Phoenix-Mesa Gateway Airport

Phoenix-Mesa Gateway Airport (IWA)
New Inline CBIS

SCHEMATIC DESIGN SUBMITTAL
BASIS OF DESIGN REPORT
Based on PGDS V8.0

June 13, 2024

PGDS V8.0

Studdiford Technical Solutions, LLC

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Executive Summary

Phoenix-Mesa Gateway Airport Authority (PMGAA) has an extensive history as a former military jet training base. The formerly known Williams Air Base was commissioned during WWII as the first jet training base. Military operations lasted 45 years at Williams Air Base until its closure in 1993. Due to growth in the Phoenix area, Williams Airbase would be repurposed again to accommodate commercial airlines. The airport went through two (2) more name changes before finally settling on Phoenix-Mesa Gateway Airport (IWA) in 2007. IWA serves nearly 2 million passengers annually. PMGAA and the Transportation Security Administration (TSA) recognize the need for an updated Checked baggage Inspection System (CBIS) and Checked baggage Resolution Area (CBRA).

The PMGAA has contracted Studdiford Technical Solutions (STS) for design services of a new Inline CBIS in the Main Terminal. This Basis of Design Report (BDR) provides the Integrated Local Design Teams' (ILDT) initial findings for the preferred layout and defines the requirements of the new inline CBIS. The new inline CBIS at IWA will replace the existing standalone screening system which will be decommissioned and demolished after the new inline CBIS has been approved for live operation. The new CBIS will process all outbound flights at IWA.

Three (3) conceptual alternatives for inline CBIS screening were presented to the PMGAA and stakeholders. All alternatives consist of a 2+1 CBIS. The differentiating factor between alternates is the location and type of CBIS enclosure. The options include a new building expansion, reuse of an existing a sprung structure, and locating the CBIS within the existing terminal; the options were shown in the Alternatives Analysis Report (AAR). A Life-Cycle Cost Analysis (LCCA) was also performed to determine the cost effectiveness of the 2+1 system over a 20-year period.

Based upon a suggestion from the TSA, traffic counts from 2023, and 2024 were looked at to reconfirm the FSA results provided by the 2022 Flight Schedule. Although the traffic counts for the IWA fiscal year showed a 5% growth, the peak month of March had a reduction in traffic of 8% for Allegiant, thus putting the design out of a 2+1 category.

With the new data from PMGAA, the system will be a 1+1 CBIS; the details will be provided in Section 6.

After all options were carefully considered and explored, Alternative 1 – Building Addition was selected as the preferred option by PMGAA and stakeholders.

The technical approach the ILDT has taken to provide this analysis study includes:

- Reviewed the most current (v8.0 at the time of writing) TSA Planning Guidelines and Design Standards (PGDS).
- Developed concept alternative layouts for the CBIS.
- Developed preliminary CBIS layouts utilizing the latest PGDS requirements.
- Developed preliminary Rough Order of Magnitude (ROM) estimate of costs.
- Preliminary coordination with additional trades
- Performed a complete system analysis utilizing the Average Day Peak Month (ADPM) and Flight Schedule Analysis (FSA) data from the ADPM Flight Schedule provided by PMGAA, dated March 21, 2022.
- Reviewed the Government Furnished Information (GFI) report provided by the TSA, entitled "AZA GFI memo 051523".

- Reviewed the Allegiant passenger summary provided by PMGAA.

Document Revision History

Revision	Description of Change	Date
0.0	Initial Release	June 13, 2024

Table of Contents

Table of Figures

Table of Tables

Abbreviations & Definitions

AAR	Alternatives Analysis Report
ACS	Access Control System
ADA	Americans with Disabilities Act
ADPM	Average Day Peak Month
AHU	Air Handling Unit
ATR	Automatic Tag Reader
BDR	Basis of Design Report
BMA	Baggage Measurement Array
BHS	Baggage Handling System
BIS	Baggage Inspection Station
BOE	Basis of Estimate
BPH	Bags per Hour
BPM	Bags per Minute
BRP	Bag Removal Position (in CBRA)
BSD	Baggage Status Display
CAGR	Compound Annual Growth Rate
CBIS	Checked Baggage Inspection System
CBRA	Checked Baggage Resolution Area
CWE	Current Working Estimate
DBU	Date of Beneficial Use
DBU+5	Date of Beneficial Use plus 5 Years
DDFS	Design Day Flight Schedule
DOM	Domestic
EDS	Explosives Detection System
ETD	Explosive Trace Detection
FAA	Federal Aviation Administration
FDRS	Field Data Reporting System
FPM	Feet per Minute
FSA	Flight Schedule Analysis
GFI	Government Furnished Information
GSE	Ground Service Equipment
HCD	High Capacity Diverter
HMI	Human Machine Interface
HVAC	Heating, Ventilation & Air Conditioning
ILDT	Integrated Local Design Team
IQT	Image Quality Test
INT	International
IWA	Phoenix-Mesa Gateway Airport
IWG	Industry Working Group
LCCA	Life-Cycle Cost Analysis
LEO	Law Enforcement Officer
LIT	Lost in Tracking
MAEP	Million Annual Enplaned Passengers
MCP	Motor Control Panel
MEC	Manual Encode Console
MEP	Mechanical, Electrical & Plumbing
MU	Make-up Unit

NFPA	National Fire Protection Association
OAG	Official Aviation Guide
OFM	Office of the Fire Marshal
OOG	Out of Gauge
OS	Oversize
OSHA	Occupational Safety and Health Administration
OSR	On-Screen Resolution
OSRA	On-Screen Resolution Area
OTK	Operational Test Kit
PGDS	Planning Guidelines and Design Standards
PLC	Programmable Logic Controller
PMGAA	Phoenix-Mesa Gateway Airport Authority
PVS	Primary Viewing Station (in OSRA)
RFID	Radio-Frequency Identification
RFP	Request for Proposal
RFV	Request for Variance
ROM	Rough Order of Magnitude
SIDA	Security Identification Display Area
SSI	Sensitive Security Information
STS	Studdiford Technical Solutions LLC
STZ	Security Tracking Zone
SVS	Secondary Viewing Station (in CBRA)
TAF	Terminal Area Forecast
TCU	Threat Containment Unit
TDR	Threat Disposal Robot
TIM	Technical Interface Meeting
TSA	Transportation Security Administration
TSO	Transportation Security Officer
UPS	Uninterruptible Power Supply
VMU	Vertical Merge Unit
VSR	Vehicle Service Road
VMU	Vertical Merge Unit
VSU	Vertical Sortation Unit

1. Introduction

IWA has experienced unprecedented growth year over year and a new, more robust, and more efficient screening system is needed to continue to provide world-class customer service and handle the increase in baggage demand. The current CBIS utilizes two (2) CT80DR Explosive Detection System (EDS) machines in a standalone configuration that are fed by a pair of ticket counter conveyors. Figure 1 shows the location of the Main Terminal and the existing CBIS location (highlighted in yellow). The new inline CBIS will be in a new building that is immediately south and adjacent the existing building (highlighted in red). A portion of the existing CBIS space will be re-purposed for the new oversized bag screening. This project will be designed to the TSA Planning Guidelines and Design Standards (PGDS), Version 8.

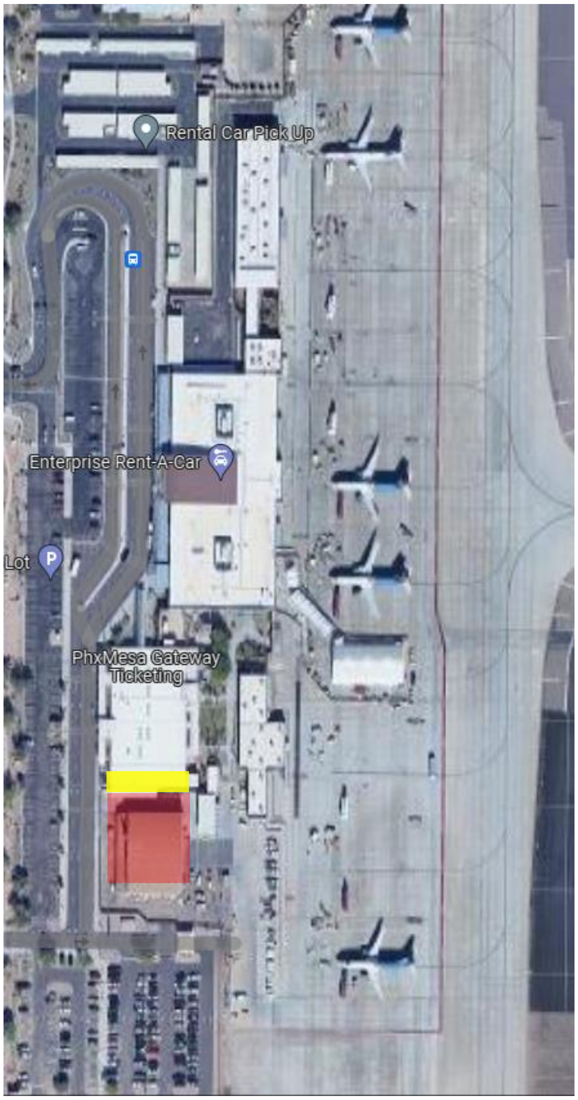

Figure 1: IWA Airport Overview

2. Existing Conditions

The existing screening system at IWA is a standalone system which includes two (2) CT-80DR EDS units. These units are located at a dedicated screening room adjacent to the ticketing lobby. Oversized and non-conveyable items are manually moved by airline staff from ticket counters to the existing screening area for security screening. The existing system routinely sees bags cascading back to the ticket counters during peak demand times due to the stand-alone configuration of the EDS machines and the inability to process bags at a sufficient rate. The existing CBIS layout is shown in Figure 2.

The existing EDS equipment will be removed from the existing terminals after the new CBIS has been approved for live operation in the second quarter of 2028. Table 1 lists the existing EDS machines to be removed.

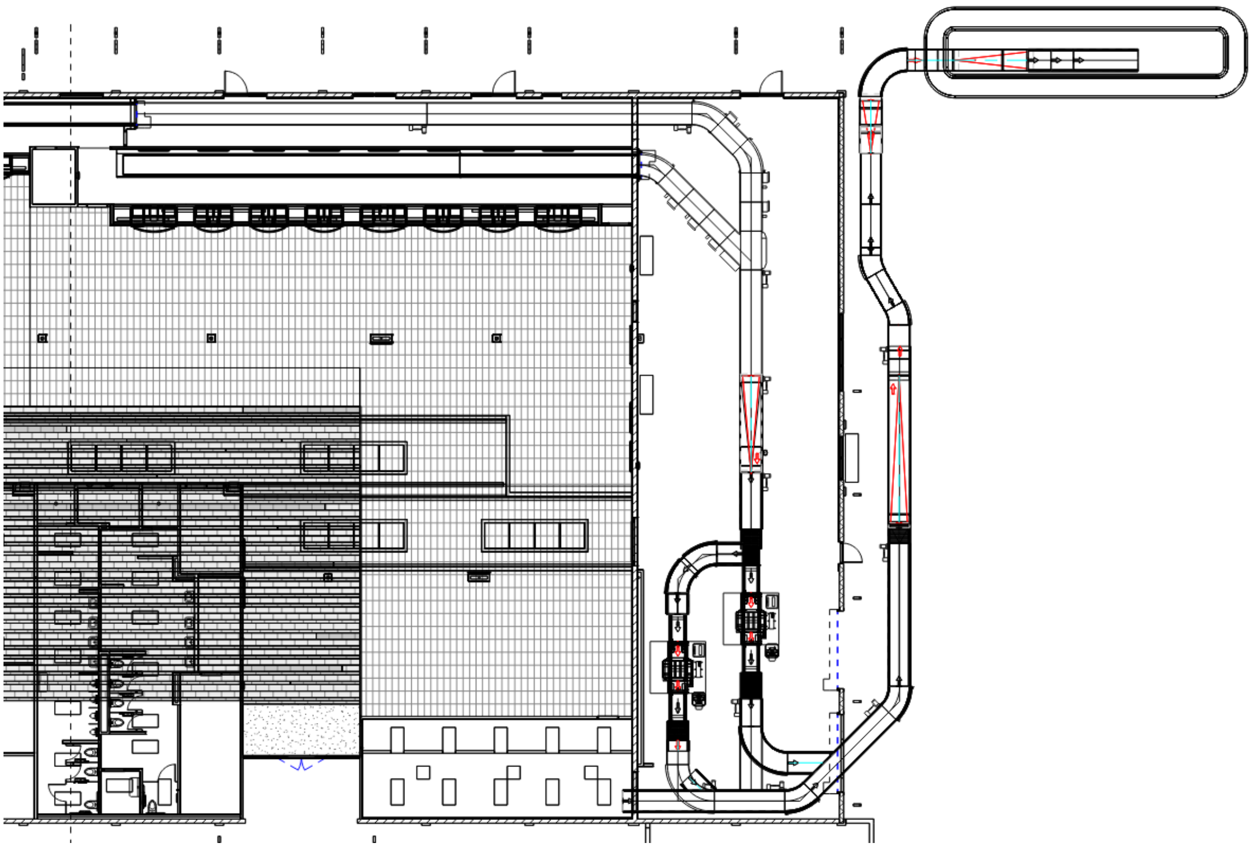

Figure 2: Existing CBIS

Location	Equipment Type	Serial Numbers
Ticket Counter Level	CT80DR	040116 040117

Table 1: Existing EDS Equipment and Serial Numbers

2.1. Airlines

Three (3) airlines operate out of IWA; see Table 2. These airlines continue to operate in the terminal during the construction. Note that Sun Country Airlines remains seasonal.

