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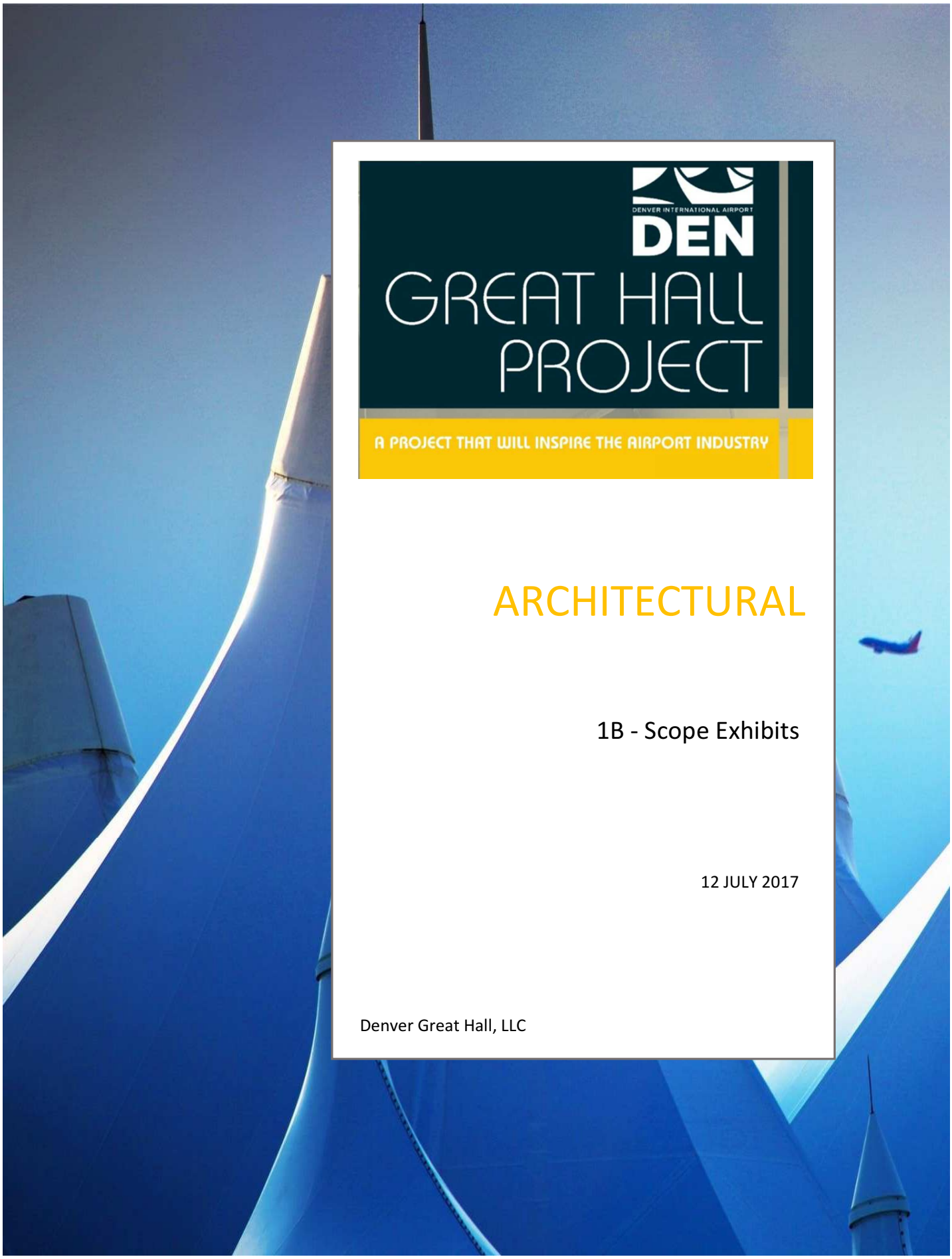

DENVER INTERNATIONAL AIRPORT

DEN

GREAT HALL PROJECT

A PROJECT THAT WILL INSPIRE THE AIRPORT INDUSTRY

ARCHITECTURAL

1B - Scope Exhibits

12 JULY 2017

Denver Great Hall, LLC

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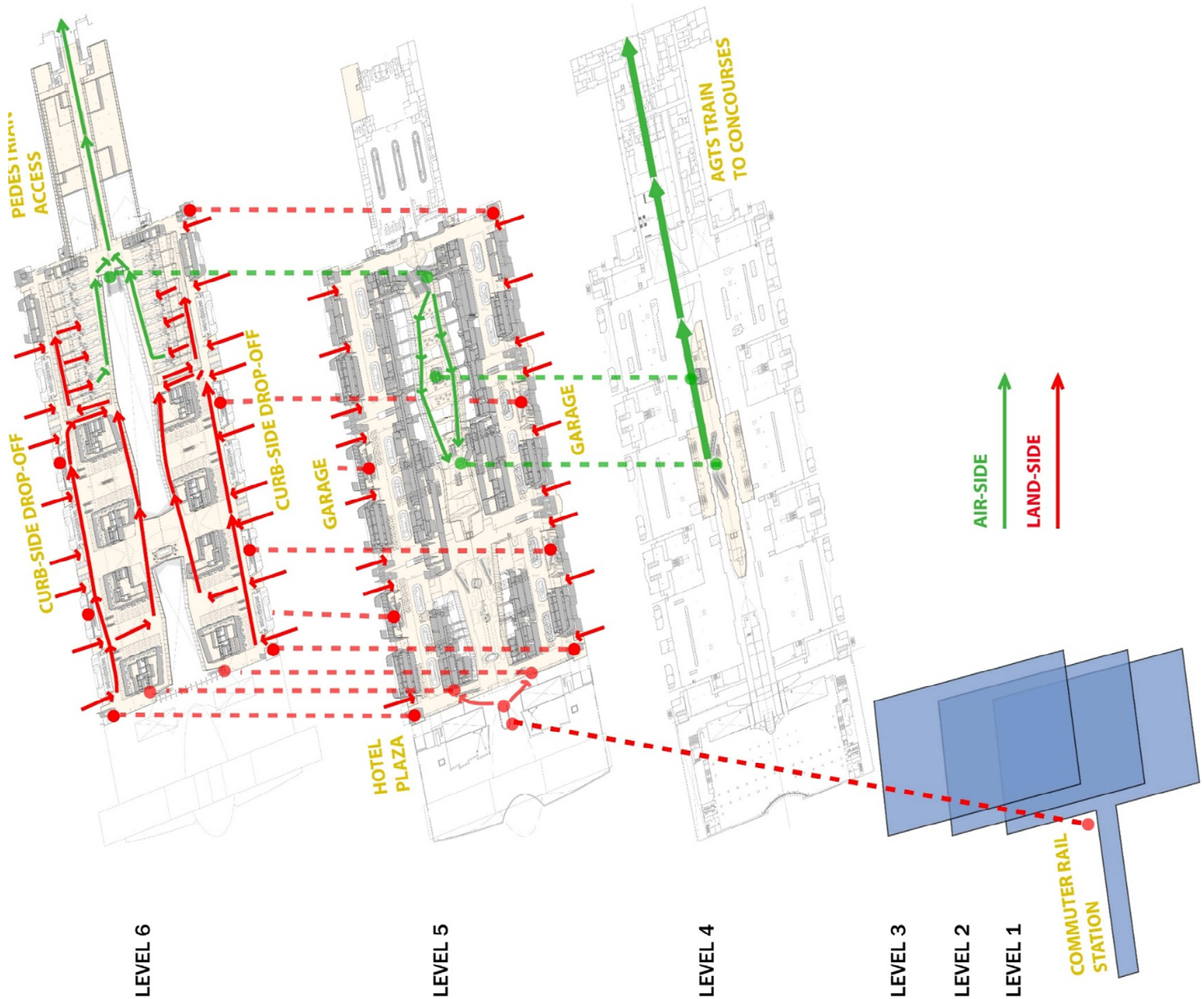
2.3 USER EXPERIENCE

The variety of users of the Terminal are great, in the following flow studies only the major user flow routes have been studied and are depicted;

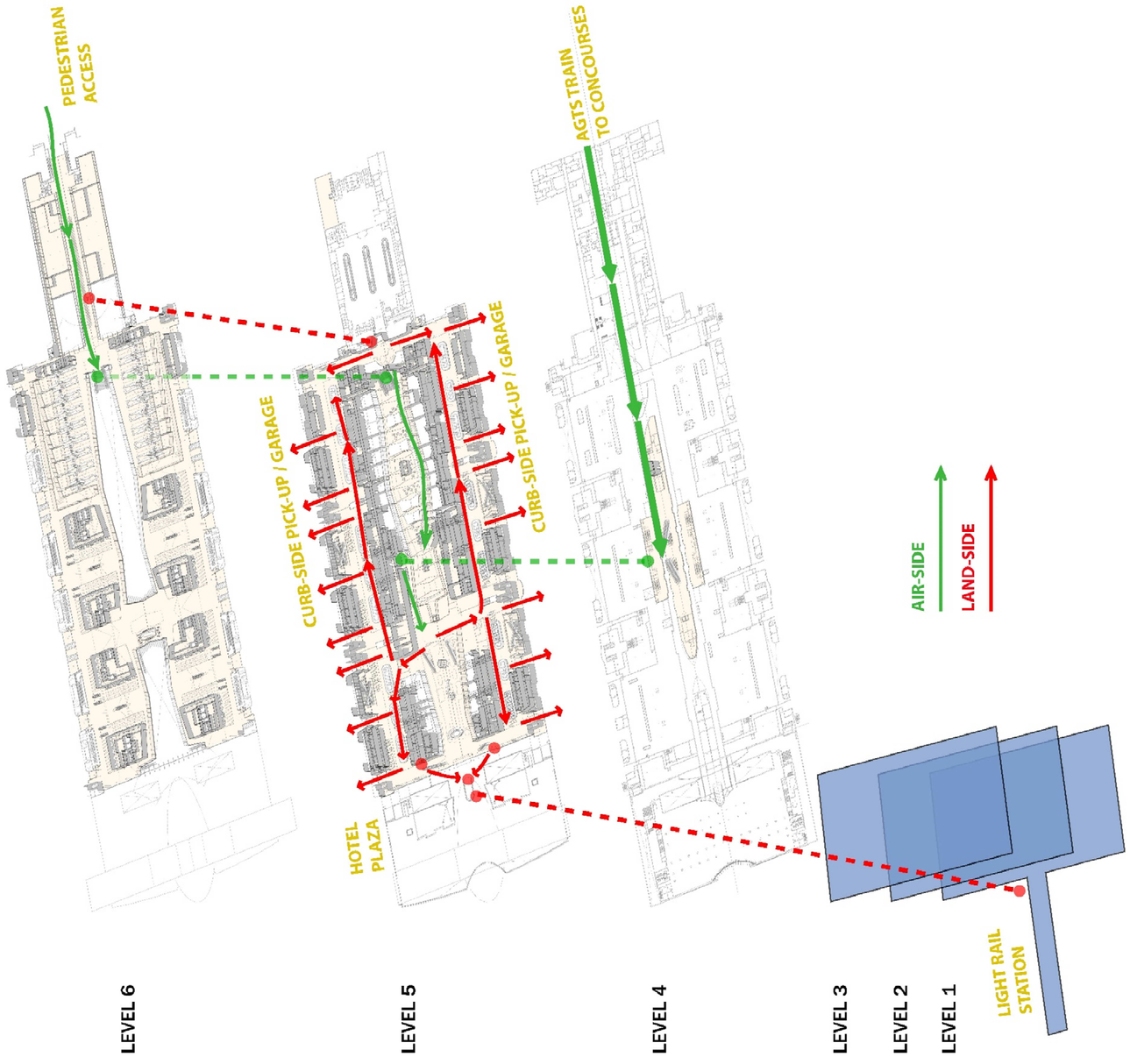
2.3.1 DEPARTING PASSENGER FLOW

Domestic and International departing passengers share the same flow;



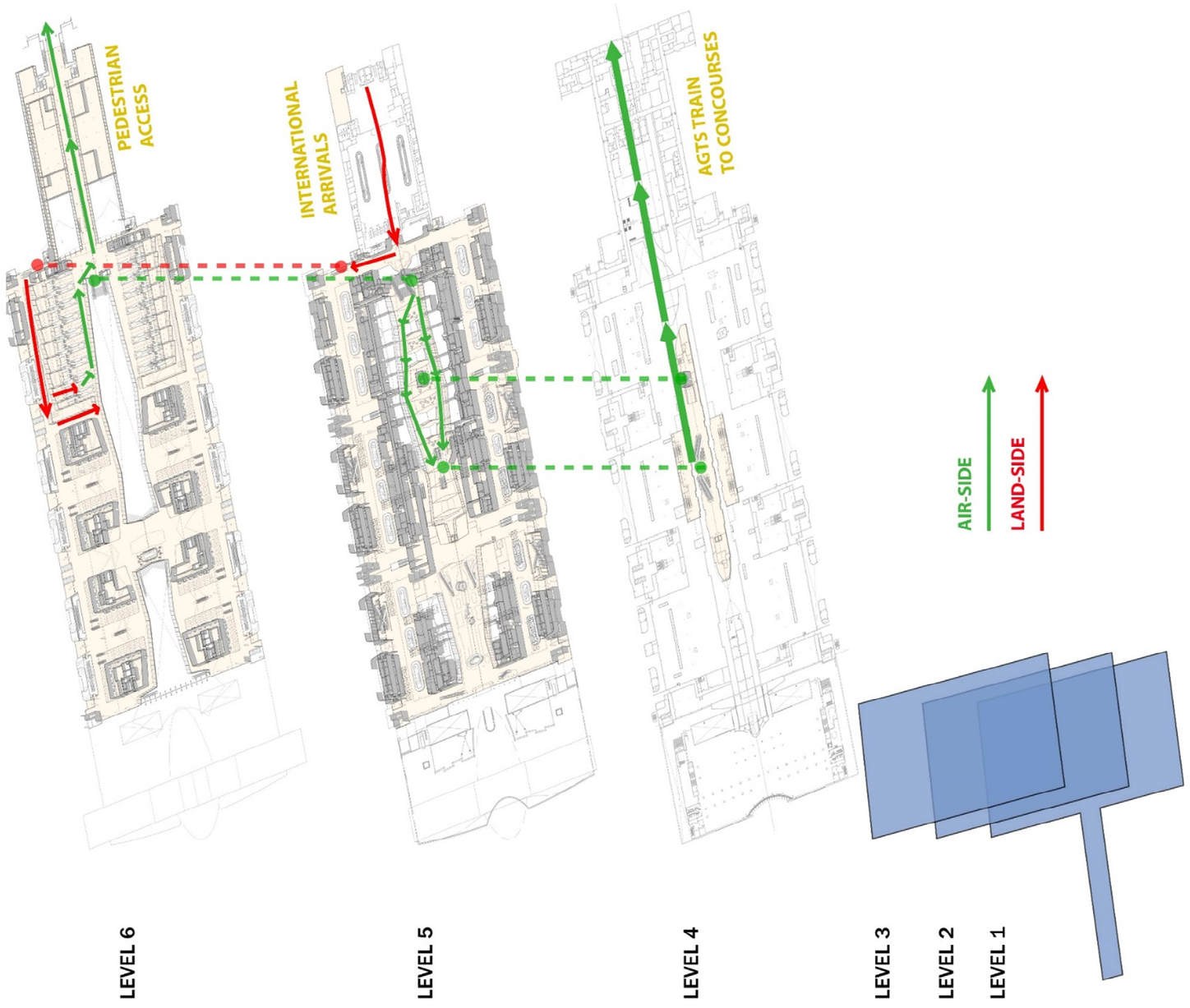
2.3.2 ARRIVING PASSENGER FLOW

Arriving Domestic passengers are highlighted;



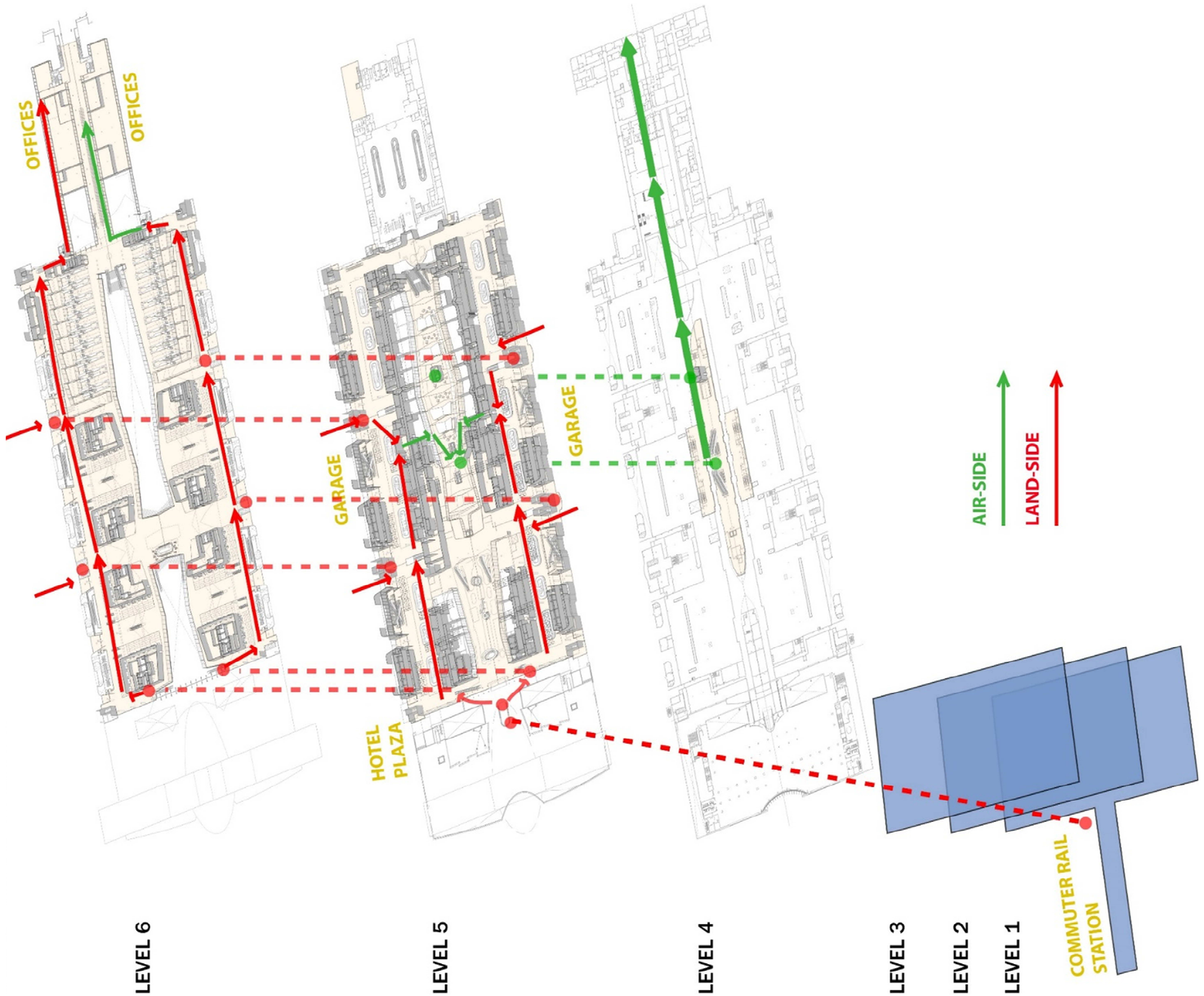
2.3.3 INTERNATIONAL TRANSFER PASSENGER FLOW

The passengers with the most demanding process requirements are the International Transfer Passengers.



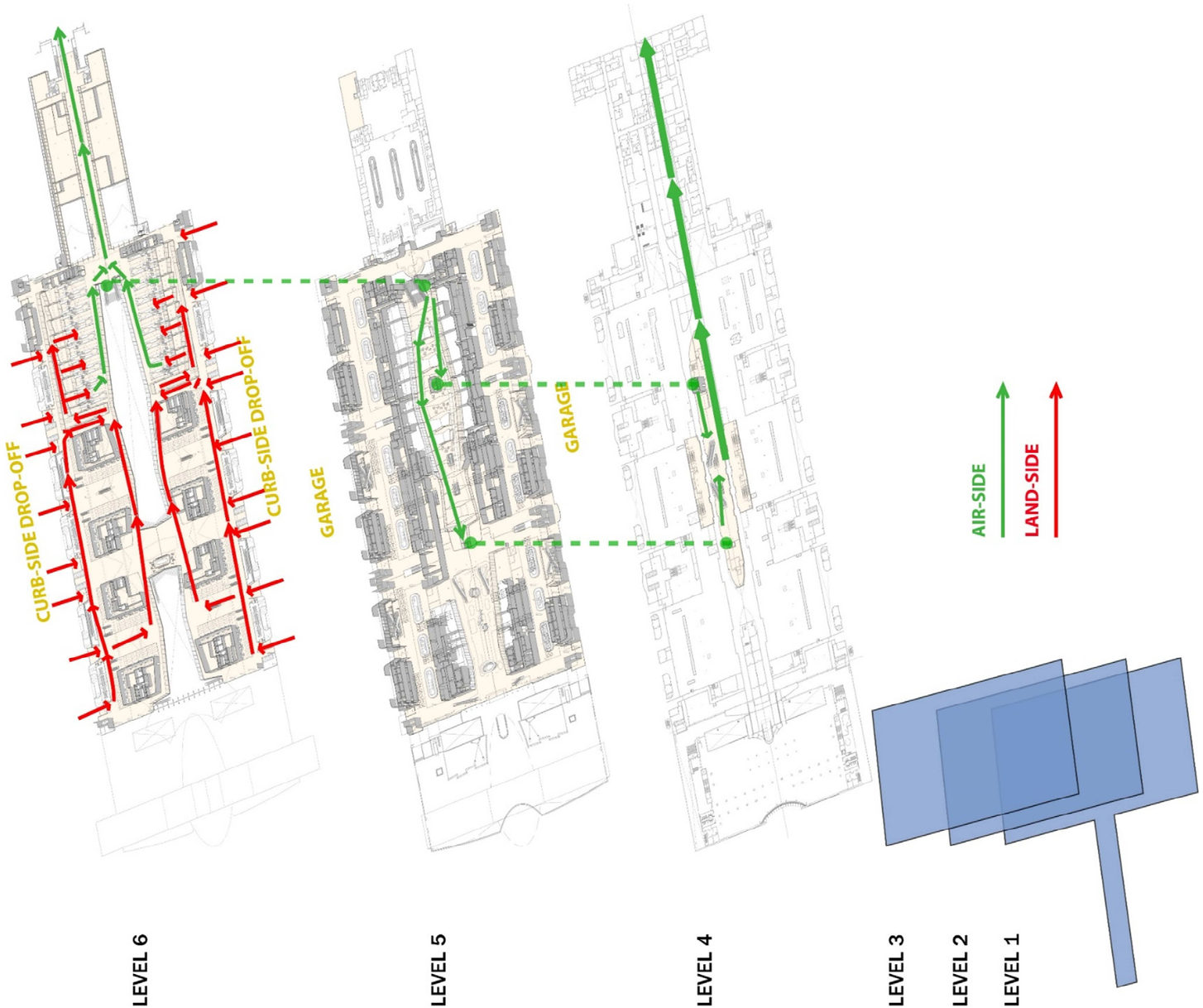
2.3.4 AIRPORT STAFF

The routes for employees accessing the new offices on the AOB corridor are shown below;



2.3.5 MOBILITY IMPAIRED PASSENGER FLOW

The route for departing passengers with impaired mobility is shown below;



2.5 DETAILED SPATIAL ORGANIZATIONS

2.5.1 CURBSIDE

The process for departing passengers that need to check-in oversized baggage will remain the same. Prior to entering the Terminal, departing-passengers would head towards the existing Out-of-Gauge (OoG) and Super-Out-of-Gauge (SOoG) stations that are located in between the Terminal entrances. While there will be a modernization of Level 6 façade facing the curb side, the check-in and luggage processing infrastructure will remain.

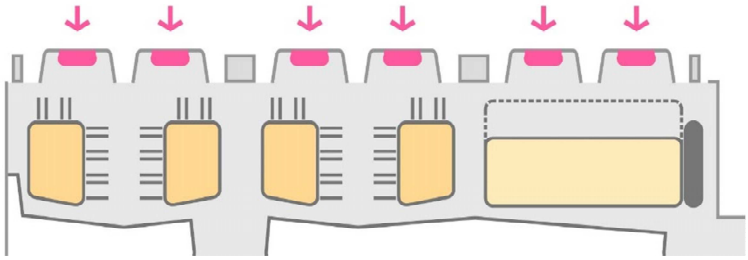


Fig. 2.5.1 – Curbside Baggage Area Diagram

2.5.2 CHECK-IN PODS

The existing check-in layout follows a linear distribution, The Project is to wrap the check-in desks around 'Pods' in order to gain more check-in interface points per square-foot, this will free up space for TSA operations to the north. Additionally, by fragmenting the barrier created by the linear check-in distribution into pods, the new layout allows for greater visual and access connection between the check-in hall and Great Hall.

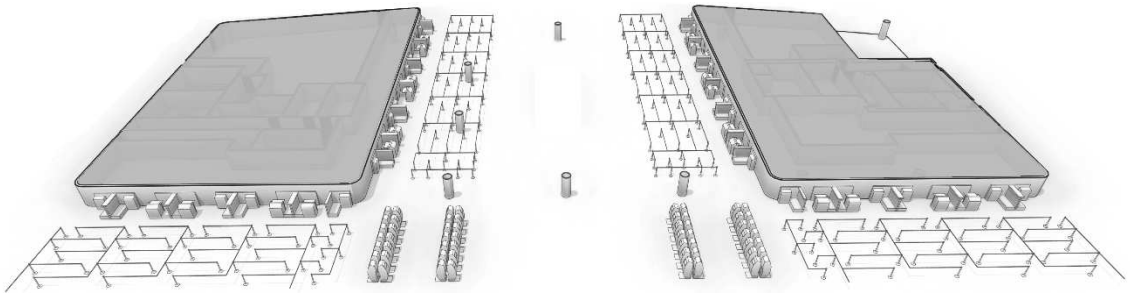


Fig. 2.5.2(a) Perspective: Check-In Pods Diagram

Each pod will contain multiple dual-system-check-in-desks along two sides. A dual system is essentially a unit made up of two slots where the airline has the option to insert either a full-service-counter and/or one bag-drop counter per slot. The new self-check-in system will make the entire check-in process much more flexible thereby allowing for quicker process times. New baggage belts will be provided and coordinated with the Baggage Handling System.

