioritizing, and portering baggage when needed.
- The EDS OEM is notified and executes repairs to the EDS, if needed.
- The O&M Team troubleshoots the failure and assists with portering of bags.

### **7.5.5 Recovery Transition**

When failure occurs and a contingency procedure is enabled, a backlog of bags will naturally occur. This is due to a decrease in processing speed or capacity when requiring any level of manual intervention. Therefore, when the failure is resolved, a recovery transition period must take place to revert to the normal screening process and airport operations.



During the recovery transition, personnel may gradually return to their normal duties as the BHS and CBIS begin to process bags. As part of the recovery transition, the ILDT may consider employing a “CBIS Recovery Mode” which allows for a temporary increase of the CBIS capacity by increasing the mainline baggage rate to above the non-redundant EDS capacity.

Although the CBIS Recovery Mode could in theory reduce the length of the recovery transition period, if not properly implemented, it could be counterproductive. CBIS faults (jams, LIT, fail-safes, EDS errors) increase as the processing rate increases. These faults create unplanned system stops which compound into more issues, creating a vicious cycle of faults. Additionally, exercising the CBIS Recovery Mode will require a temporary boost of TSA staffing in the OSRA and CBRA -to compensate for the higher CBIS processing rate -which may not always be available.

If a CBIS Recovery Mode is implemented, the following requirements shall apply:

- Submission of an RFV (during design) requesting approval to operate the mainline above the non-redundant EDS capacity requirement. (See Section 12.2.2)
- A DOO of the CBIS Recovery Mode included with the 30% Design submittal, to include:
  - Activation/Deactivation process
  - BHS HMI notifications related to the mode
  - CBIS BHS report that includes metrics about the date/time, frequency, duration, and performance metrics while activated
- ILDT provides proposed testing and validation plans
- A Memorandum of Agreement (MOA) shall be created by the Project Sponsor during the 70% Design Phase and signed by the Project Sponsor, Major airlines involved and the FSD, which specifies an agreement by all parties regarding how the Recovery Mode will operate, how it is activated, who is notified of activation, etc.



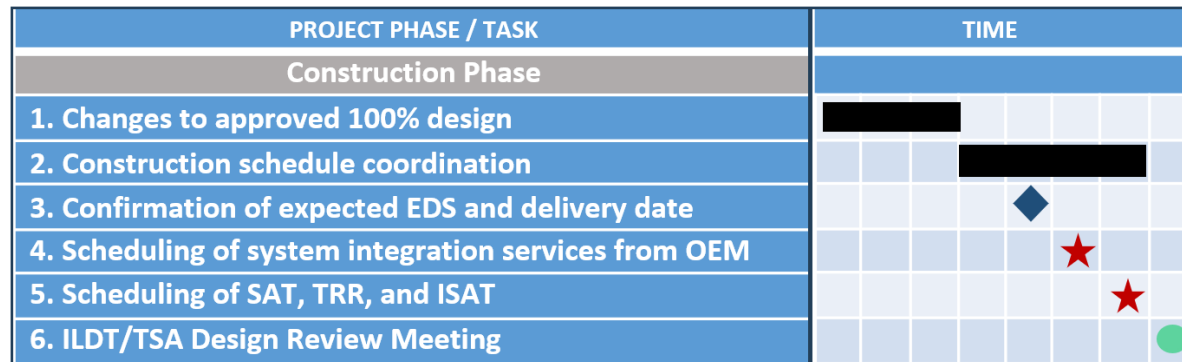
## **CHAPTER 8: CONSTRUCTION PHASE**



## 8.1 Construction Phase Overview

Tasks, deliverables, TSA responsibilities, and meetings for the Construction Phase are shown in Figure 8-1.

Figure 8-1: Summary of Construction Phase



Note: The Timetable does not reflect task duration

 ILDT Task
  ILDT Deliverable to TSA
  TSA Responsibility
  ILDT/TSA Meeting

The duration of the Construction Phase will vary significantly based on the complexity and size of the approved CBIS.

## 8.2 Project Sponsor and ILDT Construction Phase Responsibilities

The following requirements shall be adhered to during the Construction Phase, regardless of project type (design-bid-build versus design-build):

- To ensure TSA's complete understanding and acceptance of the projected system performance, any changes or amendments to the approved 100% Design, including contract document addenda, change requests and Requests for Information (RFIs), that affect the functionality of the CBIS shall be presented for approval to TSA. Any variation from the 100% approved design will not be funded without prior TSA approval of the changes.
- The Project Sponsor shall submit an updated Construction Schedule to TSA stakeholders at a minimum of every 30 calendar days after construction award. Most projects conduct a weekly meeting to review project status and shall invite a TSA Deployment representative.

- The Project Sponsor shall request an update of the availability of equipment and equipment upgrades.
- The Project Sponsor shall consult with the TSA Project Coordinator and their TSA Acceptance Testing representative no later than 90 calendar days prior to ISAT to refine projected commissioning durations.

### 8.3 Construction Phase Deliverables

The Construction Phase deliverables shall include the following documents:

- **Any changes or amendments to the approved 100% Design package** including contract document addenda, change requests and RFIs
- **Courtesy copies of shop and installation drawings** (Section 6.4.1) to ensure the original intent of the design as reviewed up to and including the 100% Design review submittal process
- **Updated project schedule with construction milestones** (Section 6.4.2)

The Project Sponsor provides responses to submission comments from TSA's Design Review Team on the Design Review Comment Form, as appropriate (Section 4.6.5). The Submittals Checklist (Section 4.6.6) is recommended but not required.

Requirements for concurrent Training Phase deliverables are in Section 8.7.

### 8.4 TSA Construction Phase Responsibilities

During the Construction Phase, based on the Construction Schedule, TSA Headquarters will confirm the availability of equipment and equipment upgrades and the schedule for delivery of specific equipment. TSA will also deliver and install TSA-furnished equipment. After the EDS equipment is delivered to site and power has been permanently connected to the EDS, TSA and the EDS OEM will conduct a Site Acceptance Test (SAT) to ensure that EDS equipment is assembled properly and complies with detection standards.

### 8.5 Meetings

Regular meetings shall be conducted with the Project Sponsor/ILDT and TSA to monitor system construction.

*Note: Ad hoc meetings should be convened as soon as possible with all affected parties to resolve safety-related issues that arise during the construction phase.*



### 8.6 Construction Schedule

- Key construction milestones for project completion shall be included in the Project Schedule such as:
  - Construction notice to proceed
  - CBIS construction prior to EDS delivery and post-EDS delivery
  - EDS delivery
  - EDS Installation
  - EDS power readiness
  - EDS SAT complete
  - EDS integration and network installation
  - CBIS Documentation checklist received and completed
  - Pre-ISAT
  - TRR
  - ISAT (see Chapter 9)
  - Live bag screening (Go-Live)
  - Operational run-in period
  - Completion of all required deficiency corrections
  - Substantial completion
  - Project closeout

### 8.7 Training

Training CBIS stakeholders is crucial for ensuring efficient and secure operations at airports. This training encompasses a comprehensive understanding of the systems components, processes, and technologies, enabling stakeholders to effectively manage and troubleshoot issues. By equipping personnel with the necessary skills and knowledge, airports can minimize baggage mishandling, enhance passenger satisfaction, and optimize overall operational efficiency.

#### 8.7.1 Training Deliverables

Training materials and documentation to be presented shall be submitted to TSA for review 60 days prior to the first scheduled training session.





### 8.7.2 CBIS Use and Logistics Training

CBIS use and logistics training, distinct from maintenance training, shall be provided by the Project Sponsor to TSA for mechanical, electrical, and computer functions required to properly operate the staffed portions of the system including, but not be limited to:

- Any BHS-provided equipment in the CBRA
- Bag induction and handling procedures
- Any BHS-provided equipment in the OSRA
- BHS control interface provided to conduct the Operational Test Kit (OTK) procedures
- CBIS orientation and layout
- CBIS fail-safe procedures
- System safety
- Bag jam and fault clearing procedures
- BHS reporting system

The Baggage Handling System Contractor (BHSC) shall provide training on how to access and download BHS reports as well as SSI training for any BHS reports classified as SSI; training must comply with Federal Government SSI guidelines. SSI Best Practices and Quick Reference Guides for more information on SSI handling, sharing, and destroying procedures can be found on the [TSA.gov SSI webpage](https://www.tsa.gov/ssi).

See Appendix A, Section A.1 for an example training documentation outline. All operators or individuals with access to either viewing or printing reports shall have completed SSI procedures training prior to operation. The training sessions shall be conducted prior to the operational startup of the respective BHS.



## **CHAPTER 9: TESTING AND EVALUATION PHASE**



### 9.1 Testing and Evaluation Phase Overview

After the CBIS construction is complete, the CBIS enters the Testing and Evaluation (T&E) phase where the ILDT, DSD, and T&E Division collaborate to verify, validate, and test the as-built design prior to acceptance of the CBIS. The T&E phase is divided into four sequential stages:

1. Pre-Integrated Site Acceptance Testing (Pre-ISAT) – ILDT verifies as-built design and performance
2. Test Readiness Review (TRR) – DSD validates CBIS functional and performance requirements
3. Integrated Site Acceptance Test (ISAT) – T&E Division tests additional functional and performance requirements in a controlled environment
4. Operational Run-In – T&E Division assesses functional and performance requirements in an operational environment

Each CBIS shall complete the four stages before an airport can permanently use the CBIS for live checked baggage security screening operations.

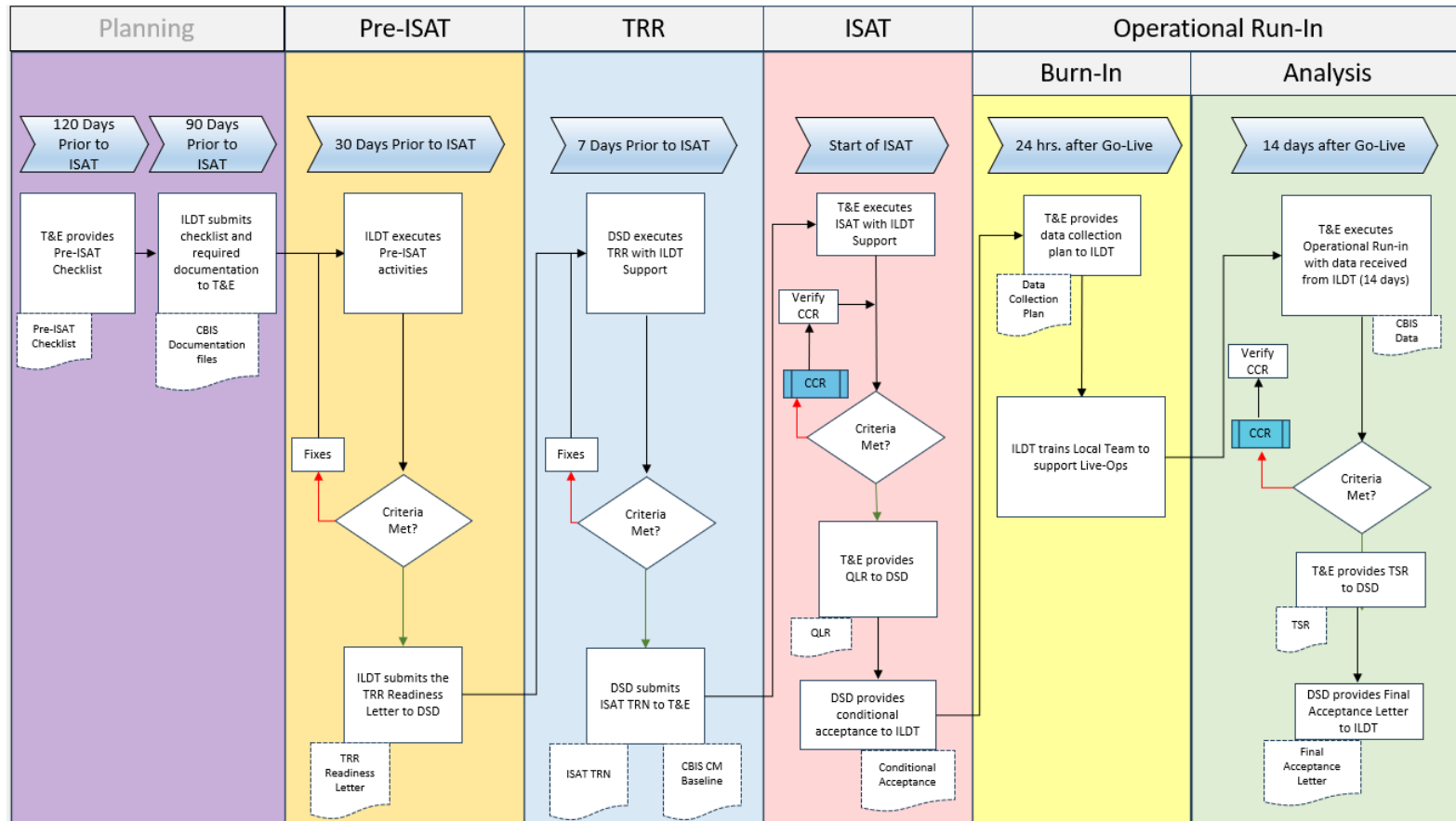
Figure 9-1 illustrates the overall T&E phase process, timeline of events, and documentation required at each stage for a typical CBIS project. The following sections provide an explanation of each step.

However, airport projects can vary in size and complexity, including the need for phased testing plans, combined T&E stages, or unique accommodations for the specific airport. Consequently, this process is dynamic and flexible, resulting in process variations that shall be discussed with and approved by the T&E Division.

For more information about the T&E testing expectations, please refer to the “Transportation Security Administration (TSA) Checked Baggage Inspection System (CBIS) Test and Evaluation (T&E) Guidebook” located on [Sam.gov](https://www.sam.gov) website using the search term “PGDS.”



Figure 9-1: Summary of Testing and Evaluation Phase



## 9.2 Planning

Although not considered a T&E stage, it is important to establish early communication with the T&E Division. This supports the ILDT in developing a realistic testing schedule with the correct sequence of events and resources planning needed for each stage.



At a minimum, the T&E Division must be involved starting at 120 calendar days prior to the start of ISAT. At this time, the T&E Division will assign a Pre-ISAT test lead, begin participating in the airport meetings, review the notional schedule, and provide the ILDT with the Pre-ISAT checklist. This Pre-ISAT checklist contains the CBIS documents and information needed to help the T&E Division become familiar with the CBIS design, operation, and technology to develop a test plan tailored to the system design.

By 90 days prior to ISAT, the ILDT shall submit the completed Pre-ISAT checklist and CBIS Documentation Package to the T&E Division (or 30 calendar days after receipt of the checklist). This will ensure the T&E Division has sufficient time to review the documents and obtain answers to any technical questions as needed. This package typically includes documents such as the BDR, CONOPS, bag hygiene policy, system drawings, and phasing plans.

During the Planning phase, the T&E Division will lock down the testing schedule and begin coordinating with the ILDT about specific logistics, resources, and execution details of the ISAT stage. Key Accomplishments which occur during planning include:

- T&E provides the Pre-ISAT checklist to ILDT.
- T&E provides ILDT with the “Transportation Security Administration (TSA) Checked Baggage Inspection System (CBIS) Test and Evaluation (T&E) Guidebook” to use as the baseline for a potential test plan.
- ILDT submits a completed Pre-ISAT checklist and all required CBIS documentation to T&E within 90 calendar days of ISAT.

### 9.3 Pre-ISAT

The Pre-ISAT stage, also known as Owner's Testing, is a series of independent checks and confidence tests conducted by the ILDT to verify the CBIS meets the approved design. It also serves as the entry gateway for the TRR activities. Approximately thirty days prior to ISAT, the T&E Division coordinates the ISAT test bag delivery and logistics with the ILDT. At a minimum, the requirements listed in Section 12.14 are validated during Pre-ISAT. Defects found during the Pre-ISAT must be corrected and retested by the ILDT. Once the CBIS has met the Pre-ISAT criteria, the ILDT shall prepare the TRR Readiness letter (also known as Owners Acceptance Letter) documenting the successful demonstration and acceptance of Pre-ISAT results and submits it to DSD. The letter confirms and documents that the CBIS is ready for TRR, allowing DSD to solidify the TRR schedule and coordinate the necessary resources. The key accomplishments achieved in the Pre-ISAT stage include:

- T&E coordinates ISAT test bags delivery and logistics with ILDT
- ILDT executes the Pre-ISAT activities and addresses any deficiencies
- ILDT submits the TRR Readiness Letter to DSD.



### 9.4 TRR

The TRR stage is a series of system checks and tests conducted by DSD to validate CBIS functional and performance requirements as seen in Section 12.14. The TRR also serves as the entry gateway for the ISAT activities and usually last about 1-3 weeks based on system complexity. The difficulty and level of effort needed for the TRR activities is defined by DSD and requires ILDT support for execution.

Defects found during the TRR must be corrected by the ILDT and retested by DSD as necessary. If the defects found prevents completion of the TRR activities, DSD may depart the site and the retest activities will be postponed to the next available test window, after corrections have been made.

Once the CBIS has met the TRR criteria, DSD prepares the ISAT Test Readiness Notification (TRN) and submits it to the T&E Division. The ISAT TRN confirms whether the CBIS is ready for ISAT, along with evidence of the TRR results which includes visual inspections checklists, system pictures, tests results, etc. The ISAT TRN serves as the gateway for entering the ISAT stage. Listed below are the key accomplishments achieved in the TRR stage:

- DSD executes the TRR activities with ILDT support
- ILDT implements and retests any required fixes
- DSD submits the ISAT TRN to the T&E Division and establishes the CBIS Configuration Management Baseline.

#### 9.4.1 CBIS Configuration Management Baseline

After the successful completion of the TRR but prior to entering the ISAT stage, the TSA establishes the initial CBIS configuration management baseline. This baseline represents the CBIS configuration “to be tested” during ISAT and therefore, cannot be changed without authorization from the TSA. This critical step marks the beginning of the CBIS Configuration Management Process. From this point forward, the ILDT shall follow the requirements listed in Section 9.8 to properly document any system changes and update the CBIS configuration baseline. This process also ensures that the respective stakeholders are informed of any CBIS changes moving forward.

The CBIS baseline includes all system documentation collected up to this point and more importantly, an unlocked copy of the PLC code. Usually, the baseline package is included with the ISAT TRN submission from DSD, but, if necessary, the T&E Division may request additional or missing information from the ILDT.

### 9.5 ISAT

The ISAT stage is a series of tests conducted by T&E, with support from the ILDT, to validate the CBIS meets functional and performance requirements (as listed in Section 12.14) in a controlled environment, isolating any system issues from the day-to-day anomalies typically



encountered during live operations. The ISAT activities usually take between 3-10 days and serve as the entry gateway for the Operational Run-in activities.

Defects found during the ISAT must be corrected promptly by the ILDT and retested by the T&E Division as necessary. However, the ILDT shall follow the CBIS configuration management process outlined in Section 9.8 prior to any retest. Furthermore, if the defects found prevent completion of the ISAT, halting the ISAT, the T&E Division may depart the site, and the retest will be postponed to the next available test window after corrections are made.

Once the ISAT is completed, the T&E Division analyzes the results, prepares the Quick Look Report (QLR), and submits it to DSD within seven (7) business days of the ISAT completion.

DSD is responsible for reviewing the QLR and deciding whether the CBIS may continue onto the Operational Run-In stage. At this point, DSD prepares the Conditional Acceptance Letter and provides it to the T&E Division, authorizing the CBIS to move on to the next step. Key accomplishments during ISAT include:

- T&E executes ISAT activities and verifies system performance
- ILDT implements and retests any required fixes
- T&E provides the QLR to DSD within seven business days
- DSD issues the Conditional Acceptance Letter

### 9.6 Operational Run-in: Burn-in

Although not considered a T&E stage, there is a Burn-in period which begins 24 hours after the CBIS begins screening live baggage and lasts 14 days. T&E Division uses the Burn-in period to finalize the planning and coordination of the Operational Run-In before collecting data for analysis. During this period, the T&E Division provides the ILDT with the Data Collection Plan which is a document that outlines the information required (frequency, format, and delivery method) from the ILDT during the next stage. This information usually includes EDS and BHS reports, but may expand to log files, CCTV videos, and others depending on the airport and project.

During the Burn-in stage, the ILDT prioritizes training as a critical component to ensure the BHS maintenance team and local TSA are fully equipped to properly use and operate the new CBIS. This stage is essential for stakeholders to develop efficient operational strategies and gain a thorough understanding of the system. Key accomplishments which take place during this stage include:

- T&E Division provides the Data Collection Plan to the ILDT
- ILDT continues to train BHS maintenance team and the local TSA in the proper use and operation of the CBIS



### 9.7 Operational Run-in: Analysis

The Analysis of the Operational Run-In data is the last stage of the T&E phase and begins 14 days after the CBIS has initiated live-bag screening. Operational Run-in is executed by the T&E Division to validate the CBIS performance requirements (as listed in Section 12.14) in an operational environment. During this stage, the CBIS is allowed to operate in a live environment with stream of commerce bags. For a period of 14 calendar days, the T&E Division monitors the CBIS performance remotely utilizing the information received from the ILDT following the Data collection Plan, provided at the beginning of the Burn-in period.

Defects found during the Operational Run-In activities shall be promptly corrected by the ILDT in coordination with the local teams to avoid any downtime that may negatively impact airport operations. The ILDT shall continue to follow the configuration management process outlined in Section 9.8. Depending on the type of defects, T&E Division may extend the Operational Run-In period on a weekly basis to gather additional data to ensure the CBIS meets the requirements consistently.

Upon completion of the Operational Run-in period, the T&E Division analyzes the results, which serve to supplement the ISAT findings. Based on this analysis, the T&E Division prepares the Test Summary Report (TSR) and submits it to DSD. DSD is responsible for reviewing the TSR and deciding whether the CBIS may continue to be used for live bag screening. At this point, DSD prepares the Final Acceptance Letter and provides it to the ILDT, authorizing the CBIS to operate indefinitely.

The key accomplishments achieved during the operational run-in period include:

- ILDT provides the required CBIS data and addresses any issues
- T&E Division monitors performance over the 14 calendar days (or more as needed)
- T&E develops and submits the TSR to DSD
- DSD issues the Final Acceptance Letter to the ILDT.

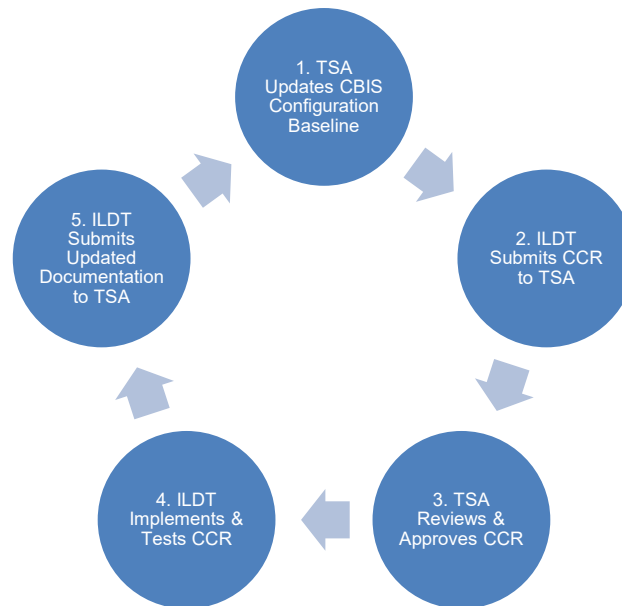
### 9.8 Configuration Management

The TSA utilizes a typical Configuration Management (CM) process to track CBIS configurations at airports. This CM process starts with establishing the CBIS configuration baseline after completion of the TRR. This initial baseline represents the “as-built” configuration, including the PLC code. From this point forward, and throughout the lifecycle of the CBIS, any physical or software changes needed shall be documented through the CCR form found in Appendix A, Section A.6 and follow the process shown in Figure 9-2.





Figure 9-2: CBIS CM Process



The ILDT is responsible for preparing and submitting the CCR form to DSD (via e-mail), with a carbon copy to the following mailbox: [BASEteam@tsa.dhs.gov](mailto:BASEteam@tsa.dhs.gov). The CCR form shall include specific information regarding the change request, including the proposed testing approach to validate the change, and required updates to existing documentation. Examples of changes requiring a CCR include:

- System Throughput: Any change that may affect any portion of the system throughput feeding either into or out of the CBIS
- Bag Presentation: Any change that may affect bag presentation to the EDS units (e.g., merges upstream too close causing double bags to enter)
- EDS Interface: Any change to the EDS interface or to how the CBIS handles bag IDs and decisions
- Tracking Model: Any change to the CBIS tracking model (i.e., shaft encoding pulses, merges downstream allowing one bag to encroach into another bag's tracking window)
- Baggage Allocation Methodology: Any changes to the bag allocation method
- Post-EDS Changes: Any change of any type from the exit of the EDS unit to the last clear bag divert point
- CBRA Changes: Any change of any type after the last chance divert point into the CBRA including the CBRA



Once the CCR is submitted, the TSA will review and respond to the CCR within 48 hours of the submission date and time. After the CCR is approved, the ILDT may implement the change and execute the required testing or validation as outlined in the CCR.

Within 5 days of successful implementation and testing of the CCR, the ILDT shall submit evidence of the testing results, all updated CBIS documentation, and updated PLC code to TSA utilizing the following mailbox: [BASEteam@tsa.dhs.gov](mailto:BASEteam@tsa.dhs.gov).

A log of all CCR changes made to the CBIS shall be maintained and controlled by the CBIS Owner. The log shall be included in all CCR submittals and include the following at a minimum:

- CBIS Designation
- Name of Change
- Description of change
- Status of Change (i.e. in testing, operational, pending, etc.)
- Date of TSA Approval
- Date of live operational use

### 9.9 Testing Process Variations

TSA does not test a partial or incomplete CBIS. The system must be in final configuration for ISAT as defined below. Any CBIS components not in final configuration, or any situation requiring phased testing shall be submitted to TSA for approval using the Request for PGDS Variance (RFV) Template prior to the start of testing. More details on RFV's can be found in Section 4.6.2. The RFV template is found in A.5.. The ILDT must demonstrate an operational impact for RFV consideration and approval. Final configuration is defined as when the physical, programming, networking, and reporting capabilities of the entire CBIS are in final operational state.

The following guidelines will be used to assist the Project Sponsor with projecting testing schedules for special case scenarios such as phased recapitalization, optimization projects, etc.:

- The Pre-ISAT and TRR will be scheduled as separate testing phases unless RFV approval has been obtained from TSA DSD to combine. If a combined Pre-ISAT/TRR is approved and conducted, a TSA DSD testing representative must be present to record and witness all testing.
- A single EDS (defined as from spur line divert to Level 1 Decision point) is phased into the existing CBIS – A combined TRR/ISAT may be conducted provided only the EDS line is being modified.
- If changes upstream of the spur line divert and downstream of the Level 1 decision point (including CBRA) are implemented and able to be tested with the first single EDS replacement, a combined TRR/ISAT can still be conducted.



## **CHAPTER 10 PROJECT CLOSEOUT PHASE**



### 10.1 Project Closeout Phase Overview

At the conclusion of the T&E Phase, TSA will provide official approval of the CBIS for beneficial use, allowing the project to enter the Closeout Phase. The Project Sponsor is responsible for completing the tasks shown in Figure 10-1 and further described in the sections to follow.

Figure 10-1: Summary of Project Closeout Phase

| PROJECT PHASE / TASK                                  | TIME |
|-------------------------------------------------------|------|
| Project Closeout Phase                                |      |
| 1. Official TSA Approval of system for beneficial use | ◆    |
| 2. As-Built CBIS Documentation Submittal              | ★    |
| 3. Final copy of PLC program with drawings            | ★    |
| 4. Final copy of disaster recovery procedures         | ★    |

Note: The Timetable does not reflect task duration

■ ILDT Task    ★ ILDT Deliverable to TSA    ◆ TSA Responsibility    ● ILDT/TSA Meeting

### 10.2 Project Closeout Phase Deliverables

The Project Closeout Phase deliverables shall include the following:

- **As-built CBIS documentation** shall be submitted to TSA, in both Computer-Assisted Design (CAD) and PDF file format, as follows:
  - Final Description of Operations (Section 6.3.2)
  - A complete set of BHS as-built mechanical, electrical, plumbing, fire protection, and special systems drawings (Section 6.4.1)
  - Final conveyor manifest (Section 6.4.5)
- **Control System Configuration Documentation** (Section 10.3)
- The PLC programs and disaster recovery procedures (Section 10.3.3)

### 10.3 Control System Configuration Documentation

The TSA requires that all configuration information be submitted at various stages of the system lifecycle especially after a system upgrade. The closeout phase requirements for the new CBIS documentation are described in the following sections.



### 10.3.1 Closeout Submittal Format

The submittal items described in this section shall be submitted to the TSA as follows:

- **30-Day Post DBU Submission:** Within 30 days following DBU, the initial submittal, as defined in Section 10.2, shall be made.
- **Submission Procedure:** Submission of all data shall be coordinated with the FSD or designee. All data shall be submitted via electronic files – paper copies will not be accepted.

#### 10.3.1.1 Summary

A descriptive summary narrative of the submittal shall be included in Microsoft Word and PDF format. This summary shall include, at a minimum, the following information:

- Airport name and area of the airport included in the submittal such as terminal, matrix, node, etc.
- Description of the included area including:
  - Number and type of EDS
  - Type and quantity of infeed conveyor systems such as ticket counter sub-systems, curbside sub-systems, mainlines, etc.
  - Type and quantity of outfeed conveyor systems such as mainlines to sort piers, make-up units, etc.
- Description of the conveyors and sub-systems and their controller equipment. At a minimum, the following information shall be provided:
  - List of each PLC and the conveyors and sub-systems it controls
  - List of each MCP and the conveyors and sub-systems it controls
- Contact information for:
  - Airport director, engineering manager or other primary contact point responsible for this CBIS
  - Airlines primary contact for this CBIS
  - Operation and maintenance contractor (if applicable) primary point of contact
  - Point of contact responsible for follow-up submittals

#### 10.3.1.2 Index

An index of the documents included in the submittal shall be included. This index shall be submitted in Microsoft Excel and PDF format. The index shall include, at a minimum, the title of each file, the file date, and the electronic file name.



### 10.3.2 Control System Architecture Drawing

A control system architecture drawing shall be submitted for each CBIS. This drawing shall be submitted in DXF and PDF format. All high and low-level networks shall be included. Details shall be down to the MCP or PLC chassis level for high-level networks. Details shall include the photo eyes and control devices for low level networks. Configuration information such as node numbers and IP addresses shall be included. Multiple drawings by different network types will be acceptable provided a high-level overall drawing is provided. This information may be segregated by airport, terminal, matrix, or other functional level to correspond with individual projects.

### 10.3.3 Lower-Level Network Configuration Information

The lower-level network submission shall include the following at a minimum.

- **PLC Program:** A copy of the PLC program shall be submitted in its native format for all PLCs. In the event multiple levels of PLCs are utilized, all programs are to be included. The PLC program submission shall include any redundant PLCs that may exist. All software keys and passwords shall be provided if programs are protected and or locked . The PLC program submittal shall include all PLC and software disaster recovery procedures, including software applications.
- **Network Configuration:** A copy of all network configuration files shall be submitted in its native format. The network configuration submittal shall include any redundant networks that may exist.
- **VFD Configuration:** A copy of the configuration of each VFD (including any firmware information) in the CBIS shall be submitted in its native format. The configuration submittal shall include all parameters (unchanged or default settings).
- **Communication and Other Controllers:** A copy of the configuration and code for all other devices as a part of the control system shall be submitted in its native format. An example of these devices might be co-processors or multi-vendor interfaces.
- **Firmware Configuration:** A spreadsheet listing all control devices and their associated firmware levels, where firmware is used, shall be submitted. This spreadsheet shall be submitted as both a Microsoft Excel document and as a PDF file. Examples of these devices are PLC chassis, PLCs, Input/Output modules, Network modules, Communication modules and VFDs.

### 10.3.4 HMI Configuration

A copy of all HMI configurations shall be submitted in their native format. Examples of these HMIs are control room graphical display systems, operator interface panels, bag display monitors or any other computer or dedicated display modules. Refer to Section 10.3.6 for configuration software requirements.

Soft copies of these programs shall also be provided, including any portion that is required to operate the system. This includes applications such as those residing in touch screens or other types of dedicated displays or interfaces.



**10.3.5 High-level Computer Configuration**

A descriptive narrative of the high-level computer equipment of the CBIS shall be submitted in Microsoft Word and PDF format. Included in the narrative shall be a description of each computer and the function/task of the computer. Any data exchange between any computers or PLCs that control or affects bag decisions shall be included. In addition, the narrative shall describe the results of any computer failure and the ability of the CBIS to continue screening baggage.

**10.3.6 Programming and Configuration Software**

A spreadsheet listing all programming and configuration software with the revision level used shall be submitted. This spreadsheet shall be submitted as both a Microsoft Excel document and as a PDF file. Examples of this software are PLC programming software, network configuration software, HMI configuration software and multi-vendor interface programming / configuration software.

**10.3.7 CBIS/ISAT Benchmark Data**

A descriptive summary narrative of the system status at time of submittal shall be included in Microsoft Word and PDF format. This summary shall include, at a minimum, the following information:

- Scan time for each PLC, average and maximum
- Memory utilization for each PLC
- Network utilization for each network on the PLC, where deterministic networks with set update times are used provide all settings and times.



**CHAPTER 11: LIFECYCLE COST ANALYSIS**





### 11.1 Cost Analysis Overview

There are three key cost analysis documents required over the course of a CBIS project: the LCCA, Basis of Estimate (BOE), and Current Working Estimate (CWE). The LCCA is a long-term planning document that primarily supports the selection of the preferred alternative. The BOE builds on the preferred alternative LCCA. The BOE is a detailed breakdown of the project construction costs that identifies costs borne entirely by the project owner and costs eligible for TSA funding. The Current Working Estimate (CWE) rolls up the information in the BOE into a summary of costs.

### 11.2 Lifecycle Cost Analysis

The design principles prescribed in the PGDS emphasize the need to define and implement the most cost-efficient screening alternative for the airport or terminal. To establish the lowest-cost alternative, planners shall calculate the lifecycle costs of building, testing, and maintaining the CBIS. These costs will include those to be borne by TSA as well as airport operators and airlines. The lifecycle costs are determined early in the design process and then refined as more information becomes available. These costs establish the basis for return-on-investment analysis.

#### 11.2.1 LCCA Assumptions

Lifecycle cost analysis assumptions include the following:

- Lifecycle cost analysis period
- Equipment lifecycle
- Construction period
- Real dollar cost

##### 11.2.1.1 Lifecycle Cost Analysis Period

To provide a standardized period for assessing lifecycle costs, a 20-year total timeframe shall be assumed based on an EBSP Acquisition Decision Memorandum to fully capture the upfront capital costs, as well as recurring costs for staffing, O&M, and lifecycle replacements. The 20-year analysis period allows planners to account for accommodating traffic growth beyond the initial project Design Year (DBU+5 years).



### 11.2.1.2 Equipment Lifecycle

For the purposes of this analysis, equipment lifecycle assumptions are as follows (see Chapter 2 for details by equipment model):

- **EDS Equipment:** The useful life of an EDS is assumed to be 15 years. Actual EDS useful life is determined by maintenance records and technical obsolescence.
- **ETD Equipment:** The useful life of an ETD is assumed to be 10 years.
- **Baggage Handling System:** The useful life of a BHS is assumed to be 20 years.

### 11.2.1.3 Construction Period

The exact construction period will be project-specific and depend on the complexity of design and contracting requirements. Therefore, planners should estimate appropriate construction periods for the project in question. However, for estimating purposes it is expected that the construction period will be, on average, approximately two years for in-line systems and one year or less for mini in-line and stand-alone systems.

### 11.2.1.4 Real Dollar Cost

Real values shall be used to estimate all costs considered in the lifecycle analysis to provide a consistent comparison of costs over time. These costs are based on the year in which the analysis is conducted. Therefore, no assumptions regarding cost escalation or inflation are necessary for this analysis. For an estimate of the present-day value of project costs, a discount rate will be applied (see Section 11.3). Cash flows can be expressed in real or nominal dollars. Nominal (or current) values represent the expected price that will be paid when a cost is due to be paid. These values include inflation. Real (or constant) values are adjusted to eliminate the effect of inflation.

Planners should calculate overall lifecycle costs for all alternatives based (as much as possible) on actual costs. Cost assumptions, averages, and estimates provided in this chapter should serve as a baseline to verify that actual costs are within a reasonable range. Details regarding estimation of the above costs are described in the paragraphs below.

## 11.2.2 Capital Costs

Capital costs to be considered include:

- Screening equipment acquisition costs
- Screening equipment direct installation costs
- Screening equipment upgrade costs
- Similar Screening Equipment Replacement costs



- Required building and BHS infrastructure modification costs

### 11.2.2.1 Screening Equipment Acquisition Costs

The estimated cost to acquire EDS and ETD equipment needed for a CBIS installation is seen summarized below in Table 11-1 and Table 11-2.

**Table 11-1: Estimated EDS/SVS/PVS/Network Procurement and Installation Costs**

| EDS Type | Procurement and Installation Cost per EDS<br>(including ancillary equipment) |
|----------|------------------------------------------------------------------------------|
| Type I   | \$1,700,000                                                                  |
| Type II  | \$700,000                                                                    |

**Table 11-2: Estimated ETD Procurement and Installation Costs**

| Type | Procurement and Installation Cost per ETD |
|------|-------------------------------------------|
| ETD  | \$20,000                                  |

### 11.2.2.2 Screening Equipment Direct Installation Costs

Direct installation costs relate to the set up and preparation of equipment for use. The components of direct installation costs are summarized in Table 11-3.

**Table 11-3: Components of Direct Installation Costs**

| Equipment                                                                                                                                                        | Labor                                                                                                                                                                                                     | Logistics                                                                                                                                                                                                       | Onsite Installation                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Auxiliary equipment (including hardware and software)</li> <li>• Initial spares/repair parts and consumables</li> </ul> | <ul style="list-style-type: none"> <li>• Program management (on-site and TSA Headquarters), including technical contracts</li> <li>• Systems engineering personnel</li> <li>• Initial training</li> </ul> | <ul style="list-style-type: none"> <li>• Warehousing</li> <li>• Shipping and handling</li> <li>• Data (training manuals, maintenance manuals, operations manuals)</li> <li>• Travel</li> <li>• Other</li> </ul> | <ul style="list-style-type: none"> <li>• Site preparation</li> <li>• Facility modifications (construction) and design (see note)</li> <li>• Integration and multiplexing</li> <li>• Testing and evaluation</li> </ul> |

Note: Includes any onsite modifications required to install screening equipment. Does not cover expenses related to BHS design and associated facility modifications. Facility modifications, construction, and design are part of the overall project by the project sponsor. Electrical for screening equipment should also be included by the project sponsor. Integration, testing, and evaluation are activities that will have both direct and project-sponsored costs.



Direct installation costs vary significantly among configurations of the same model of EDS unit. For example, the installation of a Reveal CT-80DR in a stand-alone configuration will cost significantly less than the same EDS installed in an integrated configuration. Similarly, a higher installation cost for a mini in-line system using Reveal CT-80DR equipment compared to one using Reveal CT-80DRXL equipment should be assumed, as the Reveal CT-80DR EDS is capable of operating at higher throughput rates.

### 11.2.2.3 Screening Equipment Upgrade Costs

Planners should consult with TSA about upgrade options, as well as the costs of those options that are available for the screening equipment being considered in the CBIS design for the airport.

### 11.2.2.4 Similar Screening Equipment Replacement Costs

Whenever it is necessary to replace existing screening equipment with new equipment of similar performance, it may be necessary to modify the BHS to support the new EDS types if the BHS is not already designed to support the new type of screening equipment. However, due to unpredictable variability in EDS equipment life spans, equipment replacement costs are not to be considered in the LCCA.

### 11.2.2.5 Required Building and BHS Infrastructure Modification Costs

Facility modifications and infrastructure costs represent most of the upfront costs associated with implementing an in-line system. Compared with other types of security screening equipment, EDS require significant facility design and construction costs because of their size and weight and the need to integrate the EDS into the BHS. Examples of facility modification work include, but are not limited to:

- Constructing extra baggage make-up rooms to replace existing baggage make-up areas displaced by EDS equipment,
- Constructing CBRAs to provide conditioned workspace for alarm resolution screening (e.g., alarm resolution with OSR or ETD),
- Redesigning and upgrading BHS conveyors to support integration with EDS equipment,
- Moving walls, partitions, and any other structural components,
- Reinforcing flooring to support additional weight,
- Upgrading mechanical and electrical systems (and HVAC systems, if required).

As the nature of the work will vary significantly from airport to airport and greatly depend on the type of checked baggage inspection system installed, facility modification costs can vary significantly. Planners shall develop a detailed, bottom-up cost estimate for facility modification and infrastructure costs for all alternatives being considered.

Because of their high upfront capital cost and the high degree of cost variability, facility modifications and infrastructure represent the highest risk to overall project cost and schedule. Small percentage changes in these costs can significantly affect the lifecycle cost of a project.



Facility modification costs shall be adjusted to account for regional differences in construction costs based on the latest *RS Means Construction Cost Data Indexes* published by Reed Construction Data or by other industry-standard cost adjustment practices.

### 11.2.3 Soft Costs

Soft Costs are project costs associated with the Project Management, Construction Management, Construction Administration, Construction Contingency and Escalation which can vary depending on project delivery methods.

Project Management as discussed in the PGDS refers solely to the airport, project sponsor or project sponsor's existing Program Management Office contractor's oversight and management of activities necessary to install a CBIS solution (whether in-line, stand-alone, or otherwise).

Construction Management consists of the management activities undertaken by the general construction contractor or BHSC to construct and install the CBIS.

Construction Administration involves overseeing the planning, coordination, and execution of the construction activities to ensure they meet regulatory standards and project specifications.

Construction Contingency refers to the amount of money set aside to cover unexpected costs that may arise during the CBIS construction.

Escalation refers to the anticipated increase in costs over the duration of the project due to factors such as inflation and increases in labor or material costs.

For more information on soft costs as they relate to TSA funding, please reference the latest TSA-issued Funding Policy Memo located on the [Sam.gov](https://www.sam.gov) website using the search term "PGDS."

### 11.2.4 O&M Costs

O&M costs refer to any expenses incurred by the airport or TSA to operate and maintain the baggage screening system. O&M costs to be considered include:

- Screening equipment maintenance costs
- Screening equipment operating costs
- Incremental BHS Operations and Maintenance costs (including additional maintenance personnel)

Screening equipment O&M is funded by TSA while BHS O&M is the responsibility of the airport.



#### 11.2.4.1 Screening Equipment Maintenance Costs

Screening equipment maintenance costs include preventive and corrective maintenance, related program management, replenishment of spares, repair parts, shipping and handling, technical update training, data manuals, and other direct expenses. Maintenance costs for new technology equipment are assumed to also be on a fixed price per EDS basis, equal to 10% annually of the procurement and installation cost. EDS annual maintenance costs for planning purposes are provide in Table 11-4.

**Table 11-4: EDS Annual Maintenance Costs**

| EDS Type | Cost per EDS |
|----------|--------------|
| Type I   | \$170,000    |
| Type II  | \$70,000     |

All EDS OEMs provide 2-year warranty periods, so the first two years of maintenance costs are included in the equipment purchase price. Planners should confirm equipment maintenance cost assumptions with TSA for the specific screening equipment being considered as part of the alternatives under development.

#### 11.2.4.2 Screening Equipment Operating Costs

The largest operating cost for screening equipment is the electrical consumption of the EDS equipment. Electrical consumption per EDS can be estimated from equipment specifications and duration of use, which can be estimated based on baggage flow. Table 11-5 provides information regarding the power consumption of screening equipment. Planners should consider the costs of local electricity (in cents per kilowatt hour) and calculate overall utility costs of the screening equipment.



Table 11-5: Screening Equipment Electrical Consumption

| Screening equipment           | Consumption (kW) |
|-------------------------------|------------------|
| Leidos eXaminer 3DX 6700      | 6.2              |
| Leidos eXaminer 3DX 6700 ES   | 6.2              |
| Leidos eXaminer 3DX 6600      | 6.2              |
| Leidos eXaminer 3DX 6600 ES   | 6.2              |
| Smiths CTX 9800 DSi (Classic) | 10.3             |
| Smiths CTX 9800 DSi (SEIO)    | 10.3             |
| Smiths CTX 5800               | 2.1              |
| Reveal CT-80DR+               | 4.4              |
| Reveal CT-80DR                | 4.4              |
| Reveal CT-80DRXL              | 4.4              |

Sources: TSA and screening equipment manufacturers, 2014.

#### 11.2.4.3 Incremental BHS Operating and Maintenance (O&M) Costs

Planners should account for incremental costs for BHS O&M directly related to the CBIS. These costs typically include preventive and corrective maintenance to all BHS components above the current BHS O&M costs.

For the purposes of the lifecycle cost analysis of screening alternatives, planners shall only consider the incremental cost of BHS O&M which is calculated by subtracting the existing cost of the current BHS (with or without a CBIS) from the total estimated O&M cost of the new BHS with the proposed CBIS.

For the most part, BHS repair costs outside of the CBIS are negligible, except in airports that have large sortation systems. The overall annual cost of O&M for the full CBIS shall be estimated at 10% of the initial overall cost of the system. As the system ages, a reduction in this cost may occur if proper preventative and corrective maintenance is performed.

Table 11-6 provides estimated national average costs for incremental annual BHS O&M, assuming the existing BHS O&M cost is zero (new build). However, planners should obtain accurate O&M costs from airport personnel or the BHS operator.



Table 11-6: Estimated Annual Incremental BHS O&M Costs for New Systems Without Existing CBIS

| Screening system type              | Incremental BHS O&M cost (per EDS) |
|------------------------------------|------------------------------------|
| In-line                            | \$290,000                          |
| Mini in-line (all equipment types) | \$38,000                           |
| Stand-alone                        | \$0                                |

Source: Existing in-line systems data, May 2006, escalated to Federal Fiscal Year 2013 dollars.

### 11.2.5 Staffing Costs

Staffing costs to be considered include:

- TSO and supervisor costs
- Incremental staff costs associated with clearing bag jams or for baggage porters, if not included in O&M costs described earlier

In addition, if other airport-specific staffing costs are expected, such costs should be included in staffing or O&M costs as applicable.

#### 11.2.5.1 TSA Personnel Costs

TSA will assess staffing costs for TSOs and Transportation Security Managers (TSM). Planners shall request staffing cost estimates for the screening alternatives under consideration. Incremental Costs for Baggage Porters and Other Airport/Airline Staff

Any increase or decrease in costs for baggage porters or other airport/airline staff shall be included in the lifecycle cost analysis. Planners shall include only incremental costs for baggage porters or other airport/airline staff.

### 11.3 Basis of Estimate (BOE) Document

The PGDS requires airport and project sponsors to submit cost estimates as part of the design package submission at each design phase). While the Schematic Design phase require ROM costs (CWE), the 30% through 100% Designs require detailed cost estimates. Detailed Cost Estimates submitted at each project phase from 30% Design forward shall include a Basis of Estimate (BOE) document which provides a detailed explanation of how the cost estimate was developed, including methodologies, assumptions, and data sources used. At a minimum, the following elements are required in the BOE:

- Purpose
- Executive summary





- Project scope description
- Methodology used to prepare the estimate
  - Work breakdown structure
  - Tools and data sources
  - Major cost components: labor, equipment, and material
  - Subcontractor and prime contractor markups and fees
  - Allowances
  - Other factors
  - Schedule requirements
  - Assumptions, exclusions, and exemptions
  - Areas of risks

The BOE submitted at each design phase should provide a level of detail commensurate with the level of design. Further explanation of each section of the BOE is provided below.

### 11.3.1 Purpose

The purpose provides a brief description of the major components of the project scope, level of the estimate, and major exclusions. A clearly stated purpose will provide context for the executive summary of the project and those efforts that took place prior to preparing the estimate, as well as readying the user for the ensuing detail throughout the estimate.

### 11.3.2 Executive Summary

The executive summary shall provide a brief (no more than one page) overview of the project for which the independent cost estimate, cost estimate validation, or cost to complete report is being prepared. The executive summary section shall include, not necessarily in this order, discussions of:

- Where the project sponsor is in the bid and construction contract award process, if applicable
- Whether construction has already begun and, if so, how much of the construction has been completed, if applicable
- If the airport sponsor has awarded the construction contract, the type of construction contract instrument (firm fixed price, time and materials, design-build, etc.), if applicable
- Name of the general contractor and BHS contractor, if available
- Name and telephone number of the airport representative that provided the cost information



- Brief statement of the design level the estimate was based on and statement as to whether the CWE is authored by a single entity or is a reconciliation of two or more estimates
- Statement of the escalation that has been used, based on a project schedule and a summary of the CWE at a high level to show BHS costs, other construction-related costs, and soft costs
- Discussion of any known areas of risk
- Total estimated cost
- Statement regarding whether the airport sponsor's estimate is reflective of current market conditions that addresses:
  - Description of current bidding climate relative to number of bidders responding to requests for proposals
  - Use of Davis Bacon Act wage rates, where applicable
  - List of current construction projects, including project name, type, approximate construction value, and schedule
  - Use of union versus nonunion labor
  - Narrative of labor availability
  - Narrative of material and equipment availability
  - Review of typical contracting methods used in location
- Statement of the currency (i.e., age) of the airport sponsor's estimates. Estimates for projects constantly change. To maximize use of limited funding, cost estimates for projects must be current and validated for funding to be approved.

### **11.3.3 Project Scope Description**

This section of the estimate should be organized to correspond to the Work Breakdown Structure (WBS) and will include a more detailed description of the major components of the project and the means and methods assumed in the estimate to construct them.

### **11.3.4 Methodology Used to Prepare the Estimate**

The methodology used to prepare the estimate can best be expressed in nine separate categories, as seen in the following sections.

#### **11.3.4.1 Work Breakdown Structure**

The explanation of the estimate structure plays a significant role in any future required reconciliation. As such, a generic description of the estimate format and relationships of detailed cost items to their hierarchy shall be presented. A sample WBS is provided in Figure 11-1.



Figure 11-1: Sample Work Breakdown Structure

| TSA CBIS Project<br>Sample Work Breakdown Structure                           |                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 010000 General Requirements                                                   |                                                                                                                                                                                                                                   |
| 020000 Existing Conditions                                                    |                                                                                                                                                                                                                                   |
| 022000 Measurements                                                           | 144000 Lifts                                                                                                                                                                                                                      |
| 024000 Construction Investigation                                             | 147000 Turntables (Typically not allocable)                                                                                                                                                                                       |
| 024000 Demolition and Structure Moving                                        | 148000 Scaffolding                                                                                                                                                                                                                |
| 025000 Site Remediation and Structure Removal                                 | 149000 Other Conveying Equipment                                                                                                                                                                                                  |
| 026000 Contaminated Site Material Removal                                     | 210000 Fire Suppression Systems                                                                                                                                                                                                   |
| 027000 Water Remediation                                                      | 211000 Water-Based Fire Suppression Systems                                                                                                                                                                                       |
| 028000 Facility Remediation                                                   | 212000 Fire-Extinguishing Systems                                                                                                                                                                                                 |
| 030000 Concrete                                                               | 213000 Fire Pumps                                                                                                                                                                                                                 |
| 031000 Concrete Forming and Accessories<br>(Typically not allocable)          | 214000 Fire-Suppression Water Storage                                                                                                                                                                                             |
| 032000 Concrete Reinforcing (Typically not allocable)                         | 220000 Plumbing                                                                                                                                                                                                                   |
| 033000 Cast-in-Place Concrete (Typically not allocable)                       | 221000 Plumbing Piping and Pumps                                                                                                                                                                                                  |
| 034000 Precast Concrete (Typically not allocable)                             | 222000 Plumbing Equipment                                                                                                                                                                                                         |
| 035000 Cast Decks and Underlayment (Typically not allocable)                  | 224000 Plumbing Fixtures                                                                                                                                                                                                          |
| 036000 Grouting                                                               | 230000 Heating, Ventilating, and Air-Conditioning (HVAC)                                                                                                                                                                          |
| 037000 Mass Concrete (Typically not allocable)                                | 231000 Facility Fuel Systems                                                                                                                                                                                                      |
| 038000 Concrete Cutting and Boring                                            | 232000 HVAC Piping and Pumps                                                                                                                                                                                                      |
| 040000 Masonry                                                                | 233000 HVAC Air Distribution                                                                                                                                                                                                      |
| 042000 Unit Masonry                                                           | 234000 HVAC Air Cleaning Devices                                                                                                                                                                                                  |
| 044000 Stone Assemblies                                                       | 235000 Central Heating Equipment                                                                                                                                                                                                  |
| 045000 Refractory Masonry                                                     | 236000 Central Cooling Equipment                                                                                                                                                                                                  |
| 046000 Corrosion-Resistant Masonry                                            | 237000 Central HVAC Equipment                                                                                                                                                                                                     |
| 047000 Manufactured Masonry                                                   | 238000 Decentralized HVAC Equipment                                                                                                                                                                                               |
| 050000 Metals                                                                 | 250000 Integrated Automation                                                                                                                                                                                                      |
| 051000 Structural Metal Framing (Typically not allocable)                     | 251000 Integrated Automation Network Equipment                                                                                                                                                                                    |
| 052000 Metal Joists (Typically not allocable)                                 | 252000 Integrated Automation Instrumentation and Terminal Devices                                                                                                                                                                 |
| 053000 Metal Decking (Typically not allocable)                                | 253000 Integrated Automation Facility Controls                                                                                                                                                                                    |
| 054000 Cold-Formed Metal Framing (Typically not allocable)                    | 259000 Integrated Automation Control Sequences                                                                                                                                                                                    |
| 055000 Metal Fabrications                                                     | 260000 Electrical                                                                                                                                                                                                                 |
| 057000 Decorative Metal (Not allocable)                                       | 261000 Medium-Voltage Electrical Distribution                                                                                                                                                                                     |
| 060000 Wood, Plastics, and Composites                                         | 262000 Low-Voltage Electrical Transmission                                                                                                                                                                                        |
| 061000 Rough Carpentry                                                        | 263000 Facility Electrical Power Generating and Storing Equipment                                                                                                                                                                 |
| 062000 Finish Carpentry                                                       | 264000 Electrical and Cathodic Protection                                                                                                                                                                                         |
| 063000 Architectural Woodwork                                                 | 265000 Lighting                                                                                                                                                                                                                   |
| 065000 Structural Plastics                                                    | 270000 Communications                                                                                                                                                                                                             |
| 066000 Plastic Fabrications                                                   | 271000 Structured Cabling                                                                                                                                                                                                         |
| 067000 Structural Composites                                                  | 272000 Data Communications                                                                                                                                                                                                        |
| 068000 Composite Fabrications                                                 | 273000 Voice Communications                                                                                                                                                                                                       |
| 070000 Thermal and Moisture Protection                                        | 274000 Audio-Video Communications                                                                                                                                                                                                 |
| 071000 Damp proofing and Waterproofing                                        | 275000 Distributed Communications and Monitoring Systems                                                                                                                                                                          |
| 072000 Thermal Protection                                                     | 280000 Electronic Safety and Security                                                                                                                                                                                             |
| 073000 Sheet Pile Piling (Typically not allocable)                            | 281000 Electronic Access Control and Intrusion Detection                                                                                                                                                                          |
| 074000 Retaining and Sealing Piling (Typically not allocable)                 | 282000 Electronic Surveillance                                                                                                                                                                                                    |
| 075000 Membrane Roofing (Typically not allocable)                             | 283000 Electronic Detection and Alarm                                                                                                                                                                                             |
| 076000 Flashing and Sheet Metal                                               | 284000 Electronic Monitoring and Control                                                                                                                                                                                          |
| 077000 Roof and Wall Specialties and Accessories                              | 310000 Site Clearing                                                                                                                                                                                                              |
| 078000 Fire and Smoke Protection                                              | 312000 Earth Moving                                                                                                                                                                                                               |
| 080000 Openings                                                               | 313000 Earthwork Methods                                                                                                                                                                                                          |
| 081000 Doors and Frames                                                       | 314000 Shoring and Underpinning                                                                                                                                                                                                   |
| 083000 Specialty Doors and Frames                                             | 315000 Excavation Support and Protection                                                                                                                                                                                          |
| 084000 Entrances, Storefronts, and Curtain Walls<br>(Typically not allocable) | 316000 Special Foundations and Load-Bearing Elements                                                                                                                                                                              |
| 085000 Windows (Typically interior only)                                      | 317000 Tunneling and Mining                                                                                                                                                                                                       |
| 086000 Roof Windows and Skylights (Typically not allocable)                   | 320000 Exterior Improvements (Typically not allocable)                                                                                                                                                                            |
| 087000 Hardware                                                               | 321000 Bases, Ballasts, and Paving                                                                                                                                                                                                |
| 088000 Glazing (Typically interior only)                                      | 322000 Site Improvements                                                                                                                                                                                                          |
| 089000 Louvers and Vents                                                      | 327000 Wetlands                                                                                                                                                                                                                   |
| 090000 Finishes                                                               | 328000 Irrigation                                                                                                                                                                                                                 |
| 090000 Painting and Coating                                                   | 329000 Planting                                                                                                                                                                                                                   |
| 092000 Plaster and Gypsum Board                                               | 330000 Utilities                                                                                                                                                                                                                  |
| 093000 Tiling                                                                 | 331000 Water Utilities                                                                                                                                                                                                            |
| 095000 Ceilings                                                               | 332000 Walls                                                                                                                                                                                                                      |
| 096000 Flooring                                                               | 333000 Sanitary Sewerage Utilities                                                                                                                                                                                                |
| 097000 Wall Finishes                                                          | 334000 Storm Drainage Utilities                                                                                                                                                                                                   |
| 098000 Acoustic Treatment                                                     | 335000 Fuel Distribution Utilities                                                                                                                                                                                                |
| 100000 Specialties                                                            | 336000 Hydraulic and Steam Energy Utilities                                                                                                                                                                                       |
| 101000 Information Specialties                                                | 337000 Electrical Utilities                                                                                                                                                                                                       |
| 102000 Interior Specialties                                                   | 338000 Communications Utilities                                                                                                                                                                                                   |
| 104000 Safety Specialties                                                     | 340000 Transportation                                                                                                                                                                                                             |
| 105000 Storage Specialties                                                    | 341000 Baggage Handling Systems                                                                                                                                                                                                   |
| 108000 Other Specialties                                                      | 342000 Project/Site Management – The costs associated with the baggage contractor's project management, site supervision, administration and support infrastructure associated with the project                                   |
| 110000 Equipment                                                              | 343000 Equipment – The costs for the conveyor components excluding motor control panels, PLCs and other control equipment                                                                                                         |
| 120000 Furnishings                                                            | 344000 Installation – The costs for the mawright's and electrician's labor associated with the installation of the baggage system                                                                                                 |
| 121000 Art (Not Allocable)                                                    | 345000 Engineering – The cost for the baggage system contractor to prepare shop drawings for the baggage system                                                                                                                   |
| 122000 Window Treatments (Typically not allocable)                            | 346000 Controls (linked to those control necessary to operate the CBIS and tie into the existing system) – The costs for the equipment, hardware, software and labor associated with programming and installation of the controls |
| 123000 Casework                                                               | 347000 Testing – The costs for the testing of the system                                                                                                                                                                          |
| 124000 Furnishings and Accessories                                            | 348000 Testing – The costs for the testing of the system                                                                                                                                                                          |
| 125000 Furniture                                                              | 349000 Testing – The costs for the testing of the system                                                                                                                                                                          |
| 126000 Mobile Seating (Typically not allocable)                               | 350000 Waterway and Marine Construction (Typically not allocable)                                                                                                                                                                 |
| 128000 Other Furnishings                                                      | 351000 Material Processing and Handling Equipment (Typically not allocable)                                                                                                                                                       |
| 130000 Special Facility Components                                            | 352000 Material Processing and Handling Equipment (Typically not allocable)                                                                                                                                                       |
| 131000 Special Purposes Rooms                                                 | 353000 Process Heating, Cooling, and Drying Equipment (Typically not allocable)                                                                                                                                                   |
| 132000 Special Structures                                                     | 354000 Process Gas and Liquid Handling, Purification and Storage Equipment                                                                                                                                                        |
| 133000 Special Structures                                                     | 355000 Pollution Control Equipment (Typically not allocable)                                                                                                                                                                      |
| 134000 Integrated Construction                                                | 356000 Pollution Control Equipment (Typically not allocable)                                                                                                                                                                      |
| 135000 Special Instrumentation                                                | 357000 Industry-Specific Manufacturing Equipment (Typically not allocable)                                                                                                                                                        |
| 140000 Conveying Equipment                                                    | 358000 Electrical Power Generation                                                                                                                                                                                                |
| 142000 Escalators                                                             |                                                                                                                                                                                                                                   |
| 143000 Escalators and Moving Walks (Typically not allocable)                  |                                                                                                                                                                                                                                   |



**11.3.4.2 Tools and Data Sources**

The BOE shall indicate the primary estimating methodology used in preparing the cost estimate, including those used for cost resources, historical data, and estimating tools and documents.

**11.3.4.3 Major Cost Components: Labor, Equipment, Material**

The BOE shall describe the Sources of Labor, Equipment, and material cost elements used to demonstrate the estimator's level of effort and knowledge of the project requirements.

**11.3.4.4 Subcontractor and Prime Contractor Markups and Fees**

Due to the subjectivity of the markups and fees, it is essential to articulate the contract style, along with the expected general requirements and fees, as part of the BOE's purpose.

**11.3.4.5 Allowances**

The allowances used in the estimate, along with their justifications, shall be clearly specified in the BOE. For example, "a 10% cost allowance has been included for project phasing due to the contractor being required to fully mobilize and demobilize workers and equipment to the project site each day."

**11.3.4.6 Other Factors**

The estimator should describe any other elements bearing on the estimated calculations, including project options, cost risks, and deviation from standard practices.

**11.3.4.7 Schedule Requirements**

A complete BOE will address those specific schedule requirements provided for in the estimate to maintain all major and interim milestones, including procurement, fabrication, anticipated shift work, and work week schedule. Any assumptions made regarding the key project milestones should be stated.

Section 8.3 requires the Project Sponsor to submit an updated Construction Schedule to TSA stakeholders at a minimum of every 30 days after construction award identified/agreed to in the Letter of Intent or OTA. The schedule should be submitted in both hard and soft (i.e., Microsoft Project) copies and must contain enough detail for TSA to monitor the status of activities related to the design, construction, installation, and



testing of the CBIS, OSRA, and CBRA. In addition, the schedule should include anticipated delivery dates for EDS, ETD, and any other equipment TSA is anticipated to provide.

This schedule, in conjunction with the project cost estimate, provides the basis for the EVM information required when submitting invoices to TSA (see Section 4.7.3).

### 11.3.4.8 Assumptions, Exclusions, and Exemptions

The BOE shall include three separate and distinct bulleted listings that concisely identify the assumptions, exclusions, and exemptions used in developing the estimate. The assumptions should document any assumed premiums for shift work, compressed phasing, and work anticipated to be completed by other entities. Additionally, a clear list of all activities and work that is not included in the assumption or presumed to be excluded based on the statement of work should be clearly identified.

### 11.3.4.9 Areas of Risks

Once existing conditions have been established and reflected in the design documents, the estimate should include material, equipment, and project specific labor costs, including assessments for:

- The sequence of work to adjust for labor productivity, shift premiums, unusual daily access to the site, multiple and phased staging
- Area/space constraints that may require hand tool versus large equipment use
- Any other subsidiary work that the contractor will be required to perform to safely proceed with construction
- Any other constructability issues

## 11.4 Current Working Estimate Submissions

A summary of the project costs shall be submitted at each phase of design in the form of the Current Working Estimate (CWE). The CWE summary form in Figure 11-2 shows the level of detail that should be included.

If the project sponsor is requesting TSA funding, TSA must be able to verify that only allocable portions of a project are funded. Airport sponsors requesting funding support from TSA shall provide a detailed breakout of allocable versus non-allocable costs at each phase of design.