Airline	IATA Code
Allegiant Air	G4
Sun Country Airlines	SY

Table 2: List of Airlines

3. Planning Parameters

3.1. GFI Data Analysis

Government Furnished Information (GFI) / Field Data Reporting System (FDRS) report was requested on May 3, 2023; the report (Dated on May 15, 2023) was provided on May 18, 2023. This report provided a 95% baggage screening demand value of 55 bags per 10-minute. The date of the 95% baggage screening demand value was shown to be March 22, 2022, which closely matches the Average Day Peak Month (ADPM) flight schedule provided by PMGAA which has a date of March 21, 2022. The current system is a standalone system that routinely experiences dieback during peak periods where bags routinely cascade back to the ticket counters, and bags are stowed to the side and waiting for screening. This dieback and stowing of bags at the ticket counter is not reflected in the FDRS data and results in a lower peak demand than what is experienced at IWA. Consequently, an FSA was performed based on the ADPM flight schedule for March 21, 2022, which the ILDT believes more accurately reflects the demand seen at IWA. Therefore, the screening demand and equipment requirements identified in this report have been based on the ADPM flight schedule rather than the FDRS data.

3.2. ADPM Flight Schedule

PMGAA provided an IWA historical airline summary for deplaned and enplaned passengers for Fiscal Year (FY) 2022. The 'Totals – All Airlines' column shows March 2022 having the highest enplanements for the entire year; see Table 3. Once March 2022 was determined to be the peak month, flight schedules for each day of the month were provided, showing twenty-five (25) enplanements as the average for the month of March. From those daily flight schedules, for the average day, the March 21, 2022 schedule was utilized for a Flight Schedule Analysis; see Table 4.

IWA HISTORICAL AIRLINE SUMMARY - DEPLANED & ENPLANED PASSENGERS - FY 2022

FY 2022	ALLEGIANT AIR			ALLEGIANT AIR (CHARTER)			FLAIR			WESTJET/SWOOP		
	Deplaned	Enplaned	Total	Deplaned	Enplaned	Total	Deplaned	Enplaned	Total	Deplaned	Enplaned	Total
July	80,517	76,632	157,149			0	0	0	0			
August	53,412	52,790	106,202			0	0	0	0			
September	47,247	46,077	93,324			0	0	0	0	178	63	241
October	68,031	62,371	130,402			0	0	0	0	710	285	995
November	72,385	70,380	142,765			0	0	0	0	1,762	1,505	3,267
December	83,189	82,947	166,136			0	784	477	1,261	1,581	2,140	3,721
January	68,374	63,153	131,527			0	614	767	1,381	2,349	1,602	3,951
February	82,528	77,092	159,620			0	729	960	1,689	3,551	2,597	6,148
March	**110,982**	**110,619**	**221,601**			**0**	**2,297**	**1,793**	**4,090**	**4,150**	**3,996**	**8,146**
April	74,793	84,007	158,800			0	1,233	2,125	3,358	2,234	3,571	5,805
May	65,705	70,583	136,288			0	0	0	0	444	502	946
June	65,833	70,873	136,706			0	0	0	0	215	298	513
TOTALS =	**872,996**	**867,524**	**1,740,520**	**0**	**0**	**0**	**5,657**	**6,122**	**11,779**	**17,174**	**16,559**	**33,733**

FY 2022	TOTALS - ALL AIRLINES			SWIFT AIR			AVELO/SUN COUNTRY		
	Deplaned	Enplaned	Total	Deplaned	Enplaned	Total	Deplaned	Enplaned	Total
July	82,406	78,662	161,068	43	43	86	1,846	1,987	3,833
August	54,261	53,712	107,973	377	354	731	472	568	1,040
September	47,648	46,234	93,882	223	94	317			0
October	68,782	62,697	131,479	41	41	82			0
November	74,813	72,472	147,285	118	88	206	548	499	1,047
December	87,989	87,443	175,432	0	0	0	2,435	1,879	4,314
January	73,387	67,263	140,650	0	0	0	2,050	1,741	3,791
February	89,612	82,963	172,575	157	160	317	2,647	2,154	4,801
March	**120,144**	**119,016**	**239,160**	**48**	**51**	**99**	**2,667**	**2,557**	**5,224**
April	79,580	91,435	171,015	0	0	0	1,320	1,732	3,052
May	66,202	71,134	137,336	0	49	49	53	0	53
June	66,231	71,283	137,514	112	112	224	71	0	71
TOTALS =	**911,055**	**904,314**	**1,815,369**	**1,119**	**992**	**2,111**	**14,109**	**13,117**	**27,226**

Table 3: Peak Month – March 2022

Date	number of outbound enplanements	Peak enplanement	Average enplanement	Min Enplanement
3/1/2022	15	33	25	7
3/2/2022	22			
3/3/2022	29			
3/4/2022	29			
3/5/2022	33			
3/6/2022	31			
3/7/2022	26			
3/8/2022	12			
3/9/2022	27			
3/10/2022	29			
3/11/2022	28			
3/12/2022	33			
3/13/2022	31			
3/14/2022	26			
3/15/2022	13			
3/16/2022	26			
3/17/2022	26			
3/18/2022	27			
3/19/2022	33			
3/20/2022	29			
3/21/2022	25			
3/22/2022	10			
3/23/2022	26			
3/24/2022	27			
3/25/2022	25			
3/26/2022	31			
3/27/2022	27			
3/28/2022	21			
3/29/2022	7			
3/30/2022	22			
3/31/2022	25			

Table 4: Average Day Peak Month – March 21, 2022

3.3. Passenger Arrival Distribution

The standard PGDS v8 passenger arrivals times and distribution, as shown in Table 5 and Figure 3, were utilized in the FSA.

Minutes before departing flight	Peak Domestic 5am to 9am	Off peak domestic after 9am	International	FIS/Recheck
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%
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%

Table 5: Passenger Arrival Distribution – PGDS v8

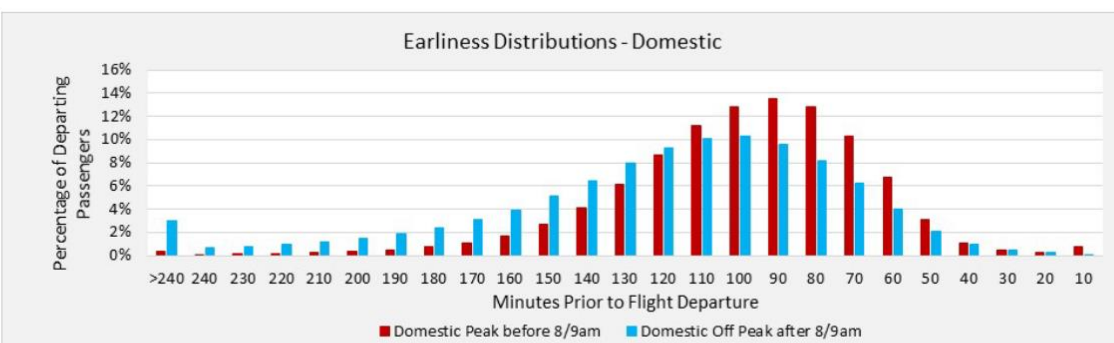

Figure 3: Passenger Arrival Curve – PGDS v8

3.4. Load Factor

Each airline's load factor, as shown in Table 6, was used in the analysis. PMGAA provided the reference data as shown in Table 7 and requested to utilize a seat count of 186 seats per aircraft with the load factor of 93.8% (2443 / 2604 x 100%).

Airline	Load Factor
Allegiant Air (G4)	93.8%
Sun Country Airlines (SY)	93.8%

Table 6: Load Factor

For Month/ Year: **March** **2022**

SCHEDULED SERVICE ONLY CHARTERS REPORTED SEPARATE

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AIR CARRIER SERVICE								
			ARRIVALS			DEPARTURES		Total Available Seats
AC Type	FAA MGLW (Lbs.)	*PAX (capacity)*	Completed Arrivals	Cumulative Landing Weights	Deplaned Passengers	Completed Departures	Enplaned Passengers	
A319	134,481	*156*	32	4,303,392	3,782	32	3234	4992
A319*	137,788	*156*	48	6,613,824	5,828	48	6064	7488
A320	142,198	*177*	14	1,990,772	1,727	13	1765	2301
A320*	145,505	*180*	601	87,448,505	97,204	604	97113	108720
A320*	145,505	*186*	14	2,037,070	2,441	14	2443	2604
				0				
				0				
		TOTALS =	709	102,393,563	110,982	711	110619	126105

Table 7: Enplanement and Deplanement Data

3.5. Bags Per Passenger

This report utilized the bags per passenger values of 0.7 bags for domestic passenger and 1.0 bags for international passenger per PGDS v8.

3.6. Oversize and Out-Of-Gauge (OOG)

The standard PGDS design values of 2% of OS and 2% OOG were utilized; the values were also verified with the PMGAA. Table 8 provides the maximum and minimum bag sizes for standard and oversize baggage.

	Length (in.)	Width (in.)	Height (in.)	Weight (lbs.)
Std. Maximum	54	24	30	120
Std. Minimum	12	12	4	5
OS Maximum	120	36	33	150
OS Minimum	55	25	31	121

Table 8: Bag Sizes

3.7. Lost-in-Tracking and EDS Error Bags

The lost-in-tracking rate and EDS error rate are 2% and 1% respectively per Table 5.4 of PGDS v8.

3.8. Reinsert Bags

The reinsert bag rate is 1.5% per TSA Comment (IWA-PD-010).

3.9. Transfer Baggage

There is no transfer baggage at the peak time.

3.10. Date of Beneficial Use (DBU)

The new inline CBIS at IWA is being built in a new building. It is anticipated that the new inline CBIS will be outfitted with new EDS machines, and that the existing Terminal's EDS machines will be decommissioned when the new ticket counter lines have been rerouted to new system. Second quarter of 2028 will be used as the date of beneficial use (DBU) per Master Schedule.

3.11. Growth factor

The growth rates are calculated from the PMGAA's master plan from Year 2022 to Year 2038 and Federal Aviation Administration's (FAA) Terminal Area Forecast (TAF) Enplanement schedule dated February 2023 from Year 2039 to Year 2043. The resulting annual growth is shown in Table 9. The Compound Annual Growth Rate (CAGR) was also calculated and is shown in Table 10.

The Annual Growth is calculated using the following formulas:

$$AnnualGrowth\,\% = \frac{Current\ Year\ Enplanements - Previous\ Year\ Enplanemtns}{Previous\ Year\ Enplanements} \times 100\%$$

The Cumulative Growth is calculated using the following formulas:

$$CumulativeGrowth\,\% = \frac{Current\ Year\ Enplanements - Base\ Year\ Enplanemtns}{Base\ Year\ Enplanements} \times 100\%$$

Year	Total Enplanements	Annual Growth
Base Year - 2022	905,000	1.00%
2023	925,000	2.21%
2024	942,000	1.84%
2025	962,000	2.12%
2026	983,000	2.18%
2027	1,002,000	1.93%
DBU - 2028	1,022,000	2.00%
2029	1,042,000	1.96%
2030	1,064,000	2.11%
2031	1,084,000	1.88%
2032	1,108,000	2.21%
DBU+5 - 2033	1,130,000	1.99%
2034	1,153,000	2.04%
2035	1,176,000	1.99%
2036	1,198,000	1.87%
2037	1,222,000	2.00%
2038	1,245,000	1.88%
2039	1,212,895	-2.58%
2040	1,238,264	2.09%
2041	1,263,792	2.06%
2042	1,289,859	2.06%
DBU+15 - 2043	1,316,826	2.09%

Table 9: Growth Rate

Forecasted Overall Average Growth Percentage

DBU+5	2033	1,130,000	**24.86%**
Base Year	2022	905,000	
Number of Years (n)=	11		
Compound Average Growth Rate			**2.04%**

Table 10: Compound Average Growth Rate

4. Flight Schedule Analysis

The ADPM flight schedule from PMGAA and the identified parameters in the previous section were utilized for FSA. There is no transfer bag; it is 100% domestic baggage during the peak hour.

4.1. FSA Results for ADPM Flight Schedule

The analysis resulted in a peak 10-minute baggage flow of 81.7 bags per 10-minute, which occurs at 5:00am. The peak 10-minute period consists of 100% domestic fights.

Figure 4: Bag Arrival Curve

5. CBIS Equipment Calculations

The following CBIS equipment requirements were calculated utilizing the formulas and calculations detailed in PGDS v8.

5.1. DBU+5 Bag Demand

The 10-minute peak provided in Section 4.1 was grown utilizing the enplanements in the TAF. The 10-minute peak at DBU+5 is shown in Table 11.