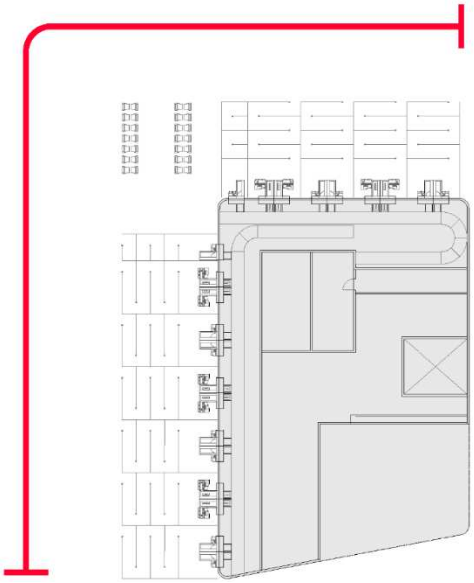


Fig. 2.5.2(b) - Single Check-In Pod Diagram

The kiosk option will allow departing passengers to self check-in, and print their boarding pass, while the bag-drop station will allow them to drop off their baggage and print their bag-tag, if needed. The full-service-check-in-desk (FSCD) will allow them to interface with a full service airline agent. All of these kiosks will be fixed to the floor and will be hardwired for power and data, no wireless technology.

Along with making the departing passenger check-in process faster and efficient, the dual systems will also enable flexibility for the airlines. It is the intention that each airline carrier will be consolidated into one of the eight (8) pods with the ability for an airline to utilize more than a single pod or a portion of one could be allowed. Behind every check in counter will be screens allowing the flexibility for the host airline of the counter to place their branding material.

The path of the passenger check-in options is shown in the diagram below:

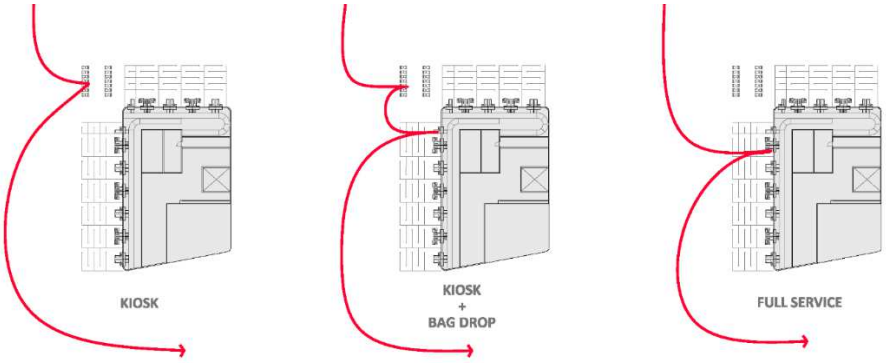


Fig. 2.5.2(c) Check In Scenarios Diagram

A full simulation has been developed by TranSolutions. This simulation describes the proposed layout and a list of facilities within the Check-in area. The following facilities will be provided to assist passengers checking-in:

1. Self-Service Kiosks

The kiosks are located in level 6 Check-in Hall in front of the dual system bag drops. There are a total of eight check-in pods with 28 kiosk for each one making a total of 224 kiosks.

2. Check-In Desks

Dual System Check-In;

Each of the eight pods will include multiple dual system positions that will allow passengers to have a full service, self-check-in or bag-drop possibility according to the airline desired configuration. Each module is designed to be fifteen-feet in length and allowing two positions options for the airlines.

Check-In Equipment Allowance Assumptions

1. Operated Bag Drop Positions – (80) Materna Drop.Go (A) units (or similar)
2. Self-Service Bag Drops – (96) Materna Air.Go (B) units (or similar)
3. Ticketing Kiosks – (224) Materna Pax.Go (B) kiosks (or similar)
4. Installation, start-up and commissioning of each unit included by equipment vendor
5. All software licenses.
6. All injection baggage belts up to Level 5.5

Total number of positions is 176.

The simulation study carried out by Transolutions, with inputs agreed with the principal airlines and the Airport, for the design of the check-in area includes a check-in queuing area analysis.

In this simulation, the passenger demand developed for three average day peak month (ADPM) flight schedules derives from the 2016 OAG flight schedule and growth rates provided for 2020, 2030 and 2040.

The demand levels approximate peak hour originating passenger volumes of:

- 2020 – 6,200 pax per hour
- 2030 – 8,200 pax per hour
- 2040 – 9,900 pax per hour

The following table shows the *queuing area requirements* for each check-in counter, in order to meet an Optimum Level of Service:

	UNIT QUEUING AREA 2020	UNIT QUEUING AREA 2030 /2040
Check-In C**onventi**onal Desks	120 sf	140 sf
Bag Drops – Flow Through	120 sf	140 sf

Note: Kiosks demand is not enough to justify a dedicated queuing area

In order to meet the Level of Service Criteria , the following check-in queueing space has been considered in the overall design: base case (red line) with a possible expansion(dotted red line):

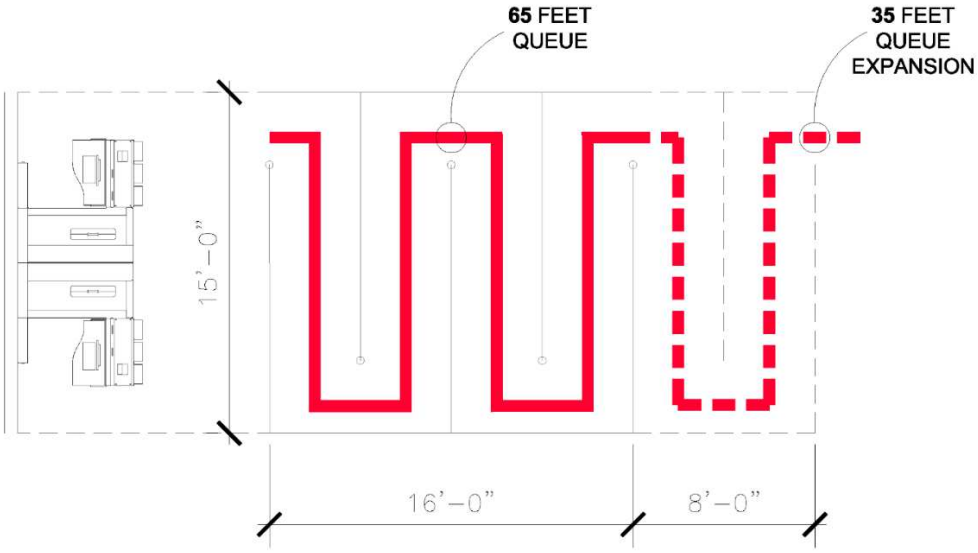


Fig. 2.5.2(d) – Designed Check-In line Diagram (base and expanded)

As it can be observed, the check-in *queueing area proposed* for each scenario is:

- Year 2020 – 240 sf (16' by 15'), 120sf for each check-in counter
- Year 2030 – Up to 360 sf (24' by 15'), 180sf for each check-in counter
- Year 2040 – Up to 360 sf (24' by 15'), 180sf for each check-in counter

Therefore, according to the simulation study carried out and the queueing area proposed, the minimum queueing area requirements for an Optimum Level of Service are met.

2.5.3 SECURITY SCREENING CHECK POINT

One of the biggest enhancements incorporated within this Project is the relocation of TSA operations. TSA screening will be moved from the center portions of level 5 and level 6 AOB corridor to be consolidated to two areas located at the north end of level 6, conveniently positioned in proximity to the Check-In Hall. This reconfiguration allows for an increase in TSA capabilities through additional SSCP capacity and modern technology. The current design shows a single body scanner per lane. Depending on the future requirements of TSA and the manufacturer of the equipment, the configuration is subject to change and x-ray machines may also be utilized. The Project shows a total of 34 SSCP lanes, 17 at each side of the Terminal, the goal is for queuing time to be minimized. The format of queuing operations is expected to improve through the use of distinct travel lanes separating various types of users, this includes Standard-passengers, Pre-Check passengers, Families-&-Disabled, and Known-Crew-Members/Law-Enforcement-Officers.

These Known-Crew-Members (KCM) and Law Enforcement Officers (LEO) lanes are located next to the regular passenger lanes.

The physical design and layout of the SSCP area is key to improving the TSA experience. The underlying goals are to provide;

- A clear and intuitive environment where passenger flow is obvious
- Speed and throughput
- Communication of wait times to passengers
- Queuing areas exposed in a sequential manner
- Warm and friendly material finishes

Throughput (Based on 2020 Forecast)

Standard lanes: 200 passengers / hour

Pre-check lanes: 300 passengers/ hour

Queuing (Based on 2020 Forecast)

For design purposes: 600 square feet for each lane

Minimum required queue area for each side in 2030: 4,190 square feet to achieve an Optimum Level of Service

Common Practice 600 to 720 square feet / lane

Passenger Type	Number of X-Ray Lanes	Peak Hour Wait Time in Queue (min)		Maximum Observed Queue* (Number of passengers)	Minimum Required Queue Area (ft^2)#	Available Queuing Area (ft^2)#
		95th Percentile	Criteria (Minutes)			
West Regular	12	0.6	10	31	335	15,900
West Pre-Check	5	0.6	10	26	281	
East Regular	12	0.6	10	28	302	15,900
East Pre-Check	5	0.6	10	21	227	

Table: SSCP Performance – 2020 Demand – 17 Lanes per Side – 35% Pre-Check Percentage

Passenger Type	Number of X-Ray Lanes	Peak Hour Wait Time in Queue (min)		Maximum Observed Queue* (Number of passengers)	Minimum Required Queue Area (ft^2)#	Available Queuing Area (ft^2)#
		95th Percentile	Criteria (Minutes)			
West Regular	5	0.6	10	22	238	15,900
West Pre-Check	12	0.6	10	12	130	
East Regular	5	0.6	10	44	475	15,900
East Pre-Check	12	0.6	10	11	119	

Table: SSCP Performance – 2030 Demand – 17 Lanes per Side – 40% Pre-Check Percentage

One of the constraining factors in the layout of the SSCP lanes at level-6 was the existing structural elements. This includes steel columns and steel braces. The spacing of these elements are at 30 feet on center in both directions. All columns and bracing elements that run in parallel with the SSCP lanes (east-west) will be reconfigured. Diagonal bracing elements running in perpendicular to the SSCP lanes (north-south) will be removed and replaced with moment frames, so as not to compromise the integrity of the Terminal structure. It is estimated (pending final Structural analysis) that ten diagonal braces will be reconfigured and eight diagonal braces will be changed to moment frames.

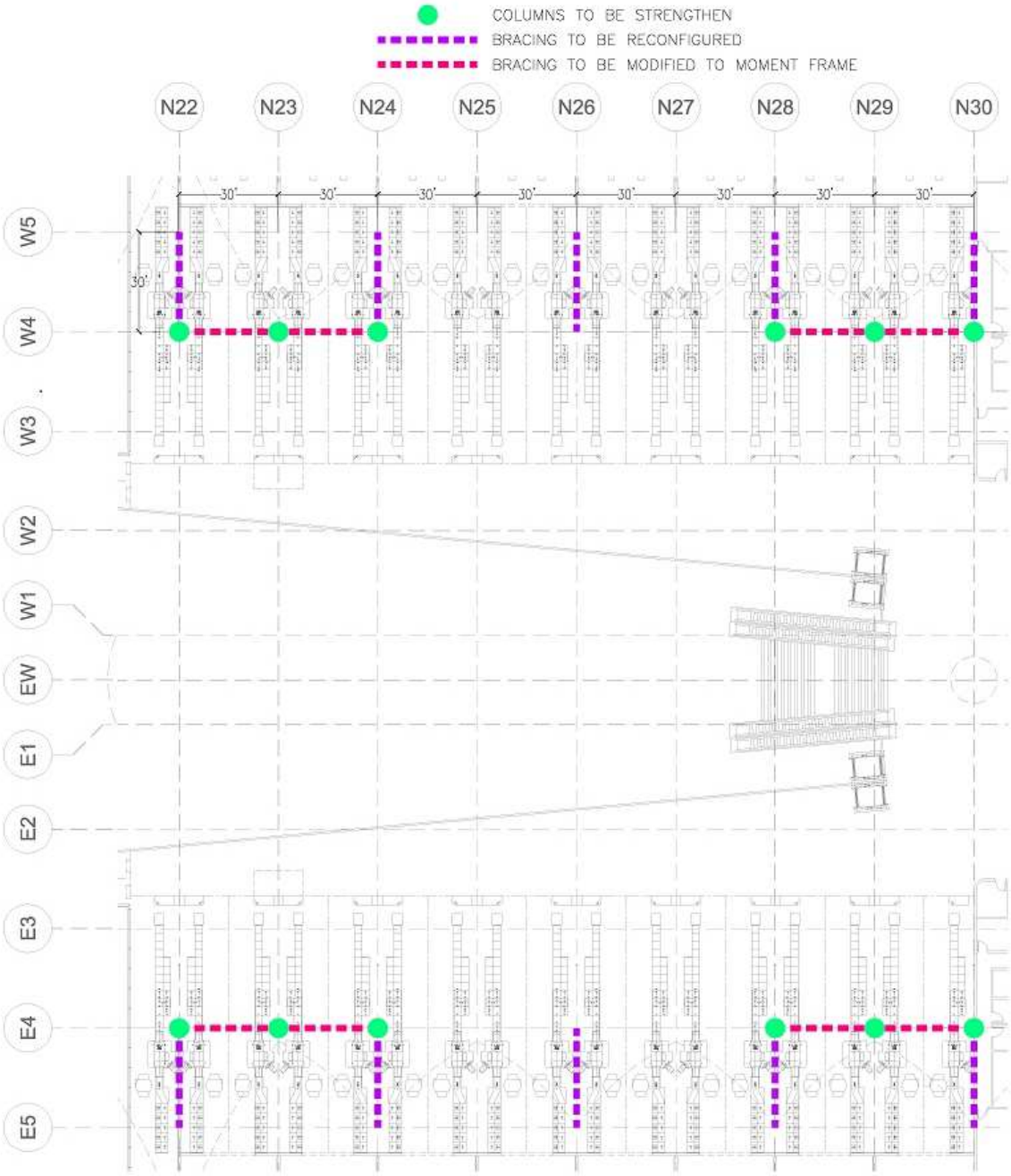


Fig. 2.5.3(a) – Structural Bracing Layout

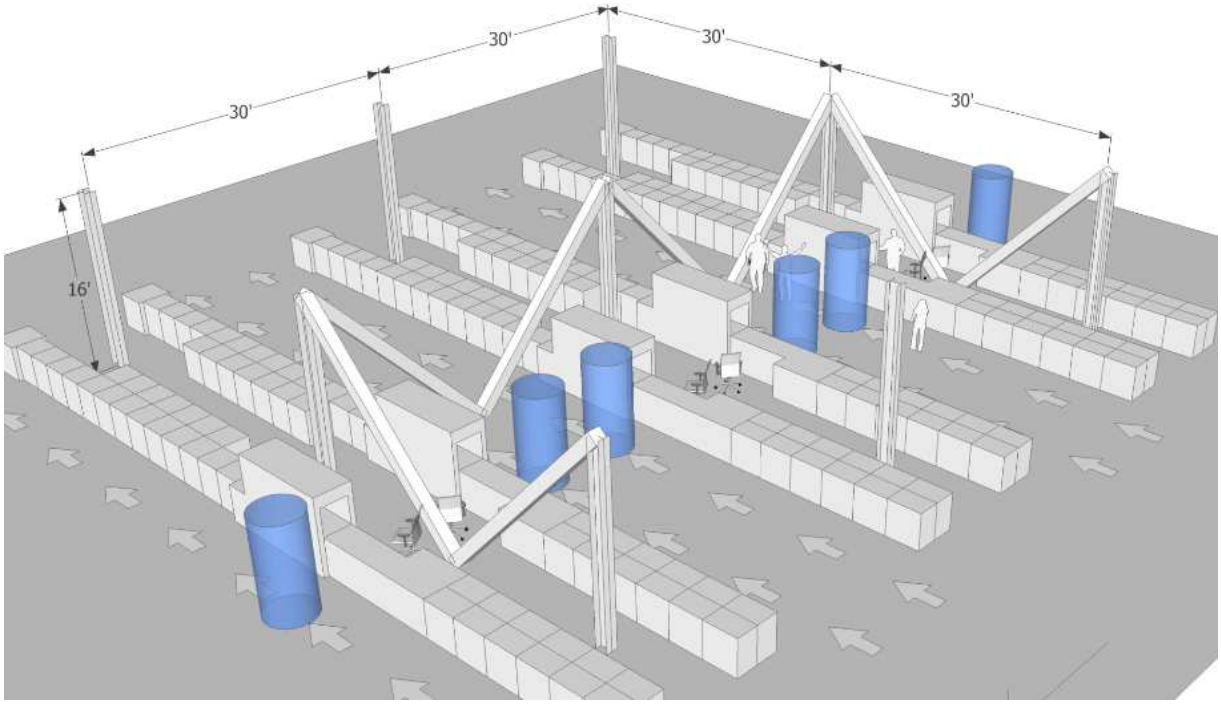


Fig. 2.5.3(b) – Existing Typical Structural Bracing in the TSA area

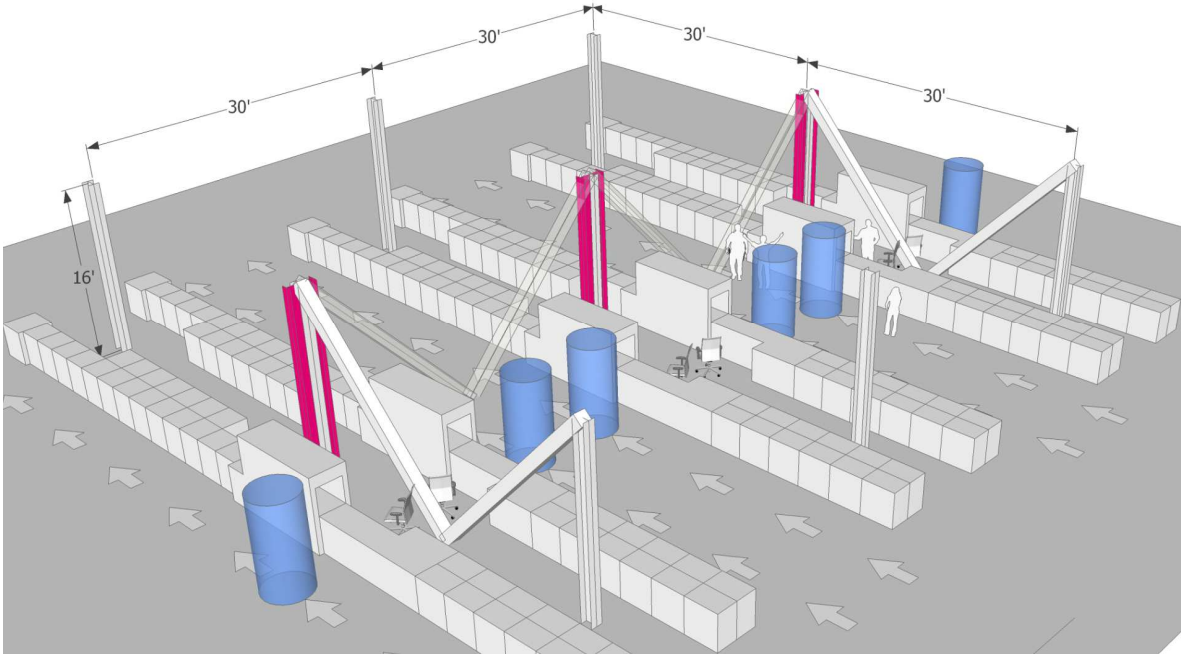


Fig. 2.5.3(c) – Columns to be strengthened - Typical

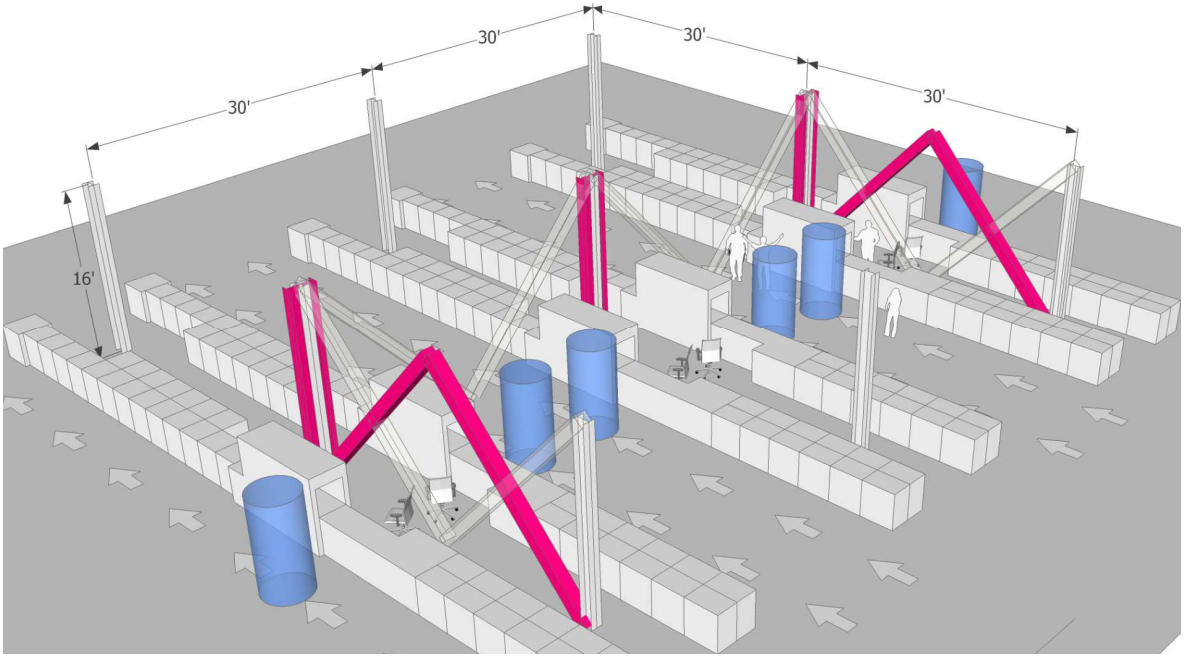


Fig. 2.5.3(d) – Braces to be reconfigured - Typical

1. Security Preparation

Before the Security Screening Process is reached, passengers need to understand that they are approaching a physical boundary that will only grant access to ticketed passengers. This limit may be a biometric one or a staffed one, but there will be no ambiguity of where the boundary is placed. (The potential for biometric control to be confirmed by DEN and TSA).

It is important for this area to provide space to departing passenger well-wishers, so that this process does not obstruct other passengers proceeding to the security entrance. A security pre compliance area will be constructed containing recycling bins and trashcans, so that passengers can dispose of forbidden elements prior to entering; as well as dump stations for liquids before entering the queue.

Architecturally, the security area is about focus and communication. Passengers approach the most anxious part of their journey and are generally looking for two things: speed and assurance. The Project tackles these two issues differently. The appearance of speed is achieved by exposing the queues sequentially and avoiding large concentration of passengers, which generally creates an inaccurate impression of underperformance. The idea of "queue boutiques" is generated around this concept, in which passengers are segregated purposely inside spatial "pockets", so that their individual process is kept separate from the general one. Regarding assurance, focus is put on communication.

The wrap-around layout with the addition of moveable partitions in the queuing space around the screening area allows for flexibility in passenger lane setup.

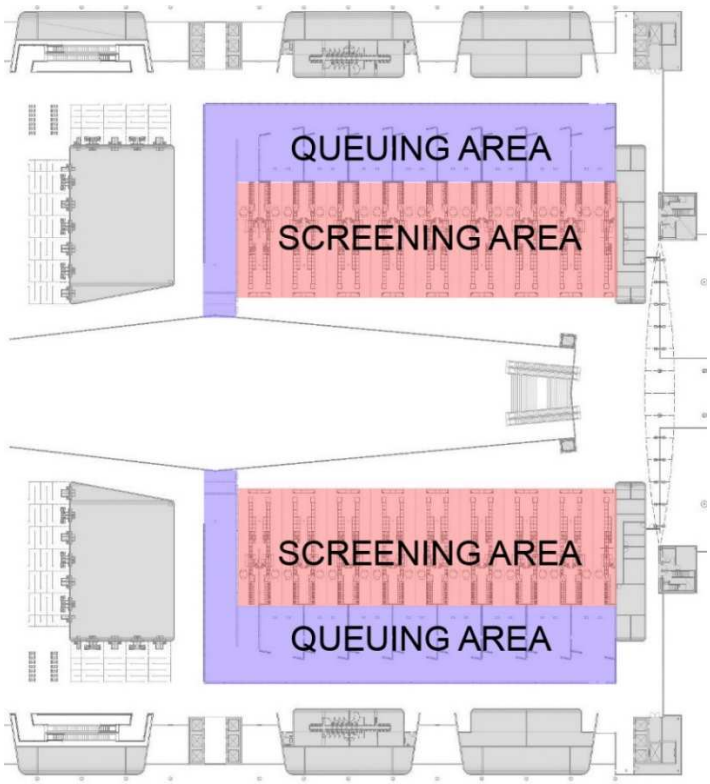


Fig. 2.5.3(f) – TSA Operation Area(s) Diagram

Next to the SSCP area will be support spaces for TSA, they include;

- Training & Briefing Rooms
- Supervisor Office
- Daily Supply Storage
- Private Screening Rooms
- IT support spaces
- Supervisor Podiums
- Briefing rooms
- Breakrooms & Meeting Areas (currently proposed to be in the AOB bridge area)

It is expected that the requirements of security demands will fluctuate with the diurnal flight schedule. Security officers will be able to stand down and be brought back into operations in a very short timescale. This necessitates welfare facilities and breakrooms close to their workstations.