Figure 11-2: Current Working Estimate Summary

| CURRENT WORKING ESTIMATE SUMMARY (08-10-2024, R0)                            |       |  |  |  |  |  |  |  |  | Prepared by: |
|------------------------------------------------------------------------------|-------|--|--|--|--|--|--|--|--|--------------|
| AIRPORT IDENTIFIER:                                                          |       |  |  |  |  |  |  |  |  |              |
| PROJECT NAME:                                                                |       |  |  |  |  |  |  |  |  |              |
| ESTIMATED PROJECT COMPLETION DATE:                                           |       |  |  |  |  |  |  |  |  |              |
| Current Working Estimate - Effective Pricing Date:                           |       |  |  |  |  |  |  |  |  |              |
| Current Working Estimate - Level of Design:                                  |       |  |  |  |  |  |  |  |  |              |
| Currency:                                                                    |       |  |  |  |  |  |  |  |  | US           |
| <b>HAZARD COSTS (ECGA)</b>                                                   |       |  |  |  |  |  |  |  |  |              |
| <b>BAGGAGE HANDLING SYSTEM/CHECKED BAGGAGE INSPECTION SYSTEM COSTS</b>       |       |  |  |  |  |  |  |  |  |              |
| Div. 34: Transportation, includes items below                                |       |  |  |  |  |  |  |  |  |              |
| Project Management                                                           |       |  |  |  |  |  |  |  |  |              |
| Equipment                                                                    |       |  |  |  |  |  |  |  |  |              |
| Installation                                                                 |       |  |  |  |  |  |  |  |  |              |
| Engineering                                                                  |       |  |  |  |  |  |  |  |  |              |
| Controls                                                                     |       |  |  |  |  |  |  |  |  |              |
| Testing                                                                      |       |  |  |  |  |  |  |  |  |              |
| <b>a. Subtotal BHS</b>                                                       |       |  |  |  |  |  |  |  |  |              |
| <b>OTHER CONSTRUCTION RELATED COSTS</b>                                      |       |  |  |  |  |  |  |  |  |              |
| Div. 1: General Requirements                                                 |       |  |  |  |  |  |  |  |  |              |
| Div. 2: Existing Conditions                                                  |       |  |  |  |  |  |  |  |  |              |
| Div. 3: Concrete                                                             |       |  |  |  |  |  |  |  |  |              |
| Div. 4: Masonry                                                              |       |  |  |  |  |  |  |  |  |              |
| Div. 5: Metals                                                               |       |  |  |  |  |  |  |  |  |              |
| Div. 6: Woods and Plastics, and Composites                                   |       |  |  |  |  |  |  |  |  |              |
| Div. 7: Thermal and Moisture Protection                                      |       |  |  |  |  |  |  |  |  |              |
| Div. 8: Openings                                                             |       |  |  |  |  |  |  |  |  |              |
| Div. 9: Finishes                                                             |       |  |  |  |  |  |  |  |  |              |
| Div. 10: Specialties                                                         |       |  |  |  |  |  |  |  |  |              |
| Div. 11: Equipment                                                           |       |  |  |  |  |  |  |  |  |              |
| Div. 12: Furnishings                                                         |       |  |  |  |  |  |  |  |  |              |
| Div. 13: Special Construction                                                |       |  |  |  |  |  |  |  |  |              |
| Div. 14: Conveying Systems                                                   |       |  |  |  |  |  |  |  |  |              |
| Div. 21: Fire Suppression                                                    |       |  |  |  |  |  |  |  |  |              |
| Div. 22: Plumbing                                                            |       |  |  |  |  |  |  |  |  |              |
| Div. 23: Heating Ventilation, and Air Conditioning                           |       |  |  |  |  |  |  |  |  |              |
| Div. 25: Integrated Automation                                               |       |  |  |  |  |  |  |  |  |              |
| Div. 26: Electrical                                                          |       |  |  |  |  |  |  |  |  |              |
| Div. 27: Communications                                                      |       |  |  |  |  |  |  |  |  |              |
| Div. 28: Electronic Safety and Security                                      |       |  |  |  |  |  |  |  |  |              |
| Div. 31: Earthwork                                                           |       |  |  |  |  |  |  |  |  |              |
| Div. 32: Exterior Improvements                                               |       |  |  |  |  |  |  |  |  |              |
| Div. 33: Utilities                                                           |       |  |  |  |  |  |  |  |  |              |
| Div. 34: Transportation w/o BHS                                              |       |  |  |  |  |  |  |  |  |              |
| Div. 35: Waterway and Marine Construction                                    |       |  |  |  |  |  |  |  |  |              |
| Div. 40: Process Integration                                                 |       |  |  |  |  |  |  |  |  |              |
| Div. 41: Material Processing and Handling Equipment                          |       |  |  |  |  |  |  |  |  |              |
| Div. 42: Process Heating, Cooling and Drying Equipment                       |       |  |  |  |  |  |  |  |  |              |
| Div. 43: Process Gas and Liquid Handling, Purification and Storage Equipment |       |  |  |  |  |  |  |  |  |              |
| Div. 44: Pollution Control Equipment                                         |       |  |  |  |  |  |  |  |  |              |
| Div. 45: Industry-Specific Manufacturing Equipment                           |       |  |  |  |  |  |  |  |  |              |
| Div. 46: Electrical Power Generation                                         |       |  |  |  |  |  |  |  |  |              |
| <b>b. Subtotal Other Construction Related Costs</b>                          |       |  |  |  |  |  |  |  |  |              |
| <b>PRIME CONTRACTOR MARK-UPS</b>                                             |       |  |  |  |  |  |  |  |  |              |
| Insurance & Bond                                                             | 1.00% |  |  |  |  |  |  |  |  |              |
| Home Office Overhead                                                         | 1.00% |  |  |  |  |  |  |  |  |              |
| Profit                                                                       | 1.00% |  |  |  |  |  |  |  |  |              |
| Sales Tax (Material only)                                                    | 1.00% |  |  |  |  |  |  |  |  |              |
| Design Contingency                                                           | 1.00% |  |  |  |  |  |  |  |  |              |
| <b>c. Contractor Mark-ups</b>                                                |       |  |  |  |  |  |  |  |  |              |
| <b>Hard Costs Subtotal (a + b + c)</b>                                       |       |  |  |  |  |  |  |  |  |              |
| <b>SOFT COSTS</b>                                                            |       |  |  |  |  |  |  |  |  |              |
| Construction Contingency                                                     | 5.00% |  |  |  |  |  |  |  |  |              |
| Construction Administration                                                  | 1.00% |  |  |  |  |  |  |  |  |              |
| Project & Construction Management                                            | 1.00% |  |  |  |  |  |  |  |  |              |
| Escalation                                                                   | 1.00% |  |  |  |  |  |  |  |  |              |
| <b>Soft Costs Subtotal</b>                                                   |       |  |  |  |  |  |  |  |  |              |
| <b>TOTAL ESTIMATED COSTS (TEC) (Current \$)</b>                              |       |  |  |  |  |  |  |  |  |              |



### 11.4.1 Cost Estimate Breakouts

Estimates should, at a minimum, include the elements shown in Figure 11-2 and summarized below:

- Subtotal estimated construction values as cost accounts (columns):
  - Baggage handling system
  - Checked baggage inspection system
  - On-screen resolution area
  - Checked baggage resolution area
  - Infrastructure construction

Each account above should be organized in a report by the most recent version of the Construction Specifications Institute Division Summary Master Format.

- The CWE includes the following contractor markups:
  - Insurance and Bond
  - Home office overhead
  - Profit
  - Sales tax (Material Only)
  - Design Contingency
- The CWE includes the following soft costs:
  - Construction contingency
  - Construction Administration
  - Project & Construction Management
  - Escalation
- The CWE includes BHS estimates listed separately under Construction Standards Institute division 34 “Transportation,” and includes as separate items each of the following:
  - Project Management
  - Equipment
  - Installation
  - Engineering
  - Controls
  - Testing





### 11.4.2 Cost Estimate Pricing Substantiation

All CWE pricing shall be effective as of the date of the submittal.

Estimates submitted for funding request purposes shall be accompanied by a market analysis specific to the airport location and timeframe during which proposed improvements will be implemented. At a minimum, the analysis should include:

- Description of the current bidding climate relative to the number of bidders responding to requests for proposals
- Use of Davis-Bacon Act wage rates, where applicable
- List of current construction projects, including project name, type, approximate construction value, and schedule
- Use of union versus nonunion labor
- Narrative of labor availability
- Narrative of material and equipment availability
- Review of typical contracting methods used in location

### 11.4.3 Allocable Costs

The CWE can contain both costs that are allowable under the terms of the OTA and allocable to the CBIS portion of the project. TSA non-allowable/allocable costs are segregated in a separate column of the CWE. The Project Sponsor shall include both allowable/allocable and non-allowable/allocable costs in the appropriate CWE column. TSA will only reimburse the airport or project sponsor for allowable costs, allocable and reasonable under Federal grant rules and guidance and are properly identified as such on the CWE. For more information on TSA's funding policy, see the Electronic Baggage Screening Program Policy Memo – TSA Funding of Checked Baggage Inspection System Project Costs at the [SAM.gov](https://www.sam.gov) website using the search term "PGDS".

### 11.5 Estimate Reconciliation

It is common practice for two independent estimates to be prepared: one by the Project Sponsor and one by the TSA at a given design level to increase confidence and accuracy in the CWE. If a reconciled estimate is sought, which is recommended for variances exceeding 10% between the Project Sponsor's estimate and TSA allowable costs, the approach to reconcile the estimates will proceed with the following ground rules:

- Estimate summaries will strictly adhere to the CWE format illustrated in Figure 11-2. As a rule of thumb, variances more than 10% for each division will be reconciled further. The rationale for the reconciliation will be documented to provide an understanding of the reconciled value.





- The formats for the estimate will strictly adhere to a WBS to evaluate the scope of the project. A sample WBS is provided in Section 11.3.4.1. Scope variance will be reconciled prior to review of pricing. Once scope differences are resolved, updated estimate summaries will be generated.
- The “reconciled” estimate will be used as the go-forward estimate.

### 11.6 Estimate Trending

As each subsequent design level is completed, the CWE should be compared with the prior design phase CWE. Any changes to scope or design shall be identified, documented, and submitted to the TSA Project Coordinator for approval. Once a project budget has been established, changes in cost should be added or deducted from the design contingencies with Contracting Officer approval.



### **SECTION III: CBIS DESIGN REQUIREMENTS AND INDUSTRY BEST PRACTICES**

#### **CHAPTER 12: CBIS DESIGN REQUIREMENTS**

#### **CHAPTER 13: ON-SCREEN RESOLUTION AREA PLANNING STANDARDS**

#### **CHAPTER 14: CHECKED BAGGAGE RESOLUTION AREA**

#### **CHAPTER 15 CBIS OPERATING AND MAINTENANCE BEST PRACTICES**

#### **CHAPTER 16: INFORMATION TECHNOLOGY SECURITY**



**CHAPTER 12: CBIS DESIGN REQUIREMENTS**



### 12.1 CBIS Design Principles

A properly designed CBIS will meet TSA's security, supportability, maintainability, and safety standards as defined in this section while maximizing efficiency, customer service level, and cost effectiveness. This section presents a discussion of:

- Overall CBIS design principles related to security, efficiency, customer service level, cost-effectiveness, and safety
- Specific design best practices and standards to assist designers and planners in developing CBIS designs in accordance with the PGDS

This section outlines the detailed design goals for CBIS design. These requirements will guide CBIS designers in developing plans and specifications. Design considerations focus on ensuring security, safety, efficiency, and cost effectiveness while maintaining high customer service levels. Proper system selection and sizing, and thorough operational planning are essential and are detailed below.

- **Security:** When designing a CBIS, security is a top priority. The CBIS design principles in this section describe key security-related requirements and best practices to be met in planning and designing a CBIS.
- **Efficiency:** To operate efficiently, CBIS designs must minimize the frequency of errors and faults. In particular, the frequency or rate at which non-alarmed bags are sent to the CBRA must be minimized. Manually inspecting these bags at the CBRA can increase system operating costs, as well as the time a bag is in the system which could lead to bags missing flights.
- **Customer Service Level:** A CBIS must meet TSA security requirements without compromising the level of service that airlines provide to their passengers. The delay incurred by the baggage screening process must be kept within acceptable limits to ensure that bags do not miss their intended flights and airline operations are not unduly affected.
- **Cost Effectiveness:** Alternative system types, if properly sized, will offer equivalent levels of security, efficiency, and customer service. Therefore, selection of the preferred alternative will be based on cost effectiveness. When evaluating cost effectiveness, it is essential to consider not only the upfront capital costs involved, but also the recurring costs associated with operating, maintaining, and staffing the system. The methodology for evaluating cost-effectiveness is discussed in Section 6.2.
- **Operational Considerations:** A CBIS is designed to accommodate a particular concept of operation. Planners and designers must document a concept of operation tailored to the specific CBIS and CBRA that must accompany the 30% Design submission to TSA. A CBIS concept of operation outline is provided in Appendix A, Section A.2. A set of generic CBIS types and related concepts of operation are described in Appendix B and can be used as a starting point for further development of airport-specific CBIS concepts of operation.
- **Proper System Selection and Sizing:** In planning a CBIS, proper system selection and sizing are essential to ensuring the system provides the necessary throughput capacity. An undersized system that cannot accommodate the frequently occurring demand can



negatively affect the customer service level. Separate chapters and sections of this PGDS are devoted to the key steps involved in proper system selection and sizing:

- Chapter 2 describes the range of system types and screening equipment to be considered.
- Section 5.5 describes the process for determining baggage screening demand.
- Section 5.6 describes the methodology for determining baggage screening equipment requirements.
- Section 6.2 describes the process used in developing and evaluating alternatives.
- **Safety:** In early planning and throughout the construction of a CBIS, safety standards and ergonomic design principles will be applied to reduce the potential for injuries caused by improper ergonomic designs. Applicable safety standards and ergonomic design principles will be applied in conjunction with other security parameters during the planning phase.

### 12.2 CBIS Screening Throughput Capacity

The CBIS Screening Throughput Capacity is determined by multiplying the quantity of non-redundant EDS by the idealized throughput of the selected EDS type. For designs utilizing site-specific bag demographics, the idealized throughput is adjusted accordingly. In all cases, the CBIS shall be designed to meet the Screening Throughput capacity as listed in the approved BDR.

If a CBIS cannot meet its approved screening throughput capacity, its effective useful life may be reduced, and additional capital investment may be required earlier than planned. TSA will not provide additional screening equipment to offset under-designed or under-performing systems.

Conversely, sustaining operations above the approved screening throughput capacity is not possible without adverse impacts to operational availability and system stability. Operating a CBIS at rates that exceed the defined screening throughput capacity consumes the capacity of redundant EDS units and will lead to operational issues when any EDS becomes unavailable. In addition, operating above the approved screening throughput capacity exceeds the design and staffing capabilities of the OSRA and CBRA, increasing the likelihood of Level 2 timeouts and CBRA diebacks. TSA will not compensate for these conditions and is not responsible for the resulting operational consequences.

Note: During controlled testing, the target screening throughput capacity is adjusted based on the testing bag set being utilized.

#### 12.2.1 BHS Capacity

The CBIS is a defined subset within the larger BHS, with its performance dependent on the surrounding BHS components. The ILDT must consider all BHS elements—both new and existing—that make up the infeed to and outfeed from the CBIS, as these can affect the CBIS's ability to consistently operate at its approved screening throughput capacity. Where appropriate, a component-by-component capacity analysis should be performed to identify and address potential capacity constraints at the interfaces between the CBIS and the broader BHS.



BHS mainlines feeding the CBIS should be sized to match the CBIS screening throughput capacity, and BHS mainlines conveying bags away from the CBIS should be sized to match or exceed that capacity.

### 12.2.2 BHS Redundancy

BHS redundancy should be applied in a manner that supports, rather than undermines, the intended resilience and performance of the CBIS. Redundant elements are appropriate only when they provide clear operational or reliability benefits and do not introduce avoidable constraints or inefficiencies. A redundant mainline will not be allowed when it:

- Undermines the intended function of redundant EDS
- Reduces the operational efficiency of the CBIS
- Introduces unwarranted costs
- Creates unnecessary spatial limitations
- Adds unnecessary complexity to the system

### 12.3 Tail-to-Head Bag Spacing Requirement

For slider bed conveyors, the space between bags as measured from the trailing edge of leading bag to the leading edge of the trailing bag, or “tail-to-head spacing” shall be no less than 12 inches prior to entering the EDS unit.

- Bag Spacing shall be measured on the queue conveyor immediately upstream of the EDS and shall be adjustable.
- Adjustments to bag spacing are allowed only at TSA’s request and through use of the CCR process.
- Adjustment ranges will be fixed with a minimum of 12 inches and a maximum of 36 inches.

The speed of the queue belt immediately before and after the EDS (as bags transition into and out of the EDS) shall comply with the EDS Integration manual. For ICS, the space between carriers shall be as determined by the EDS OEM and their ability to clearly delineate between carriers while maintaining positive tracking.



### 12.4 Bag Time-in-System

The CBIS design must take into consideration the time it takes a bag from induction, through security screening, and delivery to the makeup unit. The proposed CBIS should be designed to minimize delay to bags processed during normal operations. The bag time-in-system from induction at the furthest load point, through the CBIS, to arrival at the sortation system mainlines that feed the baggage makeup area should be no more than 10 minutes for 95% of peak hour bags during normal operations. The calculation for the worst-case scenario for Bag Time-in-system shall be provided as part of the Schematic and Detailed Design submittals.

### 12.5 Bag Travel Time Requirements

The Bag Travel Time (BTT) is the time it takes a bag to travel from the exit of the EDS to the last decision point photo eye. For in-line systems, the CBIS shall allow a minimum of 45 seconds of BTT without holding bags. This minimum BTT allows for sufficient OSR Viewing Time (OVT) and is the minimum time an operator must conduct OSR protocols at Level 2. It is critical to ensure adequate OVT when dealing with consecutive alarm bags to minimize timed out bags going into the CBRA. BTT calculations shall be provided as part of the Schematic and Detailed Design submittals.

### 12.6 Bag Tracking

This section defines the baggage tracking requirements and corresponding best practices to achieve optimal performance. A key requirement is using positive bag tracking, where the BHS always maintains a known position for all bags within the CBIS. Bag positions can be tracked using various methods, such as monitoring the conveyor belt speeds, distances, routing events, bag length, and other information associated with its travel path through the tracking zones. Positive bag tracking is essential to monitoring the security status of each bag as it passes through the CBIS.

#### 12.6.1 Positive Bag Tracking Requirements

- The CBIS shall be capable of maintaining positive bag tracking in the STZ during events (e.g., diebacks, merging, decision point transitions, etc.) that are typical of situations which may occur in BHSS.
- The STZ starts at the point at which the BHS acquires positive tracking of a bag prior to the EDS (normally at a BMA, an ATR, or a Photocell where the BHS Tracking ID is assigned). The STZ extends to the Clear Line diversion points and to the BRPs in the CBRA.
- The CBIS shall incorporate an ATR upstream of the EDS matrix. ATRs shall not be located on an incline or decline. ATRs shall be a minimum of 6' away from a power turn.



### 12.6.1.1 Pre-EDS Requirements

- The BHS shall assign a unique tracking ID (BHS Pseudo ID) to each bag once the bag enters the STZ within the CBIS for the purposes of positive bag tracking. The BHS Pseudo ID shall be used as the Primary ID passed from the BHS to the EDS. In all systems where an ATR is present, the 10-digit IATA bag tag data shall also be passed from the BHS to the EDS.
- ATR read rates shall be no less than 98% for laser arrays and 99% for RFID applications for valid reads for that system during controlled testing. ATR read rates shall be no less than 97% for laser arrays and 99% for RFID applications for valid reads for that system during live operations.
- The BHS shall maintain a relation between the BHS tracking ID and the 10-digit IATA bag tag ID for all bags that are successfully read.
- The BHS Pseudo ID and, if available, the 10-digit IATA bag tag data shall be transferred between BHS and EDS equipment as defined by each EDS OEM's interface requirements document or integration guide. If the EDS does not accept both a BHS Pseudo ID and a 10-digit IATA bag tag ID, then the 10-digit IATA bag tag ID shall be transferred to the EDS as the primary ID.
- Upstream IATA tracking accuracy: The upstream IATA tracking accuracy shall be calculated and reported in the CBIS Executive Summary Report by summing the quantity of the 10-digit IATA bag tags that are successfully handed off to the EDS,  $R_{EDS}$ , with the quantity of 10-digit IATA bag tags with Valid Reads that are seen by the photo eye (PE) just past the OOG divert location,  $R_{OOG @ PE}$ , all divided by the quantity of 10-digit IATA bag tags that are successfully read by the ATR and supplied to the BHS,  $R$ . This value shall be displayed as a percentage and shall be at least 97%. The formula used to calculate Upstream IATA Tracking Accuracy is shown in Appendix A- CBIS Executive Summary.
- IATA Handoff Accuracy: The IATA Handoff Accuracy shall be equal to the total number of 10-digit IATA bag tags sent back at the exit of the EDS divided by the total valid (non-OOG) ATR reads. This measurement shall be displayed in the CBIS Performance report. (See Appendix A, Section A.4.10)
- If the BHS Pseudo ID becomes unknown or unavailable, the BHS shall generate a new BHS Pseudo ID, or the EDS will generate an EDS Pseudo ID for tracking purposes. (EDS Bag ID range and format is specified in the OEM's integration guide.) The EDS OEM shall ensure EDS Bag ID overlaps do not occur between any EDS within any matrix.
- BHS Pseudo IDs and EDS Pseudo IDs shall not overlap with IATA requirements for bag tag IDs or repeat themselves within 24 hours (i.e., unique BHS/EDS IDs are required for a duration of 24 hours).
- OOG tracking accuracy (absolute): The OOG tracking accuracy (absolute) shall be calculated by dividing the quantity of successfully tracked OOG bags just after the OOG divert location by the total OOG bags detected at the BMA. This value shall be displayed as a percentage in the CBIS Executive Summary Report and shall be at least 97%. The equation used to calculate this value is shown in the CBIS Executive Summary report where  $R_{OOG @ PE}$  is the quantity of positively read, OOG bags at the OOG divert point;  $R_{NR, OOG @ PE}$  is the no-reads at the OOG divert;  $R_{OOG}$  is the positively read OOG bags at the BMA; and  $R_{NR, OOG}$  is the OOG no-reads at the BMA.





- Invalid Arrivals at the OOG Line: The Invalid OOG Arrival percentage shall be measured just after the OOG divert location and calculated by subtracting the known OOG bags,  $R_{OOG @ PE} + R_{NR, OOG @ PE}$ , from the total quantity of bags at the same location, all divided by the total quantity of bags at the same location. This value shall be displayed as a percentage in the CBRA Executive Summary Report.

### 12.6.1.2 Post-EDS Requirements

#### EDS Decision Retention:

- When the EDS passes a decision to the BHS, the BHS shall retain this status throughout the tracking process for each bag and never override the EDS decision.
- If a decision is not received from the EDS, the BHS shall assign a Communication Error bag status.

#### Tracking Integrity:

- The system shall never swap or transfer BHS tracking IDs or security screening decisions between bags under any circumstances.
- Even when the EDS directly controls the conveyors immediately before and after its own location, the CBIS/EDS still must comply with the same tracking criteria set for any other tracking zone. In other words, the integration of the controls does not exempt the system from following established tracking standards.

#### Invalid Arrivals in CBRA:

- Invalid arrivals at CBRA shall be monitored and logged via the BHS reporting system. Validity is based on the bag status displayed on the BSD as the bag initially arrives at the BRP (i.e., not following secondary retrieval methods that may be available, such as hand scanners).
- Valid bag arrival statuses displayed in CBRA during controlled testing or live operations, provided the status appropriately conveys the bag disposition as defined in Section 14.5.2, are:
  - Alarmed bags
  - OOG bags
  - OS bags (if applicable)
- Reported statuses should either match the displayed status or further delineate the reason for, and uniquely represent, the displayed CBRA arrival status (e.g., Unknown bags may be displayed for lost bags as well as security re-reroute conditions detected such as



bags too close; EDS errors may be the result of bag spacing errors as presented by the BHS, if delineated by the EDS disposition code, or due to various EDS fault conditions; Timeout bags can be queue or screen timeouts, provided this distinction is provided by the EDS disposition code).

### Invalid CBRA Arrival Rate Calculation:

- The Invalid CBRA Arrival rate during controlled testing is measured by dividing the number of Invalid CBRA Arrivals (per above) by Total Bags Inducted. The Invalid CBRA Arrival rate during live operations is measured by dividing the number of Invalid CBRA Arrivals (per above) by Total Bags Inducted during the 24-hour Calendar Day. The Daily CBIS Summary Report may be used to determine the Invalid CBRA Arrival rate during live operations. The Invalid CBRA Arrival rate allowed for controlled testing and live operations shall not exceed 3% in a CBRA designed with a Bag Reinsertion Line and not exceed 2% in a CBRA designed without a Reinsertion Line.
- During controlled testing, EDS Error and Timeout arrivals are excluded from the Invalid CBRA Arrival Rate calculation. During live operations, EDS Error and Timeout arrivals are included in the Invalid CBRA Arrival Rate calculation and shall be separately tracked, as any of these arrivals represent a system deficiency.

### Emergency Stop (E-stop) Protocol:

- In the event of a BHS or EDS emergency stop (E-stop) activation, the system shall:
  - Maintain tracking of all bags screened by the EDS and
  - Maintain the security status of all bags that have been screened by the EDS and
  - Maintain the security decision transmitted from the EDS to the BHS prior to or after activation of either a BHS or EDS E-stop.
- The EDS shall recover from the E-stop condition in accordance with published criteria from the EDS OEM and the BHS shall recover per established E-stop recovery procedures defined in the BHS specifications and in accordance with the OEM's integration guidelines.

### Dieback Management:

- When dieback beyond the last chance divert is inevitable, non-clear bags should be held at the merges prior to the common OSR line, while clear bags should continue to be processed through the first chance divert. (As most bags are clear, this method will allow OSR-cleared bags to be released, potentially minimizing dieback).
- Non-clear bags should be released as queuing space becomes available beyond the last chance divert. The release of the non-clear bags should occur on equal priority basis per lane while not causing starvation at any CBRA removal point.



- A non-clear bag held on a merge due to dieback, and is subsequently OSR-cleared, should immediately be released if the second chance divert is clear.

### 12.6.2 CBIS Bag Detection Requirements

#### Tracking Window Infringement:

- The CBIS shall detect when any bag infringes on the tracking window of any other bag, provided the bags meet the minimum conveyance size and the bag is not positioned on top of, underneath, or directly beside another bag. Conveyance best practices include the following:
  - Any bag with a conveyable dimension less than 12 inches should be placed in a tub.
  - The minimum conveyable bag should measure at least 12 inches in any dimension.

#### Bag Delay or Acceleration Detection:

- The CBIS shall be capable of detecting when a bag has been delayed or accelerated beyond the configured tracking window tolerances. When this occurs, the appropriate actions must follow:
  - Upstream of EDS (single bag): The CBIS shall reacquire the bag and continue tracking.
  - Downstream of EDS (single bag): Any security status assigned to the bag will no longer be considered valid and the bag shall be routed to the CBRA as an Unknown.
    - For ICS, if the identification of the carrier can be reacquired prior to the last divert point and the status of the bag is clear, the carrier can be rerouted to the sortation area.
  - Downstream of EDS (multiple bags): If multiple bags are involved and tracking windows have been infringed upon, then the CBIS shall be capable of detecting this condition and route all bags involved to the CBRA.
    - For ICS, if the identification of the carrier can be reacquired prior to the last divert point and the status of the bag is clear, the carrier can be rerouted to the sortation area.

#### Added Bags:

- The CBIS shall be capable of detecting when a bag has been added within the tracking zone, provided the bag is not placed on top of, underneath, or directly beside another bag.
  - Upstream of EDS (single bag): The CBIS shall acquire the bag and continue tracking.



- Downstream of EDS (single bag): If the addition occurs downstream of the EDS and only the added bag itself is affected (i.e., it does not infringe on another bags' tracking window), the added bag shall be routed to the CBRA.

### 12.6.3 Bag Tag Identification Best Practices

Bag tag identification is a method in which a tag or chip with a unique readable Bag Tag ID number is physically attached to each bag and linked to the Passenger Name Record (PNR). The bag tag is positively identified by scanning or reading the attached tag or chip.

Optimizing ATR read rates and ensuring accurate ATR ID association with bag images in live commerce operations relies heavily on implementing best practices. To enhance efficiency and accuracy, consider the following strategies:

- ATR maintenance and adjustments should be performed periodically to ensure optimal reader performance. This includes periodically cleaning ATR reader heads, realigning, and calibrating reader heads, and ensuring ATR to BHS communication performance occurs reliably. The need for periodic maintenance and adjustments may be planned in accordance with ATR OEM guidelines and historical operational need. Recognizing the need for unplanned maintenance and adjustments may be determined by periodic physical inspection and review of ATR performance as reported via ATR or CBIS reports.
- Airline bag tag print quality should be maintained to ensure optimal read performance. Airlines should periodically inspect printed 10-digit IATA bag tags for print quality and readability (i.e., misalignment, inadequate contrast, streaking, bleed), and maintain tag printers accordingly. Bag tag printer OEM documentation should be reviewed for performing maintenance procedures properly.
- To ensure optimal readability of bag tags during induction, the following best practices should be followed:
  - **Bag Tag Placement:** Consider tag positioning relative to bag orientation. Avoid placing tags in locations that hinder readability, such as under an extendable handle, on the underside of a bag in its induction position, or in areas where tubs may obscure the tag from the reader.
  - **Tag Removal:** Before applying a new bag tag, ensure previously used tags, including bingo tags, are removed to prevent multi-tag reads.
  - **Tag Condition:** Handle bag tags with care to prevent bending, wrinkling, smudging, or any form of distortion that could affect barcode readability.
  - **Barcode Visibility:** Apply bag tags in a manner that maximizes opportunities for barcode information on both sides to be successfully scanned.
  - **Tag Obstruction:** Avoid covering the barcode in any way—stickers should not be placed on bag tags, and occluding markers or pens should not be used for writing on them. If marking is necessary, only highlight markers should be used before reinserting bags onto re-induction lines.



### 12.7 Conveyor System Design

Effective conveyor system design is essential for reliable, secure, and efficient CBIS operations. A well-designed conveyor network supports accurate baggage tracking, optimizes throughput, and minimizes jams and operational disruptions. This section outlines the key components, design requirements, and industry best practices necessary to achieve robust CBIS performance. By adhering to these guidelines, designers can ensure that the conveyor system meets TSA operational standards and facilitates seamless integration with screening equipment, controls, and overall baggage handling processes.

#### 12.7.1 CBIS Conveyor Subsystem Nomenclature

All conveyor lines should be given a standard, two- or three-letter designation. The designation can be followed by the line or belt number.

The following nomenclatures shall be used by CBIS designers:

- Mainline Feeds: SF (Security Feed)
- Shunt: SS (Security Shunt)
- Out-of-Gauge: OOG
- OSR Line: OSR
- Clear Line: CL
- Alarm Line: AL
- Re-Insert Line: RL
- Oversize: OS
- Crossovers: XO

#### 12.7.2 Conveyor Inputs

Checked bags typically originate at induction belts located on the public side of the terminal, which deliver bags from ticket counters and curbside check-in facilities to a baggage screening zone. Additionally, airside inputs such as international or interline recheck lines may serve as a baggage screening zone.



### 12.7.3 Divert and Merge Requirements

- Bags exiting the EDS shall be properly spaced via increases in belt speeds on subsequent conveyors to allow for continuous flow (no less than the minimum diverter processing rate) through the level 1 divert point.
- Bags exiting an EDS shall be separated by their clear or non-clear screening status prior to merging onto the post-EDS mainline or OSR line. ICS carriers shall be separated by their clear or non-clear status at the first opportunity but may travel on the OSR line.
- After clear and non-clear bags have been separated, they shall not be commingled.
- Horizontal diverters shall divert only clear bags, while non-clear bags shall pass through.
- At vertical diverters, clear bags should be diverted upward, and non-clear bags should be diverted downward.
- The following requirements apply to diverters in the STZ downstream of the EDS:
  - For systems with two decision point diverters, at the first decision point diverter, if the system is unable to divert a clear bag, the bag shall bypass the diverter on the Alarm Line.
  - For systems with two decision point diverters, at the second chance diverter, if the system is unable to divert a clear bag, the bag shall cascade stop and NOT bypass the diverter on the Alarm Line.
  - For systems with a single decision point diverter, if the system is unable to divert a clear bag, the bag shall cascade stop and NOT bypass the diverter on the Alarm Line.
  - The CBIS may have a bypass feature to allow clear bags to bypass all diverters during fault conditions and be sent to the CBRA. The bypass feature shall be enabled and disabled via an operator's workstation in the BHS control room. Enabling the bypass feature is to be coordinated with local TSA. Bypass features that send non-clear bags to the outbound system shall not be allowed.
- Designers should not utilize pre-EDS 90 Degree diverter-takeaway configurations on diverters feeding the security shunt lines.

### 12.7.4 Baggage Allocation Methodology

Baggage Allocation Methodology (BAM) refers to the logic used to distribute bags between the EDSs. CBIS designs shall incorporate a round-robin BAM, in which bags are routed singularly and consecutively to each available SS line.

The chosen method for distributing baggage from the main line to the EDS will have a profound effect on the efficiency and achievable rate of the CBIS. The TSA requires a process where bags are diverted to the security shunts sequentially and singularly and is often referred to as "Round Robin". To illustrate this process, consider a 3+1 system. Baggage on the main line will be allocated to each shunt in a prescribed order: 1, 2, 3, 4,



1, 2, 3, 4, 1, 2, 3, 4, .... Each shunt will receive every fourth bag. The large spacing between diverted bags (every fourth bag on the mainline) will decrease as the conveyor speeds on the shunt decrease. Properly configured, continuous flow is achieved.

When any EDS shunt becomes unavailable, the baggage is allocated sequentially and singularly to the remaining shunts. Since the main line rate is matched to the total non-redundant EDS, the maximum rate is still present and there is no degradation in system performance.

Using a Round Robin baggage allocation method promotes stability and efficiency.

### 12.7.5 Conveyor System Design Best Practices

A CBIS design that doesn't incorporate the following industry best practices may introduce a high risk of testing failure which could delay the project and incur additional cost. Historical testing has shown that tracking failures can often be correlated to tracking issues caused by non-adherence to the below best practices.

#### 12.7.5.1 Gradual Conveyor Speed Transitions Best Practices

The transitions in conveyor belt speeds between any two consecutive conveyor belts should not exceed 30 feet per minute or a 50% difference whichever is less. This ensures bag stability, orientation, and spacing unaffected while preserving precise bag tracking.

#### 12.7.5.2 Avoidance of Steep Conveyor Slopes Best Practices

Avoiding steep slopes in conveyor design is a best practice, as excessive inclines/declines cause bags to roll or slide, leading to tracking losses, jams, and bag doubling. When double bags enter the EDS, they increase the risk of faults, reduce throughput, cause equipment downtime, heighten maintenance, and a reduced level of security.

The CBIS should be designed with incline and decline angles no greater than 18 degrees in non-tracking zones (i.e., zones where bags are not positively tracked) and no greater than 12 degrees in tracking zones (i.e., zones where bags are positively tracked).

Acute turns in the BHS with adjacent inclines or declines may also cause tracking errors and bag jams and should be avoided.



### 12.7.5.3 Divert and Merge Best Practices

The proper use of diverters and merges is essential to reducing tracking errors and bag jams. Improper merging and diverting and the use of multiple conveyor merge and divert points on an individual line increases the number of mis tracked bags and reduces the overall CBIS throughput.

- Static ploughs and roller diverters should not be used.
- Directly opposing diverters should not be used.
- Pushers should not be used in the CBIS.

Designers should consider incorporating separate conveyors when system throughput or bag tracking would be negatively affected by excessive merges/diverts on any given line.

### 12.7.5.4 Bag Orientation Best Practices

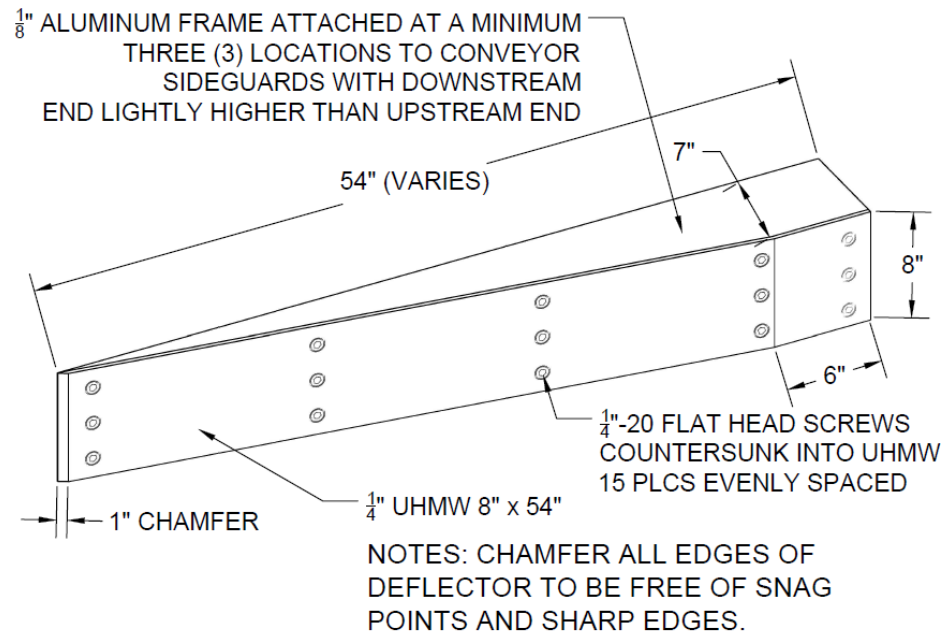
CBIS designers should emphasize maintaining effective bag orientation throughout the system, particularly as bags enter the EDS. Proper alignment at the EDS entrance is crucial, given the tunnel's narrowed entry and the scanner's round interior shape. Ensuring optimal bag orientation minimizes EDS error bags, prevents tracking disruptions, and reduces the likelihood of EDS jams.

Effective bag orientation and positioning rely on the strategic use of static deflectors and belt types to guide bags away from sideguards, enhancing system throughput before baggage is introduced to EDS equipment, ATRs, or BMAs. To ensure static deflectors function efficiently, they should be paired with a low-friction belt beneath them, while EDS in-feed and exit conveyors typically utilize high-friction belting. Figure 12-1 below illustrates an example of a static deflector solution utilized at TSA's TSIF. Pre-EDS bag centering devices should be implemented on security shunt lines to optimize bag presentation to the EDS.





**Figure 12-1: Example Static Deflector**



### 12.7.5.5 Conveyor Transition Best Practices

Efficient baggage handling relies on precise system design and careful equipment configuration. Ensuring smooth transitions, proper surface selections, and adequate spacing helps maintain operational stability and accuracy. Thoughtful layout choices and adherence to best practices (listed below) contribute to a more reliable and seamless flow throughout the system.

- Mechanical equipment transitions should be precisely aligned to ensure smooth operation and free from snag points.
- Ensure the correct belt riding surface is used in each application. For example, a high friction belt is recommended for applications including inclines and declines 7 degrees and higher and on queue conveyors with frequent cycling to reduce bag slippage at higher speeds.
- In the STZ, avoid spiral turns, consecutive power turns, and turns in an "S" configuration.



- Ensure adequate space for bag stabilization between changes in direction to improve tracking accuracy. This can be achieved by incorporating a queue between a power turn and an incline or decline conveyor or using radial break-overs for steep inclines and declines.
- Avoid the use of vertical waterfalls.
- Merge and divert transitions should adhere to the manufacturer's recommended conveyor heights, belt types, and belt speeds.

### 12.7.5.6 Conveyor System Maintenance Best Practices

Routine maintenance and monitoring are essential to ensuring the efficiency and reliability of a baggage handling system (BHS). From sensor accuracy to equipment performance, proactive upkeep minimizes errors, prevents system degradation, and optimizes operational flow. By addressing key maintenance areas, designers and operators can significantly improve tracking, reduce disruptions, and enhance overall system functionality. These best practices include:

- Photo eyes, light curtains and scanning array heads should be cleaned routinely to avoid build-up of dust and debris that can obstruct the sensors and reduce accuracy.
- Shaft encoder connections should be checked to reduce slippage and ensure precise readings.
- Belt tension tracking should be routinely inspected and corrected to avoid slippage and reduce bag jams.
- Faulty equipment should be repaired or replaced immediately to avoid further degradation of the system.
- Outdated tracking equipment and programming should be updated to ensure the system operates as efficiently as possible.
- BHS-to-EDS and EDS-to-BHS handoffs should be monitored and any increase in errors evaluated
- To ensure optimal system performance and reliability, BHS daily reports should be leveraged as a critical tool for monitoring key operational metrics and identifying potential issues.

### 12.7.5.7 Non-Powered Rollers Best Practices

Non-powered rollers should be avoided when designing the CBIS, as they can cause bag jams and tracking losses as bags slow, hang, and get caught on the rollers. Frequent cleaning is also required, as bag tags and other stickers get caught and adhere to the rollers.

The only exception is non-powered rollers that are an integral part of the transition plates for HSDs.



### 12.7.6 Recirculation Loop Requirement

A recirculation line is a conveyor pathway that allows bags to be reintroduced into the system either pre-EDS screening or post-EDS screening. Recirculation loops are prohibited in CBIS design, except for a connected reinsertion lines from the CBRA. (See Section 14.4.6.)

### 12.7.7 Reinsertion Line Requirement

A reinsertion line is used to route TSA designated bags from CBRA to the pre-EDS mainline for rescreening. Non-cleared bags shall only be reinserted upstream of the STZ (See also Section 14.4.6.). Bags either automatic or manually Reinserted bags shall be assigned a new unique BHS tracking ID prior to rescreening.

### 12.7.8 Draft Curtains Requirement

All PECs shall be clear of obstructions, including draft curtains.

### 12.7.9 Stack Light Requirements

A stack light is a visual indicator used to signal the status of a various process. In a CBIS, stack lights are required at decision points to illuminate bag status. These lights shall adhere to the following color designations:

- Green = Cleared
- Red = Alarm
- Blue = Fail-safe
- White = All others (Unknown, EDS Errored, Pending, etc.)

### 12.7.10 System Conveyable Items

Items that are conveyable in a CBIS vary from system to system. Variables that determine whether items are conveyable include BHS equipment used, EDS equipment used, legacy system constraints, and cost versus operational advantages, among other variables. Typically, OS and OOG items in the CBIS create excessive jam conditions.



Site-specific characteristics of the stream of commerce bag size distribution should always be considered during CBIS design. In unique cases, where an airport sees an unusually large percentage of long bags or other large non-conveyable items, designers should consider employing wider conveyors and wider-radius power turns to maximize the EDS usage and minimize bags sent to Oversize screening areas.

### 12.7.11 Oversize Bag Conveyance

OS items are too large to be transported on standard CBIS conveyor belts due to size limitations. Therefore, when automated conveyance of Oversize baggage is required, OS conveyors must be used for proper handling and transport.

### 12.7.12 Out-Of-Gauge Bag Conveyance

OOG bags are those bags that can be transported by the BHS but are too large to be screened by the EDS. The CBIS shall transport OOG bags directly to the CBRA. OOG bags shall be routed to the CBRA on the Alarm Line. If space or design limitations exist and routing OOG bags on the Alarm Line is not cost-effective or feasible, then OOG bags should be routed directly to the CBRA on separate conveyors. OOG bags shall be diverted upstream of the EDS lines. The most effective way to filter OOG is to locate BMAs queues upstream of the EDS lines. To minimize bags on the OOG line, bags without dimension information or that may have been lost in tracking after the BMA shall be transported to an EDS shunt, not the OOG line. The BHS shall prevent over-height bags from reaching the EDS unit by utilizing an over-height protective device positioned two queues ahead of each EDS. The device must reliably detect and stop non-compliant baggage using a technology such as an over-height photo eye, light curtain, headache bar, or other equivalent method, ensuring uninterrupted system operation and compliance with height restrictions.

## 12.8 Fail-Safe Events

A fail-safe event is one that prevents the conveyance of any non-clear bag to a clear conveyor line beyond any decision point. A single bag failing to track from the decision photo eye upstream of the diverter to the fail-safe photo eye on the Alarm Line downstream of the diverter shall activate a fail-safe event.

Upon activation of a fail-safe event the appropriate number of conveyors on the clear bag line shall stop (bags included) and audible and visible fail-safe alarms shall be activated. Fail-safe alarms shall be distinct from all other types of system event alarms. See Section 12.7.9 for fail-safe stack light requirements.

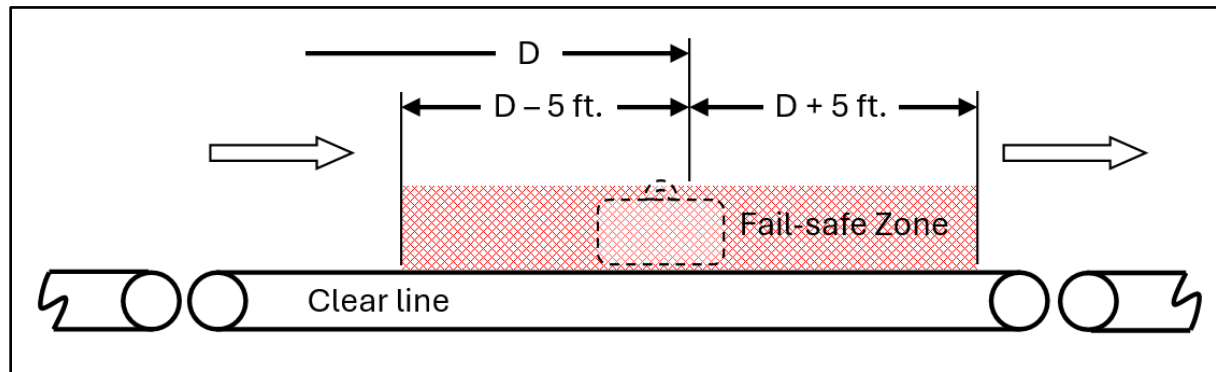
When the path from the Decision PE to the Failsafe PE is *symmetric* with the path to the Clear line (both paths have matching conveyors and identical speeds), the location of the failsafe zone may be determined with distance calculations. An example calculation is as follows:

1. Measure the distance (D) from the tracking/decision photo eye (before the diverter) to the fail-safe photo eye (after the diverter).



2. Add and subtract five additional feet. This distance (D-5 to D+5) is the portion of the clear line identified as the failsafe zone.

Figure 12-2: Example In-Line Fail-Safe Zone



**When the paths are *not symmetric***, the time for a bag to travel from the Decision PE to the Failsafe PE is calculated and then traced out on the Clear line to determine the location of "D".

The sidewalls of all conveyors or portions of conveyors associated with the fail-safe zone shall be clearly marked in red paint or tape to identify fail-safe bag removal zone.

- For systems with more than one diverter between the EDS and the CBRA, during a fail-safe activation at the first chance diverter, clear bags shall pass the diverter on the Alarm Line to be diverted at the second chance diverter.
- For systems with a single diverter, during a fail-safe activation at this diverter, clear bags shall not pass the diverter and shall cascade stop upstream of the diverter.

Fail-safe activations shall not exceed 0.5% of bag volume during the 24-Hour Calendar Day as measured by dividing the number of fail-safe activations at all Decision Points by Total Bags Inducted using the Daily CBIS Summary Report.

### 12.9 EDS Daily Operational Test

TSA performs a Daily Operational Test on all EDS prior to the screening of live baggage. Each EDS has a dedicated Operational Test Kit (OTK) bag which is conveyed through the EDS to confirm operational readiness. The BHS design allows for dedicated insertion and removal locations



with specific design criteria (such as conveyor sideguards, EDS, and BHS E-stops) needed to properly address applicable safety standards and ergonomic design principles. The following are design requirements for the OTK test.

The integration of specific OTK Test controls into the CBIS shall be coordinated with the EDS and BHS vendors, ensuring alignment with their integration documentation. The OTK test controls shall be in a way that minimizes walking distances between load and unload points. Between two adjacent EDS, OTK test controls shall be situated on shared sides to allow two EDS be tested from one access location. The conveyors between the OTK load and unload points shall be straight with a maximum angle of 0 degrees. Emphasis should be on coordinating in advance with the BHS vendors to optimize the layout for quick and efficient conduct of the daily OTK Test.

OTK Test controls shall include an operational test mode that supports the following procedures:

- Stop the normal flow of bags into the EDS without losing track of bags already in the system.
- Allow the OTK bag to be placed safely and properly onto the EDS entrance conveyor or immediately adjacent conveyor. The sideguard height at this interface point shall not exceed 4 inches and have no protrusions or sharp edges. The conveyor belt immediately upstream of the OTK load point shall stop when OTK Mode is activated to prevent a pinch point.
- Restart the EDS entrance conveyor to feed the OTK bag into the EDS.
- Stop the OTK bag on the EDS exit conveyor or immediately adjacent conveyor to allow removal of the OTK bag. The sideguard height at this removal point shall not exceed 4 inches and have no protrusions or sharp edges.
- Allow for repeat of OTK tests as necessary.
- Return the system to normal screening operation.

The CBIS shall maintain normal operations during all the OTK processes and not require a shutdown and restart from a MCP or other location. The OTK control station shall consist of a keyless, selector type switch or HMI graphics to enable the OTK test mode. The OTK test activation signal shall be annunciated in the BHS control room.



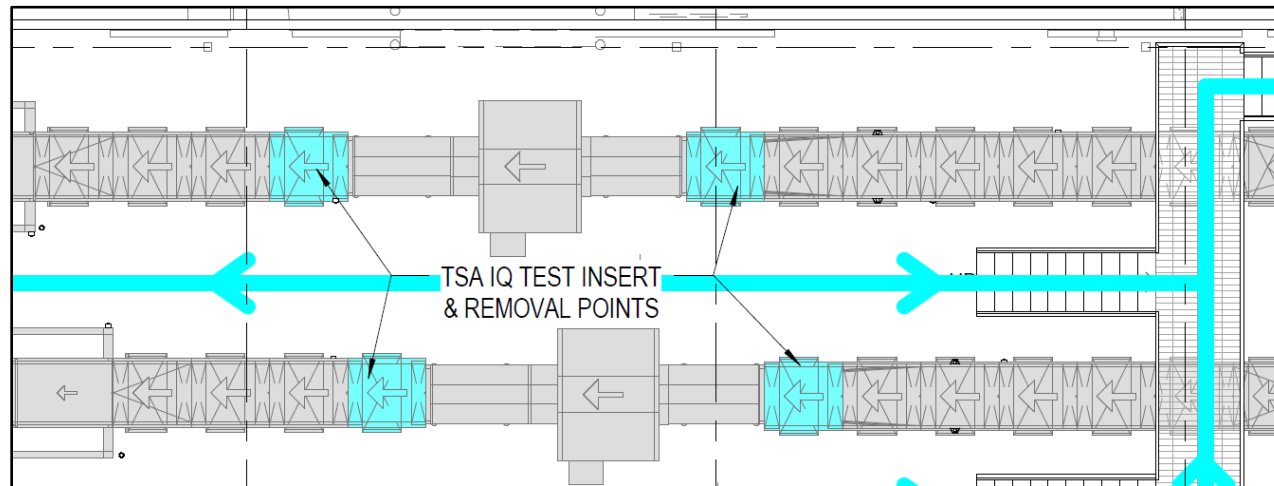


**Figure 12-3: Common OTK Access between two EDS**

## 12.10 Pre-EDS Bag Jam Rate

There are two types of bag jams that occur in a BHS, hard bag jams and missing bag jams. A hard bag jam occurs when a PEC is blocked for a configurable amount of time while the associated conveyor belt is running. A missing bag jam occurs when three sequentially tracked bags are sensed at any tracking PEC and not sensed at the next downstream tracking PEC.

- The BHSC may utilize the option of setting the missing bag jam counter to a value of one at the clear-bag line divert point.
- CBIS designs will allow for safe, quick, and effective clearing of any bag jam.
- When a bag jam does occur, adequate and proper bag jam clearing procedures are required to ensure safe and secure operations throughout the CBIS.

The Pre-EDS bag jam rate shall be calculated by dividing the number of jam events (hard and missing) from the Pre-EDS ATRs (through all EDS shunt lines) to the entrance of the EDS by the total bags inducted. The Pre-EDS bag jam rate shall be less than 1%.

- During controlled testing, the Pre-EDS bag jam rate for each system test shall be less than 0.5% of inducted bag volume. The Pre-EDS bag jam rate is calculated by dividing the number of jam events (hard and missing) from the Pre-EDS ATRs (through all EDS shunt lines) to the entrance of the EDS by the total bags inducted during the test.
- During live bag operations (operational run-in), the Pre-EDS bag jam rate shall be less than 1% of bag volume during the 24-hour Calendar Day as measured using the Daily CBIS Summary Report. The Pre-EDS bag jam rate is calculated by dividing the number of jam events (hard and missing) from the Pre-EDS ATRs (through all EDS shunt lines) to the entrance of the EDS by the total bags inducted during the operational run-in period.

Please refer to Appendix A, Section A.1 for an outline of the bag jam clearing procedures that should be provided.

### 12.11 EDS Maintainability

#### 12.11.1 Service Access / Equipment

CBIS designers will provide sufficient access to the EDS for the following purposes:

- TSA operations (e.g., TSOs conducting regular tests, preventive maintenance (PM) or operation of EDS)
- Corrective Maintenance (CM)
- Equipment removal and equipment replacement
- Equipment upgrades

A minimum service area of 3 feet shall be provided around all four sides of the equipment and 3 feet vertical clearance above the highest point of the EDS. If the EDS are installed on a mezzanine or in other inaccessible areas, provisions should be made for hoisting or transporting heavy items to the installation site (i.e., trap doors, removable conveyor sections, and overhead lifting equipment). The Project Sponsor shall ensure compliance with the EDS OEM literature.

#### 12.11.2 EDS Part Replacement Provisions

It is recommended that a winch or chain lift from an overhead beam that is rated and approved for such lifting purposes is available for the movement of heavy and large parts for maintenance purposes. The project sponsor shall verify site-specific EDS OEM replacement part maximum size and weight requirements for all replacement parts. Failure to provide access or lifting equipment will result in longer repair times.





### 12.11.3 Environment

The Project Sponsor shall ensure that all operating, environmental, and maintenance requirements as set in the OEM's integration guidelines are met. Within the facility the temperature range in the operating environment must be between 50°F and 80°F. The relative humidity must range between 10% and 60% non-condensing. There should also be adequate illumination and sufficient dedicated power source outlets to perform maintenance activities.

Designers shall not locate wet-type fire protection sprinklers or associated supply piping directly above the EDS.

Designers shall use the EDS Maintenance and Environment Assessment displayed in Figure 12-4 to ensure that the required environmental standards described in this section are met.



**Figure 12-4: EDS Maintenance and Environment Assessment**

| EDS Maintenance and Environment Assessment                                                                                                             |       |       |       |       |       |       |       |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| <b>Airport:</b>                                                                                                                                        |       |       |       |       |       |       |       |       |
| <b>Location/Terminal:</b>                                                                                                                              |       |       |       |       |       |       |       |       |
| <b>Completed by:</b>                                                                                                                                   |       |       |       |       |       |       |       |       |
| <b>Date:</b>                                                                                                                                           |       |       |       |       |       |       |       |       |
| <b>Service Access</b>                                                                                                                                  |       |       |       |       |       |       |       |       |
| Does the EDS area provide 3 feet or more around all four sides and above the units? (yes or no)                                                        |       |       |       |       |       |       |       |       |
| Provide the measured area around all four sides and overhead for each EDS unit. Add more columns if necessary.                                         |       |       |       |       |       |       |       |       |
|                                                                                                                                                        | EDS 1 | EDS 2 | EDS 3 | EDS 4 | EDS 5 | EDS 6 | EDS 7 | EDS 8 |
| <b>Entrance</b>                                                                                                                                        |       |       |       |       |       |       |       |       |
| <b>Right side</b>                                                                                                                                      |       |       |       |       |       |       |       |       |
| <b>Exit</b>                                                                                                                                            |       |       |       |       |       |       |       |       |
| <b>Left side</b>                                                                                                                                       |       |       |       |       |       |       |       |       |
| <b>Overhead</b>                                                                                                                                        |       |       |       |       |       |       |       |       |
| <b>Heating, Ventilation, and Air Conditioning (HVAC) Systems</b>                                                                                       |       |       |       |       |       |       |       |       |
| Does the EDS area provide for consistent warmed, cooled, and dehumidified air flows? (yes or no)                                                       |       |       |       |       |       |       |       |       |
| Provide the model and make of the HVAC system:                                                                                                         |       |       |       |       |       |       |       |       |
| <b>Temperature</b>                                                                                                                                     |       |       |       |       |       |       |       |       |
| Does the temperature of the EDS area maintain a consistent range between 50 F and 80 F? (yes or no)                                                    |       |       |       |       |       |       |       |       |
| Provide the measured humidity range in the EDS area:                                                                                                   |       |       |       |       |       |       |       |       |
| <b>Secure Storage and Spare Parts Access</b>                                                                                                           |       |       |       |       |       |       |       |       |
| Is there a secure storage space for spare parts and tools with an area of 150 square feet or more within close proximity of the EDS units? (yes or no) |       |       |       |       |       |       |       |       |
| Describe the secure storage space:                                                                                                                     |       |       |       |       |       |       |       |       |
| Provide the distance from the secure storage area to the closest EDS unit:                                                                             |       |       |       |       |       |       |       |       |
| <b>Heavy Equipment Lifting</b>                                                                                                                         |       |       |       |       |       |       |       |       |
| Is there a heavy equipment lifting system available for use in maintaining the EDS units? (yes or no)                                                  |       |       |       |       |       |       |       |       |
| Describe the lifting equipment or system that is in place:                                                                                             |       |       |       |       |       |       |       |       |
| <b>Quick Disconnect Standard</b>                                                                                                                       |       |       |       |       |       |       |       |       |
| Are the EDS conveyor components readily removable through the use of available hand or power tools?                                                    |       |       |       |       |       |       |       |       |
| <b>Comments:</b>                                                                                                                                       |       |       |       |       |       |       |       |       |
|                                                                                                                                                        |       |       |       |       |       |       |       |       |



### 12.11.4 Storage and Spare Parts Access

The Project Sponsor shall include a lockable storage space of a minimum of 150 square feet (per CBIS) for EDS Spare parts. This space should be located as close to the EDS as possible.

### 12.11.5 EDS Replacement

The Project Sponsor shall include access routes for EDS equipment replacement in the design documents. Structural Integrity of the flooring along EDS Replacement routes shall be properly designed to accommodate both the EDS equipment as well as any rigging equipment used during installation and removal.

#### 12.11.5.1 Quick Disconnect Conveyors

The Project Sponsor shall identify the appropriate number of conveyor components immediately before and after the EDS that will be readily removable using commonly available hand or power tools. The Project Sponsor shall also identify the methodology for removal of any ancillary equipment before or after the EDS to allow for easy access to the EDS for maintenance, removal, or replacement.

### 12.11.6 EDS Power Requirements

EDS equipment requires reliable power to maintain performance, availability, and operational effectiveness. The EDS internal components are highly sensitive to power fluctuations that can result in equipment faults, unexpected shutdowns, extended recovery times, and interruptions to screening operations. CBIS design assumes throughput rates are not degraded by unreliable power. Therefore, clean and stable power delivery to the EDS is critical for the successful operation of a CBIS.

The TSA reviewed over 50 power studies from airports over five years (2021-2026) and consistently found power disturbances can cause EDS failures or shutdowns. As a result, all CBIS designs must incorporate power conditioning devices to minimize EDS downtime and extend useful life of the EDS electrical components.

The TSA research into historical power studies and current EDS technology suggests that power interruption mitigation and battery-backed ride-through are no longer required for proper EDS operation. Therefore, the deployment of UPS solutions – which have higher lifecycle costs, battery maintenance requirements, and shorter effective battery replacement cycles – is no longer supported. The research indicates that lower-cost power regulation technologies satisfy EDS power quality through filtering, isolation, and voltage regulation rather than extended battery back-up. A power conditioner with voltage regulation is the recommended field solution because it provides the needed electrical protection and power quality improvements.



The Project Sponsor shall be responsible for the design, installation, and maintenance (if any) of the power conditioning device. The TSA will assist with the power conditioning planning during the design review process to ensure consistency with the appropriate EDS model. When cost effective, the TSA recommends the use of a single power conditioning device across multiple EDS. Manufacturer information for selected power conditioning equipment is required with 70% Design Deliverables (see section 7.3.2).

Power conditioning provisions shall meet the following requirements:

- Device shall have an expected life of no less than 10 years and be maintenance free.
- Device shall be covered by a warranty period of no less than one year.
- Device shall have galvanic isolation.
- Device shall have power regulation of +/- 10% line voltage
- Device shall have surge suppression and overload protection.
- Device shall provide isolation from noise distortions.
- Device shall provide a power factor (PF) of >90% (with no sags/drops of greater than 20%).
- Support at up to 30 amps per EDS (@480V – 3 phase). Refer to the airport-specific EDS power ratings.

### 12.11.7 EDS Network and Connectivity

EDS PLC shall communicate to the BHS PLC via Ethernet/IP Protocol. Any variation from this protocol must be coordinated with the DSD Site Lead early in design. All IT cabinet installations shall include a temperature and humidity gauge for monitoring purposes. HVAC requirements in IT cabinet spaces shall comply with all applicable OEM documentation.

The EDS and EDS ancillary equipment are connected using specific conductors for the individual applications. The following two Figures are diagrams which show the connectivity between the EDS, OSRA, and CBRA equipment, along with the required medium for each of the connected devices in a typical CBIS.



Figure 12-5: Leidos Sample EDS Network Diagram

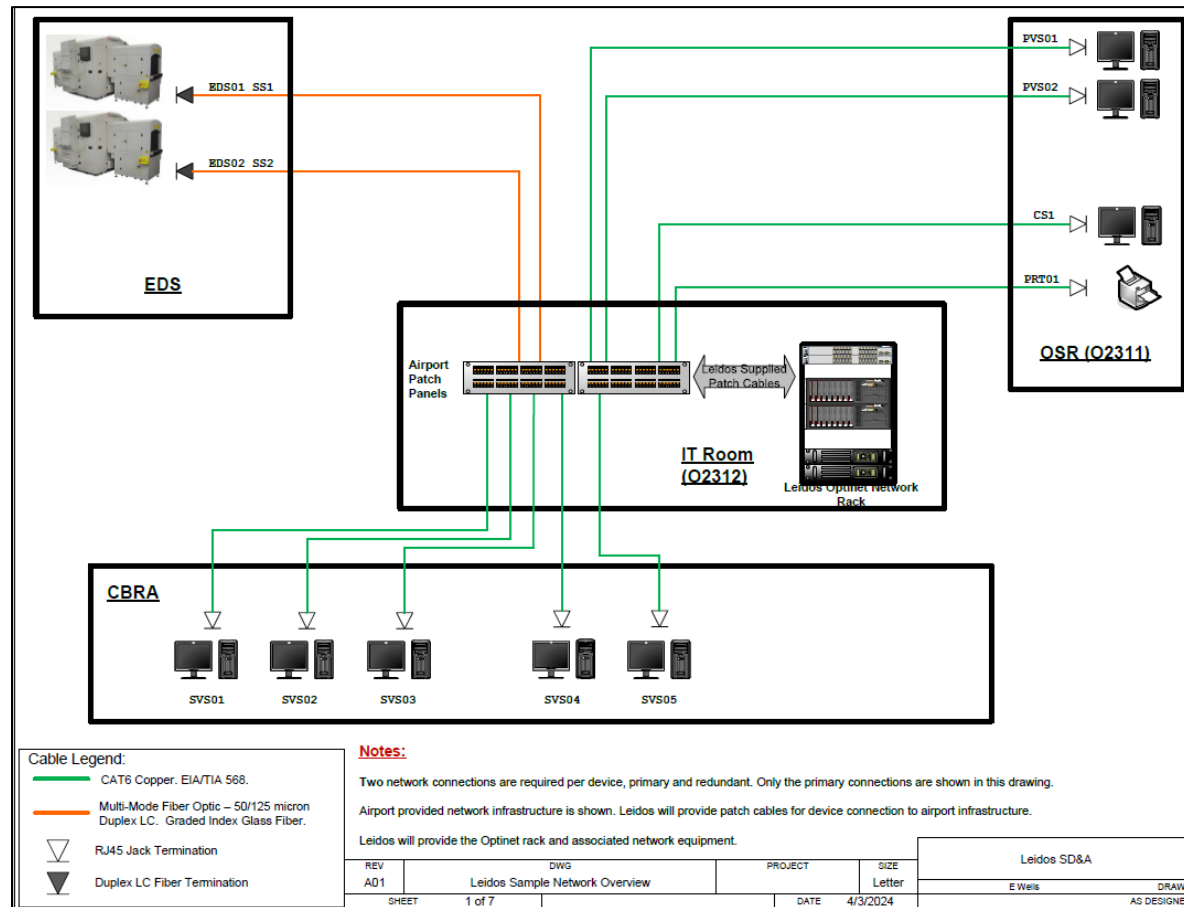
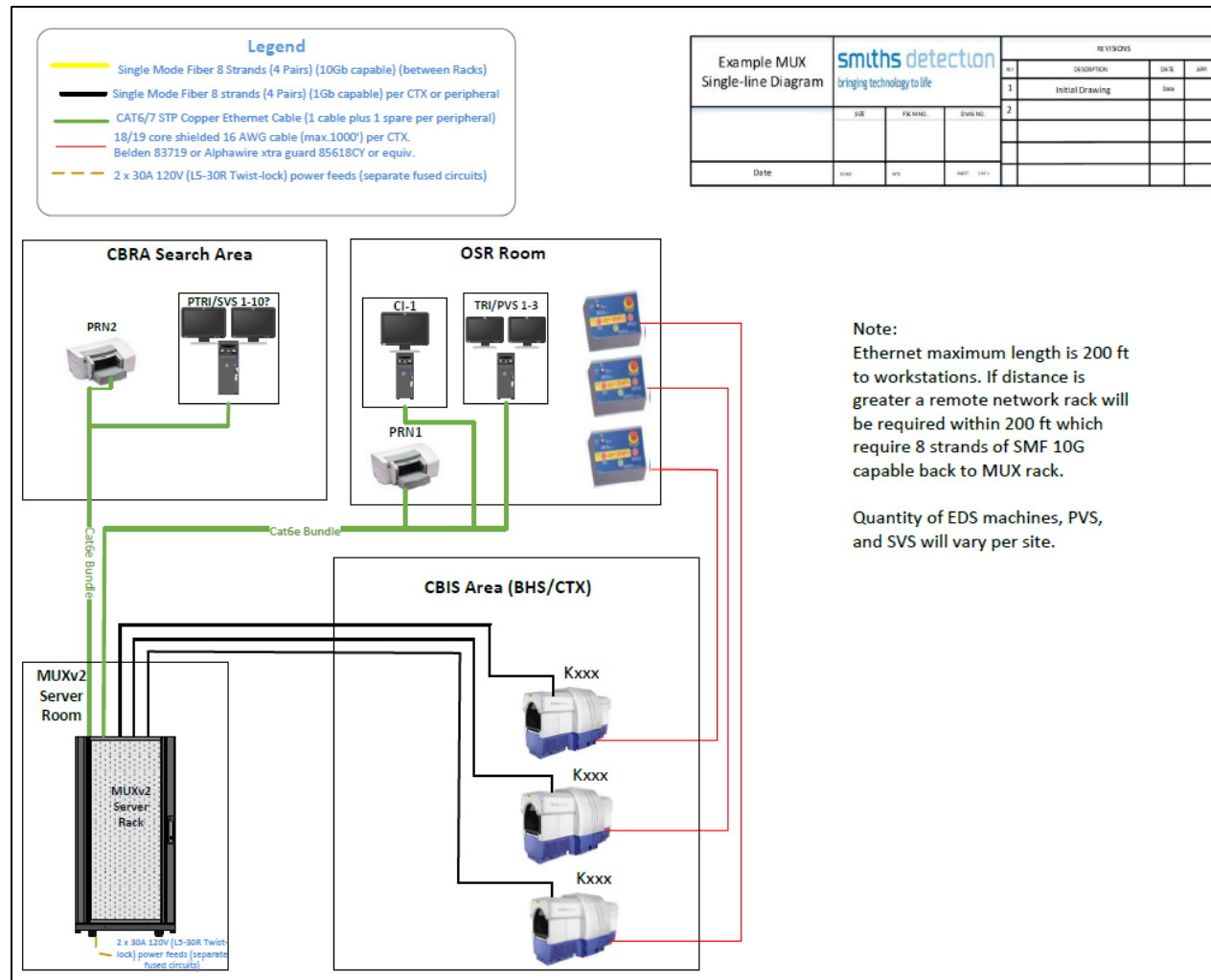


Figure 12-6: Smiths Detection Sample EDS Network Diagram



### 12.12 CBIS Reporting

Investing in CBIS error logging and reporting, or some other form of system diagnostic capability, is essential for effective CBIS operation. This functionality allows for performance monitoring, allowing early detection of potential issues and facilitating predictive or preventative maintenance efforts. The following outlines the minimum reporting requirements for CBIS.

#### 12.12.1 Reporting Frequency Requirement

The CBIS reporting system shall be capable of providing data in real time ( $\pm 1$  minute) and in hourly, daily, weekly, monthly, quarterly, annual, and manually entered time periods.