Year	Growth	Peak 10m
2022	1.00%	81.70
2023	2.21%	83.51
2024	1.84%	85.04
2025	2.12%	86.85
2026	2.18%	88.75
2027	1.93%	90.46
DBU - 2028	2.00%	92.27
2029	1.96%	94.07
2030	2.11%	96.06
2031	1.88%	97.86
2032	2.21%	100.03
DBU+5 - 2033	1.99%	102.02

Table 11: DBU+5 Bag Demand

5.2. Adjusted Peak 10-Minute Demand

Per PGDS v8, the OOG and OS bags, 2% each, are subtracted from the peak 10-minute value since those bags will not be seen by the EDS units. A reinsert value which accounts for unknown baggage reinserted upstream of the CBIS from CBRA is then added to the peak 10-minute value. The reinsert value of 1.5% has been provided by TSA during the DRN meeting dated September 28, 2023 and is used in the formula below. The adjusted peak 10-minute demand was 72.08 bags per 10-minutes.

$$Adjusted\ Peak10MinuteDemand = Peak10MinuteDemand\ x\ [100\% - (OOG\% + OS\%) + Reisert\%]$$

$$Adjusted\ Peak10MinuteDemand = 81.70\ x\ [100\% - (2\% + 2\%) + 1.5\%] = 79.66$$

5.3. Surge Factor

A surge factor (SF) is then applied to the adjusted peak 10-minute value which was calculated using the formula below.

$$= \frac{Adjusted\ Peak10MinuteDemand + 2\sqrt{Adjusted\ Peak10MinuteDemand}}{Adjusted\ Peak10MinuteDemand}$$

Therefore:

$$SF = \frac{79.66 + 2\sqrt{79.66}}{79.66} = 1.2241$$

The adjusted peak 10-minute demand is then multiplied by the surge factor, which results in a surged peak 10-minute bag demand of 97.51 bags per 10-minutes.

5.4. EDS Equipment Selection and Throughput

eXaminer 3DX 6700 ES EDS machine is the selected EDS equipment, and its belt speed is 39.5 Feet per Minute (FPM). The average bag length for domestic bags is 29.3 inches and the anticipated bag spacing is 12 inches. IWA is 100% domestic flight at peak time.

The EDS throughput is calculated using the following formula:

$$Throughput_{EDS} = \frac{EDS\ Belt\ Speed}{(29.3"\ x\ \%\ Dom.) + (30.2"\ x\ \%\ Int.) + Bag\ Spacing} \times 95\%$$

Therefore:

$$Throughput_{EDS} = \frac{39.5fpm\ x\ 60}{((29.3"/12")\ x\ 1) + ((30.2"/12")\ x\ 0) + 1'} \times\ 95\% =\ 654.2\ bph$$

5.5. EDS Equipment Requirements

The required number of EDS machines (N_{EDS}) is calculated using the following formula, then rounded to the next whole number:

$$N_{EDS} = \frac{Surged\ Adjusted\ Peak\ 10Minute\ Demand\ \times 6}{Throughput_{EDS}}$$

Therefore:

$$N_{EDS} = \frac{97.51\ \times 6}{654.2} = 0.89 \rightarrow 1$$

5.6. EDS Redundancy

There is one (1) screening group in the new inline CBIS; therefore one (1) redundant EDS machine is to be used per Section 5.6.3 of PGDS v8. Table 13 below lists the results of the calculations.

FSA - ADPM

	Year	Growth	Peak 10m	OOG %	OOG (per 10-min)	OS %	OS (per 10-min)	Reinsert value	Adjusted Peak 10m	Adj Peak (BPH)	Surge Factor	Peak 10m w/ Surge	Peak BPH w/ Surge	N_{EDS}	N_{EDS} (rounded)	N_{EDS} +1
	2022	1.00%	81.70	2.00%	1.63	2.00%	1.63	1.23	79.66	477.96	1.224	97.51	585.07	0.89	1	2
	2023	2.21%	83.51	2.00%	1.67	2.00%	1.67	1.25	81.42	488.53	1.222	99.47	596.81	0.91	1	2
	2024	1.84%	85.04	2.00%	1.70	2.00%	1.70	1.28	82.92	497.51	1.220	101.13	606.78	0.93	1	2
	2025	2.12%	86.85	2.00%	1.74	2.00%	1.74	1.30	84.68	508.07	1.217	103.08	618.49	0.95	1	2
	2026	2.18%	88.75	2.00%	1.77	2.00%	1.77	1.33	86.53	519.16	1.215	105.13	630.78	0.96	1	2
	2027	1.93%	90.46	2.00%	1.81	2.00%	1.81	1.36	88.20	529.19	1.213	106.98	641.89	0.98	1	2
DBU	2028	2.00%	92.27	2.00%	1.85	2.00%	1.85	1.38	89.96	539.76	1.211	108.93	653.57	1.00	1	2
	2029	1.96%	94.07	2.00%	1.88	2.00%	1.88	1.41	91.72	550.32	1.209	110.87	665.24	1.02	2	3
	2030	2.11%	96.06	2.00%	1.92	2.00%	1.92	1.44	93.66	561.94	1.207	113.01	678.07	1.04	2	3
	2031	1.88%	97.86	2.00%	1.96	2.00%	1.96	1.47	95.42	572.50	1.205	114.95	689.72	1.05	2	3
	2032	2.21%	100.03	2.00%	2.00	2.00%	2.00	1.50	97.53	585.18	1.203	117.28	703.69	1.08	2	3
DBU+5	**2033**	1.99%	**102.02**	**2.00%**	**2.04**	**2.00%**	**2.04**	**1.53**	**99.47**	**596.80**	**1.201**	**119.41**	**716.47**	**1.10**	**2**	**3**
	2034	2.04%	104.09	2.00%	2.08	2.00%	2.08	1.56	101.49	608.94	1.199	121.64	729.83	1.12	2	3
	2035	1.99%	106.17	2.00%	2.12	2.00%	2.12	1.59	103.52	621.09	1.197	123.86	743.18	1.14	2	3
	2036	1.87%	108.16	2.00%	2.16	2.00%	2.16	1.62	105.45	632.71	1.195	125.99	755.94	1.16	2	3
	2037	2.00%	110.32	2.00%	2.21	2.00%	2.21	1.65	107.56	645.38	1.193	128.31	769.84	1.18	2	3
	2038	1.88%	112.40	2.00%	2.25	2.00%	2.25	1.69	109.59	657.53	1.191	130.53	783.15	1.20	2	3
	2039	-2.58%	109.50	2.00%	2.19	2.00%	2.19	1.64	106.76	640.58	1.194	127.43	764.57	1.17	2	3
	2040	2.09%	111.79	2.00%	2.24	2.00%	2.24	1.68	109.00	653.97	1.192	129.88	779.26	1.19	2	3
	2041	2.06%	114.10	2.00%	2.28	2.00%	2.28	1.71	111.24	667.46	1.190	132.34	794.02	1.21	2	3
	2042	2.06%	116.45	2.00%	2.33	2.00%	2.33	1.75	113.54	681.22	1.188	134.85	809.09	1.24	2	3
DBU+15	**2043**	2.09%	**118.88**	**2.00%**	**2.38**	**2.00%**	**2.38**	**1.78**	**115.91**	**695.47**	**1.186**	**137.44**	**824.66**	**1.26**	**2**	**3**

Table 12: Calculation Result Summary

5.7. OSR Station Requirements

The number of OSR stations required (N_{OSR}) shall be equal to the number of EDS machines including any redundant machines per Section 5.6.4 of PGDS v8.0. Therefore, the number of OSR stations will be two (2) at DBU+5. The new OSR room will be able to accommodate three (3) OSR stations in order to meet EDS demand at DBU+15.

The required number of OSR stations (N_{OSR}) is calculated using the following formula:

$$N_{OSR} = Neds\ (total) = 2$$

5.8. Standard BIS Requirements

Per PGDS V8.0, the number of required standard BIS stations (alarmed + OOG + reinsert) is based on the number of non-redundant EDS machines (4 BISs per EDS for domestic operations). Use the following formula to determine the total BIS requirements:

$$N_{BIS} = 4\ x\ N_{EDS}\ x\ \%\ Domestic.$$

Therefore:

$$N_{BIS} = (4\ x\ 1\ x\ 1) = 4$$

5.9. Oversize BIS Requirements

The directed search rate for OS BIS is 19.5 Bags per Hour. The required number of oversize BIS (N_{OS}) is calculated using the following formula, then rounded to the next whole number:

$$N_{OS} = \frac{N_{EDS} \times Throughput_{EDS} \times \%\ OS}{(Rate_{OS\ Domestic.}\ x\ \%\ Int.)}$$

Therefore:

$$N_{OS} = \frac{1 \times 654.2 \times .02}{(19.5\ \ x\ 1.0)} = 0.67\ \ \rightarrow 1$$

5.10. ETD Machine Requirements

The number of required ETD machines is calculated by dividing the total number of BIS by 2. The number of ETD machines required (N_{ETD}) is calculated using the following formula:

$$N_{ETD} = \frac{N_{BIS}}{2}$$

Therefore:

$$N_{ETD} = \frac{4}{2} = 2$$

5.11. CBIS Equipment Requirements Summary

In accordance with PGDS requirements to accommodate future growth, calculations were performed on CBIS equipment requirements to DBU+15 of 2043. Table 13 below identifies all CBIS equipment requirements from the base year through DBU+15.

**Please note, as stated in section 6, the EDS, BIS, and OSR requirements will be based off of a 1+1 EDS matrix for installed equipment, with room reserved for a future EDS, BIS, and OSR.

Year	N_{EDS}	N_{EDS+1}	N_{OSR}	N_{BIS}	$N_{OS\text{-}BIS}$	N_{BIS} Total	N_{ETD}
2022	1	2	2	4	1	5	3
2023	1	2	2	4	1	5	3
2024	1	2	2	4	1	5	3
2025	1	2	2	4	1	5	3
2026	1	2	2	4	1	5	3
2027	1	2	2	4	1	5	3
DBU - 2028	1	2	2	4	1	5	3
2029	2	3	3	8	2	10	5
2030	2	3	3	8	2	10	5
2031	2	3	3	8	2	10	5
2032	2	3	3	8	2	10	5
DBU+5 - 2033	2	3	3	8	2	10	5
2034	2	3	3	8	2	10	5
2035	2	3	3	8	2	10	5
2036	2	3	3	8	2	10	5
2037	2	3	3	8	2	10	5
2038	2	3	3	8	2	10	5
2039	2	3	3	8	2	10	5
2040	2	3	3	8	2	10	5
2041	2	3	3	8	2	10	5
2042	2	3	3	8	2	10	5
DBU+15 - 2043	2	3	3	8	2	10	5

Table 13: CBIS Equipment Summary

5.12. Bag Storage Requirements

The PGDS requires that the CBIS be designed to allow 10 minutes of bag processing in CBRA per TSO. The total bags to accommodate ($Total\ bags_{to\ accomodate}$) and the bag storage requirement ($Bags_{storage\ capacity}$) are calculated using the following formulas:

$$Average\ processing\ time\ for\ domestic\ bags = \frac{60.0}{20.9} = 2.87\ minutes.$$

$$Total\ bags_{to\ accomodate} = \frac{10min}{Average_{screening\ time}(min)}\ x\ Quantity\ of\ BIS_{Alarmed/OOG}$$

$$Bags_{storage\ capacity} = Total\ bags_{to\ accomodate} - Quantity\ of\ BIS_{Alarmed/OOG}$$

Therefore:

$$Total\ bags_{to\ accomodate} = \frac{10min}{2.87\ min}\ x\ 8 = 27.87 \sim 28\ bags$$

$$Bags_{storage\ capacity} = 28 - 12 = 16\ bags$$

Utilizing the intermediate conveyors and the Bag Removal Position (BRP) conveyors, the current CBRA design includes space to store twelve (12) bags. Additional sixteen (16) bags can be stored between the level 2 decision points and the entrance to CBRA with the longer conveyors with accumulation function; the total storage capacity is nine (9) bags in the longer conveyors. The longer conveyors within the OOG line have accumulation function to store bags. See drawing package for a detailed view of the CBRA layout.

5.13. Space Planning

Per PGDS V8.0, additional space planning considerations are based on the equipment requirements for the total non-redundant EDS count at DBU+15; the layout satisfies this requirement.

6. New Data for March 2023

PMGAA provided an additional IWA historical Allegiant passenger summary for 2023 Fiscal Year on June 4, 2024. For the year over year growth, the passenger change between Year 2022 and Year 2023 increased five (5) percent, however March 2023 (Peak Month) showed the drop of eight (8) percent; see *Table 14*. With the 8% drop, the system will be 1+1 system at DBU and DBU+5. The system will have four (4) BIS locations installed with room for four (4) future BIS locations in the CBRA. The system will have one (1) OS BIS installed with room for one (1) future OS BIS in the oversize CBRA. The system will be sized with a future EDS in mind. The system will also provide CBRA 10 minutes of bag storage based upon a 2+1 system, however the system will be a 1+1 EDS matrix, with room reserved for the third EDS machine.

PASSENGERS	MARCH			FISCAL YEAR TO DATE		
	FY22	FY23	% Change	FY22 YTD	FY23 YTD	% Change
Allegiant	221,601	203,774	-8%	1,308,726	1,371,517	5%

Table 14: Passenger Summary – March 2022 & March 2023

7. CBIS Design Requirements

PGDS Compliance – The CBIS shall conform to all design requirements identified in Chapter 12 of PGDS V8.0, including best practices.