Other characteristics include:

- One raised podium (at each side) for the TSA supervisor with space for two or three persons
- One raised podium for a law enforcement, this will be 14 inches above the floor and with walls/glass partitions that are bullet resistant.
- Furniture for passengers needing to consolidate their personal belonging after being granted clearance (Refer to Furniture & Equipment Annex)
- A closing partition element as to allow for the closure of particular SSCP lanes
- Desks for the Travel-Document-Checker
- Desks for the Known-Crew-Members (KCM), TSA officers, and Law enforcement officers.
- A K9 lane within the queuing area.
- Long gun cabinet(s)
- Printer station(s)

For an initial list of furniture and equipment in the TSA area refer to Furniture & Equipment Annex, the final fit out is subject to TSA Guidelines and TSA Approval.

Currently, the TSA area will have various types of wall systems. There will be an outer ten-foot tall wall encompassing the entire TSA operations are, this wall will consist of eight-feet of opaque partition with internal bullet-resistant construction with non-bullet resistant glazing at the remaining two-feet of height. Within the TSA operations will be glass walls with demountable capabilities, these walls are intended to manage passenger queuing before entering an SSCP lane. Every SSCP lane will have installed a roller shutter system allowing for the closing off of unused lanes.

2.5.4 AOB CORRIDOR & OFFICES

So as to accommodate the reorganization of the Great Hall and to satisfy growing demands there will be floorplate expansions on level 6. Most of this expansion is for DEN offices and secondary airport services, the location will be on either side of the current Concourse A pedestrian corridor. This location is ideal given its proximity to the existing DEN Office Building (located just to the Northwest). In order to prevent any impact on the support system of the canopy structure, there will be an un-occupied roof membrane area between the expansion zone and the Terminal. Within this AOB Corridor expansion will be:

- DEN Airside Offices
- DEN Airside Restrooms
- DEN Landside Offices
- DEN Gym*
- TSA extra spaces
- DEN Business Center
- GHP Offices
- DEN Credit Union
- DEN Locker Room
- Landside Restrooms

**The Gym space will be a shell space, which is limited to the perimeter walls. The construction for the Locker Room will be rough-in. This space will have concrete floors, exposed ceiling structure, HVAC, hydronic, and domestic water supply and sanitary roofing for restroom facilities, empty electrical distribution conduit and safety and emergency lighting. All other improvements and design will be responsibility of the future tenant.*

DEN's employee locker room is a relocated facility.

(Refer to FURNITURE AND EQUIPMENT Annex and to FINISH SCHEDULE FOR SELECT ROOMS Annex)

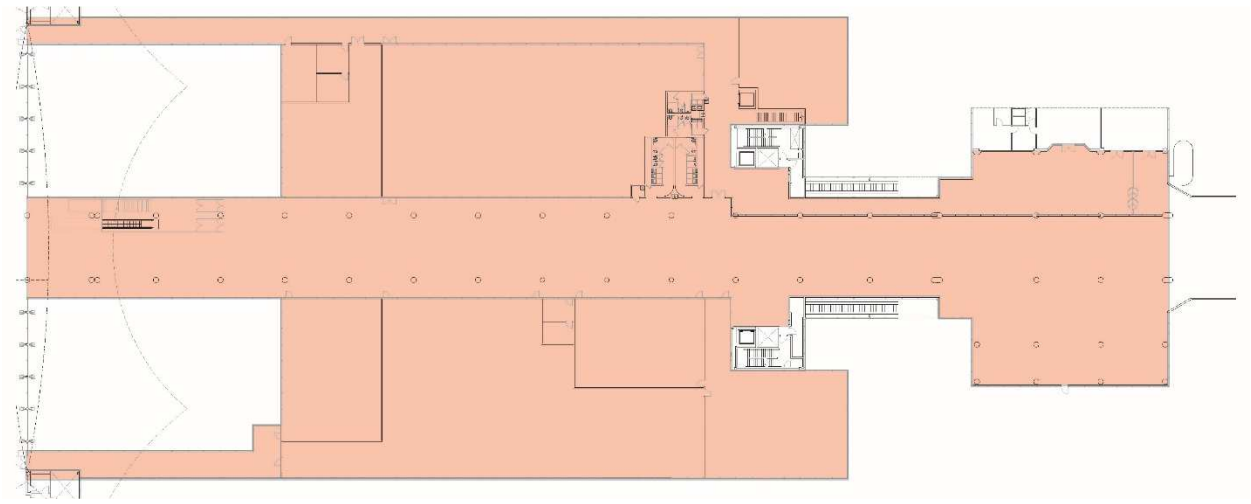


Fig. 2.5.4 – AOB Area Diagram

2.5.5 AIRSIDE PLAZA

Located in its entirety on level 5, the Airside-Plaza is located within the boundaries of the secure part of the Terminal. Entry to this space is from the north end via a grand staircase flanked by four (4) escalators in addition to four (4) elevators. Departing passengers proceeding to the AGTS trains must traverse this space, in the center-south end of the Plaza are combination of stairs and escalators that will take these passengers down to the level 4 departing platform. The formal plaza is surrounded by a combination of retail and food and beverage establishments, in the center will be a mixture of commercial kiosks, and seating areas. Restrooms are provided at both ends of the Plaza. Throughout the seating areas will be power & data plugs in the seating for passenger personal use. Arriving passengers via the AGTS can also choose to enter the retail area prior to passing the threshold to the landside plaza. This threshold between the secure Airside Plaza and the Unsecure Landside Plaza will be multiple anti-back-track doors.

The Commercial Design strategy is described in (Section 2.9). The corridor as shown is currently the subject of a design analysis review and is subject to change.

(Refer to FURNITURE & EQUIPMENT Annex)

(Refer to FINISH SCHEDULE FOR SELECT ROOMS Annex)

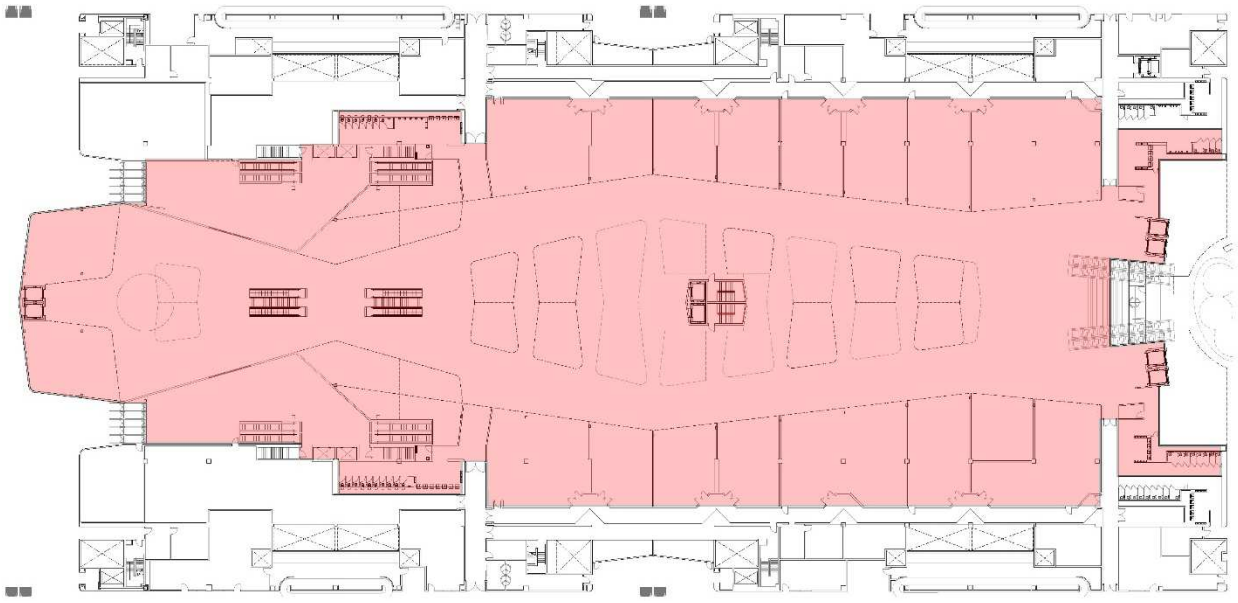


Fig. 2.5.5 – Airside-Plaza area Diagram

2.5.6 BACK-OF-HOUSE CORRIDOR

A back-of-house service corridor will be added to either side of the Airside Plaza. This will reduce the potential for any conflict between passenger movement and the flow of commercial goods. It will also ensure that this back of house restocking activity is undertaken largely out of sight of passengers. Goods will originate at level 4 (Please refer to Section 2.8.1 of this document) via a single freight elevator and a single dumb-waiter elevator located in the north-west corner. This elevator will have direct access to the western back-of-house corridor. Goods needing to go to the eastern back-of-house corridor will briefly need to traverse the Airside Plaza.

At the ends of each of these corridors are large storage facilities to be shared by the commercial tenants. These corridors and storage areas are located on the secure side of the Terminal. Also utilizing these corridors will also be Airport employees through the use of Employee Access Portals (EAP). There is expected to be EAP's at either side of the back-of-house corridor and one at the far north side of the Airside Plaza.

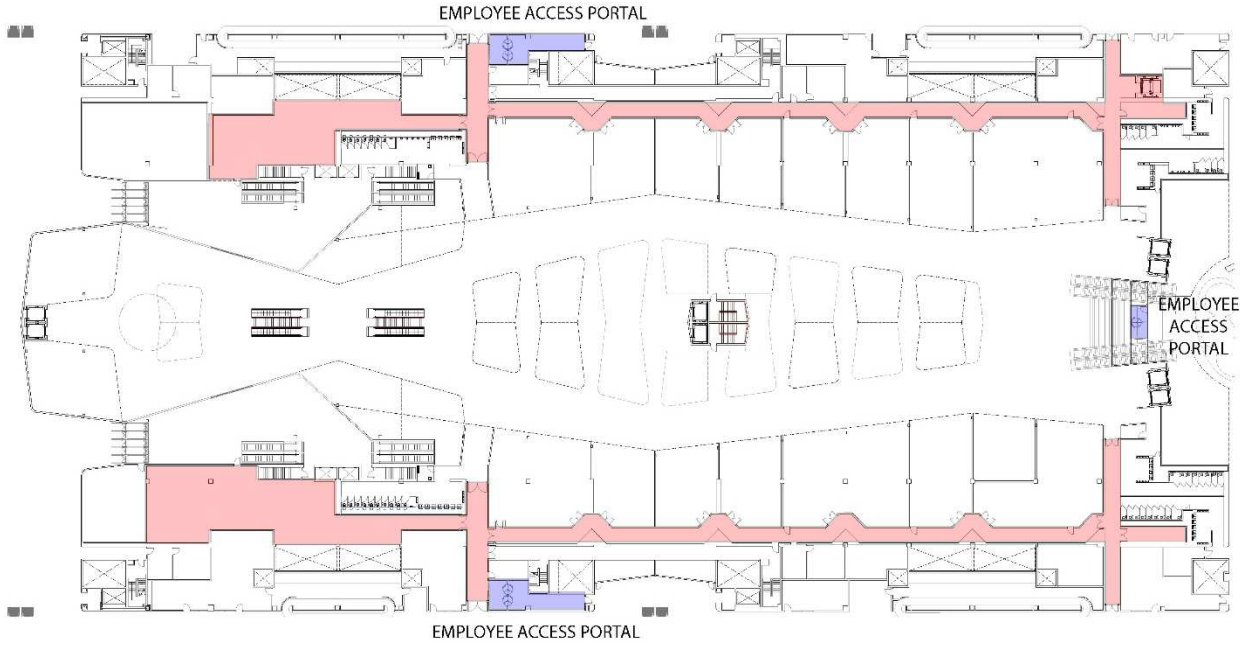


Fig. 2.5.6 – Back-of-House area diagram

2.5.7 LAND SIDE PLAZA

The Land Side Plaza is located at the south end of level 5, this is an innovatively designed space not just for persons to congregate and wait for arriving-passengers, but also to provide additional options and facilities for passengers staying at the adjacent hotel. Similar to the Airside-Plaza, this plaza will have a central space that will provide a combination of commercial, seating, and entertainment/interactive space. Additional commercial facilities flank its east and west side. (Please refer to section 2.9 for Commercial design strategies). Restrooms are also provided and are located at the Southern end of the plaza. Most passengers will move to the reclaim area on arrival and can proceed directly to their baggage carousel.

(Refer to Furniture & Equipment Annex)

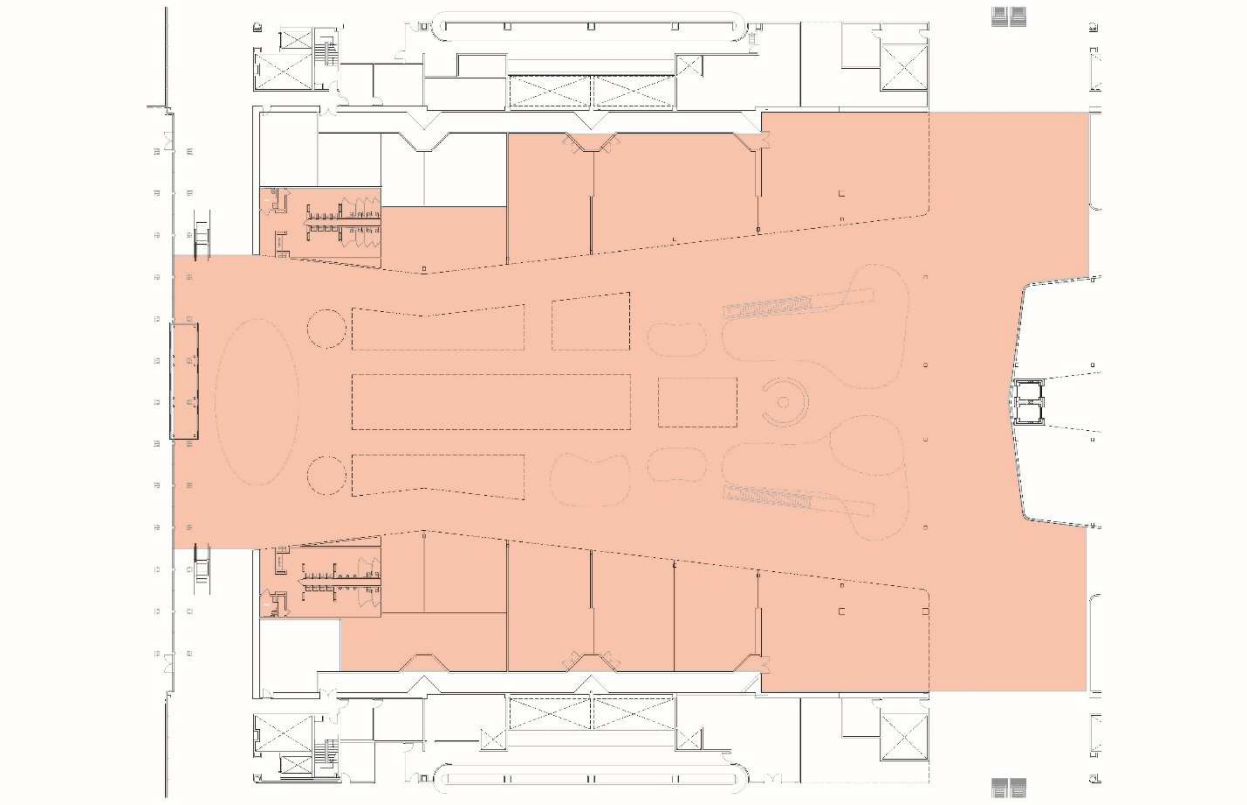


Fig. 2.5.7(a) – Landside Plaza Area Diagram

2.5.8 AGTS DEPARTING PLATFORM

Located at level 4, the major elements to be reconfigured in the departing platform are the escalators and stairs that lead from level 5. The internal walls will be adapted to accommodate this reconfiguration. Although not within scope of this Project, the benefit of this new configuration is that it accommodates future expansion of the AGTS trains. Due to this reconfiguration the entire ceiling and the flooring finishes will be replaced with new finish materials.

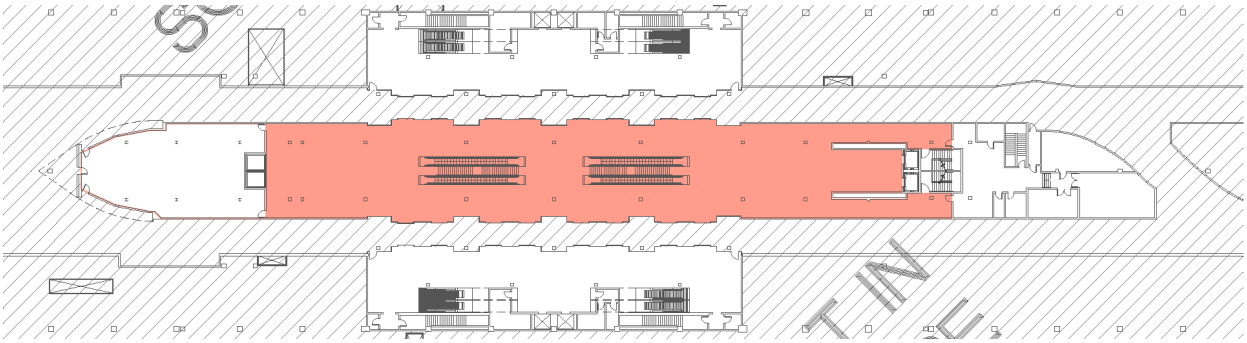


Fig. 2.5.8 – Departing Platform area diagram

2.5.9 AGTS ARRIVING PLATFORM

The footprint of the arriving-platform(s) will remain unchanged. There are floor/ceiling voids that allows the existing escalators access to level-5, however these voids currently extend beyond the escalator penetration. As to gain more floor space at level 5, these voids will be filled structurally up to the edge of the said escalators. The only material finish that will be replaced is the ceiling, whereas the existing flooring and walls finishes will remain as is.

Fig. 2.5.9 – Arriving Platform area diagram

2.5.10 CURBSIDE CANOPY

In addition to the renovation of the façade at the level 6 curb side façade (Section 2.5.1), there will also be improvements made to the curb side driveway at level 6. These improvements consist of a new curb with a new canopy. This canopy is intended to be long enough to provide cover for the new curb. The design intent is to increase the drop off space for passengers and ensure the external drop off arrangements are modified to compliment and reflect the new internal layout of facilities within the terminal. These improvements are currently expected to be undertaken in-line with Modular-Two and Modular-Three developments of the Terminal check-in hall.

This new canopy will follow modular framework as to allow for greater flexibility in implementation.

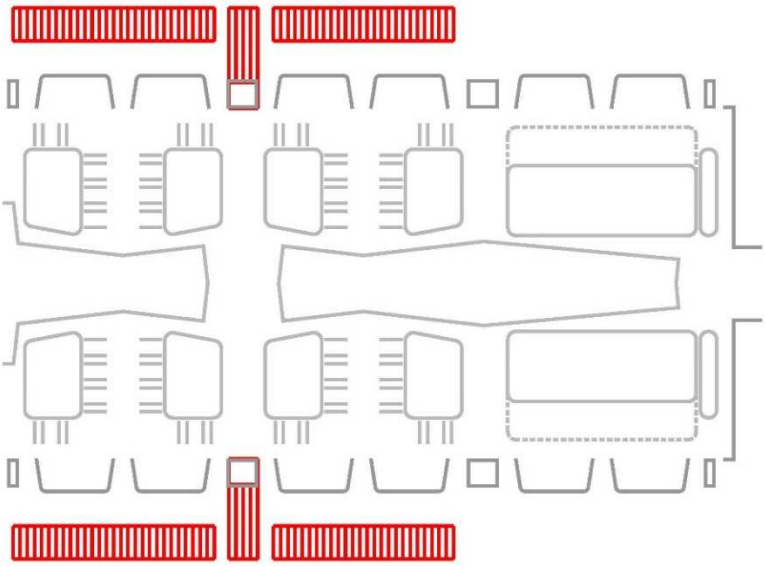


Fig. 2.5.10(a) – Alignment of canopy with Check-In Hall diagram

The new canopy should also act as a wayfinding element to aid passengers in their movement to the Terminal by expressing a hierarchy that leads to the locations of the main entrances to check in. This can be achieved through the play of canopy-geometry at various points along the canopy length.

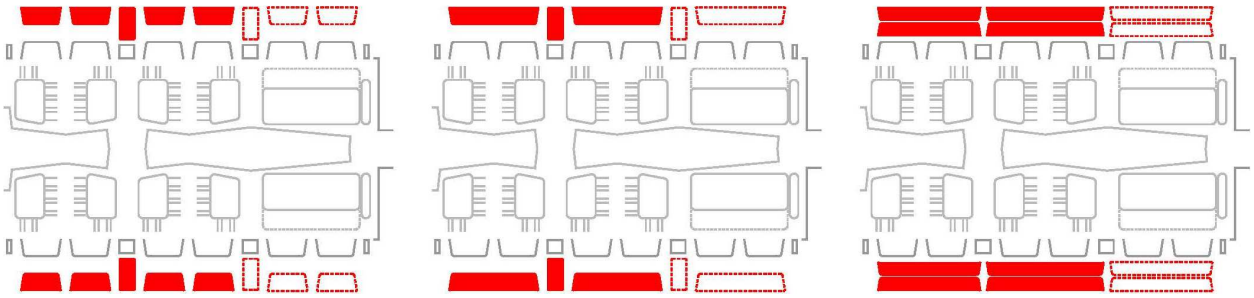


Fig. 2.5.10(b) – Layout of Canopy-geometry with possible expansions Diagram

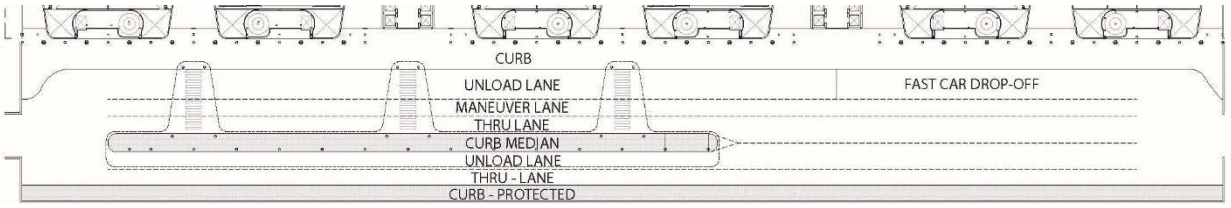


Fig. 2.5.10(e) – Level 6 curbside Diagram

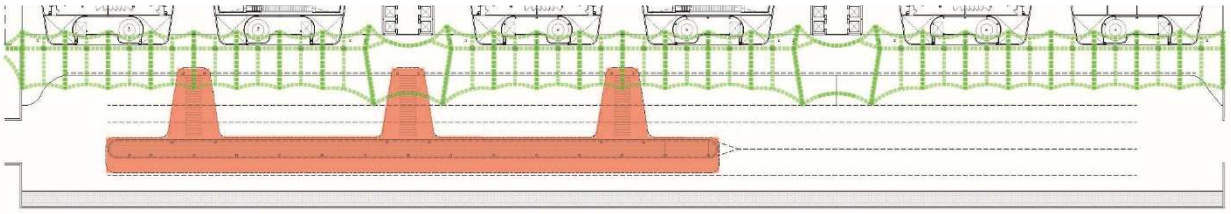


Fig. 2.5.10(f) – Proposed new canopy overhang (red) Diagram

2.6 MATERIALS

When defining the look-and-feel of the Project it has been the intention to give the design dual characteristics, integrating a modern and sophisticated atmosphere that embraces the latest materials with the warmth and boldness of an ambiance that is deeply connected to Colorado's culture.

The guiding principles for materiality are:

- Convey a sense of timeless modernity through the use of a selected few, elegant and durable finishes that marry low maintenance and attractive aesthetic qualities.

- A playful interaction of cold and warm materials has been explored, this addresses the dual character of spaces we want to convey: warm & friendly yet global & sophisticated.

- A meticulous use of light is crucial; using indirect lighting and natural lighting wherever possible point or a programmatic limit.

- Adequate visual hierarchy, being mindful of both the scale of the space.

- The selected use of color has also been explored and strategically placed. Use of color will convey implicit guidance to the user (such as wayfinding). Accent color will be highlight within a more neutral environment.

2.6.1 EXTERIOR

The east and west Terminal façades at level 6 are expected to be modernized in material appearance. The material finish will be updated to reflect the material palette used inside the Terminal, the intention is to create a seamless transition to the inside and minimize the appearance of dissimilar existing and renovated facades. The two major finish materials will be an Aluminium Composite that will have the characteristic of a rain-screen and a glazed curtain wall.

Bomb blast protection retrofits and blast-resistant measures are not included in the scope of work for the Great Hall Project.

The thermal performances of all new fenestrations will comply with current IECC standards, the actual thermal characteristics of the fenestrations will depend on the orientation and if any exterior shading elements are provided.