#### 12.12.2 Reporting Detail Requirements

- At a minimum, the CBIS reporting system shall be capable of providing the following features in reports:
  - Bag Data
    - Bag Tag number (with ATR/RFID installed)
    - Time stamped at BMA
    - BHS tracking ID number for each bag (shared by BHS and EDS)
    - Bag type (OS, OOG, In-gauge)
    - Time stamped when bag enters the EDS or time stamped when OOG bags are diverted to OOG Line
    - SSI - Level 1 screening status
    - SSI - Level 2 screening status
    - Critical Tracking PEC: Immediately upstream and downstream of each EDS, prior to and after each tracked divert point, and at the last tracked PEC entering the CBRA, the BHS shall report the following for each activation of the PEC (NOTE: This is not a report for a given PE, but rather the status of a given bag at critical PEs in the system):
    - Bag ID
    - SSI - Bag screening status
  - BHS Faults
    - Fault type (Note: A "fault" is defined as a "cause" such as lost in track, motor overload, PEC failure, encoder failure)



- Fault location
- Fault time
- Fault time cleared
- Total fault time
- BHS Events
  - Event type (Note: An "event" is defined as the "effect" of a fault, such as re-establish tracking, fail-safe, or jams, or the "effect" of human interaction on the system, such as via HMI or control station, e.g., pushing an E-stop or OTK activation)
  - Event location
  - Event time
  - Total event time
- EDS Statistics (if data to support these statistics is available from the EDS OEM being installed)
  - SSI – Number of bags alarmed by specific EDS
  - SSI – Number of bags cleared by specific EDS
  - EDS faults (if known)
  - Start time of fault
  - End time of fault
- ATR Performance
  - ATR Name
  - ATR Description (i.e., Tracking or Sortation)
  - Total number of bags seen
  - Total number of tags read
  - Number of problem tag reads (this can be provided as a single total count or ideally as a set of constituent counts plus a total count and should be representative of the number of unreadable/missing tags, number of invalid tag reads, number of conflict/multi-tag reads, etc.)
  - Number of associated tag reads (i.e., number of 10-digit IATA bag tag IDs read and associated with the bag's BHS tracking ID)
  - Total number of 10-digit IATA bag tags that are read at the ATR and passed to the EDS
  - Total number of 10-digit IATA bag tags sent back at the EDS exit





- Upstream IATA Tracking Accuracy
- IATA Handoff Accuracy
- BMA Statistics
  - Total number of bags through the BMA
  - Total number of OS bags
  - Total number of OOG bags
- System Baggage Volumes
  - By input conveyors (ticket counter conveyors, curbside conveyors, Oversize conveyors)
  - By screening area (including EDS and CBRA)
- CBRA Statistics – CBRA statistics shall be presented and considered SSI
  - Cleared
- Cleared (CLR)
  - Alarmed
    - Alarmed (ALM)
    - No Decision
    - Purged
    - Queue Time Out (Q-Timeout)
    - Operator Time Out (O-Timeout)
  - Lost in Tracking
    - Mis tracked
    - Following Lost Bag
    - Too Close
    - Security Re-route
  - Unscreened
    - OS
    - OOG



- OOG (absolute) Tracking Accuracy
  - Reinsert Line
    - Reinserted bags
- PEC Tracking Statistics
  - Total number of bags seen at each PEC
  - Total number of purged bags at each PEC
  - Total number of missing bags at each PEC
  - Total number of unknown bags at each PEC
  - Total number of “hard” jams at each PEC
  - Total number of missing bag jams at each PEC
- Baggage Process Timer (BPT) Statistics (see Section 14.4.5)
  - Total number of bags seen
  - Average processing time for each bag
  - By BIS position
- BHS Bag Spacing reporting shall:
  - Maintain spacing data for last 100 bags
  - Omit spacing greater than 36 inches when creating averages
  - Maintain a column in the “Bag Spacing Report” that shows bag spacing/averages
  - Trigger an event record when spacing is changed that will include time, date of change, and new spacing setting
- At the Project Sponsor’s discretion, the reporting system may contain the capability to perform database queries.
- The CBIS reporting system shall be within 5% difference or accuracy compared to the EDS Counts per screening line. When analyzing this data, the point of Bag ID acquisition at the EDS must be taken into consideration, i.e., if the ID is generated at the in-feed and passed to the EDS, the ID may be processed and logged in the FDRS. However, if the EDS faults, that ID and decision may not be passed back to the BHS.
- For MITs and ICS systems, all CBRA reports shall be generated based on bag status upon arrival at the inspection station location.



### 12.12.3 Daily Reporting Requirements

At a minimum, the following daily reports in the format shown in Appendix A, Section A.4, shall be available to the TSA representative via auto-download and auto-transmittal capabilities to a specified existing e-mail address or secure storage location:

- Daily CBIS Summary Report
- Daily CBIS Bag Volume Report
- CBIS Executive Summary Report—SSI
- CBRA Executive Summary Report—SSI
- PEC Tracking Reports for all PECs within a tracking zone
- BPT Summary Report
- CBRA Bag Report
- CBIS Hourly Throughput Report—SSI
- CBIS Bag Spacing Report
- CBIS Performance Report—SSI

### 12.12.4 BHS ID Log Report Requirements

A report of the last 1000 BHS IDs shall be provided as defined below:

- The BHS ID LOG shall be considered a First-In-First-Out (FIFO). The FIFO shall capture the last 1,000 Pseudo IDs, associated decisions and a flag indicating whether the bag has been processed by a TSO (including re-inserted for screening) for each EDS.
- This data shall consist of three elements:
  - Pseudo ID
  - Decision
  - Processed
- The report shall be provided in both a PDF format and an importable CSV file.



### 12.12.5 BHS Reporting During Maintenance

BHS Reporting capabilities shall be designed such that logging of photo eye activity (i.e., total, missing, unknown, etc.) is disabled on conveyors not running or operating in a manual override mode. The BHS shall only log photo eye activity when conveyors are running in a fully automated mode. Analysis of operational run-in data has been thrown off and skewed when maintenance activities occur while the system was live or logging events.

### 12.13 Mini In-line CBIS Requirements

All new mini in-line CBIS projects are held to the following requirements related to Fail-safes and Bag Travel Time.

#### 12.13.1 Fail-Safe Operation Requirements for a Mini In-Line CBIS

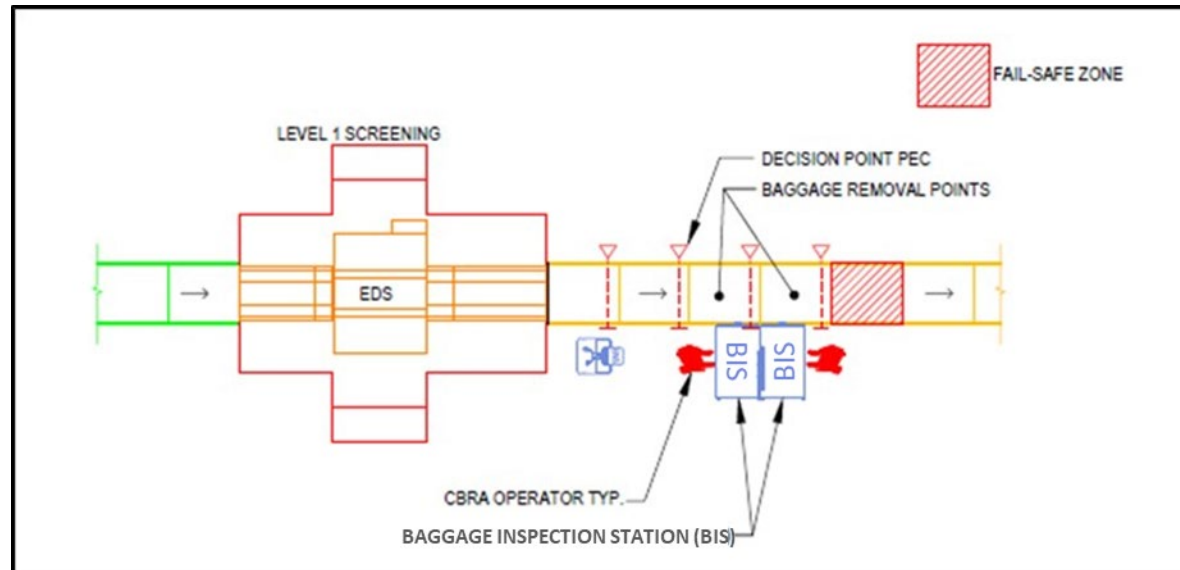
In case of a mini in-line fail-safe event, the BHS shall detect non-clear bags and perform the following actions:

- Maintain a halt condition on the Clear Line beyond the manually operated in-line decision point except when a clear bag has been successfully transported through the in-line decision point (i.e., bag information for any non-clear bags has been cleared and a clear bag is either approaching the in-line point or a bag has been processed manually at the CBRA and is reinserted at the reinsertion point through the use of local BHS controls); and
- Activate audible and visible fail-safe alarms.

Figure 12-7 below illustrates typical fail-safe designs for a mini in-line CBIS.



Figure 12-7: Mini In-Line Fail-Safe Designs



### 12.13.2 Bag Travel Time Requirements

For mini in-line systems, the minimum BTT shall be 60 seconds. However, designers are encouraged to maximize it further whenever possible. This higher BTT can be achieved without impacting EDS rates, using a combination of:

- Slower belt speeds downstream of the EDS
- Additional queues downstream of the EDS
- Holding of alarm bags downstream of the EDS to take advantage of lag times in between the bags (due to bag flow control upstream of the EDS)
- For mini in-line systems, the minimum design OVT shall be 25 seconds for each alarm bag, for up to 3 consecutive alarm bags.

## 12.14 Baseline Testing Requirements

During the Testing & Evaluation Phase, TSA verifies and validates a series of functional and performance requirements from the PGDS. TSA may choose to validate and verify additional requirements, but the baseline minimum is seen listed below in Table 12-1.

**Table 12-1: Baseline Testing Requirements**

| <b><u>PGDS<br/>Section</u></b> | <b><u>Requirement</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.5.1                          | Individual Carrier Systems: No ICS carrier design shall restrict the processing rate of any EDS machine to less than 400 bph.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 12.2                           | In all cases, the CBIS shall be designed to meet the Screening Throughput capacity as listed in the approved BDR.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 12.3                           | Tail-to-Head Bag Spacing Requirements: For slider bed conveyors, the space between bags as measured from the trailing edge of leading bag to the leading edge of the trailing bag, or tail-to-head spacing shall be no less than 12 inches prior to entering the EDS unit. Bag Spacing shall be measured on the queue conveyor immediately upstream of the EDS machine and shall be adjustable.                                                                                                                                                                                        |
| 12.6.1.1                       | Pre-EDS Requirements: ATR read rates shall be no less than 98% for laser arrays and 99% for RFID applications for valid reads for that system during controlled testing. ATR read rates shall be no less than 97% for laser arrays and 99% for RFID applications for valid reads for that system during live operations.                                                                                                                                                                                                                                                               |
| 12.6.1.1                       | Pre-EDS Requirements: The upstream IATA tracking accuracy shall be calculated and reported in the CBIS Executive Summary Report, Figure A.4 1 by summing the quantity of the 10-digit IATA bag tags that are successfully handed off to the EDS units, REDS, with the quantity of 10-digit IATA bag tags that are seen by the photo eye just past the OOG divert location, ROOG @ PE, all divided by the quantity of 10-digit IATA bag tags that are successfully read by the ATR and supplied to the BHS, R. This value shall be displayed as a percentage and shall be at least 97%. |
| 12.6.1.1                       | Pre-EDS Requirements: BHS Pseudo IDs and EDS Pseudo IDs shall not overlap with IATA requirements for bag tag IDs or repeat themselves within 24 hours (i.e., unique BHS/EDS IDs are required for a duration of 24 hours).                                                                                                                                                                                                                                                                                                                                                              |
| 12.6.1.1                       | Pre-EDS Requirements: The OOG tracking accuracy (absolute) shall be calculated by dividing the quantity of successfully tracked OOG bags just after the OOG divert location by the total OOG bags detected at the BMA. This value shall be displayed as a percentage in the CBIS Executive Summary Report and shall be at least 97%.                                                                                                                                                                                                                                                   |



| <b><u>PGDS<br/>Section</u></b> | <b><u>Requirement</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12.6.1.2                       | Post-EDS Requirements: When the EDS passes a decision to the BHS, the BHS shall retain this status throughout the tracking process for each bag and never override the EDS decision.                                                                                                                                                                                                                                                                                                                                                                              |
| 12.6.1.2                       | Post-EDS Requirements: The Invalid CBRA Arrival rate allowed for controlled testing and live operations shall not exceed 3% in a CBRA designed with a Baggage Reinsertion Line and not exceed 2% in a CBRA designed without a Reinsertion Line.                                                                                                                                                                                                                                                                                                                   |
| 12.6.1.2                       | Post-EDS Requirements: In the event of a BHS or EDS emergency stop (E-stop) activation, the system shall: Maintain tracking of all bags screened by the EDS and Maintain the security status of all bags that have been screened by the EDS and Maintain the security decision transmitted from the EDS to the BHS prior to or after activation of either a BHS or EDS e stop.                                                                                                                                                                                    |
| 12.6.2                         | CBIS Detection Requirements: The CBIS shall be capable of detecting when any bag infringes on the tracking window of any other bag if the bags are at or above the minimum conveyance size and the bag is not on top of, underneath, or directly beside another bag.                                                                                                                                                                                                                                                                                              |
| 12.6.2                         | <p>CBIS Detection Requirements: The CBIS shall be capable of detecting when a bag has been delayed or accelerated beyond the configured tracking window tolerances. Based on where this occurs, appropriate actions must follow:</p> <ul style="list-style-type: none"> <li>• Upstream of EDS (single bag): The CBIS shall reacquire the bag and continue tracking.</li> <li>• <u>Downstream of EDS (single bag): Any security status assigned to the bag will no longer be considered valid and the bag shall be routed to the CBRA as an Unknown</u></li> </ul> |
| 12.6.2                         | CBIS Detection Requirements: Downstream of EDS (multiple bags): If multiple bags are involved and tracking windows have been infringed upon, then the CBIS shall be capable of detecting this condition and route all bags involved to the CBRA.                                                                                                                                                                                                                                                                                                                  |
| 12.6.2                         | CBIS Detection Requirements: The CBIS shall be capable of detecting when a bag has been added within the tracking zone if that bag is added anywhere other than on top of, underneath, or directly beside another bag. Upstream of EDS (single bag): The CBIS shall acquire the bag and continue tracking.                                                                                                                                                                                                                                                        |
| 12.6.2                         | Downstream of EDS (single bag): If the addition occurs downstream of the EDS and only the added bag itself is affected (added bag does not infringe on the tracking window of another bag), then the added bag shall be routed to the CBRA.                                                                                                                                                                                                                                                                                                                       |



| <b><u>PGDS<br/>Section</u></b> | <b><u>Requirement</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12.8                           | For systems with a single diverter, during a fail-safe activation at this diverter, clear bags shall not pass the diverter and shall cascade stop upstream of the diverter.                                                                                                                                                                                                                                                                                           |
| 12.7.3                         | For systems with two decision point diverters, at the first decision point diverter, if the system is unable to divert a clear bag, the bag shall bypass the diverter on the Alarm Line.                                                                                                                                                                                                                                                                              |
| 12.7.3                         | For systems with two decision point diverters, at the second chance diverter, if the system is unable to divert a clear bag, the bag shall cascade stop and NOT bypass the diverter on the Alarm Line.                                                                                                                                                                                                                                                                |
| 12.7.3                         | For systems with a single decision point diverter, if the system is unable to divert a clear bag, the bag shall cascade stop and NOT bypass the diverter on the Alarm Line.                                                                                                                                                                                                                                                                                           |
| 12.7.4                         | Baggage Allocation Methodology: BAM refers to the logic used to distribute bags between the EDS units. All new CBIS designs shall incorporate a round-robin BAM, in which bags are routed singularly and consecutively to each available SS line. Deviations from round-robin BAM shall be submitted through an RFV for review and approval by TSA.                                                                                                                   |
| 12.8                           | Fail-Safe Events: A single bag failing to track from the decision photo eye upstream of the diverter to the fail-safe photo eye on the Alarm Line downstream of the diverter shall activate a fail-safe event. Upon activation of a fail-safe event the appropriate number of conveyors on the clear bag line shall stop and audible and visible fail-safe alarms shall be activated. Fail-safe alarms shall be distinct from all other types of system event alarms. |
| 12.8                           | Fail-safe activations shall not exceed 0.5% of bag volume during the 24-Hour Calendar Day as measured by dividing the number of fail-safe activations at all Decision Points by Total Bags Inducted using the Daily CBIS Summary Report.                                                                                                                                                                                                                              |
| 12.8                           | All conveyors in the fail-safe zone must be stopped during a fail-safe event. The sidewalls of all conveyors or portions of conveyors associated with the fail-safe zone shall be clearly marked in red paint or tape to identify fail-safe bag removal zone                                                                                                                                                                                                          |
| 12.8                           | For systems with more than one diverter between the EDS and the CBRA, during a fail-safe activation at the first chance diverter, clear bags shall pass the diverter on the Alarm Line to be diverted at the second chance diverter                                                                                                                                                                                                                                   |





| <b>PGDS<br/>Section</b> | <b><u>Requirement</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12.9                    | Operational Test Kit: These [OTK Test] controls shall enable an operator to: Stop the normal flow of bags into the EDS without losing track of bags already in the system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 12.10                   | Pre-EDS Bag Jam Rate: The Pre-EDS Jam Rate shall be less than 1%.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 12.10                   | Pre-EDS Bag Jam Rate: During controlled testing, the Pre-EDS bag jam rate for each system test shall be less than 0.5% of inducted bag volume is calculated by dividing the number of jam events (hard and missing) from the ATRs of the SF line through all EDS shunts to the entrance of the EDS by the total bags inducted during the test.                                                                                                                                                                                                                                                                                                                                                                 |
| 12.10                   | Pre-EDS Bag Jam Rate: During live bag operations, the Pre-EDS bag jam rate shall be less than 1% of bag volume during the Daily Peak Hour and 24-hour Calendar Day as measured using the Daily CBIS Summary Report defined in Appendix A, Section A.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 12.13.1                 | Fail-Safe Operation Requirements for a Manually Operated In-Line Decision Point CBIS: In case of a fail-safe event, the BHS shall identify non-clear bags and perform one of the following actions: Maintain a halt condition on the Clear Line beyond the manually operated in-line decision point except when a clear bag has been successfully transported through the in-line decision point (i.e., bag information for any non-clear bags has been cleared and a clear bag is either approaching the in-line point or a bag has been processed manually at the CBRA and is reinserted at the reinsertion point through the use of local BHS controls); and Activate audible and visible fail-safe alarms. |
| 12.13.2                 | Bag Travel Time Requirements, Mini In-Line Systems: For mini in-line systems, the minimum design OVT shall be 25 seconds for each alarm bag, for up to 3 consecutive alarm bags.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 14.4.1                  | BIS Utilization: When there is more than one available BIS, bags arriving on the Alarm Line shall be assigned to the BIS that has been available for the longest period.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 14.4.2                  | Alarm Line Queuing: If there are no enabled BISs, bags arriving on the Alarm Line shall queue at the second most downstream BRP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 14.5.4.6                | Unique Identifiers Cell: When a positively tracked bag arrives in CBRA with a Duplicate IATA message in the UIC, the system shall process the bag according to the bag status.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |



| <b><u>PGDS<br/>Section</u></b> | <b><u>Requirement</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14.4.2                         | Alarm Line Queuing: The CBRA shall be programmed to queue bags waiting for an available BIS in the following order: Level 1: Enabled BRPs, starting from the most upstream Level 2: CBRA queue conveyors (except intermediate queues), upstream of the enabled BISs Level 3: Intermediate queues starting from the most upstream                                                                                                                                                                                                                              |
| 14.5.4.6                       | Unique Identifiers Cell: When a positively tracked bag arrives in CBRA with a Duplicate IATA message in the UIC, the system shall process the bag according to the bag status.                                                                                                                                                                                                                                                                                                                                                                                |
| 14.6.4                         | Lighting: Luminance shall be measured at the surface of the BIS and found to be in the range of 500 to 750 lux. In other areas of the CBRA, the luminance shall not fall below 300 lux.                                                                                                                                                                                                                                                                                                                                                                       |
| 14.6.5                         | Heating, Ventilation and Air Conditioning: If forced-air ventilation is provided, fresh outside air shall be delivered to the CBRA at rates specified by the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Standard 62.1-2016 Ventilation for Acceptable Indoor Air Quality. The CBRA shall be under positive pressure relative to ambient BHS areas to minimize the migration of contaminants (e.g., products of combustion from tugs and vehicles, as well as outside dirt, dust, and debris) from entering the CBRA. |
| 14.6.8                         | CBRA Noise Abatement: The CBRA shall have adequate acoustical insulation to ensure the background noise levels do not exceed 70dBA as measured at the natural TSO standing points at each screening station using a time-weighted average over an 8-hour shift.                                                                                                                                                                                                                                                                                               |



**CHAPTER 13: ON-SCREEN RESOLUTION AREA PLANNING STANDARDS**



### 13.1 OSRA Overview

The On-Screen Resolution Area (OSRA) is a mission-critical environment where Level 2 Screening is conducted by seated Transportation Security Officers (TSOs). Effective OSRA design balances ergonomic precision, operational efficiency, and environmental control to support sustained TSO performance and minimize fatigue and distraction.

To meet these goals, the OSRA must incorporate adjustable ergonomic workstations, reduced-glare displays, thermal regulation, and optimized spatial planning. These design principles are grounded in standards including MIL-STD-1472G, OSHA ergonomic guidelines, and ASHRAE 62.1-2016 for air quality and ventilation.

This chapter provides requirements and best practices to help the Project Sponsor design and build the optimal OSRA for the TSA operations

### 13.2 General Space Design

The OSRA design shall account for space and placement of the following equipment:

- Viewing Stations—Primary work areas for TSOs conducting Level 2 screening. Each station shall include a Primary Viewing Station (PVS), task desk, and ergonomic chair.
- Supervisor Desk—Positioned to maintain a clear line of sight to all TSO viewing stations for effective oversight. Includes direct communication equipment with the CBRA and access to system status displays
- EDS CI Workstation—An EDS OEM-provided computer workstation used by TSOs to check EDS status and access the EDS reporting system. Includes monitor, CPU, keyboard, and mouse.
- BHS Status Display—A wall-mounted or freestanding monitor displaying real-time conveyor system status and layout. It must be visible from both the Supervisor Desk and relevant viewing stations.
- EDS remote stop/start—Where required by the EDS model, include a dedicated reset control box to manage EDS fault conditions.
- Personal Storage Lockers—Provide secure lockers for TSO belongings unless personal storage is accommodated in a nearby break room. Locker placement shall avoid interference with workstation zones or circulation paths.

The OSRA design should also account for the space and coordination of the Kronos Time clock system. Nearby TSA break rooms with potable water sources should also be discussed with Local TSA during CBIS design.



While the number of OSR stations installed is based on DBU+5 design values, OSRA space planning is based on DBU+15 values to ensure adequate space for growth, if needed. For space allocation purposes, the size of the OSRA shall be based on the number of OSR stations derived based on the DBU+15 checked baggage demand projections and respective EDS requirements.

### 13.3 Floor Plan

The OSRA floor plan can take many shapes and sizes, providing vast options to meet the requirements listed in this chapter. Figure 13-1 and Figure 13-2 provide two basic and minimalistic floor plan options that foster communication between the supervisor and TSOs and allows easy routing from the entrance door to the workstations.

The Project Sponsor shall work with local TSA to obtain feedback regarding the various floor plan options available to accommodate any unique needs for the specific airport being worked on.



Figure 13-1: Linear Viewing Stations Floor Plan

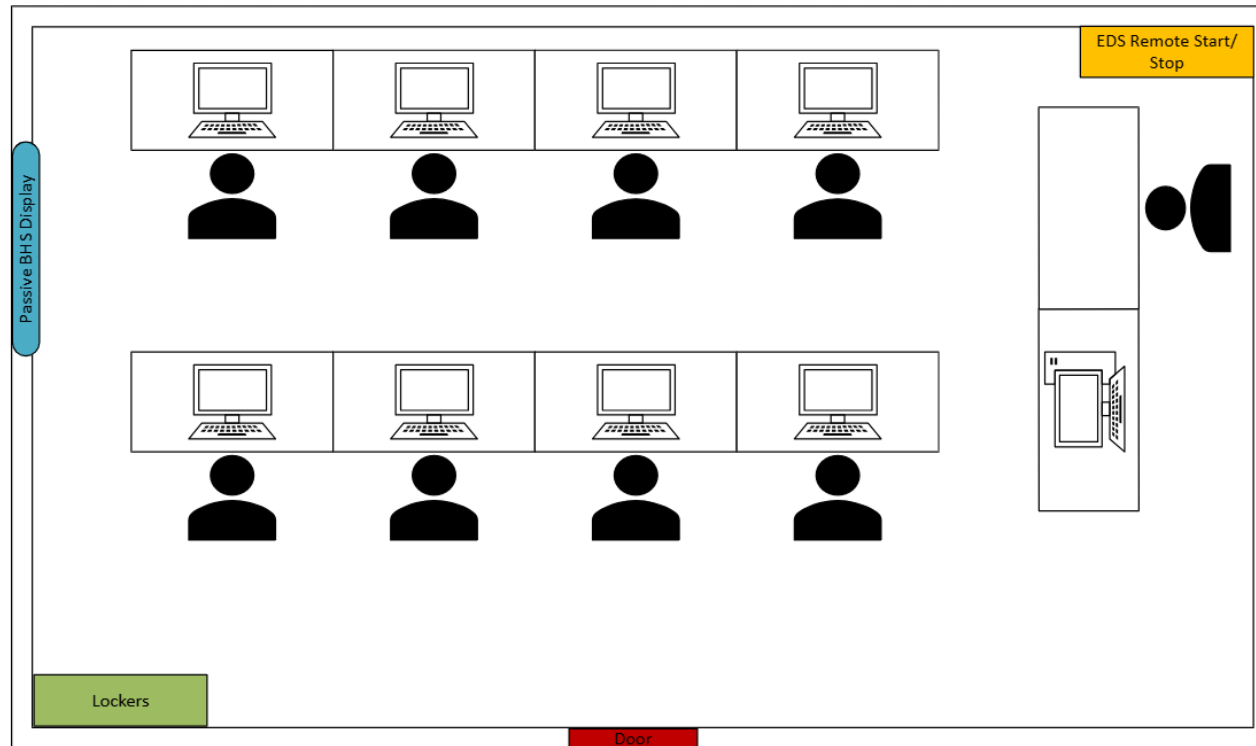
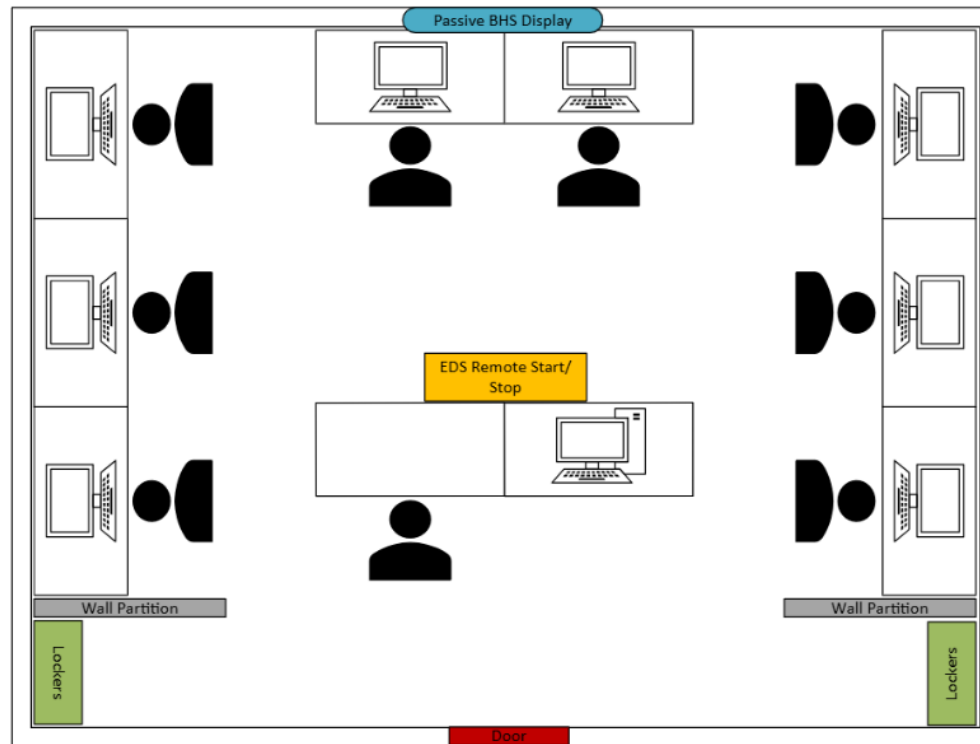


Figure 13-2: U-Shaped Viewing Stations Floor Plan



## 13.4 Viewing Station Design

The viewing station design for the OSRA must provide an ergonomic workspace that promotes a neutral body position to reduce strain on muscles, tendons, and the skeletal systems. While ergonomic research and equipment technologies continue to evolve, the following minimum requirements shall serve as the baseline. Project sponsors are encouraged to collaborate with local TSA stakeholders to enhance comfort and performance based on available funding, constraints, and the latest advancements.

### 13.4.1 Desk Specifications

- Length: 60 inches
- Height: 30 inches (floor to top of the working surface)
- Depth: 30 inches
- Knee Clearance: Minimum 26 inches (floor to underside of desk)

### 13.4.2 Chair Specifications

- Height: Adjustable between 16 and 21 inches (floor to seat surface)
- Base: Five-legged with 360 degrees rotation and casters for full mobility
- Armrests: Not required; if included, they must be removable and not impede clearance or adjustability

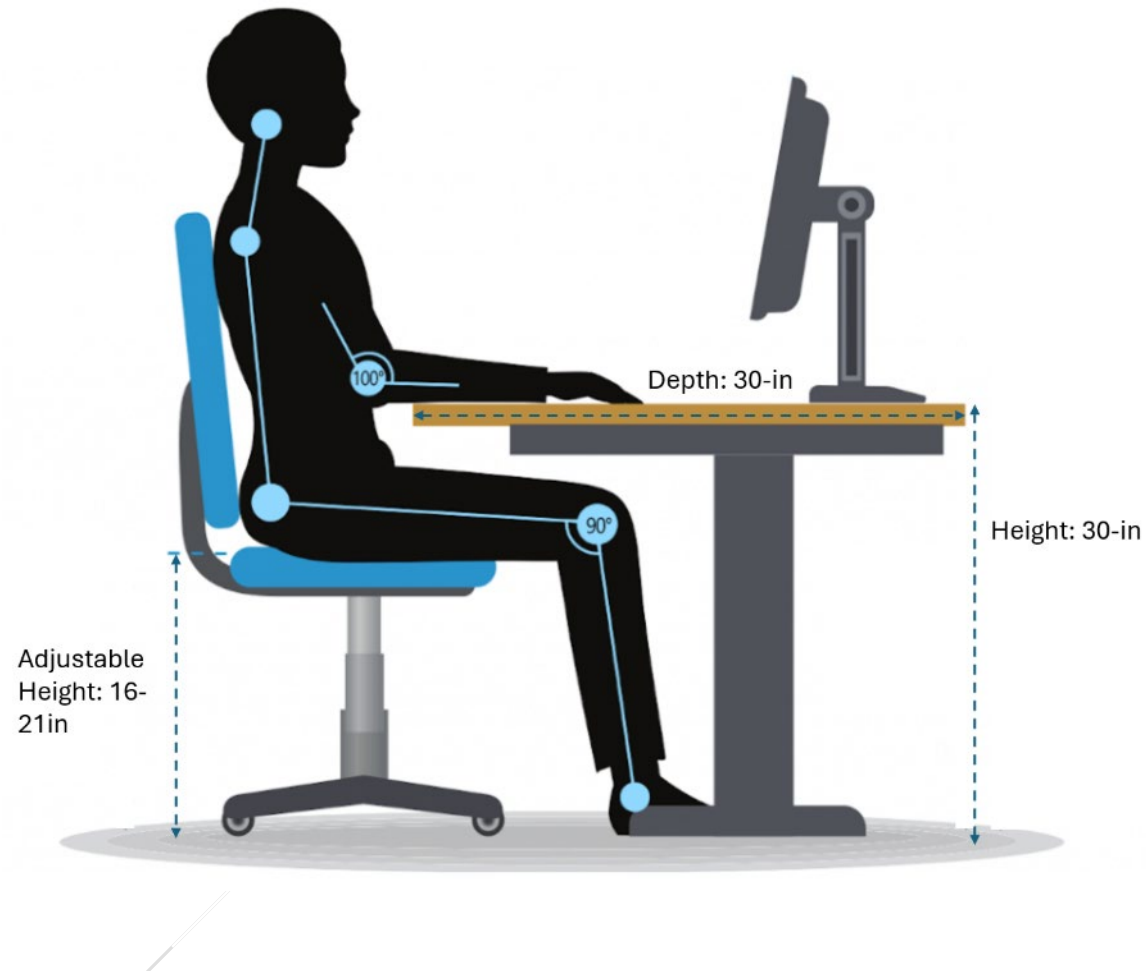
### 13.4.3 Additional Requirements

- Power: Provide one Quad receptacle (120V/15A) per workstation
- Task Lighting: Provide an average luminance level of 300 to 500 lux on the work surface directly in front of the monitor
- Posture Reference: See Figure 13-3 for an example of neutral computer workstation posture





Figure 13-3: View Station Side View



**CHAPTER 14: CHECKED BAGGAGE RESOLUTION AREA PLANNING STANDARDS**



### 14.1 CBRA Overview

The CBRA provides the space and equipment needed by TSOs to conduct bag inspection per the Checked Baggage SOP as mandated by the TSA. The proper layout and furnishing of the CBRA are essential to ensuring that TSOs can effectively, efficiently, and safely perform their duties. Careful consideration needs to be given to the operational controls, environmental and ergonomic configuration, and equipment specified for the CBRA.

Although each airport is different and the available space may differ, all CBRAs need to follow the same layout concept, BIS configuration, functionality, and BSD operations. This standardizes training and improves personnel utilization across multiple CBRAs within an airport. The following sections provide details in these four aspects of the CBRA design.

### 14.2 CBRA Layout

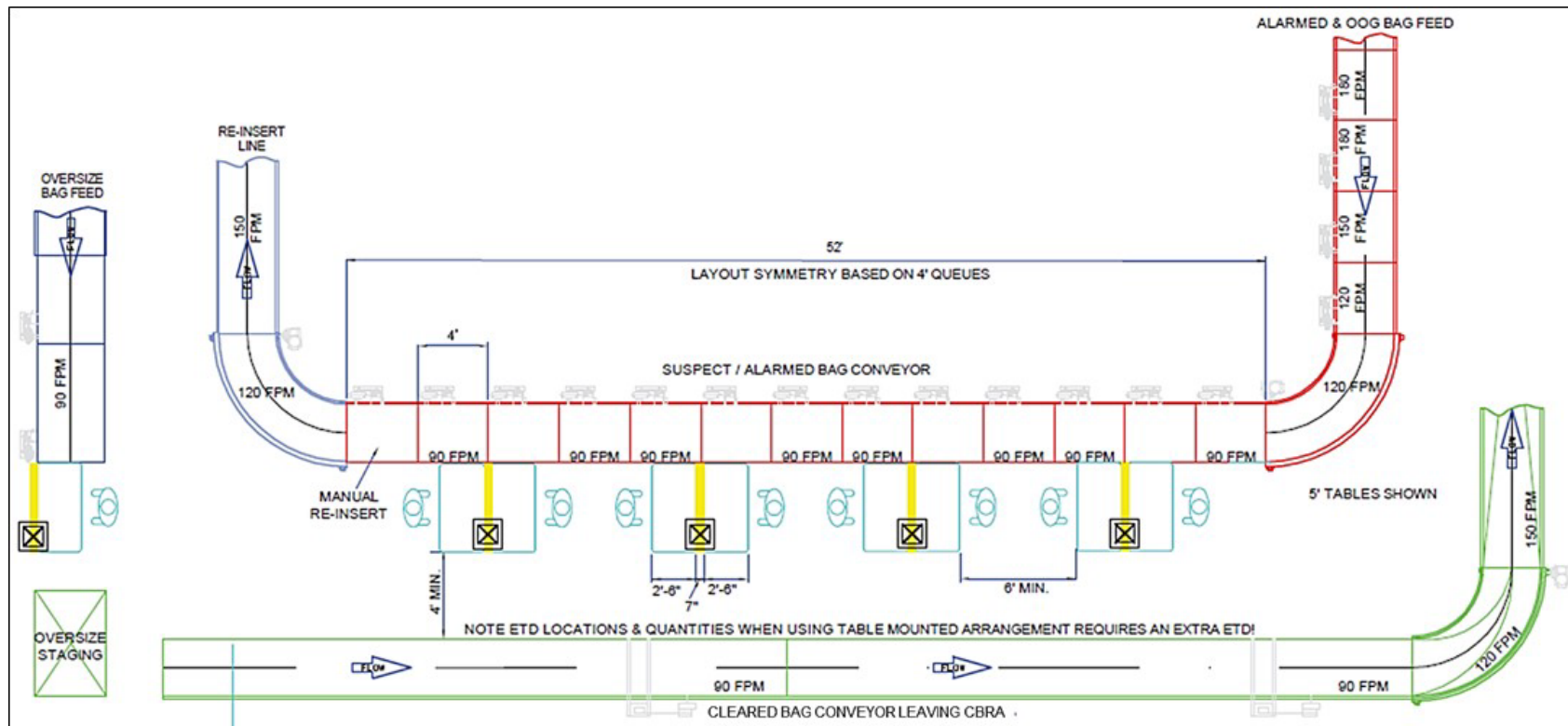
The CBRA layout shall be designed to centralize and optimize TSO utilization, avoid bag lifting, reduce equipment costs, and incorporate the following:

- Single Clear Line unless physical constraints require additional lines. Multiple Alarm Lines may be used for larger CBRAs
- Connected to the end of the Alarm Line, a Reinsert Line with no side guard (at beginning of the Reinsert Line) to ease bag placement during manual reinsertion
- Transport of OOG bags via the Alarm Line (or separately, as approved) and exit via the Clear Line
- Clear Lines shall be shared among multiple Alarm Lines, where possible
- Transport of OS bags via a dedicated conveyor line

For smaller configurations, the optimal layout shall include a straight Alarm Line and a parallel Clear Line as shown in Figure 14-1. For configurations with multiple Alarm Lines, a description of operations discussing Alarm Line balancing and prioritization schemes is required.



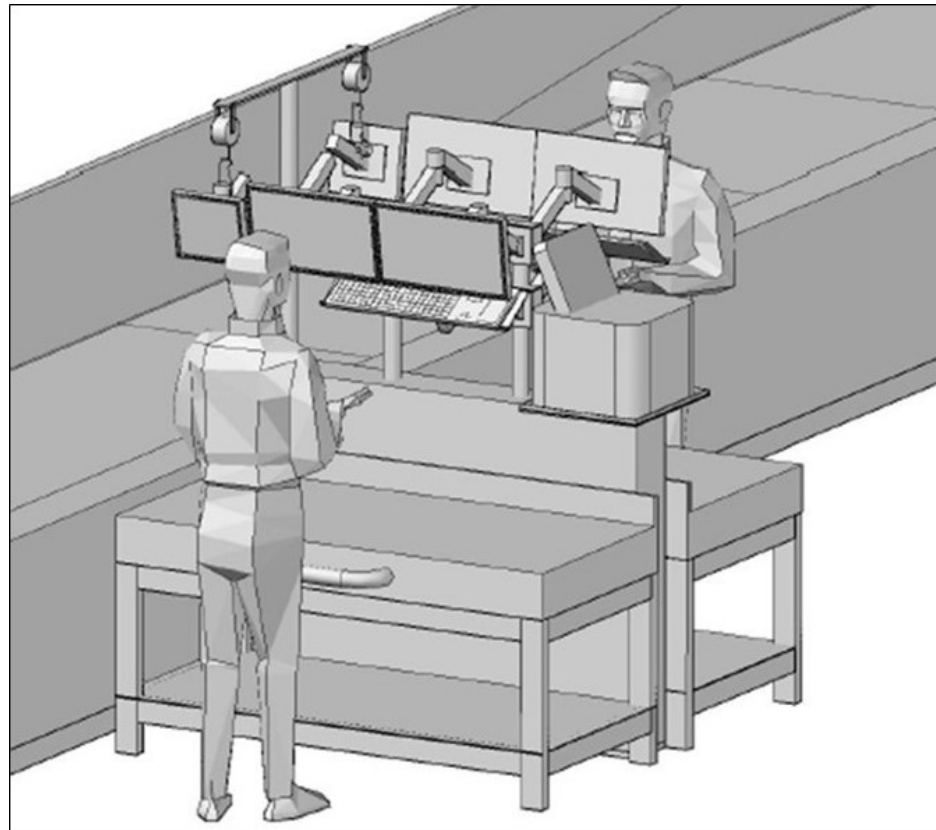
Figure 14-1: Optimal CBRA Layout for Smaller Systems



## 14.3 Baggage Inspection Stations

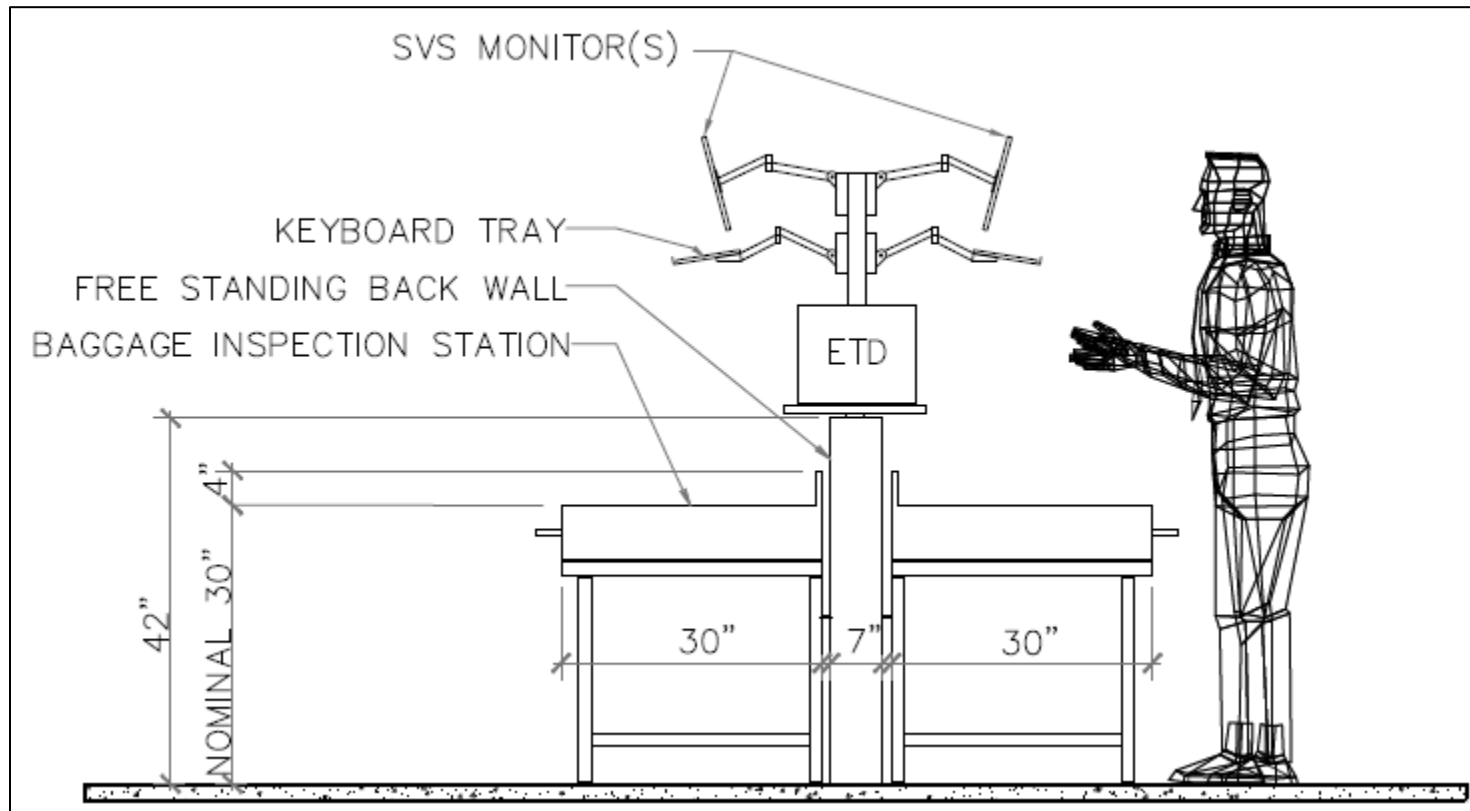
The BIS is a workstation that provides the TSO with all the tools needed and an ergonomically sound space for inspecting bags. This section provides the typical BIS configuration and requirements. However, designers are encouraged to find other configurations that may improve the TSO workspace. An example BIS is shown in Figure 14-2 and a BIS cross section in Figure 14-3.

Figure 14-2: Example CBRA Baggage Inspection Station



Note: The table shown in the figure is only for reference. Other baggage inspection work surface solutions may be used.

Figure 14-3: CBRA Baggage Inspection Station Cross Section



Note: The table shown in the figure is only for reference. Other baggage inspection work surface solutions may be used.

The BIS shall include a flat work surface for the TSO to place the bag and remove any objects inside the bag as needed. The work surface shall be made of a non-porous material that can withstand isopropyl alcohol decontamination. The BIS work surface shall be 30" W x 60" L and be placed at 30" high above the finished floor.

The BIS shall be capable of processing bags year-round in an environment with a temperature range of 50-100°F and a humidity of 30-70%. The baggage to be screened may weigh up to 125 pounds. The BIS shall provide a 36" W x 60" L workspace in front of the working surface for the TSO to move freely. In addition, the BIS shall allow maintenance access to all components and accommodate the CBRA ancillary equipment listed in Section 14.3.1.

Kick panels shall be installed at locations where a bag is opened along the Alarm Line and Clear Line.

The BISs for the OS line do not require the SVS, scan gun, or BSD, as these bags were not screened by the EDS.

The bag inspection process requires the use of certain tools that will vary depending on the bag. The BIS shall provide a storage system for these tools to increase TSO efficiency, prevent theft, and avoid leaving tools inside passenger luggage after the inspection. The tool storage system shall be:

- Organized for easy inventory checks at the end of each shift by the Transportation Security Manager (TSM)
- Visually trackable for quick inventory checks after each bag inspection by the TSO

The storage system shall allow quicker access to primary and secondary tools as these are the most used, while the special tools may require more time to obtain since they are only used occasionally. A list of primary, secondary, and special tools to be stored can be found in Table 14-1.

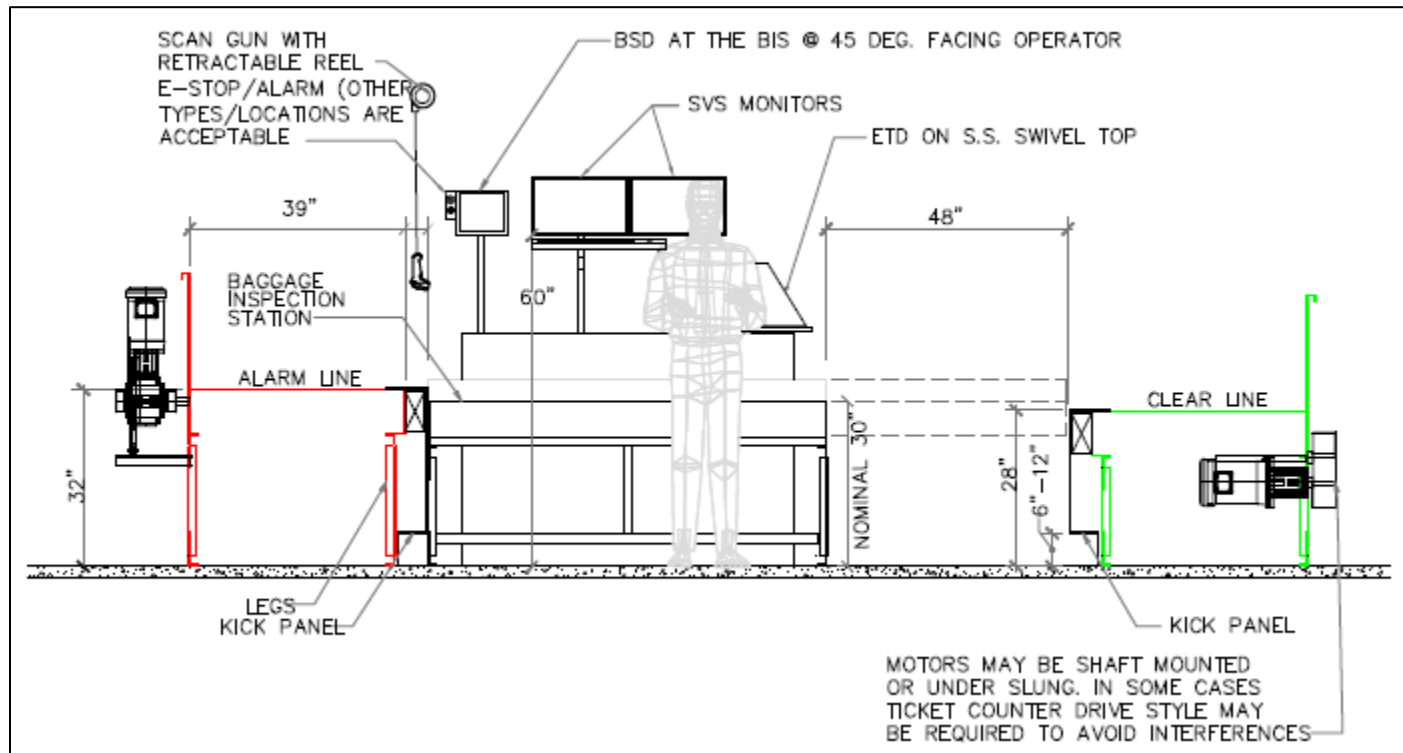
**Table 14-1: List of Tools Needed for the Bag Inspection Process**

| Primary                                         | Secondary                                                                              | Special                                                                     |
|-------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Lock Keys<br>TSA notes<br>ETD wand<br>ETD disks | Alcohol bottle<br>Paper towel<br>Gloves box<br>Hand sanitizer<br>Marker<br>Bolt cutter | Screwdriver<br>Pry-bar<br>HAZMAT notes<br>Scissor<br>Box cutter<br>Tape gun |

Figure 14-4 illustrates the BIS position between the alarm and clear lines and the positioning of ancillary equipment with respect to the BIS and the standing position of the TSO.



Figure 14-4: CBRA Workstation Elevation



Note: The table shown in the figure is only for reference. Other baggage inspection work surface solutions may be used.

## 14.3.1 BIS Ancillary Equipment

The BIS shall include all the supports needed to mount the ancillary equipment listed in this section.

- The **BSD** is the interface between the TSO and the BHS. It displays specific baggage information and allows the TSO to act on a given bag. One BSD shall be installed per BIS. The BSD shall be color and touch capable with a 12" minimum diagonal display size. The bezel of the BSD shall not exceed 1" in any direction and shall be located near the BRP at a 45-degree angle. The BSD mounting solution shall be adjustable in X, Y, Z dimensions without the use of tools.



- The **SVS** is the interface between the TSO and the EDS. It permits the TSO to conduct searches using the bag ID and image of the bag. The SVS is provided by the EDS OEM and may include one or two monitors, a keyboard, a mouse, and a computer Central Processing Unit (CPU). The SVS monitors, keyboard and mouse shall be located towards the middle of the BIS and shall be adjustable in X, Y, Z dimensions without the use of tools. The SVS CPU shall be in a lockable compartment where it will not interfere with the screening process.
- The CBRA reconciliation device can retrieve the IATA or RFID primary tracking ID related to the bag and transfer the information to the BSD, which then sends the information to the SVS for image retrieval. If scan guns are utilized, the scan gun shall be connected to the BSD via a predefined communication port. The scan gun shall include a shock absorbing protector (rubber or similar) and be located near the adjacent BRP on a retractable reel. Scan guns shall be corded with stationary mounting solutions. RFID reconciliation devices shall be able to retrieve the RFID tracking ID as the operator moves the bag to the CBRA workstation.
- The **ETD** is a device used to screen a bag for explosives. The CBRA design shall provide means to place and share an ETD between two adjacent BISs. The ETDs are provided by the TSA.
- The **Emergency Stop (E-stop)** shall stop all conveyors in a contiguous line when pressed during an emergency. Each BIS shall have a readily accessible E-stop within arm's reach of the TSO. Alternatively, an E-stop lanyard the length of the alarm line or a control station-type E-stop can be utilized. E-stop stations at other locations (such as the Clear Line or an OS line) are also encouraged. A single start push button per E-stop zone shall be installed to ensure the system can only be started (reset) from one location within the zone after an E-stop has been activated.
- The **UPS** is a device capable of temporarily providing power to the TSA-provided BIS equipment whenever power outages occur. The BIS shall provide a place to locate the UPS.

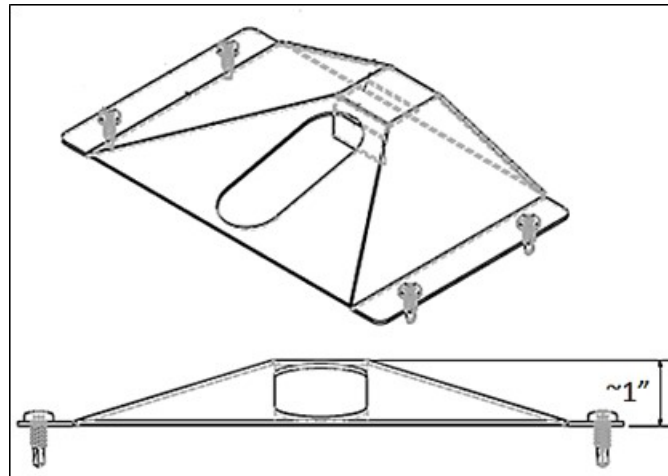
### 14.3.2 Baggage Removal Point

The **BRP** is the queue conveyor where bags stop for removal and processing by the TSO.

- The BRP shall be 48" L and 32" H (floor to the conveyor bed). The PE location and programming of the BRP shall ensure that bags arriving are centered (with respect to the width of the conveyor) and stop next to the corresponding BIS. In addition, the photo eye reflector cover shall be of a slim design no more than 1" H that allows bags to be slid over it. Refer to Figure 14-5 for an example.



Figure 14-5: Photo Eye Reflector Cover



- The queue conveyors situated between the BRPs are termed “Intermediate Queues” and shall be a minimum of 48” long and 32 inches high. Intermediate queues shall be installed in the space between BIS pairs adjacent to the workspace for the TSOs.

## 14.3.3 CBRA BHS Displays

The CBRA shall be equipped with a display of additional BHS information that is useful for the TSA to effectively respond to system issues or bag surges. This information shall be visually available as follows:

- BHS Status Display – A visual representation of the conveyor belt design shall be included that uses industry-wide standard color codes to communicate real-time equipment status.
- BHS Remote Reporting Workstation – A remote thin client BHS workstation shall be provided to TSA in OSRA/CBRA at supervisor’s desk depending on system size and TSA needs.
- The BHS Remote Reporting Workstation display of all reports shall include an optional setting to refresh at a user-selected interval, allowing the report to remain open while showing current operational data.

The number, locations, and size of displays will depend upon the BHS design, TSM desk location, and CBRA layout. Smaller airports may require one to two smaller displays (22” to 27”), while bigger airports may require one to three larger displays (42” to 60”). The exact configuration of CBRA BHS displays shall be coordinated between TSA and the ILDT during the Detailed Design Phases.

### 14.4 CBRA Functionality

This section provides a description of the functionality and controls required by the equipment in CBRA. Note that certain BHS information related to TSA screening and processing times is considered SSI and requires SSI training to access.

#### 14.4.1 BIS Utilization

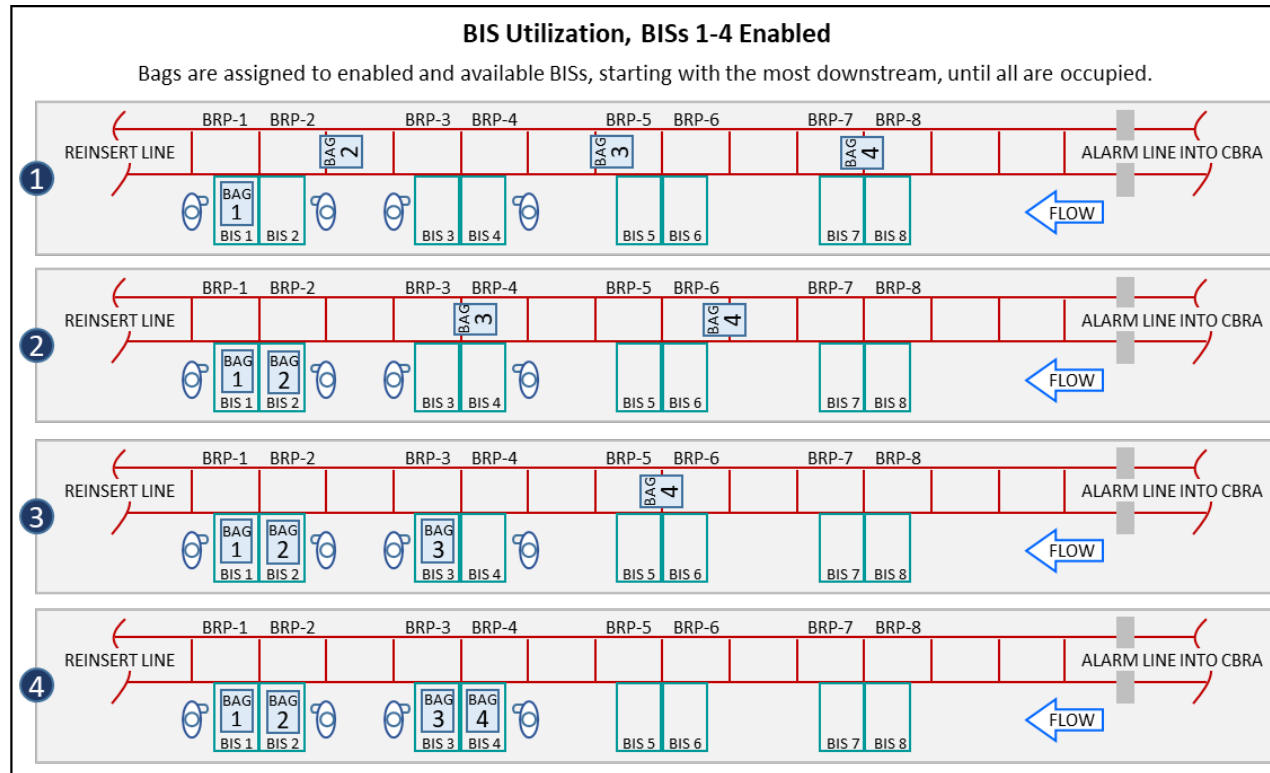
A BIS is considered enabled when an operator is logged in. BISs shall be enabled in upstream sequence only, beginning with the furthest downstream station. The BHS shall inhibit an upstream station from being enabled if downstream BISs are disabled.

An enabled BIS is considered available when it is not occupied with a bag for screening. When there is more than one available BIS, bags arriving on the Alarm Line shall be assigned to the BIS that has been available for the longest period. When the BHS assigns a bag to an available BIS, the bag cannot be reassigned to another BIS unless the BIS is disabled (i.e., the operator logs out).

An example of BIS utilization is illustrated in Figure 14-6.



**Figure 14-6: BIS Utilization Example**



## 14.4.2 Alarm Line Queuing

Queuing methodology refers to the logic used to determine the order in which Alarm Line conveyors in the CBRA are filled with bags waiting to be screened.

If there are no enabled BISs, bags arriving on the Alarm Line shall queue at the second most downstream BRP, shown as BRP-2 in Figure 14-6 above.

When BISs are enabled but none are available, a three-level queuing methodology has been found to be appropriate for most CBRA designs. The CBRA shall be programmed to queue bags waiting for an available BIS in the following order:



- Level 1: Enabled BRPs, starting from the most upstream
- Level 2: CBRA queue conveyors (except intermediate queues), upstream of the enabled BISs
- Level 3: Intermediate queues starting from the most upstream

The three queuing levels are described in detail later in this section. Deviations from this queuing method may be considered for more complex CBRA layouts. Use the RFV process to work with TSA to identify the optimum logic.

### 14.4.2.1 Level 1 Queuing

Level 1 queuing is shown in Figure 14-7 and applies when all enabled BISs are unavailable (screening a bag). Each additional bag entering CBRA indexes forward onto the BRP next to an enabled BIS, beginning with the most upstream BRP, leaving the intermediate queues vacant.

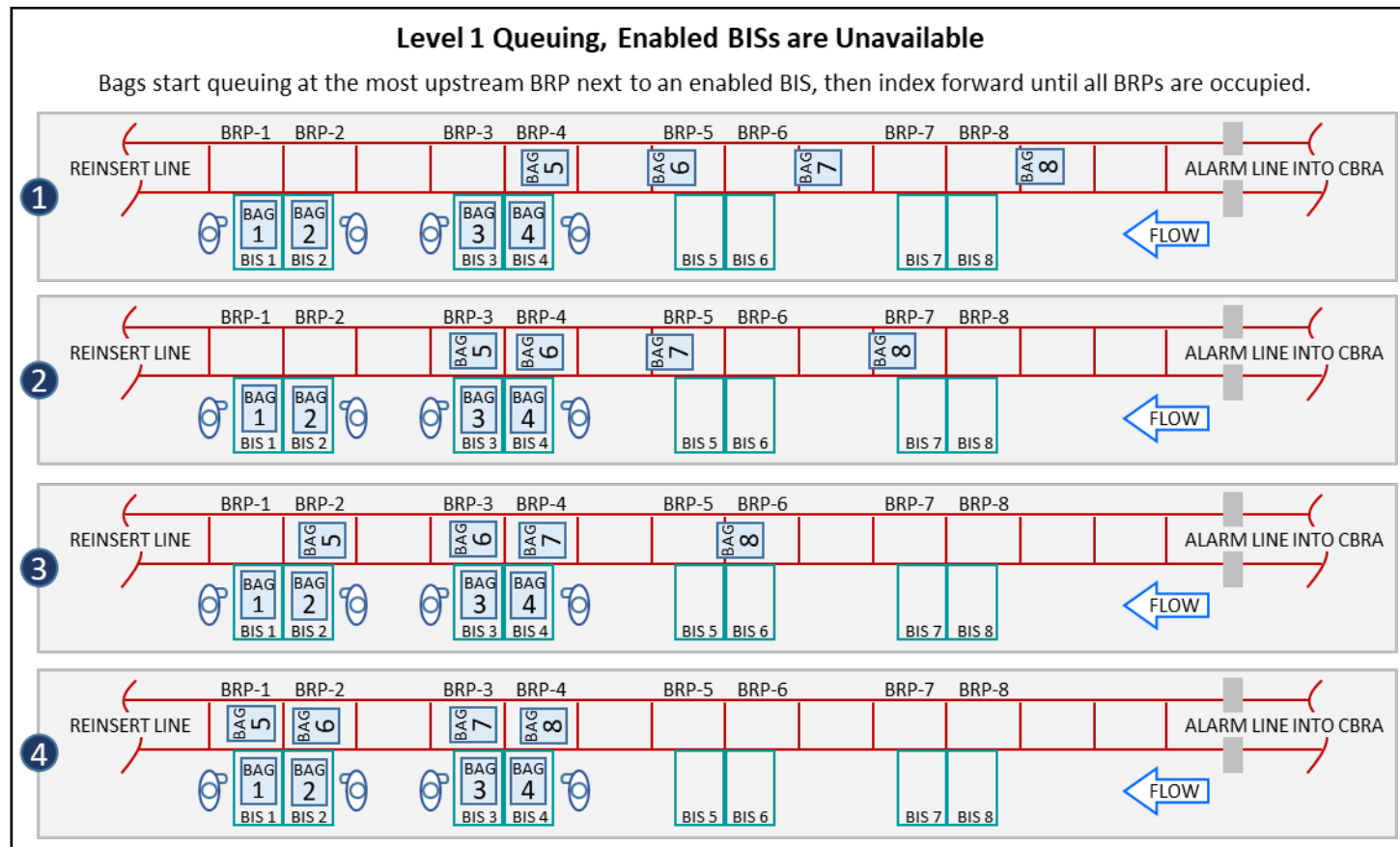
Figure 14-7 assumes that BIS-1, BIS-2, BIS-3, and BIS-4 are enabled and available and eight bags arrive in the CBRA consecutively. Following Level 1 queuing logic:

1. Bag 5 queues at BRP-4.
2. When Bag 6 arrives on the intermediate conveyor immediately upstream of BRP-4 and no BIS has become available, Bag 5 indexes forward to BRP-3 and Bag 6 indexes forward to BRP-4.
3. When Bag 7 arrives on the intermediate conveyor immediately upstream of BRP-4 and no BIS has become available, Bag 5 indexes forward to BRP-2, Bag 6 indexes forward to BRP-3, and Bag 7 indexes forward to BRP-4.
4. When Bag 8 arrives on the intermediate conveyor immediately upstream of BRP-4 and no BIS has become available, Bag 5 indexes forward to BRP-1, Bag 6 indexes forward to BRP-2, Bag 7 indexes forward to BRP-3, and Bag 8 occupies BRP-4.

When a BIS becomes available, the upstream bags index forward using the same logic to keep all BRPs next to enabled BISs occupied.