- Security Requirements
- Customer Service Level Requirements
- Cost Requirements
- Operational Requirements
- System Sizing
- Safety Requirements
- Phasing Requirements
- Planning Assumptions

8. Project Schedule

Provide a summary of the TSA milestone dates in Table 15. All dates may not be known early on but provide as much as possible. Provide the full project schedule in the appendices or as a separate document.

Task	Start Date	End Date
Design OTA Start	12/09/25	05/25/26
RFP Release	10/27/25	10/27/25
Bid Selection Process Complete	07/13/26	07/13/26
Design Consultant Notice to Proceed	04/20/23	N/A
Pre-Design Delivery to TSA for Review	11/13/23	11/13/23
Pre-Design TSA Review	11/14/23	12/21/23
Schematic Design Delivery to TSA for Review	06/13/24	06/13/24
Schematic Design TSA Review	06/14/24	07/23/24
30% Design Submittal Delivery to TSA for Review	10/25/24	10/25/24
30% Design Submittal TSA Review	10/28/24	12/04/24
70% Design Submittal Delivery to TSA for Review	03/10/25	03/10/25
70% Design Submittal TSA Review	03/11/25	05/01/25
100% Design Submittal Delivery to TSA for Review	08/12/25	08/12/25
100% Design Submittal TSA Review	08/13/25	09/19/25
Permanent Power for EDS	09/08/27	09/08/27
EDS Delivery	11/05/27	11/05/27
EDS Installation	11/08/27	11/19/27
EDS SAT	11/22/27	11/26/27
Owner Testing	03/10/28	04/28/28
TRR	05/08/28	05/12/28
ISAT	05/22/28	05/26/28
Live Operation	06/14/28	06/14/28
Run-In Period	06/15/28	06/28/28
Existing EDS Decommission	06/19/28	06/21/28

Table 15: TSA Milestone Dates

9. Alternatives Analysis

Three (3) CBIS alternatives were designed and presented to the PMGAA. The presentation included an extensive list of pros and cons, including costs, BHS rights-of-way, architectural considerations, and airport functionalities. The size of the system and architectural constraints became the driving factors for additional spatial requirements. The Alternatives Analysis Report (AAR) described each option; see Appendix C for reference.

10. CBIS Overview / Description of Operations (Schematic Requirement)

The primary objective of the new inline CBIS design is to replace the existing CBIS/BHS with an efficient, flexible, centralized CBIS/BHS to meet the needs of both the current and future baggage demand. To meet these goals, the design team has developed a centrally located screening room that is in the new building, including CBIS, CBRA, and all TSA support spaces. The material flow diagram will be provided in the future submittal.

The new CBIS will be fed by two (2) ticket counter conveyor lines; the existing ticket counter conveyor lines will be controlled and integrated into the new system. The lines will merge into a mainline which feeds the new CBIS. The new CBIS consists of one (1) nonredundant EDS machine with one (1) redundant EDS machine. OSR will consist of two (2) workstations in the new OSR room and the new CBRA will consist of four (4) inspection stations with room for four (4) future BIS positions.

A portion of the existing screening area will be modified to become the new oversize bag screening area for the oversized and non-conveyable items. Non-conveyable items are manually moved by airline staff to the new oversize CBRA from ticket counters. A new clear oversized conveyor line will be provided in the oversize CBRA which consists of one (1) inspection stations.

After CBIS, there is a clear mainline that will feed an existing makeup carousel.

10.1. Inputs

The primary inputs will include two (2) existing ticket counter lines (CS1, CS2) that merge into a new mainline as shown in Figure 5. The existing controls will be demolished. The existing ticket counter conveyor lines will be recontroled and integrated into the new system.

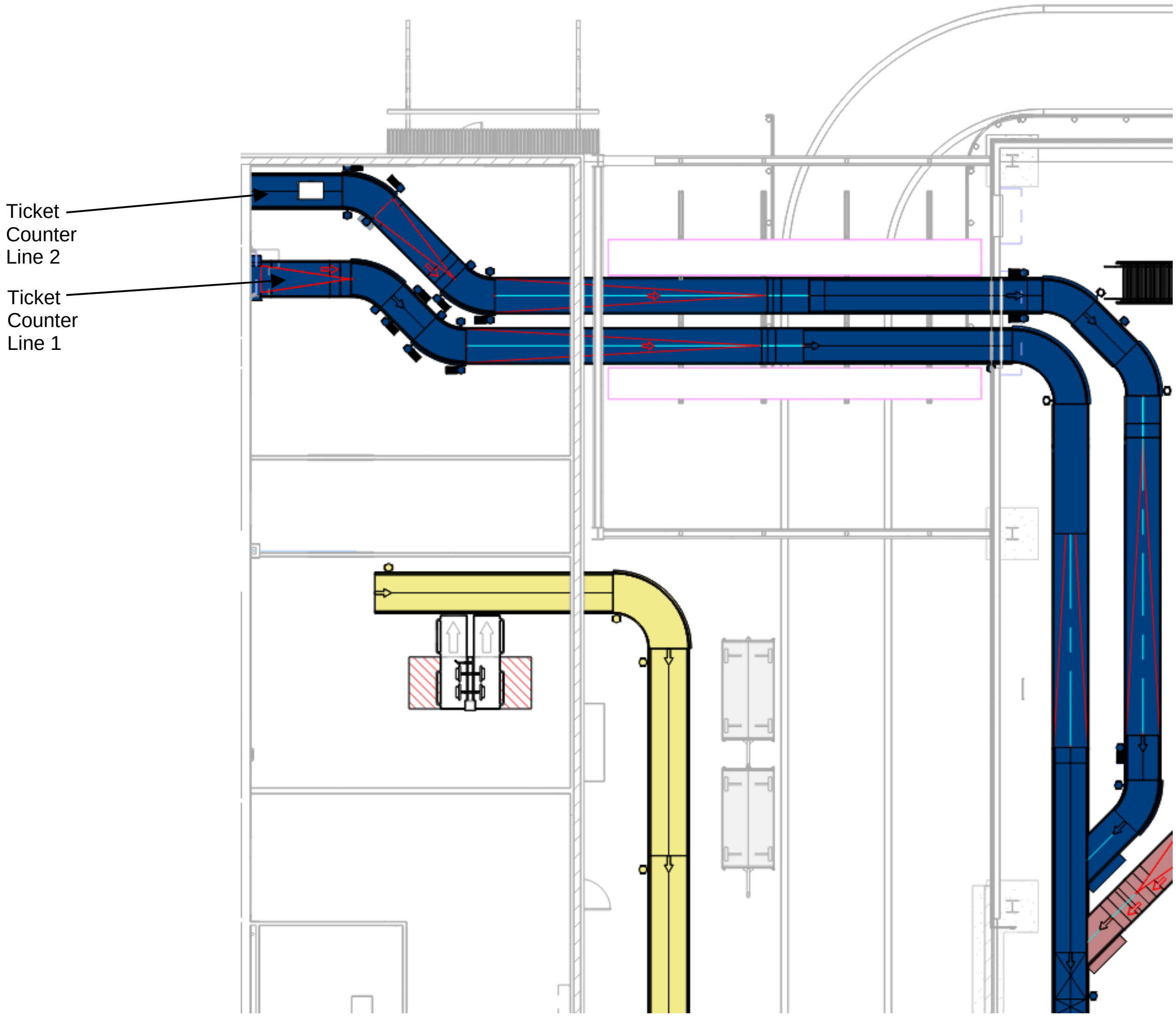

Figure 5: Input Subsystems

10.2. Out-Of-Gauge (OOG)

The mainline includes a Bag Measuring Array (BMA); the BMA shall be used to identify all OOG baggage and BHS shall track and divert all OOG bags from the mainline to the OOG line, see Figure 6. The OOG line merges into AL1 for transport directly to CBRA. Any bag lost in tracking after the BMA or any bag with missing dimension information will be sent to one of available EDS spur lines. A light curtain upstream of the EDS machine will verify bag spacing. If the bag is determined to be over-height or over-length, the bag will be stopped prior to entering the EDS machine and a notification will be sent to the Human Machine Interface (HMI) that an OOG bag is waiting to be removed. The bag will then be removed by airport maintenance personnel and transported to CBRA for screening, alternatively the airport maintenance personnel could simply pick up the OOG bag and carry it to a location immediately downstream of the EDS units to one of OSR lines, since OOG bags are able to be conveyed.

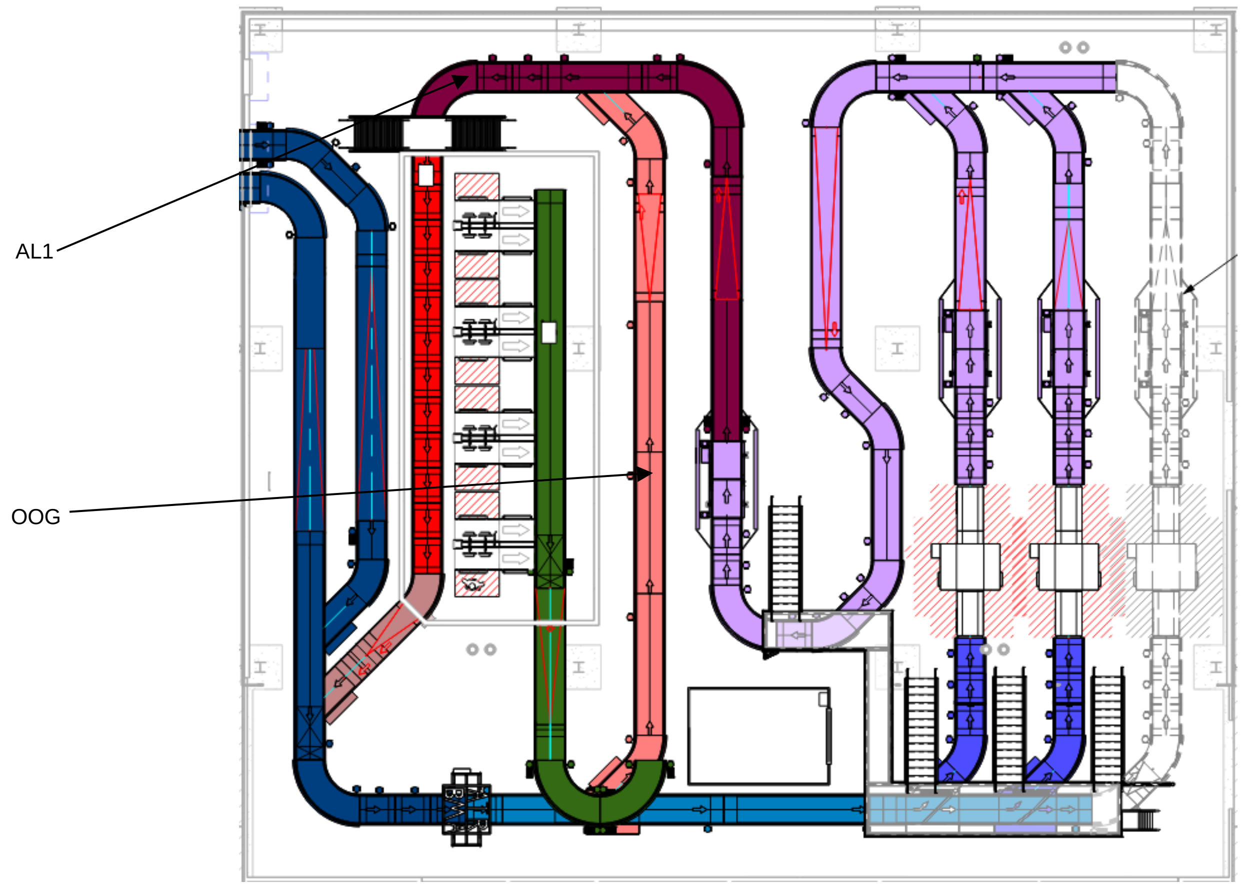

Figure 6: OOG Subsystem

10.3. Oversize (OS)

A portion of the existing screening area will be modified to house the new oversize CBRA. A new OS clear line, OS, will be provided in the oversize CBRA which consists of one (1) inspection station, see Figure 7. An OS bag present light will be provided at the makeup carousel for OS notification.