CLIMATE ZONE	5 AND MARINE 4	
Vertical fenestration		
***U*-factor**		
Fixed fenestration	0.38	
Operable fenestration	0.45	
Entrance doors	0.77	
SHGC		
Orientation[a]	SEW	N
PF < 0.2	0.40	0.53
0.2 ≤ PF < 0.5	0.48	0.58
PF ≥0.5	0.64	0.64

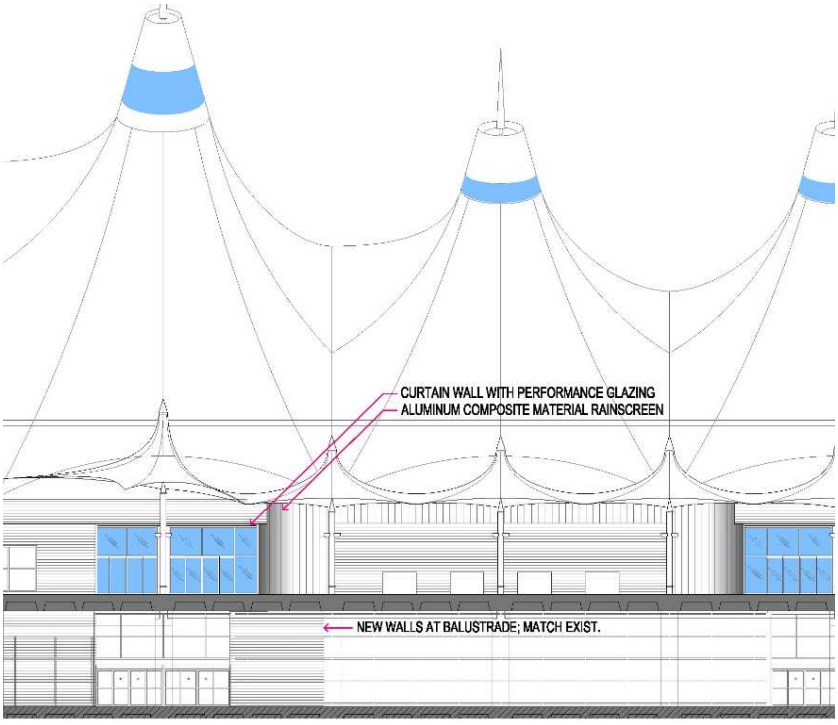


Fig. 2.6.1(a) – IECC: Fenestration Values

Fig. 2.6.1(b) – Curb side Elevation Typ.

2.6.2 INTERIOR

At the conceptual level, the material selection will follow within the DEN Design Principles Guidelines; minimize clutter, a limited palette of materials/colors/textures, and reinforce the link between the Terminal and its context with the region.

Some selected spaces within the Project scope will be finished and furnished. All spaces that are expected to be for future tenant use will constructed to the level of shell-and-core. Tenant finishing is not within the scope of the Project.

(Refer to FURNITURE AND EQUIPMENT Annex)

(Refer to FINISH SCHEDULE FOR SELECT ROOMS Annex)

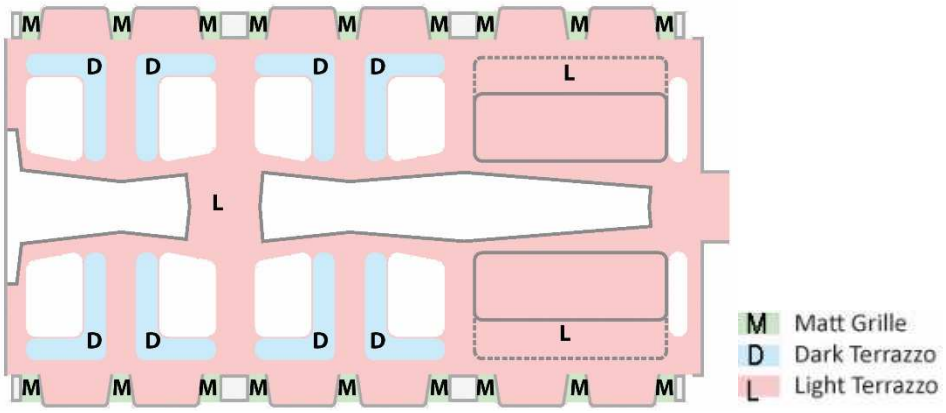
Demolition:

Although not fully elaborated in this Report, renovations on such a scale as this Project will require an extensive amount of demolition. This strategy is paramount considering that the Terminal will remain to be occupied and used during the life of the Project. In addition, attempts will be made to reuse and/or recycle materials as to possibly reduce cost and attain LEED rating points.

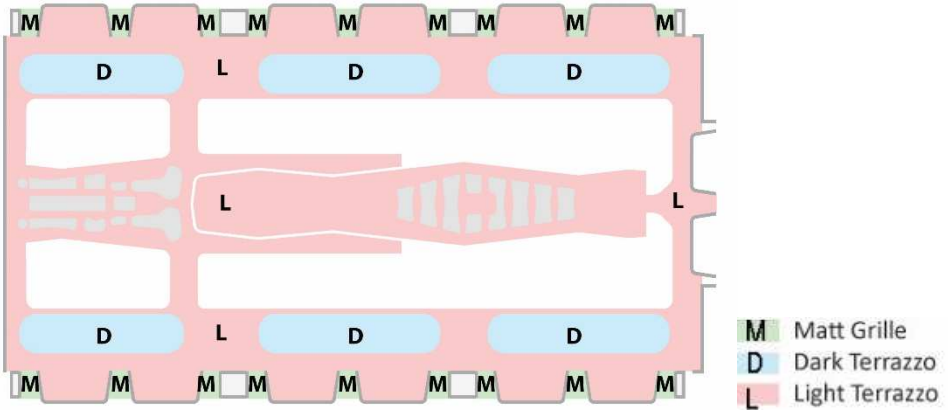
FLOORING

Airports are highly transited areas, where users often carry with them carry-on baggage and trolleys. It is therefore imperative that the flooring material is durable in addition to assisting with the functionality of the area its serving. The material of choice is Terrazzo, not only is it durable but it requires low maintenance. Another benefit is that terrazzo allows for a lesser density of joints compared with other flooring finishes. For the Grand Staircase, its steps will be made of Precast Terrazzo. The Check-In, TSA areas, and Baggage reclaim area will largely have terrazzo of a light tone and more homogeneous patterns, as to bring in a calm and bright atmosphere. Within these areas will be tonality of darker shades as to show the difference between circulation and waiting space, allowing the flooring to be a part of the wayfinding strategy.

Floor tile will be used in the restrooms and other wet areas. Back of house areas, office space, and logistic areas will have either carpet or sealed concrete.



Level 6 Flooring Diagram



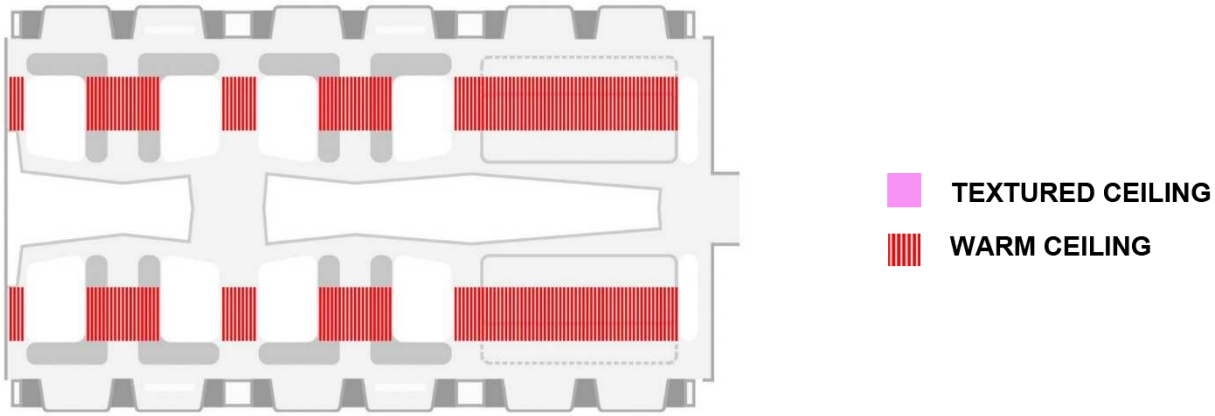
Level 5 Flooring Diagram

Cross section indicating flooring strategies

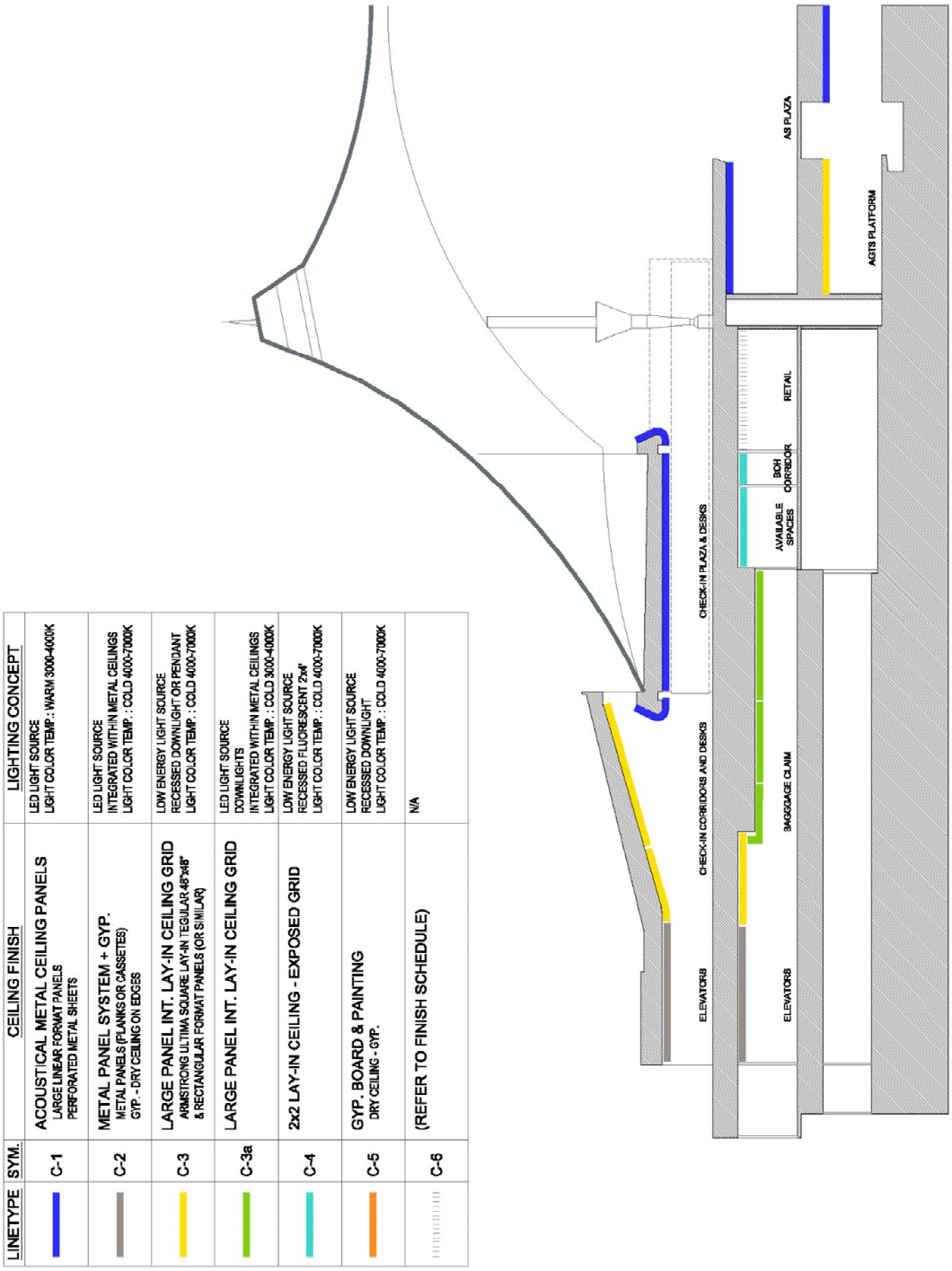
CEILINGS

The design intent is to use warmer materials in the most representative areas of the Terminal. Warm materials will help in the intent reducing stress and adding a friendly and welcoming quality. A color palette will be studied to see if there can be adaption to a 'Colorado' aura. All ceiling lighting is expected to be integrated with the ceiling systems. At areas expected to experience significant foot-traffic will have accent ceilings.

The intention is to minimize the spread of sound. Ceiling materials are expected to play a large role in curbing sound from migrating. Despite these measures, it is expected that the open areas will not meet DEN's technical criteria for sound levels.



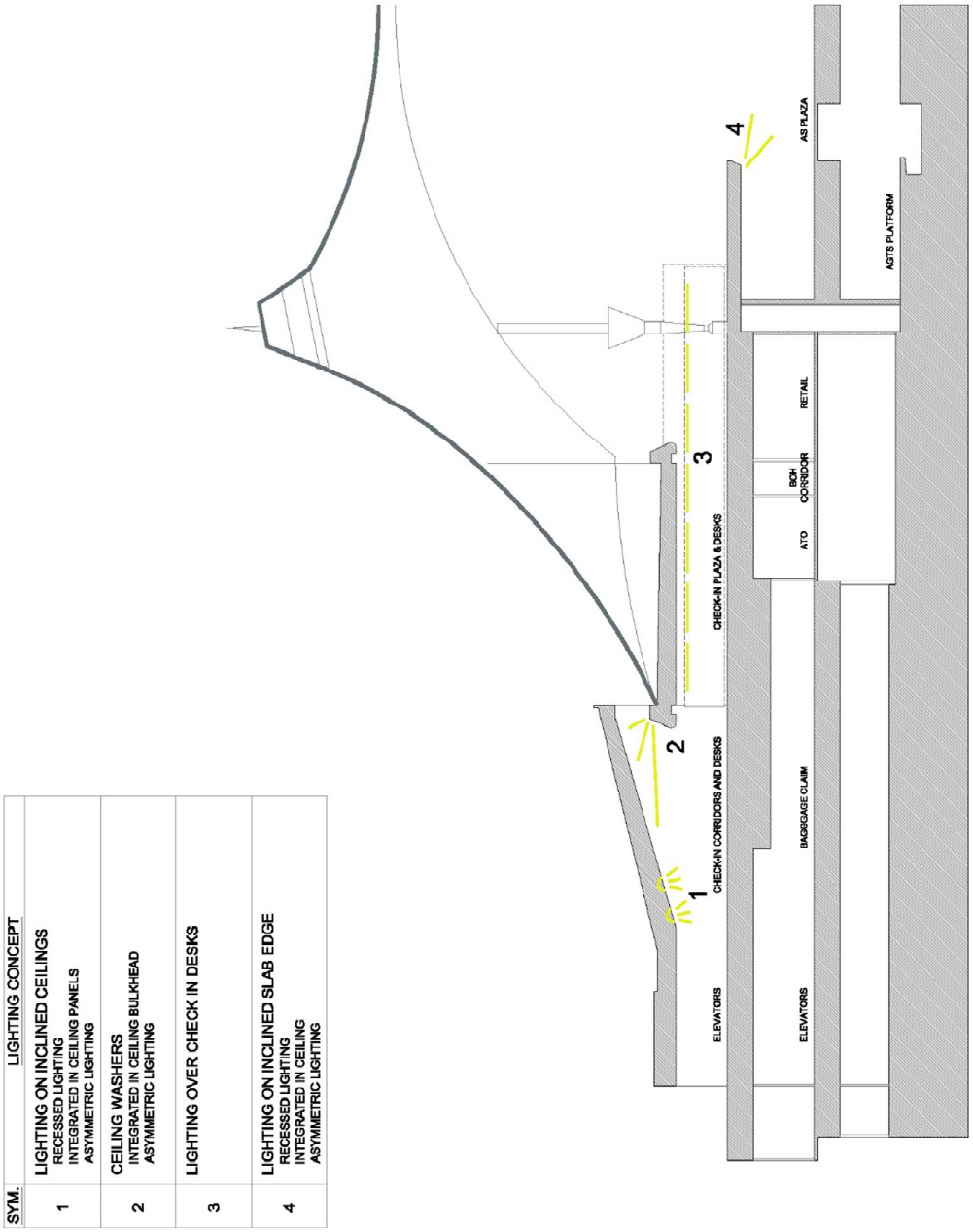
Ceiling Locations Diagram – Level 6



Cross section indicating ceiling strategies

SPECIAL LIGHTING FEATURES

Areas of the Terminal that will have high public use will have lighting features, this includes areas such as the Airside Plaza, Check-In desk lighting, lighting from existing skylights and the baggage area.



Cross section indicating lighting strategies

WALL LINING

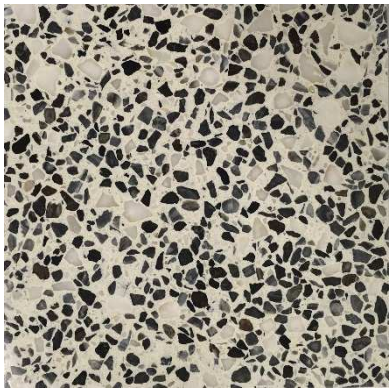
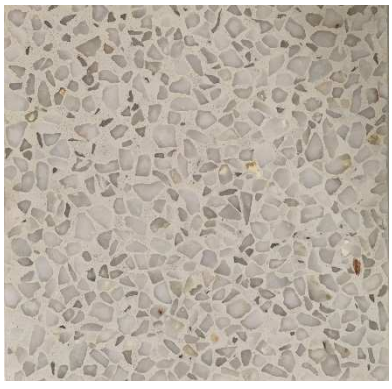
Wall lining materials play a fundamental role in the interior look of any airport. Because of their exposure to passenger traffic, wall linings need to be durable and easily maintained, particularly in the more prominent areas where passengers congregate and where checked-in baggage may apply additional wear and tear. At the same time, wall lining is also the main surface where various elements will need to be integrated (doors, FIDs, wayfinding, advertising, etc.) and thus the risk of introducing visual clutter is at its highest. Careful consideration should be given to select a material that is durable and allows different formatting arrangements.

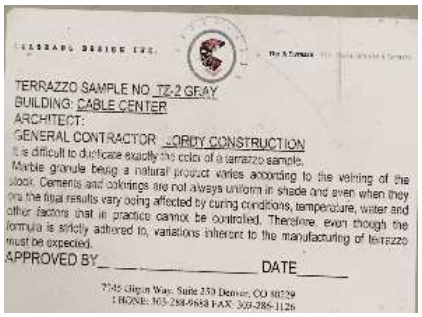
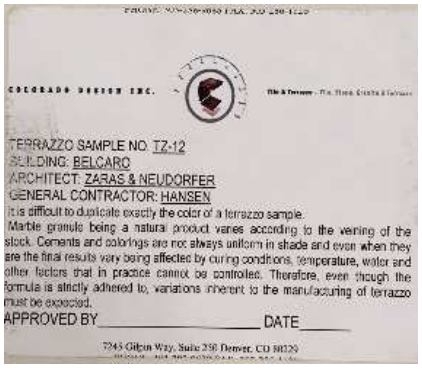
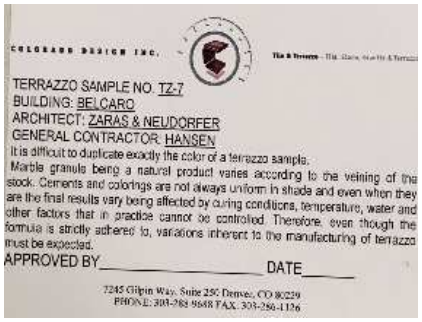
With the intention of reducing clutter, it is proposed that all the front-of-house wall lining material be consistent: high-impact, resilient and durable composite that are in large format sizes. Where needed, special care will be taken in the application of the new materials in areas where it is being placed next to existing material so as to align seams and patterns.

Although the main concept behind wall lining is to provide a single material as to give a consistent appearance throughout the Terminal, one exception has been made at the façade escalators that connect levels 5 and 6. These areas have a double height wall that is directly adjacent to the escalators. This allows for the opportunity to introduce opaque glass as a variation to the front-of-house finish, in that could take advantage of the scale of the space and proximity to the passenger whilst providing a low maintenance solution.

MATERIAL FINISH TABLE

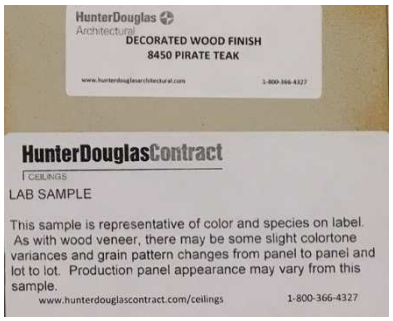
NOTE: Finishes depicted here are for reference purposes only.

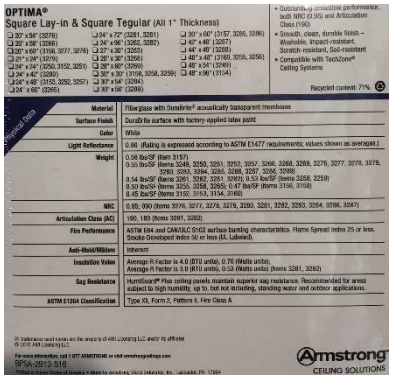
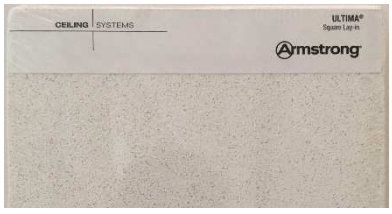
	FLOORING	
F-1	**EPOXY TERRAZO**	**Material Samples**
DESCRIPTION	Terrazzo flooring poured in place, divided by metal strips with geometry and 3 colors. Prefabricated, top-set, 4" terrazzo base included at all terrazzo flooring. Prefabricated terrazzo stair treads, risers, and landings to be ¾", set in steel stair pans	  

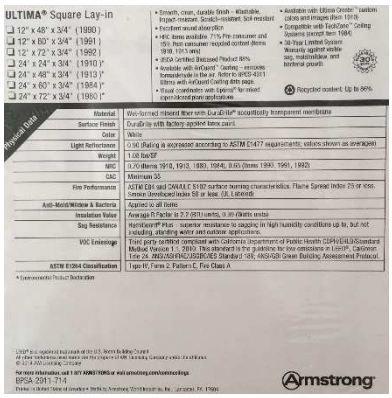
BRAND & PRODUCT TITLE	Terroxy Resin Systems or similar	  
F-2	**SEALED CONCRETE**	
DESCRIPTION	Cast in place concrete, sealed	
BRAND & PRODUCT TITLE		
F-3	**EXPOSED CONCRETE**	
DESCRIPTION	Exposed structural concrete	
BRAND & PRODUCT TITLE		
F-4	**CERAMIC TILE**	
DESCRIPTION	Tile. (12x12” or 24” x 24”)	

BRAND & PRODUCT TITLE	TBD	
F-5	**CARPET**	
DESCRIPTION	Carpet Tile. TBD	
BRAND & PRODUCT TITLE	TBD	
F-6	**ENTRANCE RECESS FOOT GRILLE**	
DESCRIPTION	Aluminum foot grille & heavy duty poly brush insert	
BRAND	Mat's Inc. Grate Mat or similar	
F-7	**ACCENT PAVEMENT**	
DESCRIPTION	Terrazzo flooring poured in place, divided by metal strips with geometry and colors as per design guidelines	
BRAND & PRODUCT TITLE	Terroxy Resin Systems or similar	

	CEILINGS	
C-1	**ACOUSTICAL METAL CEILING PANELS**	
DESCRIPTION	Metal Linear panels	  
BRAND & PRODUCT TITLE	TBD, Hunter Douglas, BOX 4 or similar	

		 
C-2	**METAL PANEL SYSTEM**	
DESCRIPTION	Metal panel ceiling, textured or plain painted aluminum panels and Gypsum board on edges or transition zones.	
BRAND & PRODUCT TITLE	Hunter Douglas, Architectural – Torsion Spring - Plank 0280 - Cotton White – 0.032" Aluminum or similar	
C-3	**4x4 LARGE PANEL INTEGRATED LAY-IN CEILING GRID**	

DESCRIPTION	Lay-In Ceiling Grids, Square lay-in mineral fiber glass panels and Gypsum board on edges or transitions	
BRAND & PRODUCT TITLE	Armstrong, Optima Square Lay-in & Square Tegular - #3160 48”x48” or similar	
C-3a	**2x4 LARGE PANEL INTEGRATED LAY-IN CEILING GRID**	
DESCRIPTION	Lay-In Ceiling Grids, Square lay-in mineral fiber glass panels and Gypsum board on edges or transitions	
BRAND & PRODUCT TITLE	Armstrong, Optima Square Lay-in & Square Tegular - 24”x48” or similar ppppp	
C-4	**2X2 LAY-IN CEILING, EXPOSED SUSPENDED CEILING GRID**	
DESCRIPTION	Lay-In Ceiling Grids, Square lay-in mineral fiber glass panels	

BRAND & PRODUCT TITLE	Armstrong, Ultima Square Lay-in - #1911 24”x24” or similar	
C-5	GYP. BOARD & PAINTING	
DESCRIPTION	Gypsum board, painted, eggshell finish, with appropriate access	
BRAND & PRODUCT TITLE	TBD	
C-6	SHELL & CORE	
DESCRIPTION	Exposed, unfinished structure. Painting of any exposed structure at Open to Structure areas (C-6) is not included	
BRAND & PRODUCT TITLE		

	WALL LININGS	
W-1	**HIGH IMPACT WALL PANEL**	
DESCRIPTION	High Impact Wallcovering Panels, made of engineered PETG, formed by high impact rigid sheets.	
BRAND & PRODUCT TITLE	Acrovyn, 0.40"/0.06¨/0.75¨Acrovyn 4000 or similar	
W-2	**HIGH IMPACT WALL PANEL MTL FINISH TO MATCH ESCALATOR**	
DESCRIPTION	High Impact Wallcovering Panels, made of engineered PETG, formed by high impact rigid sheets, with Brushed Silver finish.	