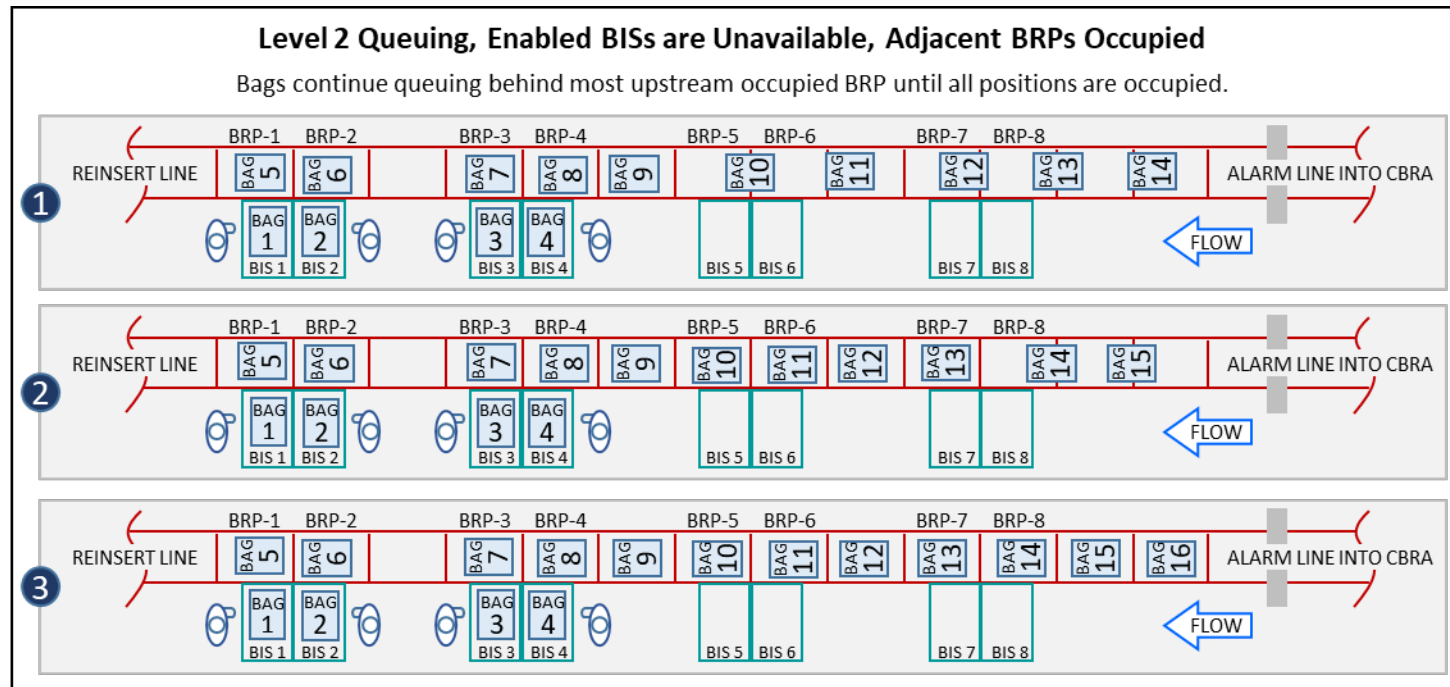
Figure 14-7: Level 1 Queuing



## 14.4.2.2 Level 2 Queuing

When all enabled BIS and adjacent BRPs are occupied, queuing begins at the queue position immediately upstream of the most upstream enabled BRP and then indexes bags backwards as more bags enter the CBRA. Figure 14-8 illustrates bags indexing until all the upstream CBRA queues positions are occupied. Intermediate queues are left open until all BIS are occupied and bags cascade to fill all the upstream queue positions in CBRA. The only exception is that bags in route to the reinsertion line may occupy intermediate queues. Note that intermediate queues exist only between enabled back-to-back BISs.

**Figure 14-8: Level 2 Queuing**

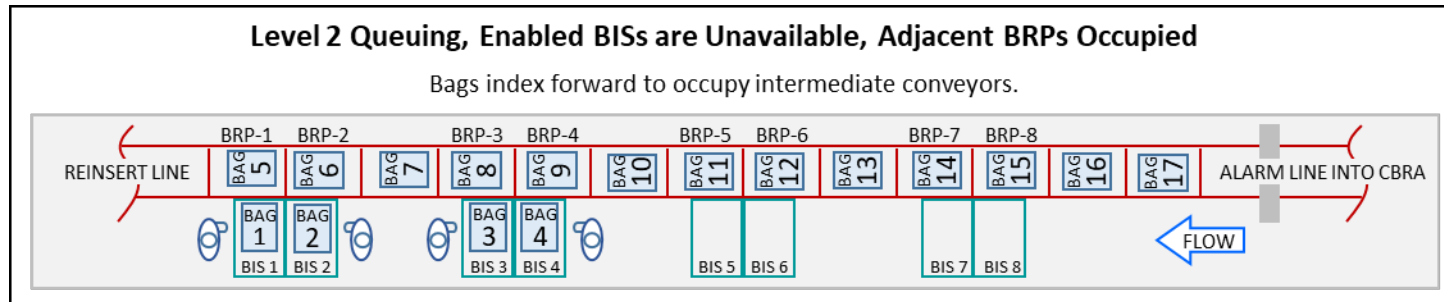


## 14.4.2.3 Level 3 Queuing

In Level 3, bags will index forward to occupy the intermediate queues, as illustrated in Figure 14-9. Any queueing required beyond Level 3 will take place outside of the CBRA.



Figure 14-9: Level 3 Queuing



## 14.4.3 Baggage Removal Point Lag Timer

After a bag has been removed from a BRP and an action button has been selected on the BSD (the chronological order is irrelevant, but both conditions must be met), the system controls shall have an adjustable lag timer for the BRP belt to resume operations (i.e., advance other bags) which is used to prevent TSO injury while a bag is being transferred. The default value shall be 3 seconds.

## 14.4.4 Scan Guns

Handheld scan guns are provided at each BIS to read the 10-digit IATA bar codes, used to retrieve Unknown (lost in tracking) bag status and corresponding image. See Section 14.5.4.5 for more details on Unknown bag processing. Scan guns shall be mounted using an overhead retractable reel, like that shown in Figure 14-4: CBRA Workstation Elevation.

## 14.4.5 Baggage Process and Screening Timers

The BHS shall use a BPT to record every bag processing time at each BIS using the arrival of a bag at the BRP as the start signal for the timer. The BHS shall also use a Baggage Screening Timer (BST) to record the bag screening time at each BIS using the SEARCH button on the BSD as the start signal for the timer. Both BPT and BST use the CLEARED button for the stop signal and are recorded in the CBRA Bag Process report. Example reports are provided in Appendix A, Section A.4.





### 14.4.6 Reinsert Line

The Reinsert Line conveyor shall automatically start when a reinserted bag is detected on the upstream queue conveyor and the bag is automatically transferred onto the Reinsert Line for rescreening. A control station shall be provided to manually operate the Reinsert Line conveyor as described in the next section.

#### 14.4.6.1 Manual Reinsert Points

As shown in Figure 14-1, manual reinsert locations are provided at strategic locations in CBRA to minimize carrying distances if a TSO needs to manually reinsert a bag (instead of processing the bag at the BIS). Manual reinsert points shall be located downstream of the furthest downstream BIS on each alarm line. The manual reinsert points shall incorporate a control station with the functionality of “Insert Bag” which will stop the conveyor and queue bags upstream to allow a bag to be manually placed on the reinsert conveyor. After the bag is placed on the conveyor, pressing a “dispatch” button shall send the bag downstream tracked with a status of “REINSERTED”. Reinserted bags shall not stop at enabled BRPs if the path to the Reinsert Line is clear and will be advanced directly to the Reinsert Line.

### 14.5 BSD Operations

#### 14.5.1 BSD Screens Design

The BSD Interface comprises different elements and specific visual characteristics that shall be replicated on every design. The visual design shall include:

- Font style: The font shall be a web-safe sans-serif typeface such as Arial, Verdana, or Calibri.
- All Capital Letters: Bag statuses, Unique Identifier Cells (UICs), and operator messages shall be displayed in capital letters. Everything else will follow the typical format of the first capital letter only.
- The elements to screen size ratio shall be maintained regardless of the display size. For instance, when determining the width of the elements:
  - Data fields—10% each (or 40% total)
  - Operator Message—10%
  - Primary Buttons—40%
  - Secondary buttons—20%
- All colors used throughout the displays shall follow the colors in Table 14-2:



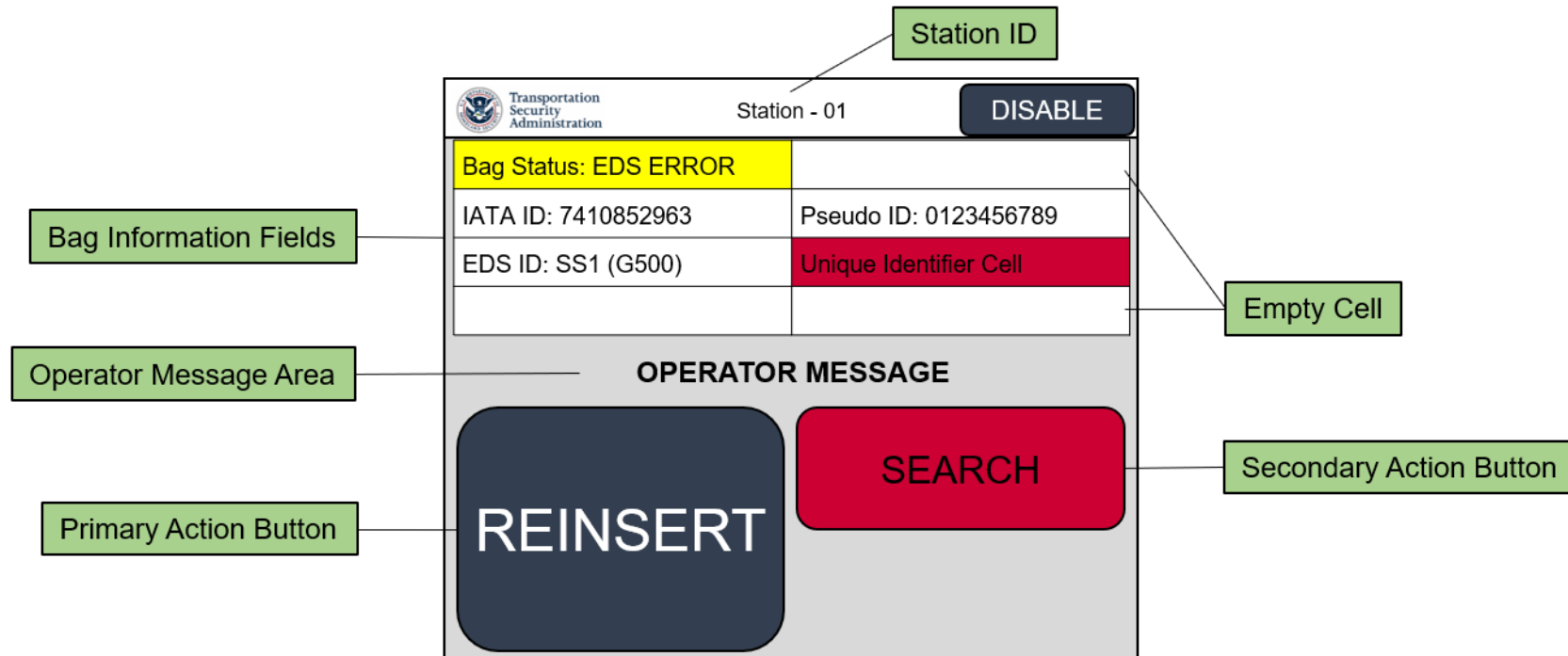
Table 14-2: BSD Color Requirements

| Color      | Pantone       | R   | G   | B   |
|------------|---------------|-----|-----|-----|
| Blue       | 2955 C        | 0   | 51  | 102 |
| Gray       | Cool Gray 6 C | 176 | 177 | 179 |
| Red        | 187 C         | 204 | 0   | 51  |
| Light Blue | 307 C         | 0   | 102 | 153 |
| Green      | 370 C         | 51  | 153 | 0   |
| Orange     | 159           | 191 | 87  | 0   |
| Yellow     | 102 C         | 246 | 229 | 0   |



The BSD structure shall include the following key elements, illustrated in Figure 14-10:

Figure 14-10: Elements of Bag Status Display Screen



- **Station ID:** Numbering convention in the format of “STATION –XX”, which correlates to the BIS number in which it is mounted.
- **Bag Information Fields:**
  - **Bag Status:** Disposition of the bag as indicated by designator and color listed in Section 14.5.2
  - **IATA ID or RFID:** The IATA number shall be populated here.
  - **PSEUDO ID:** The generated pseudo-ID (either by the BHS or the EDS) shall be shown.
  - **EDS ID:** EDS screening line and EDS serial number used to process the current bag in the format of SS8 (G500)



- **UIC:** Used to identify when any of the following scenarios occur:
  - o Duplicate IATA
  - o Timeout
  - o Communication Error
  - o Reinsert
  - o Others may be added with an approved RFV
- **Found at PE:** Photo eye ID that correlates to the location where bags that have been lost in tracking were “found”.
- **Operator Message Area:** Used to display any messages for the operator.
- **Primary Buttons:** These represent the primary action typically taken by the operator. These also work as a trigger for the Bag Auto ID Transfer functionality when needed, as referenced in TSA’s Integration Requirements Document (IRD).
- **Secondary Action Buttons:** These provide an optional action for the operator under certain circumstances.

Throughout the following sections, multiple BSD screens will be presented to show the desired results from each processing step. The ILDT is required to match every aspect of each screen including colors, font style, button location and size, messages displayed, and others. If the ILDT desires additional functionality, or would like to propose changes to improve operations, an RFV could be submitted to start the dialogue.

### 14.5.2 BSD Statuses and High-level Processing Procedures

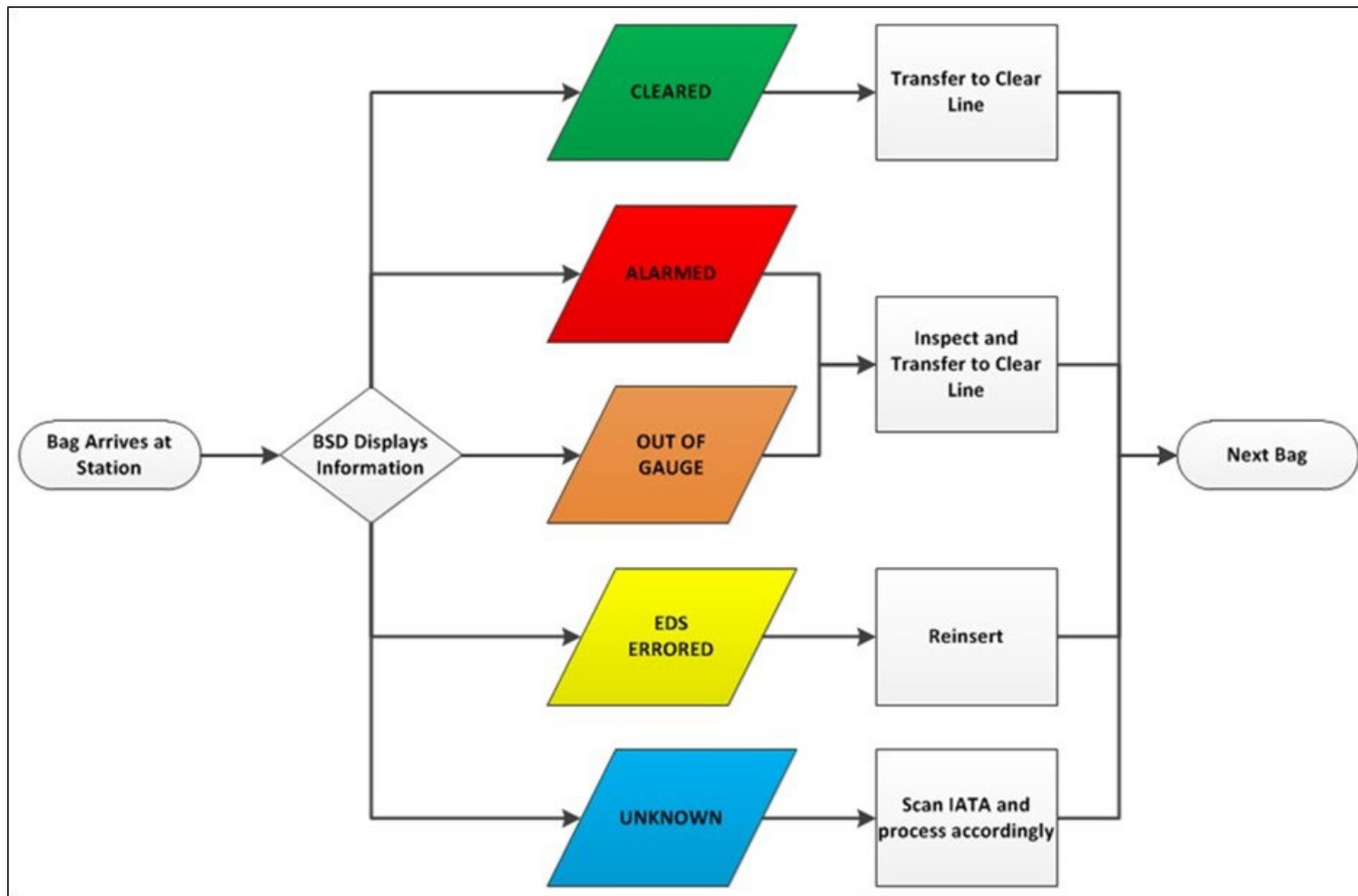
Baggage that arrives in the CBRA shall be limited to the following five statuses with their corresponding designator codes and color.

- **CLEARED** (Green) – Bags that received a clear status from the EDS or OSR.
- **ALARMED** (Red) – Bags that generate an automatic alarm on an EDS and were viewed but not cleared by the Level 2 OSR Operator.
  - Timeout – Bags that received an alarm status from the EDS but timed out during OSR or didn’t make it to the OSR viewing at all.
- **OUT-OF-GAUGE** (Orange) – Bags that do not fit into the EDS.
- **EDS ERRORED** (Yellow) – Bags that received an error status from the EDS.
- **UNKNOWN** (Blue) – Bags that have become lost in tracking between the exit of the EDS and the BRP or forced unknown for security reasons.
  - Communication Error – BHS will assign this status in scenarios where a disposition has not been received by the BHS from the EDS. This status is NOT an indication of an EDS or BHS error but indicates a possible communications error.
  - Reinsert – BHS will assign this status to bags which are destined for the reinsertion line. Operators will have the option to screen the bag, manually reinsert the bag or take no action where the bag will continue towards the reinsertion line. In the case of a non-connected reinsertion line, the options will be to screen or manually reinsert the bag.



These five statuses will be processed primarily utilizing five operator sub processes as shown in Figure 14-11. These sub processes are discussed in greater detail in the next sections utilizing diagrams to illustrate multiple tasks happening simultaneously throughout each bag status resolution.

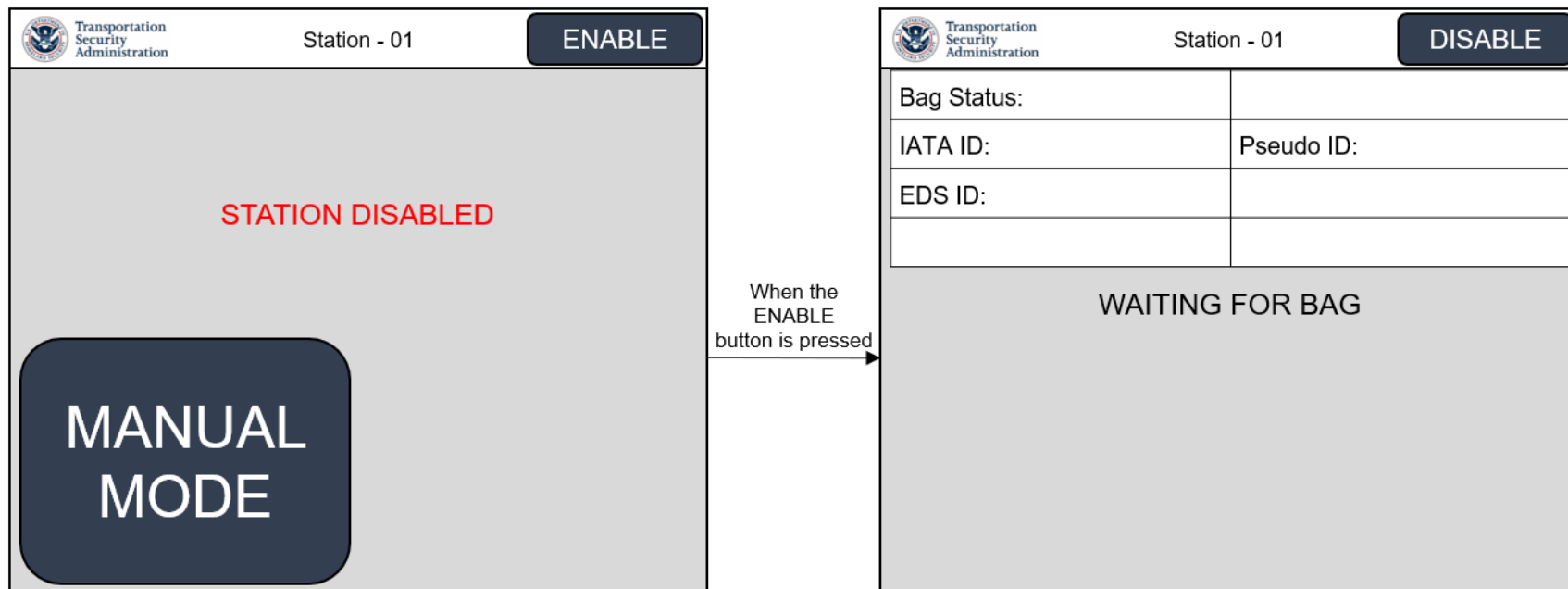
Figure 14-11: High-level Procedure Per Bag Status



## 14.5.3 Station Disabled and Waiting for Bag Screens

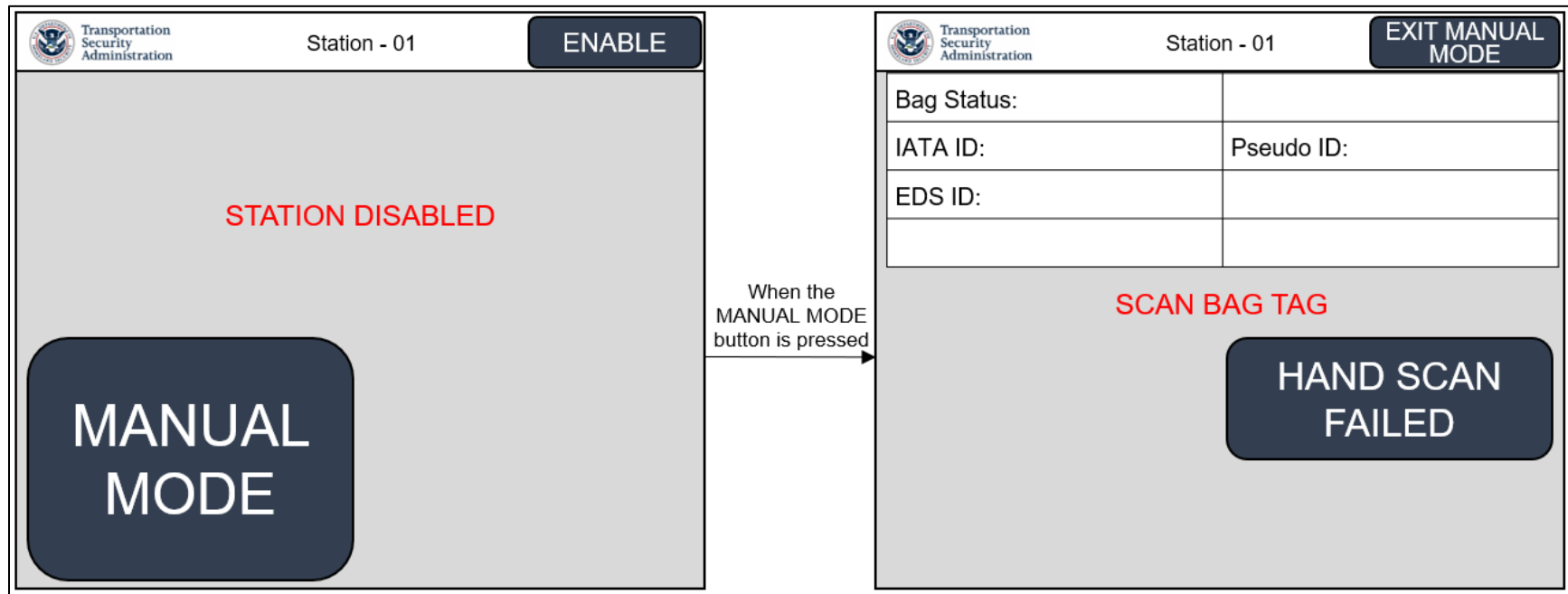
After the BHS startup procedures are completed, the BSD shall remain DISABLED until an operator presses the ENABLE button shown in Figure 14-12.

Figure 14-12: Station Disabled (left side) and Station Enabled (right side) Screens



MANUAL MODE allows for processing of bags hand carried to a BIS. MANUAL MODE can only be entered from a “DISABLED” BSD. While in MANUAL MODE, the BHS will not queue bags on the associated BRP, and the BSD will default to the “UNKNOWN” status to allow for a tag scan. The processing of bags while in MANUAL MODE follows the sequence for UNKNOWN bags shown in Section 14.5.4.5. The MANUAL MODE BSD screen is shown in Figure 14-13.

Figure 14-13: Station Disabled (left side) and Manual Mode Activated (right side) Screens



## 14.5.4 Bag Processing by Status

The figures in this section depict the following information regarding bag processing:

- The BSD screens required for processing all five bag statuses
- The physical sequence of operations required by the operator to complete the process, and;
- The controls requirements throughout the process

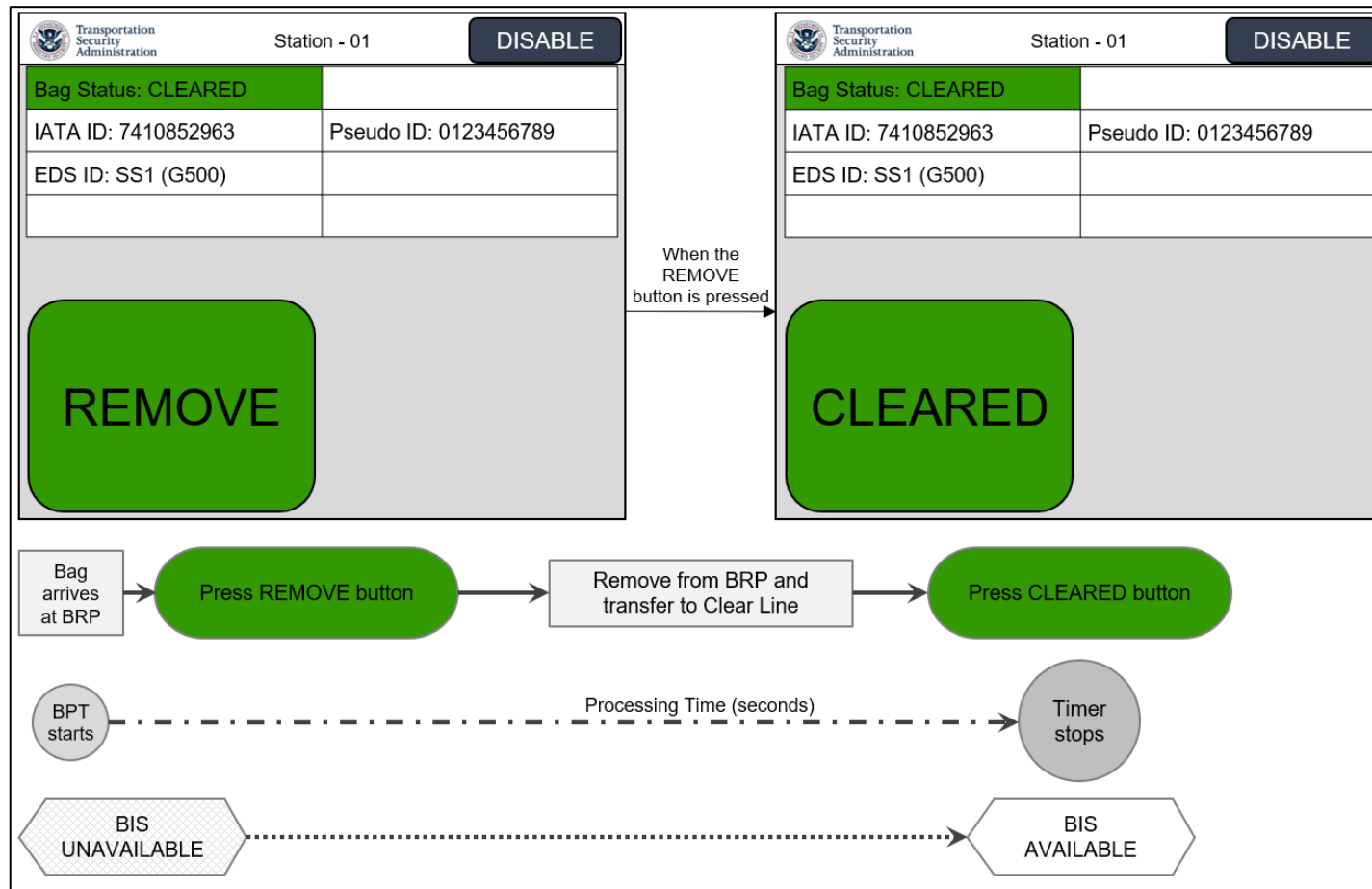
### 14.5.4.1 Cleared Bag Processing

The BPT starts and the BIS becomes unavailable when the bag arrives at the BRP. The bag status, IATA ID, EDS ID, and Pseudo ID information cells are populated. The bag status cell is green and displays the status CLEARED. The primary action button is green and displays REMOVE. The TSO presses the primary button, which then changes to display CLEARED. The TSO transfers the bag to the clear line and presses the primary button again to stop the BPT and make the BIS available again.





Figure 14-14: Cleared Bag Processing Screens and Sequence of Operations



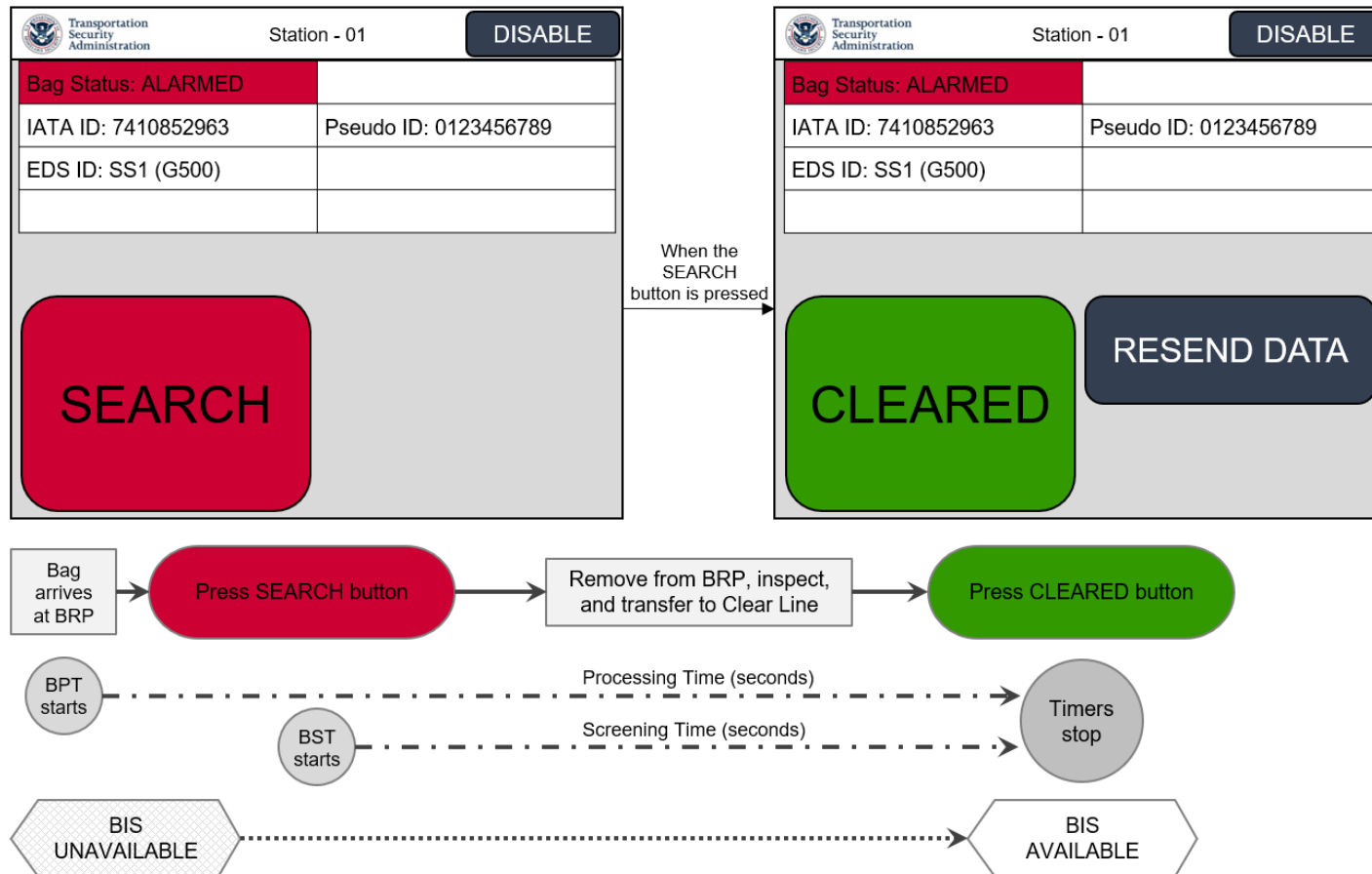
## 14.5.4.2 Alarmed Bag Processing

The BPT starts and the BIS becomes unavailable when the bag arrives at the BRP. The bag status cell is red and displays the status ALARMED. The IATA ID, EDS ID, and Pseudo ID information cells are populated. The primary action button is red and displays SEARCH. The TSO presses



the primary button, which then changes to green and displays CLEARED. The TSO inspects the bag, transfers it to the clear line, and presses the primary button again to stop the BPT and make the BIS available again.

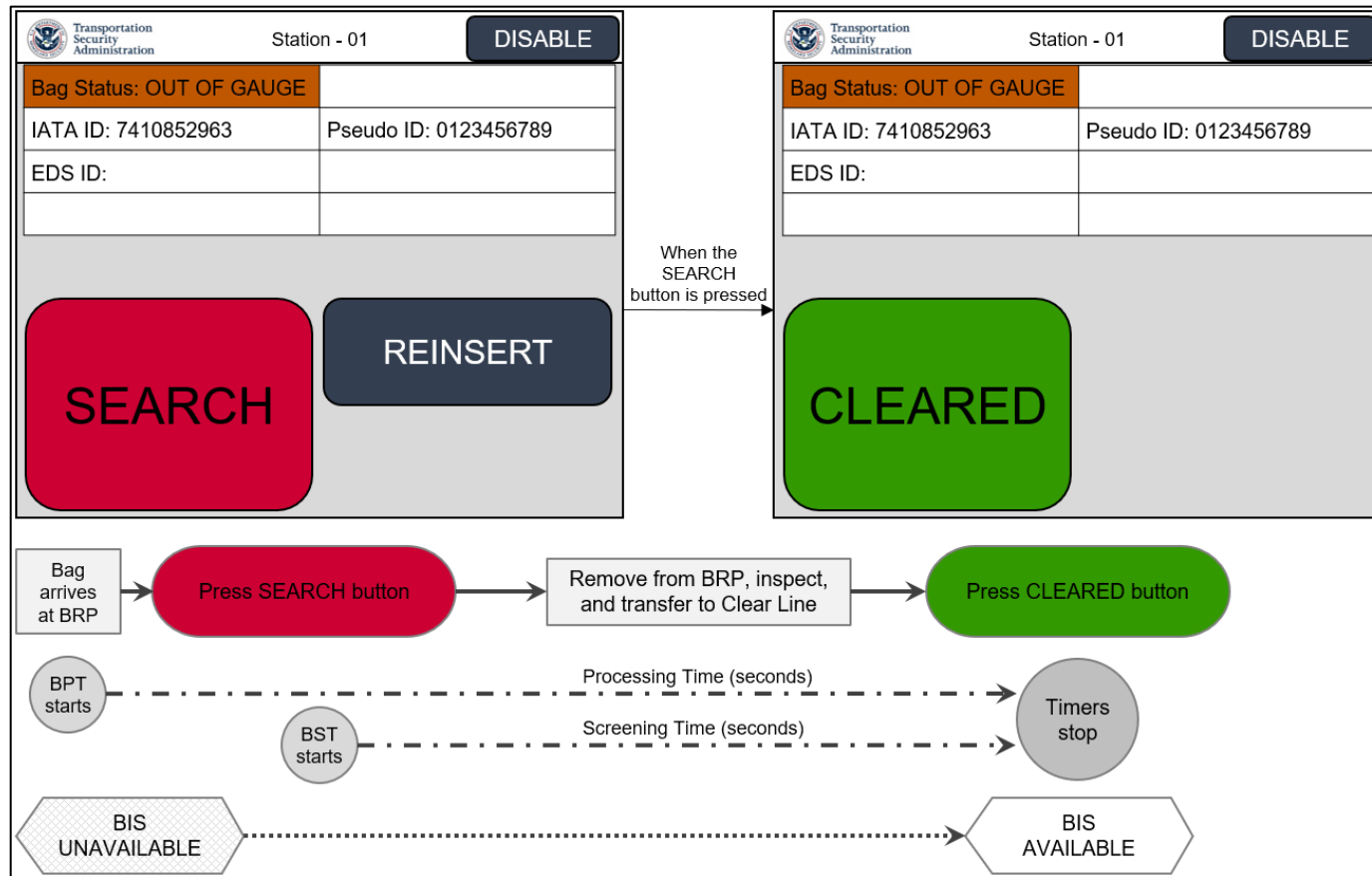
**Figure 14-15: Alarmed Bag Processing Screens and Sequence of Operations**



## 14.5.4.3 Out-of-Gauge Bag Processing

The BPT starts and the BIS becomes unavailable when the bag arrives at the BRP. The bag status cell is orange and displays the status OUT-OF-GAUGE. The IATA ID and Pseudo ID information cells are populated. The primary action button is red and displays SEARCH. The TSO presses the primary button, which then changes to green and displays CLEARED. The TSO inspects the bag, transfers it to the clear line, and presses the primary button again to stop the BPT and make the BIS available again.

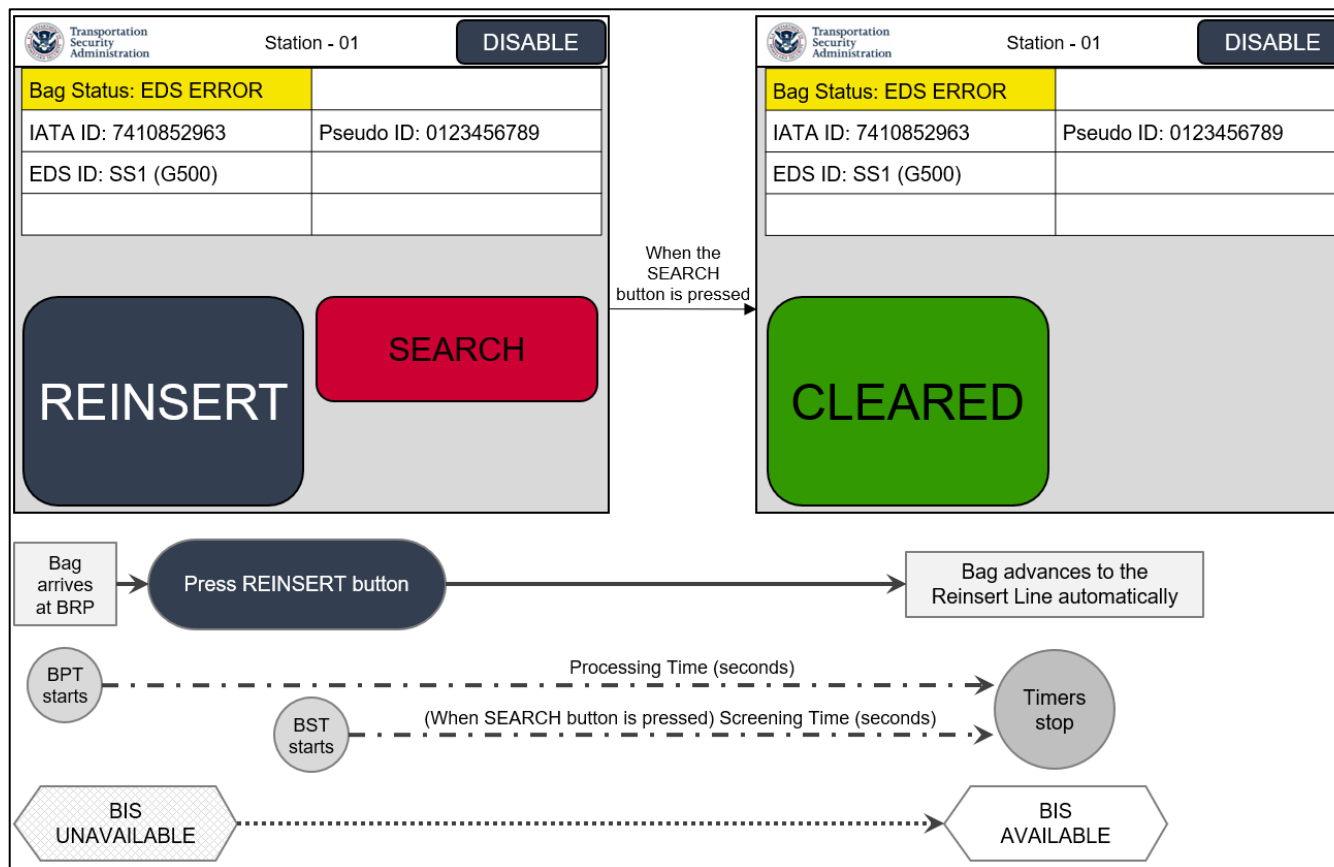
**Figure 14-16: Out-of-Gauge Bag Processing Screens and Sequence of Operations**



## 14.5.4.4 EDS Errored Bag Processing

The BPT starts and the BIS becomes unavailable when the bag arrives at the BRP. The bag status cell is yellow and displays the status EDS ERROR. The IATA ID, EDS ID, and Pseudo ID information cells are populated. The primary action button is dark blue and displays REINSERT. The secondary action button is red and displays SEARCH. When the TSO presses the primary button, and the bag automatically advances to the reinsert line. When the TSO presses the secondary button, which then changes to green and displays CLEARED. The TSO presses the CLEARED button (after the bag is reconciled) to stop the BPT and make the BIS available again.

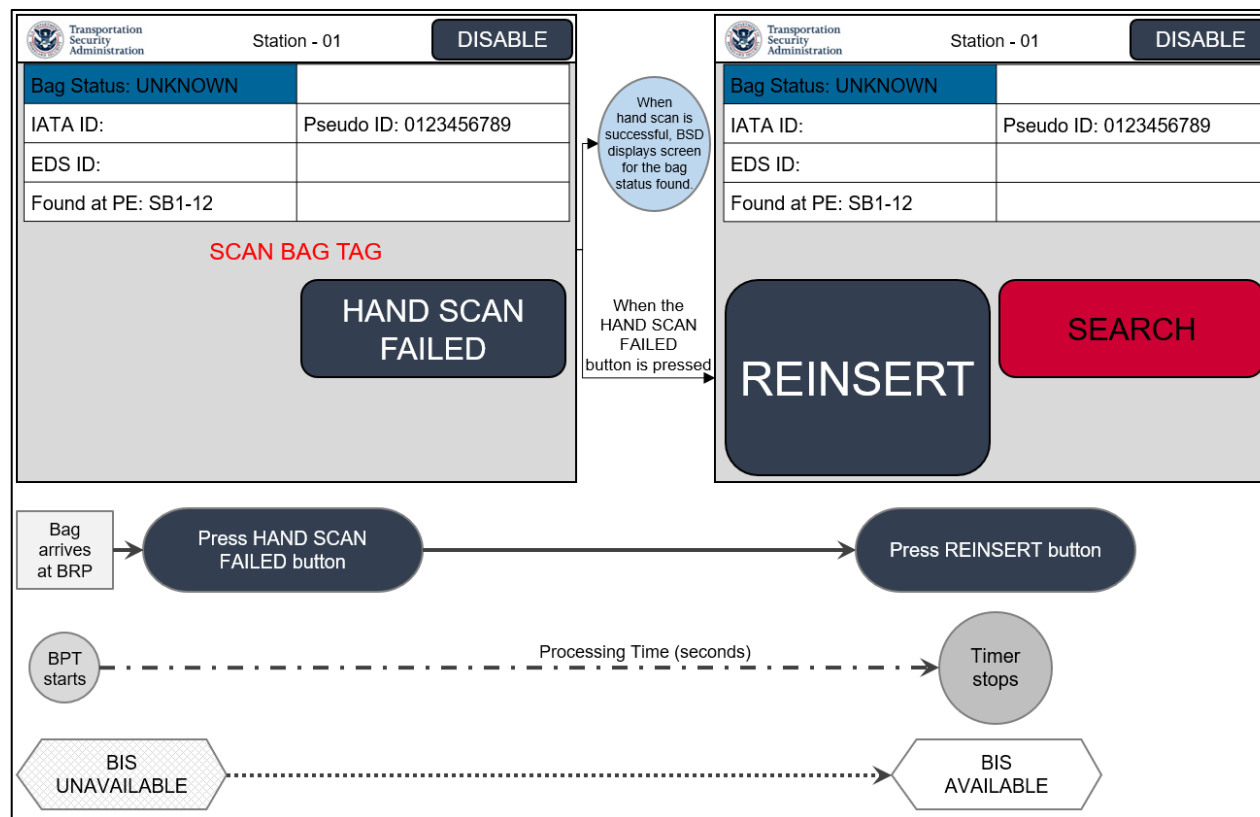
**Figure 14-17: EDS ERRORED Bag Processing Screens and Sequence of Operations**



## 14.5.4.5 Unknown Bag Processing

The BPT starts and the BIS becomes unavailable when the bag arrives at the BRP. The bag status cell is blue and displays the status UNKNOWN. The IATA ID and EDS ID information cells are blank. The Pseudo ID information cell is populated. A normally empty information cell displays the words “found at” and the photo eye ID. The primary action button is not displayed. The secondary action button is dark blue and displays HAND SCAN FAILED. If the scan fails to retrieve the bag information, the TSO presses the secondary button. The screen changes to display a dark blue primary button that says REINSERT and a red secondary button that says SEARCH. Whichever button the TSO presses, the screen changes to the corresponding reinsert or search screen.

**Figure 14-18: UNKNOWN Bag Processing Screens and Sequence of Operations**



## 14.5.4.6 Unique Identifiers Cell

There are four messages that may be displayed in the UIC: Reinsert, Comm Error, Timeout, and Duplicate IATA; these shall be displayed as shown in Figure 14-19. These messages are used mostly for troubleshooting purposes. Additional UIC messages may be used if submitted through an RFV and approved by the TSA.

**Figure 14-19: Unique Identifier Cell Messages**

The figure displays four screenshots of the Unique Identifier Cell (UIC) interface, each showing a different error state. Each screenshot includes the Transportation Security Administration logo, 'Station - 01', and a 'DISABLE' button.

**Top Left Screenshot (COMM ERROR):**

|                     |                       |
|---------------------|-----------------------|
| Bag Status: UNKNOWN |                       |
| IATA ID:            | Pseudo ID: 0123456789 |
| EDS ID: SS1 (G500)  | COMM ERROR            |
| Found at PE:        |                       |

SCAN BAG TAG

HAND SCAN FAILED

**Top Right Screenshot (REINSERT):**

|                     |                       |
|---------------------|-----------------------|
| Bag Status: UNKNOWN |                       |
| IATA ID:            | Pseudo ID: 0123456789 |
| EDS ID:             | REINSERT              |
| Found at PE: SB1-12 |                       |

REINSERT-NO ACTION NEEDED

SEARCH

MANUALLY REINSERT

**Bottom Left Screenshot (TIMEOUT):**

|                     |                       |
|---------------------|-----------------------|
| Bag Status: ALARMED |                       |
| IATA ID: 7410852963 | Pseudo ID: 0123456789 |
| EDS ID: SS1 (G500)  | TIMEOUT               |
| :                   |                       |

SEARCH

**Bottom Right Screenshot (DUPLICATE IATA):**

|                     |                       |
|---------------------|-----------------------|
| Bag Status: ALARMED |                       |
| IATA ID: 7410852963 | Pseudo ID: 0123456789 |
| EDS ID: SS1 (G500)  | DUPLICATE IATA        |
|                     |                       |

SEARCH



When a positively tracked bag arrives in CBRA with a Duplicate IATA message in the UIC, the system shall process the bag according to the bag status. If a Duplicate IATA is retrieved following the hand scanning of an Unknown bag arrival, the search function is limited to recalling images using the BHS Pseudo ID.

## 14.5.5 Manual Reinsertion

When the Alarm line queues in CBRA are full (cascaded), any operator working on a bag requiring reinsertion at an affected BIS will be notified by the BSD to reinsert the bag manually. This slightly different process applies only to OOG, EDS ERRORED, and UNKNOWN statuses. The associated BSD screens shown in Figure 14-20, Figure 14-21, and Figure 14-22.

**Figure 14-20: Manual Reinsert – Out-of-Gauge Bag Screen**

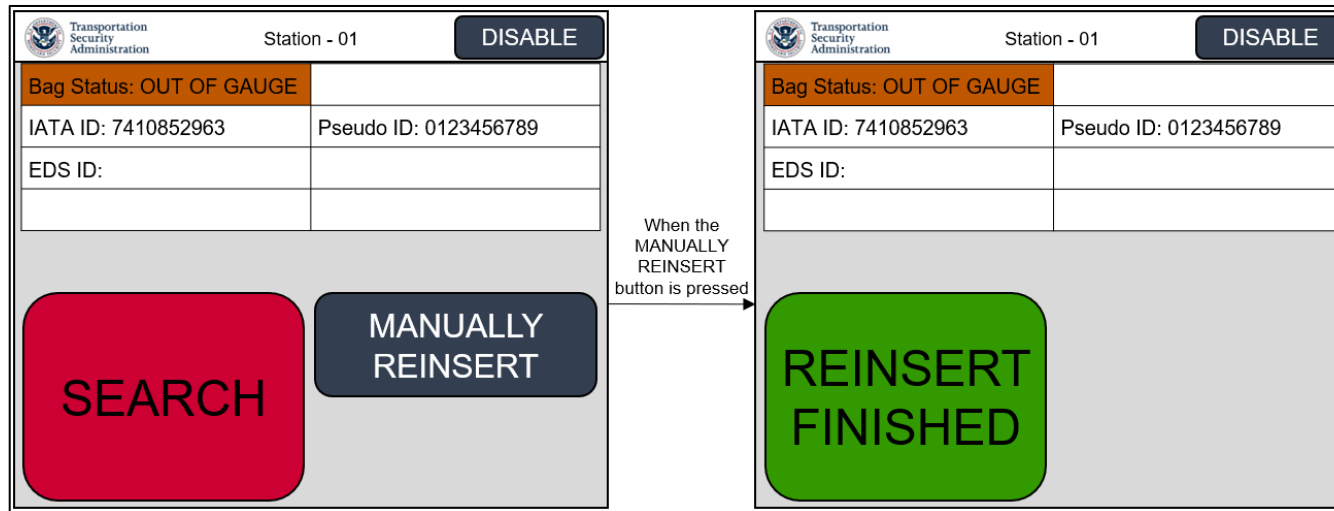


**Figure 14-21: Manual Reinsert – EDS Error Bag Screen**

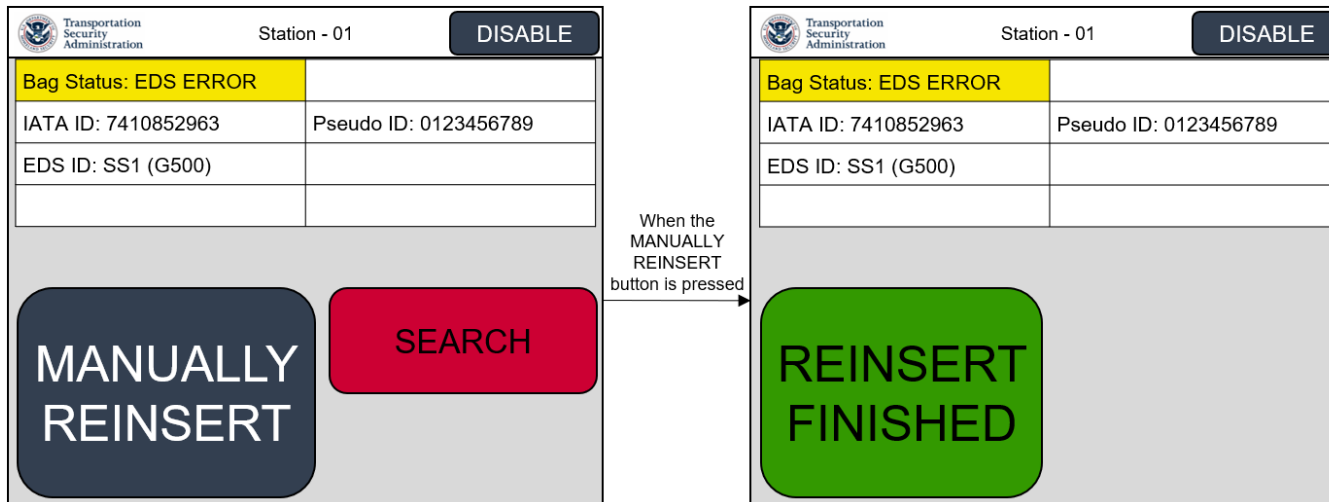
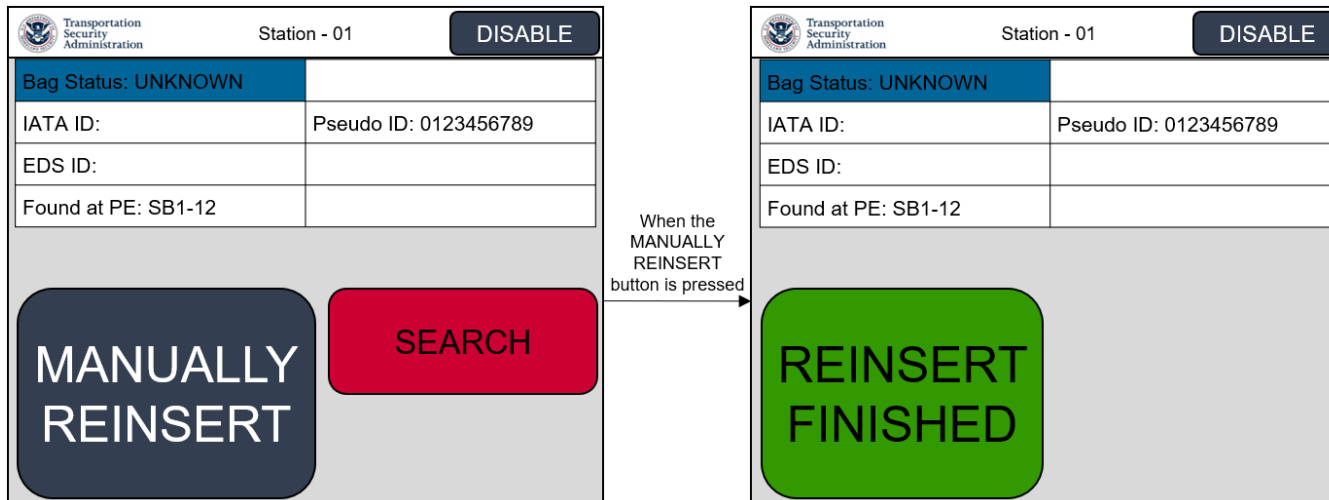


**Figure 14-22: Manual Reinsert – Unknown Bag Screen**





## 14.5.6 Bag Waiting Alerts

To mitigate unnecessary dieback in the CBRA, a flashing visual alarm shall alert operators to a condition where manual intervention is required.

The following conditions shall trigger the Bag Waiting Alert on the BSD:

- If the BIS is available and a bag requiring manual intervention (i.e., pressing a button) is queued at the adjacent BRP, a bag waiting timer shall start.
- If the bag is left unattended for 15 seconds, the BSD shall display a flashing BAG WAITING TOO LONG message in red until an action is taken on the bag as shown in the example in Figure 14-23. This applies to all bag type screens.
- If the bag is left unattended for 45 seconds, the bag shall advance to an available downstream BRP.
- After the 45 seconds have expired the BHS shall lock out the search bag button for 3 seconds before the bag departs to the next available Downstream BIS.

Figure 14-23: Example of Bag Waiting Alert for Alarm Bag Screen

| Transportation Security Administration |                       | Station - 01 | DISABLE |
|----------------------------------------|-----------------------|--------------|---------|
| Bag Status: ALARMED                    |                       |              |         |
| IATA ID: 7410852963                    | Pseudo ID: 0123456789 |              |         |
| EDS ID:                                |                       |              |         |
| BAG WAITING TOO LONG!                  |                       |              |         |
| SEARCH                                 |                       | REINSERT     |         |

## 14.6 General CBRA Design Considerations

The following sections describe general design considerations for CBRA including Architectural, Mechanical, Electrical and Spatial design.

### 14.6.1 Bag Storage Capacity

The TSA staffing methodology allows for 10 minutes of bag processing in CBRA per TSO. Therefore, the CBIS design shall be capable of storing the proper quantity of bags needed to avoid system diebacks. The following equations shall be used to determine the bag storage needed to meet this requirement:

$$Total\ Bags_{to\ accommodate} = \frac{10\ min}{Average_{screening\ time}(min)} \times Quantity\ of\ BISs_{Alarmed/OOG}$$

$$Bag\ Storage\ Capacity = Total\ bags_{to\ accommodate} - Quantity\ of\ BISs_{Alarmed/OOG}$$

For example, Table 14-3 shows how the storage capacity changes based upon the number of BISs and the average processing times.

**Table 14-3: Example of CBRA Accumulation**

| # of BISs | Default BRPs/<br>Intermediate Queue | Bag Storage Capacity Needed for<br>Domestic @ 2.87 min/bag | Bag Storage Capacity Needed for<br>INTL @ 3.2 min/bag |
|-----------|-------------------------------------|------------------------------------------------------------|-------------------------------------------------------|
| 4         | 6                                   | 10                                                         | 9                                                     |
| 8         | 12                                  | 20                                                         | 17                                                    |
| 12        | 18                                  | 30                                                         | 26                                                    |
| 16        | 24                                  | 40                                                         | 34                                                    |
| 20        | 30                                  | 50                                                         | 43                                                    |
| 30        | 45                                  | 75                                                         | 64                                                    |
| 40        | 60                                  | 100                                                        | 85                                                    |

When analyzing the bag storage capacity needed for a particular design, the ILDT shall consider the third and fourth column from Table 14-3.

For instance, using a CBRA with four BISs and an average screening time of 2.87 minutes, the conveyor system will need to accommodate up to 10 bags. Since the layout will include four BRPs and two intermediate queues, another four bags will need to be stored somewhere else.



The bag storage capacity shall be achieved using a combination of queues or other cost-effective means between the OSR 2nd/last chance divert point and the entrance to the CBRA as well as BRPs and Intermediate Queues within CBRA.

### 14.6.2 Architectural Features

The CBRA shall be fully enclosed with segregating partitions extending to the structural deck to allow for the security and comfort of the TSOs. Conveyor wall penetrations in CBRA shall be equipped with security doors to completely secure the CBRA when the conveyor system is not running. The CBRA shall be provided with finished horizontal and vertical surfaces as follows:

- **Flooring** shall be composed of a safety/anti-fatigue material configured for a continuous installation under all TSO work and movement areas except for MIT pathways with a service-life of no less than seven years. Flooring shall extend at least 12" beneath stationary table edges on all work and movement sides.
- **Walls** shall have durable, impervious surfaces, such as painted masonry, plastic laminate or drywall that is taped, bedded, and textured with epoxy or enamel paint.
- **Ceilings** shall include the use of painted suspended drywall, or suspended, lay-in acoustical tile at a minimum height of 9 feet. An acceptable design can include exposed structure with no ceiling. See Section 14.6.8 below for noise abatement recommendations.
- **Access** shall be provided with at least one set of double doors (or a rollup door) for access for equipment movement into and out of the area.

### 14.6.3 CBRA Physical Space Requirements

The size of the CBRA is dictated by the number of queues and BISs required to adequately meet the screening demands of the CBIS and is based on DBU+15 values to ensure room for growth is available if needed. For space allocation planning, the CBRA shall be sized to accommodate the number of BISs that would be allocated based on the number of non-redundant EDS required at DBU+15.

The space requirements for the staging of OS bags shall be based on the individual airport handling of OS bags. If the OS bag screening is performed in the CBRA, the airlines may send multiple bags via carts.

Space shall be allocated for the storing of hazardous materials outside of the CBRA. The hazardous materials storage space requirement shall be based on the historical accumulation of these materials and the frequency with which the airport collects them.

The only equipment installed in the CBRA shall be directly required for the operations in that space, e.g., SVSs, BISs, and BSDs. No other equipment such as motor control panels, UPSs for EDS equipment, IT racks or any other equipment not directly related to CBRA operations shall be installed in the CBRA.



Verification with local authorities is required to ensure routes of egress within and external to the CBRA comply with applicable IBC and NFPA 101 Life safety codes. Primary access and egress pathways to the CBIS must not pass through the CBRA.

Consultation with local authorities is necessary to determine proper protocols and routing for the removal of threat bags from the CBRA including a designated exit path for TSOs when a threat is discovered, this also includes adequate access to the CBRA for local authorities with threat containment units or bomb disposal robots.

### 14.6.4 Lighting

Proper illumination is required in the CBRA to allow the TSOs to perform their duties without unnecessary fatigue and eye strain. Luminance shall be measured at the surface of the BIS and found to be in the range of 500 to 750 lux. In other areas of the CBRA, the luminance shall not fall below 300 lux.

These values are easily realized with the proper placement of light sources. Color rendition by the TSO is important. Color corrected and full spectrum lighting lamps shall be used, and fluorescent lights are preferred.

### 14.6.5 Heating, Ventilation, and Air Conditioning

The CBRA shall be a climate-controlled space. Temperature and humidity control shall be supplied commensurate with the locale. A separate temperature control thermostat shall be provided for the CBRA.

If forced-air ventilation is provided, fresh outside air shall be delivered to the CBRA at rates specified by the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Standard 62.1-2016 *Ventilation for Acceptable Indoor Air Quality*. The CBRA shall be under positive pressure relative to ambient BHS areas to minimize the migration of contaminants (e.g., products of combustion from tugs and vehicles, as well as outside dirt, dust, and debris) from entering the CBRA.

### 14.6.6 Power and Communications

Power shall be provided to the CBRA to support TSA- and airport operator-provided equipment. The Project Sponsor shall coordinate the final requirements based on the actual equipment list and layout, but as a minimum:

- Two quad receptacles (120V/20A) shall be provided for each BIS to support screening operations and ancillary equipment.
- One duplex receptacle shall be provided on the end of the back wall between the two BISs for cleaning personnel access.
- Convenience outlets shall be provided on the perimeter walls as required by local codes.



The CBRA requires both voice and data communication provisions. The ILDT will determine the requirements based on the actual equipment selected for the CBRA, but at a minimum:

- A telephone shall be provided for use by TSOs, with access to the airport communication network, and for placing outside calls.
- All cabling and associated outlets shall be installed in a location where they cannot to be damaged by BISs or cause a safety hazard.

### 14.6.7 Connectivity to TSA Network

The connection of the CBRA ETD equipment to the TSA Network (TSANet) shall be provided via a “Dual Drop” consisting of 2 RJ45 Cat6/Cat6a connections terminated at a wall or floor box.

In addition, the following requirements shall be met:

- All core drilling shall support a minimum of 4 “Dual Drops”
- All new fiber installations shall be single 6-strand bundles enclosed in innerduct
- All cabinet installations require 2 110v 20A service
- All cabinet installations shall meet the local seismic rating requirements and can be floor/bracket mounted

### 14.6.8 CBRA Noise Abatement

The CBRA shall have adequate acoustical insulation to ensure the background noise levels do not exceed 70dBA as measured at the natural TSO standing points at each screening station using a time-weighted average over an 8-hour shift.

### 14.6.9 Ergonomic Design Dimensions

Peripheral equipment stations shall have sturdy and durable mounting systems that are adjustable to allow TSOs to function from a standing position with good posture in accordance with DOT/FAA/CT-03-05, Human Factors Design Standard for Acquisition of Commercial Off-the-Shelf, Non-developmental, and Developmental Systems to accommodate the 95th percentile male and 5th percentile female.

### 14.6.10 Conveyor System Crossovers and Catwalks

CBRA conveyor system crossovers shall consist of up and down treaded stairs, a full railing system, and a toe-boarded catwalk. Crossover configurations can be straight, L-shaped, U-shaped, or Z-shaped to conform to existing immovable structures within the CBRA footprint. TSA access stairs and handrails in and around CBRA used on a routine basis shall be compliant with the current OSHA 1910.25 or IBC 1011 code, whichever is more stringent.



### 14.6.11 Conveyor Belt End Points on Alarm Line

End points of in-bound conveyor belts shall have a photo eye installed across the conveyor belt to stop baggage from falling off the end. Termination photo eyes shall be located sufficiently upstream to prevent baggage straps from becoming entangled in the conveyor belt at the end point.

### 14.6.12 Design for Safety

The Alarm Line conveyor belt surfaces shall be smooth or semi-smooth to facilitate easier baggage removal. Such surfaces minimize the amount of exertion required by TSOs to remove bags from in-bound belts.

All motor drives and associated tracking devices shall not be intrusive to the screening workspace. The design shall use motor drives mounted on the opposite side of the inbound and outbound lines from screening personnel or, if this is not feasible, the designers shall ensure that all hazardous moving parts (e.g., drive shafts, roller spindles, bearings, bearing components etc.) are guarded and free from sharp or pointed edges to prevent accidental contact.

End caps shall be installed on conveyor shaft bearing assemblies within TSO-occupied spaces to avoid operational hazards. End caps shall be attached to conveyor shaft bearing assemblies via mounting hardware. Press fit end caps or caps retained by tabs shall not be used.

Any moving part located in any area of the CBRA where TSOs are required to perform their duties shall be shielded to avoid injury.

The CBRA shall be designed to comply with TSA's "no-lift" policy.

All aspects of the CBRA layout shall consider the requirements for maintenance and custodial services access as stated in Mil Standard 1472G Section 5.9.



**CHAPTER 15: CBIS OPERATING AND MAINTENANCE BEST PRACTICES**



### 15.1 CBIS Operating Best Practices

During the Operations and Maintenance stage, the ILDT and TSA operate the CBIS and monitor its performance. TSA HQ is available to support local stakeholders in CBIS troubleshooting and improvements when needed. However, many potential operational issues can be avoided by heeding the collective lessons learned of the industry.

Designing an optimal CBIS should include implementation of design practices that will ensure optimal CBIS O&M. High quality and cost-effective operation and maintenance of CBISs can help maintain good performance of the CBIS and prevent unnecessary performance degradation. CBIS performance monitoring can be used to help identify corrective maintenance and schedule preventive maintenance actions to improve the overall operations.

This section discusses CBIS O&M best practices that designers should be cognizant of during the CBIS design phase. Optimal CBIS design allows for implementation of O&M best practices when the CBIS is operational to ensure a high-quality and cost-effective CBIS operation.

#### 15.1.1 CBIS Remote Reporting Workstation

A CBIS Remote Reporting Workstation (a real-time display of key CBIS statistics and data) in the BHS control room is important to facilitate cost-effective monitoring and quick detection of any CBIS performance degradation or malfunction.