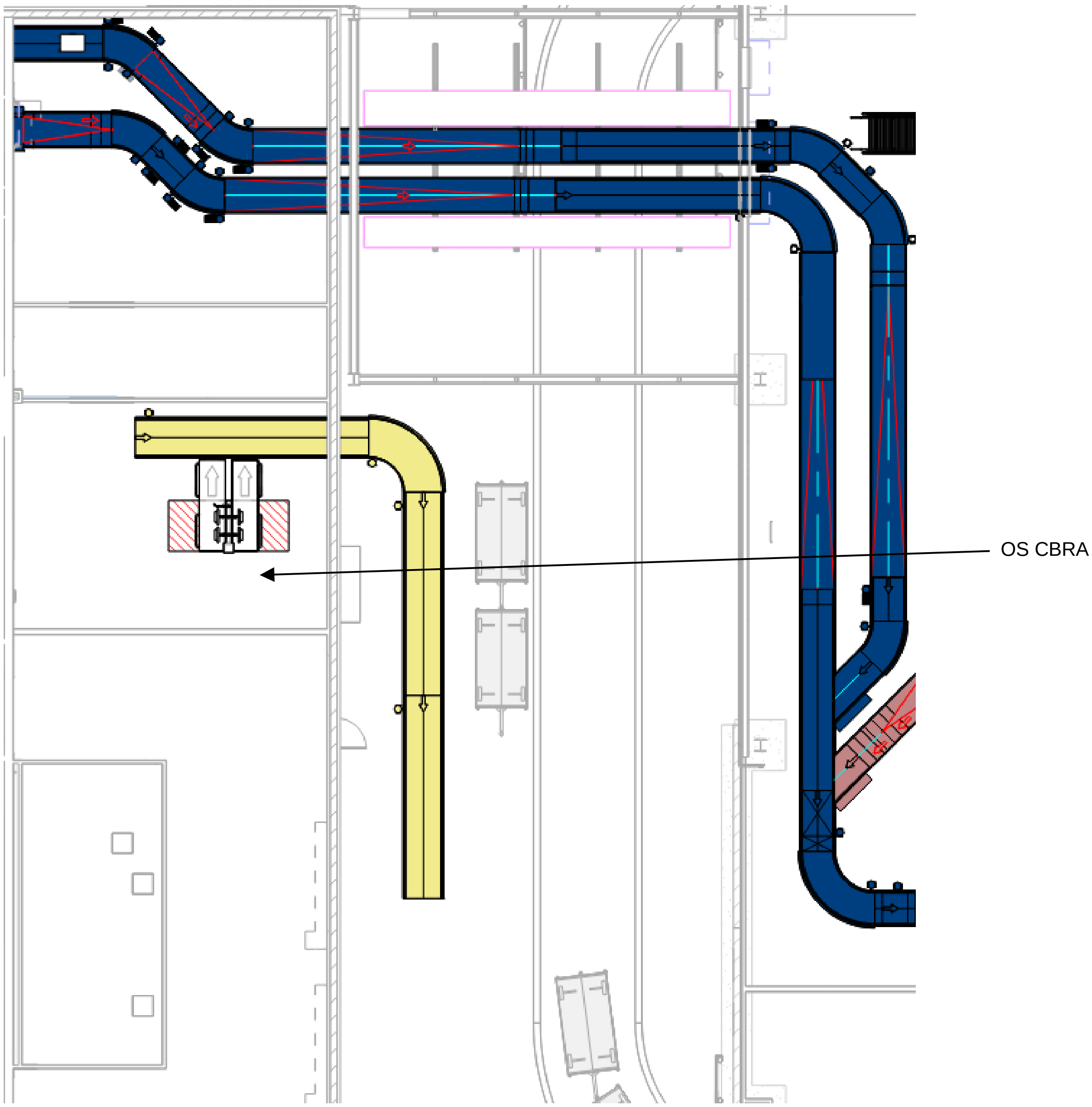

Figure 7: OS Subsystem

10.4. Non-Conveyable Baggage

The non-conveyable bag is moved manually from the ticket counters to the new oversize CBRA, see Figure 7.

10.5. Level 1 (EDS) Screening

There is a baggage screening area in the new building, see Figure 8; the baggage screening area consists of an input mainline and two (2) EDS spur lines. The mainline will include an Automatic Tag Reader (ATR)-Baggage Measurement array (BMA). The ATR will read the 10-digit IATA bag tag ID and deliver the IATA tag information to the BHS. The BMA will measure the size of each bag to determine whether it is in-guage or out of guage. The BHS will assign a pseudo ID to each bag to track each bag entering a Security Tracking Zone (STZ) within CBIS for the purposes of positive bag tracking. After the ATR, all baggage will continue down the mainline and be diverted to one of the EDS spur lines. By default, bags will be evenly distributed between all operational lanes. Bags will be distributed in a one-for-one round robin manner to evenly utilize each operational EDS machine.

Per PGDS v8.0 Section 12.3.1, the system will include programming that limits the throughput so that it does not exceed the total combined throughput of the non-redundant EDS machines (654 BPH).

The Uninterruptible Power Supply (UPS) for EDSs will be provided. The UPS that is specified to be utilized with eXaminer 3DX 6700 ES is Riello, Model No. Master HP-UL 80-00 80 KVA, which is rated to power four (4) EDS machines. Since we have three (2) machines in this system, one (1) UPS unit will be included in the design.

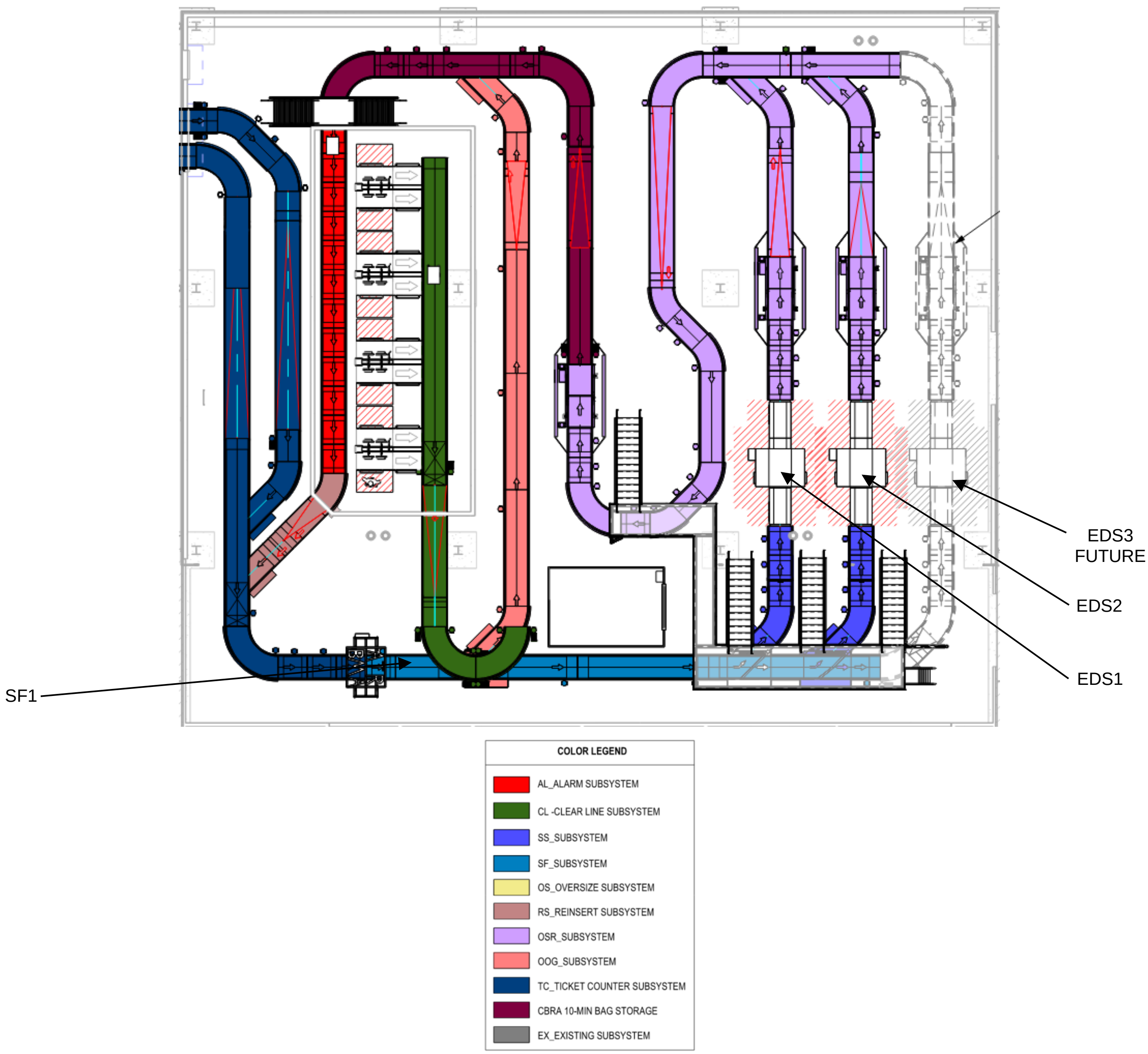

Figure 8: EDS Shunt Subsystems

10.6. Level 2 (OSR) Screening

Bags screened by the EDS machines will be sorted via Vertical Sortation Units (VSUs). Non-clear bags will be sorted down to the individual OSR lines while clear bags will be sorted up to the individual EDS clear lines. Two (2) of these clear lines merge into one (1) clear mainline. All two (2) individual OSR lines will merge to a single OSR mainline, see Figure 9. Non-clear bags will continue down the OSR mainline providing a minimum of 45 seconds of viewing time (52 seconds through SS1 and 54 seconds through SS2) for on-screen resolution (level 2 screening). At the level 2 decision point, a VSU will sort OSR cleared bags to the clear mainline and non-clear bags to the alarm line for transport directly to

CBRA. After the second chance diverts, the out-of-gauge line will merge onto the alarmed line and the alarmed line will continue into the CBRA.

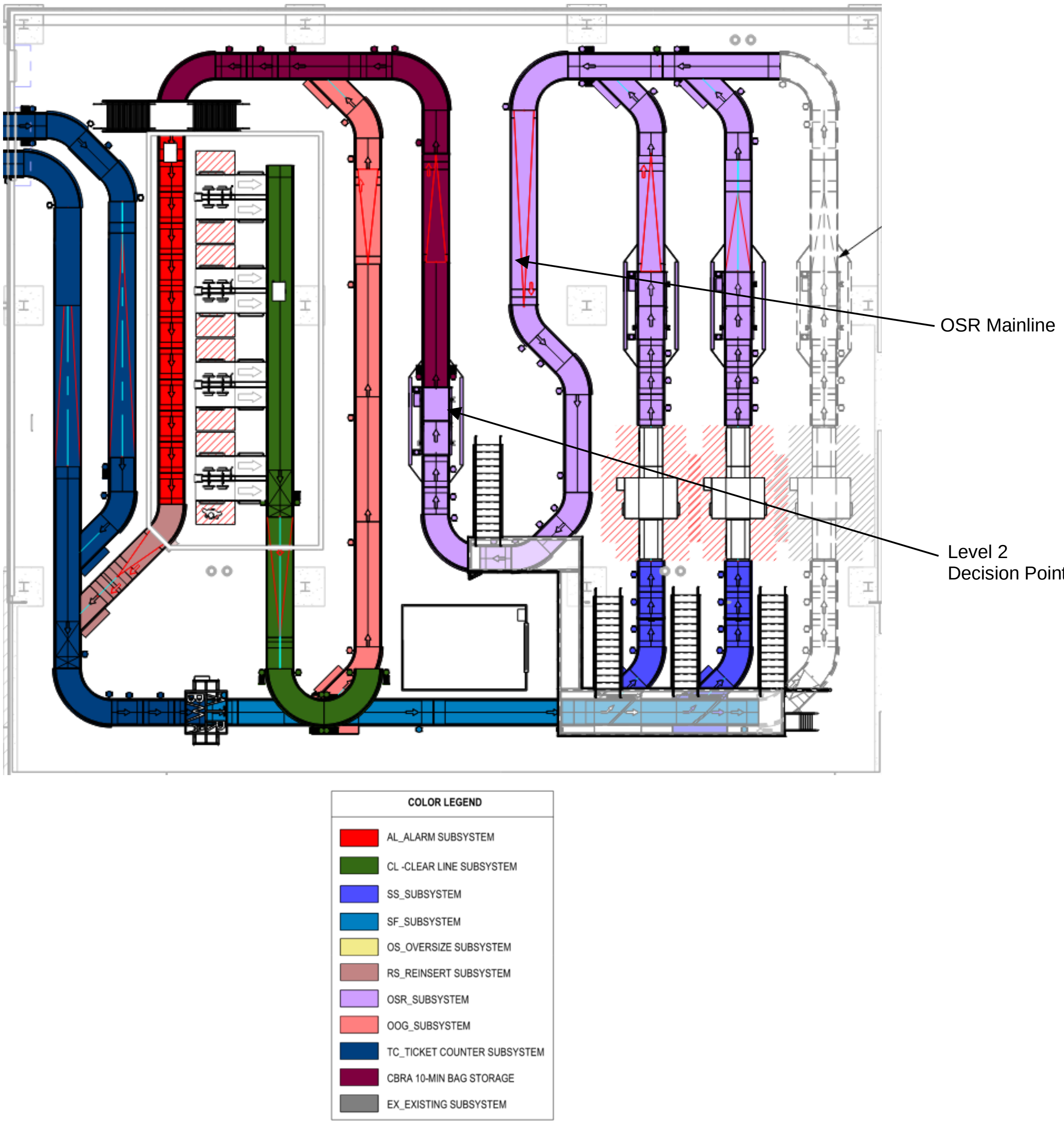

Figure 9: OSR Subsystem

10.7. Failsafe Operations

Any bag failing to track from the decision photo eye upstream of the VSU (Level 1 Divert) or VSU (Level 2 Divert) to the fail-safe photo eye on the OSR line or alarm line downstream of the diverter will activate a fail-safe condition, see Figure 10. All conveyors within the fail-safe zone will be stopped during a fail-safe event. The failsafe bag will be removed by the airport maintenance personnel and transported to CBRA for screening. Bag length shall also be re-measured at the decision photo eye immediately upstream of each VSU. This measurement shall be compared to the bag's baseline length. Any bag that has increased in length by twelve (12) inches or more at the decision photo eye upstream of each VSU shall be conveyed to the CBRA with a status of "Length Change". Fail-safe zones are calculated by determining the length from the divert photo-eye to the fail-safe photo-eye and then adding 5'. Thus our fail-safe zone would be a calculated length of 15' (longer due to conveyor size which will be shown in the drawing package.