BRAND & PRODUCT TITLE	0.40"/0.06¨/0.75¨Acrovyn 4000 or similar	
W-3	**HIGH IMPACT GYP BOARD PAINTED W/WALL GUIDES**	
DESCRIPTION	High impact gypsum board with wall guides, painted	
BRAND & PRODUCT TITLE	TBD	
W-4	**PAINT**	
DESCRIPTION	TBD	
BRAND & PRODUCT TITLE	TBD	
W-5	**WALL ACCENT PANEL**	
DESCRIPTION	Glazed wall panels, made of laminated glass translucent internal layer, aluminum frame supported from wall structure.	
BRAND & PRODUCT TITLE	TBD	
W-6	**SCREEN PROTECTION 10ft**	
DESCRIPTION	Screen protection made of vertical mullions made of stainless steel, transparent and	

	laminated glass panels 2 sides supported and no cap tap on top. Height 10 ft.	
BRAND & PRODUCT TITLE	TBD	
W-7	GLAZED SCREEN PARTITION	
DESCRIPTION	Glazed wall panels, made of laminated glass and transparent glass, supported by aluminum frame. Height 10 ft.	
BRAND & PRODUCT TITLE	TBD	
W-8	FRP PANEL	
DESCRIPTION	FRP Wall Panels, made of fiberglass reinforced plastic panels	
BRAND & PRODUCT TITLE	NUDO, FiberLite or similar	 

		 
W-11	W11 HIGH IMPACT WALL PANEL RESTROOM	
DESCRIPTION	High Impact Wallcovering Panels, made of engineered PETG, formed by high impact rigid sheets, with Brushed Silver finish.	
BRAND & PRODUCT TITLE	0.40"/0.06¨/0.75¨Acrovyn 4000 or similar	
W-12	GLASS TRANSOM	
DESCRIPTION	2’-0” glazed transom above.	
BRAND & PRODUCT TITLE	TBD	
W-13	GLAZED MOVABLE PARTITION	
DESCRIPTION	A combination of opaque, non-glazed and glazed demountable partitions. Height 8 ft.	
BRAND & PRODUCT TITLE	TBD	
W-14	RETAIL CURTAIN WALL	
DESCRIPTION	TBD	
BRAND & PRODUCT TITLE		

W-15	BALAUSTRADE SCREEN PROTECTION 4ft	
DESCRIPTION	Screen protection made of vertical mullions made of stainless steel, transparent and laminated glass panels 2 sides supported and no cap tap on top. Height 4 ft.	
BRAND & PRODUCT TITLE	TBD	
W-16	ELEVATOR CURTAIN WALL	
DESCRIPTION	Point supported structural glass systems on north elevators connecting level 6 and 5.	
BRAND & PRODUCT TITLE	TBD	

	FACADES	
E-1	**CURTAIN WALL**	
DESCRIPTION	Glazed curtain wall to match existing curtain wall.	
BRAND & PRODUCT TITLE	**TBD**	
E-2	**COMPOSITE ALUMINUM RAINSCREEN PANELS**	
DESCRIPTION	Rain-screen system compound by aluminum frame, connectors, composite aluminum panels. ACM panel system is to be a rout and return spline joint rain screen system fabricated from 4mm FR core ACM sheet. Panel system is to be finished in one standard color, 2-coat non mica/nonmetallic white color/finish. Panel system is to have a nominal system depth of 2" with ½" vertical and horizontal joints. Panels are to be installed on continuous horizontal galvanized girts and 2" DOW scoreboard insulation, installed directly to the structure. Panel system is to have matching perimeter flashing and trim using .040" thick aluminum.	
BRAND & PRODUCT TITLE	TBD	

2.7 VERTICAL & HORIZONTAL CIRCULATION

Due to the extensive reconfiguration of program within the Terminal, most of the existing vertical circulation will be modified to adapt to the Terminal reconfiguration.

2.7.1 PUBLIC STAIRS

There will be public stairs connecting all three reconfigured levels of the Project. There will also be a grand staircase connecting level 6 with level 5 at the north end of the Great Hall and a pair of stairs connecting level 5 with the level 4 departing platform.

2.7.2 EGRESS STAIRS

The majority of the egress stairwells will be maintained, however there will be some replacements and additions of the stairwells as to keep the Project compliant with Code. The internal stairwells located in module-one, and only for level 6, will be rebuilt in a new location to accommodate the expanded TSA operations area. A new set of unrated egress stairwells are proposed to connect level 4 to level 5 and increase egress capabilities of the expanded level 4 departing-platform.

All BOH egress stairs to be exposed concrete and do not include coverings or stair nosings.

2.7.3 ELEVATORS

The Terminal has an extensive inventory of existing elevators and some of them will be replaced. The new elevators include;

Denver International Airport
Great Hall Program
Vertical Transportation
New Equipment

	Service Levels						
	1	2	3	4	5	6	
Floor Elevation	5338'-0"	5350'-6"	5360'-0"	5373'-0"*	5393'-0"	5413'-0"	
Height	---	12'-6"	9'-6"	13'-0"	20'-0"	20'-0"	Total price to includes multiple units

Legend		
ESC		New Escalator
ELEV		New Elevator
E-ELEV-F		Existing Frieght Elevator
E-ELEV-P		Existing Passenger Elevator

Assigned Name	MOD	SIDE	#	Quantity	Grid Reference	Phase	Capacity	Price	Description
ELEV-01	1	West	1	1	N29/W1.5	4			New Passenger elevator, glass front and rear, glass hoistway
ELEV-02	1	West	2	1	N29/W1.5	4			New Passenger elevator, glass front and rear, glass hoistway
ELEV-03	1	East	3	1	N29/E1.5	4			New Passenger elevator, glass front and rear, glass hoistway
ELEV-04	1	East	4	1	N29/E1.5	4			New Passenger elevator, glass front and rear, glass hoistway
ELEV-06	2	East	6	1	N29/W4	3			New Service Elevator
ELEV-07	3	West	7	1	N11/CL	2			New Passenger elevator
ELEV-08	3	East	8	1	N11/CL	2			New Passenger elevator
ELEV-09	1	West	9	1	N22/CL	4			New Passenger elevator
ELEV-10	1	East	10	1	N22/CL	4			New Passenger elevator
ELEV-11	2	West	11	1	N42/W3	1			New Passenger elevator

* Level 4 floor elevation is elevation of AGTS Train platform

Figure 2.7.3 – Vertical Transportation: New Elevators

2.7.4 ESCALATORS

The Terminal has an extensive inventory of existing escalators and some of them will be replaced. The new escalators include;

- Within the level 6 concourse A bridge will be a single new escalator that will travel down to level 5.
- Along the west and east façade of the Terminal, new escalators will be provided. These escalators will connect level 5 and level 6.
- Southern end of Terminal, up travel escalators connecting level 5 with level 6, intended for departing passengers arriving via the hotel or RTD rail that need to access to the check-in hall.
- In the center-south side of the Terminal, up and down-travel escalators connecting level 5 with level 6, intended to connect the Check-In Hall with the Landside Plaza.
- In the center-north side of the Terminal, down escalators connecting level 6 with level 5, intended to connect the Check-In Hall with the Airside-Plaza.
- In the center of the Terminal, down travel escalators connecting level 5 with level 4, intended to connect the Airside-Plaza with the Departing Platform.

Denver International Airport
Great Hall Program
Vertical Transportation
New Equipment

		Service Levels							Legend		
		1	2	3	4	5	6		ESC		New Escalator
									ELEV		New Elevator
	Floor Elevation	5338'-0"	5350'-6"	5360'-0"	5373'-0"*	5393'-0"	5413'-0"		E-ELEV-F		Existing Frieght Elevator
									E-ELEV-P		Existing Passenger Elevator
	Height	---	12'-6"	9'-6"	13'-0"	20'-0"	20'-0"	Total price to includes multiple units			
Assigned Name	MOD	SIDE	#	Quantity	Grid Reference					Phase	Capacity	Price	Description
ESC-01	3	West	1	1	N8/W8					2			Finish to Match Existing in the Airport, two treads on the flat
ESC-02	3	West	2	1	N8/W8					2			Finish to Match Existing in the Airport, two treads on the flat
ESC-03	3	East	3	1	N8/E8					2			Finish to Match Existing in the Airport, two treads on the flat
ESC-04	3	East	4	1	N8/E8					2			Finish to Match Existing in the Airport, two treads on the flat
ESC-05	3	West	5	1	N1.5/W3					2			Finish to Match Existing in the Airport, two treads on the flat, remove
ESC-07	3	East	7	1	N1.5/E3					2			Finish to Match Existing in the Airport, two treads on the flat, remove
ESC-09	2	West	9	1	N18/W8					1			Finish to Match Existing in the Airport, two treads on the flat
ESC-10	2	West	10	1	N18/W8					1			Finish to Match Existing in the Airport, two treads on the flat
ESC-11	2	East	11	1	N18/E8					1			Finish to Match Existing in the Airport, two treads on the flat
ESC-12	2	East	12	1	N18/E8					1			Finish to Match Existing in the Airport, two treads on the flat
ESC-13	1	West	13	1	N29/W1					4			Finish to Match Existing in the Airport, two treads on the flat
ESC-14	1	West	14	1	N29/W1					4			Finish to Match Existing in the Airport, two treads on the flat
ESC-15	1	East	15	1	N29/E1					4			Finish to Match Existing in the Airport, two treads on the flat
ESC-16	1	East	16	1	N29/E1					4			Finish to Match Existing in the Airport, two treads on the flat
ESC-17	1	West	17	1	N31/W6.5					3			Finish to Match Existing in the Airport, two treads on the flat
ESC-18	1-2	West	18	1	N15/CL					4			Finish to Match Existing in the Airport, two treads on the flat
ESC-19	1-2	West	19	1	N15/CL					4			Finish to Match Existing in the Airport, two treads on the flat
ESC-20	1-2	East	20	1	N17/CL					4			Finish to Match Existing in the Airport, two treads on the flat
ESC-21	1-2	East	21	1	N17/CL					4			Finish to Match Existing in the Airport, two treads on the flat
ESC-22	0	West	22	1	N32/W1					1			Finish to Match Existing in the Airport, two treads on the flat
ESC-23	3	West	23	1	N8/W1.5					2			Finish to Match Existing in the Airport, two treads on the flat
ESC-24	3	East	24	1	N8/E1.5					2			Finish to Match Existing in the Airport, two treads on the flat

Figure 2.7.4 – Vertical Transportation: New Escalators

2.7.5 MOVING WALKWAYS

Within the boundary of the Project there exists two moving walkways, they are located at level 6 on the Concourse-A pedestrian bridge. Both of these existing moving walkways will be replaced so as to accommodate a new escalator located at its southern side.

Denver International Airport
Great Hall Program
Vertical Transportation
New Equipment

						Service Levels									Legend		
						1	2	3	4	5	6				ESC		New Escalator
															ELEV		New Elevator
					Floor Elevation	5338'-0"	5350'-6"	5360'-0"	5373'-0"*	5393'-0"	5413'-0"				E-ELEV-F		Existing Frieght Elevator
															E-ELEV-P		Existing Passenger Elevator
					Height	---	12'-6"	9'-6"	13'-0"	20'-0"	20'-0"	Total price to includes multiple units					
Assigned Name	MOD	SIDE	#	Quantity	Grid Reference							Phase	Capacity	Price	Description		
Travelator - Moving Walkway	AOB	CL	1	2	N41-N44/EW							1			New walking travelators 120' long		
Travelator - Moving Walkway	AOB	CL	2	2	N35-N40/EW										New smaller walking travelators 150" long.		

Figure 2.7.5 –Transportation: New Moving Walkways

2.7.6 PEDESTRIAN BRIDGES

Due to the relocation and subsequent expansion of TSA SSCP area at the north end of level 6, the use of the north pedestrian bridge that connects the east and west wings will become obsolete. The Project therefore includes the removal of the bridge which helps create a more open space for the Airside-Plaza. The south pedestrian bridge will remain and be widened to accommodate the additional pedestrian load from the removal of the north bridge.

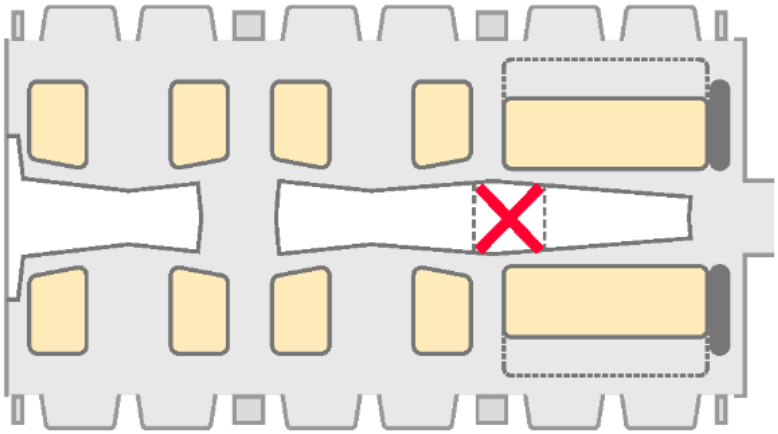


Fig. 2.7.6 – Removal of North Pedestrian Bridge Diagram

2.7.7 WAYFINDING

In addition to reducing the number of possible paths a passenger can take, the Project will also include wayfinding aiding elements that include, but are not limited to the following;

- Static signage
- Media screens
- Information totems
- Wall mounted
- Floor mounted
- Ceiling mounted
- Product Integrated

Visual clutter will be reduced through the employment of these elements at strategic locations only. The reconfiguration of spaces will allow the architecture itself to provide intuitive guidance and provide clear sight lines for passengers. Wherever possible, suspended and/or freestanding wayfinding elements will be given priority due to their effectiveness and the fact that they are less susceptible to being visually lost within any commercial advertising.

The number of possible paths throughout the Terminal is vast. Nevertheless, the wayfinding elements shown below are located in areas with expected major departing passenger paths;

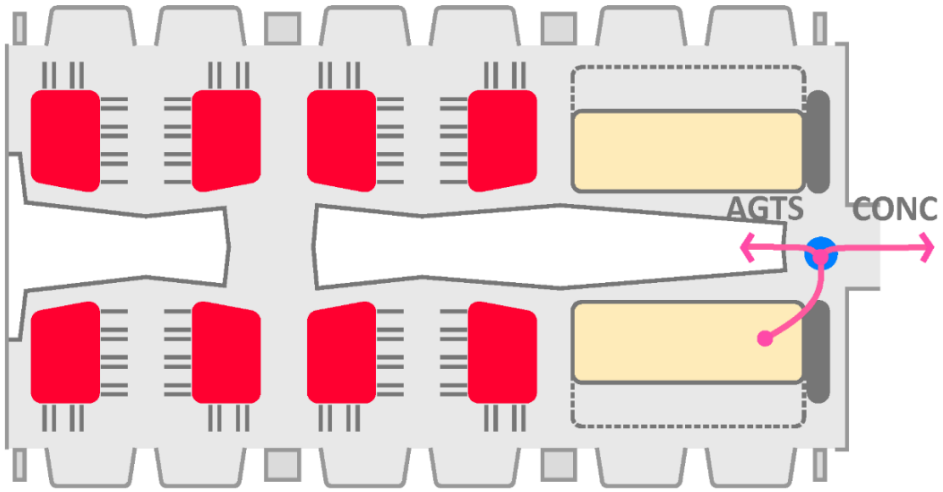


Fig. 2.7.7(a) – Wayfinding after TSA Diagram

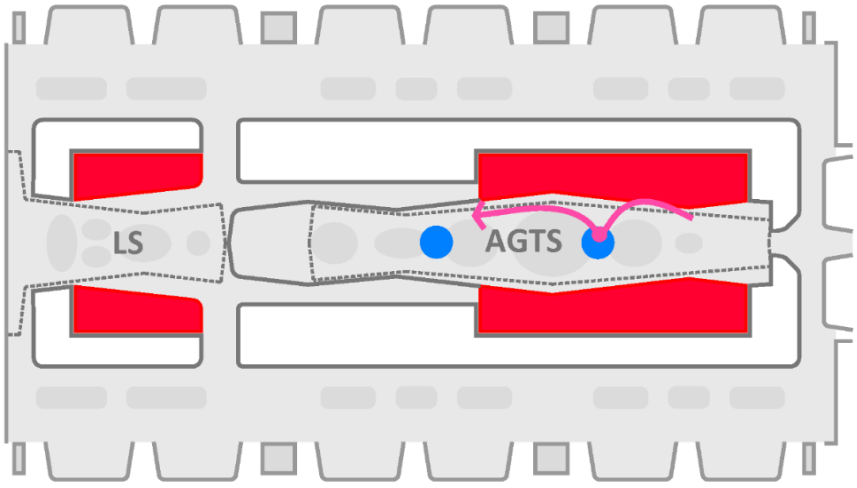


Fig. 2.7.7(b) – Wayfinding in Airside-Plaza Diagram

2.8 TERMINAL SERVICES

As the demands of the Great Hall grow, so do the required Terminal services. Although these spaces are largely out-of-sight, their value is important to create a smooth-functioning Terminal.

2.8.1 GOODS & SERVICES

Goods and services for the commercial tenants of the Great Hall will originate from level 4. This level includes an existing loading dock space and security screening. The Project calls for a new security screening room, located at the northwest-center area of the Terminal. The location of the goods elevator and a dumb-waiter elevator has been coordinated.

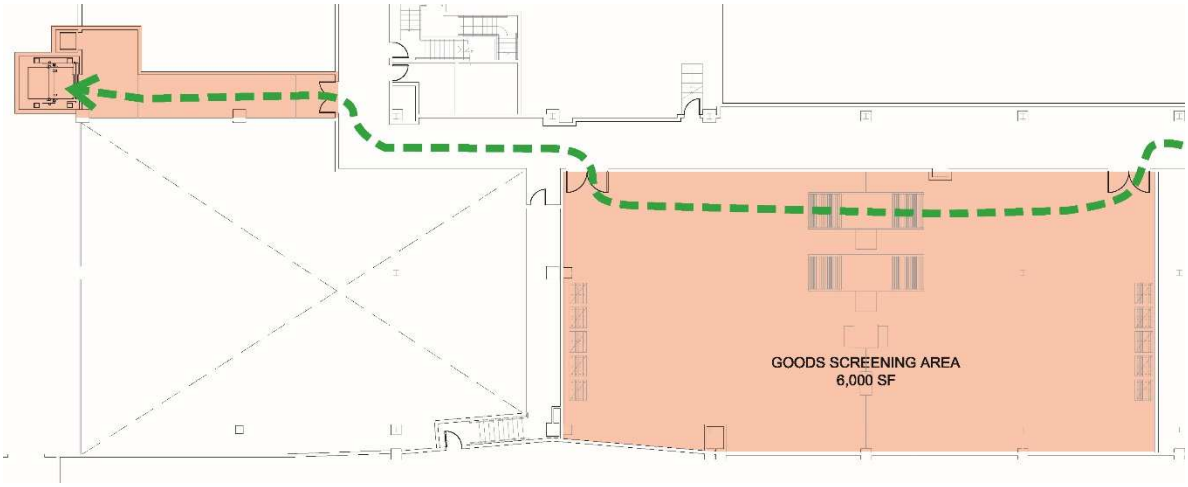


Fig. 2.8.1 – Goods Flow on Level 4 Diagram

2.8.2 JANITORAL & MAINTENANCE

All newly constructed restrooms will have a janitor closet with sufficient space to incorporate a mop-sink. Maintenance-access to the center restroom fixtures will be via a pipe-chase space.

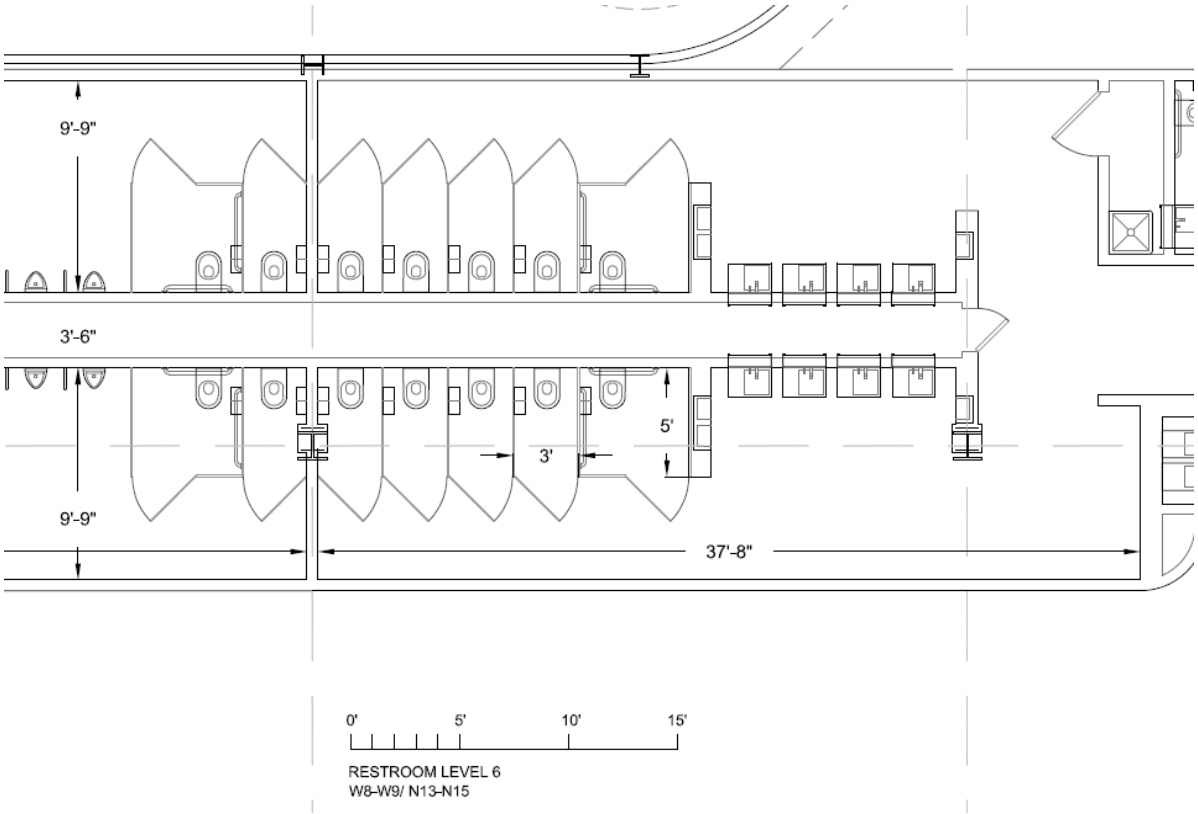


Fig. 2.8.2 – Pipe Chases Diagram in Restrooms – Typical

2.9 PUBLIC SPACE

2.9.1 LEVEL-6 LANDSIDE CONCESSIONS ENVIRONMENT

Departing passengers arrive on level 6, ticketing and security, from various points. The space will be designed to balance functional requirements with a stress-free environment. Ample circulation areas, clear directional signage, simple modern design, and supportive retail opportunities will support this goal.

This retail is centered around the bridge that connects the East and West side of the terminal. The four corners of this space have convenience and quick service food options.

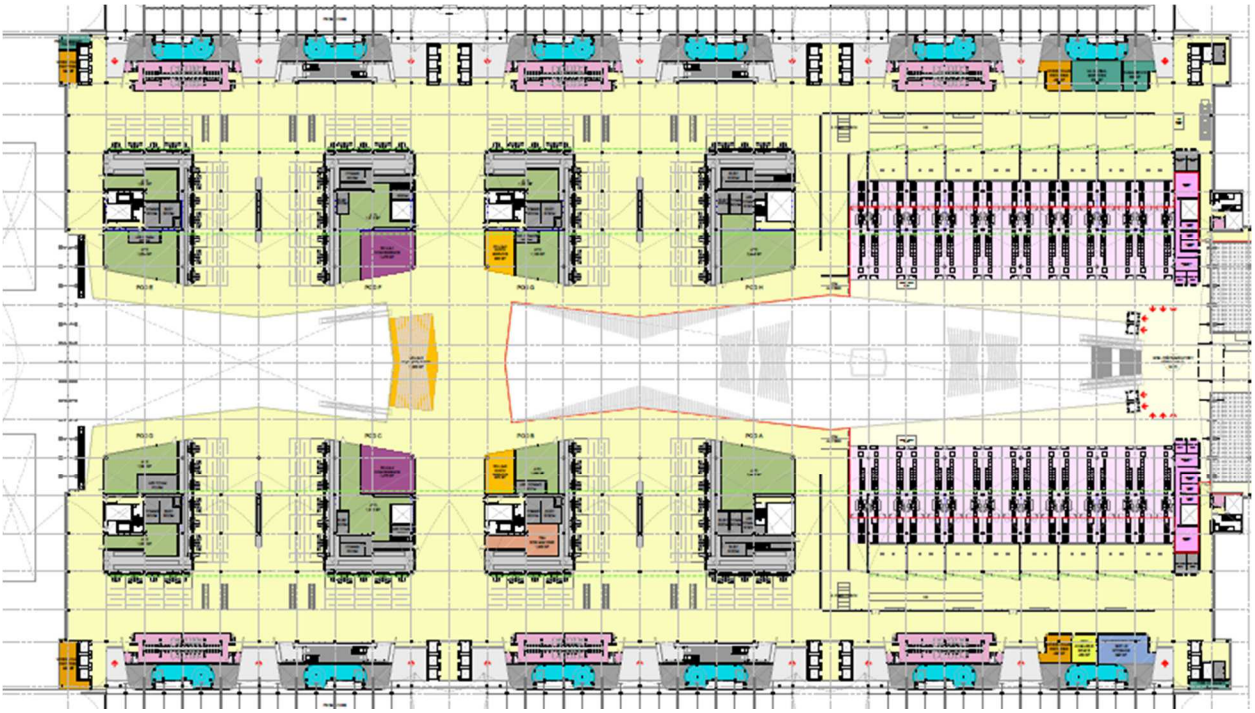


Fig. 2.9.1(a) – Level 6 Landside Concessions (gray shaded)

On the bridge, there will be a bar. It will overlook the Landside Plaza below, as well as have a close visual link to the iconic experience element of the Great Hall.

Specific design topics include:

- Use three dimensional, expressive, yet cohesive elements (not random and chaotic) that provide personal scale, while clarifying the passenger orientation toward the ticketing counters and security.
- Tenant guidelines will establish minimum transparency expectations of stores to preserve sightlines, as well as suggestions for strategies for accomplishing these goals, along with

certain set design elements and material requirements that will help provide visual and thematic cohesion while allowing for individual tenant / brand expression.

- Provide storefronts that are expressive, engaging and reinforce the experience of the passengers. The design guidelines will help define the potential for more dynamic expression, including neutral piers, signage, lighting and image.

2.9.2 LEVEL-5 LANDSIDE CONCESSIONS ENVIRONMENT

Arriving passengers will have the option to traverse the area, as well as those greeting them. Airport employees, passengers arriving from the RTD light rail and transit terminal, and hotel guests all will come through this space.