One recommended method of designing and implementing a CBIS Remote Reporting Workstation is to use a separate thin client Internet-based system from the BHS control system to combine the output into one user-friendly dashboard. Output information is displayed on screen and allows for audible and visible alarms when required.

#### 15.1.2 CBIS Reporting Trends

One of the most effective tools used to monitor CBIS performance, ensure seamless operations, and quickly identify and address problems is to be able to review CBIS operating trends. The following are key trends that provide important information about CBIS performance and are vital to detecting CBIS performance degradation:

- Increase in CBRA error percentages – The error rate established when the system was commissioned should remain within a relatively constant range. An increase trend can signal that more bags are labeled as unknown or error bags, which may be due to CBIS performance degradation or malfunction (e.g., bag tracking system).
- EDS false alarm rates – EDS false alarm rates should remain relatively constant over time (assuming no changes in protocol). An increasing or decreasing trend may indicate degradation in the CBIS or EDS performance.





### 15.1.3 CBIS Testing

The most valuable CBIS tests are often the most difficult, and costly, to perform. A complete battery of tests cannot be completed on a live CBIS without a severe interruption of regular operations. Therefore, in addition to the above-mentioned improved diagnostics and monitoring CBIS trends using reports, spot checks (subsets of the ISAT) are the best way to ensure that the system is efficient, secure, and not deteriorating.

Ensuring that EDS-required detection levels are maintained can be achieved through the periodic use of test bags, such as the TSA-qualified OTK kit or other TSA-qualified test bags. Designers should allow for the conduct of such periodic testing as seamlessly as possible with regular operation of the CBIS. An example of such design principles is communications system between TSO testing at the EDS and TSO testing at the CBIS control room (TSOs need to switch the EDS to test mode and switch back to regular screening mode after the test is complete).

### 15.1.4 BHS O&M Contracts

System monitoring should be used to avoid “break-fix” contracts, which allow for the slow deterioration of the system. Performance metrics should be used to monitor system performance for maintenance contracts.

### 15.1.5 Communications

An important key element to ensuring efficient and high-quality CBIS operations is effective communication between all relevant stakeholders. Communication is vital to quickly identify and address problems that will inevitably arise during operation. Considerations related to communications between stakeholders should include the following:

- Ensuring that proper communication can occur between EDS and the BHS control room
- Improved communications between TSA and the BHS operator (e.g., BHS operators should be notified by TSA of any EDS failure)
- Review of data by all stakeholders (airport operators, airlines, airport engineers, TSA, BHS operators) and the scheduling of biweekly (or at least monthly) meetings to review both non-SSI and SSI CBIS reports

While Project Sponsors or airlines are usually responsible for BHS maintenance, TSA is responsible for the maintenance of the EDS, which are owned by TSA. As such, non-TSA personnel clearing bag jams from the EDS may create contractually challenging situations. Therefore, only authorized TSA personnel or other TSA designees are allowed to clear bag jams from EDS.

## 15.2 Maintenance Best Practices

Effective CBIS maintenance is an important element in ensuring that the CBIS is operating as required and is efficiently remediated during malfunctioning. The following is a list of recommended preventive and corrective maintenance best practices.



## 15.2.1 Maintenance Responsibility Matrix

TSA and the BHS operator (and the contracted maintenance providers) must have a clear picture of their responsibilities. A responsibility matrix should be created once the core team is established. An OTA or Memorandum of Agreement (MOA) document between TSA and the Project Sponsor should be created outlining all responsibilities and include technical upgrades to the CBIS. Table 15-1 identifies the equipment types which are procured, delivered, installed, and maintained by the TSA. All other equipment is the responsibility of the Project Sponsor.

**Table 15-1: TSA Procurement and Maintenance Responsibility Matrix**

| Category            | Equipment Type                 | TSA Procured | TSA Maintained |
|---------------------|--------------------------------|--------------|----------------|
| Screening Equipment | EDS, ETD                       | Yes          | Yes            |
| Ancillary Equipment | SVS, PVS, MCS, Network Server  | Yes          | Yes            |
| Ancillary Equipment | EDS Power Conditioning Devices | No           | No             |
| Furniture           | OSR Chairs                     | No           | No             |

## 15.2.2 Operator Training

Operator training is an important element in preventive maintenance, which, if conducted well, can improve CBIS operating time and Mean Time Between Critical Failure (MTBCF). Training should include items such as what the operator sees, hears, and smells to determine the correct operation of the CBIS. Operators should report anything unusual that can be an indication of required maintenance. For example, oil stains or smell of burning rubber/ plastic can be important indicators of a CBIS malfunction or an imminent malfunction and, if reported promptly and accurately, can be addressed with preventive maintenance. Training should also include Level 1 preventive and corrective maintenance requirements as identified by the equipment manufacturer (see Section 15.2.5).

## 15.2.3 Frequency of Preventive Maintenance

PM helps improve the reliability of the CBIS. There are two levels of PM for screening equipment. Level 1 PM consists of user-level activities such as inspecting and cleaning filters or replacing consumables at intervals specified in the OEM user manual. Level 2 PM is performed by trained service technicians every month, quarter, or year according to the OEM guidelines. Level 2 PM is conducted by the OEM during the warranty period and thereafter under TSA's Contractor Logistics Support contract.

BHS preventive maintenance should be performed daily, weekly, monthly, and semi-annually in accordance with the airport Project Sponsor maintenance contract.



### 15.2.4 CBIS Environment

The cleanliness of the overall CBIS environment can significantly affect the overall performance of the BHS and EDS, as dust and dirt can cause computers to malfunction. An adequate HVAC system often helps improve the performance of a CBIS over time and is, therefore, a worthy investment.

### 15.2.5 Aligning BHS and EDS Preventive Maintenance

Contractually, aligning BHS and EDS maintenance would be difficult; however, face-to-face communication can greatly improve this alignment and create good O&M synergy. This successful alignment typically varies from airport to airport. Best practices to allow for such successful alignment include:

- Routine maintenance
- Onsite teams
- Well-trained people
- Audit teams

Safety EDS maintenance best practices, that when implemented, have led to significant improvements in operating time and MTBCF of EDS include:

- Ensuring that work environments are safe for all personnel who work in the area.
- Providing and using appropriate personal protective equipment for service personnel
- Immediately reporting any injuries that occur on site

### 15.2.6 BHS Maintenance Best Practice

BHS maintenance such as the cleaning of photo eyes should not be performed during live bag operations.



**CHAPTER 16: INFORMATION TECHNOLOGY SECURITY**



### 16.1 Cybersecurity Overview

As airports continue to integrate advanced technologies to enhance operational efficiency and passenger experience, the importance of robust cybersecurity measures cannot be overstated. Airport Cybersecurity encompasses the protection of information systems, networks, and data from cyber threats, ensuring the integrity, confidentiality, and availability of critical infrastructure. This chapter introduces cybersecurity for airports and outlines best practices for use in CBIS.

It is expected in the future that TSA will release cybersecurity requirements for airport BHS and Industrial Control System (ICS) consistent with DHS Sensitive Systems Policy Directive 4300A and other related policies. TSA will require those systems to demonstrate not only initial but ongoing compliance to the cybersecurity requirements. It is recommended that any BHS/ICS provider proactively implement the cybersecurity controls that are outlined within this chapter. Future direction of CBIS and ICS systems will be interconnections with other airport and non-airport systems. As these interconnections roll out, TSA may require risk management profiles and documentation for understanding and mitigating cybersecurity risks associated with these interconnections. Please review the authorizations section below for more detail on risk management and authorizations of systems.

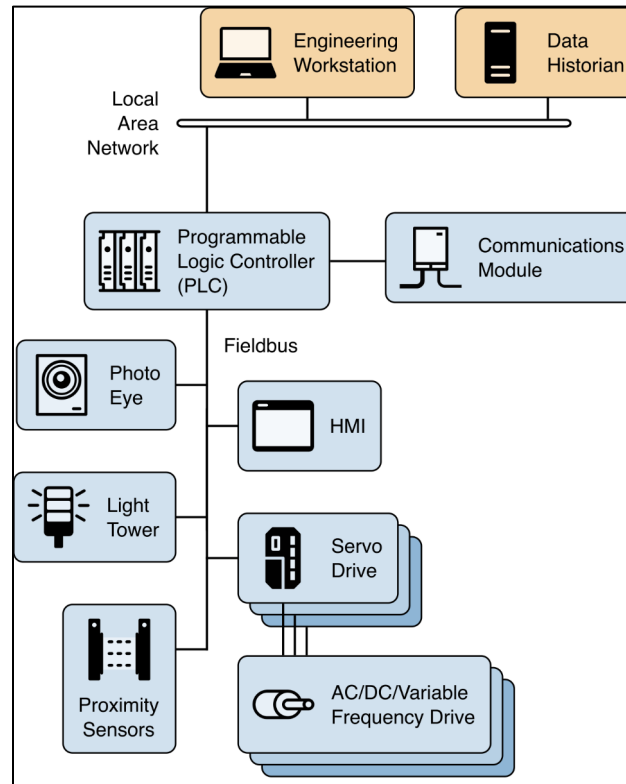
Airports are complex environments with interconnected systems that include passenger processing, baggage handling, air traffic control, and security screening. A cyber-attack on any of these systems can have significant consequences, including operational disruptions, financial losses, and compromised safety. Therefore, implementing effective cybersecurity measures is essential to protect against potential threats and vulnerabilities. The main Cybersecurity Goals and Objectives are:

- Confidentiality – Protect the confidentiality of sensitive information and system from unauthorized entities
- Integrity - Protect the integrity and accuracy of information and systems.
- Availability – Ensure systems and information are accessible to authorized users when needed.

The information provided in this chapter is derived from the National Institute of Standards and Technology (NIST) 800-82 and 800-171 Cybersecurity Framework, Transportation Security Administration (TSA) Information Assurance Handbook, Technical Standards (TS), Defense Information Systems Agency (DISA) Security Technology Implementation Guides (STIGs), NIST Cybersecurity for Industrial Control Systems (ICS), related TSA and DHS policies.

Figure 16-1 illustrates a discrete-component Industrial Control System, which is representative of the design used in most BHSs.

**Figure 16-1: Industrial Control System High-Level View**



Source: NIST: Guide to Operational Security, 2023

Industrial Control Systems of this type can be the target of cyber-attacks at both the computer and controller level. These cybersecurity best practices are set forth to guide vendors towards system integrity throughout the project lifecycle and system operational life.

The NIST Cybersecurity framework has five pillars (or functions) for managing risk in cybersecurity:

- (1) **Identify**—What processes and assets need protection?
- (2) **Protect**—Implement safeguards to ensure protection of organizations identified assets

- (3) **Detect**—Implement mechanisms to identify cybersecurity events
- (4) **Respond**—Develop mechanisms to respond and mitigate cybersecurity events
- (5) **Recover**—Implement processes to restore system service and capability that were compromised

These NIST functions are broken down into approximately 20 categories or families. The cybersecurity framework is meant to be an all-encompassing framework for the entirety of an enterprise system and function. Several areas would apply to back-office functions or be defined/owned by the airport/TSA environment. Examples of these are physical access control using door locks/badging systems and TSO cybersecurity training. These best practices guide seeks to pick out, constrain or identify the cybersecurity functions and controls that would be applicable for a system implementer to provide as part of the installed BHS system and operating environment. The following NIST categories (and their associated two-digit identifier) are most applicable to a CBIS Industrial Control System and meet the above criteria. These six categories are detailed in this chapter:

- Access control
- Assessment, Authorization, and Monitoring
- Identification and Authentication
- Media Protection
- System and Information Integrity
- System and Communications Protection

### 16.2 NIST Controls

The NIST functions are broken down further within the defined categories into individual controls. Per the NIST 800-53 Revision 5 specification, Controls can be viewed as descriptions of the safeguards and protection capabilities appropriate for achieving the particular security and privacy objectives of the organization and reflecting the protection needs of organizational stakeholders. Actual designation and subsequent implementation of the controls are requirements. Requirements are a set of specifications that define the functional, assurance, and strength characteristics for a mechanism, system, or system element.

#### 16.2.1 Access Control (AC)

The first steps towards securing the Industrial Control System from cyber-attacks is to establish means to control access to the system. This control family focuses on limiting access to systems, applications, and data to authorized users, processes, or devices. It ensures that access is granted based on the principle of least privilege and need-to-know. Access control includes the following:

- Account Management—Creation and maintenance of individual user accounts, role-based access, and group level permissions
- Access and Information Flow Enforcement—Enforce approved authorizations for logical access to information and system resources in accordance with applicable access control policies; enforce approved authorizations for controlling the flow of information within the system and between connected systems
- Least Privilege—Employ the principle of least privilege, allowing only authorized accesses for users (or processes acting on behalf of users) that are necessary to accomplish assigned organizational tasks
- Session Monitoring—Monitor active sessions to prevent users from having multiple active sessions

### 16.2.2 Assessment, Authorization, and Monitoring (CA)

This control family ensures that information systems are assessed for security risks, authorized for use, and continuously monitored to maintain compliance with security requirements. The control objective for this control family is to ensure that security and privacy controls are effective and remain so over time. Continuous monitoring is a key component, enabling organizations to detect and respond to changes in the system environment or emerging threats in real time.

- Demonstrate initial compliance with Cybersecurity requirements for systems before deployment.
- Continuously monitor systems for compliance, system/application events, and cybersecurity events.

#### 16.2.2.1 Authorizations

The overall goal of the application of the NIST framework is to provide guidance towards required cybersecurity postures and controls for Original Equipment Manufacturer (OEM) supplying systems and equipment operating as Checked Baggage Inspection Systems (CBIS). The NIST Risk Management Framework (RMF) can be used to validate systems towards the Authority to Operate (ATO) for certain systems operating as federal information systems. It may be required that any Vendor providing the ICS for CBIS systems to enter or participate in specific Cybersecurity Interconnection Service Agreements (ISA) and/or Memorandum of Understandings (MOU) as part of the ATO.

ATO is a formal declaration issued by an Authorizing Official (AO), granting approval for a federal information system on a Federal Information Security Modernization Act (FISMA) boundary to operate within a defined cybersecurity risk tolerance. Interconnected systems at an airport may be part of an airport Authority to Operate (ATO). NIST Special Publication 800-47, “Security Guide for Interconnecting Information Technology Systems”, provides guidance on identifying risks associated with interconnectivity of systems, identifying data exchanged between the systems



and defining controls necessary for mitigating those risks. The assigned AO may be from the TSA Information Technology (IT) or be other delegated officials like contractual Program Managers (PM) or division heads.

Interconnections between TSA systems and non-TSA systems most likely will require written management authorization per OMB Circular A-130, “Management of Federal Information Resources”, alongside a risk assessment. The type and complexity of the interconnection will guide as to the appropriate agreement document. Typically, these interconnections include:

- Information Exchange Agreement (IEA)
- Interconnection Service Agreement (ISA)
- Memoranda of Understanding (MOU) and/or Agreement (MOA)

More complex interconnections may require other documents up to and including contracts and Non-disclosure Agreements (NDA).

### 16.2.2.2 Logging

The Industrial Control System should implement methods to assure that there is logging of differing events of the system for review. Application, system, and security events of anomalies and events leading up to the issues should be recorded. Event data should be consistently formatted with proper datetime stamps.

### 16.2.3 Identification and Authentication (IA)

The Identification and Authentication control family helps to protect the identities of users and devices. This control family includes controls such as multifactor authentication, which requires users to provide more than one form of identification before being granted access to a system. The Authentication control family also includes controls such as device identification and device access. These controls help to ensure that devices are correctly identified and that they have not been tampered with. By implementing the controls in this family, organizations can help to protect the identities of their users and devices. Identification and Authentication controls include:

- Uniquely identify and authenticate organizational users and associate that unique identification with system user accounts
- Uniquely identify and authenticate devices before establishing connection
- Implement mechanisms for authentication to a cryptographic module that meet the FIPS 140 requirements.

### 16.2.4 Media Protection (MP)

The Industrial Control System should implement methods to assure that the users of the system exercise good information security with regard to external media system files, and the system hardware. These devices are generally used to transfer data and applications in/out of the system.

This control family includes controls such as data classification, and media sanitization. Data classification is the process of assigning a label to data based on its sensitivity, which helps to ensure that only authorized personnel have access to the data. These controls are essential for protecting media and files from unauthorized access or use, for ensuring the safe storage of media and files. Systems should implement proper encryption techniques and technology as part of those protections.

### 16.2.5 System and Information Integrity (SI)

This control family focuses on ensuring that systems and information remain accurate, complete, and protected from unauthorized changes or malicious activities. It includes measures to detect and respond to security threats, such as malware, unauthorized modifications, or data corruption. By implementing these controls, organizations can maintain the integrity of their systems and data while reducing the risk of compromise and tampering. Implementing these controls can help to safeguard organizational assets and reduce the risk of security breaches, system communication failures and other risks to system availability.

- Deploy anti-virus and anti-malware solutions to detect and prevent malicious code.
- Monitor systems for unauthorized changes or suspicious activity.
- Apply OS and application security patches and updates promptly to address vulnerabilities

### 16.2.6 Systems and Communication Protection (SC)

The System and Communications Protection family focuses on securing the transmission of data and protecting systems from unauthorized access or interference. It includes controls for encrypting data in transit and at rest, implementing secure communication protocols, and protecting against network-based threats. These measures ensure confidentiality, integrity, and availability of information as it is transmitted and processed across systems.

- Use encryption to protect data in transit and at rest.
- Implement secure communication protocols.
- Segment networks to isolate sensitive systems and data.
- Monitor and control communications at external and internal boundaries.
- Protect against denial-of-service (DoS) attacks and other network-based threats.

### 16.2.6.1 Firewalls

Network firewalls to control the flow of network traffic should be employed. The firewalls should restrict connectivity to and from internal and external networks to those with a need-to-know.

It is recommended that additional firewalls be employed to further restrict inter-subnetwork communications between functional security subnets and devices.

- [NIST SP 800-82 Rev. 3, Sep 2023 Guide to Operational Technology \(OT\) Security | CSRC](#)
- [NIST SP 800-41 Rev.1 Sep 2009 Guidelines on Firewalls and Firewall Policy](#)
- [NIST PUB 1800-10 Mar 2022: Protecting Information and System Integrity in Industrial Control System Environments](#)

### 16.3 Network and Switch Fabric

Any network and switch fabric should implement other methods to assure overall system integrity and security. The following sections detail how this network fabric should be secured.

#### 16.3.1.1 Network Segregation

In the past, CBIS and ICS systems were air-gapped or segregated from other systems. This is a last-ditch cybersecurity control that mitigates outside security issues by completely separating networks and allowing no communication between them.

Future systems will be defined by the interconnection of other networks that provide various services that enhance the CBIS and ICS equipment and processes. Network segmentation is the practice of dividing a computer network into smaller, isolated segments to enhance security, performance, and manageability. Unlike network segregation, segmentation allows for secure interconnectivity, enabling operational flexibility while maintaining robust security controls. Segmentation can be achieved through methods such as VLANs (Virtual Local Area Networks), firewalls, or other networking methods. This approach is a key component of a strong cybersecurity strategy.

A typical in-line CBIS will have several network layers including some of the following:

- Device level networks such as DeviceNet or Actuator Sensor Interface.
- Industrial control networks such as Ethernet IP, ControlNet or Profibus.
- High-level networks such as Ethernet.

Each network should include only the equipment necessary for that network. The following networks should be segmented from all other networks:

- **BHS and EDS networks.** The BHS or any other airport network should not be directly connected to the network used by the EDS for transmission of images, e.g., the Smiths MUX or Leidos OptiNet without approved firewall controls.
- **TSA data network.** Neither the BHS nor any other airport network should be directly connected to the TSA data network unless specifically directed and authorized by TSA without approved firewall controls.

Wireless networks, whether part of the CBIS or its control system, should use the guidelines as noted in NIST Special Publication SP 800-153 Feb 2012 *Guidelines for Securing Wireless Local Area Networks (WLANs)*.

### 16.3.1.2 External Connections

Remote access should be enabled only when required. Normal users may require on-demand remote access, but vendor support may only require remote access in rare instances. Therefore, vendor user IDs should be disabled until they are required to be enabled and then disable them once again when they have completed their task. This technique can be applied to any group of users who require only intermittent access. Alternatively, external network connections can be physically disconnected or otherwise made inaccessible when not needed.

### 16.3.1.3 Remote Access

Systems allowing remote access should employ appropriate security measures. **All remote access capability and protections schemes should be reviewed and approved by onsite TSA.** At a minimum, the system should be secured as noted in the SC and SI sections. Further information regarding remote access can be found in the documents noted in firewall section.

## 16.4 Incident Handling and Response

The ILDT should make any onsite support team aware of how to report cybersecurity related attacks. The Onsite support team should consult the TSA prior to operations on proper cybersecurity incident reporting.

## 16.5 Cybersecurity Reference

Further reading on DHS defined basic cybersecurity steps for Industrial Control Systems can be found at:

- [DHS-NCCIC Seven Strategies to Defend ICS \(2015\)](#)

## 16.6 Advanced Surveillance Program Video Surveillance

TSA's Advanced Surveillance Program (ASP) recommends the following best practices for all video surveillance systems:

- The system installed should be configurable, expandable, and have a hierarchy of access levels, user IDs and passwords.
- All recorded videos should be able to be stored for a minimum of 30 days; airports may choose to increase the length of storage based on local considerations.
- Cameras and displays should be positioned to minimize any impact on the quality or performance of the video displayed due to light glare.
- Video data should be in a format suitable for use by all airport stakeholders (e.g. local TSA, local law enforcement, airport authority, etc.).
- Video surveillance workstations should be provided at reasonable locations.

Table 16-1 shows the recommended minimum Fields of View (FOVs) to be captured using any number of devices.

**Table 16-1: ASP Recommended Fields of View**

| Field of View         | Summary                                   | Capability                                                                                                                                                                                     |
|-----------------------|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EDS Entrance          | FOV is the baggage entering the EDS unit. | FOV enables effective situational monitoring of this area; specifically, the view enables identification of baggage by shape, color, and - if applicable - identification of the EDS operator. |
| EDS Exit              | FOV is baggage exiting the EDS unit.      | FOV enables effective situational monitoring of this area; specifically, the view enables identification of baggage by shape, color, and - if applicable - identification of the EDS operator. |
| OSRA                  | FOV is OSR alarm resolution area.         | FOV enables effective situational monitoring of this area; specifically, the view enables identification of personnel performing screening and monitoring of primary viewing station in OSRA.  |
| Overhead View of CBRA | FOV is overhead view of CBRA.             | FOV enables effective situational monitoring of this area; specifically, the view enables monitoring of the baggage as it is taken to the bag inspection table.                                |
| CBRA Baggage Entrance | FOV is baggage entering CBRA.             | FOV enables effective situational monitoring of this area; specifically, the view enables identification of baggage by shape and color.                                                        |

| Field of View                                  | Summary                                                                                                                           | Capability                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CBRA Baggage Inspection Tables                 | FOV is bag contents screening and ETD Sampling.                                                                                   | FOV enables effective situational monitoring of this area; specifically, the view enables identification of baggage by shape and color; view includes screeners handling any items from the passenger property; identification of individual items removed from and returned to baggage should also be included in the view.                  |
| CBRA ETD Machine                               | FOV is screener collecting samples to be placed into ETD, screener placing sample into ETD machine, and results from ETD machine. | FOV enables effective situational monitoring of this area; specifically, the view enables identification of screener and identifies if ETD machine alarmed.                                                                                                                                                                                   |
| CBRA Exit to Reintroduction / Reinsertion Belt | FOV is baggage exiting CBRA for EDS re-screening.                                                                                 | FOV enables effective situational monitoring of this area; specifically, the view enables identification of baggage by shape and color; view also enables identification of personnel placing baggage onto belt.                                                                                                                              |
| CBRA Exit to Cleared Belt                      | FOV is baggage exiting CBRA for entry into Cleared Belt.                                                                          | FOV enables effective situational monitoring of this area; specifically, the view includes belt and enables identification of baggage by shape and color and identification of personnel placing baggage onto Cleared Belt.                                                                                                                   |
| Personnel Entrance to CBRA                     | FOV is personnel entrance to CBRA.                                                                                                | FOV enables effective situational monitoring of this area; specifically, the view enables identification of any persons entering the CBRA along with identification of baggage entering CBRA in their possession.                                                                                                                             |
| CBRA Personnel Exit                            | FOV is personnel exit from CBRA.                                                                                                  | FOV enables effective situational monitoring of this area; specifically, the view enables identification of any persons exiting the CBRA along with identification of baggage leaving the area in their possession.                                                                                                                           |
| OS / OOG                                       | FOV is baggage entering OS / OOG belt and then entering the CBRA.                                                                 | FOV enables effective situational monitoring of this area; specifically, it enables identification of baggage by shape and color; if applicable, allows the identification of the EDS operator. View enables monitoring of the baggage as it is transferred to CBRA. Coverage is sufficient to enable review of baggage screening procedures. |

---

## SECTION IV: APPENDICES

The following PGDS Appendices are included herein:

- Appendix A: Forms and Templates
- Appendix B: Generic Examples of Checked Baggage Inspection Systems
- Appendix C: Generic BHS and CBIS Responsibility Matrix
- Appendix D: References
- Appendix E: Requirements Lists



**Appendix A:**  
**Forms, Templates, Outlines and Examples**



This appendix provides the following resources to support implementation of guidance and requirements in the PGDS:

- A.1: CBIS Use and Logistics Training Example
- A.2: CBIS Operations Guide – Sample Outline
- A.3: Baggage and Data Flow Chart Examples
- A.4: Daily CBIS Report Examples
- A.5: PGDS Request for Variance (RFV) Form
- A.6: CBIS Change Request (CCR) Form
- A.7: Field Data Reporting System (FDRS) Request Form
- A.8: Industry Comment Template

**A.1 CBIS USE AND LOGISTICS TRAINING EXAMPLE**

The following is an example outline for the required documentation for training TSA on the use and logistics of the CBIS.

- Startup and shut down procedures
- Overall bag flow from ticket counter to CBRA
  - Description of bag flow
  - Identify Conveyor subsystems
  - Conveyor subsystem nomenclatures
  - Listing of Photo eye identification numbers correlated to conveyor subsystems
- Bag hygiene for the ticket counter induction and the reinsertion line
- BMA settings
- Fail-safe procedures
- Bag jam clearing procedures including at a minimum:
  - Applicable activation of E-stop controls (this is not a requirement for the actual clearing of the logical fault)
  - Lock out/tag out procedures
  - Removal of articles from the affected jam location
  - Proper reinsertion of the affected articles either upstream or downstream of the jam location, depending on the specific zone (pre-EDS, post-EDS, fail-safe, etc.). In any tracked portion of the EDS, care should be taken to ensure proper bag spacing when placing articles back onto the respective conveyors to ensure bags are not re-inserted into another bag's tracking window.
  - Restart of the affected conveyor subsystem via normal operating protocol
  - Safe personnel maneuvering in and around the jam area
  - Restrict bag jam clearance from an EDS to only authorized TSA personnel or other TSA designees
- E-stop procedures and zones
- CBIS OSR settings
  - List the available travel time for OSR per EDS line
- CBRA Procedures
  - Defining the CBIS BSD Statuses
  - Cross reference of CBIS BSD Statuses to EDS disposition code
  - Bag Removal from the BRP

- Transfer of Bag Information from BRP to BIS
  - Search for Unknown bags
- CBIS reporting—specifically the Daily EDS reports as outlined in Section 12.12.3
  - How to retrieve
  - How to interpret
- Reintroduction Line procedures
- Appendix
  - Description of operations document for the CBIS
  - Bag handling policy
  - Fail-safe Procedures
  - Jam procedures
- CBIS Interface
- OTK Mode for Daily Operational testing
- Protocol for coordination aspects between OSR and CBRA
- The Local TSA will supplement the CBIS training manuals with the following information:
  - Train the OSARP refresher course (recommended)
  - Provide applicable documented policies and Standard Operating Procedures (SOPs)
  - Correct ETD protocol for Unknown Bags
  - Proper protocol for alarm resolution
- Develop and train OOG procedures (valid vs. invalid)
- Update Staff Allocation Model to ensure proper staffing levels
- Ensure proper inventory of inspection station equipment (i.e. keys, tape, bolt cutter, box cutter)
- Confirm EDS unit location and serial number information for reporting purposes (Performance Management Information System, etc.)
- Specialized Screening—weapons, pets, etc.

**A.2 CBIS OPERATIONS GUIDE – SAMPLE OUTLINE**

The following Sample outline provides an example of current industry standard for CBIS Concept of Operations.

**Title page**

- Three letter code of the airport in which the system is located
- Title of Project
- Date of System (based on actual date of beneficial use)
- Project Number (as appropriate)

**Fore Matter**

- Record of Revisions
- Table of Contents

**Chapter 1 - Operational Terms and Definitions**

- Chapter Index
- Glossary of operation-related terms and equipment identification/designations
  - Manufacturer codes and abbreviations
  - Operational terminology and abbreviations
  - Symbols
- Other related information, such as
  - Conveyor ID marking rules
  - Equipment information needed for maintenance calls

**Chapter 2 - System Overview**

- Chapter Index
- System overview – high-level description, diagrams
- Inputs – locations, number of and types of inputs
- Outputs – locations, number of and type of sort areas
- Functional areas and system design

- Ticket counter
- Oversize and Out-of-Gauge processing
- CBIS and CBRA
- Sortation system – BMAs, ATRs, manual encoding, makeup
- Control stations
- System and subsystem conveyor designations
- Processing rate of each subsystem and the total system

**Chapter 3 - Baggage Weight and Size Limitations**

- Chapter Index
- Normal Size Baggage
- Baggage that can be processed by system but requires special considerations/handling (i.e., skis and golf bags)
- Fragile Baggage
- Oddsize Baggage

**Chapter 4 - Detailed Description of System Operation**

- Chapter Index
- Detailed operational description for each system and subsystem, with sufficient detail to provide operational personnel such as ticketing agents, service baggage handlers, skycaps, and TSA agents a thorough understanding of how to operate the system, including:
  - System start-up, shut down, operational stop/start control stations, jam reset, and emergency stop operational requirements
  - Baggage loading procedures relative to placement of bar coded bag tags
  - System fault annunciation
  - Sortation controllers, computers, and workstations
  - All graphic display information systems
  - Specific sortation controller operation
  - Placing equipment "in" or "out" of service
  - ATRs
  - BDDs
  - Handheld bar code scanner guns

- Bag status displays
- Creation of flight/sort assignment tables
- All operator-initiated reports
- All system automatically generated reports
- All system fault alarm messages and reports
- Explanation of interaction with system, including:
  - o Thorough explanation and purpose of each command message or report
  - o Required keyboard or operator response
  - o All operator interface command entries
- Operator's troubleshooting guide
- Procedures and recommendations for alternative modes of system operation as may be required due to various equipment or subsystem failures

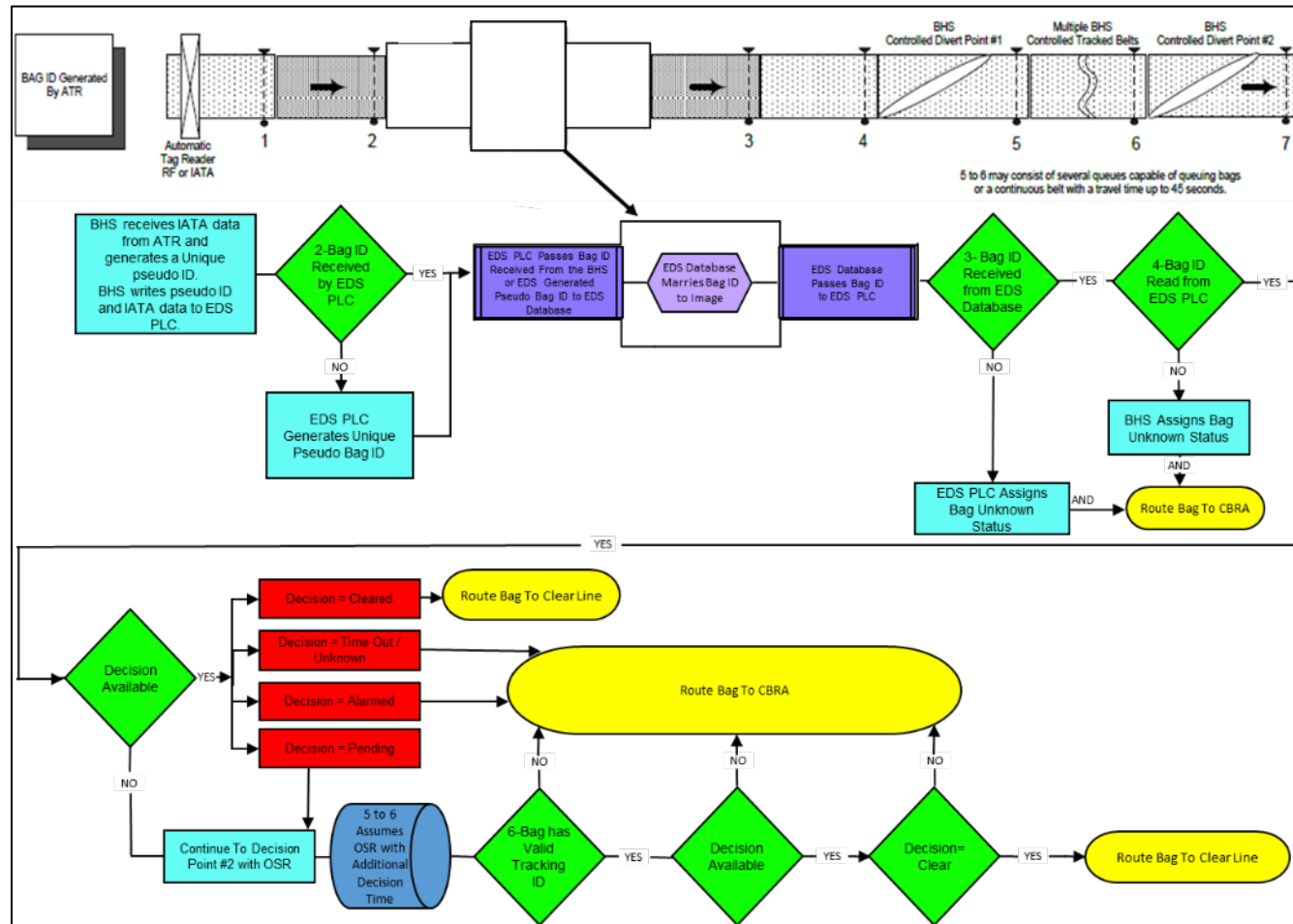
**Chapter 5 - Operational Safety**

- Chapter Index
- Safety information related to the proper and safe operation of the specified system and its equipment from an operator's point of view reflecting the most current OSHA, American National Standards Institute (ANSI) and local code, policies and standards and covering at minimum:
  - Pre-operating procedure
  - Start-up and shut-down procedure
  - Emergency stop and restart procedure
  - Jam detection, jam clearance and restart procedure
  - Equipment lockout/tag-out procedures

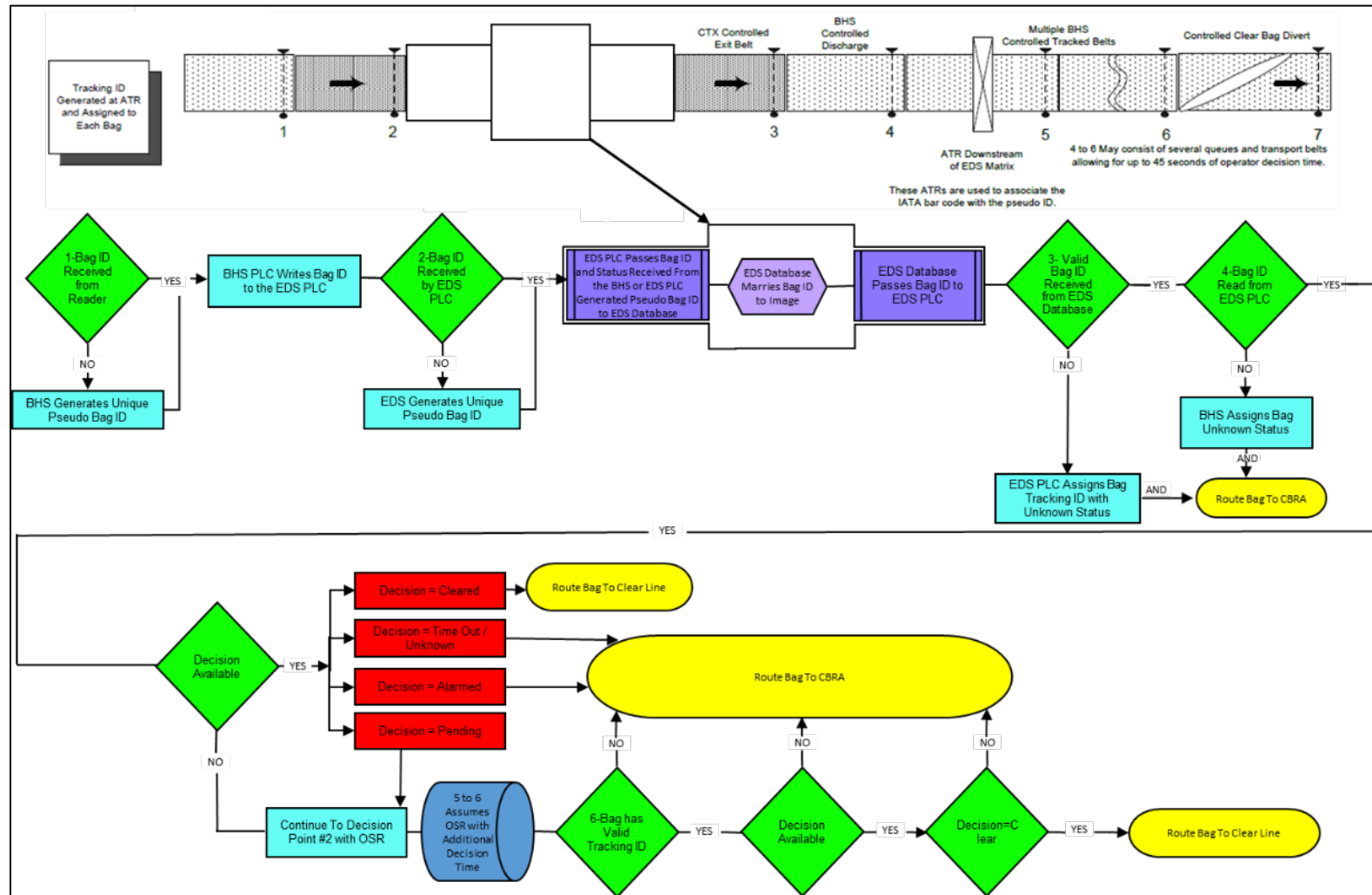
**A.3 BAGGAGE AND DATA FLOW CHART EXAMPLES**

Appendix Figure A-1 and Appendix Figure A-2 show generic examples of EDS/BHS/CBRA data flows with upstream and downstream ATRs.

Appendix Figure A-1: Baggage and Data Flow Chart with Upstream ATR



Appendix Figure A-2: Baggage and Data Flow Chart with Downstream ATR





**A.4 CBIS REPORT EXAMPLES**

The following report examples are intended to provide designers and programmers with formats and the level of detail necessary to meet the reporting requirements stated in Section 12.12.3. Reports that contain SSI will contain appropriate markings.

Reports will include footers containing term definitions and any equations used for metric calculations to provide transparent data interpretation. These definitions and equations may differ from system to system and can depend on how the system is programmed to operate. Note that some figures show example footers with example definitions and calculations for illustrative purposes but are incomplete. Actual report footers will have definitions for each term on the report and all calculations. A separate page may be used if needed.

## A.4.1 DAILY CBIS SUMMARY REPORT

Appendix Figure A-3: Daily CBIS Summary Report

|  Transportation Security Administration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                        | <div style="border: 2px solid red; padding: 5px; text-align: center; color: red;"> <b>See Section 12.13 for reporting requirements</b> </div> |                   | <b>Daily CBIS Summary Report</b>                                          |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------------------------------------------------------|--------|-----------------|--|--|--|--|-----------------|----------|--------------|----------|-------|----------------|---|---|---|---|------------------|-----|-----|-----|-------|--------------|----------|--------------|----------|----------|------------------|---------|---------|---------|---------|------------|--|--|--|--|--|------------------------|--|--|----------------------|------------|-------------------|------------|-------|----------------|----------------|---|---|---|---|------------------|-----|-----|-------|--|-------------------|--|--|--|--|--------|-----------------|-------------------|---------------|----------|----------------|----------------|-----------------------|---|-----|-----|------------------------|---|-----|-----|-----------------------|---|---------|---------|---------|---|---------|---------|---------------|----------|----------------|----------------|------|---|---------|---------|---------|---|---------|---------|-----------|---|---------|---------|---------|---|---------|---------|--------------------------------|----------|----------------|----------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |                                                                                                                                               |                   | Screening System Name [Name]<br>Airport [Airport Code]<br>Terminal [Name] |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Report Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Daily                  | Report Run Date                                                                                                                               |                   | [Date]                                                                    | [Time] |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| From                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | [Date] [Time]          |                                                                                                                                               |                   |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| To                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | [Date] [Time]          |                                                                                                                                               |                   |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="5" style="text-align: center;">Inducted Volume</th> </tr> <tr> <th style="text-align: left;">Inducted Volume</th> <th style="text-align: center;">In-Gauge</th> <th style="text-align: center;">Out of Gauge</th> <th style="text-align: center;">Oversize</th> <th style="text-align: center;">Total</th> </tr> </thead> <tbody> <tr> <td>Number of Bags</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Percent of Total</td> <td style="text-align: center;">0.0</td> <td style="text-align: center;">0.0</td> <td style="text-align: center;">0.0</td> <td style="text-align: center;">100.0</td> </tr> </tbody> </table><br><table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Time in CBIS</th> <th style="text-align: center;">In-Gauge</th> <th style="text-align: center;">Out of Gauge</th> <th style="text-align: center;">Oversize</th> <th style="text-align: center;">All Bags</th> </tr> </thead> <tbody> <tr> <td>Average Bag Time</td> <td style="text-align: center;">0:00:00</td> <td style="text-align: center;">0:00:00</td> <td style="text-align: center;">0:00:00</td> <td style="text-align: center;">0:00:00</td> </tr> </tbody> </table><br><table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="5" style="text-align: center;">EDS Volume</th> </tr> <tr> <th></th> <th colspan="3" style="text-align: center;">----- Calculated -----</th> <th style="text-align: center;">----- Measured -----</th> </tr> <tr> <th style="text-align: left;">EDS Volume</th> <th style="text-align: center;">Inducted in-Gauge</th> <th style="text-align: center;">Reinserted</th> <th style="text-align: center;">Total</th> <th style="text-align: center;">Counted at EDS</th> </tr> </thead> <tbody> <tr> <td>Number of Bags</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Percent of Total</td> <td style="text-align: center;">0.0</td> <td style="text-align: center;">0.0</td> <td style="text-align: center;">100.0</td> <td></td> </tr> </tbody> </table><br><table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4" style="text-align: center;">Faults and Events</th> </tr> <tr> <th></th> <th style="text-align: center;">Number</th> <th style="text-align: center;">Total Down Time</th> <th style="text-align: center;">Average Down Time</th> </tr> </thead> <tbody> <tr> <td><b>Faults</b></td> <td style="text-align: center;"><b>0</b></td> <td style="text-align: center;"><b>0:00:00</b></td> <td style="text-align: center;"><b>0:00:00</b></td> </tr> <tr> <td>Pre-EDS Lost in Track</td> <td style="text-align: center;">0</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> </tr> <tr> <td>Post-EDS Lost in Track</td> <td style="text-align: center;">0</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> </tr> <tr> <td>Diverter/Door Failure</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0:00:00</td> <td style="text-align: center;">0:00:00</td> </tr> <tr> <td>(other)</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0:00:00</td> <td style="text-align: center;">0:00:00</td> </tr> <tr> <td><b>Events</b></td> <td style="text-align: center;"><b>0</b></td> <td style="text-align: center;"><b>0:00:00</b></td> <td style="text-align: center;"><b>0:00:00</b></td> </tr> <tr> <td>Jams</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0:00:00</td> <td style="text-align: center;">0:00:00</td> </tr> <tr> <td>E-Stops</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0:00:00</td> <td style="text-align: center;">0:00:00</td> </tr> <tr> <td>Fail-Safe</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0:00:00</td> <td style="text-align: center;">0:00:00</td> </tr> <tr> <td>(other)</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0:00:00</td> <td style="text-align: center;">0:00:00</td> </tr> <tr> <td><b>Total Faults and Events</b></td> <td style="text-align: center;"><b>0</b></td> <td style="text-align: center;"><b>0:00:00</b></td> <td style="text-align: center;"><b>0:00:00</b></td> </tr> </tbody> </table> |                        |                                                                                                                                               |                   |                                                                           |        | Inducted Volume |  |  |  |  | Inducted Volume | In-Gauge | Out of Gauge | Oversize | Total | Number of Bags | 0 | 0 | 0 | 0 | Percent of Total | 0.0 | 0.0 | 0.0 | 100.0 | Time in CBIS | In-Gauge | Out of Gauge | Oversize | All Bags | Average Bag Time | 0:00:00 | 0:00:00 | 0:00:00 | 0:00:00 | EDS Volume |  |  |  |  |  | ----- Calculated ----- |  |  | ----- Measured ----- | EDS Volume | Inducted in-Gauge | Reinserted | Total | Counted at EDS | Number of Bags | 0 | 0 | 0 | 0 | Percent of Total | 0.0 | 0.0 | 100.0 |  | Faults and Events |  |  |  |  | Number | Total Down Time | Average Down Time | <b>Faults</b> | <b>0</b> | <b>0:00:00</b> | <b>0:00:00</b> | Pre-EDS Lost in Track | 0 | N/A | N/A | Post-EDS Lost in Track | 0 | N/A | N/A | Diverter/Door Failure | 0 | 0:00:00 | 0:00:00 | (other) | 0 | 0:00:00 | 0:00:00 | <b>Events</b> | <b>0</b> | <b>0:00:00</b> | <b>0:00:00</b> | Jams | 0 | 0:00:00 | 0:00:00 | E-Stops | 0 | 0:00:00 | 0:00:00 | Fail-Safe | 0 | 0:00:00 | 0:00:00 | (other) | 0 | 0:00:00 | 0:00:00 | <b>Total Faults and Events</b> | <b>0</b> | <b>0:00:00</b> | <b>0:00:00</b> |
| Inducted Volume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |                                                                                                                                               |                   |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Inducted Volume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | In-Gauge               | Out of Gauge                                                                                                                                  | Oversize          | Total                                                                     |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Number of Bags                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0                      | 0                                                                                                                                             | 0                 | 0                                                                         |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Percent of Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.0                    | 0.0                                                                                                                                           | 0.0               | 100.0                                                                     |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Time in CBIS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | In-Gauge               | Out of Gauge                                                                                                                                  | Oversize          | All Bags                                                                  |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Average Bag Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0:00:00                | 0:00:00                                                                                                                                       | 0:00:00           | 0:00:00                                                                   |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| EDS Volume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |                                                                                                                                               |                   |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ----- Calculated ----- |                                                                                                                                               |                   | ----- Measured -----                                                      |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| EDS Volume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Inducted in-Gauge      | Reinserted                                                                                                                                    | Total             | Counted at EDS                                                            |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Number of Bags                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0                      | 0                                                                                                                                             | 0                 | 0                                                                         |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Percent of Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.0                    | 0.0                                                                                                                                           | 100.0             |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Faults and Events                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |                                                                                                                                               |                   |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Number                 | Total Down Time                                                                                                                               | Average Down Time |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| <b>Faults</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>0</b>               | <b>0:00:00</b>                                                                                                                                | <b>0:00:00</b>    |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Pre-EDS Lost in Track                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0                      | N/A                                                                                                                                           | N/A               |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Post-EDS Lost in Track                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0                      | N/A                                                                                                                                           | N/A               |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Diverter/Door Failure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0                      | 0:00:00                                                                                                                                       | 0:00:00           |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| (other)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0                      | 0:00:00                                                                                                                                       | 0:00:00           |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| <b>Events</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>0</b>               | <b>0:00:00</b>                                                                                                                                | <b>0:00:00</b>    |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Jams                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0                      | 0:00:00                                                                                                                                       | 0:00:00           |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| E-Stops                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0                      | 0:00:00                                                                                                                                       | 0:00:00           |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| Fail-Safe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0                      | 0:00:00                                                                                                                                       | 0:00:00           |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| (other)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0                      | 0:00:00                                                                                                                                       | 0:00:00           |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |
| <b>Total Faults and Events</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>0</b>               | <b>0:00:00</b>                                                                                                                                | <b>0:00:00</b>    |                                                                           |        |                 |  |  |  |  |                 |          |              |          |       |                |   |   |   |   |                  |     |     |     |       |              |          |              |          |          |                  |         |         |         |         |            |  |  |  |  |  |                        |  |  |                      |            |                   |            |       |                |                |   |   |   |   |                  |     |     |       |  |                   |  |  |  |  |        |                 |                   |               |          |                |                |                       |   |     |     |                        |   |     |     |                       |   |         |         |         |   |         |         |               |          |                |                |      |   |         |         |         |   |         |         |           |   |         |         |         |   |         |         |                                |          |                |                |

Appendix Figure A-4: Daily CBIS Summary Report Definitions

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>Transportation<br/>Security<br/>Administration</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <p><b>Daily CBIS Summary Report Definitions</b></p> <p>Screening System Name [Name]<br/>         Airport [Airport Code]<br/>         Terminal [Name]</p> |
| <p><b>Definitions</b></p> <ul style="list-style-type: none"> <li>• <b>Inducted Volume</b> = Bags counted at external induction points – ticket counters, curbside, oversize, (excludes reinserted bags); this data matches the corresponding data on the Daily CBIS Bag Volume Report</li> <li>• <b>Bag time in CBIS</b> = Single bag time from the pre-EDS ATR/BMA to bag delivery onto a clear line.</li> </ul> $\text{Average Bag Time in CBIS} = \frac{\sum \text{Total Inducted Baggage Volume Bag Time in CBIS}}{\text{Total Inducted Baggage Volume}}$ <ul style="list-style-type: none"> <li>• <b>Reinserted</b> = Bags counted at RL</li> <li>• <b>EDS Volume</b> = Total Bag Count of bags exiting the EDS machines during report <u>time period</u>; this data matches the corresponding data on the Daily CBIS Bag Volume Report</li> <li>• <b>Pre-EDS Lost in Track</b> is a bag lost between the pre-EDS ATR and the EDS. NO time is associated with this fault.</li> <li>• <b>Post-EDS Lost in Track</b> is a bag lost between the EDS and the last chance divert or CBRA. NO time is associated with this fault.</li> <li>• A <b>Diverter/Door Failure</b> is recorded when a diverter or fire/security door sends any sort of failure signal</li> <li>• <b>Other Fault</b> = to be completed with site-specific faults not already included</li> <li>• <b>Jam faults</b> consist of Hard and Missing bag jams occurring during the specified <u>time period</u></li> <li>• An <b>E-Stop event</b> is recorded whenever an E-stop button is pressed (this can be further segmented based on e-stop location)</li> <li>• A <b>Fail-Safe event</b> is recorded when the CBIS prevents the conveyance of any non-cleared bag to the clear line</li> <li>• <b>Other Event</b> = to be completed with site-specific events not already included</li> </ul> |                                                                                                                                                          |

## A.4.2 DAILY CBIS BAG VOLUME REPORT

Appendix Figure A-5: Daily CBIS Bag Volume Report

|                                                                                                    |                                               |                                                         |                                                                                                                                                                         |  |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                   | Transportation<br>Security<br>Administration  | <b>See Section 12.13 for<br/>reporting requirements</b> | <b>Daily CBIS Bag Volume Report</b><br><br>Screening System Name     [Name]<br>Airport                         [Airport Code]<br>Terminal                        [Name] |  |
| Report Type     Daily<br>From             [Date]     [Time]<br>To                [Date]     [Time] | Report Run Date             [Date]     [Time] |                                                         |                                                                                                                                                                         |  |

| 1. Inducted Volume    |                |                           |
|-----------------------|----------------|---------------------------|
| Input Conveyors       | Number of Bags | Percent of Inducted Total |
| TC1                   | 0              | 0.0                       |
| TC2 etc.              | 0              | 0.0                       |
| TC Subtotal           | 0              | 0.0                       |
| CS1                   | 0              | 0.0                       |
| CS2 etc.              | 0              | 0.0                       |
| CS Subtotal           | 0              | 0.0                       |
| TX1                   | 0              | 0.0                       |
| TX2 etc.              | 0              | 0.0                       |
| TX Subtotal           | 0              | 0.0                       |
| OS2                   | 0              | 0.0                       |
| OS2 etc.              | 0              | 0.0                       |
| OS Total              | 0              | 0.0                       |
| Other                 | 0              | 0.0                       |
| <b>Inducted Total</b> | <b>0</b>       | <b>100.0</b>              |

| 2. EDS Volume           |                |                  |
|-------------------------|----------------|------------------|
|                         | Number of Bags | Percent of Total |
| <b>Calculated</b>       |                |                  |
| Inducted In-Gauge       | 0              | 0.0              |
| Reinserted              | 0              | 0.0              |
| <b>Total Calculated</b> | <b>0</b>       | <b>100.0</b>     |
| <b>Counted at EDS</b>   | <b>0</b>       | <b>100.0</b>     |

| 3. Bag Sizing |                |                  |
|---------------|----------------|------------------|
|               | Number of Bags | Percent of Total |
| In-Gauge      | 0              | 0.0              |
| Out-of-Gauge  | 0              | 0.0              |
| Oversize      | 0              | 0.0              |
| <b>Total</b>  | <b>0</b>       | <b>100.0</b>     |

**Definitions**

- Inducted Volume** = Bag volume counted at external induction points (excludes reinserted bags) – ticket counters, curbside, transfer, oversize; this data matches the corresponding data on the Daily CBIS Summary Report
- Reinserted** = Bags counted at RL
- EDS Volume** = Calculated EDS volume (BHS PLCs) should equal bags counted at the EDS exits; this data matches the corresponding data on the Daily CBIS Summary Report
- CBIS Volume** = Bag trips through the CBIS on the standard conveyors (including Reinserted but excluding Oversize)
- Bag Sizing** total should equal Inducted Total; In-Gauge and OOG counted at BMA, OS counted at OS lines

## A.4.3 CBIS EXECUTIVE SUMMARY REPORT

Appendix Figure A-6: CBIS Executive Summary Report

|                                                                                                                          |  |                                                     |  |                                                                           |  |  |  |
|--------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------|--|---------------------------------------------------------------------------|--|--|--|
|  Transportation Security Administration |  | <b>See Section 12.13 for reporting requirements</b> |  | <b>CBIS Executive Summary Report</b>                                      |  |  |  |
|                                                                                                                          |  |                                                     |  | Screening System Name [Name]<br>Airport [Airport Code]<br>Terminal [Name] |  |  |  |
| Report Type Daily<br>From [Date] [Time]<br>To [Date] [Time]                                                              |  | Report Run Date [Date] [Time]                       |  |                                                                           |  |  |  |

| EDS Machine  | Total Bags | Machine Decisions |         |           |         |         | OSR Decisions |         |           |         |         | Bags tracked to CBRA | Tracking Accuracy % |
|--------------|------------|-------------------|---------|-----------|---------|---------|---------------|---------|-----------|---------|---------|----------------------|---------------------|
|              |            | Total             | Cleared | % Cleared | Alarmed | % Alarm | Total         | Cleared | % Cleared | Alarmed | % Alarm |                      |                     |
| EDS-SS1      | 0          | 0                 | 0       | 0%        | 0       | 0%      | 0             | 0       | 0%        | 0       | 0%      | 0                    | 0%                  |
| EDS-SS2      | 0          | 0                 | 0       | 0%        | 0       | 0%      | 0             | 0       | 0%        | 0       | 0%      | 0                    | 0%                  |
| EDS-SS3      | 0          | 0                 | 0       | 0%        | 0       | 0%      | 0             | 0       | 0%        | 0       | 0%      | 0                    | 0%                  |
| EDS-SS4      | 0          | 0                 | 0       | 0%        | 0       | 0%      | 0             | 0       | 0%        | 0       | 0%      | 0                    | 0%                  |
| EDS-SS5      | 0          | 0                 | 0       | 0%        | 0       | 0%      | 0             | 0       | 0%        | 0       | 0%      | 0                    | 0%                  |
| <b>Total</b> | 0          | 0                 | 0       | 0%        | 0       | 0%      | 0             | 0       | 0%        | 0       | 0%      | 0                    | 0%                  |

|                                |         |
|--------------------------------|---------|
| Upstream tracking accuracy (%) | Total % |
| IATA                           | 0.0     |
| OOG (Absolute)                 | 0.0     |

Tracking accuracy =  $\frac{\text{Bags Tracked to CBRA}}{\text{Total Bags} - \text{Machine Cleared} - \text{OSR Cleared}}$

Upstream IATA Tracking Accuracy =  $\left( \frac{R_{\text{OOG @ PE}} + R_{\text{EDS}}}{R} \right) \times 100$

OOG Tracking Accuracy (absolute) =  $\left( \frac{R_{\text{OOG @ PE}} + R_{\text{NR, OOG @ PE}}}{R_{\text{OOG}} + R_{\text{NR, OOG}}} \right) \times 100$

WARNING: This record contains Sensitive Security Information that is controlled under 49 CFR parts 15 and 1520. No part of this record may be disclosed to persons without a "need to know" as defined in 49 CFR parts 15 and 1520, except with the written permission of the Administrator of the Transportation Security Administration, or the Secretary of Transportation. Unauthorized disclosure may result in civil penalty or other action. For U.S. Government agencies, public release is governed by 5 U.S.C. 552 and 49 CFR parts 15 and 1520.