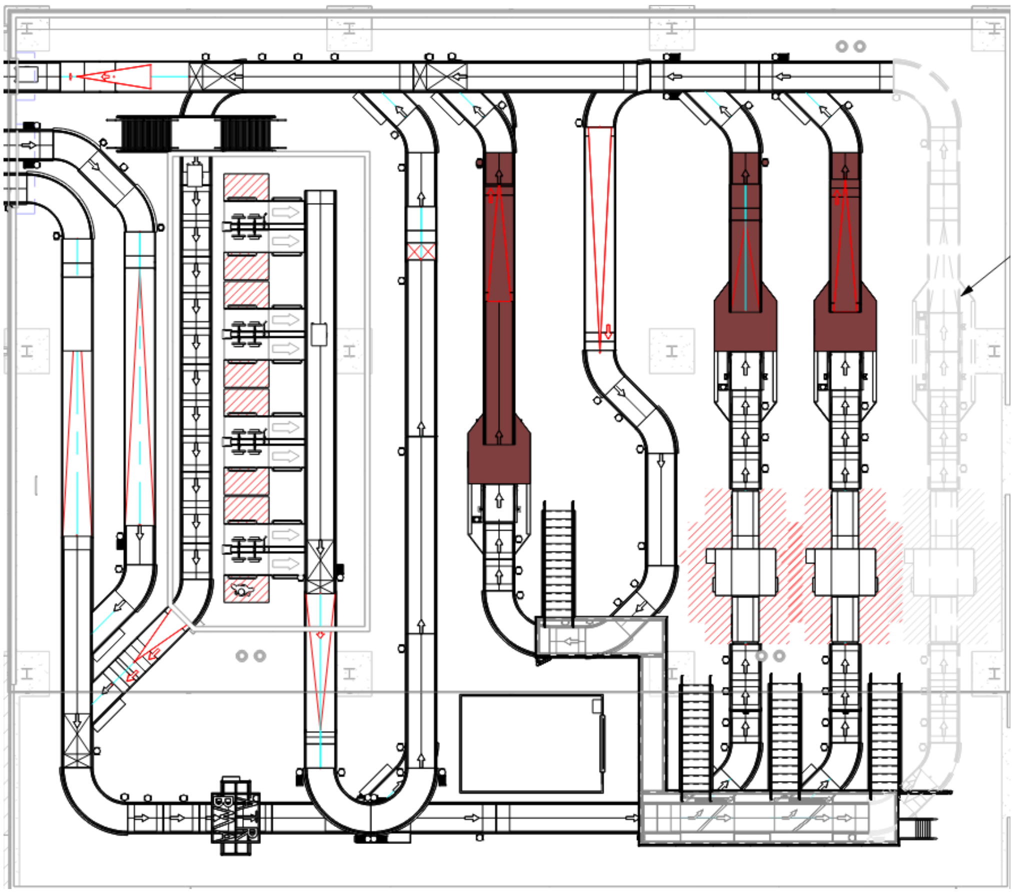

Figure 10: Failsafe Locations

10.8. Level 3 (CBRA) Screening

Non-clear bags will continue down the alarm line and enter the Checked Baggage Resolution Area (CBRA), as shown in Figure 11. The CBRA is sized to accommodate four (4) sliding-top Baggage Inspection Stations (BISs) for installation. 4 BIS positions would be reserved for space planning. All BIS positions and associated equipment will be designed to conform to the specifications outlined in section 14.3 of the PGDS. A reinsertion line is provided at the end of the alarm line for unknown bags; the reinsertion line is the automated reinsertion of unknown bags along with pseudo-OOG bags. The reinsert bags are inducted back onto the ticket counter line. There is a CBRA clear line; the clear line is located next to BISs for easy access from the BISs and transports clear bags out of the CBRA.

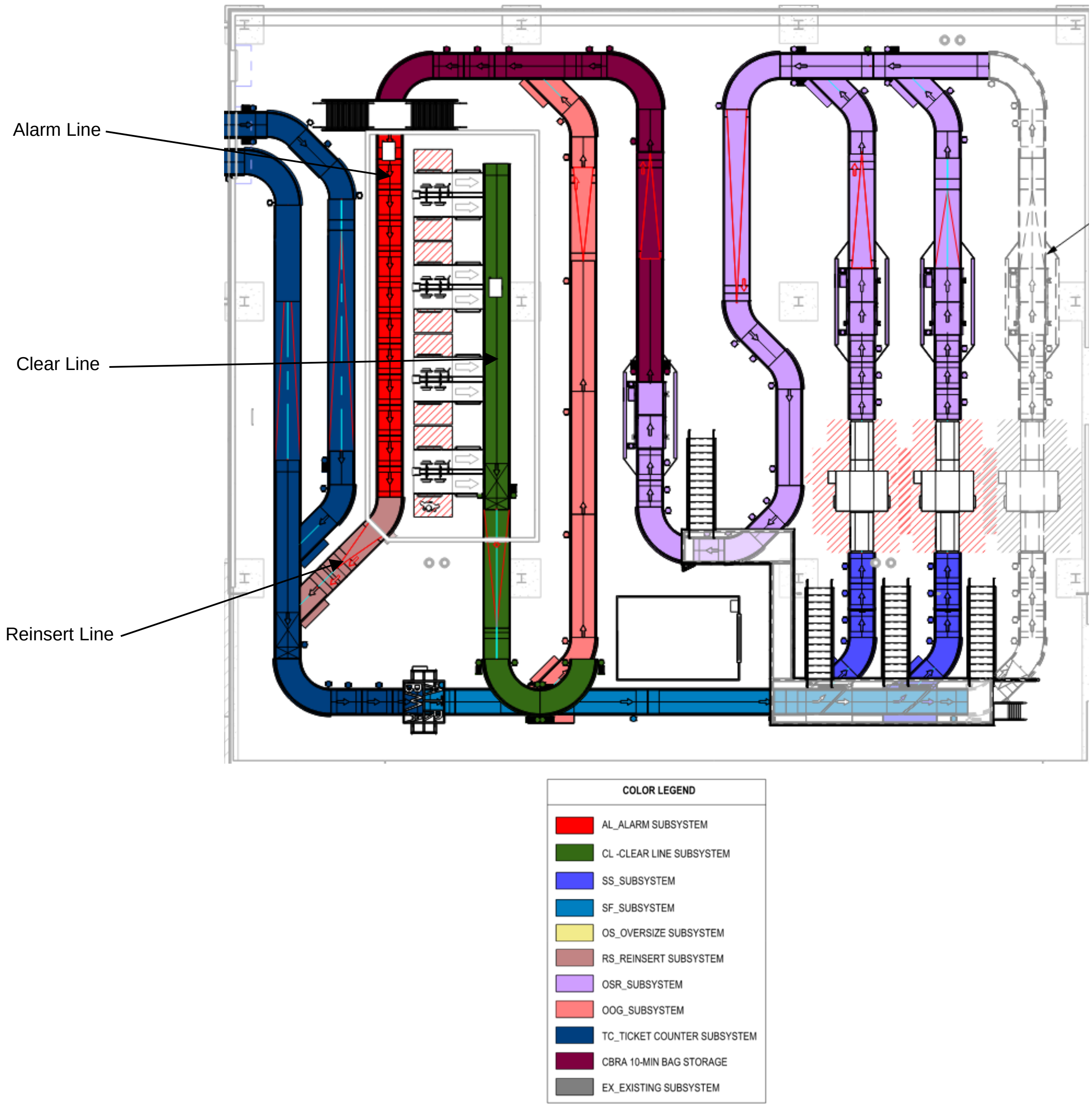

Figure 11: CBRA Subsystems

10.9. Cleared Bags and Sortation

The individual clear lines merge into one (1) clear mainline; the cleared bags from the Level 2 (OSR) and CBRA will merge into the clear mainline, see Figure 12. All cleared bags are transported to the existing makeup carousel.

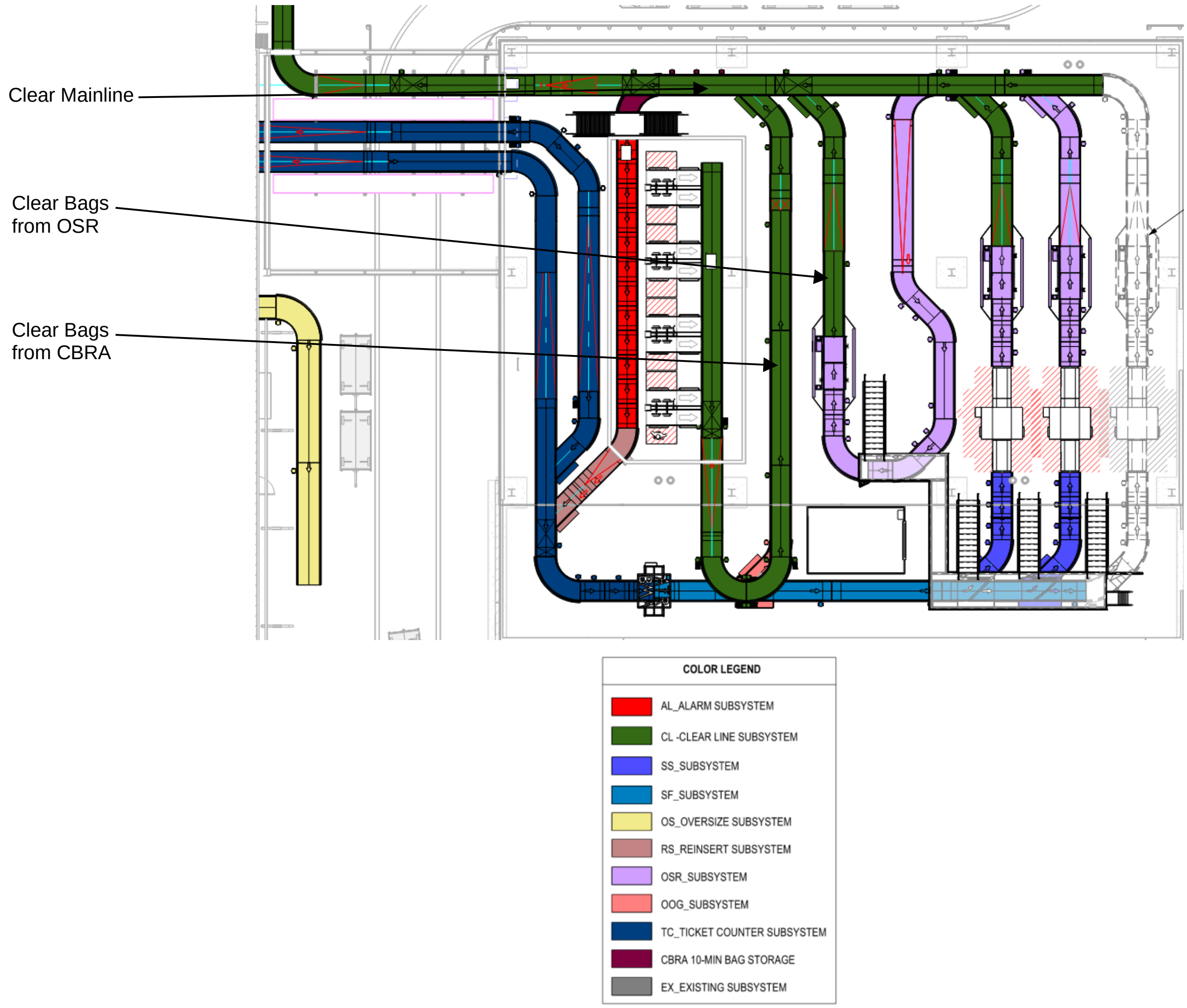

Figure 12: Clear Bag Subsystem

10.10. OSR Room

The new CBIS will utilize a new OSR room which is in the new building. BHS support spaces are in the same area. The spaces include a TSA IT/Server room, restroom, TSA break room, TSA manager room, and BHS control room. The TSA specific spaces are shown in Figure 13. The new On-Screen Resolution Area (OSRA) will accommodate two (2) new OSR workstations, room for a 3rd OSR position, and an OSR manager's desk. A new System Status Display (SSD) is equipped in the new OSR room for CBIS monitoring.