The plaza is surrounded by stores that will provide a variety of eating and shopping options. The Landside Plaza will also include a Business Incubator unit. This area will be finished and basic furniture will be provided. In the center, there will be small scale retail with seating. The children's interactive play area will be integrated with the retail units so that families can eat, wait and enjoy a positive experience.

The statue of the terminal namesake, Elrey B. Jeppesen, will be located at the north end of the Landside Plaza. Around the statue a visitor desk will be located.

Four escalators will take people up to Level 6- ticketing and security areas, as well as the Level 6 bar on the bridge.

Specific design topics include:

- This plaza will act as a space that will 'greet, orient and direct' visitors. A clear primary circulation will have a free range of secondary circulation, with visual transparency across the space. Flexible space and functions will assure that people will have fun within the casual, modern 'living rooms' of retail and seating. The concessions are designed for people to "live life, travel well'!
- The potential exists for a slightly different theme for this area. While continuing a common thread of the 'warm, contemporary mountain' brand of the other retail areas, it will also relate to Union Station, the train, planes, technology, etc. It is the interface to Denver proper.
- The space acts as both a focal point for arriving passengers, as well as point of focus for those arriving from the hotel/train. Many employees arrive here (make them proud). This area will provide a retail /hospitality environment that will maximize dwell or linger time and hence dollars spent by all three primary customer groups – passengers, hotel guests, and employees.
- Individual tenants will design and construct their spaces. The developer will establish design standards to establish a cohesive identify within the landside and airside plazas.
- Allow for orientation upon arriving at top of escalators and while moving to the Landside area by providing area for people to stop and orient themselves.
- This space provides a positive and exciting experience. The Landside Plaza will provide a powerful brand introduction for DEN and Colorado, "Welcome to Denver, CO"!
- Landside Plaza Seating Areas will include furniture (lounge chairs, coffee tables, benches), planters, plants, light-poles. The landside plaza will have 200 seats approx.

2.9.3 LEVEL-5 AIRSIDE CONCESSIONS ENVIRONMENT

A passenger's first introduction to the Airside Plaza is from Level 6, either a distant view from the ticketing area, or as an overlook view after clearing security. The 're-composure' area immediately after leaving the security screening will have views over the central seating and retail space of the plaza. As they move toward the north end escalators, elevators and stair, they will see directional and flight information screens

As passengers descend the escalators into the Great Hall, they will see a unique retail environment that provides an array of innovative shopping and dining experiences. A central space will provide food, relaxation, seating options, with a variety of retail shops lining the space. The retail units in the central area will be united visually under an overhead trellis.

At the center plaza area, a variety of seating types will accommodate eating, lounging and people watching. Flight information screens will be clearly visible, so that passengers will know how much time they have before their flights. Information about time-travel to concourses will also be available.

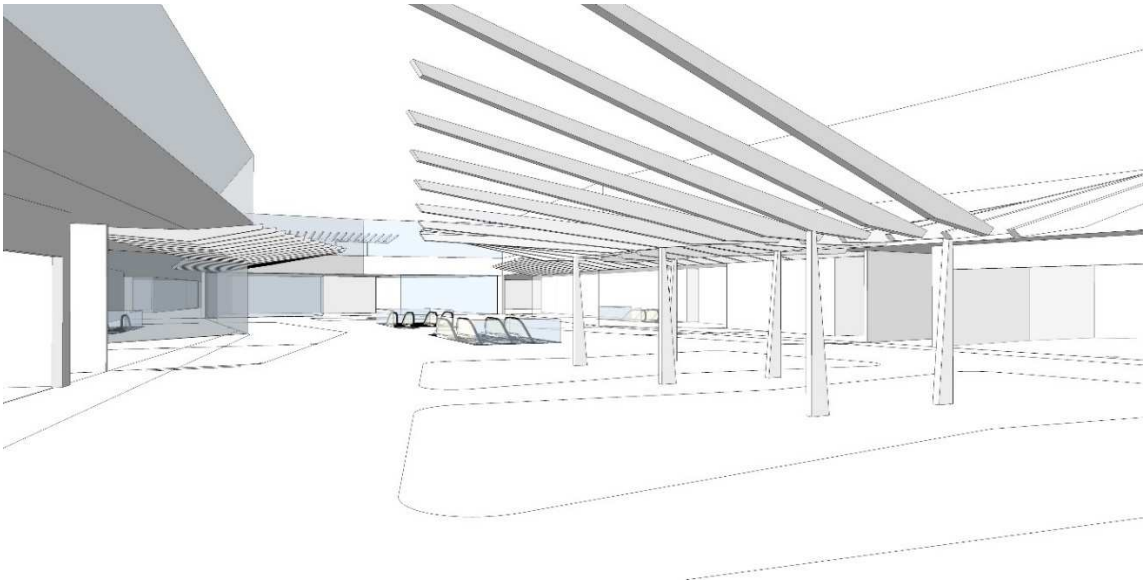


Fig. 2.9.3(a) –Trellis view in the Airside Plaza

Integrated lighting will highlight the retail opportunities. The trellis also defines the central seating.

Between the four escalators that lead to the AGTS a Digital Info pylon will be located. This info pylon will show information about trains schedule so passengers will know at any time how long it will take to get to the concourses.

The stores on the perimeter of Level 5, will have unique and dynamic storefronts designed and constructed by each tenant according to design standards established by the Developer.

Fig. 2.9.3(b) – Example of storefronts along the Airside Plaza perimeter

Specific design topics include:

- Provide strong, identifiable three-dimensional elements that provide scale within the space, such as a trellis structure, iconic storefronts, light fixtures, seating, and elements that reinforce the overall image. There is a strong, geometric framework, not random and chaotic, that will help clarify the passenger's orientation as they move toward the trains.
- Define edges of concessions without impeding sightlines or the lateral flow of passengers. This can be done through subtle changes in material and with limited use of (non-sightline obstructing) low walls and seating.
- Tenant guidelines will establish minimum transparency expectations of stores to preserve sightlines, as well as suggestions for strategies for accomplishing these goals, along with certain set design elements and material requirements that will help provide visual and thematic cohesion while allowing for individual tenant / brand expression.
- Unique environment, relaxing, comfortable, calming, with a variety of seating options.
- By providing flight information, time to concourses, video monitors, and clear orientation, the Great Hall will reinsure passengers that they can shop and easily make their flights.
- Provide storefronts that are expressive, engaging and reinforce the experience of the passengers. The design guidelines will help define the potential for more dynamic expression, signage, lighting and image.
- Inline versus island retail: At the access to the trains the concessions will take on a blend of island and in-line with potential of transparency through to the passenger flow. The retail, whether it is inline or island, will be exposed to overhead views from level 6.
- The Airside Plaza Seating Areas will include furniture (lounge chairs, coffee tables, benches), planters and plants. The airside plaza will have 200 seats approx.

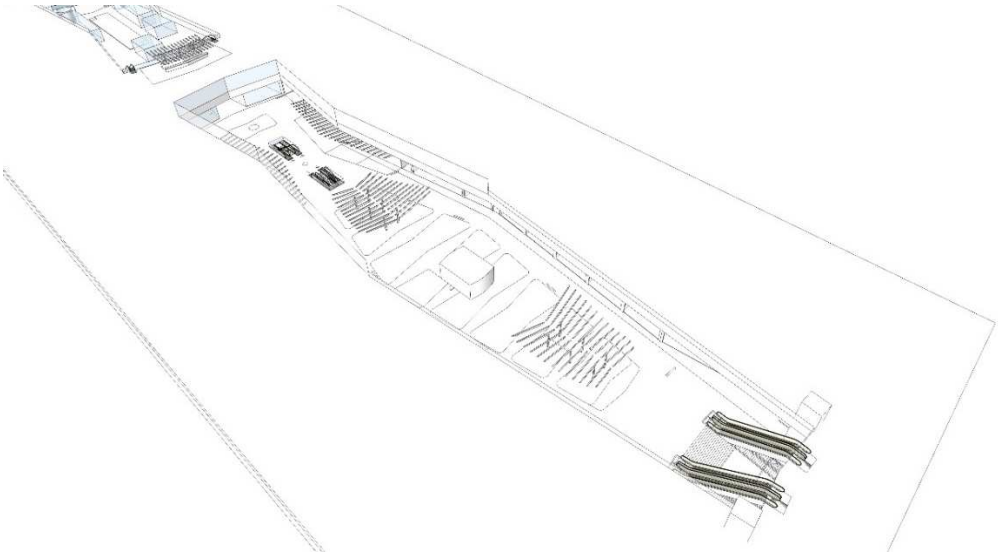


Fig. 2.9.3(d) – Trellis distribution on Level 5 & Level 6

2.9.4 LEVEL-5 INTERNATIONAL ARRIVALS LANDSIDE CONCESSIONS ENVIRONMENT

The area for passengers arriving on international flights provides an opportunity to introduce Denver and Colorado to those visitors. Arriving passengers, as well as their greeters, will be presented with a vibrant area of seating, along with essential retail. Food and convenience units, along with a currency exchange tenant space will satisfy their immediate needs. An information kiosk will provide a place to get information. The area will be bright and inviting, with signage to help direct visitors to their connecting flights, transportation and additional retail opportunities.

Specific design topics include:

- The International Arrivals Plaza Seating Area will include furniture (lounge chairs, coffee tables, benches), planters and artificial plants. The International Arrivals Landside Plaza will have 20 seats approx.

2.9.5 CUSTOMER EXPERIENCE PROPOSAL FOR AIRSIDE AND LANDSIDE PLAZA

The planned redevelopment of the Great Hall of the Denver International Airport will create a new, modern experience for all visitors and travelers passing through the airport. Inspired by the unique and diverse culture of Colorado and the New West, the Airside Plaza will provide a memorable experience that marks the true beginning of every traveler's journey.

Media Escalators:

Most passengers likely will take one of the escalators down to Level 5. Along the way, they'll have a fun encounter with virtual travelers also descending into the Great Hall.

Creating the experience is a glass divider sandwiched between each pair of escalators and composed of transparent video screens. As guests step onto the escalators, they will see their virtual companions on the video screens traveling along with them.

The characters on video will be fellow airport patrons, international travelers, colorful personalities from Colorado lore such as gold miners or indigenous people, members of local sports teams, celebrities, even some of the airport's notorious aliens and super-secret men in black. Sensors along the escalator path may detect when real passengers are present and thus trigger interactive content, e.g., a character on screen might turn to ask a question or make a comment.

The media escalators also present marketable branding opportunities. Characters on the displays might carry branded bags or wear recognizable outdoor gear or fashions from the retailers whose shops are directly visible from the escalator. There could even be special events such as a sponsored escalator fashion show or a salute to local heroes such as firefighters, helpful airport personnel, or kids who get straight-As in school.

Each pair of escalators accessing the Airside Plaza from Level 6 will include full-body diagonal transparent OLED media panels sandwiched between two layers of protective glass mounted between the escalator balustrades.

Fig. 2.9.5(a) Example of Media Escalators

Media Wall:

Video panels will be displayed in one third of the total length of the perimeter. They will be slightly tilted towards the Plaza and a height of approximately 96" in the tilted axis. There are no video-walls in the Landside Plaza.

The screens may also be used to display sponsored content from retailers and others.

Overhead Cloud Show:

Ultralight flying models shaped like fluffy clouds occasionally drift overhead lending an ethereal fantastic context to the hustle and bustle below. Flying among them, trying to keep a low profile, is an UFO that gives a sly nod to the unusual mythology and traditions associated with the airport. The various flying objects initially congregate on a structure in the Plaza, and eventually launch into a choreographed routine over the entire Plaza during scheduled show times.

The clouds are constructed around models formed from durable and highly flexible materials that are filled with helium so that they literally float in the air. The clouds contain onboard avionics and electric motors and can be “piloted” remotely by operators using radio control, or follow preprogrammed paths with pinpoint precision.

The clouds may also interact with other elements in the space; if they drift toward one of the media displays on the side spandrels, they can trigger a sudden squall. Near the iconic element at the southern end of the Plaza, the clouds can trigger a snowstorm over a previously serene mountain panorama.

The clouds require occasional battery recharges, helium refills and other routine maintenance, and are designed to dock into special locations. The clouds may be integrated into an overall program for the Plaza and the scheduled show times will be an eagerly-anticipated, must-see highlight of any visit to the airport.

Due to security restrictions, cloud flight will not be allowed to cross from airside to landside and, due to fire alarm beam detectors within the Great Hall, will not be allowed to exceed approximately 12’-0” above Level 6 finished floor elevation.

Fig. 2.9.5(b) –Example of Overhead Cloud Show

Non - Interactive Kids Area – Airside Plaza:

Also located near the center of the Plaza there is a dedicated space for a play area. The play area features a complete playground (provided by DEN) for kids.

Interactive Kids Area – Landside Plaza:

Located at the north end of the Plaza, near the Jeppesen Statue, there is a dedicated space for a play area.

The interactive floor can cycle through various activities to keep the area feeling fresh, and may also feature easy to learn group games and activities like a giant game of tic-tac-toe.

Fig. 2.9.5(d) – Examples of Interactive Kids Area – Landside Plaza

Iconic Sphere and Interactive Floor:

At the south end of the plaza, just beyond the escalators to the Automated Guideway Transit System (AGTS) Platform, a large iconic sphere appears to be floating and attracts passengers to approach and take a closer look.

The sphere is paneled with facetted LED mesh panels and cycles through a customized media program that will showcase its unique display capabilities.

The base of the sphere is encompassed by an array of interactive floors that are functionally similar to the one found in the Interactive Kids Area.

Because the sphere will be elevated for maximum visibility, it will be possible to walk directly underneath it as well. Guests will discover a large floor-mounted wheel that they can be physically turned, causing the sphere to appear to rotate through animation in the media

The sphere is anticipated to be cantilevered from the expanded south bridge.

Fig. 2.9.5(e) – Example of Iconic Sphere Element and Interactive moment

2.9.6 CUSTOMER EXPERIENCE ELEMENTS

The Customer Experience Elements scope of work includes the following items:

MEDIA ESCALATORS:

Planar (or similar) LO55-S Transparent OLED 55" Displays stacked three rows high running in-between both sets of escalators from L6 to L5 Airside Plaza. OLED panels to be protected by glass screens on each side of all OLED panels. All servers, programming and content is not included.

MEDIA WALL:

Approximately 8'-0 tall LED panels with a maximum resolution of 6mm, located in the Level 5 Airside Plaza along the East/West L6 slab edge from gridlines 18 to 24 only. All servers, programming and content is not included.

OVERHEAD CLOUDS:

(3) Radio-controlled helium-filled balloons made to look like clouds as provided by Airstage (or similar), including (1) docking stations and an autonomous cloud control system. All servers, programming and maintenance required for flight (battery swapping, helium re-filling, etc.) not included.

INTERACTIVE KIDS AREA at LANDSIDE PLAZA ONLY:

Brightlogic ActiveFloor (or similar) reactive flooring with 7.8mm LED panels and (2) video controllers for programming content. All servers, programming and content is not included. A 2'-0 rubber flooring border is included at the perimeter of the reactive flooring to accommodate any potential height differences in the finished floor elevations. Floor covering over the LED panels (e.g. glass, acrylic panels, etc.) is not included (not required).

ICONIC SPHERE ELEMENT:

Steel sphere structure with a 13'-0 radius includes 20 lbs/sf for the total surface area of approximately 2,100 SF. (2) 13'-0 W27x539 beams are included to connect the sphere to the bridge, and 108 tons of steel included to reinforce the bridge structure to carry the loads of the sphere.

LED media panels with a maximum resolution of 6mm are included at the entire surface area of approximately 2,100 SF. All servers, programming and content is not included.

Metal cladding is included at the W27x539 support arms.

Waterfall/fountains are not included per DEN's direction.

Mesh media panels are not included per DEN's direction.

Brightlogic ActiveFloor (or similar) reactive flooring with 7.8mm LED panels included below the sphere. All servers, programming and content is not included. A 2'-0 rubber flooring border is included at the perimeter of the reactive flooring to accommodate any potential height differences in the finished floor elevations. Floor covering over the LED panels (e.g. glass, acrylic panels, etc.) is not included (not required).

Customer Experience Elements servers, media programming and/or content is not included.

2.10 RESTROOMS

Through the idea of relocating services to the periphery of the Terminal, all restrooms in the Project will be new. This will not only allow for the complete modernization of fixtures and finishes but also keep the facilities consistent in terms of interior design.

2.10.1 FACILITY LOCATION

In comparison with the existing layout, the proposal improves access to the restrooms, providing more facilities throughout the Terminal which will shorten walking distances. The proposal is also code compliant.

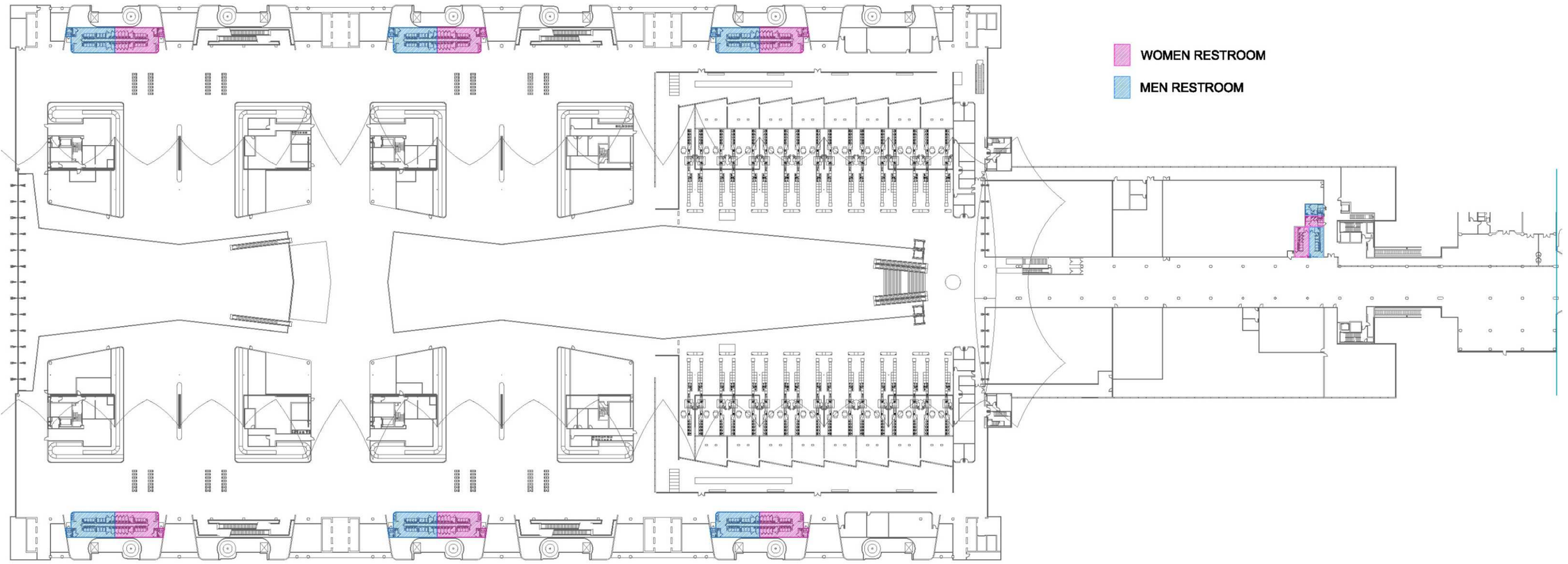


Fig. 2.10.1(a) – Level 6 Restroom Facilities

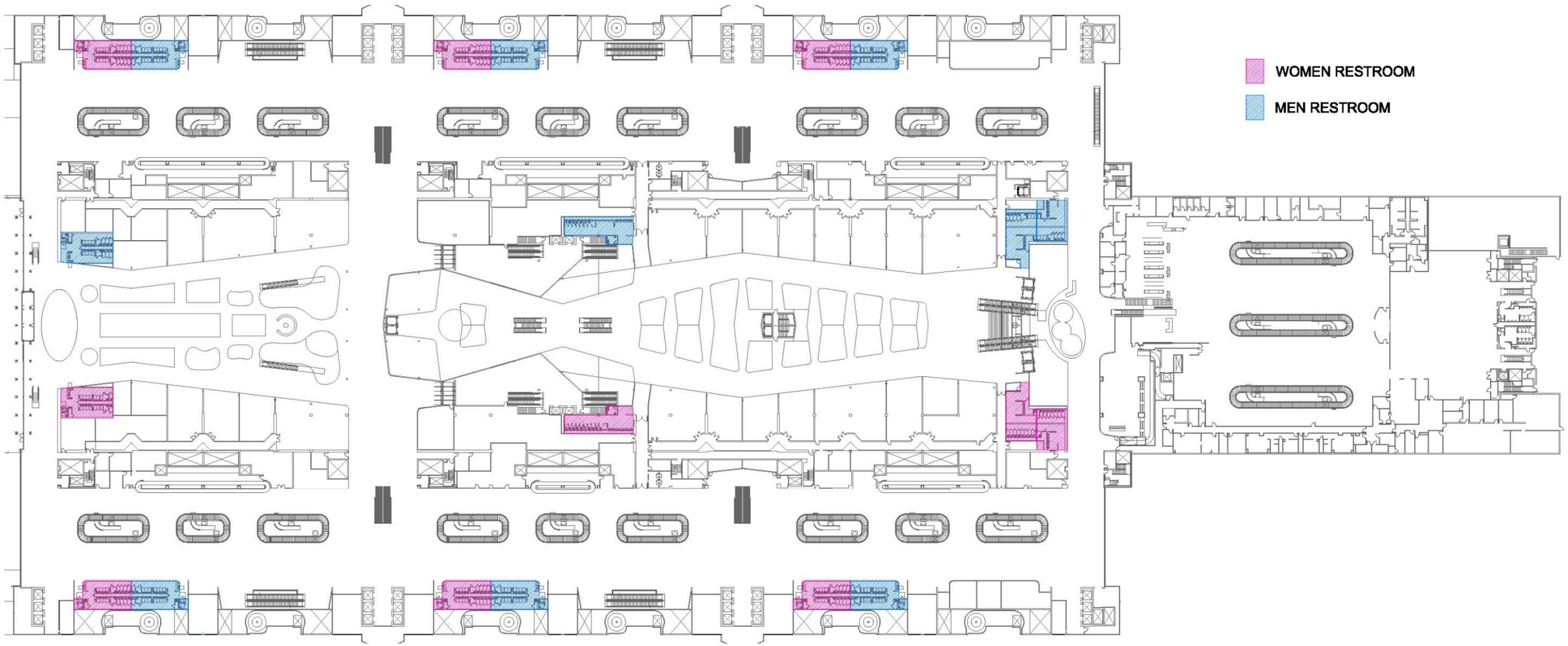


Fig. 2.10.1(b) – Level 5 Restroom Facilities

2.10.2 FIXTURE COUNT

Level 6[3]				
		Code Minimum	Existing	Proposed
Landside	*Water Closets[4]*	**16**	**45**	**96**
Airside	*Water Closets[4]*	**7**		**3**
Landside	*Urinals*	**-**	**19**	**36**
Airside	*Urinals*	**-**		**2**
Landside	*Lavatories[4]*	**8**	**40**	**96**
Airside	*Lavatories[4]*	**7**		**6**
Level 5[2]				
		Code Minimum	Existing	Proposed
Landside	*Water Closets[4]*	**26**	**88**	**120**
Airside	*Water Closets[4]*	**8**		**24**
Landside	*Urinals*	**-**	**30**	**46**
Airside	*Urinals*	**-**		**8**
Landside	*Lavatories[4]*	**15**	**64**	**132**
Airside	*Lavatories[4]*	**5**		**18**
[2] Level 4 public Occupants are expected to use Level 5 Restrooms, Level 4 data included				
[3] Airport Office Bridge expansion excluded				
[4] Sum of Male and Female requirement				

Each facility will comply with DEN requirement of providing at least two ADA accessible toilet stalls.

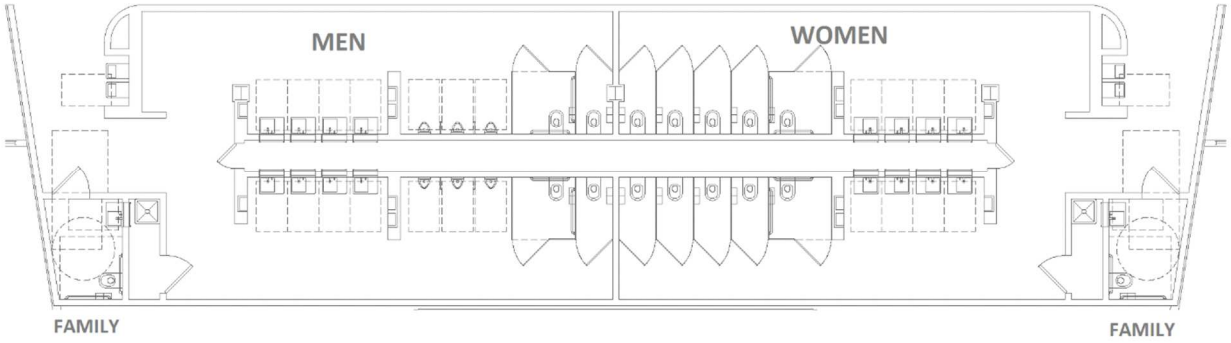
Currently there are no public restrooms in the level 4 Arriving and Departing platforms, due to the transit nature of these spaces, this will remain unchanged.

Two drinking fountains will be located outside each public restroom. One drinking fountain will be mounted at a standard height and the second mounted at a height to comply with ADA, with a bottle fill device.

2.10.3 CHARACTERISTICS

All restrooms will be modernized in both materials and layout. The restrooms are formatted in a way that allow for half of the restroom to undergo cleaning without closing the entire restroom, this is achieved by mirroring the fixtures.

All new restrooms will comply with ADA regulations, the number of stalls for handicapped users is expected to exceed ADA requirements. As per DEN standards there will be two stalls for handicapped passengers within each facility - which sits well with the mirrored strategy identified above.