## A.4.4 CBRA EXECUTIVE SUMMARY REPORT

Appendix Figure A-7: CBRA Executive Summary Report

| SENSITIVE SECURITY INFORMATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |                                                                                                                                                                           |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------|------------|------------------------|-------------------|---|-------|------------------------------------|---|------|-----------------|---|------|------------------------------|---|------|--------------------|------------|------------------|------------|---|------|----------------------------|---|------|-------------------------------|---|-------|-------------------|----|------|-----------------------------------------|----|------|-----------------|----|------|---------------|---|------|---------------------|---|------|--------|---|------|--------------------|---|------|-----------|---|------|-------------------|---|------|
|  <div style="display: inline-block; vertical-align: middle;"> <b>Transportation<br/>Security<br/>Administration</b> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            | <div style="border: 2px solid red; padding: 5px; color: red; font-weight: bold; margin: 0 auto; width: fit-content;"> See Section 12.13 for reporting requirements </div> |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| <b>CBRA Executive Summary Report</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |                                                                                                                                                                           |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Report Type     Daily<br>From             [Date]     [Time]<br>To                [Date]     [Time]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            | Screening System Name     [Name]<br>Airport                         [Airport Code]<br>Terminal                        [Name]                                              |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Report Run Date             [Date]     [Time]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |                                                                                                                                                                           |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">1. CBRA Statistics</th> <th style="text-align: center;">Total Bags</th> <th style="text-align: center;">% of CBRA Total Volume</th> </tr> </thead> <tbody> <tr> <td>CBRA Total Volume</td> <td style="text-align: center;">0</td> <td style="text-align: center;">100.0</td> </tr> <tr> <td>Invalid Arrivals / CBRA Error Rate</td> <td style="text-align: center;">0</td> <td style="text-align: center;">00.0</td> </tr> <tr> <td>Reinserted Bags</td> <td style="text-align: center;">0</td> <td style="text-align: center;">00.0</td> </tr> <tr> <td>Invalid Arrivals at OOG line</td> <td style="text-align: center;">0</td> <td style="text-align: center;">00.0</td> </tr> </tbody> </table><br><table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">2. CBIS Statistics</th> <th style="text-align: center;">Total Bags</th> <th style="text-align: center;">% of CBIS Volume</th> </tr> </thead> <tbody> <tr> <td>EDS Volume</td> <td style="text-align: center;">0</td> <td style="text-align: center;">00.0</td> </tr> <tr> <td>OOG Volume</td> <td style="text-align: center;">0</td> <td style="text-align: center;">00.0</td> </tr> <tr> <td>CBIS Volume (EDS+OOG)</td> <td style="text-align: center;">0</td> <td style="text-align: center;">100.0</td> </tr> <tr> <td>CBRA Total Volume</td> <td style="text-align: center;">--</td> <td style="text-align: center;">00.0</td> </tr> <tr> <td>Invalid Arrivals / Invalid Arrival Rate</td> <td style="text-align: center;">--</td> <td style="text-align: center;">00.0</td> </tr> <tr> <td>Reinserted Bags</td> <td style="text-align: center;">--</td> <td style="text-align: center;">00.0</td> </tr> </tbody> </table> <p><b>Definitions</b></p> <ul style="list-style-type: none"> <li>CBRA Total Volume = total number of bags arriving in CBRA</li> <li>CBRA Error Rate = Total Invalid Arrivals / CBRA Total Volume</li> <li>Reinserted Bags are counted at the Reinsert Line</li> <li>EDS Volume = Total Bag Count of bags exiting the EDS machines during report time period; this data matches the corresponding data on the Daily CBIS Bag Volume Report</li> <li>CBIS Volume = EDS Volume + OOG (excludes OS)</li> </ul>                                                                                                                                                                                                                                                                                                                       |            |                                                                                                                                                                           |  | 1. CBRA Statistics                 | Total Bags | % of CBRA Total Volume | CBRA Total Volume | 0 | 100.0 | Invalid Arrivals / CBRA Error Rate | 0 | 00.0 | Reinserted Bags | 0 | 00.0 | Invalid Arrivals at OOG line | 0 | 00.0 | 2. CBIS Statistics | Total Bags | % of CBIS Volume | EDS Volume | 0 | 00.0 | OOG Volume                 | 0 | 00.0 | CBIS Volume (EDS+OOG)         | 0 | 100.0 | CBRA Total Volume | -- | 00.0 | Invalid Arrivals / Invalid Arrival Rate | -- | 00.0 | Reinserted Bags | -- | 00.0 |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| 1. CBRA Statistics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Total Bags | % of CBRA Total Volume                                                                                                                                                    |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| CBRA Total Volume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0          | 100.0                                                                                                                                                                     |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Invalid Arrivals / CBRA Error Rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Reinserted Bags                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Invalid Arrivals at OOG line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| 2. CBIS Statistics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Total Bags | % of CBIS Volume                                                                                                                                                          |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| EDS Volume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| OOG Volume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| CBIS Volume (EDS+OOG)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0          | 100.0                                                                                                                                                                     |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| CBRA Total Volume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | --         | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Invalid Arrivals / Invalid Arrival Rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | --         | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Reinserted Bags                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | --         | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| <div style="display: flex; justify-content: space-between;"> <div> <ul style="list-style-type: none"> <li>Invalid Arrival Rate = Total Invalid Arrivals / CBIS Volume</li> <li>Invalid Arrivals at the OOG Line = <math>\left( \frac{\text{Total Bags at OOG PE} - (R_{\text{OOG @ PE}} + R_{\text{NR, OOG @ PE}})}{\text{Total Bags at OOG PE}} \right) \times 100</math></li> </ul> </div> <div style="width: 60%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">3. CBRA Total Volume by Bag Status</th> <th style="text-align: center;">Total Bags</th> <th style="text-align: center;">% of CBRA Total Volume</th> </tr> </thead> <tbody> <tr><td>Valid Arrivals</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>OS</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>OOG</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>Alarmed</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>Invalid Arrivals</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>Timeout</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>Queue Time Out (Q-TimeOut)</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>Operator Time Out (O-TimeOut)</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>Cleared</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>EDS Error</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>Unknown</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>Lost in Track</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>Communication Error</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>Purged</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>Following Lost Bag</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>Too Close</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> <tr><td>Security Re-route</td><td style="text-align: center;">0</td><td style="text-align: center;">00.0</td></tr> </tbody> </table> </div> </div> |            |                                                                                                                                                                           |  | 3. CBRA Total Volume by Bag Status | Total Bags | % of CBRA Total Volume | Valid Arrivals    | 0 | 00.0  | OS                                 | 0 | 00.0 | OOG             | 0 | 00.0 | Alarmed                      | 0 | 00.0 | Invalid Arrivals   | 0          | 00.0             | Timeout    | 0 | 00.0 | Queue Time Out (Q-TimeOut) | 0 | 00.0 | Operator Time Out (O-TimeOut) | 0 | 00.0  | Cleared           | 0  | 00.0 | EDS Error                               | 0  | 00.0 | Unknown         | 0  | 00.0 | Lost in Track | 0 | 00.0 | Communication Error | 0 | 00.0 | Purged | 0 | 00.0 | Following Lost Bag | 0 | 00.0 | Too Close | 0 | 00.0 | Security Re-route | 0 | 00.0 |
| 3. CBRA Total Volume by Bag Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Total Bags | % of CBRA Total Volume                                                                                                                                                    |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Valid Arrivals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| OS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| OOG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Alarmed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Invalid Arrivals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Timeout                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Queue Time Out (Q-TimeOut)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Operator Time Out (O-TimeOut)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Cleared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| EDS Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Unknown                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Lost in Track                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Communication Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Purged                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Following Lost Bag                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Too Close                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| Security Re-route                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0          | 00.0                                                                                                                                                                      |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |
| <p><small>WARNING: This record contains Sensitive Security Information that is controlled under 49 CFR parts 15 and 1520. No part of this record may be disclosed to persons without a "need to know" as defined in 49 CFR parts 15 and 1520, except with the written permission of the Administrator of the Transportation Security Administration, or the Secretary of Transportation. Unauthorized disclosure may result in civil penalty or other action. For U.S. Government agencies, public release is governed by 5 U.S.C. 552 and 49 CFR parts 15 and 1520.</small></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |            |                                                                                                                                                                           |  |                                    |            |                        |                   |   |       |                                    |   |      |                 |   |      |                              |   |      |                    |            |                  |            |   |      |                            |   |      |                               |   |       |                   |    |      |                                         |    |      |                 |    |      |               |   |      |                     |   |      |        |   |      |                    |   |      |           |   |      |                   |   |      |

## A.4.5 PEC TRACKING REPORT

Appendix Figure A-8: PEC Tracking Report

|  Transportation Security Administration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            | See Section 12.13 for reporting requirements                                                                              |              | <b>PEC Tracking Report</b>                  |                  |                  |             |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |  |  |  |  |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------------------------------------------------------|--------------|---------------------------------------------|------------------|------------------|-------------|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|--|--|--|--|--|--|
| Report Type    Daily<br>From            [Date]    [Time]<br>To               [Date]    [Time]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            | Screening System Name    [Name]<br>Airport                        [Airport Code]<br>Terminal                       [Name] |              | Report Run Date            [Date]    [Time] |                  |                  |             |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |  |  |  |  |  |  |
| <table border="1"> <thead> <tr> <th>Photocell</th> <th>Total Bags</th> <th>Unknown bags</th> <th>Missing Bags</th> <th>Jams</th> <th>Missing Bag Jams</th> <th>Purged Bags</th> </tr> </thead> <tbody> <tr><td>PE_AL-01</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>PE_AL-02</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>PE_AL-03</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>PE_AL-04</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>PE_AL-05</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>PE_AL-06</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>PE_AL-07</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>PE_AL-08</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>PE_AL-09</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>PE_AL-10</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table> | Photocell  | Total Bags                                                                                                                | Unknown bags | Missing Bags                                | Jams             | Missing Bag Jams | Purged Bags | PE_AL-01 | 0 | 0 | 0 | 0 | 0 | 0 | PE_AL-02 | 0 | 0 | 0 | 0 | 0 | 0 | PE_AL-03 | 0 | 0 | 0 | 0 | 0 | 0 | PE_AL-04 | 0 | 0 | 0 | 0 | 0 | 0 | PE_AL-05 | 0 | 0 | 0 | 0 | 0 | 0 | PE_AL-06 | 0 | 0 | 0 | 0 | 0 | 0 | PE_AL-07 | 0 | 0 | 0 | 0 | 0 | 0 | PE_AL-08 | 0 | 0 | 0 | 0 | 0 | 0 | PE_AL-09 | 0 | 0 | 0 | 0 | 0 | 0 | PE_AL-10 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |  |  |  |  |
| Photocell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Total Bags | Unknown bags                                                                                                              | Missing Bags | Jams                                        | Missing Bag Jams | Purged Bags      |             |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |  |  |  |  |  |  |
| PE_AL-01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0          | 0                                                                                                                         | 0            | 0                                           | 0                | 0                |             |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |  |  |  |  |  |  |
| PE_AL-02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0          | 0                                                                                                                         | 0            | 0                                           | 0                | 0                |             |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |  |  |  |  |  |  |
| PE_AL-03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0          | 0                                                                                                                         | 0            | 0                                           | 0                | 0                |             |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |  |  |  |  |  |  |
| PE_AL-04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0          | 0                                                                                                                         | 0            | 0                                           | 0                | 0                |             |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |  |  |  |  |  |  |
| PE_AL-05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0          | 0                                                                                                                         | 0            | 0                                           | 0                | 0                |             |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |  |  |  |  |  |  |
| PE_AL-06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0          | 0                                                                                                                         | 0            | 0                                           | 0                | 0                |             |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |  |  |  |  |  |  |
| PE_AL-07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0          | 0                                                                                                                         | 0            | 0                                           | 0                | 0                |             |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |  |  |  |  |  |  |
| PE_AL-08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0          | 0                                                                                                                         | 0            | 0                                           | 0                | 0                |             |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |  |  |  |  |  |  |
| PE_AL-09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0          | 0                                                                                                                         | 0            | 0                                           | 0                | 0                |             |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |  |  |  |  |  |  |
| PE_AL-10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0          | 0                                                                                                                         | 0            | 0                                           | 0                | 0                |             |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |          |   |   |   |   |   |   |  |  |  |  |  |  |

## A.4.6 CBRA BAG PROCESS REPORT

Appendix Figure A-9: CBRA Bag Process Report

| SENSITIVE SECURITY INFORMATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |                                                         |                      |                         |              |               |               |                 |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------|----------------------|-------------------------|--------------|---------------|---------------|-----------------|-----------|
|  <div style="display: inline-block; vertical-align: middle;">           Transportation<br/>Security<br/>Administration         </div>                                                                                                                                                                                                                                                                                                                                                   |                 | <b>See Section 12.13 for<br/>reporting requirements</b> |                      | CBRA Bag Process Report |              |               |               |                 |           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 |                                                         |                      | Screening System Name   |              | [Name]        |               |                 |           |
| Report Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 | Daily                                                   |                      | Report Run Date         |              | [Date]        |               | [Time]          |           |
| From                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 | [Date] [Time]                                           |                      |                         |              |               |               |                 |           |
| To                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 | [Date] [Time]                                           |                      |                         |              |               |               |                 |           |
| BPT Statistics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |                                                         |                      |                         |              |               |               |                 |           |
| Bag Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Total Bag Count | CBRA Bag Total %                                        | Average Process Time | % 0-60 sec              | % 60-120 sec | % 120-180 sec | % 180-240 sec | % 240 – 300 sec | % 300+sec |
| Alarm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0               | 0.0                                                     | 00:00:00             | 0.0                     | 0.0          | 0.0           | 0.0           | 0.0             | 0.0       |
| Clear                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0               | 0.0                                                     | 00:00:00             | 0.0                     | 0.0          | 0.0           | 0.0           | 0.0             | 0.0       |
| Unknown                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0               | 0.0                                                     | 00:00:00             | 0.0                     | 0.0          | 0.0           | 0.0           | 0.0             | 0.0       |
| Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0               | 0.0                                                     | 00:00:00             | 0.0                     | 0.0          | 0.0           | 0.0           | 0.0             | 0.0       |
| OOG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0               | 0.0                                                     | 00:00:00             | 0.0                     | 0.0          | 0.0           | 0.0           | 0.0             | 0.0       |
| Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0               | 100.0                                                   | 00:00:00             |                         |              |               |               |                 |           |
| BPT Distribution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |                                                         |                      |                         |              |               |               |                 |           |
| BPT Statistics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |                                                         |                      |                         |              |               |               |                 |           |
| Station                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Total Bag Count | CBRA Bag Total %                                        | Average Process Time | % 0-60 sec              | % 60-120 sec | % 120-180 sec | % 180-240 sec | % 240 – 300 sec | % 300+sec |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0               | 0.0                                                     | 00:00:00             | 0.0                     | 0.0          | 0.0           | 0.0           | 0.0             | 0.0       |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0               | 0.0                                                     | 00:00:00             | 0.0                     | 0.0          | 0.0           | 0.0           | 0.0             | 0.0       |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0               | 0.0                                                     | 00:00:00             | 0.0                     | 0.0          | 0.0           | 0.0           | 0.0             | 0.0       |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0               | 0.0                                                     | 00:00:00             | 0.0                     | 0.0          | 0.0           | 0.0           | 0.0             | 0.0       |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0               | 0.0                                                     | 00:00:00             | 0.0                     | 0.0          | 0.0           | 0.0           | 0.0             | 0.0       |
| Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0               | 100.0                                                   | 00:00:00             |                         |              |               |               |                 |           |
| BPT Distribution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |                                                         |                      |                         |              |               |               |                 |           |
| <b>Definitions</b> <ul style="list-style-type: none"> <li>• Process time starts when bag arrives at assigned BRP</li> <li>• Process time stops when either a reinsert or clear button is pressed</li> <li>• BPT Statistics percentages based on total number of bags in CBRA at BIS</li> <li>• BPT Distribution percentages based on total number of bags in CBRA for that Bag Type or processed at BIS</li> </ul>                                                                                                                                                       |                 |                                                         |                      |                         |              |               |               |                 |           |
| <p><i>WARNING: This record contains Sensitive Security Information that is controlled under 49 CFR parts 15 and 1520. No part of this record may be disclosed to persons without a "need to know" as defined in 49 CFR parts 15 and 1520, except with the written permission of the Administrator of the Transportation Security Administration, or the Secretary of Transportation. Unauthorized disclosure may result in civil penalty or other action. For U.S. Government agencies, public release is governed by 5 U.S.C. 552 and 49 CFR parts 15 and 1520.</i></p> |                 |                                                         |                      |                         |              |               |               |                 |           |





## A.4.8 CBIS HOURLY THROUGHPUT REPORT

Appendix Figure A-11: CBIS Hourly Throughput Report

| SENSITIVE SECURITY INFORMATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |                                                                                                                                               |            |                                                                                                            |           |           |           |           |           |           |           |           |           |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|  Transportation Security Administration                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            | <div style="border: 2px solid red; padding: 5px; color: red; text-align: center;"> <b>See Section 12.13 for reporting requirements</b> </div> |            | CBIS Hourly Throughput Report<br>Screening System Name [Name]<br>Airport [Airport Code]<br>Terminal [Name] |           |           |           |           |           |           |           |           |           |           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |                                                                                                                                               |            | Report Type Daily<br>From [Date] [Time]<br>To [Date] [Time]                                                |           |           |           |           |           |           |           |           |           |           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |                                                                                                                                               |            | Report Run Date [Date] [Time]                                                                              |           |           |           |           |           |           |           |           |           |           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            | Hour                                                                                                                                          | 00:00-0:59 | 0100-0159                                                                                                  | 0200-0259 | 0300-0359 | 0400-0459 | 0500-0559 | 0600-0659 | 0700-0759 | 0800-0859 | 0900-0959 | 1000-1059 | 1100-1159 |
| AM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | EDS Volume | 0                                                                                                                                             | 0          | 0                                                                                                          | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Alarms     | 0                                                                                                                                             | 0          | 0                                                                                                          | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | To CBRA    | 0                                                                                                                                             | 0          | 0                                                                                                          | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Invalids   | 0                                                                                                                                             | 0          | 0                                                                                                          | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            | Hour                                                                                                                                          | 1200-1259  | 1300-1359                                                                                                  | 1400-1459 | 1500-1559 | 1600-1659 | 1700-1759 | 1800-1859 | 1900-1959 | 2000-2059 | 2100-2159 | 2200-2259 | 2300-2359 |
| PM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | EDS Volume | 0                                                                                                                                             | 0          | 0                                                                                                          | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Alarms     | 0                                                                                                                                             | 0          | 0                                                                                                          | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | To CBRA    | 0                                                                                                                                             | 0          | 0                                                                                                          | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Invalids   | 0                                                                                                                                             | 0          | 0                                                                                                          | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| <b>Definitions</b> <ul style="list-style-type: none"> <li><b>EDS Volume</b> = Total Bag Count of bags exiting the EDS machines during report time period; this data matches the corresponding data on the Daily CBIS Bag Volume Report</li> <li><b>Alarms</b> = Total number of bags that receive a Level 1 alarmed decision</li> <li><b>To CBRA</b> = Total number of bags entering CBRA</li> <li><b>Invalids</b> = Any bag arriving at a BIS with a status other than Alarmed, OOG, or OS.</li> </ul>                                                                  |            |                                                                                                                                               |            |                                                                                                            |           |           |           |           |           |           |           |           |           |           |
| <p><i>WARNING: This record contains Sensitive Security Information that is controlled under 49 CFR parts 15 and 1520. No part of this record may be disclosed to persons without a "need to know" as defined in 49 CFR parts 15 and 1520, except with the written permission of the Administrator of the Transportation Security Administration, or the Secretary of Transportation. Unauthorized disclosure may result in civil penalty or other action. For U.S. Government agencies, public release is governed by 5 U.S.C. 552 and 49 CFR parts 15 and 1520.</i></p> |            |                                                                                                                                               |            |                                                                                                            |           |           |           |           |           |           |           |           |           |           |

## A.4.9 CBIS BAG SPACING REPORT

Appendix Figure A-12: CBIS Bag Spacing Report

|  Transportation Security Administration                                                                                                                                                                                |               | <div style="border: 2px solid red; padding: 5px; text-align: center; color: red;"> <b>See Section 12.13 for reporting requirements</b> </div> |          | <b>CBIS Bag Spacing Report</b>                                            |                     |            |              |                |                |                |                 |                 |                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------|---------------------|------------|--------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|
|                                                                                                                                                                                                                                                                                                         |               |                                                                                                                                               |          | Screening System Name [Name]<br>Airport [Airport Code]<br>Terminal [Name] |                     |            |              |                |                |                |                 |                 |                 |
| Report Type                                                                                                                                                                                                                                                                                             | Daily         | Report Run Date                                                                                                                               |          |                                                                           |                     |            |              |                |                |                |                 |                 |                 |
| From                                                                                                                                                                                                                                                                                                    | [Date] [Time] | [Date] [Time]                                                                                                                                 |          |                                                                           |                     |            |              |                |                |                |                 |                 |                 |
| To                                                                                                                                                                                                                                                                                                      | [Date] [Time] |                                                                                                                                               |          |                                                                           |                     |            |              |                |                |                |                 |                 |                 |
| Start Time                                                                                                                                                                                                                                                                                              | Start Date    | End Time                                                                                                                                      | End Date | Equipment                                                                 | Time Interval(sec.) | Total Bags | Bag Per Hour | Max Bag Length | Min Bag Length | Avg Bag Length | Max Bag Spacing | Min Bag Spacing | Avg Bag Spacing |
| 00:00:00                                                                                                                                                                                                                                                                                                | 00/00/00      | 00:00:00                                                                                                                                      | 00/00/00 | EDS_ST2                                                                   | 10                  | 0          | 0            | 00.00          | 00.00          | 00.00          | 00.00           | 00.00           | 00.00           |
| 00:00:00                                                                                                                                                                                                                                                                                                | 00/00/00      | 00:00:00                                                                                                                                      | 00/00/00 | EDS_ST2                                                                   | 15                  | 0          | 0            | 00.00          | 00.00          | 00.00          | 00.00           | 00.00           | 00.00           |
| 00:00:00                                                                                                                                                                                                                                                                                                | 00/00/00      | 00:00:00                                                                                                                                      | 00/00/00 | EDS_ST2                                                                   | 30                  | 0          | 0            | 00.00          | 00.00          | 00.00          | 00.00           | 00.00           | 00.00           |
| 00:00:00                                                                                                                                                                                                                                                                                                | 00/00/00      | 00:00:00                                                                                                                                      | 00/00/00 | EDS_ST2                                                                   | 60                  | 0          | 0            | 00.00          | 00.00          | 00.00          | 00.00           | 00.00           | 00.00           |
| 00:00:00                                                                                                                                                                                                                                                                                                | 00/00/00      | 00:00:00                                                                                                                                      | 00/00/00 | EDS_ST2                                                                   | 1440                | 0          | 0            | 00.00          | 00.00          | 00.00          | 00.00           | 00.00           | 00.00           |
| 00:00:00                                                                                                                                                                                                                                                                                                | 00/00/00      | 00:00:00                                                                                                                                      | 00/00/00 | EDS_ST3                                                                   | 10                  | 0          | 0            | 00.00          | 00.00          | 00.00          | 00.00           | 00.00           | 00.00           |
| 00:00:00                                                                                                                                                                                                                                                                                                | 00/00/00      | 00:00:00                                                                                                                                      | 00/00/00 | EDS_ST3                                                                   | 15                  | 0          | 0            | 00.00          | 00.00          | 00.00          | 00.00           | 00.00           | 00.00           |
| 00:00:00                                                                                                                                                                                                                                                                                                | 00/00/00      | 00:00:00                                                                                                                                      | 00/00/00 | EDS_ST3                                                                   | 30                  | 0          | 0            | 00.00          | 00.00          | 00.00          | 00.00           | 00.00           | 00.00           |
| 00:00:00                                                                                                                                                                                                                                                                                                | 00/00/00      | 00:00:00                                                                                                                                      | 00/00/00 | EDS_ST3                                                                   | 60                  | 0          | 0            | 00.00          | 00.00          | 00.00          | 00.00           | 00.00           | 00.00           |
| 00:00:00                                                                                                                                                                                                                                                                                                | 00/00/00      | 00:00:00                                                                                                                                      | 00/00/00 | EDS_ST3                                                                   | 1440                | 0          | 0            | 00.00          | 00.00          | 00.00          | 00.00           | 00.00           | 00.00           |
| <b>Definitions</b> <ul style="list-style-type: none"> <li>Max Bag Spacing is 36 inches</li> <li>Bag spacing of greater than 36 inches is not included in the average bag spacing calculation</li> <li>Note: Bag Per Hour Column is an extrapolated value based on the time interval selected</li> </ul> |               |                                                                                                                                               |          |                                                                           |                     |            |              |                |                |                |                 |                 |                 |

## A.4.10 CBIS PERFORMANCE REPORT

Appendix Figure A-13: CBIS Performance Report

| SENSITIVE SECURITY INFORMATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------------|---------------|--------|---------------|---------------|------------|-------------|---------------|-------------|-----------|---------------|-----------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------|----------------|--------|----------|---------------|-----|----------|---------------|-----|----------|---------------|---|----------|-------|-----|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---|----------------|-----------|-----------|---------|-----|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---|-----|--------|---------|-----------|---|-------|-------------|-----|-----|--------------|----------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----|---|--------|----------|-----------------|-----|-----|------------|---|-----|-------------|-----|-----|---------------|-----|-----|---------------|----------|-----|-----------------|-----|--------|-----|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---|------------|--------|-------|-------|-------------|--------|-------|------------|---------|-----|---|-----|---------|-----|---|-----|---------|---|-----|-----|---------|---|-----|-----|---------|---------|---|-----|---------|-----|---|-----|---------|-----|---|-----|---------|---|---|-----|---------|---|---|-----|---------|---|---|-----|
|  <div style="display: inline-block; vertical-align: middle;">           Transportation<br/>Security<br/>Administration         </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           | <b>See Section 12.13 for<br/>reporting requirements</b> |                                                                                                                                                                                                                                                                                                                                                                                                   | <b>CBIS Performance Report</b>                                            |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                   | Screening System Name [Name]<br>Airport [Airport Code]<br>Terminal [Name] |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Report Type Daily<br>From [Date] [Time]<br>To [Date] [Time]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           | Report Run Date [Date] [Time]                           |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| <b>1. BAG VOLUME</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th># Bags</th> <th>% Total</th> </tr> </thead> <tbody> <tr><td>Total</td><td>0</td><td>100.0</td></tr> <tr><td>TC1</td><td>0</td><td>0.0</td></tr> <tr><td>TC2 etc.</td><td>0</td><td>0.0</td></tr> <tr><td>CS1</td><td>0</td><td>0.0</td></tr> <tr><td>CS2 etc.</td><td>0</td><td>0.0</td></tr> <tr><td>TX1</td><td>0</td><td>0.0</td></tr> <tr><td>TX2 etc.</td><td>0</td><td>0.0</td></tr> <tr><td>OS2</td><td>0</td><td>0.0</td></tr> <tr><td>OS2 etc.</td><td>0</td><td>0.0</td></tr> <tr><td>Other</td><td>0</td><td>0.0</td></tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                   | # Bags                                                                    | % Total    | Total         | 0      | 100.0         | TC1           | 0          | 0.0         | TC2 etc.      | 0           | 0.0       | CS1           | 0         | 0.0      | CS2 etc.                                                                                                                                                                                                                                                                                                                                                                                                      | 0       | 0.0    | TX1            | 0      | 0.0      | TX2 etc.      | 0   | 0.0      | OS2           | 0   | 0.0      | OS2 etc.      | 0 | 0.0      | Other | 0   | 0.0 | <b>2. OSR STATS</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Total OSR Bags</th> <th># Cleared</th> <th>% Cleared</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>00.0</td> </tr> </tbody> </table> |          |   | Total OSR Bags | # Cleared | % Cleared | 0       | 0   | 00.0     | <b>3. ATR STATS</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th># Bags</th> <th>% Total</th> </tr> </thead> <tbody> <tr><td>ATR Total</td><td>0</td><td>100.0</td></tr> <tr><td>ATR No Read</td><td>0</td><td>0.0</td></tr> <tr><td>Tag Conflict</td><td>0</td><td>0.0</td></tr> </tbody> </table> |     |   |     | # Bags | % Total | ATR Total | 0 | 100.0 | ATR No Read | 0   | 0.0 | Tag Conflict | 0        | 0.0 | <b>4. PEAK HOUR</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th># Bags</th> <th>% Total</th> </tr> </thead> <tbody> <tr><td>Peak Hour Total</td><td>0</td><td>0.0</td></tr> <tr><td>EDS Volume</td><td>0</td><td>0.0</td></tr> <tr><td>EDS Alarmed</td><td>0</td><td>0.0</td></tr> <tr><td>CBRA Arrivals</td><td>0</td><td>0.0</td></tr> <tr><td>CBRA Invalids</td><td>0</td><td>0.0</td></tr> <tr><td>Avg Bag Spacing</td><td>0</td><td>inches</td></tr> </tbody> </table> |   |     |   | # Bags | % Total  | Peak Hour Total | 0   | 0.0 | EDS Volume | 0 | 0.0 | EDS Alarmed | 0   | 0.0 | CBRA Arrivals | 0   | 0.0 | CBRA Invalids | 0        | 0.0 | Avg Bag Spacing | 0   | inches |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | # Bags    | % Total                                                 |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0         | 100.0                                                   |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| TC1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| TC2 etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| CS1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| CS2 etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| TX1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| TX2 etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| OS2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| OS2 etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Other                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Total OSR Bags                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | # Cleared | % Cleared                                               |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0         | 00.0                                                    |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | # Bags    | % Total                                                 |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| ATR Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0         | 100.0                                                   |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| ATR No Read                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Tag Conflict                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | # Bags    | % Total                                                 |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Peak Hour Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| EDS Volume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| EDS Alarmed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| CBRA Arrivals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| CBRA Invalids                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0         | 0.0                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Avg Bag Spacing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0         | inches                                                  |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| <b>5. EDS STATISTICS</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">Volume</th> <th colspan="2">Alarms</th> <th colspan="2">IATA Handoffs</th> </tr> <tr> <th># Bags</th> <th>% EDS Total</th> <th># Bags</th> <th>% EDS Total</th> <th># at Exit</th> <th>% Accuracy</th> </tr> </thead> <tbody> <tr><td>EDS Total</td><td>0</td><td>100.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>[EDS ID]</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>[EDS ID]</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>[EDS ID]</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>[EDS ID]</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>[EDS ID]</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>[EDS ID]</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>[EDS ID]</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>[EDS ID]</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>[EDS ID]</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                   |           |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                   | Volume                                                                    |            | Alarms        |        | IATA Handoffs |               | # Bags     | % EDS Total | # Bags        | % EDS Total | # at Exit | % Accuracy    | EDS Total | 0        | 100.0                                                                                                                                                                                                                                                                                                                                                                                                         | 0       | 0.0    | 0              | 0.0    | [EDS ID] | 0             | 0.0 | 0        | 0.0           | 0   | 0.0      | [EDS ID]      | 0 | 0.0      | 0     | 0.0 | 0   | 0.0                                                                                                                                                                                                                                                       | [EDS ID] | 0 | 0.0            | 0         | 0.0       | 0       | 0.0 | [EDS ID] | 0                                                                                                                                                                                                                                                                                                                                                    | 0.0 | 0 | 0.0 | 0      | 0.0     | [EDS ID]  | 0 | 0.0   | 0           | 0.0 | 0   | 0.0          | [EDS ID] | 0   | 0.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 | 0.0 | 0 | 0.0    | [EDS ID] | 0               | 0.0 | 0   | 0.0        | 0 | 0.0 | [EDS ID]    | 0   | 0.0 | 0             | 0.0 | 0   | 0.0           | [EDS ID] | 0   | 0.0             | 0   | 0.0    | 0   | 0.0 | <b>6. TOP 5 PE STATISTICS</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>PE Pre-EDS</th> <th># Bags</th> <th># Unk</th> <th>% Unk</th> <th>PE Post-EDS</th> <th># Bags</th> <th># Unk</th> <th>% Unk</th> </tr> </thead> <tbody> <tr><td>[PE ID]</td><td>0</td><td>0</td><td>0.0</td><td>[PE ID]</td><td>0</td><td>0</td><td>0.0</td></tr> <tr><td>[PE ID]</td><td>0</td><td>0</td><td>0.0</td><td>[PE ID]</td><td>0</td><td>0</td><td>0.0</td></tr> <tr><td>[PE ID]</td><td>0</td><td>0</td><td>0.0</td><td>[PE ID]</td><td>0</td><td>0</td><td>0.0</td></tr> <tr><td>[PE ID]</td><td>0</td><td>0</td><td>0.0</td><td>[PE ID]</td><td>0</td><td>0</td><td>0.0</td></tr> <tr><td>[PE ID]</td><td>0</td><td>0</td><td>0.0</td><td>[PE ID]</td><td>0</td><td>0</td><td>0.0</td></tr> </tbody> </table> |           |   | PE Pre-EDS | # Bags | # Unk | % Unk | PE Post-EDS | # Bags | # Unk | % Unk      | [PE ID] | 0   | 0 | 0.0 | [PE ID] | 0   | 0 | 0.0 | [PE ID] | 0 | 0   | 0.0 | [PE ID] | 0 | 0   | 0.0 | [PE ID] | 0       | 0 | 0.0 | [PE ID] | 0   | 0 | 0.0 | [PE ID] | 0   | 0 | 0.0 | [PE ID] | 0 | 0 | 0.0 | [PE ID] | 0 | 0 | 0.0 | [PE ID] | 0 | 0 | 0.0 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Volume    |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                   | Alarms                                                                    |            | IATA Handoffs |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | # Bags    | % EDS Total                                             | # Bags                                                                                                                                                                                                                                                                                                                                                                                            | % EDS Total                                                               | # at Exit  | % Accuracy    |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| EDS Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0         | 100.0                                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [EDS ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [EDS ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [EDS ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [EDS ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [EDS ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [EDS ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [EDS ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [EDS ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [EDS ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| PE Pre-EDS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | # Bags    | # Unk                                                   | % Unk                                                                                                                                                                                                                                                                                                                                                                                             | PE Post-EDS                                                               | # Bags     | # Unk         | % Unk  |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [PE ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0         | 0                                                       | 0.0                                                                                                                                                                                                                                                                                                                                                                                               | [PE ID]                                                                   | 0          | 0             | 0.0    |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [PE ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0         | 0                                                       | 0.0                                                                                                                                                                                                                                                                                                                                                                                               | [PE ID]                                                                   | 0          | 0             | 0.0    |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [PE ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0         | 0                                                       | 0.0                                                                                                                                                                                                                                                                                                                                                                                               | [PE ID]                                                                   | 0          | 0             | 0.0    |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [PE ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0         | 0                                                       | 0.0                                                                                                                                                                                                                                                                                                                                                                                               | [PE ID]                                                                   | 0          | 0             | 0.0    |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [PE ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0         | 0                                                       | 0.0                                                                                                                                                                                                                                                                                                                                                                                               | [PE ID]                                                                   | 0          | 0             | 0.0    |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |                                                         | <b>7. TOP 3 CBIS JAM STATISTICS</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>CBIS Jams</th> <th>Count</th> <th>Duration</th> </tr> </thead> <tbody> <tr><td>[Location ID]</td><td>0</td><td>00:00:00</td></tr> <tr><td>[Location ID]</td><td>0</td><td>00:00:00</td></tr> <tr><td>[Location ID]</td><td>0</td><td>00:00:00</td></tr> </tbody> </table> |                                                                           |            | CBIS Jams     | Count  | Duration      | [Location ID] | 0          | 00:00:00    | [Location ID] | 0           | 00:00:00  | [Location ID] | 0         | 00:00:00 | <b>8. TOP 3 FAIL-SAFE EVENT STATISTICS</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>CBIS Fail Safe</th> <th>Count</th> <th>Duration</th> </tr> </thead> <tbody> <tr><td>[Location ID]</td><td>0</td><td>00:00:00</td></tr> <tr><td>[Location ID]</td><td>0</td><td>00:00:00</td></tr> <tr><td>[Location ID]</td><td>0</td><td>00:00:00</td></tr> </tbody> </table> |         |        | CBIS Fail Safe | Count  | Duration | [Location ID] | 0   | 00:00:00 | [Location ID] | 0   | 00:00:00 | [Location ID] | 0 | 00:00:00 |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| CBIS Jams                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Count     | Duration                                                |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [Location ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0         | 00:00:00                                                |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [Location ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0         | 00:00:00                                                |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [Location ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0         | 00:00:00                                                |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| CBIS Fail Safe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Count     | Duration                                                |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [Location ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0         | 00:00:00                                                |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [Location ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0         | 00:00:00                                                |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| [Location ID]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0         | 00:00:00                                                |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| <b>9. CBRA STATISTICS</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">Volume</th> <th colspan="2">Reconciled</th> <th colspan="2">Reinserted</th> <th colspan="2">Peak Hour</th> </tr> <tr> <th># Bags</th> <th>% Total</th> <th># Bags</th> <th>% Total</th> <th># Bags</th> <th>% Total</th> <th># Bags</th> <th>% Total</th> </tr> </thead> <tbody> <tr><td>CBRA Total</td><td>0</td><td>100.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>Valid</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>  Alarmed</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>  OOG</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>  OS</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>Invalid</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>  Clear</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>  EDS Error</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>  Comm Error</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>  Unknown</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> <tr><td>  Timeout</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td><td>0</td><td>0.0</td></tr> </tbody> </table> |           |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        | Volume        |               | Reconciled |             | Reinserted    |             | Peak Hour |               | # Bags    | % Total  | # Bags                                                                                                                                                                                                                                                                                                                                                                                                        | % Total | # Bags | % Total        | # Bags | % Total  | CBRA Total    | 0   | 100.0    | 0             | 0.0 | 0        | 0.0           | 0 | 0.0      | Valid | 0   | 0.0 | 0                                                                                                                                                                                                                                                         | 0.0      | 0 | 0.0            | 0         | 0.0       | Alarmed | 0   | 0.0      | 0                                                                                                                                                                                                                                                                                                                                                    | 0.0 | 0 | 0.0 | 0      | 0.0     | OOG       | 0 | 0.0   | 0           | 0.0 | 0   | 0.0          | 0        | 0.0 | OS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0 | 0.0 | 0 | 0.0    | 0        | 0.0             | 0   | 0.0 | Invalid    | 0 | 0.0 | 0           | 0.0 | 0   | 0.0           | 0   | 0.0 | Clear         | 0        | 0.0 | 0               | 0.0 | 0      | 0.0 | 0   | 0.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | EDS Error | 0 | 0.0        | 0      | 0.0   | 0     | 0.0         | 0      | 0.0   | Comm Error | 0       | 0.0 | 0 | 0.0 | 0       | 0.0 | 0 | 0.0 | Unknown | 0 | 0.0 | 0   | 0.0     | 0 | 0.0 | 0   | 0.0     | Timeout | 0 | 0.0 | 0       | 0.0 | 0 | 0.0 | 0       | 0.0 |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Volume    |                                                         | Reconciled                                                                                                                                                                                                                                                                                                                                                                                        |                                                                           | Reinserted |               |        | Peak Hour     |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | # Bags    | % Total                                                 | # Bags                                                                                                                                                                                                                                                                                                                                                                                            | % Total                                                                   | # Bags     | % Total       | # Bags | % Total       |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| CBRA Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0         | 100.0                                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           | 0      | 0.0           |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Valid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           | 0      | 0.0           |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Alarmed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           | 0      | 0.0           |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| OOG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           | 0      | 0.0           |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| OS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           | 0      | 0.0           |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Invalid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           | 0      | 0.0           |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Clear                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           | 0      | 0.0           |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| EDS Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           | 0      | 0.0           |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Comm Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           | 0      | 0.0           |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Unknown                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           | 0      | 0.0           |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| Timeout                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0         | 0.0                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                 | 0.0                                                                       | 0          | 0.0           | 0      | 0.0           |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |
| <p><i>WARNING: This record contains Sensitive Security Information that is controlled under 49 CFR parts 15 and 1520. No part of this record may be disclosed to persons without a "need to know" as defined in 49 CFR parts 15 and 1520, except with the written permission of the Administrator of the Transportation Security Administration, or the Secretary of Transportation. Unauthorized disclosure may result in civil penalty or other action. For U.S. Government agencies, public release is governed by 5 U.S.C. 552 and 49 CFR parts 15 and 1520.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                           |            |               |        |               |               |            |             |               |             |           |               |           |          |                                                                                                                                                                                                                                                                                                                                                                                                               |         |        |                |        |          |               |     |          |               |     |          |               |   |          |       |     |     |                                                                                                                                                                                                                                                           |          |   |                |           |           |         |     |          |                                                                                                                                                                                                                                                                                                                                                      |     |   |     |        |         |           |   |       |             |     |     |              |          |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |   |        |          |                 |     |     |            |   |     |             |     |     |               |     |     |               |          |     |                 |     |        |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |   |            |        |       |       |             |        |       |            |         |     |   |     |         |     |   |     |         |   |     |     |         |   |     |     |         |         |   |     |         |     |   |     |         |     |   |     |         |   |   |     |         |   |   |     |         |   |   |     |

Appendix Figure A-14: CBIS Performance Report Definitions

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                              |                                              |                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------|------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Transportation<br>Security<br>Administration | <b>CBIS Performance Report Definitions</b>   |                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                              | Screening System Name<br>Airport<br>Terminal | [Name]<br>[Airport Code]<br>[Name] |
| <b>Definitions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                              |                                              |                                    |
| <ol style="list-style-type: none"> <li>1. Bag Volume: from Daily CBIS Bag Volume report           <ul style="list-style-type: none"> <li>• <b>Inducted Volume</b> = Bag volume counted at external induction points (excludes reinserted bags) – ticket counters, curbside, transfer, oversize; this data matches the corresponding data on the Daily CBIS Summary Report</li> <li>• <b>CBIS Volume</b> = EDS Volume + OOG + Reinserted, counts bag trips through the CBIS on the standard conveyors</li> </ul> </li> <li>2. OSR Stats           <ul style="list-style-type: none"> <li>• <b>OSR Total</b> = Number of bags that receive a Level 2 cleared decision</li> </ul> </li> <li>3. ATR Stats           <ul style="list-style-type: none"> <li>• <b>ATR Total</b> = count of ATR read attempts</li> <li>• Individual percentages are calculated against the ATR TOTAL number</li> </ul> </li> <li>4. Peak Hour: from CBIS Tracking Summary report           <ul style="list-style-type: none"> <li>• <b>Average Bag Spacing</b> from CBIS Bag Spacing Report</li> </ul> </li> <li>5. EDS Statistics           <ul style="list-style-type: none"> <li>• <b>EDS Total</b> = Number of bags entering all EDS (measured at the handoff PE)</li> <li>• <b>EDS AL</b> = Number of bags that receive a Level 1 alarm decision (if a Level 1 decision is not provided by the EDS, leave this section blank)</li> <li>• <b>Tracking</b> = Total Level 2 alarm bags arriving in CBRA / total Level 2 alarm bags</li> <li>• <b>IATA Handoffs</b> = Number of IATA IDs received at the exit of the EDS. Accuracy is # handoffs/EDS Total</li> </ul> </li> <li>6. Top 5 PE Statistics           <ul style="list-style-type: none"> <li>• These are the 5 photoeyes with the highest percentage of unknown bags for the query selected. These will vary per query.</li> <li>• <b>% Unk</b> = # Unk / # Bags for each photoeye</li> <li>• Photoeyes within the EDS are included in the post-EDS column</li> </ul> </li> <li>7. Top 3 CBIS Jam Statistics: from Daily CBIS Summary report           <ul style="list-style-type: none"> <li>• These are the 5 locations with the highest number of jams for the query selected. These will vary per query.</li> </ul> </li> <li>8. Top 3 Fail-Safe Event Statistics: from Daily CBIS Summary report           <ul style="list-style-type: none"> <li>• These are the 3 locations with the highest number of Fail-Safes for the query selected. These will vary per query.</li> </ul> </li> <li>9. CBRA Statistics: from CBRA Executive Summary report           <ul style="list-style-type: none"> <li>• <b>CBRA Total</b> = Number of bags entering CBRA</li> <li>• <b>Timeout</b> – This is a subset of alarm bags arriving in CBRA</li> <li>• <b>CBRA Invalids</b> – This total includes the following status and sub-status: Clear, EDS Error, Unknown, Com Error, AND Timeout. The percentage is calculated against total CBRA Total Volume.</li> <li>• <b>Peak Hour Section</b> – Only populated on reports with durations less than 24 hours or same day</li> </ul> </li> </ol> |                                              |                                              |                                    |

## A.5 PGDS REQUEST FOR VARIANCE (RFV) FORM

RFVs submitted during design phases are sent to TSA at [CBTPlanning@tsa.dhs.gov](mailto:CBTPlanning@tsa.dhs.gov). RFV's submitted during the construction phase are sent to [BASEteam@tsa.dhs.gov](mailto:BASEteam@tsa.dhs.gov). Appendix Figure A-15 contains a PGDS Request for Variance Form. The RFV form can be obtained through your TSA Project Coordinator or by e-mailing [PGDS@tsa.dhs.gov](mailto:PGDS@tsa.dhs.gov).

Appendix Figure A-15: PGDS Request for Variance Form

| PGDS Request for Variance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| <p>The PGDS Request for Variance (RFV) form is used by the CBIS ILDT to request a variance from the requirements set forth in the PGDS. The RFV is used prior to TSA's Acceptance Testing and submitted in the native Word format to the TSA Project Coordinator and <a href="mailto:CBTPlanning@tsa.dhs.gov">CBTPlanning@tsa.dhs.gov</a> for projects in Design. For projects in construction, submit to Project Coordinator and <a href="mailto:BaseTeam@tsa.dhs.gov">BaseTeam@tsa.dhs.gov</a>.</p> <p><b><i>(If a response or additional information is requested from the TSA and not received within 48 hours the RFV will be returned as rejected due to insufficient information)</i></b></p> |                                                                              |
| RFV #:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                              |
| SUBJECT:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                              |
| PROJECT PHASE:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | DESIGN <input type="checkbox"/> CONSTRUCTION <input type="checkbox"/>        |
| FROM:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TO: <b>TSA Project Coordinator</b>                                           |
| EMAIL:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | EMAIL:                                                                       |
| PGDS REFERENCE:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | AIRPORT CODE:                                                                |
| MOA/LOI/OTA NO.:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | EBSP PROJECT NO.:                                                            |
| ATTACHED DWGS: Yes <input type="checkbox"/> No <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | DOCUMENTS ATTACHED: Yes <input type="checkbox"/> No <input type="checkbox"/> |
| DWG LISTING:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | DOCUMENTS LISTING:                                                           |
| REQUESTED VARIANCE:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                              |
| PROPOSED ALTERNATIVE METHOD FOR MEETING PGDS COMPLIANCE:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                              |
| REQUESTOR:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | DATE REQUEST SUBMITTED:                                                      |
| PRINT NAME:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                              |
| SIGNATURE:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                              |
| TSA RESPONSE TO VARIANCE:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                              |
| BHS SME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Accepted <input type="checkbox"/> Rejected <input type="checkbox"/>          |
| Preliminary Disposition – T&E:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Accepted <input type="checkbox"/> Rejected <input type="checkbox"/>          |
| Final Disposition – EBS/PSD:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Accepted <input type="checkbox"/> Rejected <input type="checkbox"/>          |
| BHS SME:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | DATE:                                                                        |
| T&E ENGINEER:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | DATE:                                                                        |
| EBS/PSD Coordinator:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | DATE:                                                                        |
| CBIS_RFV_R16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                              |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                              |

## A.6 CBIS CHANGE REQUEST (CCR) FORM

Appendix Figure A-16 contains an image of the CBIS Change Request Form. The CCR form can be obtained through your TSA Project Coordinator or by e-mailing [PGDS@tsa.dhs.gov](mailto:PGDS@tsa.dhs.gov).

Appendix Figure A-16: CBIS Change Request (CCR) Form

| CBIS Change Request (CCR)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                         |                                                                    |                                                |                                                                      |                                         |                                                        |  |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------|--|--|--|
| Email Completed CCR in Excel format (.xlsx) to Baseteam@tsa.dhs.gov                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                         |                                                                    |                                                |                                                                      |                                         |                                                        |  |  |  |
| Airport Code:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                         | ISAT <input type="checkbox"/>                                      |                                                | Bag Room / CBIS                                                      |                                         | Post Com. <input type="checkbox"/>                     |  |  |  |
| Requested By:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Name:                                                                   |                                                                    |                                                | Company:                                                             |                                         |                                                        |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Phone:                                                                  |                                                                    |                                                | Email:                                                               |                                         |                                                        |  |  |  |
| BHS Installer /                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Name:                                                                   |                                                                    |                                                | Company:                                                             |                                         |                                                        |  |  |  |
| Maintenance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Phone:                                                                  |                                                                    |                                                | Email:                                                               |                                         |                                                        |  |  |  |
| BHS Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Name:                                                                   |                                                                    |                                                | Company:                                                             |                                         |                                                        |  |  |  |
| Support:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Phone:                                                                  |                                                                    |                                                | Email:                                                               |                                         |                                                        |  |  |  |
| Date of Request:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                         |                                                                    |                                                |                                                                      |                                         |                                                        |  |  |  |
| Type of Integration:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Fully <input type="checkbox"/>                                          | Semi <input type="checkbox"/>                                      | Mini <input type="checkbox"/>                  | Other <input type="checkbox"/>                                       |                                         |                                                        |  |  |  |
| Affected Area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Security Tracking Zone (STZ) <input type="checkbox"/>                   |                                                                    | Non-STZ <input type="checkbox"/>               | Pre-EDS <input type="checkbox"/>                                     | Post-EDS <input type="checkbox"/>       | CBRA <input type="checkbox"/>                          |  |  |  |
| EDS Type, Model & Quantity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                         |                                                                    |                                                |                                                                      |                                         |                                                        |  |  |  |
| Change Description:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                         |                                                                    |                                                |                                                                      |                                         |                                                        |  |  |  |
| Detected Problem:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                         |                                                                    |                                                |                                                                      |                                         |                                                        |  |  |  |
| Proposed Corrective Action/Change:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                         |                                                                    |                                                |                                                                      |                                         |                                                        |  |  |  |
| Describe Testing to Verify Change:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                         |                                                                    |                                                |                                                                      |                                         |                                                        |  |  |  |
| Implementation Time (man hrs)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                         |                                                                    |                                                |                                                                      |                                         |                                                        |  |  |  |
| Engineering Reviewer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                         |                                                                    |                                                | Date:                                                                |                                         |                                                        |  |  |  |
| Engineering Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                         |                                                                    |                                                |                                                                      |                                         |                                                        |  |  |  |
| Engineering Change Validation(CV)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Approved <input type="checkbox"/>                                       | Disapproved <input type="checkbox"/>                               | TSA LOCAL <input type="checkbox"/>             | T&E <input type="checkbox"/>                                         | Deferred to DC <input type="checkbox"/> | Extended (Add to CV Comments) <input type="checkbox"/> |  |  |  |
| Validation Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Remote Analysis <input type="checkbox"/>                                | Live Operations <input type="checkbox"/>                           | Non-Operational Hours <input type="checkbox"/> | Other (Add to CV Comments) <input type="checkbox"/>                  |                                         |                                                        |  |  |  |
| CCR Validated By                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Name                                                                    | Date                                                               | Validation Pass <input type="checkbox"/>       | Validation Fail (Add reason to CV Comments) <input type="checkbox"/> |                                         |                                                        |  |  |  |
| Documentation required by T&E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2 weeks of BHS Reporting, Pre-CCR and Post-CCR <input type="checkbox"/> | Updated PLC CODE Required for all Changes <input type="checkbox"/> | Updated Drawing <input type="checkbox"/>       | Other (Add to CV Comments) <input type="checkbox"/>                  |                                         |                                                        |  |  |  |
| CV Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                         |                                                                    |                                                |                                                                      |                                         |                                                        |  |  |  |
| Deployment Coordinator(DC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                         |                                                                    |                                                | Date:                                                                |                                         |                                                        |  |  |  |
| DC Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                         |                                                                    |                                                |                                                                      |                                         |                                                        |  |  |  |
| DC Disposition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Approved <input type="checkbox"/>                                       | Disapproved <input type="checkbox"/>                               | Deferred <input type="checkbox"/>              |                                                                      |                                         |                                                        |  |  |  |
| <p>After CCR is validated, signed and dated, the person validating shall send a copy to the DC and Baseteam@tsa.dhs.gov.</p> <p>NOTE: A copy of the updated PLC code shall be delivered to T&amp;E at Baseteam@tsa.dhs.gov upon completion of the CCR.</p> <p>The approval to implement the changes noted above does not constitute a change in the contract, or commit additional funding to the project. Contract modifications can only be made by the TSA Contracting Officer.</p> <p>(Where additional information has been requested by the TSA and it is not received within 48 hours, the CCR will be returned as rejected due to insufficient information.)</p> |                                                                         |                                                                    |                                                |                                                                      |                                         |                                                        |  |  |  |



**A.6.1 CCR EXAMPLE**

The following is an example of a CCR document provided by Siemens. Designers should follow a similar outline when submitting a CCR request.

**Introduction**

The purpose of this document is to describe the changes of the PLC code to be reviewed and approved by TSA or authorized agent.

**Proposed Change Description - Purging of the Reconciliation Lookup Table for IR Bag****Detected Problem**

When a bag arrives at CBRA with Unknown status it can be reintroduced in the system through the RI line. At the RI, the 10-digit IATA bag tag is scanned using a hand scanner or entered using the station display. Once scanned, the bag is tracked to EDS2 line and handled just like a new bag introduced at the ticket counter and scanned by ATR.

BHS includes a reconciliation scanner ATR SB1. The purpose of this scanner is to reconcile bags with the EDS decision when a bag is lost between exit of EDS and ATR SB1.

Because of the reconciliation process, special attention must be paid to the reinserted bags that are screened twice. Procedure must include provisions to prevent conditions when the bag on the first pass is cleared, on the second pass is alarmed, is lost in tracking downstream from the EDS and reconciled to the first clear decision. Algorithm of the current program handles this issue correctly. However, to completely avoid possibility of manual intervention in the reconciliation process, additional safeguards are introduced.

**Corrective Action**

The 10-digit IATA bag tag of the re-inducted bag will be purged from the reconciliation table to guarantee that the bag will never reconcile with data from the first screening process.

Procedure was added to re-induct functionality (FC98, Network 69) to search through the look up table and delete the record created by the first screening.

**Testing Procedure**



To validate the requested change, the following test procedures will be performed:

1. Introduce a suspect bag upstream of ATR EDS2
2. Clear bag status from OSR after 10 sec to make sure that bag is routed to SB line
3. Delay bag at SB1-07 just after ATR SB1 to create loss of tracking
4. Re-induct bag from RI1-01
5. Verify that bag is Alarmed by EDS
6. Delay bag on SB1-02 to create loss of tracking
7. Verify that bag is reconciled on ATR SB1 to the Alarmed status and routed to CBRA

### **Adjustment of Tracking Parameters for SS3**

#### **Detected problem**

During high volume baseline test bag ID exchange was detected on SS3-01. After analysis of the Bag History Report and CCTV recording it was determined that main reason was insufficient gap between bags created at the Ticket Counter merge leading to bag collisions.

Merge window parameters were adjusted, and additional gapping introduced on the queue conveyors just downstream of the merge TC1-TC4.

#### **Corrective Actions**

In addition to already mentioned changes measures following adjustment are proposed:

1. Increase Run Time delay on EDS1-08 to allow downstream conveyors to clear before restarting EDS line and minimize possible tracking losses
2. Decrease Missing bag detection timer to improve tracking loss detection

#### **Testing Procedure**

Perform Added Bag Test on Zone 1A and 1B for the SS3 line.

### **EDS1-08 Stops When SS2 is Unavailable**

#### Detected Problem

South Security Matrix consists of three lines SS1 – SS3. When SS2 becomes unavailable it also stops conveyor feeding all three lines - EDS1-08, even if SS3 is still available. A\_Takeaway\_Running parameter defines the name of the downstream conveyor in straight direction that needs to be available for EDS1-08 to run. Parameter review showed that it was set to incorrect value.

#### Corrective Action

A\_Takeaway\_Running parameter needs to point to a conveyor downstream from EDS1\_08. Replace the Current A\_Takeaway\_Running with the true A destination SS3\_01.Running Forward. This will ensure that EDS1-08 will continue to run if SS3 is available.

#### Testing Procedure

1. Disable the SS2 line.
2. Place HSD-SS2 is in Automatic mode.

Expected Result: EDS1-08 to continue to run until SS3 become full.

### A.7 FIELD DATA REPORTING SYSTEM (FDRS) DATA REQUESTS

TSA often has historical EDS data that may prove beneficial to designers and planners of BHSs that incorporate a CBIS. FDRS data is EDS information supplied by the TSA intended to aid in the design of BHS projects, specifically projects that involve the CBIS portion of a BHS.

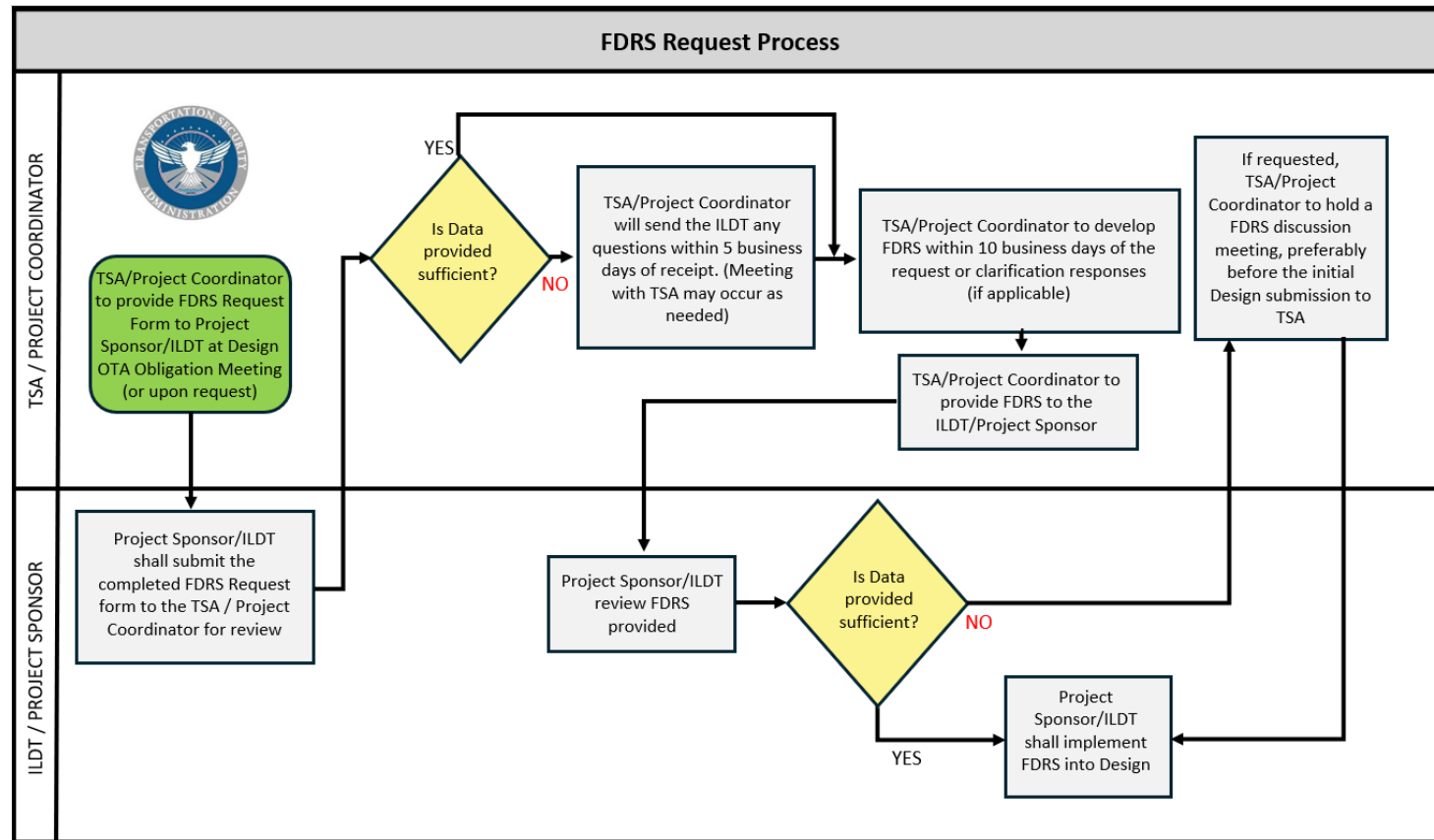
FDRS data, offered at the Preliminary stages of the design process, is contingently applicable, and is very dependent upon the scope of the project. For TSA to supply FDRS data, we need to gain a perspective about the overall scope of the project and a general understanding of the project's intent. The form shown below in Appendix Figure A-18 is used to request FDRS data from TSA:

FDRS data is historical data of the quantity of the bags that go through the EDS units. If specific EDS unit numbers are supplied:

- The TSA can supply the 10 minute peaks of every day for the most recent year's span, by EDS grouping. This will be represented by two graphs, indicating the peaks chronologically and in ascending order. We'll also indicate the ADPM day, as well as the day that corresponds to the 95 percentile for a year's sampling.
- TSA can also supply a graph of the baggage rate for the 95% day and the peak day. These graphs will show the average of 10 minutes, in 1-minute increments (rolling 10 minute bins), for the 95% and peak days. They do not include the Surge Factor.
- If available, TSA will supply the baggage rate graphs of the individual EDS units for the 95% day. These graphs will indicate the baggage rate for each minute, by the minute (no averaging, no Surge Factor).

TSA encourages participation in Technical Interchange Meetings throughout the design review process to allow for open lines of communication and a vehicle to resolve issues or concerns as they arise. The process flow chart below illustrates the overall FDRS Request process for TSA. See a copy of the FDRS request form.

Appendix Figure A-17: FDRS Request Process



Appendix Figure A-18: FDRS Request Form

| FDRS Request Form <i>Version 1 (3/27/2023)</i>                                                                    |                                                                                        |                                      |                        |                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Note: This form is intended to provide Field Data Reporting System (FDRS) Baggage Rate for CBIS Design</b>     |                                                                                        |                                      |                        |                                                                                                                                 |
| Date of request                                                                                                   |                                                                                        |                                      |                        |                                                                                                                                 |
| Airport Code                                                                                                      |                                                                                        | Terminal/Area/CBIS:                  |                        |                                                                                                                                 |
| Requestor (Airport Point of Contact information)                                                                  | Name:                                                                                  |                                      | Company:               |                                                                                                                                 |
|                                                                                                                   | Phone:                                                                                 |                                      | Email:                 |                                                                                                                                 |
| Local TSA (FSD/AFSD) POC                                                                                          | Name:                                                                                  |                                      | Email:                 |                                                                                                                                 |
|                                                                                                                   | Phone:                                                                                 |                                      |                        |                                                                                                                                 |
| Project Scope<br>Provide a brief background of the project scope. i.e. New, Recap, Optimization, Renovation, etc. |                                                                                        |                                      |                        |                                                                                                                                 |
| Airline/Airport Zone(s)                                                                                           |                                                                                        |                                      |                        |                                                                                                                                 |
| Existing Screening Method                                                                                         | <input type="checkbox"/> Full Inline CBIS<br><input type="checkbox"/> Mini-Inline CBIS | <input type="checkbox"/> Stand Alone |                        |                                                                                                                                 |
| Provide Information for Existing Screening Method                                                                 | EDS OEM and Model                                                                      |                                      | Note                   | For ETD Screening Only, EDS FDRS and Baggage Rate Profiles are not available. Only total bags screened per day can be provided. |
|                                                                                                                   | EDS Serial Numbers                                                                     |                                      | EDS SN's by Matrix/Pod |                                                                                                                                 |
| Date of Expected Pre-Design Submittal to TSA                                                                      |                                                                                        |                                      |                        |                                                                                                                                 |
| Expected Date of Beneficial Use (DBU)                                                                             |                                                                                        |                                      |                        |                                                                                                                                 |
| Other Comments                                                                                                    |                                                                                        |                                      |                        |                                                                                                                                 |

## A.8 INDUSTRY COMMENT TEMPLATE

The TSA Acquisition Program Management (APM) will be the recipient of all comments regarding proposed updates to the PGDS. All comments will be reviewed and considered in a timely manner. The TSA values comments and input from industry stakeholders, but only those comments and input determined to enhance and improve the PGDS will be incorporated in the next release of the PGDS. An example of the standard form for comments is provided in Appendix Figure A-19 below.

**Appendix Figure A-19: Industry Comment Form Template**

| <div style="text-align: center;"><br/>Transportation<br/>Security<br/>Administration<br/><br/><i>Planning Guidelines and Design Standards for Checked Baggage Inspection Systems (PGDS) v9.0 Comment Form</i></div> |        |             |         |         |               |          |        |                   |                    |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------|---------|---------|---------------|----------|--------|-------------------|--------------------|--------------|
| Comment ID                                                                                                                                                                                                                                                                                            | Status | Disposition | Chapter | Section | Paragraph No. | Page No. | Author | Comment/Rationale | Suggested Revision | TRC Decision |
|                                                                                                                                                                                                                                                                                                       |        |             |         |         |               |          |        |                   |                    |              |
|                                                                                                                                                                                                                                                                                                       |        |             |         |         |               |          |        |                   |                    |              |
|                                                                                                                                                                                                                                                                                                       |        |             |         |         |               |          |        |                   |                    |              |
|                                                                                                                                                                                                                                                                                                       |        |             |         |         |               |          |        |                   |                    |              |
|                                                                                                                                                                                                                                                                                                       |        |             |         |         |               |          |        |                   |                    |              |
|                                                                                                                                                                                                                                                                                                       |        |             |         |         |               |          |        |                   |                    |              |
|                                                                                                                                                                                                                                                                                                       |        |             |         |         |               |          |        |                   |                    |              |
|                                                                                                                                                                                                                                                                                                       |        |             |         |         |               |          |        |                   |                    |              |
|                                                                                                                                                                                                                                                                                                       |        |             |         |         |               |          |        |                   |                    |              |

Comments should be submitted to the [PGDS@tsa.dhs.gov](mailto:PGDS@tsa.dhs.gov) mailbox, on the comment form located on the [Sam.gov](https://sam.gov) website using the search term "PGDS".

**Appendix B:**

**Generic Examples of Checked Baggage Inspection Systems**

## **B.1 INTRODUCTION**

This appendix provides generic examples of various design concepts of CBISs, relevant operational assumptions for those examples, and specific best practices related to the CBIS examples to supplement the information contained in Chapter 12 of the PGDS.

The high-level generic examples, which are not highly detailed, but rather convey a conceptual screening system, are provided to assist planners at the Schematic Phase of CBIS design with the development of conceptual alternatives. The examples are not site-specific and should not be used as is. These examples are intended to serve as a starting point for planners to provide ideas on different concepts of CBISs, some of the pros and cons of each concept, and some of the best practices that relate to specific CBIS design concepts. When developing design concepts, planners should consider local operational and spatial conditions, which are likely to significantly influence the actual CBIS design concepts developed.

The following generic examples of CBIS concepts are presented in this appendix:

- Two variations of linear CBIS design concepts (A, B)
- Two variations of ICS CBIS design concepts (C,D)

## **B.2 METHODOLOGY FOR DEVELOPING GENERIC EXAMPLES**

The four examples of linear CBIS or ICS designs were developed and evaluated based on in-line system types using Type I EDS units as the basis of design. Higher throughput could be accomplished in most cases by a substitution of the EDS units. This substitution may require changing the layout of the main EDS processing system (i.e., changing BHS conveyors in the immediate vicinity of the EDS units, resizing of the CBIS, and CBRA), but may not require changes to ticketing/curbside belts and bag makeup/sortation conveyors.

In some examples, other minor layout revisions may be required to provide a better match between BHS conveying capacity and EDS design throughput, but these revisions are unlikely to have much effect on BHS capital costs or building area requirements. Planners should consider such modifications when developing specific CBIS design concepts. The substitution of a higher capacity EDS unit will likely result in revised values for OSR and ETD screener staffing requirements and for the associated equipment/space requirements for this equipment and personnel.

A useful strategy may be to design a system based initially on the use of Type I EDS units and subsequent replacement by higher throughput EDS units as demand increases. This strategy may provide a convenient method of achieving a 35% to 40% increase in system throughput capacity. There is a chance that significant changes to the OSR and CBRA will be required due to these capacity increases as stated above.

## PGDS APPENDIX B      GENERIC EXAMPLES OF CHECKED BAGGAGE INSPECTION SYSTEMS

---

The following assumptions were the basis for developing the generic CBIS examples:

- A separate line is used for OS bags. These bags are too large to be loaded on the ticketing/curbside belts (e.g., surfboards, skis, and golf clubs) and are screened using ETD for primary screening.
- A bypass belt is used (except in mini in-line applications) to divert OOG bags that will not fit the aperture dimensions of the EDS tunnel. The diverter directs OOG bags directly to the CBRA, bypassing the EDS units.
- A minimum of 45 seconds of travel time is provided after the bag has been screened by an EDS unit for OSR processing in in-line CBIS designs.
- EDS and ETD throughputs are consistent with the equipment described in Chapter 3.
- Mainlines will be capable of delivering bags to the EDS units to equal the capacity of the total non-redundant EDS units at a minimum. Mainlines taking bags away from the EDS unit will be capable of transporting bags equal to or greater than the capacity of the non-redundant EDS units.

### B.3      GENERIC EXAMPLES OF LINEAR CBIS DESIGN CONCEPTS

Linear CBIS design concepts typically have a relatively straight forward linear conveyor system transporting baggage from ticketing/curbside take-away belts to the screening zones and from the screening zones to the CBRA zones and bag makeup devices.

Two variations of linear CBIS design concepts are described below:

- **Linear CBIS Design Concept A**—Baggage is transferred from ticketing on a single conveyor to the EDS, and vertical sorters or 45-degree diverters separate clear/alarmed bags soon after the bags exit the EDS units.
- **Linear CBIS Design Concept B**—Similar to design Concept A but intended to handle a higher volume of bags transferred from the induction lines.

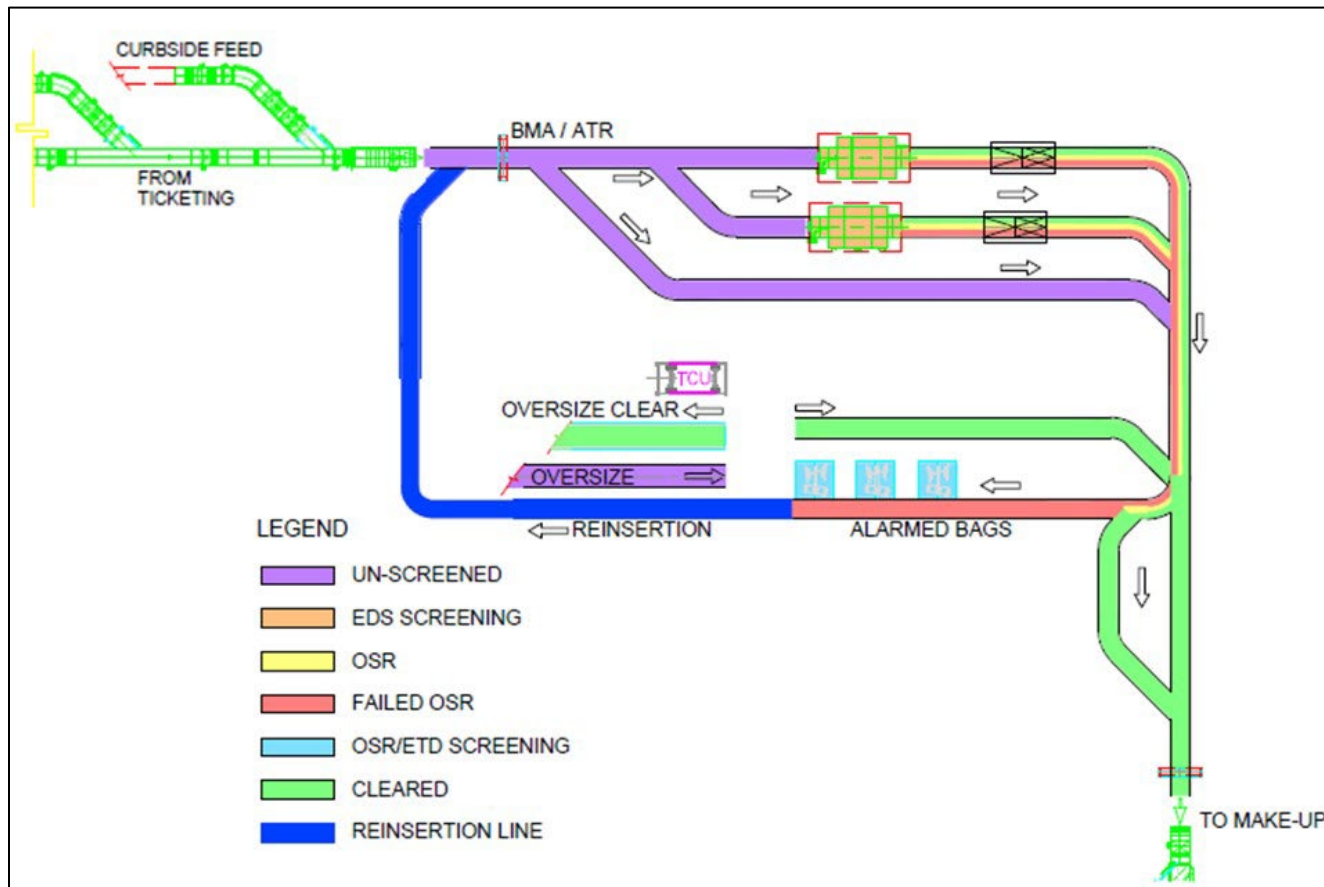


## PGDS APPENDIX B      GENERIC EXAMPLES OF CHECKED BAGGAGE INSPECTION SYSTEMS

### B.3.1      LINEAR CBIS DESIGN CONCEPT A

An example layout of linear CBIS design Concept A is shown in Appendix Figure B-1.

Appendix Figure B-1: Linear CBIS Design Concept A



**B.3.1.1 Description of Linear CBIS Design Concept A**

Ticketing and curbside take-away belts are merged into a single mainline conveyor belt leading to the security screening and bag makeup area. A BMA is used to identify OOG bags that exceed the available cross-sectional area that can be accommodated by the EDS units. OOG bags are diverted to a conveyor leading directly to the CBRA for manual inspection and clearance. All other bags proceed to a diverter that allocates bag flow between the two EDS units. After screening by EDS equipment, bags proceed to a VSU (a 45-degree diverter with parallel conveyors could also be configured) where alarmed bags are transported to an accumulation conveyor, pending OSR inspection by TSA personnel.

Bags that are cleared by the EDS units are immediately segregated from alarmed bags and diverted to a single clear bag line leading to the baggage makeup area. There is a subsequent merge point for bags cleared by OSR or ETD. Upon reaching the end of the OSR conveyor, bags that have been cleared by TSA personnel are diverted (VSU or 45-degree diverter) to a cleared bag belt, which, in turn, merges with the clear bag line leading to the baggage makeup area, as described above. Bags that are not cleared by TSA personnel (including bags for which no clearance decision has been reached by the time the bag reaches the decision point) will default to the CBRA for manual inspection.

Positive bag tracking controls are used to monitor the locations of all bags processed by the EDS units and to enable EDS images of screened bags sent to the CBRA to be accessed by TSA screening personnel. EDS images are transferred to the corresponding ETD inspection position to assist with directed ETD screening of the bag. Bags that are cleared after ETD screening and search are loaded onto a return conveyor, which merges with the clear bag line leading to the bag makeup area. Any “threat” bags identified during the ETD screening and search process are either resolved or disposed of per the current TSA checked baggage SOP, which typically involves the local law enforcement officer.