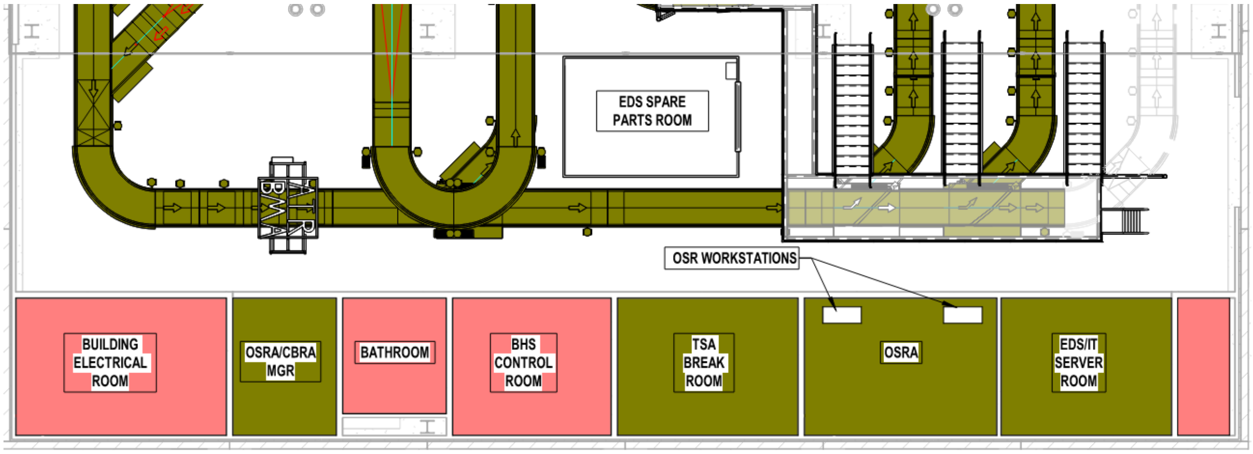

Figure 13: TSA Spaces

10.11. TSA and BHS Support Spaces

BHS support spaces are in the new building; the new BHS control room and BHS server room are located next to the new TSA break room. The new CBIS will have a new EDS spare parts space near the EDS units; see Figure 13.

Also, there is a pathway from CBRA to each EDS unit; see Figure 14.

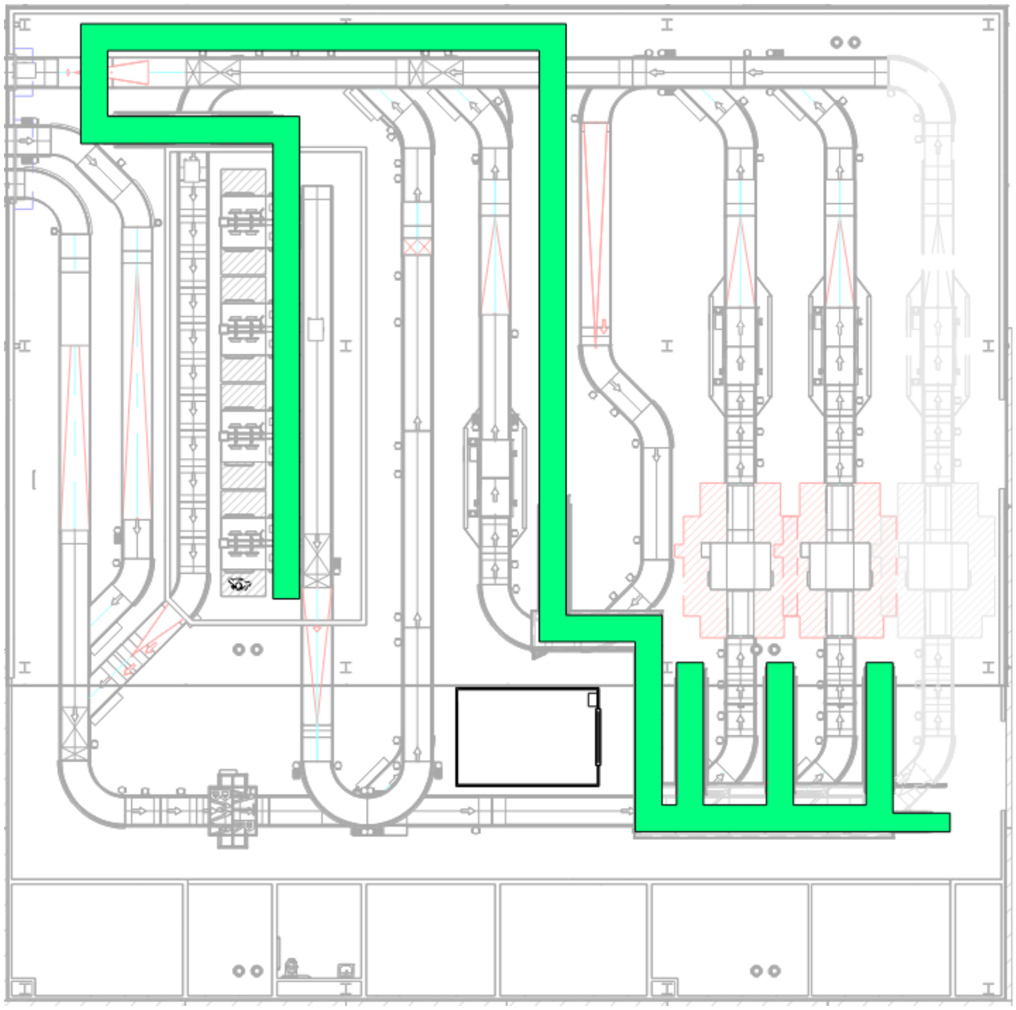

Figure 14: Pathway Between CBRA and EDSs

10.12. EDS Maintenance and Removal

The screening room is in the new building, therefore access in and out of the screening room for the EDS components will be utilized an EDS removal path. The queue conveyors upstream and downstream of the EDS machines are fitted with quick-disconnects and lockable casters to aid in EDS removal. Additionally, a hoist rail system (half-ton load capacity) will be installed to aid in transferring EDS parts across the EDS spur lines. The proposed EDS removal path is detailed in this drawing package.

10.13. Threat Bag Removal

In the event an alarmed bag requires removal from either the primary or oversize CBRAs, provisions have been made to allow for the transport of the suspect bag using a Threat Disposal Robot (TDR), see Figure 15, and it is detailed in the submittal.

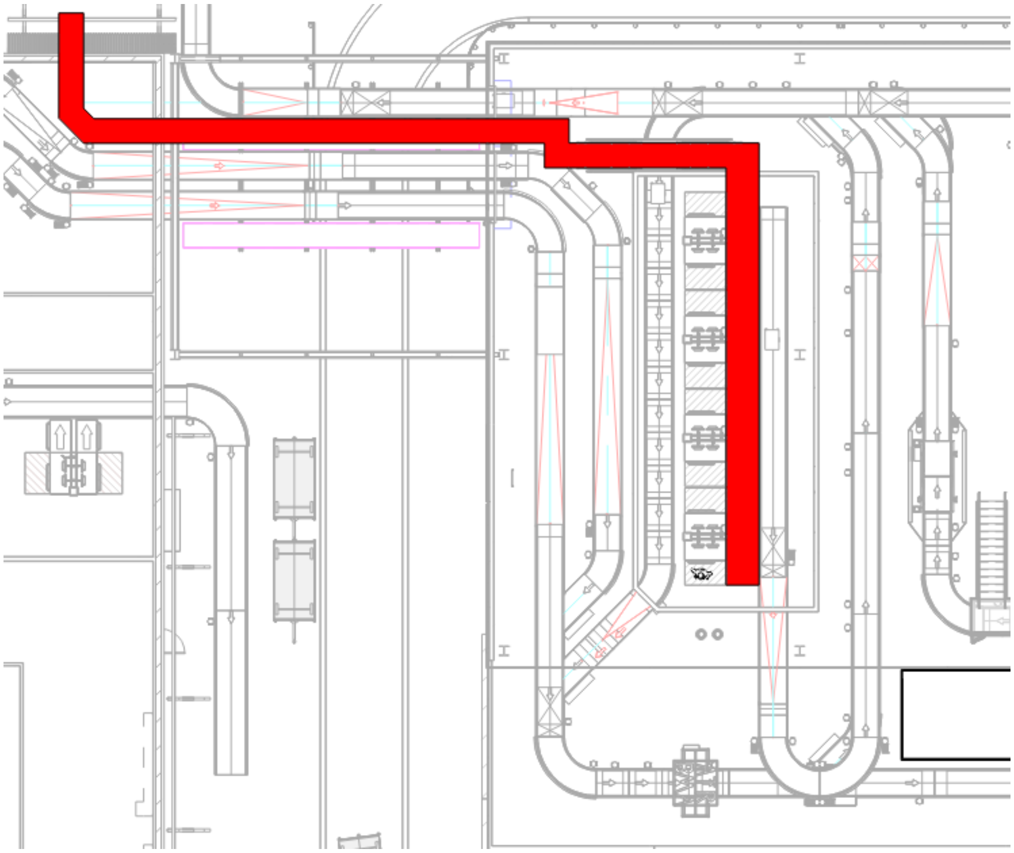

Figure 15: Threat Bag Removal Path

10.14. Allocable Portion

Figure 16 illustrates the allocable portion of the project; it is also included in the submittal.

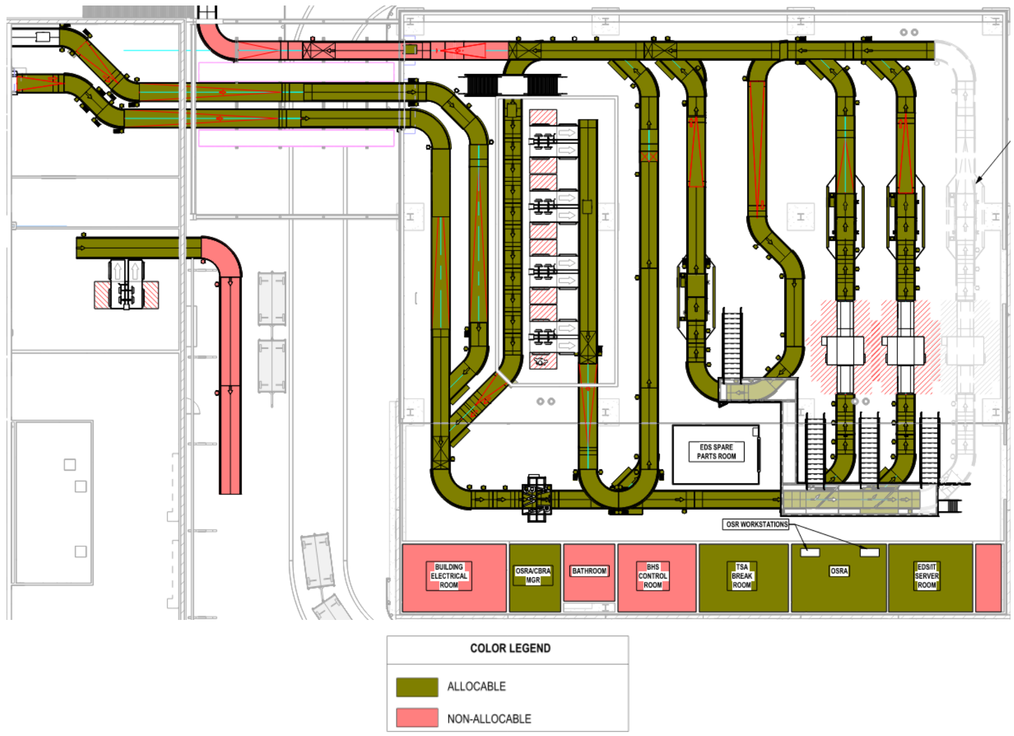

Figure 16: Allocable Layout

10.15. Controls Methodology

The primary controls network will be Ethernet/IP for the new CBIS.

11. Life Cycle Costs Analysis

The life cycle cost analysis (LCCA) is only provided for the preferred option, i.e., 1+1 CBIS with building addition. The LCCA for TSA supplied equipment was calculated based upon eXaminer 3DX 6700 ES EDS machines. The following assumptions were used in the development of the LCCA:

- Initial equipment installation in 2027
- DBU in 2028
- Removal of equipment from Main Terminal 2028
- ETD replacement in 2038, 10-years after DBU
- Replacement of the original three (3) EDS machines in 2043, 15-years after DBU

The calculated Total Present Costs for the selected alternative are **$35,017,000** and the Constant Value Costs are **$78,913,500**. The detailed LCCA can be found in Appendix A.

12. Flow-Based Modeling (Schematic Requirement)

High-level flow-based modeling was used to determine maximum baggage time in system by calculating the shortest and longest times a bag will travel through the system as measured from the natural points of bag induction through an EDS, into and out of the CBRA and transport to the makeup carousel. This calculation was performed for both standard bags and OOG bags. The results are shown in *Table 16*. The paths used for each of these calculations are detailed in the future drawing package.

The following assumptions were used to calculate all travel times:

- Redundancy crossover time was not included
- A dwell time of 18 seconds at the CBRA BIS (Typical)
- Future EDS machine positions were not used
- Future BIS positions were not used
- No provision for bag jams or faults
- No halting for merging or diverting

Travel Pathway	Minutes	Seconds
Longest Path, OOG Bag	6	16
Shortest Path, OOG Bag	5	3
Longest Path, Standard Bag	7	27
Shortest Path, Standard Bag	6	9
Shortest Path, OSR Viewing Time	-	52

Table 16: Time-In-System Results

13. Constructability Technical Memoranda (Schematic Requirement)

This section includes project-specific overviews for each discipline. The purpose is to ensure all disciplined have been involved in the project planning.