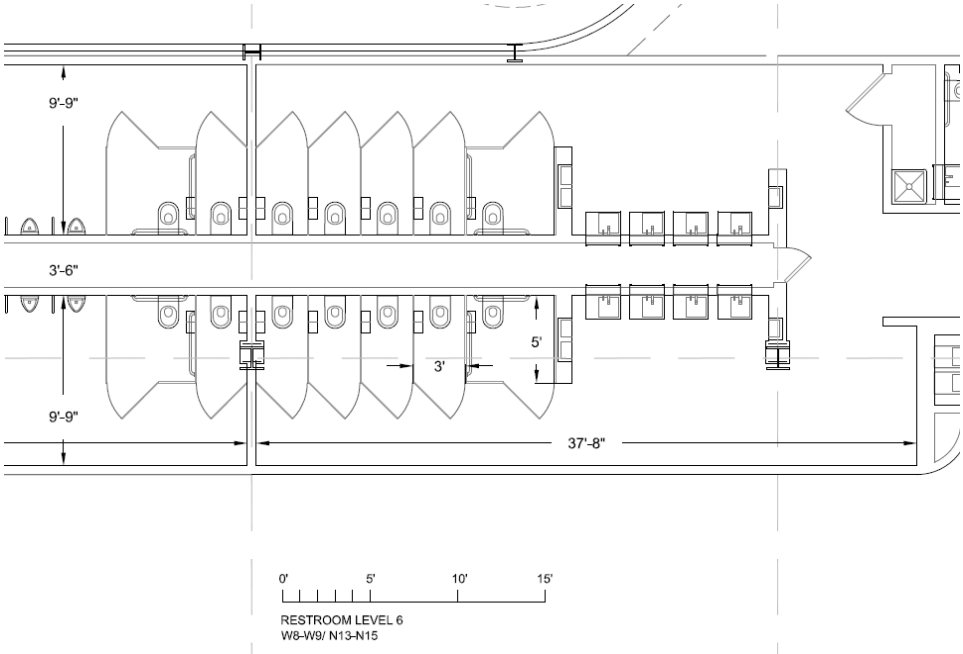


Fig. 2.10.3(a) - Typical Restroom Layout (Level 6)

2.11.2 EGRESS STRATEGIES

Most of the egress elements are expected to be preserved, any new/modified elements will be constructed so as to comply with the current Code. As there will be additional program development at level 6 (AOB addition and Great Hall floorplate expansion), existing egress elements that are expected to experience this additional occupant load may need to me modernized to the current Code.

In the event of a full evacuation, building occupants will have multiple options to exit/discharge from the Terminal at level 6, level 5, and level 4.

2.12 LIFE & SAFETY MEASURES

The number of existing Automated-External-Defibrillator's (AED) will be maintained in the Terminal. If an existing AED needs to be relocated and/or remounted it is expected that the AED will be mounted to ADA mounting height and wall projection requirements.

Dedicated space for paramedics and their associated sleeping quarters will be located on level 6 at the northwest corner of the Terminal.

2.12.2 TORNADO SHELTERS

Although not required by Code, DEN has stipulated a requirement that tornado shelters be provided in the Terminal. Tornado shelters will be provided in all the stairwells and restroom facilities. The (un-adopted) ICC-500 standard is being referenced as to appropriately layout these facilities. The amount of shelter space provided in the Proposed for all three levels of the Terminal is estimated to be 38,700 square-feet. This is an approximate 45% increase of the existing storm shelter space in the terminal, existing is estimated to be 20,000 square-feet (in comparison with known designated spaces located at level 6, 5, and 4).

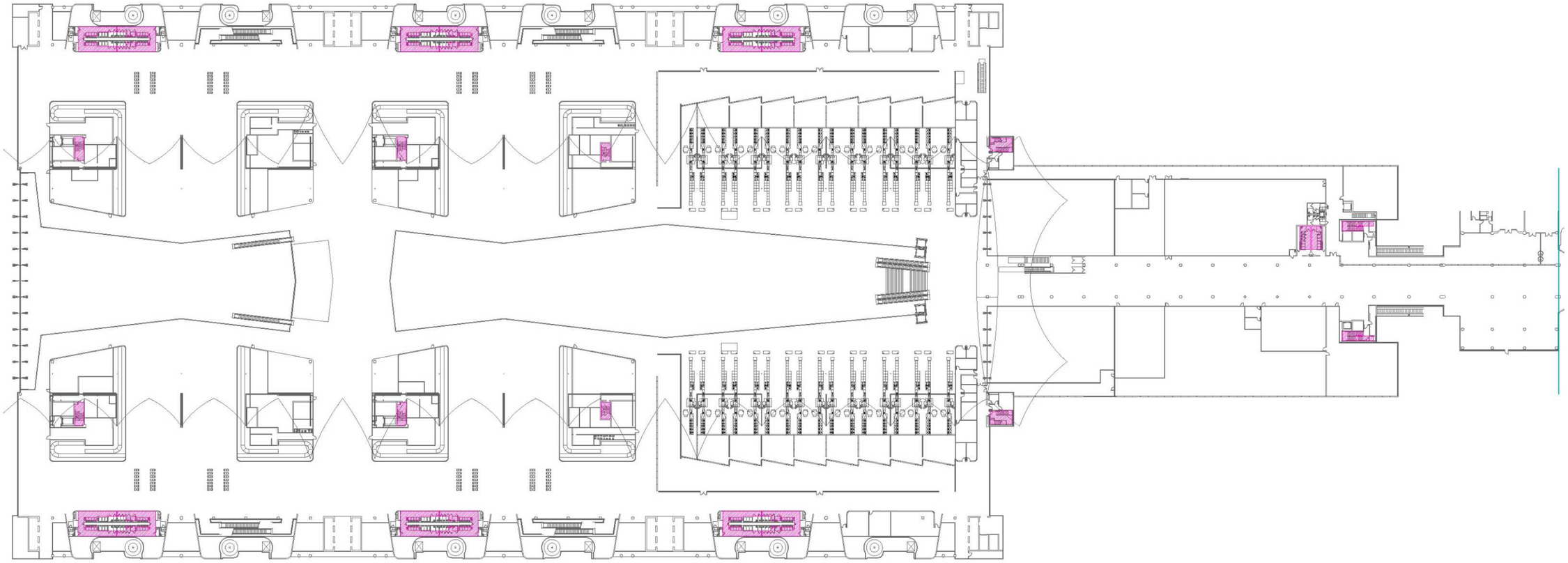


Fig. 2.12.2(a) Level 6 Tornado Shelters Diagram

TORNADO SHELTERS LEVEL 6: 8,000 sqft

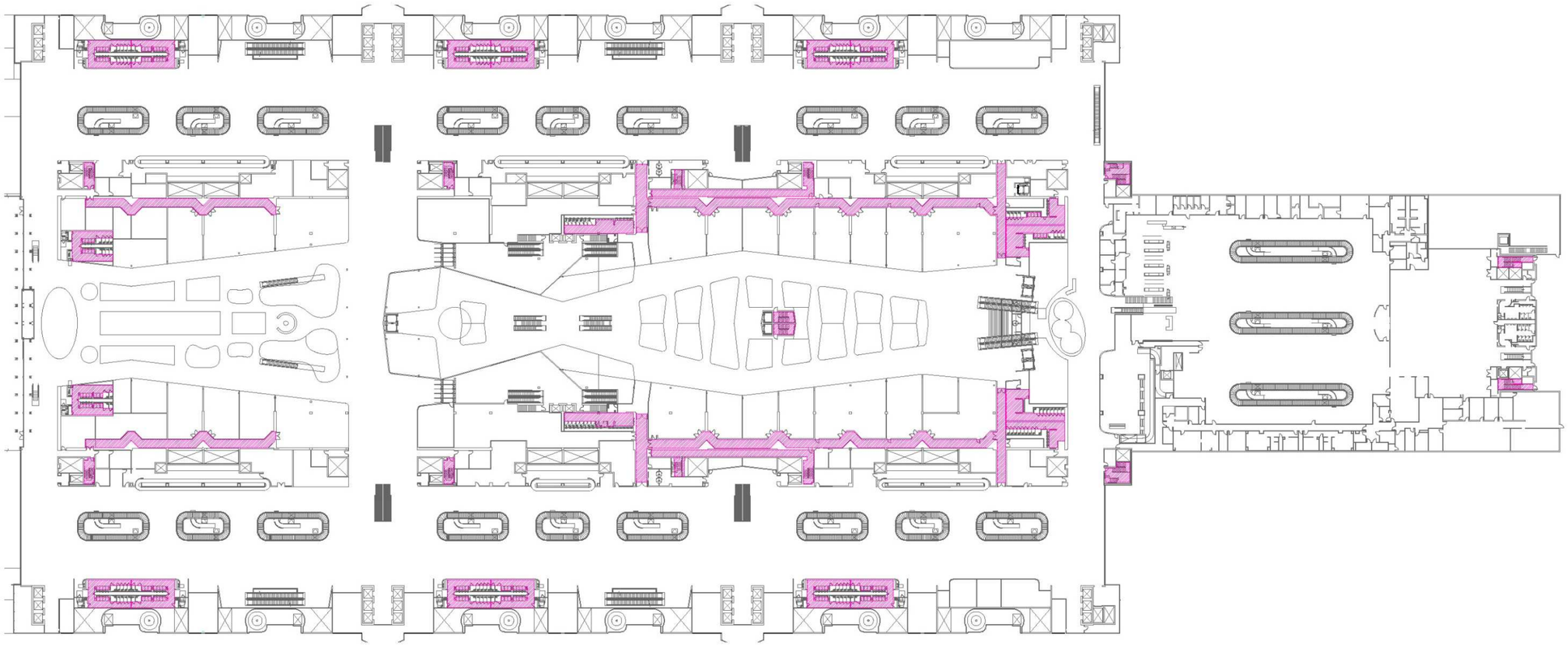


Fig. 2.12.2(b) Level 5 Tornado Shelters Diagram

TORNADO SHELTERS LEVEL 5: 24,000 sqft

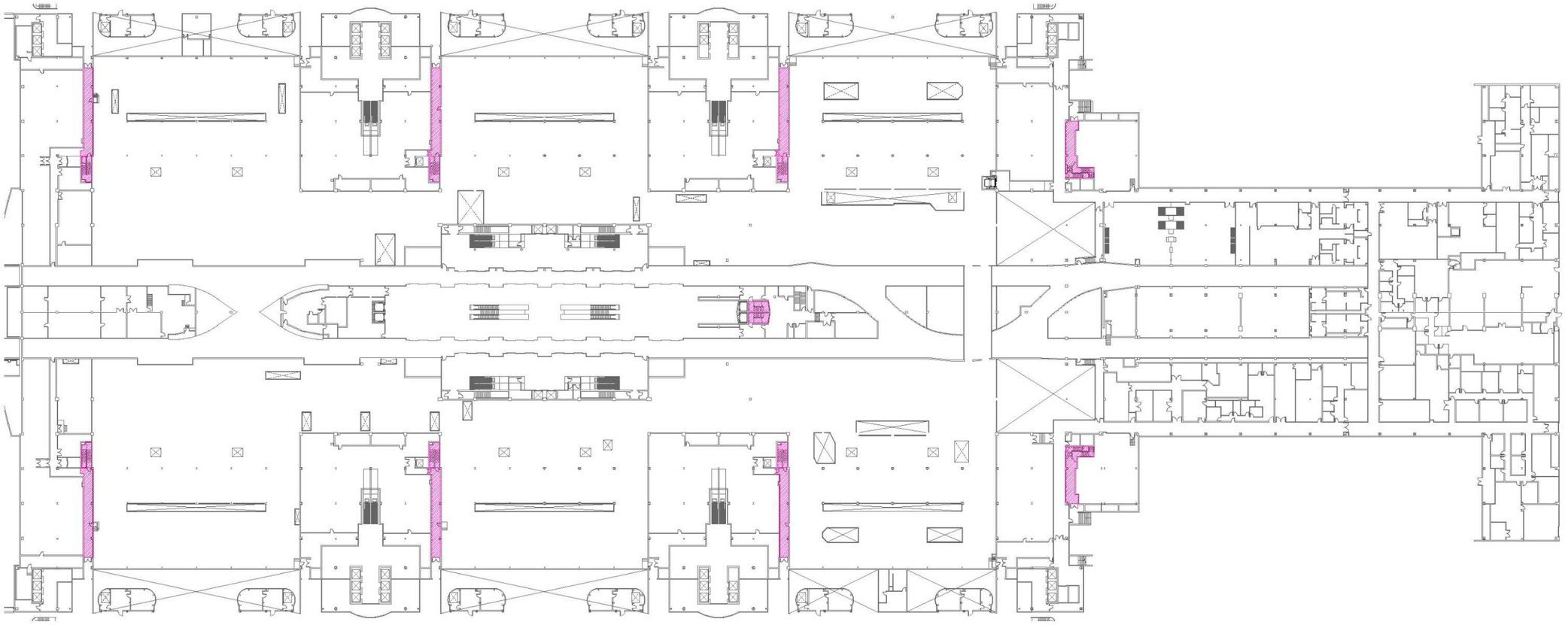


Fig. 2.12.2(c) Level 4 Tornado Shelters Diagram

TORNADO SHELTERS LEVEL 4: 6,000 sqft

2.13 ART

Removal, curation, and reinstallation of existing art is to be performed by the Owner and is not included in the Project. All flooring installations that are currently part of the art programme will be declassified by the Owner and will not be installed back.

DEN EXISTING ART COLLECTION

IMAGE	TITLE	PLACEMENT	CURRENT LOCATION DESCRIPTION	MEDIA	ARTIST YEAR	NEW LOCATION
	America, Why I Love Her	Wall Mount	Mod 1: E, S end, Level 5	Multi media	Sweeny 1994	
	Experimental Aviation	Installation	Mod 2 CORE E & W Level 5	Polychrome Steel	Ortiz 1994	
	A Different Sense of Time	Wall Mount	Mod 1: S end, Level 5	Video Technology	Alweis 1994	
	Balustrade	Sculpture	Mod 2: N, S ends, Level 6	Ceramic	Woodman 1994	
	Elrey Jeppesen	Monument	Mod 2: CORE, Level 5	Bronze	Lundeen 1993	

	Notre Denver	Sculpture	Mod 2: E & W Baggage Claim Level 5	Bronze	Allen 1993	
	Tribute to Bill Smith	Sculpture	Mod 1: N Level 6	Bronze granite	Dwight 1994	
	Spirit of the People	Photos and Paintings	Mod 1 (entirety): W, N & E Level 5	Photo Paintings	Various Artists 1994	
	In Peace and Harmony with Nature	Wall Mount	Mod 1: W South end Level 5	Painting	Tanguma 1994	
	Children of the World Dream of Peace	Wall Mount	Mod 2: E South end Level 5	Painting	Tanguma 1994	
	La memoria de nuestra tierra	Wall Mount	Mod 3: E Level 5	Print	Bacca 1994	
	Mile High and Rising	Wall Mount	Mod 3: W Level 5	Multi media	Akinlana 1994	

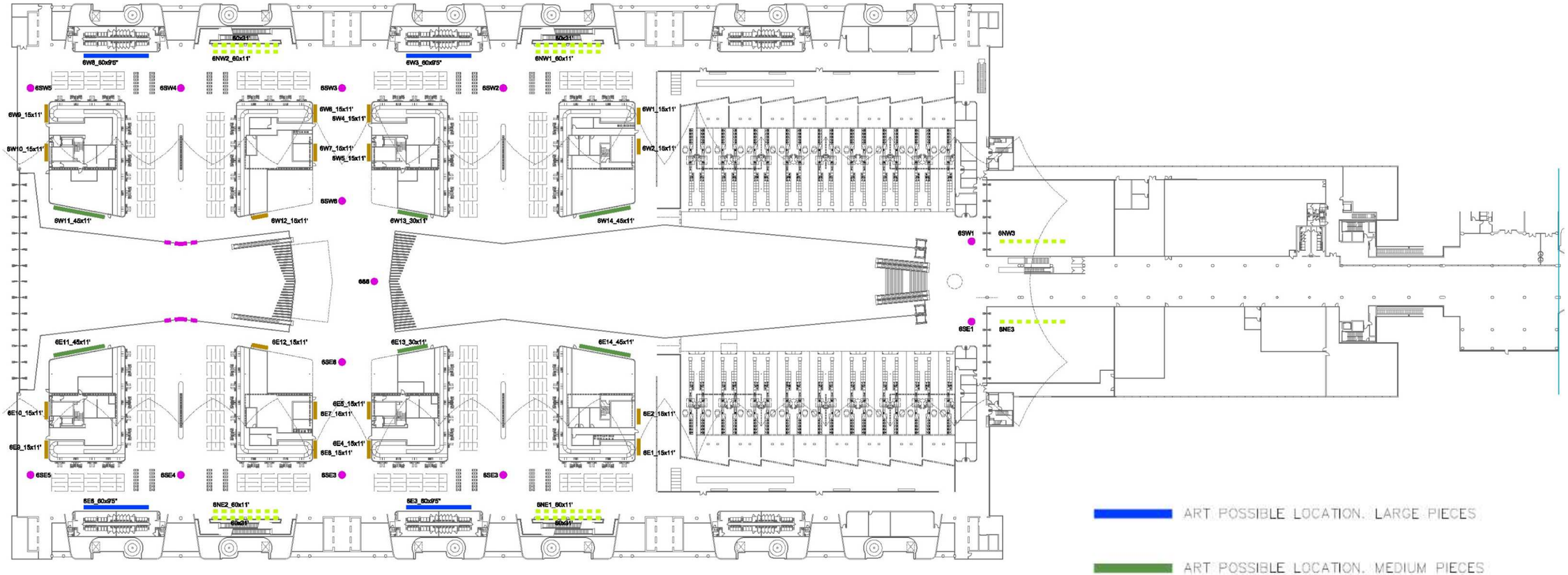


Fig. 2.14(a) – DEN Suggested Potential Art Locations Level 6

ART POSSIBLE LOCATION, LARGE PIECES

ART POSSIBLE LOCATION, MEDIUM PIECES

ART POSSIBLE LOCATION, SMALL PIECES

COMMERCIAL USE

NEW ART POSSIBLE LOCATION

B.W. BALUSTRADE POSSIBLE LOCATION

SCULPTURE POSSIBLE LOCATION

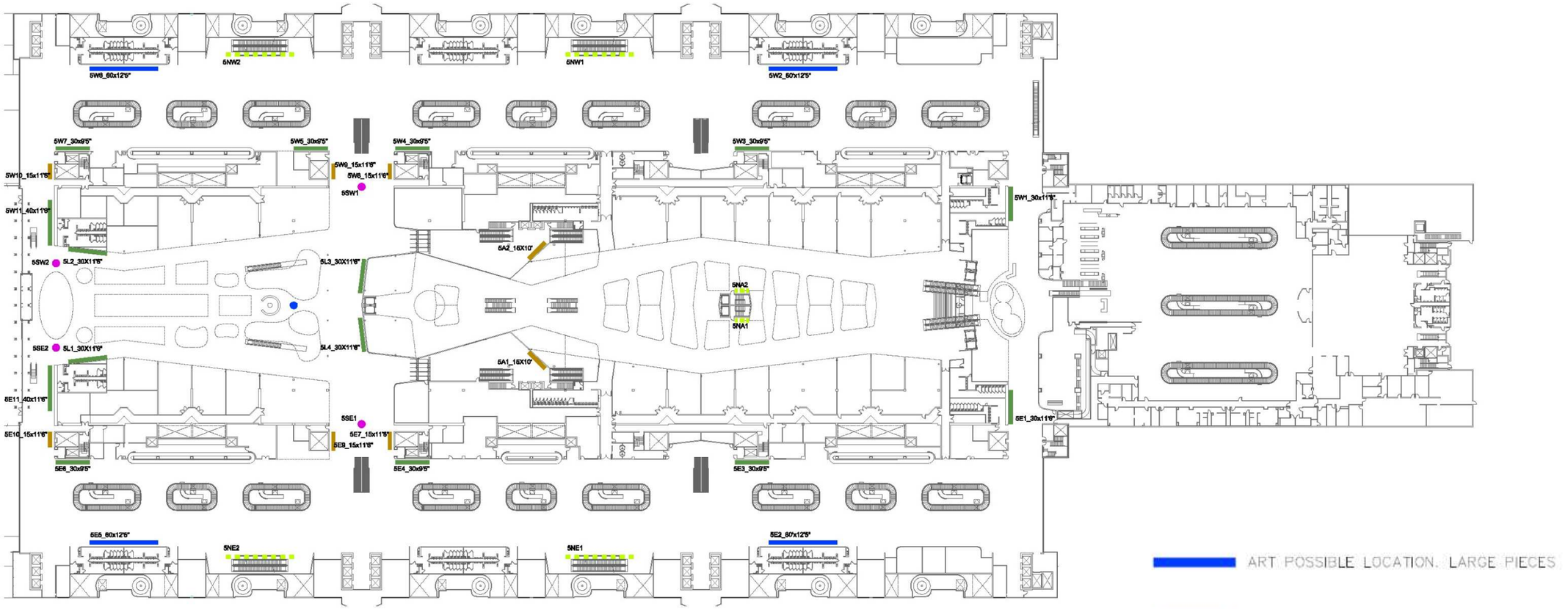


Fig. 2.14(b) – DEN Suggested Potential Art Locations Level 5

2.14 PROGRAM SCHEDULE

All square footages provided are NET areas.

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
RETAIL UNIT L6-1	L6	W-M3	POD F	COMMERCIAL	CONVENIENCE	1,475
RETAIL UNIT L6-2	L6	W-M2	POD G	COMMERCIAL	QUICK SERVICE	800
RETAIL UNIT L6-3	L6	C-M3	BRIDGE	COMMERCIAL	BAR WITH FOOD	2,500
RETAIL UNIT L6-4	L6	E-M3	POD C	COMMERCIAL	CONVENIENCE	1,475
RETAIL UNIT L6-5	L6	E-M2	POD B	COMMERCIAL	QUICK SERVICE	800
FERROVIAL RETAIL STORAGE (LS)	L6	E-M1	N28-E8	COMMERCIAL	STORAGE	960
AIRLINE OFFICES	L6	W-M2	POD H N19-W4	AIRLINES	OFFICES	2,445
AIRLINE OFFICES	L6	E-M2	POD A N20-E3	AIRLINES	OFFICES	2,445
AIRLINE OFFICES	L6	W-M2	POD G N14-W3	AIRLINES	OFFICES	1,100
AIRLINE OFFICES	L6	W-M2	POD G N14-W5	AIRLINES	OFFICES	1,000
AIRLINE OFFICES	L6	E-M2	POD B N13-E3	AIRLINES	OFFICES	1,050
AIRLINE OFFICES	L6	W-M3	POD F N9-W4	AIRLINES	OFFICES	1,910

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
AIRLINE OFFICES	L6	E-M3	POD C N8-E4	AIRLINES	OFFICES	1,910
AIRLINE OFFICES	L6	W-M3	POD E N3-W3	AIRLINES	OFFICES	1,825
AIRLINE OFFICES	L6	W-M3	POD E N3-W5	AIRLINES	OFFICES	1,000
AIRLINE OFFICES	L6	E-M3	POD D N3-E3	AIRLINES	OFFICES	2,590
AIRLINE OFFICES	L6	E-M3	POD D N3-E5	AIRLINES	OFFICES	1,000
RESTROOMS (LS)	L6	W-M3	N4-W8	RESTROOMS	RESTROOMS	1,500
RESTROOMS (LS)	L6	W-M2	N14-W8	RESTROOMS	RESTROOMS	1,500
RESTROOMS (LS)	L6	W-M1	N24-W8	RESTROOMS	RESTROOMS	1,500
RESTROOMS (LS)	L6	E-M3	N4-E8	RESTROOMS	RESTROOMS	1,500
RESTROOMS (LS)	L6	E-M2	N14-E8	RESTROOMS	RESTROOMS	1,500
RESTROOMS (LS)	L6	E-M1	N24-E8	RESTROOMS	RESTROOMS	1,500
WHEELCHAIR PROVIDER	L6	W-M3	N1-W8	NON-AIRLINE TENANT	N.A.	360
WHEELCHAIR PROVIDER	L6	W-M1	N27-W8	NON-AIRLINE TENANT	N.A.	490
WHEELCHAIR PROVIDER	L6	E-M3	N1-E8	NON-AIRLINE TENANT	N.A.	600
WHEELCHAIR PROVIDER	L6	E-M1	N27-E8	NON-AIRLINE TENANT	N.A.	490

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
UA GLOBAL SERVICES	L6	W-M1	N28-W8	NON-AIRLINE TENANT	N.A.	920
PARAMEDICS-TREATMENT ROOM	L6	W-M1	N29-W8	NON-AIRLINE TENANT	N.A.	500
FIRE COMMAND WEST	L6	W-M3	N1-W9	NON-AIRLINE TENANT	N.A.	225
FIRE COMMAND EAST	L6	E-M1	N31-E9	NON-AIRLINE TENANT	N.A.	215
TSA EDS MACHINE	L6	E-M2	POD B	NON-AIRLINE TENANT	N.A.	1,000
DEN AVAILABLE SPACE	L6	E-M1	N28-E8	AVAILABLE	N.A.	450
SECURITY SCREENING CHECKPOINTS (2)	L6	E/W-M1	TSA	TSA	TSA	39,393
TSA IT (2)	L6	E/W-M1	TSA	TSA	SUPPORT	400
TSA TRAINING/ BRIEFING (2)	L6	E/W-M1	TSA	TSA	SUPPORT	800
BREAK ROOM/ MEETING AREA	L6	E-M0	AOB CORRIDOR N36-E2	TSA	SUPPORT	1,000
TSA RESTROOMS (6)	L6	E-M0	AOB CORRIDOR N36-E2	TSA	RESTROOMS	300
SUPERVISOR OFFICES (2)	L6	E/W-M1	TSA	TSA	OFFICES	210