**B.3.1.2 Evaluation of Linear CBIS Design Concept A**

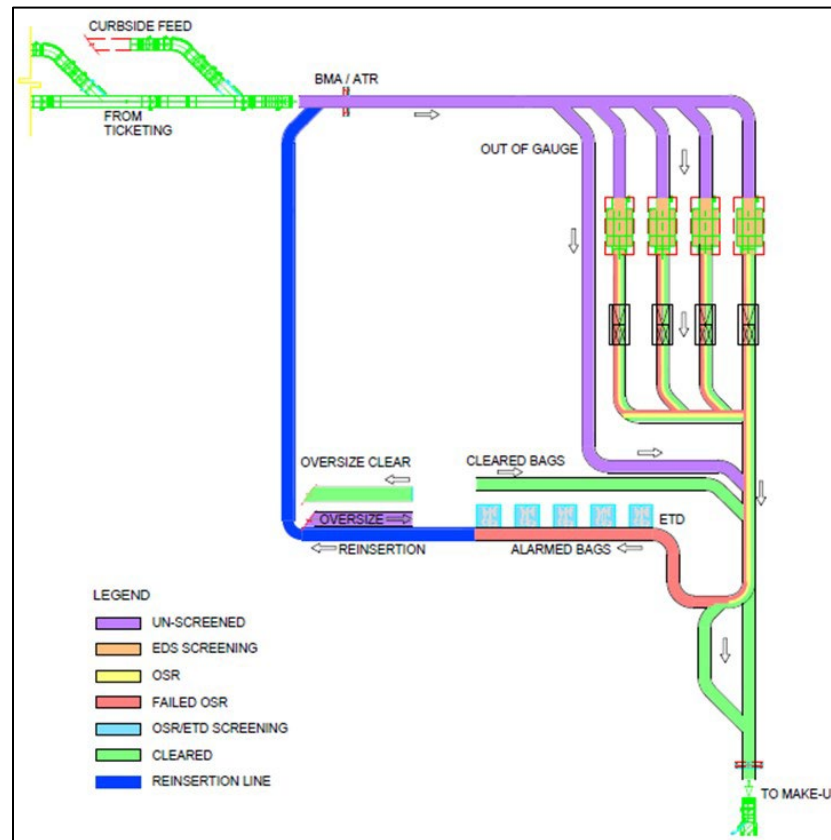
This design concept is well suited for a moderately sized application. However, the concept may involve a high cost for EDS units because a redundant unit may be necessary to maintain operations in the event of unit failure, resulting in average unit utilization of about 50% during peak period operations when both units are operational. CBRA space and equipment requirements should be identified considering the agreed-upon contingency plan developed by the Project Sponsor (see Section 5.6.2). Separation of alarmed and cleared bags immediately downstream of the EDS units minimizes the risk of bag mis tracking by diverting the majority of bags to an untracked conveyor environment but involves some system complexity (PLC programming due to a larger tracking zone) and cost.

## PGDS APPENDIX B      GENERIC EXAMPLES OF CHECKED BAGGAGE INSPECTION SYSTEMS

### B.3.2      LINEAR CBIS DESIGN CONCEPT B

An example layout of linear CBIS design Concept B is shown in Appendix Figure B-2.

Appendix Figure B-2: Linear CBIS Design Concept B



**B.3.2.1 Description of Linear CBIS Design Concept B**

Ticketing and curbside take-away belts are merged into a single mainline conveyor belt leading to the security screening and bag makeup area. A BMA is used to identify OOG bags that exceed the available cross-sectional area that can be accommodated by the EDS units. The OOG bags are diverted directly to a conveyor leading to the CBRA for manual inspection and clearance. All other bags proceed to a diverter zone, typically consisting of three 45-degree diverters, which divide bag flow among four EDS units. After EDS screening, bags proceed to a VSU (a 45-degree diverter with parallel conveyors could also be configured), where alarmed bags are transported onto an accumulation conveyor pending OSR screener decision.

Bags cleared by the EDS units are diverted onto a clear bag line leading to the bag makeup area to be discharged to a sort system. Upon reaching the end of the OSR accumulation conveyor, bags that have been cleared by TSA personnel are diverted (VSU or 45-degree diverter) to a cleared bag belt, which, in turn, merges with the cleared bag line leading to the bag makeup area.

Bags that are not cleared by TSA personnel (including bags for which no clearance decision has been reached by the time the bag reaches the decision point) default to the CBRA for manual inspection. Positive belt tracking controls are used to monitor the location of all bags processed by the EDS units and to enable images of screened bags sent to the CBRA to be accessed by TSA screening personnel who perform directed ETD screening of the bag. Bags cleared after ETD screening and search are manually transferred onto a return conveyor, which merges with the cleared bag line leading to the bag makeup area. Any “threat” bags identified during the CBRA process are either resolved or disposed of per the current TSA checked baggage SOP, which typically involves the local law enforcement officer.

In most systems with this throughput capacity, the cleared bag line conveyor leading to the bag makeup area leads to a separate sortation area, where bags are typically distributed among a number of makeup loops or piers for final sort to individual flights. This process usually requires an ATR and manual encode spur upstream of the makeup loops or piers. Sortation to individual loops or piers is typically via VSUs or 45-degree diverters, as appropriate. The sortation component of the BHS is not included in this analysis

**B.3.2.2 Evaluation of Linear CBIS Design Concept B**

The use of multiple EDS units increases the average peak period use of each unit (compared with Concept A) from about 50% to about 75%, as redundant screening equipment represents a smaller percentage of the system. However, the baggage conveying systems serving the EDS units in this concept are more complex and costly. Linear CBIS design Concept B depends on a single mainline conveyor feeding bags to the EDS unit array and a single mainline conveyor feeding bags to the makeup/sort area. The bag throughput rate on these single conveyors is also relatively high during peak periods. This concept generally requires a separate sortation system downstream of the EDS/ETD screening area to sort bags by flight or by airline.

As with linear CBIS design Concept A, the design for Concept B maintains the separation of cleared and alarmed bags; Concept B potentially has higher reliability compared with Concept A because the additional conveyors leading to a higher number of EDS units can compensate for an EDS unit failure.

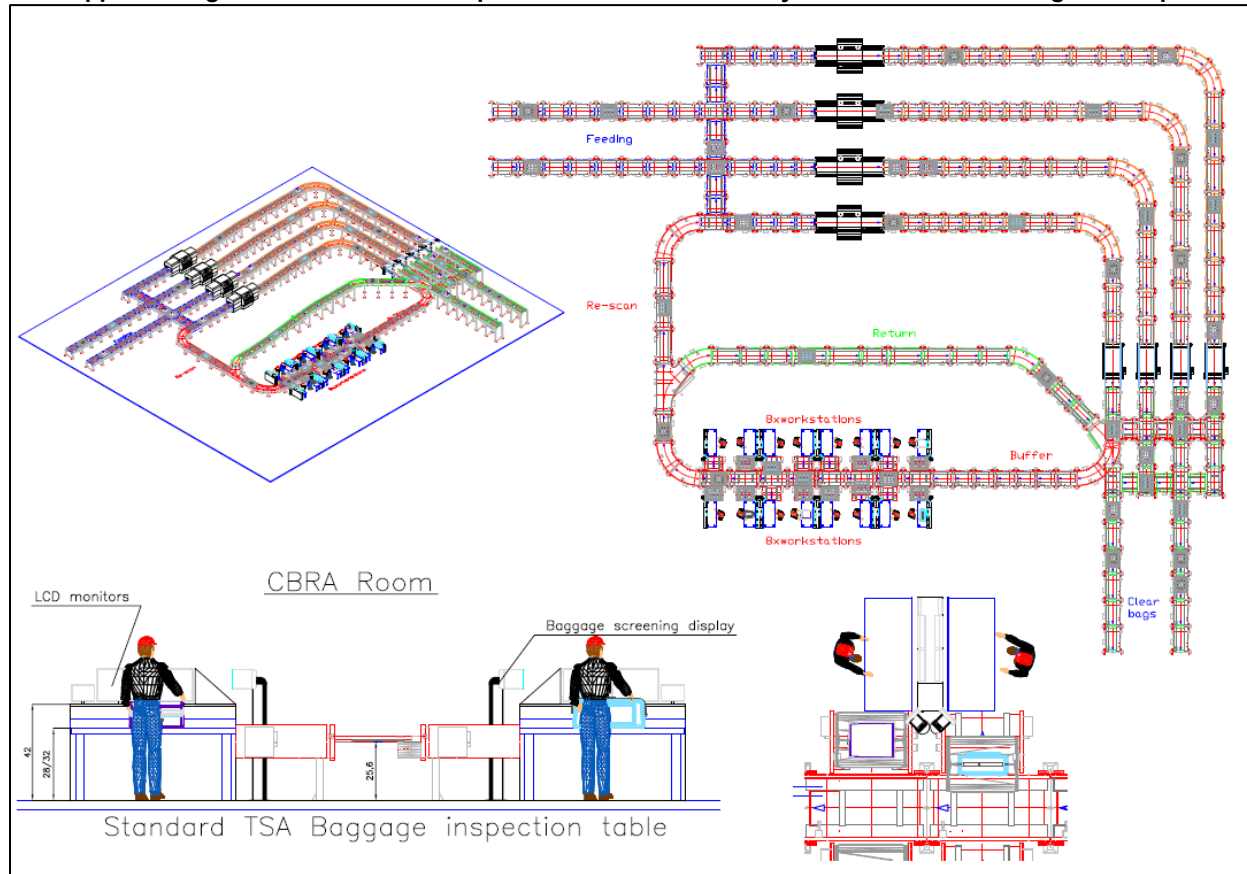
#### **B.4 GENERIC EXAMPLES OF INDIVIDUAL CARRIER SYSTEM-BASED CBIS DESIGN CONCEPTS**

An ICS-based CBIS design concept typically uses individual carriers to carry baggage through a transport and sortation system, which allows for the distribution of bags to the EDS units as well as to the CBRA, and if so designed, for the automated sortation of bags to multiple makeup devices. ICSs typically consist of a closed-loop conveying system on which special-purpose carriers (each accommodating a single bag and possessing a unique RFID tag) are transported to the EDS.

There are two types of ICS concepts shown in this Appendix. The first (Concept C) is a carrier-based screening where the bag remains inside the carrier during screening and the second (Concept D) is the where the bag is removed from the carrier during screening and then picked up again after screening. Alarmed baggage is transported to the CBRA (in the carrier) while cleared baggage is conveyed to the sortation system. The ICS concepts are presented to provide planners with potential CBIS concepts for consideration during the Schematic Phase.

This concept is illustrated schematically in Appendix Figure B-3 and Appendix Figure B-3, which is not representative of a physical equipment layout and does not show upstream ATRs. While this concept is unconventional, it is nonetheless presented to provide planners with a potential CBIS concept for consideration during the Schematic Phase.

Appendix Figure B-3: Generic Examples of Individual Carrier System Based CBIS Design Concept C



**B.4.1 DESCRIPTION OF INDIVIDUAL CARRIER SYSTEM-BASED CBIS DESIGN CONCEPT C**

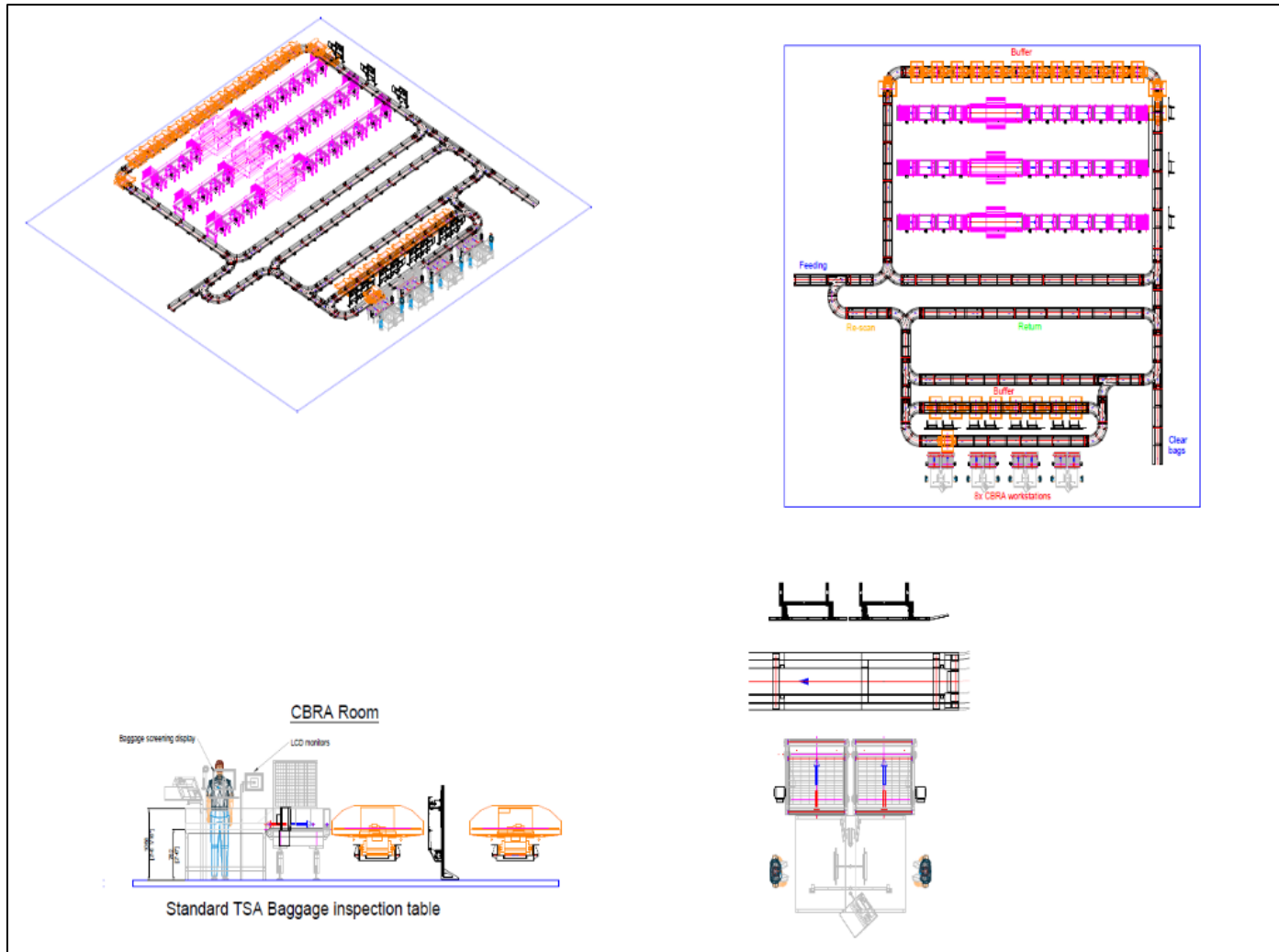
Bags from the ticketing/curbside take-away belts are delivered to three delivery belts and pass a combined BMA/ATR position where they are measured and identified. OOG bags are immediately diverted to a bypass line leading to a combined OS/OOG CBRA. Standard bags are transported under tracking control to a carrier loading and induction unit, where they are loaded onto a vehicle or carrier and a destination is assigned to the carrier. The carrier and bag then proceed to one of four EDS units, with automatic flow balancing to equalize the use of available EDS units. Bags that clear EDS screening are directed to the baggage sortation system. Bags that alarm are reviewed through the OSR decision process. OSR clear bags are directed to the baggage sortation system. OSR alarm bags are directed to CBRA for further processing. After CBRA processing has cleared the bag, the bag is directed to the baggage sortation system. An ICS carrier may be permitted to keep the bag in the carrier through the EDS screening process if the carrier meets TSA validation to not impact EDS detection per Section 3.5.1. An ICS carrier may be permitted to keep the bag in the carrier through the CBRA inspection process if the carrier meets TSA requirements for the baggage inspection stations per Section 14.3. In this concept, it is usually necessary to provide storage lines for empty carriers (for use in off-peak periods when only a small number of carriers are needed). These empty carrier storage lines can also be used for storing early check-in bags to reduce the makeup cart/container requirement for the terminal.

**B.4.2 EVALUATION OF INDIVIDUAL CARRIER SYSTEM-BASED CBIS DESIGN CONCEPT C**

By keying the unique carrier number to bag identity, it is possible to accurately track bags and transfer images to TSA personnel in the CBRA. Bag orientation can also be maintained from the EDS unit to the inspection table. It is possible to subdivide the carrier distribution system in this concept into two or more independent but connected subsystems, allowing a single point of failure condition can be avoided. This concept generally avoids the need for a separate sortation system downstream of the EDS/ETD screening area and permits the same system to be used for both security screening purposes and for sorting bags by flight or by airline. In ICS-based design Concept C, it is relatively easy to add EDS units to accommodate future growth. Considering the complexity of the system, it is likely to be most suitable for a large installation of a complete baggage system in a new or extensively renovated terminal, for a major hub airline, or for a large terminal with multiple airlines sharing a common EDS screening facility.

## PGDS APPENDIX B      GENERIC EXAMPLES OF CHECKED BAGGAGE INSPECTION SYSTEMS

Appendix Figure B-4: Generic Examples of Individual Carrier System Based CBIS Design Concept D





**B.4.3 DESCRIPTION OF INDIVIDUAL CARRIER SYSTEM-BASED CBIS DESIGN CONCEPT D**

Bags from the ticketing/curbside take-away belts are delivered to three delivery belts and pass a combined BMA/ATR position where they are measured and identified. OOG bags are immediately diverted to a bypass line leading to a combined OS/OOG CBRA. Standard bags are transported under tracking control to a cart loading unit, where they are loaded onto a cart and a destination is assigned to the carrier. The cart with bag then proceeds to one of three EDS units where the bag will be unloaded to a screening line, with automatic flow balancing to equalize the use of available EDS units. After screening the bag will be reloaded onto one available cart. Bags that clear EDS screening are directed to the baggage sortation system. Bags that alarm are reviewed through the OSR decision process. OSR clear bags are directed to the baggage sortation system. OSR alarm bags are directed to CBRA for further processing. After CBRA processing has cleared the bag, the bag will be reloaded onto a cart and directed to the baggage sortation system.

**B.4.4 EVALUATION OF INDIVIDUAL CARRIER SYSTEM-BASED CBIS DESIGN CONCEPT D**

By keying the unique cart number to bag identity, it is possible to accurately track bags and transfer images to TSA personnel in the CBRA. It is possible to subdivide the cart distribution system in this concept into two or more independent but connected subsystems, allowing a single point of failure condition can be avoided. This concept generally avoids the need for a separate sortation system downstream of the EDS/ETD screening area and permits the same system to be used for both security screening purposes and for sorting bags by flight or by airline. Considering the complexity of the system, it is likely to be most suitable for small to medium installations of a complete baggage system in a new or extensively renovated terminal with multiple airlines sharing a common EDS screening facility.

**Appendix C: Generic BHS and CBIS Responsibility Matrix**

## PGDS APPENDIX C

## GENERIC BHS AND CBIS RESPONSIBILITY MATRIX

The following Appendix provides a Generic example of the BHS and CBIS Responsibility Matrix, a requirement beginning at the 70% detailed design phase.

**Appendix Table C-1: Generic BHS and CBIS Responsibility Matrix Revision 3**

| Generic BHS and CBIS Responsibility Matrix - Revision3 |      |                                                                                                                   |        |           |         |
|--------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------|--------|-----------|---------|
| Area                                                   | Task | Description of Activity/Task                                                                                      | TSA HQ | Local TSA | Airport |
| EDS                                                    | A1   | EDS Equipment procurement                                                                                         | R, A   | C         | I       |
|                                                        | A2   | EDS shipping                                                                                                      | R, A   | C         | I       |
|                                                        | A3   | EDS Rigging, Unloading, and On-Site placement                                                                     | R, A   | C         | I       |
|                                                        | A4   | EDS rigging path and quick disconnect conveyors removal                                                           | C      | I         | R, A    |
|                                                        | A5   | Validation of structural floor capacity for EDS footprint and removal path                                        | C      | I         | R, A    |
|                                                        | A6   | Provide Centerline and End lines on floor for EDS placement                                                       | C      | I         | R, A    |
|                                                        | A7   | EDS placement on centerlines                                                                                      | R, A   | I         | C       |
|                                                        | A8   | EDS – Electrical Connection to EDS (Electrical power supply to EDS)                                               | C      | I         | R, A    |
|                                                        | A9   | EDS Seismic Anchor procurement                                                                                    | R, A   | I         | C       |
|                                                        | A10  | EDS Seismic Anchor installation and anchor bolts procurement                                                      | C      | I         | R, A    |
|                                                        | A11  | EDS installation and Assembly                                                                                     | R, A   | I         | C       |
|                                                        | A12  | EDS/BHS integration                                                                                               | A, C   | I         | R       |
|                                                        | A13  | Install SVS/PVS and connect them to the EDS network                                                               | R, A   | I         | C       |
|                                                        | A14  | Procure, provide, install ETD equipment                                                                           | R      | A         | I, C    |
|                                                        | A15  | Power Conditioning Device for EDS procurement, shipping, rigging<br>Unloading and On-Site placement (if required) | C      | I         | R, A    |
|                                                        | A16  | EDS Equipment Protection (after On-Site Placement)                                                                | C      | I         | R, A    |
|                                                        | A17  | EDS – Communication/data cabling (between EDS and EDS Server Room). Patch panel to patch panel                    | A, C   | C, I      | R       |
|                                                        | A18  | Hoist/Hoist alternative and parts access path for EDS parts                                                       | C      | I         | R, A    |
|                                                        | A19  | 3 feet clearance above and around EDS with no obstructions                                                        | C      | I         | R, A    |
|                                                        | A20  | Ensure Environmental conditions meet EDS requirements                                                             | C      | I         | R, A    |
|                                                        | A21  | Convenience outlet at EDS                                                                                         | I      | C         | R, A    |
|                                                        | A22  | EDS Spare Parts room                                                                                              | I      | C         | R, A    |
|                                                        | A23  | EDS Spare Parts for EDS                                                                                           | R      | A, C      | I       |

## PGDS APPENDIX C

## GENERIC BHS AND CBIS RESPONSIBILITY MATRIX

| Generic BHS and CBIS Responsibility Matrix - Revision3 |      |                                                                                                                                                                           |        |           |         |
|--------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----------|---------|
| Area                                                   | Task | Description of Activity/Task                                                                                                                                              | TSA HQ | Local TSA | Airport |
|                                                        | A24  | Procure and install all bag status displays (BSD), barcode scan guns and mounting arms/trays for SVS/BSD/barcode scan guns/ETD per bag inspection station                 | C      | I         | R, A    |
|                                                        | A25  | Condensate Drain                                                                                                                                                          | C      | I         | R, A    |
|                                                        | A26  | BHS network connection to EDS                                                                                                                                             | C      | I         | R, A    |
|                                                        | A27  | BHS E-stop connect to EDS                                                                                                                                                 | C      | I         | R, A    |
|                                                        | A28  | Decommission existing EDS equipment                                                                                                                                       | R, A   | C         | I       |
|                                                        | A29  | Clearing the removal path of obstructions for the decommissioned EDS equipment                                                                                            | C      | I         | R, A    |
|                                                        | A30  | Refurbishment of finishes in decommissioned EDS locations                                                                                                                 | I      | C         | R, A    |
| OSR and CBRA EDS Equipment                             | B1   | EDS Network equipment (servers, racks, PVS, SVS) procurement, shipping, and rigging                                                                                       | R, A   | I         | C       |
|                                                        | B2   | Quad power receptacles for each PVS, SVS                                                                                                                                  | I      | C         | R, A    |
|                                                        | B3   | Procure Remote Start/Stop devices (Smiths Detection only)                                                                                                                 | R, A   | I         | C       |
|                                                        | B4   | Remote start/Stop device cabling and methodology to implement (PLC based touchscreen or Belden cable with physical start/stop devices - Smiths Detection Only)            | C      | I         | R, A    |
|                                                        | B5   | Provide generic Single Line diagram for EDS network devices prior to 30% Design                                                                                           | R, A   | I         | C       |
|                                                        | B6   | CBRA/ OSRA Control Room Communication voice and Data cabling to/from Server / Telecom Rooms                                                                               | I      | C         | R, A    |
|                                                        | B7   | Procure and install all fiber, power, communications cabling, and outlets required for CBRA and OSR function and connection to and between EDS/CBRA/OSRA MUX server room) | C      | I         | R, A    |
|                                                        | B8   | Bag inspection tables for SVS/BSD/ETD/scan gun equipment procurement and maintenance                                                                                      | I      | C         | R, A    |
|                                                        | B9   | Install SVS/PVS workstations and connect to wall mounted jacks                                                                                                            | R, A   | I         | C       |
|                                                        | B10  | Procure, provide, install ETD equipment                                                                                                                                   | A      | R         | C, I    |
|                                                        | B11  | Procure and install all bag status displays (BSD), barcode scan guns and mounting arms/trays for SVS/BSD/barcode scan guns/ETD per bag inspection station                 | C      | I         | R, A    |
|                                                        | B12  | Internal EDS network rack cabling from patch panel                                                                                                                        | R, A   | C         | I       |
|                                                        | B13  | Furnish, Modify or Install BHS Satellite Computer Terminal Workstation in TSA's OSRA                                                                                      | I      | C         | R, A    |
| CBIS Testing                                           | C1   | BHS Factory Acceptance Testing                                                                                                                                            | C      | I         | R, A    |
|                                                        | C2   | EDS SAT                                                                                                                                                                   | R, A   | C         | I       |
|                                                        | C3   | Pre-ISAT / Pre-TRR execution                                                                                                                                              | C      | I         | R, A    |
|                                                        | C4   | Test Readiness Review (TRR) execution                                                                                                                                     | R, A   | I         | C       |

## PGDS APPENDIX C

## GENERIC BHS AND CBIS RESPONSIBILITY MATRIX

| Generic BHS and CBIS Responsibility Matrix - Revision3 |      |                                                                                                                                                                                              |        |           |         |
|--------------------------------------------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----------|---------|
| Area                                                   | Task | Description of Activity/Task                                                                                                                                                                 | TSA HQ | Local TSA | Airport |
|                                                        | C5   | Integrated Site Acceptance Testing (ISAT) execution                                                                                                                                          | R, A   | I         | C       |
|                                                        | C6   | Provide Operational Decision Letter                                                                                                                                                          | R, A   | C         | I       |
|                                                        | C7   | Decision for Go Live Date                                                                                                                                                                    | I      | C         | R, A    |
|                                                        | C8   | 14 day Burn-in and 14 day Analysis period                                                                                                                                                    | R, A   | I         | C       |
|                                                        | C9   | Provide CBIS Acceptance letter                                                                                                                                                               | R, A   | C         | I       |
| Other                                                  | D1   | TSA Time clock location and installation coordination                                                                                                                                        | C, I   | C         | R, A    |
|                                                        | D2   | Break room location coordination                                                                                                                                                             | C, I   | C         | R, A    |
|                                                        | D3   | Bathroom location coordination                                                                                                                                                               | C, I   | C         | R, A    |
|                                                        | D4   | CCTV Camera Feeds (for CBIS / OSRA / CBRA) coordination                                                                                                                                      | C, I   | C         | R, A    |
|                                                        |      | <b><u>R = Responsible</u></b> = Responsible for performing the task (i.e... the actual person doing the work to complete the task).                                                          |        |           |         |
|                                                        |      | <b><u>A = Accountable</u></b> = Ultimately accountable for the task being done in a satisfactory manner. The accountable person must sign-off the work that the Responsible person produces. |        |           |         |
|                                                        |      | <b><u>C = Consulted</u></b> = Team members whose input is used to complete the task. Communication with these members will be 2-way in nature.                                               |        |           |         |
|                                                        |      | <b><u>I = Informed</u></b> = Team members who are informed as to the status of the task. Communication with these members will be 1-way in nature.                                           |        |           |         |

## **Appendix D: References**

The PGDS was developed with reference to several documents and models previously developed by the US government and its contractors, as well as other standards organizations as discussed below:

## D.1 TRANSPORTATION SECURITY ADMINISTRATION

- Recommended Security Guidelines for Airport Planning, Design and Construction, Revised May 2011

This revised document was issued by TSA in May 2011 and presents recommendations for incorporating sound security considerations into the planning, design, construction, and modification of security-related airport facilities and airport terminal buildings. It consolidates information developed through the participation of TSA and other government and aviation industry professionals. The Recommended Security Guidelines document is intended to help users ensure that security considerations and requirements are a component of the planning and design of airport infrastructure, facilities, and operational elements. Intended users include aviation user-agencies (airport operators, aircraft operators and airport tenants), airport planners and consultants, designers, architects, and engineers engaged in renovation and new airport facility planning, design or construction projects.

- Integrated Deployment Model

As part of the BSIS, TSA also developed the Integrated Deployment Model, which is an economic model based on a lifecycle cost approach to screening system selection. The model is used to conduct a top-down evaluation of various schematic concepts of EDS screening systems, based on the methodologies outlined in this document. These schematic concepts consider high-level spatial constraints at airport terminals and are optimally sized according to the estimated checked baggage demand. The concepts were then evaluated based on the lifecycle costs of developing, maintaining, and replacing the EDS screening systems. Though schematic in nature, these concepts may serve as a useful starting point for any airport or airline that plans to implement a checked baggage screening system and would be made available upon request.

The Integrated Deployment Model is a working model that will be continuously updated as new technologies are developed and performance characteristics are updated.

- Advanced Surveillance Program (ASP), TSA Baseline Video Surveillance Operational Requirements, Checked Baggage (draft)
- Checked Baggage Inspection System Interface Requirements Document (IRD) for BHS and In-Line Screening Device (ISD)
- Checkpoint Requirements and Design Guide. <https://sam.gov/opp/0e0420dad5384ee594fcccf2fdc3bfe7/view>
- *Electronic Baggage Screening Program Policy – TSA Funding of Checked Baggage Inspection System Project Costs*: [SAM.gov](https://sam.gov)
- *SSI Best Practices Guide for Non-DHS Employees and Contractors*: [TSA.gov SSI webpage](https://tsa.gov/ssi)

### Checked Baggage Program Contacts and Resources

- Guidance and FAQs on the funding and application processes can be found on [TSA's EBSP webpage](#).
- To obtain the most up-to date information on qualified EDS, contact [PGDS@tsa.dhs.gov](mailto:PGDS@tsa.dhs.gov).

### D.2 OTHER FEDERAL AGENCIES

- Centre for the Protection of National Infrastructure and the United States Department of Homeland Security, *Configuring and Managing Remote Access for Industrial Control Systems*, April 2011,
- Customs and Border Protection, Advance Passenger Information System (APIS), *Consolidated User Guide (CUG)*
- Department of War Design Criteria Standard: *Human Engineering* MIL-STD-1472G
- National Institute of Standards and Technology. NIST Special Publication SP 800-40 Rev. 3 Jul 2013 *Guide to Enterprise Patch Management Technologies* <http://dx.doi.org/10.6028/NIST.SP.800-40r3>
- National Institute of Standards and Technology. NIST Special Publication SP 800-41 Rev. 1 Sep 2009 *Guidelines on Firewalls and Firewall Policy* <http://dx.doi.org/10.6028/NIST.SP.800-41r1>
- National Institute of Standards and Technology. NIST Special Publication SP 800-61 Rev. 2 Aug 2012 *Computer Security Incident Handling Guide* <http://dx.doi.org/10.6028/NIST.SP.800-61r2>
- National Institute of Standards and Technology. NIST Special Publication SP 800-82 Rev.2 May 2015 *Guide to Industrial Control Systems (ICS) Security* <http://dx.doi.org/10.6028/NIST.SP.800-82r2>
- National Institute of Standards and Technology. NIST Special Publication SP 800-84 Sep 2006 *Guide to Test, Training, and Exercise Programs for IT Plans and Capabilities* <http://dx.doi.org/10.6028/NIST.SP.800-84>
- National Institute of Standards and Technology. NIST Special Publication SP 800-98 Apr 2007 *Guidelines for Securing Radio Frequency Identification (RFID) Systems* <http://dx.doi.org/10.6028/NIST.SP.800-98>
- National Institute of Standards and Technology. NIST Special Publication SP 800-100 Oct 2006 *Information Security Handbook: A Guide for Managers* <http://dx.doi.org/10.6028/NIST.SP.800-100>
- National Institute of Standards and Technology. NIST Special Publication SP 800-115 Sep 2008 *Technical Guide to Information Security Testing and Assessment* <http://dx.doi.org/10.6028/NIST.SP.800-115>



- National Institute of Standards and Technology. NIST Special Publication SP 800-153 Feb 2012 *Guidelines for Securing Wireless Local Area Networks (WLANs)* <http://dx.doi.org/10.6028/NIST.SP.800-153>
- National Institute of Standards and Technology. NIST Special Publication SP 800-167 Oct 2015 *Guide to Application Whitelisting* <http://dx.doi.org/10.6028/NIST.SP.800-167>
- United States Department of Homeland Security. (2009). Recommended Practice: Improving Industrial Control Systems Cybersecurity with Defense-In-Depth Strategies.
- United States Department of Homeland Security and Centre for the Protection Of National Infrastructure. (2011). *Configuring & Managing Remote Access For Industrial Control Systems*.
- United States Department of Labor, Occupational Safety & Health Administration Computer Workstations eTool, available at [www.osha.gov/SLTC/etools/computerworkstations/index.html](http://www.osha.gov/SLTC/etools/computerworkstations/index.html)
- U.S. Department of Labor, Occupational Safety and Health Standards 29 CFR 1910

### D.3 INDUSTRY GUIDANCE DOCUMENTS

- American National Standards Institute, ANSI/ISA-62443-1-1 (99.01.01)-2007 - Security for Industrial Automation and Control Systems Part 1-1: Terminology, Concepts, and Models
- American National Standards Institute, ANSI/ISA-62443-2-1 (99.02.01)-2009 - Security for Industrial Automation and Control Systems: Establishing an Industrial Automation and Control Systems Security Program
- American National Standards Institute, ANSI/ISA-TR62443-2-3-2015 - Security for industrial automation and control systems Part 2-3: Patch management in the IACS environment
- American National Standards Institute, ANSI/ISA-62443-3-3 (99.03.03)-2013 - Security for industrial automation and control systems Part 3-3: System security requirements and security levels
- American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Standard 62.1-2016 *Ventilation for Acceptable Indoor Air Quality*.
- Association for the Advancement of Cost Engineering (AACE) International, Recommended Practice No. 10S-90, *Cost Engineering Terminology*, copyright 2004.
- International Organization for Standardization (ISO) Standard ISO 11064-1: 1999, *Design of Control Centers. Part 1: Principles for the design of control centres*

- International Organization for Standardization (ISO) Standard ISO 11064-2: 1999, Design of Control Centers. Part 2: Principles for the arrangement of control suites
- International Organization for Standardization (ISO) Standard ISO 11064-3: 1999, *Design of Control Centers. Part 3: Control room layout*
- International Society of Automation and International Electro Commission, IEC TS 62443-1-1:2009 Industrial communication networks - Network and system security - Part 1-1: Terminology, concepts, and models
- International Society of Automation and International Electro Commission, IEC 62443-2-1:2010 Industrial communication networks - Network and system security - Part 2-1: Establishing an industrial automation and control system security program
- International Society of Automation and International Electro Commission, IEC TR 62443-2-3:2015 Security for industrial automation and control systems - Part 2-3: Patch management in the IACS environment
- International Society of Automation and International Electro Commission, IEC 62443-2-4:2015 Security for industrial automation and control systems - Part 2-4: Security program requirements for IACS service providers
- International Society of Automation and International Electro Commission, IEC PAS 62443-3:2008 *Security for industrial process measurement and control - Network and system security*
- International Society of Automation and International Electro Commission, IEC TR 62443-3-1:2009 Industrial communication networks - Network and system security - Part 3-1: Security technologies for industrial automation and control systems
- International Society of Automation and International Electro Commission, IEC 62443-3-3:2013 Industrial communication networks - Network and system security - Part 3-3: System security requirements and security levels
- National Fire Protection Association (NFPA) 70, National Electrical Code and NFPA 101, Life Safety Code

#### D.4 ADDITIONAL CYBERSECURITY RESOURCES

**National Institute of Standards and Technology Information Technology Laboratory's** (ITL) two security divisions - Computer Security Division (CSD) and Applied Cybersecurity Division (ACD) – can be retrieved from: <http://csrc.nist.gov/publications/index.html>.

**American National Standards Institute, International Society of Automation, and International Electro Commission**

The 62443 series publications can be obtained from one of the following:

- <https://www.ansi.org/>

- <http://www.iec.ch/>
- <https://www.isa.org/>

### **Department of Homeland Security Industrial Control Systems Cyber Emergency Response Team**

The Department of Homeland Security Industrial Control Systems Cyber Emergency Response Team (ICS-CERT) works to reduce risks within and across all critical infrastructure sectors by partnering with law enforcement agencies and the intelligence community and coordinating efforts among Federal, state, local, and tribal governments and control systems owners, operators, and vendors. Additionally, ICS-CERT collaborates with international and private sector Computer Emergency Response Teams (CERTs) to share control systems-related security incidents and mitigation measures. The ICS-CERT provides many cybersecurity publications and resources. Publications can be viewed at:

- <https://ics-cert.us-cert.gov/Recommended-Practices>
- <https://ics-cert.us-cert.gov/Standards-and-References>

The ICS-CERT main page can be accessed at:

- <https://ics-cert.us-cert.gov/>

**Appendix E:**  
**Requirements Lists**

### Applicability Requirements

**Current Version:** Designs for new CBISs shall comply with the requirements set forth in this version of the PGDS.

**Prior Versions:** Any project sponsor that has received formal confirmation from TSA of the receipt of the complete 30% Detailed Design Package for a CBIS project prior to the publication date of this version of the PGDS shall continue to be governed by the PGDS version in effect at the time of such confirmation. Furthermore, projects that have passed the 30% Detailed Design phase—including those systems currently under construction or in operation—with TSA approval shall be held to the design standards specified by that approval (either under the previous PGDS versions or prior standards in place before the publication of Version 1.0 of the PGDS).

### Chapter 3: CBIS Types and Equipment Requirements

**3.2.1 In-Line CBIS:** Throughput values used during design for system sizing shall be based on a site-specific bag sizes, which may differ from the assumed 28" average bag size used in Table 3.1.

**3.3.2 Stand-Alone EDS:** Stand-alone EDS layout designs shall ensure TSA personnel do not handle baggage more than 8 feet from the entrance or exit of the baggage screening location footprint (as validated by the local FSD) for the purposes of picking up a bag for screening or returning a screened bag to the aircraft operator.

**3.3.2 Stand-Alone EDS:** Silent duress alarms shall be installed at all stand-alone EDS Checked Baggage screening areas located in the public space.

**3.4.1 Primary Screening:** Silent duress alarms shall be installed at all ETD primary screening systems located in the public space.

**3.5.1 Individual Carrier Systems:** The Project Sponsor shall ensure the EDS-carrier configuration is approved, and a TSA approval letter is issued before submission of the 100% design package. The ICS OEM shall coordinate the certification assessment with the EDS OEM as part of its research and development process and provide the applicable carriers to the EDS OEM for testing. The Project Sponsor, in coordination with the ICS OEM, shall monitor changes to the approved carrier or applicable TSA-qualified EDS configuration baseline throughout the construction phase. Any changes to the approved carrier or TSA-qualified EDS configuration baseline shall require a certification reassessment.

**3.5.1 Individual Carrier Systems:** The average ICS carrier size shall be no larger than two standard deviations above the airport-specific average bag length, plus additional carrier length beyond maximum bag loading size required for operations specified by the ICS manufacturers (typically 6 inches).<sup>2</sup>

---

<sup>2</sup> Based on national average bag lengths, the standard deviations are 5.3" for domestic and 4.7" for international.

**3.5.1 Individual Carrier Systems:** The Project Sponsor shall consider the decreased capacity during the design phases and never allow an EDS throughput below 400 bph.

**3.5.1 Individual Carrier Systems:** The average ICS carrier size shall be no larger than two standard deviations above the airport-specific average bag length, plus additional carrier length beyond maximum bag loading size required for operation specified by the ICS manufacturers.

**3.5.1 Individual Carrier Systems:** No ICS carrier design shall restrict the processing rate of any EDS machine to less than 400 bph.

**3.5.3 Advanced Tracking Technology:** Enhanced tracking methods shall have the ability to be disabled from the Human-Machine Interface (HMI).

## Chapter 4: Project Planning and Initiation

**4.2.2 Project Sponsor:** If an ILDT is not formed, the Project Sponsor shall assume the responsibilities of the ILDT as defined in Section 4.2.2.

**4.3 Project Phases:** All projects shall follow project phasing sequence Schematic Design Phase, Detailed Design Phase, Construction Phase, Testing and Evaluation Phase, and Project Closeout Phase.

**4.3 Project Phases:** Documentation of the Preferred Alternative analysis and selection process shall be included(only for Schematic Design Phase)\_as an Appendix in the BDR

**4.4 Design-Build Projects:** Sponsors of projects anticipated for completion through a design-build contract, regardless of the design percentage at which the design-build contract is expected to be awarded, shall provide all documentation outlined in the PGDS.

**4.4 Design-Build Projects:** Documentation shall be provided in accordance with a schedule coordinated by the Project Sponsor and TSA to ensure applicability of the intended system to the guidelines and standards presented in the PGDS.

**4.4 Design-Build Projects:** Additionally, shop drawings and 70% progress drawings shall be provided for CBISs being constructed through design-build contracts to demonstrate that the system being constructed conforms to the design reviewed and approved by TSA.

**4.6.1 Supporting Data:** During the entirety of the design phase:

- All formulas and calculations for figures shall be submitted.
- All PGDS or other TSA-provided rates and numbers shall be used in all submittals unless a RFV is submitted to and approved by TSA.
- All rates and numbers supplied in submittals shall be accompanied by all the supporting numbers and calculations.

**4.6.2 Requests for Variation:** The Project Sponsor shall submit a RFV for any PGDS requirement that cannot be met.

**4.6.2 Requests for Variation:** The ILDT shall assess all implications of an exemption from any requirements set forth in the PGDS due to local constraints and include full documentation supporting the request to the Project Sponsor.

**4.6.2 Requests for Variation:** Design package submittals shall include documentation of all RFVs associated with the CBIS project.

**4.6.3 Submittals Formatting:** All submittals shall be made electronically in print-ready PDF and shall include the following:

- The title of the design shall be located on the front page and in the footer section and shall state the applicable PGDS version at the time.
- Each design package shall begin with a table of contents.
- All chapters/submittals shall be indexed electronically within the file.
- A table of contents listing headings and page numbers shall be included in the front of each submittal.
- Each chapter shall be identified with an electronic PDF bookmark.
- PDF file size shall not exceed 20 MB for any submittal items.

**4.6.4 Electronic File Naming Convention:** The electronic file names shall conform to the following convention:  
ABC\_XXXX\_LOCATION\_YYYYMMDD\_TYPE\_DESCRIPTION. EXT

**4.6.5 Design Review Comment Form:** The Project Sponsor shall provide written responses to each TSA comment and shall include a reference to the submittals sections where changes were made to address comments.

**4.7.2 Use of TSA-Approved Equipment:** When TSA funds the design and construction of a CBIS project, the project sponsor shall design their CBIS for incorporation of TSA-qualified EDS and ETD units.

## Chapter 5: Schematic Design Phase - Part 1

**5.1 Schematic design Phase Overview:** This analysis of alternatives shall be included as an Appendix in the BDR.

**5.3 Schematic design Phase Deliverables:** The Schematic Design package shall include the deliverables described below: (see text for details)

- Basis of Design Report
- Preliminary layout drawings of the CBIS
- Preliminary phasing plan
- Preliminary project schedule
- ROM estimate of probable construction costs
- EDS Maintenance and Environment Assessment of environmental conditions that will exist in the designed CBIS and environmental requirements of EDS
- Contingency plan (only applicable to mini in-lines at this phase)
- Stakeholder notification documentation
- Approved and in-process RFVs

**5.5.1 Determine Current Checked Baggage Demand:** If available, FDRS data provided by TSA shall be used to determine the 95<sup>th</sup> percentile peak 10-minute demand. If FDRS is not available, the FSA methodology shall be used to derive the ADPM peak 10-minute demand.

**5.5.1.1 Flight Schedule Analysis Methodology:** Only validated and TSA-approved flight schedules shall be used to determine ADPM.

**5.5.1.1(1) Flight Schedule Analysis Methodology:** The total number of monthly originating bags and international recheck bags for all airlines in that zone shall be obtained and the peak month identified.

**5.5.1.1(1) Flight Schedule Analysis Methodology:** The total number of daily originating and international recheck bags for all airlines in that zone during the peak month shall be calculated, and a mathematical average shall be derived.

**5.5.1.1(2) Flight Schedule Analysis Methodology:** Once the ADPM has been determined, that day's flight schedule shall be provided in MS Excel format. To identify outbound baggage demand, flight schedules shall only contain information on departing flights from the subject airport. Flight schedules shall specify for each flight: destination, flight departure time, flight number, published carrier, operator, aircraft type, and number of seats.

**5.5.1.1(2) Flight Schedule Analysis Methodology:** To derive international recheck baggage demand, the arrival schedule of international flights whose passengers will be connected to domestic flights shall be provided.

**5.5.1.1(4) Flight Schedule Analysis Methodology:** The percentage of passengers arriving on international flights and connecting to domestic flights shall be used to derive international recheck baggage demand.

**5.5.1.1(4) Flight Schedule Analysis Methodology:** The estimated number of originating passengers shall be calculated by multiplying the number of seats by the load factor and by the percentage of originating passengers' assumptions for the ADPM.

**5.5.1.1(4) Flight Schedule Analysis Methodology:** The estimated number of connecting passengers from international to domestic flights shall be calculated by multiplying the number of arriving seats by the load factor and by the percentage of connecting passengers' assumptions for the ADPM.

**5.5.1.1(6) Flight Schedule Analysis Methodology:** The estimated number of originating checked bags shall be calculated by multiplying the estimated number of originating passengers by the number of checked bags per passenger assumptions for the ADPM.

**5.5.1.1(6) Flight Schedule Analysis Methodology:** The estimated number of international recheck bags shall be calculated by multiplying the estimated number of connecting passengers from international to domestic flights by the number of international recheck bags per passenger assumptions for the ADPM.

**5.5.1.1(7) Flight Schedule Analysis Methodology:** The ratio of International and Domestic bags in the peak 10-minutes shall be used in CBIS equipment calculations.

**5.5.2 Project Future Baggage Demand:** Current baggage demand shall be projected to the Design Year to determine screening equipment requirements. The Design Year for equipment requirements shall be five years after the initial DBU for a given baggage screening system (i.e., DBU+5 years).

**5.5.2 Project Future Baggage Demand:** Current Demand shall be projected to DBU+15 for space planning purposes.



**5.5.2 Project Future Baggage Demand:** If, for any reason, local airport and airline staff and their consultants believe that the TAF or the Master Plan forecasts do not properly represent expected growth at the airport, the revised forecast, and a detailed explanation of the reasons that the FAA-approved forecast is not acceptable shall be provided to TSA for approval.

**5.6 Baggage Screening Equipment Requirements Determination:** The EDS, OSRA, and CBRA equipment requirements and associated screening demand shall be listed in the Basis of Design Report, from DBU through DBU+15 years. These equipment requirements shall be shown in a chart with 1-year increments expressed as calculated values (to the nearest tenth of a decimal point) as well as the rounded values. The equipment requirements for 10 additional years past DBU+5 years shall be used to support space allocation planning in CBRA and OSRA.

**5.6 Baggage Screening Equipment Requirements Determination:** Equipment requirements shall be revalidated 12 months prior to equipment delivery. If EDS equipment type changes, the construction start date is delayed, or if the Construction Schedule causes delays more than 12 months beyond the expected DBU, then a revalidation of EDS and CBRA requirements shall be submitted.

**5.6.2 Baggage Screening Equipment Requirements Determination:** In determining EDS equipment requirements, the 10-minute demand of the Design Year (DBU+5) shall be used.

**5.6.2.1 Determine EDS Demand:** (Applicable for FSA methodology only) The following formula shall be used to calculate surge factor:

$$\text{Surge Factor} = \frac{\text{Adjusted Design Year Demand} + 2\sqrt{\text{Adjusted Design Year Demand}}}{\text{Adjusted Design Year Demand}}$$

**5.6.2.2 Calculate EDS Throughput:** EDS throughput rates shall be calculated using the following formula:

$$\text{Throughput}_{\text{EDS}} = \frac{\text{EDS Belt Speed} \times 60}{(29.3 \text{ in} \times \% \text{ Domestic}) + (30.2 \text{ in} \times \% \text{ International}) + \text{Bag Spacing}}$$

where  $\text{Throughput}_{\text{EDS}}$  = Number of bags screened per hour by the EDS.

**5.6.2.2 Calculate EDS Throughput:** Note: EDS throughput for ICS designs shall be calculated based upon the carrier size and the minimum spacing requirements

**5.6.2.3 Calculate Number of EDS Required:** The number of EDS units required shall be calculated as follows:

$$N_{\text{EDS}} = \frac{\text{EDS Demand} \times 6}{\text{Throughput}_{\text{EDS}}}$$

where:

$N_{\text{EDS}}$  = Number of EDS units

EDS Demand = 10-minute demand that will be screened by EDS units

$\text{Throughput}_{\text{EDS}}$  = Number of bags screened bags per hour by the EDS.

**5.6.3 EDS Equipment Redundancy:** the ILDT shall determine the quantity of redundant EDS using the following thresholds:

- A CBIS with six or fewer non-redundant EDS requires **one** dedicated redundant EDS.
- A CBIS with seven or more non-redundant EDS requires **two** dedicated redundant EDS.

**5.6.4 OSR Station Requirements:** The number of OSR stations ( $N_{OSR}$ ) required shall be equal to the number of EDS machines including any redundant machines.

**5.6.5 Baggage Inspection Station Requirements:** The number of BISs to be installed shall be derived based on the total non-redundant EDS capacity. The size of the CBRA in terms of space allocation shall be based on the number of BISs derived based on the total EDS capacity.

**5.6.5.1 Baggage Inspection Stations for Alarmed, Reinsert, and OOG Processing:** The number of BISs to be installed shall be based on the number of non-redundant EDS machines.

**5.6.5.1 Baggage Inspection Stations for Alarmed, Reinsert, and OOG Processing:** For systems processing Alarmed+Reinsert+OOG bags on the same lines, the number of BISs to meet demand shall be calculated as follows:

- For a strictly Domestic operation, 4 BISs are allocated per non-redundant EDS machine.
- For a strictly International operation, 4.5 BISs are allocated per non-redundant EDS machine.
- For operations that include a percentage of International destinations in the peak hour, the number of BISs per non-redundant EDS machine is pro-rated between 4 and 4.5 according to the Domestic/International ratio.
- The calculated number of BISs is half-rounded, where greater than or equal to 0.5 rounds up, and less than 0.5 rounds down.

**5.6.5.1 Baggage Inspection Stations for Alarmed, Reinsert, and OOG Processing:** For systems with separate Alarmed+Reinsert lines and OOG lines, the number of BISs to meet demand shall be calculated as follows:

- For a strictly Domestic operation, 3.3 BISs are allocated per non-redundant EDS machine for Alarmed+Reinsert bag processing and 0.7 BISs are allocated per non-redundant EDS machine for OOG bag processing.
- For a strictly International operation, 3.6 BISs are allocated per non-redundant EDS machine for Alarmed+Reinsert bag processing and 0.9 BISs are allocated per non-redundant EDS machine for OOG bag processing.
- For operations that include a percentage of International destinations in the peak hour, the number of BISs per non-redundant EDS machine for each group of lines is pro-rated between the values above according to the Domestic/International ratio.
- Rounding for the two groups of lines is as follows:
  - For Alarmed+Reinsert bag processing, the calculated number of BISs is half-rounded, where greater than or equal to 0.5 rounds up, and less than 0.5 rounds down.
  - For the OOG bag processing, the calculated number of BISs is rounded like the EDS rounding methodology; greater than or equal to 0.1 rounds up, and less than 0.1 rounds down.

**5.6.5.1 Baggage Inspection Stations for Alarmed, Reinsert, and OOG Processing:** For systems that do not use default average bag lengths as specified in Table 5.4, an RFV shall be submitted to deviate from the BIS-per-EDS requirement specified in this section.

**5.6.5.2 Oversize Baggage Inspection Station Requirements:** The number of BIS required to process Oversize bags shall be calculated using the following equation:

$$N_{OS} = \frac{N_{EDS} \times \text{Throughput}_{EDS} \times \% OS}{(\text{Rate}_{OS Domestic} \times \% Domestic) + (\text{Rate}_{OS International} \times \% International)}$$

Where:

$N_{EDS}$  = number of non-redundant EDS

$\text{Throughput}_{EDS}$  = throughput of the EDS

% OS = percentage of OS bags

$\text{Rate}_{OS Domestic}$  = rate at which TSOs resolve domestic OS baggage via OS search

$\text{Rate}_{OS International}$  = rate at which TSOs resolve international OS baggage via OS search

**5.6.6 ETD Machine Requirements:** The number of ETD machines required shall be calculated as the number of BISs divided by two; fractional results are rounded up to the next whole number.

## Chapter 6: Schematic Design Phase - Part 2

**6.2.1 Alternatives Development:** When developing the BDR and associated analysis of alternatives, planners shall follow the requirements listed in Sections (Project Sponsor and ILDT Responsibilities), 5.6 (Baggage Screening Equipment Requirements Determination), and Chapter 11 (LifeCycle Cost Estimating).

**6.2.1 Alternatives Development:** Spatially and operationally feasible alternatives shall be evaluated based on a 20-year lifecycle cost analysis detailed in Chapter 11 for implementing, maintaining, and replacing the screening system.

**6.2.1.3 Alternatives Equipment Requirements Estimation:** For each alternative proposed, planners shall determine the CBIS type (e.g., in-line, mini in-line, stand-alone) and number of units required for each screening zone.

**6.2.1.4 Alternatives Concept Definition:** The ultimate terminal or airport capacity shall be the upper limit for demand estimates for the purposes of CBIS design.

**6.2.2.2 Selecting the Preferred Alternative:** Alternatives shall be evaluated based on the present value of total lifecycle costs, defined as the present value of the annual sum of capital, O&M, and staffing costs.

**6.2.2.2 Selecting the Preferred Alternative:** For the purposes of estimating the present value of these costs, planners shall use the 20-year Real Interest Rate on Treasury Notes and Bonds of Specified Maturities found in the latest version of the Office of Management and Budget Circular No. A-94, Appendix C, as the real discount rate.

**6.2.2.2 Selecting the Preferred Alternative:** Once the costs of all concept-level alternatives have been developed to include the full present value lifecycle costs, alternatives shall be ranked based on present value lifecycle costs and the lowest-cost alternative that meets all other requirements shall be selected as the preferred alternative.

**6.3 Basis of Design Report:** The BDR shall include, as designated for each phase:

- Alternatives Analysis Report (Section 6.2.2)
- Detailed project requirements (Section 6.3.1 )
- EDS equipment make, model, and quantity that will be provided by TSA (Section 3.2.1)
- Description of Operations (Section 6.3.2)
- Flow-based modeling assumptions and results, including time-in-system and BTT analyses (Section 6.3.3)
- List of legacy EDS to be decommissioned (Section 6.3.5)

**6.3.1 Project Requirements:** The project requirements discussion shall include, at minimum:

- A system evaluation of the approved alternative
- Specific reference to the EDS type that TSA approved
- Indication of preferred equipment model and quantity at Schematic Design and specific reference to equipment TSA has committed to provide in subsequent phases
- Constructability technical memoranda documenting project-specific issues for each discipline, including CBIS design and architectural, structural, mechanical, plumbing, electrical, and communications considerations
- Planning assumptions including Space Planning (DBU+15) design intent
- Demolition requirements describing what will need to be removed for the CBIS project to move forward

**6.3.2 Description of Operations:** At the Schematic Design Phase, the description of operations shall describe the Preliminary operational concept.

**6.3.2 Description of Operations:** At the 30% Detailed Design Phase, the Description of Operations shall describe, at a high level:

- How the overall CBIS is intended to work, with references to how requirements in Chapter 12 will be met
- How OSR is intended to work, with references to how requirements in Chapter 13 will be met
- How CBRA is intended to work, with references to how requirements in Chapter 14 will be met
- How the CBIS integrates with the airport BHS, including contrasting baggage rates and controls methodology

**6.3.2 Description of Operations:** At the 70% Detailed Design Phase, the Description of Operations shall describe:

- Refinements to the 30% Design Description of Operations
- Detailed OS and OOG Description of Operations
- Operational description of how the “no-lift” policy will be met in the CBRA
- Description of Operations of how non-conveyable items (pets, etc.) will be processed

**6.3.2 Description of Operations:** At the 100% Detailed Design Phase, the Description of Operations shall include final refinements to all topics covered in the 70% Design Description of Operations.

**6.3.3 Flow Based Modeling:** The flow-based modeling discussion shall:

- Identify the paths used for the high-level flow-based modeling calculations on plan view drawings
- Identify the assumptions used for the flow modeling
- Provide time-in-system analysis results including maximum baggage time in system by calculating the shortest and longest times that
  - An in-gauge bag will travel through the system as measured from the natural points of bag induction through an EDS, into and out of the CBRA
  - An OOG bag will travel from natural induction into and out of the CBRA
- Provide bag travel time analysis results to demonstrate adequate time for OSR

**6.3.4 EDS to Be Decommissioned:** The project sponsor shall submit a list of EDS equipment, by make, model, and serial number, that will be decommissioned after the proposed in line system is operational.

**6.4.1 Design Drawings:** the following requirements apply for all submissions:

- All drawing packages shall begin with a cover sheet and index.
- Each drawing shall have a title box. The drawing title box shall be clearly labeled with a construction phase number, where applicable
- Each drawing shall include a legend.
- Each drawing shall show standard details for the drawing type (structural, mechanical, electrical, etc.
- Each drawing shall label conveyors and components, if known.
- Each drawing shall show dimension of points of intersection.
- Each drawing package submittal shall include an enlarged single-sheet plan view of the CBIS and an enlarged single-sheet plan view of the CBRA.
- Drawings shall be 1/4" scale for elevation views and 1/8" scale for plan views, except for the BIS plan view, which shall be enlarged to 1/2" scale

**6.4.1 Design Drawings:** In the Construction Phase, TSA shall be provided with courtesy copies of shop and installation drawings to ensure the original intent of the design as reviewed up to and including the 100% Design review submittal process

**6.4.1 Design Drawings:** Schematic Design Phase, Detailed Design Phase, and Closeout Phase drawings shall include the elements in Table 6.1 marked as “Required” for the indicated project phase.

**6.4.2 Project Schedule:** The project schedule shall include, at a minimum, the following milestones:

- Design OTA Period of Performance Start
- Design Consultant Notice to Proceed
- Schematic design delivery to TSA for review
- Schematic design – TSA review
- 30% Design delivery to TSA for review
- 30% Design – TSA review
- 70% Design delivery to TSA for review
- 70% Design – TSA review
- 100% Design delivery to TSA for review
- 100% Design – TSA review
- RFP release
- Bid selection process completion
- Design OTA Period of Performance End
- EDS Delivery (if phased delivery is planned, provide delivery dates per phase)
- EDS Installation (if phased installation is planned, provide installation dates per phase)
- Testing (SAT, Owner testing, TRR, ISAT, Live Operations, and Run-In period)
- EDS Decommission Dates

**6.4.3 Phasing Plan:** Phasing plans shall include:

- Plan view drawing package showing conveyor layout and BHS/EDS components of the CBIS (i.e., ATRs, BMAs, EDS, CBRA BRPs) at each construction phase
- Brief description of the state of the system represented in each phase drawing, including:
  - The major functional changes of the CBIS in each phase (e.g., what components are removed/replaced, what major additions are made to the network or subsystems)

- Whether the CBIS will be used operationally following each phase, and a brief description of how operations would be conducted (e.g., which induct points, which screening lines, is CBRA temporary or final configuration, etc.)
- Number and type of each EDS populating screening lines in each phase
- Schedule showing when each phase is anticipated amongst other major activities impacting the system state by the BHSC and EDS OEM (e.g., high level of demolition and construction, networking, and integration work, etc.)

**6.4.4 Screening Equipment Installation Guidelines References:** Submittals shall reference manufacturer's site-installation and integration guides (including document name, date, and revisions) and describe how requirements for the satisfactory accommodation of the selected screening equipment will be met, including requirements for EDS ancillary equipment and their respective spaces.

**6.4.4 Screening Equipment Installation Guidelines References:** HVAC requirements (EDS, CBRA, OSRA, IT closets, etc.) associated with spaces housing screening equipment and associate ancillary equipment shall also be confirmed.

**6.4.5 Conveyor Manifest:** Starting at the 30% Design Phase, the conveyor manifest shall list, for each planned conveyor in the system:

- Conveyor identifier
- Approximate conveyor length
- Conveyor speed

**6.4.5 Conveyor Manifest:** Starting at the 70% Design Phase, the conveyor manifest shall include:

- Conveyor motor sizing
- Conveyor motor amperage
- Total amperage requirements

**6.4.6 Specifications:** Project specifications shall make explicit reference to TSA-specified CBIS design performance requirements in Chapter 12, 13, and 14.

**6.4.6 Specifications:** Project specifications shall reference current commissioning requirements outlined in Chapter 12.

**6.4.6 Specifications:** Project specifications shall include detailed BIS requirements.

**6.4.7 Bid Documents:** Bid documents, if they are submitted at the 100% Design Phase ( See Section 7.4.1) shall include:

- Cover sheet with noted stakeholders, project locale, title, dates, revision block
- Drawing index
- Legend sheet
- Mechanical

- Conveyor manifest sheets
- Plan views, including catwalk, stairs, and egress
- Elevation views
- Project specific/standard details
- Phasing drawings
- Demolition requirements
- Electrical
  - o Control stations/devices/MCP locations
  - o E-stop zones, with relevant control station
- Demolition and phasing plans
- EDS unit removal route as well as all other O&M-related access
- CBRA plans

**6.4.8 Stakeholder Notification:** Design package submittals shall include documentation that project stakeholders have been periodically briefed on the progress of the planning and design effort.

## Chapter 7: Detailed Design Phase Requirements

**7.2.2 30% Design Deliverables:** The 30% design package shall include the following documents, which shall be delivered both in the native format (Word, Excel, etc.) and as a PDF file (hard copies are not required):

- Updated Basis of Design Report (Section 6.3) with emphasis on:
  - Updated project requirements (Section 6.3.1)
  - Refined flow-based modeling assumptions and results (Section 6.3.3)
  - Detailed discussion of operations (Section 6.3.2)
- Preliminary Drawings for mechanical, electrical, plumbing, fire protection, and special systems (Section 6.6.1)
- Updated Preliminary phasing plan (6.4.3)
- Updated project schedule (Section 6.4.2)
- Basis of Estimate, 30% Current Working Estimate, and, if applicable, updated LCCA (Chapter 11)
- Contingency plan (Section 7.5; only applicable to mini in-lines at this phase)



- Baggage and data flow charts (detailed data flow and examples are in Appendix A, Section A.3)
- Conveyor manifest (Section 6.5)
- Screening Equipment Installation Guideline References (Section 6.4.5)
- Outline of Reporting Capabilities to be provided by the CBIS (12.13) (see Appendix A, Section A.4 for examples of detailed reports)
- National Environmental Policy Act form (Section IV of TSA form 2602-1)
- Stakeholder notification documentation (Section 6.4.7)
- Approved and in-process RFVs (Section 4.6.2)

**7.2.2 30% Design Deliverables:** [The 30% Design package] Preliminary plans for all disciplines include:

- Plan views of outlined conveyors and rights of ways, mechanical elements, EDS power pole locations , EDS locations and CBRA areas
- EDS unit removal route with locations of quick disconnect conveyors as well as all other O&M-related access
- Inclines and declines
- Conveyor delineations, especially near the EDS units and in the CBRA
- Conveyor identification (ID) labels
- Elevations of significant areas (floor and wall penetrations, steep gradients, congested areas)
- Top of Bed approximate elevations
- Approximate MCP locations

**7.2.4 Dynamic Modeling:** If dynamic modeling is used, the modeling provider shall submit to the Project Sponsor and the TSA Project Coordinator all programming parameters that may be used to adjust the model including but not limited to:

- Bag distribution methodology
- Belt speeds
- Merge windows
- Spacer/bag gap timers
- Jam timer
- Space programmed between bags for diverting
- Bag spacing at vertical sortation units
- All statistical distributions used

**7.3.2 70% Design Deliverables:** The 70% Design package shall include the following documents:

- Updated Basis of Design Report (Section 6.3) with emphasis on:
  - Updated project requirements (Section 6.3.1)
  - Refined flow-based modeling assumptions and results (Section 6.3.3)
  - Refined detailed discussion of operations (Section 6.3.2)
- 70% Design Drawings for mechanical, electrical, plumbing, fire protection, and special systems (Section 6.4.1)
- Updated phasing plan (Section 6.4.3)
- Updated project schedule (Section 6.4.2)
- Basis of Estimate, 70% Current Working Estimate, and, if applicable, updated LCCA (Chapter 11)
- Preliminary contingency plan (see Section 7.5)
- Baggage and data flow charts (detailed data flow and examples are in Appendix A, Section A.3)
- Updated conveyor manifest (Section 6.4.5)
- Screening Equipment Installation Guideline References (Section 6.4.4)
- Manufacturer information for Power Conditioning Devices (Section 12.11.6)
- Outline of Reporting Capabilities to be provided by the CBIS (12.12) (see Appendix A, Section A.4 for examples of detailed reports generated)
- National Environmental Policy Act form (Section IV of TSA form 2601-1)
- Draft Site-Specific Configuration Management Plan (Section 7.3.4)
- 70% Specifications (Section 6.4.6)
- Stakeholder notification documentation (Section 6.4.7)
- Approved and in-process RFVs (Section 4.6.2)
- EDS Network Diagram (Section 12.11.7)

**7.3.4 Configuration Management:** The Configuration Management Plan shall follow the outline below:

- 1 Introduction
  - 1.1 Background
  - 1.2 Purpose
  - 1.3 Configuration Management Defined
- 2 Organizational Construct – Configuration and Organization Integration Baseline
  - 2.1 Airport Roles and Responsibilities
  - 2.2 TSA Roles and Responsibilities

- 2.3 Airlines Roles and Responsibilities
- 3 Configuration Control: Management, Organization, and Responsibilities
- 4 Configuration Control Board
  - 4.1 Purpose
  - 4.2 Organization and Membership
  - 4.3 Change Request Process and Protocol
  - 4.4 Communications Management Plan
    - 4.4.1 Post Commissioning Change Management
    - 4.4.2 Documentation and Audit

**7.4.2 100% Design Deliverables:** The 100% Design package shall include the following documents:

- Final Basis of Design Report (Section 6.3) with emphasis on
  - Final project requirements (Section 6.3.1)
  - Final flow-based modeling assumptions and results (Section 6.3.3)
  - Final detailed discussion of operations (Section 6.3.2)
- 100% Design Drawings or Bid Documents for mechanical, electrical, plumbing, fire protection, and special systems (Section 6.4.1)
- Final phasing plan (Section 6.4.3)
- Updated project schedule (Section 6.4.2)
- Final Basis of Estimate, 100% Current Working Estimate, and, if applicable, updated LCCA (Chapter 11)
- Final contingency plan (Section 7.5)
- Baggage and data flow charts (detailed data flow and examples are in Appendix A, Section A.3)
- Final conveyor manifest (Section 6.4.5)
- Screening Equipment Installation Guideline References (Section 6.4.4)
- Outline of Reporting Capabilities to be provided by the CBIS (12.12)
- National Environmental Policy Act form (Section IV of TSA form 2601-1)
- Final Site-Specific Configuration Management Plan (Section 7.3.4)
- 100% Specifications (Section 6.4.6)
- Stakeholder notification documentation (Section 6.4.7)
- Approved RFVs (Section 4.6.2)
- Updated EDS Network Diagram (Section 12.11.7)

**7.5 Contingency Planning Requirements:** The project sponsor, ILDT, TSA FSD, TSA HQ, Airlines, and all other relevant stakeholders shall mutually develop a comprehensive contingency plan during the CBIS design process.