13.1. Project Delivery Overview

13.1.1. Execution

The project will be executed as a design-build project, however the STS will complete the BHS Contract Documents.

13.1.2. Existing Terminal Building and Operations

The majority of new TSA compliant inline CBIS and associated support areas will be constructed at the new building. The existing BHS system will be demolished after the new CBIS is operational. The Project requires that provisions be made to maintain existing operations in the existing building during construction of the new CBIS, therefore, the project will be done in phases:

Phase 1 – Install and commission all new conveyors and EDSs in the new building.

Phase 2 – Demolish the existing input conveyors and tie in to the new CBIS and the existing makeup conveyor line.

Phase 3 – Demolish the existing screening area and decommission the existing EDSs.

13.2. Commissioning & Phased Acceptance

Early collaboration between stakeholders and systems vendors is necessary to streamline the commissioning of building systems and equipment during the construction phases of this project. This effort includes efficient communication with all stakeholders, utilization of internal departments, and external agencies that must be involved in the timely turnover of completed facilities. The design team will continue to work closely with system vendors during the design and construction administration phases to support the commissioning process. This collaboration creates opportunities to:

- Accelerate the substantial completion schedule for the various phases.
- Facilitate pre-functional and functional performance testing of the BHS.
- Achieve commissioning completion and turnover of operational facilities when promised.

The following major building systems will require commissioning:

- Baggage Handling System
- Mechanical and Building Management Systems
- Electrical Systems
- Fire Alarm and Fire Protection Systems
- Security, Information Technology and Communication Systems

13.3. BHS Phasing

The new CBIS will be located at the new building addition. The ticket counter lines need to be recontroled, and all other building services need be modified at the existing screening area for the new oversize CBRA. This project will be executed in multiple steps; each step is described in Section 13.1.2.

13.4. Architectural

Due to increasing baggage demand, this project is to replace the existing CBIS/BHS and provide a new inline CBIS/BHS at the new building. This project exists to replace the aging BHS and CBIS at the existing building, update its technology, improve the terminal customer experience, and expand the airport capability to serve additional customers. With that comes the need for increased speed to screen outbound baggage. The new CBIS/BHS will provide a higher level of service from the baggage system function and a higher level of service for airport passengers than they currently enjoy.

The overall design proposes to maintain flexibility on the Operations Level by providing a dedicated CBIS and CBRA room at the new building.

13.4.1. TSA Support Spaces

The new TSA support spaces including TSA IT/Server room, TSA manager room, OSR room, break area and restrooms are located within the new building. The new CBIS will have a new EDS spare parts storage near the EDSs. TSA IT equipment is maintained with security access.

13.5. Civil

The design objective is to provide new improvements to the project site such as meeting Americans with Disabilities Act (ADA) accessibility requirements. It is anticipated that any roof drains for the new building will discharge to grade and into the current drainage path. Minor grading adjacent to the new building will be developed to provide a positive slope away from the building and tie into the existing conditions.

13.6. Structural

The primary responsibility of Structure is to provide a safe, reliable, and efficient design. A standalone new building (112’ x 112’) is located directly south of the existing terminal at the old Hangar 24; the Hangar 24 will be demolished as part of a separate project.

13.7. Mechanical

The design objective is to provide and integrate the requirements for Heating, Ventilation & Air Conditioning (HVAC) and plumbing systems into the baggage handling, architectural and structural systems, while maintaining a focus on reliability, accessibility for maintenance, code compliance, and occupant comfort.

The new building will be provided with high efficiency packaged DX equipment; the system will include approximately six (6) 5-ton nominal packaged DX heat pump units, low pressure supply and return ductwork, air terminal devices, and condensate drain piping. All HVAC equipment will be integrated into the existing Allerton BAS system.

13.8. Plumbing

The plumbing design shall be in accordance with applicable standards, including the International Building Code and Uniform Plumbing Code. EDS condensate gravity flows to the 4” branch via dedicated 4” floor drains and 3” pipes.

13.9. Electrical

The design objective is to provide power and lighting to support the new CBIS in the new building. The existing electrical service that currently serves the Hangar 24 on the site is not sufficient for the new CBIS. A new 800A, 480/277V, 3 Phase 4-wire service will be provided; the service will be located outdoors on the exterior of the building.

Baggage handling systems shall be served directly from the service switchboards via multiple motor control panel groups. Localized panelboards shall serve other miscellaneous loads around and associated with the baggage handling systems such as lighting, maintenance receptacles, and controls.

13.10. Life Safety

The design objective is to provide a preliminary analysis for the proposed means of egress within the new building. The analysis will include review of the stakeholder feedback items, egress from the airside and landside, exit access requirements, and installation of AED's, phones, and portable fire extinguishers. Impact to egress will be identified to the Office of the Fire Marshal (OFM).

Means of egress within the new building area of work will be coordinated with the International Building Code and Life Safety Code. The quantity and location of exit will be based on travel distances, common path of travel, and dead-end corridors.

13.11. Fire Protection

The design objective is to provide general requirements of the fire suppression and fire alarm systems. The new building and attached exterior canopy will be protected with a wet-sprinkler type fire suppression system with semi-recessed fire sprinklers. A fire riser room will contain the riser with a fire department connection on the exterior of the building with an electronic bell. The existing sprinklers at the existing terminal will be modified as required for the renovated spaces.

Fire alarm will include expansion of the existing airport system with additional booster panels and annunciators as required. Devices will be added based on the new floor plan in the new building and according to NFPA 72.

13.12. Security

The existing Access Control System (ACS) will be integrated for the new building. Card reader locations are to include all points of entry to the building and certain strategic interor doors to sensitive areas. All video surveillance systems in the new CBIS, CBRA, and OSR room will be provided per PGDS v8.

14. Cost Estimate

The Basis of Estimate (BOE) document is provided as separate documents in the submittal.

Appendix A – Life Cycle Cost Analysis

Life Cycle Cost Analysis for IAW Main Terminal CBIS - TSA Cost ONLY

Cost Categories	Rounded	Year 0	1	2	3	4	(DBU) 5	6	7	8	9	(DBU+5) 10	11	12	13	14	(DBU+10) 15	16	17	18	19	(DBU+15) 20
		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Capital Costs	Constant $ Totals																					
Initial CBIS Equipment (EDS and ETD)	$2,250,500					2,250,600																
Initial CBIS Installation	$1,410,000					1,410,000														-		
Replacement EDS Equipment	$2,138,500																					2,138,600
Replacement ETD Equipment	$112,000																112,000					
Replacement CBIS Installation	$1,410,000																					1,410,000
CBIS Infrastructure Mod (existing machine location)	$0																					
Existing CBIS/EDS Removal	$160,000						80,000															80,000
O&M Costs																						
CBIS Screening Equipment Maintenance	$8,039,000	---	---	---	---	225,060	225,060	225,060	225,060	225,060	225,060	225,060	225,060	225,060	225,060	826,910	826,910	826,910	826,910	826,910	826,910	826,910
Power Consumption Costs CBIS Screening Equipment	$673,000	---	---	18,443	18,443	18,443	18,443	18,443	18,443	18,443	18,443	18,443	18,443	18,443	18,443	64,549	64,549	64,549	64,549	64,549	64,549	64,549
Staffing Costs																						
TSA Screening and Supervisor	$62,720,000	---	---	---	1,792,000	1,792,000	1,792,000	1,792,000	1,792,000	1,792,000	1,792,000	1,792,000	1,792,000	1,792,000	1,792,000	6,144,000	6,144,000	6,144,000	6,144,000	6,144,000	6,144,000	6,144,000
Total	$78,913,500	$0	$0	$18,443	$1,810,443	$5,696,103	$2,115,503	$2,035,503	$2,035,503	$2,035,503	$2,035,503	$2,035,503	$2,035,503	$2,035,503	$2,035,503	$7,035,459	$7,147,459	$7,035,459	$7,035,459	$7,035,459	$7,035,459	$10,664,059
Discount Factor		0.00	1.00	1.07	1.14	1.23	1.31	1.40	1.50	1.61	1.72	1.84	1.97	2.10	2.25	2.41	2.58	2.76	2.95	3.16	3.38	3.62
Discounted Annual Costs		$0	$0	$17,236	$1,581,311	$4,649,716	$1,613,907	$1,451,285	$1,356,341	$1,267,609	$1,184,681	$1,107,179	$1,034,746	$967,053	$903,787	$2,919,465	$2,771,908	$2,549,974	$2,383,153	$2,227,246	$2,081,538	$2,948,701
Present Value of Costs	**$35,017,000**	include in BDR																				
Constant Value of Costs	**$78,913,500**	include in BDR																				

Cost Assumptions	Value	Source	Comment
Discount rate	7%		
Rounding	500		
CTX-9800 per unit	$ 1,000,000.00	PGDS v8 Table 11.1	Pulled from table 11.1 and split the 1.7m into unit and install costs.
CTX-9800 Installation Cost per unit	$ 700,000.00	PGDS v8 Table 11.1	Pulled from table 11.1 and split the 1.7m into unit and install costs.
CBIS Infrastructure Modification per unit (Ex)	$ 200,000.00	PGDS.v6 Table 8-3	
CBIS Infrastructure Modification per unit (N)	$ 5,600,000.00	PGDS.v6 Table 8-4	Additional EDS machine added to existing system
Existing EDS Removal per unit	$ 40,000.00		
ETD Cost per unit	$ 56,000.00		
ETD Installation Cost per unit	$ -	PGDS.v6 Table 8-2	Table 8-2 assume no installation cost for ETD
Power Consumption Cost per kW hour	$ 0.1022		Budgetary based on average industrial power consumption cost per: https://www.electricitylocal.com/states/arizona/phoenix/
CTX-9800 Electrical Consumption (kW)	10.3	PGDS.v8 Table 11.4	
Hours of Operation	24		24-7 per flight schedule analysis results
UPS Cost per unit	$ 69,300.00		
UPS Installation Cost per unit	$ 5,000.00		
Annual Staff Cost per individual	$ 64,000.00		
CBIS Equipment Maintenance Cost	10%	PGDS Section 11.6.1	Includes EDS, ETD, and UPS

Baseline Equipment Assumptions	DBU Value	2041 Value
Number of Total EDS Machines	2	2
Number of Non-Redundant EDS Machines	1	1
Number of ETD Machines	2	2
Number of OSR Stations	2	2
Number of CBRA Stations including OS	5	5
Number of Existing EDS Machines	2	2

Staffing Assumptions	Value
TSOs in CBRA including OS	5
TSOs in OSR	3
Supervisors	2
Total Staff per shift	10
Annual Staff (Total Staff x 2.8)	28

Appendix B – EDS Maintenance and Environment Assessment (Schematic Requirement)

EDS PGDS Maintainability Standards Exhibit (Environment Checklist)

Airport: IWA
Location/Terminal: New Building
Completed By: STS
Date: 06/13/2024

Service Access	**Yes**	**No**
Does the EDS area provide 3 feet or more around all four sides of the unit(s) and a clearance of 9 feet or more above the unit(s)?	X	
Measured area around all four sides, and overhead clearance, of EDS (please provide): All EDS machines maintain a minimum of 36" clear on all four sides. A minimum distance of 10'-2" will be maintained from the finished floor to the nearest obstruction over the EDS machines.		
Environment		
Heating, Ventilation and Air Conditioning (HVAC) Systems	**Yes**	**No**
Does the EDS area provide for consistent warmed, cooled and dehumidified air flows?	X	
Model and make of the HVAC system in place (please provide): The new CBIS will be installed in a new building. The design team is coordinating to ensure that all conditions specified in the EDS guidelines are met.		
Temperature	**Yes**	**No**
Does the temperature of the EDS area maintain a consistent range between 50°F and 80°F?	X	
Measured temperature range in the EDS area (please provide): The new CBIS will be installed in a new building. As such, no existing measurements are available. However, the design team is coordinating to ensure that all conditions specified in the EDS guidelines are met.		
Humidity	**Yes**	**No**
Does the humidity of the EDS area maintain a consistent range between 10% and 60% non-condensing?	X	
Measured humidity range in the EDS area (please provide): The new CBIS will be installed in a new building. As such, no existing measurements are available. However, the design team is coordinating to ensure that all conditions specified in the EDS guidelines are met.		
Storage and Space Parts Access		
Secure Storage Space	**Yes**	**No**
Is there a secure storage space for spare parts and tools with an area of 150 square feet or more, and within close proximity of the EDS?	X	
Describe secure storage space (please provide): The secure storage space for EDS spare parts is located at the new CBIS.		
Distance from EDS to secure storage area (please provide): The proposed storage location is roughly 20' from the nearest EDS machine.		

Heavy Equipment Lifting	**Forklift**	**Overhead Trolley Hoist**
Is their heavy equipment lifting equipment and/or systems are in place for use in maintaining the EDS unit(s)?		X
Specify heavy equipment lifting equipment or system that is in place (please provide): A monorail hoist system with a half-ton load capacity will be installed near the EDS machines for transport of EDS maintenance parts.		
Quick Disconnect Standard	**Yes**	**No**
Are the EDS conveyor components readily removable through the use of available hand or power tools?	X	
Notes/Comments:		

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