## Chapter 8: Construction Phase Requirements

**8.2 Project Sponsor and ILDT Construction Phase Responsibilities:** The following requirements shall be adhered to during the Construction Phase, regardless of project type (design-bid-build versus design-build): (requirements listed separately)

**8.2 Project Sponsor and ILDT Construction Phase Responsibilities:** To ensure TSA's complete understanding and acceptance of the projected system performance, any changes, or amendments to the approved 100% Design, including contract document addenda, change requests and RFIs, that affect the functionality of the CBIS shall be presented for approval to TSA. Any variation from the 100% approved design will not be funded without prior TSA approval of the changes.

**8.2 Project Sponsor and ILDT Construction Phase Responsibilities:** The Project Sponsor shall submit an updated Construction Schedule to TSA stakeholders at a minimum of every 30 days after construction award. Most projects conduct a weekly meeting to review project status and shall invite a TSA Deployment representative.

**8.2 Project Sponsor and ILDT Construction Phase Responsibilities:** The project sponsor shall request an update of the availability of equipment and equipment upgrades.

**8.2 Project Sponsor and ILDT Construction Phase Responsibilities:** The Project Sponsor shall consult with the TSA Project Coordinator and their TSA Acceptance Testing representative no later than 90 days prior to ISAT to refine projected commissioning durations.

**8.3 Construction Phase Deliverables:** The Construction Phase deliverables shall include the following documents:

- Any changes or amendments to the approved 100% Design package including contract document addenda, change requests and RFIs
- Courtesy copies of shop and installation drawings to ensure the original intent of the design as reviewed up to and including the 100% Design review submittal process
- Updated project schedule with construction milestones

**8.5 Meetings:** Regular meetings shall be conducted with the Project Sponsor/ILDT and TSA to monitor system construction.

**8.6 Construction Schedule:** Key construction milestones for project completion shall be included in the Project Schedule such as:

- Construction notice to proceed
- CBIS construction prior to EDS delivery and post-EDS delivery
- EDS delivery
- EDS power readiness and installation

- EDS SAT complete
- EDS integration and network installation
- CBIS Documentation checklist received and completed
- Pre-ISAT
- TRR
- ISAT
- Live bag screening
- 14 day Burn-in and 14 day Analysis period
- Completion of all required deficiency corrections
- Substantial completion
- Project closeout

**8.7.1 Training Deliverables:** Training materials and documentation to be presented shall be submitted to TSA for review 60 days prior to the first scheduled training session.

**8.7.2 CBIS Use and Logistics Training:** CBIS use and logistics training, distinct from maintenance training, shall be provided by the Project Sponsor to TSA for mechanical, electrical, and computer functions required to properly operate the staffed portions of the system including, but not be limited to:

- Any BHS-provided equipment in the CBRA
- Bag induction and handling procedures
- Any BHS-provided equipment in the OSRA
- BHS control interface provided to conduct the OTK procedures
- CBIS orientation and layout
- CBIS fail-safe procedures and layout
- System safety
- Bag jam and fault clearing procedures
- BHS reporting system

**8.7.2 CBIS Use and Logistics Training:** The BHSC shall provide training on how to access and download BHS reports as well as SSI training for any BHS reports classified as SSI; training must comply with Federal Government SSI guidelines. SSI Best Practices and Quick Reference Guides for more information on SSI handling, sharing, and destroying procedures can be found on the [TSA.gov SSI webpage](#).

**8.7.2 CBIS Use and Logistics Training:** All operators or individuals with access to either viewing or printing reports shall have completed SSI procedures training prior to operation. The training sessions shall be conducted prior to the operational startup of the respective BHS.

## Chapter 9: Testing and Evaluation Phase Requirements

**9.1 Testing and Evaluation Phase Overview:** Each CBIS must complete the four stages before an airport can permanently use the CBIS for live checked baggage security screening operations.

**9.2 Planning:** At a minimum, the T&E Division must be involved starting at 120 calendar days prior to the start of ISAT.

**9.2 Planning:** The ILDT shall submit the completed CBIS Documentation checklist and deliver any required CBIS documentation to the T&E Division 90 days prior to the ISAT (or 30 calendar days after receipt of the checklist).

**9.3 Pre-ISAT:** Defects found during the Pre-ISAT must be corrected and retested by the ILDT.

**9.3 Pre-ISAT:** Once the CBIS has met the Pre-ISAT criteria, the ILDT shall prepare the TRR Notification letter documenting the successful demonstration and acceptance of Pre-ISAT results and submits it to the DSD.

**9.4 TRR:** Defects found during the TRR must be corrected by the ILDT and retested by DSD as necessary.

**9.4.1 CBIS Configuration Management Baseline:** From this point forward, the ILDT shall follow the requirements listed in Section 9.8 to properly document any system changes and update the CBIS configuration baseline.

**9.5 ISAT:** Defects found during the ISAT must be corrected promptly by the ILDT and retested by the T&E Division as necessary. However, the ILDT shall follow the CBIS configuration management process outlined in Section 9.8 prior to any retest.

**9.7 Operational Run-in: Analysis:** Defects found during the Operational Run-In activities must be promptly corrected by the ILDT in coordination with the local teams to avoid any downtime that may negatively impact airport operations.

**9.7 Operational Run-in: Analysis:** The ILDT shall continue to follow the configuration management process outlined in Section 9.8.

**9.8 Configuration Management:** From this point forward, and throughout the lifecycle of the CBIS, any physical or software changes needed shall be documented through the CBIS Change Request (CCR) form found in Appendix A, Section A.6 and follow the process shown in Figure 9-2.

**9.8 Configuration Management:** The CCR form shall include specific information regarding the change request, including the proposed testing approach to validate the change, and required updates to existing documentation.

**9.8 Configuration Management:** Within 5 days of successful implementation and testing of the CCR, the ILDT shall submit evidence of the testing results, all updated CBIS documentation, and updated PLC code to TSA utilizing the following mailbox: [BASEteam@TSA.DHS.gov](mailto:BASEteam@TSA.DHS.gov).

**9.8 Configuration Management:** A log of all CCR changes made to the CBIS shall be maintained and controlled by the CBIS Owner. The log shall be included in all CCR submittals and include the following at a minimum:

- CBIS Designation

- Name of Change
- Description of change
- Status of Change (i.e....in testing, operational, pending, etc.)
- Date of TSA Approval
- Date of live operational use

**9.9 Testing Process Variations:** The system must be in final configuration for ISAT as defined below.

**9.9 Testing Process Variations:** Any CBIS components not in final configuration, or any situation requiring phased testing shall be submitted to TSA for approval using the Request for PGDS Variance (RFV) Template prior to the start of testing.

## Chapter 10: Project Closeout Phase Requirements

**10.1 Project Closeout Phase Overview:** Once the CBIS has successfully completed ISAT and allowed to proceed to Live Bag Screening operations (all required CBIS deficiencies have been corrected), TSA will provide official approval of the CBIS for beneficial use and the following actions are the responsibility of the Project Sponsor and ILDT to close out the project.

**10.2 Project Closeout Phase Deliverables:** The Project Closeout Phase deliverables shall include the following:

- As-built CBIS documentation shall be submitted to TSA, in both Computer-Assisted Design (CAD) and PDF file format, as follows:
  - Final Description of Operations (Section 6.3.2)
  - A complete set of BHS as-built mechanical, electrical, plumbing, fire protection, and special systems drawings (Section 6.4.1)
  - Final conveyor manifest (Section 6.4.5)
- Control System Configuration Documentation (Section 10.3)
- The PLC program and disaster recovery procedures (Section 10.3.3)

**10.3.1 Submittal Format:** The submittal data described in this section shall be submitted to the TSA as follows:

- 30-Day Post DBU Submission: Within 30 days following DBU, the initial submittal, as defined in Section Chapter 9, shall be made.
- Submission Procedure: Submission of all data shall be coordinated with the FSD or designee. All data shall be submitted via electronic files—paper copies will not be accepted.

**10.3.1.1 Summary:** A descriptive summary narrative of the submittal shall be included in Microsoft Word and PDF format. This summary shall include, at a minimum, the following information:

- Airport name and area of the airport included in the submittal such as terminal, matrix, node, etc.

- Description of the included area including:
  - Number and type of EDS units
  - Type and quantity of infeed conveyor systems such as ticket counter sub-systems, curbside sub-systems, mainlines, etc.
  - Type and quantity of outfeed conveyor systems such as mainlines to sort piers, make-up units, etc.
- Description of the conveyors / sub-systems and their controller equipment. At a minimum, the following information shall be provided:
  - List of each PLC and the conveyors / sub-systems it controls
  - List of each MCP and the conveyors / sub-systems it controls
- Contact information for:
  - Airport director, engineering manager or other primary contact point responsible for this CBIS
  - Airlines primary contact for this CBIS
  - Operation and maintenance contractor (if applicable) primary point of contact
  - Point of contact responsible for follow-up submittals

**10.3.1.2 Index:** An index of the documents included in the submittal shall be included. This index shall be submitted in Microsoft Excel and PDF format. The index shall include, at a minimum, the title of each file, the file date, and the electronic file name.

**10.3.2 Control System Architecture Drawing:** A control system architecture drawing shall be submitted for each CBIS. This drawing shall be submitted in DXF and PDF format. All high and low level networks shall be included. Detail shall be down to the motor control panel or PLC chassis level for high-level networks. Detail shall be down to the PEC or control devices for low level networks. Configuration information such as node numbers and IP addresses shall be included.

**10.3.3 Lower-Level Network Configuration Information:** The low level, or PLC control, submission shall include the following at a minimum:

- **PLC Program:** A copy of the PLC program shall be submitted in its native format for all PLCs included as a part of the CBIS. This shall include any redundant PLCs that may exist. All software keys and or passwords shall be provided if programs are protected and or locked in some way. The PLC program submittal shall include all PLC and software disaster recovery procedures, including software applications.
- **Network Configuration:** A copy of all network configuration files shall be submitted in its native format. This shall include any redundant networks that may exist.
- **VFD Configuration:** A copy of the configuration of each VFD (including any firmware information) in the CBIS shall be submitted in its native format. The configuration submittal shall include all parameters including unchanged or default settings.
- **Communication and Other Controllers:** A copy of the configuration and code for all other devices as a part of the control system shall be submitted in its native format. An example of these devices might be co-processors or multi-vendor interfaces.
- **Firmware Configuration:** A spreadsheet listing all control devices and their associated firmware levels, where firmware is used, shall be submitted. This spreadsheet shall be submitted as both a Microsoft Excel document and as a PDF file. All devices which have



firmware shall be included. Examples of these devices are PLC chassis, PLCs, I/O modules, Network modules, Communication modules and VFDs.

**10.3.4 HMI Configuration:** A copy of all HMI configurations shall be submitted in their native format. Soft copies of these programs shall also be provided, including any portion that is required to operate the system.

**10.3.5 High-level Computer Configuration:** A descriptive narrative of the high-level computer equipment of the CBIS shall be submitted in Microsoft Word and PDF format. Included in the narrative shall be a description of each computer and the function/task of the computer. Any data exchange between any computers or PLCs that control or affects bag decisions shall be included. In addition, the narrative shall describe the results of any computer failure and the ability of the CBIS to continue screening baggage.

**10.3.6 Programming and Configuration Software:** A spreadsheet listing all programming and configuration software with the revision level used shall be submitted. This spreadsheet shall be submitted as both a Microsoft Excel document and as a PDF file.

**10.3.7 CBIS/ISAT Benchmark Data:** A descriptive summary narrative of the system status at time of submittal shall be included in Microsoft Word and PDF format. This summary shall include, at a minimum, the following information:

- Scan time for each PLC, average and maximum
- Memory utilization for each PLC
- Network utilization for each network, high- and low-level networks. Where deterministic networks with set update times are used provide all settings and times.

## Chapter 11: Lifecycle Cost Estimating Requirements

**11.1 Lifecycle Cost Estimating Overview:** To establish the lowest-cost alternative, planners shall calculate the lifecycle costs of developing, maintaining, and replacing the CBIS.

**11.2.1.1 Lifecycle Cost Analysis Period:** To provide a standardized period for assessing lifecycle costs, a 20-year total timeframe shall be assumed based on an EBSP Acquisition Decision Memorandum to fully capture the upfront capital costs, as well as recurring costs for staffing, O&M, and lifecycle replacements.

**11.2.1.4 Real Dollar Cost:** Real values are used to provide a consistent comparison of costs over time and shall be used to estimate all costs considered in the lifecycle analysis.

**11.2.2.5 Required Building and BHS Infrastructure Modification Costs:** Planners shall develop a detailed, bottom-up cost estimate for facility modification and infrastructure costs for all alternatives being considered.

**11.2.2.5 Required Building and BHS Infrastructure Modification Costs:** Facility modification costs shall be adjusted to account for regional differences in construction costs based on the latest *RS Means Construction Cost Data Indexes* published by Reed Construction Data or by other industry-standard cost adjustment practices.

**11.2.4.3 Incremental BHS Maintenance Costs:** For the purposes of the lifecycle cost analysis of screening alternatives, planners shall only consider the incremental cost of BHS maintenance which is calculated by subtracting the existing maintenance cost of the current BHS (with or without a CBIS) from the total estimated maintenance cost of the new BHS with the proposed CBIS.

**11.2.4.3 Incremental BHS Maintenance Costs:** The overall annual cost of O&M for the full CBIS shall be estimated at 10% of the initial overall cost of the system.

**11.2.4.3 Incremental BHS Operating Costs:** Planners shall compare utility costs for the BHS on an incremental basis. To calculate the incremental BHS operating costs, planners shall subtract the existing operating cost of the current BHS (with or without a CBIS) from the total estimated operating cost of the new BHS with the proposed CBIS.

**11.2.5.1 TSA Personnel Costs:** Planners shall request staffing cost estimates for the screening alternatives under consideration.

**11.7.2 Incremental Costs for Baggage Porters and Other Airport/Airline Staff:** Any increase or decrease in costs for baggage porters or other airport/airline staff shall be included in the lifecycle cost analysis. Planners shall include only incremental costs for baggage porters or other airport/airline staff.

**11.3 Basis of Estimate Document:** Estimates submitted for funding request purposes shall include a BOE document which includes, at a minimum, the following elements:

- Purpose
- Executive summary
- Project scope description
- Methodology used to prepare the estimate
  - Work breakdown structure
  - Tools and data sources
  - Major cost components: labor, equipment, and material
  - Subcontractor and prime contractor markups and fees
  - Allowances
  - Other factors
  - Schedule requirements
  - Assumptions, exclusions, and exemptions
  - Areas of risks

**11.3.2 Executive Summary:** The Executive Summary shall provide a brief (no more than one page) overview of the project for which the independent cost estimate, cost estimate validation, or cost to complete report is being prepared. The Executive Summary section shall include, not necessarily in this order, discussions of:

- Where the project sponsor is in the bid and construction contract award process, if applicable
- Whether construction has already begun and, if so, how much of the construction has been completed, if applicable
- If the airport sponsor has awarded the construction contract, the type of construction contract instrument (firm fixed price, time and materials, design-build, etc.), if applicable
- Name of the general contractor and BHS contractor, if available
- Name and telephone number of the airport representative that provided the cost information
- Brief statement of the design level the estimate was based on and statement as to whether the CWE is authored by a single entity or is a reconciliation of two or more estimates
- Statement of the escalation that has been used, based on a project schedule and a summary of the CWE at a high level to show BHS costs, other construction-related costs, and soft costs
- Discussion of any known areas of risk
- Total estimated cost
- Statement regarding whether the airport sponsor's estimate is reflective of current market conditions. This statement should address:
  - Description of current bidding climate relative to number of bidders responding to requests for proposals
  - Use of Davis Bacon Act wage rates, where applicable
  - List of current construction projects, including project name, type, approximate construction value, and schedule
  - Use of union versus nonunion labor
  - Narrative of labor availability
  - Narrative of material and equipment availability
  - Review of typical contracting methods used in location
- Statement of the currency (i.e., age) of the airport sponsor estimates.

**11.3.4.1 Work Breakdown Structure:** A generic description of the estimate format and relationships of detailed cost items to their hierarchy shall be presented.

**11.3.4.2 Tools and Data Sources:** The BOE shall indicate the primary estimating methodology used in preparing the cost estimate, including that used for cost resources, historical data, and estimating tools and documents.

**11.3.4.3 Major Cost Components:** Labor, Equipment, Material: Sources for labor, equipment and material cost elements used in preparing the estimate shall be described, thereby further demonstrating the estimator's level of effort and knowledge of the project requirements.

**11.3.4.5 Allowances:** Allowances used in the estimate and the reason they were used shall be clearly stated.

**11.3.4.8 Assumptions, Exclusions, and Exemptions:** The BOE shall include three separate and distinct bulleted listings that concisely identify the assumptions, exclusions, and exemptions used in developing the estimate.

**11.4 Current Working Estimate Submission:** A summary of the Basis of Estimate costs shall be submitted at each phase of design.

**11.4 Current Working Estimate Submission:** Airport sponsors requesting funding support from TSA shall provide a detailed breakout of allocable versus non-allocable costs at each phase of design.

**11.4.2 Cost Estimate Pricing Substantiation:** All CWE pricing shall be effective as of the date of the submittal.

**11.4.2 Cost Estimate Pricing Substantiation:** Estimates submitted for funding request purposes shall be accompanied by a market analysis specific to the airport location and timeframe during which proposed improvements will be implemented.

**11.4.3 Allocable Costs:** The Project Sponsor shall include both allowable/allocable and non-allowable/allocable costs in the appropriate CWE column.

**11.6 Estimate Trending:** Any changes to scope or design shall be identified, documented, and submitted to the TSA Project Coordinator for approval.

## Chapter 12: CBIS Design Requirements

**12.2 CBIS Screening Throughput Capacity:** In all cases, the CBIS shall be designed to meet the Screening Throughput capacity as listed in the approved BDR.

**12.3 Tail-to-Head Bag Spacing Requirements:** For slider bed conveyors, the space between bags as measured from the trailing edge of leading bag to the leading edge of the trailing bag, or “tail-to-head spacing” shall be no less than 12 inches prior to entering the EDS unit.

Bag Spacing shall be measured on the queue conveyor immediately upstream of the EDS machine and shall be adjustable.

**12.3 Tail-to-Head Bag Spacing Requirements:** The speed of the queue belt immediately before and after the EDS unit (as bags transition into and out of the EDS) shall comply with the EDS Integration manual. For ICS, the space between carriers shall be as determined by the EDS manufacturer and their ability to clearly delineate between carriers.

**12.4 Bag Time in System:** The worst-case scenario for Bag Time-in-system calculations shall be provided as part of the Schematic and Detailed Design submittals.

**12.5 Bag Travel Time Requirements:** For in-line systems, the CBIS shall allow a minimum of 45 seconds of BTT without holding bags.

**12.5 Bag Travel Time Requirements:** BTT calculations shall be provided as part of the Schematic and Detailed Design submittals.

**12.6.1 CBIS Positive Bag Tracking Requirements:** The CBIS shall be capable of maintaining positive bag tracking in the STZ during events (e.g., diebacks, merging, decision point transitions, etc.) that are typical of situations which may occur in baggage handling systems.

**12.6.1.1 Pre-EDS Requirements:** The CBIS shall incorporate an ATR upstream of the EDS matrix. ATRs shall not be located on an incline or decline. ATRs shall be a minimum of 6' away from a power turn.

**12.6.1.1 Pre-EDS Requirements:** The BHS shall assign a unique tracking ID (BHS Pseudo ID) to each bag once the bag enters the STZ within the CBIS for the purposes of positive bag tracking.

**12.6.1.1 Pre-EDS Requirements:** The BHS Pseudo ID shall be used as the Primary ID passed from the BHS to the EDS. In all systems where an ATR is present, the 10-digit IATA bag tag data shall also be passed from the BHS to the EDS.

**12.6.1.1 Pre-EDS Requirements:** ATR read rates shall be no less than 98% for laser arrays and 99% for RFID applications for valid reads for that system during controlled testing.

**12.6.1.1 Pre-EDS Requirements:** ATR read rates shall be no less than 97% for laser arrays and 99% for RFID applications for valid reads for that system during live operations.

**12.6.1.1 Pre-EDS Requirements:** The BHS shall maintain a relation between the BHS tracking ID and the 10-digit IATA bag tag ID for all bags that are successfully read.

**12.6.1.1 Pre-EDS Requirements:** The BHS Pseudo ID and, if available, the 10-digit IATA bag tag data shall be transferred between BHS and EDS equipment as defined by each EDS manufacturer's interface requirements document or integration guide. If the EDS does not accept both a BHS Pseudo ID and a 10-digit IATA bag tag ID, then the 10-digit IATA bag tag ID shall be transferred to the EDS as the primary tracking ID.

**12.6.1.1 Pre-EDS Requirements:** The upstream IATA tracking accuracy shall be calculated and reported in the CBIS Executive Summary Report, Figure A.4 1 by summing the quantity of the 10-digit IATA bag tags that are successfully handed off to the EDS units,  $R_{EDS}$ , with the quantity of 10-digit IATA bag tags that are seen by the photo eye just past the OOG divert location,  $R_{OOG@PE}$ , all divided by the quantity of 10-digit IATA bag tags that are successfully read by the ATR and supplied to the BHS,  $R$ . This value shall be displayed as a percentage and shall be at least 97%.

**12.6.1.1 Pre-EDS Requirements:** The IATA Handoff Accuracy shall be calculated by dividing the total number of 10 digit IATA bag tags sent back at the exit of the EDS machine by the total EDS volume. This measurement shall be displayed in the CBIS Performance report.

**12.6.1.1 Pre-EDS Requirements:** If the BHS Pseudo ID becomes unknown or unavailable, the BHS shall generate a new BHS Pseudo ID, or the EDS will generate an EDS Pseudo ID for tracking purposes. (EDS Bag ID range and format is specified in the OEM's integration guide.) The EDS OEM shall ensure EDS Bag ID overlaps do not occur between any EDS within any matrix.

**12.6.1.1 Pre-EDS Requirements:** BHS Pseudo IDs and EDS Pseudo IDs shall not overlap with IATA requirements for bag tag IDs or repeat themselves within 24 hours (i.e., unique BHS/EDS IDs are required for a duration of 24 hours).

**12.6.1.1 Pre-EDS Requirements:** The OOG tracking accuracy (absolute) shall be calculated by dividing the quantity of successfully tracked OOG bags just after the OOG divert location by the total OOG bags detected at the BMA. This value shall be displayed as a percentage in the CBIS Executive Summary Report and shall be at least 97%.

**12.6.1.1 Pre-EDS Requirements:** The Invalid OOG Arrival percentage shall be measured just after the OOG divert location and calculated by subtracting the known OOG bags,  $R_{\text{OOG}} @ \text{PE} + \text{RNR}$ , OOG @ PE, from the total quantity of bags at the same location, all divided by the total quantity of bags at the same location. This value shall be displayed as a percentage in the Daily CBIS Summary Report.

**12.6.1.2 Post-EDS Requirements:** When the EDS passes a decision to the BHS, the BHS shall retain this status throughout the tracking process for each bag and never override the EDS decision.

**12.6.1.2 Post-EDS Requirements:** If a decision is not received from the EDS, the BHS shall assign a Communication Error status for tracking purposes.

**12.6.1.2 Post-EDS Requirements:** The system shall never swap or transfer BHS tracking IDs or security screening decisions between bags under any circumstances

**12.6.1.2 Post-EDS Requirements:** Invalid arrivals at CBRA shall be monitored and logged via the BHS reporting system.

**12.6.1.2 Post-EDS Requirements:** During controlled testing, EDS Error and Timeout arrivals are excluded from the CBRA Arrival Rate calculation. During live operations, EDS Error and Timeout arrivals are included in the Invalid CBRA Arrival Rate calculation and shall be separately tracked, as any of these arrivals represent a system deficiency.

**12.6.1.2 Post-EDS Requirements:** The Invalid CBRA Arrival rate allowed for controlled testing and live operations shall not exceed 3% in a CBRA designed with a Baggage Reinsertion Line and not exceed 2% in a CBRA designed without a Reinsertion Line.

**12.6.1.2 Post-EDS Requirements:** In the event of a BHS or EDS emergency stop (E-stop) activation, the system shall:

- Maintain tracking of all bags screened by the EDS and
- Maintain the security status of all bags that have been screened by the EDS and
- Maintain the security decision transmitted from the EDS to the BHS prior to or after activation of either a BHS or EDS e stop

**12.6.1.2 Post-EDS Requirements:** The EDS shall recover from the E-stop condition in accordance with published criteria from the EDS vendor and the BHS shall recover per established E-stop recovery procedures defined in the BHS specifications and in accordance with the OEM's integration guidelines.

**12.6.2 CBIS Bag Detection Requirements:** The CBIS shall be capable of detecting when any bag infringes on the tracking window of any other bag, provided the bags meet the minimum conveyance size and the bag is not on top of, underneath, or directly beside another bag.

**12.6.2 CBIS Bag Detection Requirements:** The CBIS shall be capable of detecting when a bag has been delayed or accelerated beyond the configured tracking tolerance shall result in application of one of the following solutions:

- Upstream of EDS (single bag): The CBIS shall reacquire the bag and continue tracking
- Downstream of EDS (single bag): If the bag has already been screened and traveled downstream of the EDS, any security status assigned to the bag will no longer be considered valid and the bag shall be routed to the CBRA

- Downstream of EDS (multiple bags): If multiple bags are involved and tracking windows have been infringed upon, then the CBIS shall be capable of detecting this condition and route all bags involved to the CBRA

**12.6.2 CBIS Bag Detection Requirements:** The CBIS shall be capable of detecting when a bag has been added within the tracking zone if that bag is added anywhere other than on top of, underneath, or directly beside another bag.

- Upstream of EDS (single bag): The CBIS shall acquire the bag and continue tracking
- Downstream of EDS (single bag): If the addition occurs downstream of the EDS and only the added bag itself is affected (added bag does not infringe on the tracking window of another bag), then the added bag shall be routed to the CBRA

**12.7.1 CBIS Conveyor Subsystem Nomenclature:** The following nomenclatures shall be used by CBIS designers:

- Mainline Feeds: SF (Security Feed)
- Shunt: SS (Security Shunt)
- Out-of-Gauge: OOG
- OSR Line: OSR
- Clear Line: CL
- Alarm Line: AL
- Re-Insert Line: RL
- Oversize: OS
- Crossovers: XO

**12.7.3 Divert and Merge Requirements:** Bags exiting the EDS machine shall be properly spaced via increases in belt speeds on subsequent conveyors to allow for continuous flow (no less than the minimum diverter processing rate) through the level 1 divert point.

**12.7.3 Divert and Merge Requirements:** Bags exiting each EDS unit shall be separated by their clear or non-clear screening status prior to merging onto the post-EDS mainline or OSR line. ICS carriers shall be separated by their clear or non-clear status at the first opportunity but may travel on the OSR line.

**12.7.3 Divert and Merge Requirements:** After clear and non-clear bags have been separated, they shall not be commingled.

**12.7.3 Divert and Merge Requirements:** Only clear bags shall be diverted at horizontal diverters; non-clear bags shall pass through.

**12.7.3 Divert and Merge Requirements:** The following requirements apply to diverters in the security tracking zone downstream of the EDS units:

- For systems with two decision point diverters, at the first decision point diverter, if the system is unable to divert a clear bag, the bag shall bypass the diverter on the Alarm Line.



- For systems with two decision point diverters, at the second chance diverter, if the system is unable to divert a clear bag, the bag shall cascade stop and NOT bypass the diverter on the Alarm Line.
- For systems with a single decision point diverter, if the system is unable to divert a clear bag, the bag shall cascade stop and NOT bypass the diverter on the Alarm Line.
- The CBIS bypass feature shall be enabled and disabled via an operator's workstation in the BHS control room. Bypass features that send non-clear bags to the outbound system shall not be allowed.

**12.7.4 Baggage Allocation Methodology:** BAM refers to the logic used to distribute bags between the EDS units. All new CBIS designs shall incorporate a round-robin BAM, in which bags are routed singularly and consecutively to each available SS line.

**12.7.6 Recirculation Loop Requirement:** Recirculation Lines are prohibited in CBIS design, except for connected reinsertion lines in the CBRA.

**12.7.7 Reinsertion Line Requirement:** Non-cleared bags shall only be reinserted upstream of the STZ.

**12.7.7 Reinsertion Line Requirement:** Reinserted bags (automatic or manual) shall be assigned a new unique BHS tracking ID prior to rescreening.

**12.7.8 Draft Curtain Requirement:** All PECs shall be clear of obstructions, including draft curtains.

**12.7.9 Stack Light Requirements:** Stack lights used at decision points in the CBIS shall adhere to the following color designations:

- Green = Cleared
- Red = Alarm
- Blue = Fail-safe
- White = All others (Unknown, EDS Errored, Pending, etc.)

**12.7.12 Out-of-Gauge Bag Conveyance:** The CBIS shall transport OOG bags directly to the CBRA. OOG bags shall be routed to the CBRA on the Alarm Line. OOG bags shall be diverted upstream of the EDS lines. To minimize bags on the OOG line, bags that do not have dimension information or that may have been lost in tracking after the BMA shall be transported to an EDS shunt, not the OOG line. An over-height protective device shall be installed two queues in front of each EDS unit, e.g., an over-height photo eye, light curtain, headache bar or other similar device to ensure over height bags are stopped prior to the EDS unit.

**12.8 Fail-Safe Events:** A single bag failing to track from the decision photo eye upstream of the diverter to the fail-safe photo eye on the Alarm Line downstream of the diverter shall activate a fail-safe event.

**12.8 Fail-Safe Events:** Upon activation of a fail-safe event the appropriate number of conveyors on the clear bag line shall stop and audible and visible fail-safe alarms shall be activated. Fail-safe alarms shall be distinct from all other types of system event alarms.

**12.9 Fail-Safe Events:** All conveyors in the fail-safe zone must be stopped during a fail-safe event. The sidewalls of all conveyors or portions of conveyors associated with the fail-safe zone shall be clearly marked or identified to support appropriate bag removal.



**12.8 Fail-Safe Events:** For systems with more than one diverter between the EDS units and the CBRA, during a fail-safe activation at the first chance diverter, clear bags shall pass the diverter on the Alarm Line to be diverted at the second chance diverter.

**12.8 Fail-Safe Events:** For systems with a single diverter, during a fail-safe activation at this diverter, clear bags shall not pass the diverter and shall cascade stop upstream of the diverter.

**12.8 Fail-Safe Events:** Fail-safe activations shall not exceed 0.5% of bag volume during the 24-Hour Calendar Day as measured by dividing the number of fail-safe activations at all Decision Points by Total Bags Inducted using the Daily CBIS Summary Report defined in Appendix A, Section A.4.

**12.9 Operational Test Kit:** The integration of specific OTK Test controls into the CBIS shall be coordinated with the EDS and BHS vendors, ensuring alignment with their integration documentation. The OTK test controls shall be in a way that minimizes walking distances between Load and Unload points. Between two adjacent EDS, OTK test controls shall be situated on shared sides so two EDS can be tested from one access location. The conveyors between the OTK load and unload points shall be straight with a maximum angle of 0 degrees.

**12.9 Operational Test Kit:** OTK Test controls shall include an operational test mode that supports the following procedures:

- Stop the normal flow of bags into the EDS without losing track of bags already in the system.
- Allow the OTK bag to be placed safely and properly onto the EDS entrance conveyor or immediately adjacent conveyor. The sideguard height at this interface point shall not exceed 4 inches and have no protrusions or sharp edges. The conveyor belt immediately upstream of the OTK load point shall stop when OTK Mode is activated to prevent a pinch point.
- Restart the EDS entrance conveyor to feed the OTK bag into the EDS.
- Stop the OTK bag on the EDS exit conveyor or immediately adjacent conveyor to allow removal of the OTK bag. The sideguard height at this removal point shall not exceed 4 inches and have no protrusions or shape edges.
- Allow for repeat of OTK Tests as necessary.
- Return the system to normal screening operation.

**12.9 Operational Test Kit:** The CBIS shall maintain normal operations during all the OTK processes and not require a shutdown and restart from a MCP or other location. The OTK control station shall consist of a keyless, selector type switch or HMI graphics to enable the OTK test mode. The OTK test activation signal shall be annunciated in the BHS control room.

**12.10 Pre-EDS Bag Jam Rate:** The Pre-EDS Jam Rate shall be less than 1%.

**12.10 Pre-EDS Bag Jam Rate:** During controlled testing, the Pre-EDS bag jam rate for each system test shall be less than 0.5% of inducted bag volume. The Pre-EDS bag jam is calculated by dividing the number of jam events (hard and missing) from the Pre-EDS ATRs (through all EDS Shunt lines) to the entrance of the EDS by the total bags inducted during the test.

**12.10 Pre-EDS Bag Jam Rate:** During live bag operations, the Pre-EDS bag jam rate shall be less than 1% of bag volume during the 24-hour Calendar Day as measured using the Daily CBIS Summary Report defined in Appendix A, Section A.4.

**12.11.1 Service Access:** A minimum service area of 3 feet shall be provided around all four sides of the equipment and 3 feet vertical clearance above the highest point of the EDS. The Project Sponsor shall ensure compliance with the EDS OEM's site planning and installation guidelines

**12.11.2: EDS Part Replacement Provisions:** The project sponsor shall verify site-specific EDS manufacturer replacement part maximum size and weight requirements for all replacement

**12.11.3 Environment:** The Project Sponsor shall ensure that all operating environmental and maintenance requirements as set in the OEM's integration guidelines are met.

**12.11.3 Environment:** Designers shall not use wet-type fire protection sprinkler systems above or in close proximity to the EDS machines.

**12.11.3 Environment:** Designers shall use the EDS PGDS Maintainability Standards Exhibit (Environment Checklist) displayed in Figure 12 5 to ensure that the required environmental standards described in this section are met.

**12.11.4 Storage and Spare Parts Access:** The Project Sponsor shall include a lockable storage space of a minimum of 150 square feet (per CBIS) for EDS Spare parts. This space should be located as close to the EDS as possible.

**12.11.5 EDS Replacement:** The Project Sponsor shall include access routes for EDS equipment replacement in the design documents. Structural Integrity of the flooring along EDS Replacement routes shall be properly designed to accommodate both the EDS equipment as well as any rigging equipment used during installation and removal.

**12.11.5.1 Quick Disconnect Standard:** The Project Sponsor shall identify the appropriate number of conveyor components immediately before and after the EDS unit that will be readily removable using commonly available hand or power tools. The Project Sponsor shall also identify the methodology for removal of any ancillary equipment before or after the EDS units to allow for easy access to the EDS units for maintenance, removal, or replacement.

**12.11.6 EDS Power Requirements:** The Project Sponsor shall be responsible for the design, installation, and maintenance (if any) of the power conditioning device.

**12.11.6 EDS Power Requirements:** Power conditioning provisions shall meet the following requirements:

- Device shall have an expected life of no less than 10 years and be maintenance free.
- Device shall be covered by a warranty period of no less than one year.
- Device shall have galvanic isolation.
- Device shall have power regulation of +/- 10% line voltage
- Device shall have surge suppression and overload protection.
- Device shall provide isolation from noise distortions.
- Device shall provide a power factor (PF) of >90% (with no sags/drops of greater than 20%).

- Support at up to 30 amps per EDS (@480V – 3 phase). Refer to the airport-specific EDS power ratings.

**12.11.7: EDS Network:** EDS PLC shall communicate to the BHS PLC via Ethernet/IP Protocol. Any variation from this protocol must be coordinated with DSD Site Lead in early designs.

**12.13.1 Reporting Frequency Requirement:** The CBIS reporting system shall be capable of providing data in real time ( $\pm 1$  minute) and in hourly, daily, weekly, monthly, quarterly, annual, and manually entered time periods.

**12.12.2 Reporting Detail Requirements:** The CBIS reporting system shall be capable of providing detailed data by Bag ID number and EDS unit and will be provided by the BHS Vendor.

**12.12.2 Reporting Detail Requirements:** At a minimum, the reporting system shall be capable of providing the following features in reports:

- Bag Data
  - Bag Tag number (with ATR/Rfid installed)
  - Time stamped at BMA
  - BHS tracking ID number for each bag (shared by BHS and EDS unit)
  - Bag type (OS, OOG, in-gauge)
  - Time stamped when bag enters the EDS unit or time stamped when OOG bags are diverted to OOG Line
  - SSI—Level 1 screening status
  - SSI—Level 2 screening status

**12.12.2 Reporting Detail Requirements:** At a minimum, the reporting system shall be capable of providing the following features in reports:

- Critical Tracking PEC: Immediately upstream and downstream of each EDS, prior to and after each tracked divert point, and at the last tracked PEC entering the CBRA, the BHS shall report the following for each activation of the PEC:
  - Bag ID
  - SSI—Bag screening status

**12.12.2 Reporting Detail Requirements:** At a minimum, the reporting system shall be capable of providing the following features in reports:

- BHS Faults
  - Fault type (Note: A "fault" is defined as a "cause" such as lost in track, motor overload, PEC failure, encoder failure)
  - Fault location
  - Fault time
  - Fault time cleared
  - Total fault time

**12.12.2 Reporting Detail Requirements:** At a minimum, the reporting system shall be capable of providing the following features in reports:

- BHS Events
  - Event type (Note: An "event" is defined as the "effect" of a fault, such as re-establish tracking, fail-safe, or jams, or the "effect" of human interaction on the system, such as via HMI or control station, e.g., pushing an e stop or OTK activation)
  - Event location
  - Event time
  - Total event time

**12.12.2 Reporting Detail Requirements:** At a minimum, the reporting system shall be capable of providing the following features in reports:

- EDS Statistics (if data to support these statistics is available from the EDS OEM being installed)
  - SSI—Number of bags alarmed by specific EDS unit
  - SSI—Number of bags cleared by specific EDS unit
  - EDS unit faults (if known)
  - Start time of fault
  - End time of fault

**12.12.2 Reporting Detail Requirements:** At a minimum, the reporting system shall be capable of providing the following features in reports:

- ATR Performance
  - ATR Name
  - ATR Description (i.e., Tracking or Sortation)
  - Total number of bags seen
  - Total number of tags read
  - Number of problem tag reads (this can be provided as a single total count or ideally as a set of constituent counts plus a total count and should be representative of the number of unreadable/missing tags, number of invalid tag reads, number of conflict/multi-tag reads, etc.)
  - Number of associated tag reads (i.e., the number of 10-digit IATA bag tag IDs read and associated with the bag's BHS tracking ID)
  - Total number of 10-digit IATA bag tags that are read at the ATR and passed to the EDS
  - Total number of 10-digit IATA bag tags sent back at the EDS exit
  - Upstream IATA Tracking Accuracy
  - IATA Handoff Accuracy

**12.12.2 Reporting Detail Requirements:** At a minimum, the reporting system shall be capable of providing the following features in reports:

- BMA Statistics
  - Total number of bags through the BMA
  - Total number of OS bags
  - Total number of OOG bags
  - OOG (absolute) tracking accuracy

**12.12.2 Reporting Detail Requirements:** At a minimum, the reporting system shall be capable of providing the following features in reports:

- System Baggage Volumes
  - By input conveyors (ticket counter conveyors, curbside conveyors, Oversize conveyors)
  - By screening area (including EDS unit and CBRA)

**12.12.2 Reporting Detail Requirements:** At a minimum, the reporting system shall be capable of providing the following features in reports:

- CBRA Statistics—CBRA statistics shall be presented and considered SSI.
  - Cleared
    - Cleared (CLR)
    - PRE-Clear (P-CLR)
    - SEL-Clear (S-CLR)
  - Alarmed
    - Alarmed (ALM)
    - PRE-Alarmed (P-ALM)
    - SEL-Alarmed (S-ALM)
    - No Decision
    - Purged
    - Queue Time Out (Q-Timeout)
    - Operator Time Out (O-Timeout)
  - Lost in Tracking
    - Mis tracked
    - Following Lost Bag

- Too Close
  - Security Re-route
- Unscreened
  - OS
  - OOG
  - OOG (absolute) Tracking Accuracy
- Reinsert Line
  - Reinserted bags

**12.12.2 Reporting Detail Requirements:** At a minimum, the reporting system shall be capable of providing the following features in reports:

- HOUPEC Tracking Statistics
  - Total number of bags seen at each PEC
  - Total number of purged bags at each PEC
  - Total number of missing bags at each PEC
  - Total number of unknown bags at each PEC
  - Total number of “hard” jams at each PEC
  - Total number of missing bag jams at each PEC

**12.12.2 Reporting Detail Requirements:** At a minimum, the reporting system shall be capable of providing the following features in reports:

- BPT Statistics—see Section 14.5.5
  - Total number of bags seen
  - Average processing time for each bag
  - By BIS position

**12.12.2 Reporting Detail Requirements:**

- BHS Bag Spacing reporting shall:
  - Maintain spacing data for last 100 bags
  - Omit spacing greater than 36 inches when creating averages
  - Maintains a column in the “Bag Spacing Report” that shows bag spacing/averages

- Trigger an event record when spacing is changed that will include time, date or change, and new spacing setting

**12.12.2 Reporting Detail Requirements:** The reporting system shall provide BHS Reports which should be within 5% difference or accuracy compared to the EDS Counts per screening line.

**12.12.2 Reporting Detail Requirements:** For MITs and ICS systems, all CBRA reports shall be generated based on bag status upon arrival at the inspection station location.

**12.12.3 Daily Reporting Requirements:** At a minimum, the following daily reports in the format shown in Appendix A, Section A.4 shall be available to the local TSA representative via auto-download and auto-transmittal capabilities to a specified existing e-mail address or secure storage location:

- Daily CBIS Summary Report
- Daily CBIS Bag Volume Report
- CBIS Executive Summary Report (Figure A.4 3)—SSI
- CBRA Executive Summary Report (Figure A.4 4)—SSI
- PEC Tracking Reports for all PECs within a tracking zone
- BPT Summary Report
- CBRA Bag Report
- CBIS Hourly Throughput Report—SSI
- CBIS Bag Spacing Report
- CBIS Performance Report—SSI

**12.12.4 BHS ID Log Report Requirements:** A report of the last 1000 BHS IDs shall be provided as defined below:

- The BHS\_ID\_LOG shall be considered a FIFO. The FIFO shall capture the last 1,000 Pseudo IDs, associated decisions and a flag indicating whether the bag has been processed by a TSO (including re-inserted for screening) for each EDS.
- This data shall consist of three elements:
  - Pseudo ID
  - Decision
  - Processed
- The report shall be provided in both a PDF format and an importable CSV file.

**12.12.5 BHS Reporting During Maintenance:** BHS Reporting capabilities shall be designed such that logging of photo eye activity (i.e., total, missing, unknown, etc.) is disabled on conveyors not running or operating in a manual override mode. The BHS shall only log PE activity when conveyors are running in a fully automated mode.

**12.13.1 Fail-Safe Operation Requirements for a Mini In-Line CBIS:** In case of a mini in-line fail-safe event, the BHS shall detect non-clear bags and perform the following actions:

- Maintain a halt condition on the Clear Line beyond the manually operated in-line decision point except when a clear bag has been successfully transported through the in-line decision point (i.e., bag information for any non-clear bags has been cleared and a clear bag is either approaching the in-line point or a bag has been processed manually at the CBRA and is reinserted at the reinsertion point through the use of local BHS controls); and
- Activate audible and visible fail-safe alarms.

**12.13.2 Bag Travel Time Requirements for a Mini In-Line CBIS:** For mini in-line systems, the minimum BTT shall be 60 seconds. However, designers are encouraged to maximize it further whenever possible. This higher BTT can be achieved without impacting EDS rates, using a combination of:

- Slower belt speeds downstream of the EDS
- Additional queues downstream of the EDS
- Holding of alarm bags downstream of the EDS to take advantage of lag times in between the bags (due to bag flow control upstream of the EDS)
- For mini in-line systems, the minimum design OVT shall be 25 seconds for each alarm bag, for up to 3 consecutive alarm bags.

**12.14 Baseline Testing Requirements:** See Chapter 12 for this table.

## Chapter 13: On-Screen Resolution Area Planning Standards and Requirements

**13.2 OSRA General Space Requirements:** The OSRA design shall account for space and placement of the following equipment:

- Viewing Stations—Primary work areas for TSOs conducting Level 2 screening. Each station shall include a Primary Viewing Station (PVS), task desk, and ergonomic chair.
- Supervisor Desk—Positioned to maintain a clear line of sight to all TSO viewing stations for effective oversight. Includes direct communication equipment with the CBRA and access to system status displays



- EDS CI Workstation—An EDS OEM-provided computer workstation used by TSOs to check EDS status and access the EDS reporting system. Includes monitor, CPU, keyboard, and mouse.
- BHS Status Display—wall-mounted or freestanding monitor displaying real-time conveyor system status and layout. It must be visible from both the Supervisor Desk and relevant viewing stations.
- EDS remote stop/start—Where required by the EDS model, include a dedicated reset control box to manage EDS fault conditions.
- Personal Storage Lockers—provide secure lockers for TSO belongings unless personal storage is accommodated in a nearby break room. Locker placement shall avoid interference with workstation zones or circulation paths.

**13.2 OSRA General Space Requirements:** For space allocation purposes, the size of the OSRA shall be based on the number of OSR stations derived based on the DBU+15 checked baggage demand projections and respective EDS requirements

## Chapter 14: Checked Baggage Resolution Area Planning Standards Requirements

**14.1 CBRA Overview:** Deviations from Chapter 14 requirements shall be submitted through an RFV for review and approval by TSA.

**14.2 CBRA Layout:** The CBRA layout shall be designed to centralize and optimize TSO utilization, avoid bag lifting, reduce equipment costs, and incorporate the following:

- Single Clear Line unless physical constraints require additional lines. Multiple Alarm Lines may be used for larger CBRAs
- Connected to the end of the Alarm Line, a Reinsert Line with no side guard to ease bag placement during manual reinsertion
- Transport of OOG bags via the Alarm Line and leave via the Clear Line
- Transport of OS bags via a dedicated conveyor line

**14.2 CBRA Layout:** For smaller configurations, the optimal layout shall include a straight Alarm Line and a parallel Clear Line.

**14.3 Baggage Inspection Stations:** BIS designs shall include a flat work surface for the TSO to place the bag and remove any objects inside the bag as needed. The work surface shall be made of a non-porous material that can withstand isopropyl alcohol decontamination. The BIS work surface shall be 30" W x 60" L and be placed at 30" high above the finished floor.

**14.3 Baggage Inspection Stations:** The BIS design shall be capable of processing bags year-round in an environment with a temperature range of 50-100°F and a humidity of 30-70%. The baggage to be screened may weight up to 125lbs. The BIS shall provide a 36" W x 60" L workspace in front of the working surface for the TSO to move freely. In addition, the BIS shall allow maintenance access to all components and shall accommodate all the CBRA ancillary equipment listed in Section 14.3.1.

**14.3 Baggage Inspection Stations:** Kick panels shall be installed at all locations where a bag is opened along the Alarm Line and Clear Line.

**14.3 Baggage Inspection Stations:** The BIS shall provide a storage system for these tools to increase TSO efficiency, prevent theft, and avoid leaving tools inside passenger luggage after the inspection. The tool storage system shall be:

- Organized for easy inventory checks at the end of each shift by the TSM
- Visually trackable for quick inventory checks after each bag inspection by the TSO

The storage system shall allow quicker access to primary and secondary tools as these are the most used, while the special tools may require more time to obtain since they are only used occasionally.

**14.3.1 BIS Ancillary Equipment:** The BIS shall include all the supports needed to mount the ancillary equipment listed in this section.

**14.3.1 BIS Ancillary Equipment:** One BSD shall be installed per BIS. The BSD shall be color and touch capable with a 12" diagonal display size. The bezel of the BSD shall not exceed 1" in any direction and shall be located near the BRP at a 45-degree angle. The BSD mounting solution shall be adjustable in X, Y, Z dimensions without the use of tools.

**14.3.1 BIS Ancillary Equipment:** The SVS monitors, keyboard and mouse shall be located towards the middle of the BIS and shall be adjustable in X, Y, Z dimensions without the use of tools. The SVS CPU shall be in a lockable compartment where it will not interfere with the screening process.

**14.3.1 BIS Ancillary Equipment:** The scan guns shall be connected to the BSD via a predefined communication port. The scan gun shall include a shock absorbing protector (i.e., rubber or similar) and be located near the adjacent BRP on a retractable reel. Scan guns shall be corded with stationary mounting solutions.

**14.3.1 BIS Ancillary Equipment:** The CBRA design shall provide means to place and share an ETD between two adjacent BISs.

**14.3.1 BIS Ancillary Equipment:** The Emergency Stop (E-stop) shall stop all conveyors in a contiguous line when pressed during an emergency. Each BIS shall have a readily accessible E-stop within arm's reach. A single start push button per E-stop zone shall be installed to ensure the system can only be started (reset) from one location within the zone after an E-stop has been activated.

**14.3.1 BIS Ancillary Equipment:** The BIS shall provide a place to locate the UPS.

**14.3.2 Baggage Removal Point:** The BRP shall be 48" L and 32" H (floor to the conveyor bed). The PE location and programming of the BRP shall ensure that arriving bags are centered (with respect to the width of the conveyor) and stop next to the corresponding BIS. In addition, the photo eye reflector cover shall be of a slim design no more than 1" H that allows bags to be slid over it.

**14.3.2 Baggage Removal Point:** The queue conveyors situated between the BRPs are termed "Intermediate Queues" and shall be a minimum of 48" L and 32" inches in height. Intermediate queues shall be installed in the space between BIS pairs adjacent to the circulation space for the TSOs.

**14.3.3 CBRA BHS Displays:** The CBRA shall be equipped with a display of additional BHS information that is useful for the TSA to effectively respond to system issues or bag surges. This information shall be visually available as follows:

- BHS Status Display – A visual representation of the conveyor belt design shall be included that uses industry-wide standard color codes to communicate real-time equipment status.
- BHS CBIS Remote Reporting Workstation – A remote thin client BHS workstation shall be provided to TSA in OSRA/CBRA at supervisor's desk depending on system size and TSA needs.
- The BHS Remote Reporting Workstation display of all reports shall include an optional setting to refresh at a user-selected interval, allowing the report to remain open while showing current operational data.

**14.3.3 CBRA BHS Displays:** The exact configuration of CBRA BHS displays shall be coordinated between TSA and the ILDT during the project submittal phase.

**14.4.1 BIS Utilization:** BISs shall be enabled in upstream sequence only, beginning with the furthest downstream station. The BHS shall inhibit an upstream station from being enabled if downstream BISs are disabled.

**14.4.1 BIS Utilization:** When there is more than one available BIS, bags arriving on the Alarm Line shall be assigned to the BIS that has been available for the longest period.

**14.4.1 BIS Utilization:** When the BHS assigns a bag to an available BIS, the bag cannot be reassigned to another BIS unless the BIS is disabled (i.e., the operator logs out).

**14.4.2 Alarm Line Queuing:** If there are no enabled BISs, bags arriving on the Alarm Line shall queue at the second most downstream BRP.

**14.4.2 Alarm Line Queuing:** The CBRA shall be programmed to queue bags waiting for an available BIS in the following order:

- Level 1: Enabled BRPs, starting from the most upstream
- Level 2: CBRA queue conveyors (except intermediate queues), upstream of the enabled BISs
- Level 3: Intermediate queues starting from the most upstream

**14.4.3 Baggage Removal Point Lag Timer:** After a bag has been removed from a BRP and an action button has been selected on the BSD (the chronological order is irrelevant, but both conditions must be met), the system controls shall have an adjustable lag timer for the BRP belt to resume operations (i.e., advance other bags) which is used to prevent TSO injury while a bag is being transferred. The default value shall be 3 seconds

**14.4.4 Scan Guns:** Scan guns shall be mounted using overhead retractable reel, like that shown Figure 14-2 CBRA Workstation Example.

**14.4.5: Baggage Process and Screening Timers:** The BHS shall use a BPT to record every bag processing time at each BIS using the arrival of a bag at the BRP as the start signal for the timer. BPT information is considered SSI and requires SSI training to access. The BHS shall also use a Baggage Screening Timer (BST) to record the bag screening time at each BIS using the SEARCH button on the BSD as the start signal for the timer. Both BPT and BST use the CLEARED button for the stop signal and are recorded in the CBRA Bag Process report.

**14.4.6: Reinsert Line:** The Reinsert Line conveyor shall automatically start when a reinserted bag is detected on the upstream queue conveyor and the bag is automatically transferred onto the Reinsert Line for rescreening.

**14.4.6 Reinsert Line:** Bags eligible for either automatic or manual reinsertion shall be assigned a new unique BHS tracking ID prior to rescreening.

**14.4.6 Reinsert Line:** A control station shall be provided to operate the Reinsert Line conveyor and allow for the manual placement of a bag. At the manual reinsert points, located in optimal layouts shown in Figure 14-1, the design shall incorporate a control station with the functionality of “Insert Bag” which will stop the conveyor and queue bags upstream to allow a bag to be manually placed on the conveyor (manual reinsert process). After the bag is placed on the conveyor, pressing a “dispatch” button shall send the bag downstream tracked with a status of “REINSERTED”. Reinserted bags shall not stop at enabled BRPs if the path to the Reinsert Line is clear and will be advanced directly to the Reinsert Line.

**14.4.6.1 Manual Reinsert Points:** Manual reinsert points shall be located downstream of the furthest downstream BIS on each alarm line. The Manual Reinsert points shall incorporate a control station with the functionality of “Insert Bag” which will stop the conveyor and queue bags upstream to allow a bag to be manually placed on the reinsert conveyor). After the bag is placed on the conveyor, pressing a “dispatch” button shall send the bag downstream tracked with a status of “REINSERTED”. Reinserted bags shall not stop at enabled BRPs if the path to the Reinsert Line is clear and will be advanced directly to the Reinsert Line

**14.5.1 BSD Screens Design:** The BSD Interface comprises different elements and specific visual characteristics that shall be replicated on every design. The visual design shall include:

- Font style: The font shall be a web-safe sans-serif typeface such as Arial, Verdana, or Calibri.
- All Capital Letters: Bag statuses, UICs, and operator messages shall be displayed in all capital letters.
- The elements to screen size ratio shall be maintained regardless of the display size.
- All colors used throughout the displays shall follow the colors in Table 14 2. (see text for details)

**14.5.1 BSD Screens Design:** The BSD structure shall include the following key elements:

- [BSD element] Station ID: Numbering convention in the form of “STATION –XX”, which correlates to the BIS number in which it is mounted.
- Bag Information Fields:
  - Bag Status: Disposition of the bag as indicated by designator and color listed in Section 14.5.1
  - IATA ID or RFID: The IATA number shall be populated here.
  - PSEUDO ID: The generated pseudo ID (either by the BHS or the EDS) shall be shown.
  - EDS ID: EDS screening line and EDS serial number used to process the current bag in the format of SS8 (G500)
  - Unique Identifier Cell (UIC): Used to identify when any of the following scenarios occur:

- Duplicate IATA
- Timeout
- Communication Error
- Others may be added with an approved RFV
- Found at PE: PE ID that correlates to the location where bags that have been lost in tracking were “found”.
- Operator Message Area: Used to display any messages for the operator.
- Primary Buttons: These represent the primary action typically taken by the operator. These also work as a trigger for the Bag Auto ID Transfer functionality when needed, as referenced in TSA’s Integration Requirements Document (IRD).
- Secondary Action Buttons: These provide an optional action for the operator under certain circumstances.

**14.5.2 BSD Statuses and High Level Processing Procedure:** Baggage that arrives in the CBRA shall be limited to the following five statuses with their corresponding designator codes, and color.

- **CLEARED** (Green) – Bags that received a clear status from the EDS or OSR. Cleared bags include:
- **ALARMED** (Red) – Bags that generate an automatic alarm on an EDS unit and were viewed but not cleared by the Level 2 OSR Operator.
  - Timeout – Bags that received an alarm status from the EDS but timed out during OSR or didn’t make it to the OSR viewing at all.
- **OUT-OF-GAUGE** (Orange) – Bags that do not fit into EDS units.
- **EDS ERRORED** (Yellow) – Bags that received an error status from the EDS.
- **UNKNOWN** (Blue) – Bags that have become lost in tracking between the exit of the EDS and the BRP or forced unknown for security reasons.
  - Communication Error – BHS will assign this status in scenarios where a disposition has not been received by the BHS from the EDS. This status is NOT an indication of an EDS or BHS error but indicates a possible communications error. Where the status is persistent, the BHS and EDS engineers should review the possible condition causing the error.

**14.5.3 Station Disabled and Waiting for Bag Screens:** After the BHS startup procedures are completed, the BSD shall remain DISABLED until an operator presses the ENABLE button shown in Figure 14-12, or logs on to the SVS with two-way communication.

**14.5.4.6 Unique Identifiers Cell:** There are four messages that may be displayed in the UIC: Reinsert, Comm Error, Timeout, and Duplicate IATA; these shall be displayed as shown in Figure 14-19.

**14.5.4.6 Unique Identifiers Cell:** When a positively tracked bag arrives in CBRA with a Duplicate IATA message in the UIC, the system shall process the bag according to the bag status.

**14.5.6 Bag Waiting Alerts:** To mitigate unnecessary dieback in the CBRA, a flashing visual alarm shall alert operators to a condition where manual intervention is required.

**14.5.6 Bag Waiting Alerts:** The following conditions shall trigger the Bag Waiting Alert on the BSD:

- If the BIS is available and a bag requiring manual intervention (i.e., pressing a button) is queued at the adjacent BRP, a bag waiting timer shall start.
- If the bag is left unattended for 15 seconds, the BSD shall display a flashing BAG WAITING TOO LONG message in red until an action is taken on the bag as shown in the example in Figure 14-23. This applies to all bag type screens.
- If the bag is left unattended for 45 seconds, the bag shall advance to an available downstream BRP.
- After the 45 seconds time has expired the BHS shall lock out the search bag button for 3 second before the bag departs to the next available Downstream BIS.

**14.6.1 Bag Storage Capacity:** The CBIS design shall be capable of storing the proper quantity of bags needed to avoid system diebacks. The following equations shall be used to determine the bag storage needed to meet this requirement:

$$Total\ bags_{to\ accommodate} = \frac{10min}{Average_{screening\ time}(min)} \times Quantity\ of\ BITS_{Alarmed/OOG}$$

$$Bag\ Storage\ Capacity = Total\ bags_{to\ accommodate} - Quantity\ of\ BITS_{Alarmed/OOG}$$

**14.6.1 Bag Storage Capacity:** When analyzing the bag storage capacity needed for a particular design, the ILDT shall consider the third and fourth column from Table 14 3.

**14.6.1 Bag Storage Capacity:** The bag storage capacity shall be achieved using a combination of queues, or other cost-effective means between the OSR 2nd/last chance divert point and the entrance to the CBRA as well as BRPs and Intermediate Queues within CBRA.

**14.6.2 Architectural Features:** The CBRA shall be fully enclosed with segregating partitions extending to the structural deck to allow for the security and comfort of the TSOs. Conveyor wall penetrations in CBRA shall be equipped with security doors to completely secure the CBRA when the conveyor system is not running.

**14.6.2 Architectural Features:** The CBRA shall be provided with finished horizontal and vertical surfaces as follows:

- Flooring shall be composed of a safety/anti-fatigue material configured for a continuous installation under all TSO work and movement areas with a service-life of no less than seven years.
- Walls shall have durable, impervious surfaces, such as painted masonry, plastic laminate or drywall that is taped, bedded, and textured with epoxy or enamel paint.
- Ceilings shall include the use of painted suspended drywall, or suspended, lay-in acoustical tile at a minimum height of 9 feet. An acceptable design can include exposed structure with no ceiling. See Section 14.6.2 above for noise abatement recommendations.

- Access shall be provided with at least one set of double doors (or a rollup door) for access for equipment movement into and out of the area.

**14.6.3 CBRA Physical Space Requirements:** For space allocation planning, the size of the CBRA shall be adequate to allow for the number of queues and BISs that would be allocated based on the number of non-redundant EDS required at DBU+15.

**14.6.3 CBRA Physical Space Requirements:** The space requirements for the staging room for OS bags shall be based on the individual airport handling of OS bags.

**14.6.3 CBRA Physical Space Requirements:** Space shall be allocated for the storing of hazardous materials outside of the CBRA. The space requirement shall be based on the historical frequency of these materials and the frequency to which the airport collects them.

**14.6.3 CBRA Physical Space Requirements:** The only equipment installed in the CBRA shall be directly required for the operations in that space, e.g., SVSs, BISs, and BSDs. No other equipment such as motor control panels, UPSs for EDS equipment, IT racks or any other equipment not directly related to CBRA operations shall be installed in the CBRA.

**14.6.3 CBRA Physical Space Requirements:** Designers shall verify with local authorities that routes of egress within and external to the CBRA comply with applicable IBC and NFPA 101 life safety codes. Designers shall also ensure that primary access/egress pathways to the CBIS (or other system locations) do not pass through the CBRA. Additionally, sufficient clearance for utilization of bomb disposal robots shall also be considered.

**14.6.3 CBRA Physical Space Requirements:** Designers shall consult with local authorities to determine the proper protocols and routing for the removal of threat bags from the CBRA including a designated exit path for TSOs when a threat is discovered, as well as adequate access to the CBRA room for local authorities with threat containment units.

**14.6.4 Lighting:** Luminance shall be measured at the surface of the BIS and found to be in the range of 500 to 750 lux. In other areas of the CBRA, the luminance shall not fall below 300 lux.

**14.6.4 Lighting:** Color corrected, and full spectrum lighting lamps shall be used, and fluorescent lights are preferred.

**14.6.5 Heating, Ventilation and Air Conditioning:** The CBRA shall be a climate-controlled space. Temperature and humidity control shall be supplied commensurate with the locale. A separate temperature control thermostat shall be provided for the CBRA.

**14.6.5 Heating, Ventilation and Air Conditioning:** If forced-air ventilation is provided, fresh outside air shall be delivered to the CBRA at rates specified by the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Standard 62.1-2016 Ventilation for Acceptable Indoor Air Quality. The CBRA shall be under positive pressure relative to ambient BHS areas to minimize the migration of contaminants (e.g., products of combustion from tugs and vehicles, as well as outside dirt, dust, and debris) from entering the CBRA.

**14.6.6 Power and Communications:** Power shall be provided to the CBRA to support TSA- and airport operator-provided equipment. The Project Sponsor shall coordinate the final requirements based on the actual equipment list and layout, but as a minimum:

- Two quad receptacles (120V/20A) shall be provided for each BIS to support screening operations and ancillary equipment.



- One duplex receptacle shall be provided on the end of the back wall between the two BISs for cleaning personnel access.
- Convenience outlets shall be provided on the perimeter walls as required by local codes.

**14.6.6 Power and Communications:** At a minimum:

- A telephone shall be provided for use by TSOs, with access to the airport communication network, and for placing outside calls.
- The network cabling shall be provided to support the BHS, EDS, and TSA workstations.
- All cabling and associated outlets shall be installed in a location where they cannot to be damaged by BISs or cause a safety hazard.

**14.6.7 Connectivity to TSA Network:** The connection of the CBRA ETD equipment to the TSA Network (TSANet) shall be provided via a “Dual Drop” consisting of 2 RJ45 Cat6/Cat6a connections terminated at a wall or floor box.

**14.6.7 Connectivity to TSA Network:** In addition, the following requirements shall be met:

- All core drilling shall support a minimum of 4 “Dual Drops”
- All new fiber installations shall be single in conflict with 7.2.13.3-mode, 6-strand bundles enclosed in innerduct
- All cabinet installations require 2 110v 20A service
- All cabinet installations shall meet the local seismic rating requirements and can be floor/bracket mounted

**14.6.8 CBRA Noise Abatement:** The CBRA shall have adequate acoustic insulation to ensure the background noise levels do not exceed 70dBA as measured at the natural TSO standing points at each screening station using a time-weighted average over an 8-hour shift.

**14.6.9 Ergonomic Design Dimensions:** Peripheral equipment stations shall have sturdy and durable mounting systems that are adjustable to allow TSOs to function from a standing position with good posture in accordance with DOT/FAA/CT-03-05, Human Factors Design Standard for Acquisition of Commercial Off-the-Shelf, Non-developmental, and Developmental Systems to accommodate the 95th percentile male and 5th percentile female.

**14.6.10 Conveyor System Crossovers and Catwalks:** CBRA conveyor system crossovers shall consist of up and down treaded stairs, a full railing system, and a toe-boarded catwalk. TSA access stairs and handrails in and around CBRA used on a routine basis shall be current OSHA 1910.25 or IBC 1011 compliant, whichever is more stringent.

**14.6.11 Conveyor Belt End Points on Alarm Line:** End points of in-bound conveyor belts shall have a photo eye installed across the conveyor belt to stop baggage from falling off the end. Termination photo eyes shall be located sufficiently upstream to prevent baggage straps from becoming entangled in the conveyor belt at the end point.

**14.6.12 Design for Safety:** The AL conveyor belt surfaces shall be smooth or semi-smooth to facilitate easier baggage removal.

**14.6.12 Design for Safety:** All motor drives and associated tracking devices shall not be intrusive to the screening workspace. The design shall use motor drives mounted on the opposite side of the inbound and outbound lines from screening personnel or, if this is not feasible, the designers



shall ensure that all hazardous moving parts (e.g., drive shafts, roller spindles, bearings, bearing components etc.) are guarded and free from sharp or pointed edges to prevent accidental contact.

**14.6.12 Design for Safety:** End caps shall be installed on conveyor shaft bearing assemblies within TSO-occupied spaces to avoid operational hazards. End caps shall be attached to conveyor shaft bearing assemblies via mounting hardware. Press fit end caps or caps retained by tabs shall not be used.

**14.6.12 Design for Safety:** Any moving part located in any area of the CBRA where TSOs are required to perform their duties shall be shielded to avoid injury.

**14.6.12 Design for Safety:** The CBRA shall be designed to comply with TSA's "no-lift" policy.

**14.6.12 Design for Safety:** All aspects of the CBRA layout shall consider the requirements for maintenance and custodial services access as stated in Mil Standard 1472G Section 5.9.