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
MANAGER OFFICES (2)	L6	E/W-M1	TSA	TSA	OFFICES	210
DAILY SUPPLY STORAGES (2)	L6	E/W-M1	TSA	TSA	STORAGE	240
KNOWN CREW ACCESS POINTS (2)	L6	E/W-M1	TSA	TSA	TSA	725
PRIVATE SCREENING ROOMS (4)	L6	E/W-M1	TSA	TSA	SUPPORT	400
REMOTE VIEWING CONTROL ROOM	L6	E-M0	AOB CORRIDOR N36-E2	TSA	SUPPORT	1,200
BHS FACILITIES	L6	W-M2	POD H	TECHNICAL	BHS	2,140
BHS FACILITIES	L6	E-M2	POD A	TECHNICAL	BHS	2,140
BHS FACILITIES	L6	W-M2	POD G	TECHNICAL	BHS	2,130
BHS FACILITIES	L6	E-M2	POD B	TECHNICAL	BHS	2,130
BHS FACILITIES	L6	W-M3	POD F	TECHNICAL	BHS	2,140
BHS FACILITIES	L6	E-M3	POD C	TECHNICAL	BHS	2,140
BHS FACILITIES	L6	W-M3	POD E	TECHNICAL	BHS	2,130
BHS FACILITIES	L6	E-M3	POD D	TECHNICAL	BHS	2,130
BHS FACILITIES	L6		CURBSIDE	TECHNICAL	BHS	8,260
MEP FACILITIES (ELEC+ COMM)	L6	W-M2	POD H	TECHNICAL	MEP	1,320

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
MEP FACILITIES (ELEC+ COMM)	L6	E-M2	POD A	TECHNICAL	MEP	1,320
MEP FACILITIES (ELEC+ COMM)	L6	W-M2	POD G	TECHNICAL	MEP	760
MEP FACILITIES (ELEC+ COMM)	L6	E-M2	POD B	TECHNICAL	MEP	820
MEP FACILITIES (ELEC+ COMM)	L6	W-M3	POD F	TECHNICAL	MEP	980
MEP FACILITIES (ELEC+ COMM)	L6	E-M3	POD C	TECHNICAL	MEP	980
MEP FACILITIES (ELEC+ COMM)	L6	W-M3	POD E	TECHNICAL	MEP	815
MEP FACILITIES (ELEC+ COMM)	L6	E-M3	POD D	TECHNICAL	MEP	1,050
MEP FACILITIES (ELEC+ COMM)	L6	E/W-M1	TSA	TECHNICAL	MEP	660
CIRCULATION SPACE (LS)	L6		GREAT HALL	CIRCULATION	FoH	200,157
CIRCULATION SPACE (LS)	L6		GREAT HALL	CIRCULATION	BoH	2,075
CIRCULATION SPACE (AS)	L6		GREAT HALL	CIRCULATION	BoH	24,900
CIRCULATION SPACE (LS)	L6		AOB CORRIDOR	CIRCULATION	BoH	8,386

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
CIRCULATION SPACE (AS)	L6		AOB CORRIDOR	CIRCULATION	FoH	24,647
LOBBY AREAS	L6		FACADES E/W	CIRCULATION	N.A.	13,736
VARIOUS DEN LS OFFICES	L6	W-M0	AOB CORRIDOR N35-W2	AIRPORT	OFFICES	2,390
VARIOUS DEN LS OFFICES	L6	W-M0	AOB CORRIDOR N43-W4	AIRPORT	OFFICES	2,200
VARIOUS DEN AS OFFICES	L6	E-M0	AOB CORRIDOR N38-E3	AIRPORT	OFFICES	10,370
DEN BUSINESS CENTER	L6	E-M0	AOB CORRIDOR	NON-AIRLINE TENANT	OFFICES	2,480
GHP OFFICES	L6	E-M0	AOB CORRIDOR	NON-AIRLINE TENANT	OFFICES	3,680
DEN GYM	L6	E-M0	AOB CORRIDOR	NON-AIRLINE TENANT	N.A.	9,030
DEN CREDIT UNION	L6	E-M0	AOB CORRIDOR	NON-AIRLINE TENANT	N.A.	414
MEP FACILITIES	L6	W-M0	AOB CORRIDOR	TECHNICAL	MEP	693
EXTERNAL COURTYARDS	L6		AOB CORRIDOR	N.A.	N.A.	16,442

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
EGRESS CORRIDOR	L6	E-M0	AOB CORRIDOR N33-E4	CIRCULATION	BoH	1,470
EMPLOYEE PORTALS	L6		AOB ENTRY	AIRPORT	N.A.	
RESTROOMS (LS)	L6	W-M0	AOB CORRIDOR N41-W3	RESTROOMS	RESTROOMS	330
RESTROOMS (AS)	L6	W-M0	AOB CORRIDOR N41-W2	RESTROOMS	RESTROOMS	681
SUBTOTAL	**L6**					**443,539**
RETAIL UNIT A5-1	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	DUTY FREE	3,027
RETAIL UNIT A5-2	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	1,484
RETAIL UNIT A5-3	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	1,369
RETAIL UNIT A5-4	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	1,260
RETAIL UNIT A5-5	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	1,160
RETAIL UNIT A5-6	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	1,070

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
RETAIL UNIT A5-7	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	1,070
RETAIL UNIT A5-8	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	FULL SERVICE	2,030
RETAIL UNIT A5-9	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	870
RETAIL UNIT A5-10	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	1,078
RETAIL UNIT A5-11	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	CONVENIENCE	2,080
RETAIL UNIT A5-12	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	900
RETAIL UNIT A5-13	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	1,490
RETAIL UNIT A5-14	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	CASUAL DINING	2,680
RETAIL UNIT A5-15	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	QUICK SERVICE	1,160
RETAIL UNIT A5-16	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	QUICK SERVICE	1,070
RETAIL UNIT A5-17	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	QUICK SERVICE	1,070
RETAIL UNIT A5-18	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	CASUAL DINING	2,030

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
RETAIL UNIT A5-19	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	870
RETAIL UNIT A5-20	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	CONVENIENCE	1,078
RETAIL UNIT A5-21	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	455
UNIT A5-22	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SEATING AREA	520
RETAIL UNIT A5-23	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	QUICK SERVICE	1,225
UNIT A5-24	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	SEATING AREA	1,490
UNIT A5-25	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SEATING AREA	625
UNIT A5-26	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SEATING AREA	520
UNIT A5-27	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	NON-INTERACTIVE KIDS AREA	455
UNIT A5-28	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SEATING AREA	545
RETAIL UNIT A5-29	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	1,200
RETAIL UNIT A5-30	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	545

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
RETAIL UNIT A5-31	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	BAR WITH FOOD	900
~~RETAIL UNIT A5-32~~	~~L5~~	~~C-M2~~	~~AIRSIDE PLAZA~~	~~COMMERCIAL~~	~~SPECIALTY~~	-
UNIT A5-33	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	SEATING AREA	700
RETAIL UNIT A5-34	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	BAR WITH FOOD	1,425
RETAIL UNIT A5-35	L5	C-M2	AIRSIDE PLAZA	COMMERCIAL	BAR WITH FOOD	1,425
RETAIL UNIT A5-36	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SPECIALTY	625
UNIT A5-37	L5	C-M1	AIRSIDE PLAZA	COMMERCIAL	SEATING AREA	290
RETAIL UNIT IMG-1	L5	C-M1	INT. LS PLAZA	COMMERCIAL	QUICK SERVICE	1,500
RETAIL UNIT IMG-2	L5	C-M1	INT. LS PLAZA	COMMERCIAL	CONVENIENCE	1,500
UNIT IMG-3	L5	C-M1	INT. LS PLAZA	COMMERCIAL	SEATING AREA	640
RETAIL UNIT IMG-4 (DEN MONEY EX.)	L5	C-M1	INT. LS PLAZA	COMMERCIAL	MONEY EXCHANGE	60
RETAIL UNIT MG-2	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	QUICK SERVICE	1,277

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
RETAIL UNIT MG-3	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	QUICK SERVICE	1,175
RETAIL UNIT MG-4	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	QUICK SERVICE	1,075
RETAIL UNIT MG-5	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	FULL SERVICE	2,432
RETAIL UNIT MG-6	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	BUS. INCUBATOR	1,000
RETAIL UNIT MG-7	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	CONVENIENCE	1,277
RETAIL UNIT MG-8	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	CASUAL DINING	2,275
RETAIL UNIT MG-9	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	SPECIALTY	2,432
RETAIL UNIT MG-14	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	SPECIALTY	850
RETAIL UNIT MG-15	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	SPECIALTY	530
UNIT MG-17	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	SEATING AREA	2,000
RETAIL UNIT MG-18	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	QUICK SERVICE	500
RETAIL UNIT MG-19	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	BAR WITH FOOD	850

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
UNIT MG-20	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	INTERACTIVE KIDS AREA	450
UNIT MG-21	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	SEATING AREA	220
UNIT MG-22	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	SEATING AREA	1,630
UNIT MG-23	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	SEATING AREA	220
UNIT MG-24	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	SEATING AREA	1,180
UNIT MG-25	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	SEATING AREA	450
RETAIL UNIT MG-26	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	SPECIALTY	150
RETAIL UNIT MG-27	L5	C-M3	LANDSIDE PLAZA	COMMERCIAL	SPECIALTY	150
RETAIL UNIT MG-30	L5	W-M3	CLAIM HALL	COMMERCIAL	QUICK SERVICE	730
RETAIL UNIT MG-31	L5	E-M3	CLAIM HALL	COMMERCIAL	QUICK SERVICE	810
FERROVIAL RETAIL STORAGE (LS)	L5	C-M3	N3-W3	COMMERCIAL	STORAGE	427
FERROVIAL RETAIL STORAGE (LS)	L5	C-M3	N4-W3	COMMERCIAL	STORAGE	340

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
FERROVIAL RETAIL STORAGE (LS)	L5	C-M3	N5-W3	COMMERCIAL	STORAGE	715
FERROVIAL RETAIL STORAGE (LS)	L5	C-M3	N4-E4	COMMERCIAL	STORAGE	1,140
FERROVIAL RETAIL STORAGE (AS)	L5	C-M2	N16-W3	COMMERCIAL	STORAGE	2,300
FERROVIAL RETAIL STORAGE (AS)	L5	C-M2	N16-E3	COMMERCIAL	STORAGE	3,374
AS FERROVIAL SERVICIOS STORAGE	L5	C-M2	N12-E3	CONCESSIONS	STORAGE	1,083
RETAIL STORAGE (LS)	L5	E-M1	N28-E8	COMMERCIAL	STORAGE	450
RESTROOMS (LS)	L5	W-M3	N4-W8	RESTROOMS	RESTROOMS	1,500
RESTROOMS (LS)	L5	W-M2	N14-W8	RESTROOMS	RESTROOMS	1,500
RESTROOMS (LS)	L5	W-M1	N24-W8	RESTROOMS	RESTROOMS	1,500
RESTROOMS (LS)	L5	E-M3	N4-E8	RESTROOMS	RESTROOMS	1,500
RESTROOMS (LS)	L5	E-M2	N14-E8	RESTROOMS	RESTROOMS	1,500
RESTROOMS (LS)	L5	E-M1	N24-E8	RESTROOMS	RESTROOMS	1,500
RESTROOMS (LS)	L5	C-M3	N3-W3	RESTROOMS	RESTROOMS	800
RESTROOMS (LS)	L5	C-M3	N3-E3	RESTROOMS	RESTROOMS	800
RESTROOMS (AS)	L5	C-M2	N17-W3	RESTROOMS	RESTROOMS	800
RESTROOMS (AS)	L5	C-M2	N17-E3	RESTROOMS	RESTROOMS	800
RESTROOMS (AS)	L5	C-M1	N29-W3	RESTROOMS	RESTROOMS	800

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
RESTROOMS (AS)	L5	C-M1	N29-E3	RESTROOMS	RESTROOMS	800
RESTROOMS (LS)	L5	C-M1	N30-W3	RESTROOMS	RESTROOMS	630
RESTROOMS (LS)	L5	C-M1	N30-E3	RESTROOMS	RESTROOMS	630
NURSING ROOM (AS)	L5	C-M1	N28-W2	RESTROOMS	NURSING ROOM	75
NURSING ROOM (AS)	L5	C-M1	N28-E2	RESTROOMS	NURSING ROOM	75
NURSING ROOM (LS)	L5	W-M1	N27-W8	RESTROOMS	NURSING ROOM	135
NURSING ROOM (LS)	L5	E-M1	N27-E8	RESTROOMS	NURSING ROOM	135
AIRLINE OFFICES AO-01	L5	W-M1	N29-W5	AIRLINES	OFFICES	581
AIRLINE OFFICES AO-02	L5	W-M1	N27-W5	AIRLINES	OFFICES	538
AIRLINE OFFICES AO-03	L5	W-M1	N24-W5	AIRLINES	OFFICES	1,021
AIRLINE OFFICES AO-04	L5	W-M2	N17-W5	AIRLINES	OFFICES	694
AIRLINE OFFICES AO-05	L5	W-M2	N14-W5	AIRLINES	OFFICES	523
AIRLINE OFFICES AO-06	L5	W-M3	N8-W5	AIRLINES	OFFICES	925
AIRLINE OFFICES AO-07	L5	W-M3	N4-W5	AIRLINES	OFFICES	338
AIRLINE OFFICES AO-08	L5	E-M3	N3-E5	AIRLINES	OFFICES	166
AIRLINE OFFICES AO-09	L5	E-M3	N4-E5	AIRLINES	OFFICES	433
AIRLINE OFFICES AO-10	L5	E-M3	N8-E5	AIRLINES	OFFICES	1,006
AIRLINE OFFICES AO-11	L5	E-M2	N14-E5	AIRLINES	OFFICES	1,384

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
AIRLINE OFFICES AO-12	L5	E-M2	N17-E5	AIRLINES	OFFICES	889
AIRLINE OFFICES AO-13	L5	E-M1	N23-E5	AIRLINES	OFFICES	434
AIRLINE OFFICES AO-14	L5	E-M1	N24-E5	AIRLINES	OFFICES	430
AIRLINE OFFICES AO-15	L5	E-M1	N27-E5	AIRLINES	OFFICES	537
AIRLINE OFFICES AO-16	L5	E-M1	N29-E5	AIRLINES	OFFICES	885
PRAYER ROOMS (2 SPACES)	L5	C-M3	N3-E3	AIRPORT	CHAPEL	711
TSA PRE-CHECK	L5	C-M3	N5-E3	NON-AIRLINE TENANT	PUBLIC SERVICE	800
PERMIT SALES	L5	C-M3	N2-W3	AIRPORT	PUBLIC SERVICE	545
DEN AVAILABLE SPACE	L5	E-M2	N20-E4	AIRPORT	N.A.	245
MEDIA	L5	E-M1	N22-E4	AIRPORT	N.A.	245
TERMINAL OPS. STORAGE	L5	W-M2	N20-W4	AIRPORT	STORAGE	245
TECHNOLOGY STORAGE	L5	W-M1	N22-W4	AIRPORT	STORAGE	245
GROUND TRANSPORTATION PROVIDERS	L5	C-M2	N13-W3	NON-AIRLINE TENANT	PUBLIC SERVICE	2,200
EVENT STORAGE	L5	W-M3	N1-E9	AIRPORT	STORAGE	600
PLAZA SNOW TEAM	L5	E-M3	N1-W9	AIRPORT	OFFICES	600
AMBASSADOR'S OFFICE	L5	E-M1	N29-E8	AIRPORT	OFFICES	840

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
GHP CONCESSION OFFICES (LS)	L5	W-M0	N42-W4	NON-AIRLINE TENANT	OFFICES	4,700
DENVER POLICE DEPARTMENT	L5	E-M3	N4-E2	AIRPORT	AVAILABLE	414
DEN AVAILABLE SPACE	L5	W-M1	N28-W8	AIRPORT	AVAILABLE	1,820
DEN AVAILABLE SPACE	L5	W-M1	N29-W4	AIRPORT	AVAILABLE	220
DEN AVAILABLE SPACE	L5	E-M1	N29-E4	AIRPORT	AVAILABLE	220
DEN AVAILABLE SPACE	L5	E-M1	N28-E8	AIRPORT	AVAILABLE	500
BHS FACILITIES OOG	L5		N.A.	TECHNICAL	BHS	7,422
BHS FACILITIES	L5		CURBSIDE	TECHNICAL	BHS	8,261
MEP FACILITIES (ELEC+ COMM)	L5		W4-W5/E4-E5	TECHNICAL	MEP	3,930
BAGGAGE CLAIM AREA	L5		W5-W7/E5-E7	AIRPORT	N.A.	46,544
CIRCULATION SPACE (LS)	L5		N.A.	CIRCULATION	FoH	136,042
CIRCULATION SPACE (LS)	L5		N.A.	CIRCULATION	BoH	5,535
CIRCULATION SPACE (AS)	L5		N.A.	CIRCULATION	FoH	40,369
CIRCULATION SPACE (AS)	L5		N.A.	CIRCULATION	BoH	6,860
LOBBY AREAS	L5		FACADES E/W	CIRCULATION	N.A.	14,580

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
DEN INFO/WELCOME/GT INFO DESK	L5	C-M3	LANDSIDE PLAZA	AIRPORT	PUBLIC SERVICE	254
EMPLOYEE PORTALS	L5	W-M2	N19-W5	AIRPORT	N.A.	455
EMPLOYEE PORTALS	L5	E-M2	N19-E5	AIRPORT	N.A.	455
EMPLOYEE PORTALS	L5	C-M1	N29-EW	AIRPORT	N.A.	200
SUBTOTAL	**L5**					**391,124**
CIRCULATION SPACE	L4	C-M2	AGTS PLATFORM	CIRCULATION	FoH	13,390
CIRCULATION SPACE	L4	C-M2	AGTS PLATFORM	CIRCULATION	BoH	758
CIRCULATION SPACE	L4	W-M2	AGTS PLATFORM	CIRCULATION	FoH	4,414
CIRCULATION SPACE	L4	E-M2	AGTS PLATFORM	CIRCULATION	FoH	4,414
CIRCULATION SPACE	L4		N42-W3	CIRCULATION	BoH	282
DEN AVAILABLE SPACE	L4		N11-EW	AIRPORT	AVAILABLE	982
GOODS SCREENING FACILITIES	L4		N33-W3	AIRPORT	STORAGE	6,000
GOODS SCREENING CORRIDOR	L4		N30-W4	AIRPORT	STORAGE	487

ROOM	LEVEL	MOD	LOCATION	TYPE	CLASS	SQUARE FOOTAGE
SUBTOTAL	**L4**					**30,727**
TSA CMF	L3		N30-E6	TSA	SUPPORT	4,040
SUBTOTAL	**L3**					**4,040**
TOTAL						**869,430**

FURNITURE & EQUIPMENT ANNEX

LEVEL 5				
LOCATION	**TYPE**	**COUNT**	**UNIT**	**NOTES**
LEVEL 5: AIRSIDE PLAZA				
	Plaza Furniture			
A5-28 (545 SF)	Low Planters Below FIDS	3	EA	Planters centered below FIDS Display. 2’ wide x 4’ long x 24” tall planters with low-growing native plants.
	Trash / Recycling Enclosures	2	EA	4' wide x 3' deep x 3'-6" tall enclosures for trash and recycling bins.
	Benches	16	LF	18" tall units clad with local red sandstone or corten base and "wood look" top.
	2-Top Dining Table and (2) Chairs	9	EA	(1) 24" x 30" Table. Quartz Top and metal base. (2) Chairs with metal seat and metal legs
	8-top Dining Table and (8) Chairs	1	EA	112" long x 36" wide x 30" tall Communal 8-top table with "wood look" top and metal bases. (8) Chairs with metal seat and metal legs
A5-25 (625 SF)	Low Planters Below FIDS	3	EA	Planters centered below FIDS Display. 2’ wide x 4’ long x 24” tall planters with low-growing native plants.
	Trash / Recycling Enclosures	2	EA	4' wide x 3' deep x 3'-6" tall enclosures for trash and recycling bins.
	Benches	24	LF	18" tall units clad with local red sandstone or corten base and "wood look" top.
	Tree Planters	2	EA	48" tall planters, clad in corten steel.
	Artificial Tree	2	EA	20' tall artificial aspen tree. 1 tree per planter.
	Curved Bench	30	LF	Curved Bench.
	Lounge Chair	3	EA	Lounge Chair Seating.
	Coffee Table	5	EA	30.5" wide x 30.5" deep x 16" high "wood look" coffee table.
A5-26 (520 SF)	Low Planters Below FIDS	2	EA	48" tall planters, clad in corten steel.
	Trash / Recycling Enclosures	1	EA	4' wide x 3' deep x 3'-6" tall enclosures for trash and recycling bins.
	2-Top Dining Table and (2) Chairs	12	EA	(1) 24" x 30" Table. Quartz Top and metal base. (2) Chairs with metal seat and metal legs
	8-top Dining Table and (8) Chairs	1	EA	112" long x 36" wide x 30" tall Communal 8-top table with "wood look" top and metal bases. (8) Chairs with metal seat and metal legs

LEVEL 5				
LOCATION	**TYPE**	**COUNT**	**UNIT**	**NOTES**
	5-top Dining Table and (5) Chairs	1	EA	48" diameter communal round table with wood top and metal legs. (5) Chairs with wood seat and metal legs
A5-22 (520 SF)	Trash / Recycling Enclosures	1	EA	4' wide x 3' deep x 3'-6" tall enclosures for trash and recycling bins.
	Benches	8	LF	18" tall units clad with local red sandstone or cor ten base and "wood look" top.
	Curved Bench	32	LF	Curved Bench.
	Lounge Chair	9	EA	Lounge Chair Seating.
	Coffee Table	8	EA	30.5" wide x 30.5" deep x 16" high "wood look" coffee table.
A5-37 (290 SF)	Trash / Recycling Enclosures	1	EA	4' wide x 3' deep x 3'-6" tall enclosures for trash and recycling bins.
	Benches	4	LF	18" tall units clad with local red sandstone or cor ten base and "wood look" top.
	Curved Bench	16	LF	Curved Bench.
	Lounge Chair	5	EA	Lounge Chair Seating.
	Coffee Table	4	EA	30.5" wide x 30.5" deep x 16" high "wood look" coffee table.
A5-24 (1490 SF)	Low Planters Below FIDS	6	EA	4' wide x 3' deep x 3'-6" tall enclosures for trash and recycling bins.
	Trash / Recycling Enclosures	4	EA	4' wide x 3' deep x 3'-6" tall enclosures for trash and recycling bins.
	Benches	34	LF	18" tall units clad with local red sandstone or cor ten base and "wood look" top.
	Curved Bench	38		Curved Bench.
	2-Top Dining Table and (2) Chairs	7	EA	(1) 24" x 30" Table. Quartz Top and metal base. (2) Chairs with metal seat and metal legs
	8-top Workhub and (8) Chairs	2	EA	112" long x 36" wide x 42" tall workhub table with quartz cladding and stainless steel trim. Includes integral task lighting and (8) power / usb charging outlets. (8) stools with metal seat and metal legs
	Tree Planters	4	EA	48" tall planters, clad in corten steel.
	Artificial Tree	4	EA	20' tall artificial aspen tree. 1 tree per planter.
	Lounge Chair	8	EA	Lounge Chair Seating.
	Coffee Table	5	EA	30.5" wide x 30.5" deep x 16" high "wood look" coffee table.
A5-33 (700 SF)	Trash / Recycling Enclosures	2	EA	4' wide x 3' deep x 3'-6" tall enclosures for trash and recycling bins.

LEVEL 5				
LOCATION	**TYPE**	**COUNT**	**UNIT**	**NOTES**
	Benches	12	LF	18" tall units clad with local red sandstone or cor ten base and "wood look" top.
	Curved Bench	40	LF	Curved Bench.
	Lounge Chair	10	EA	Lounge Chair Seating.
	Coffee Table	10	EA	30.5" wide x 30.5" deep x 16" high "wood look" coffee table.
LEVEL 5: LANDSIDE PLAZA				
Plaza Furniture				
L5-MG-22 (1630 SF)	Low Planters Below FIDS	2	EA	30.5" wide x 30.5" deep x 16" high "wood look" coffee table.
	Trash / Recycling Enclosures	2	EA	4' wide x 3' deep x 3'-6" tall enclosures for trash and recycling bins.
	Benches	24	LF	18" tall units clad with local red sandstone or cor ten base and "wood look" top.
	Curved Bench	80	LF	Curved Bench.
	Light Pole	2	EA	Timber Light pole with brushed metal base and luminaire top
	8-top Workhub and (8) Chairs	1	EA	112" long x 36" wide x 42" tall workhub table with quartz cladding and stainless steel trim. Includes integral task lighting and (8) power / usb charging outlets. (8) stools with metal seat and metal legs
	Lounge Chair	20	EA	Lounge Chair Seating.
	Coffee Table	18	EA	30.5" wide x 30.5" deep x 16" high "wood look" coffee table.
L5-MG-24 (1180 SF)	Low Planters Below FIDS	2	EA	Curved Bench.
	Trash / Recycling Enclosures	2	EA	4' wide x 3' deep x 3'-6" tall enclosures for trash and recycling bins.
	Benches	24	LF	18" tall units clad with local red sandstone or cor ten base and "wood look" top.
	Curved Bench	60	LF	Curved Bench.
	Light Pole	2	EA	Timber Light pole with brushed metal base and luminaire top
	8-top Workhub and (8) Chairs	1	EA	112" long x 36" wide x 42" tall workhub table with quartz cladding and stainless steel trim. Includes integral task lighting and (8) power / usb charging outlets. (8) stools with metal seat and metal legs
	Lounge Chair	14	EA	Lounge Chair Seating.

LEVEL 5				
LOCATION	**TYPE**	**COUNT**	**UNIT**	**NOTES**
	Coffee Table	12	EA	30.5" wide x 30.5" deep x 16" high "wood look" coffee table.
L5-MG-21 (220 SF)	Curved Bench	16	LF	Curved Bench.
	Lounge Chair	4	EA	Lounge Chair Seating.
	Coffee Table	4	EA	30.5" wide x 30.5" deep x 16" high "wood look" coffee table.
L5-MG-23(220 SF)	Curved Bench	16	LF	Curved Bench.
	Lounge Chair	4	EA	Lounge Chair Seating.
	Coffee Table	4	EA	30.5" wide x 30.5" deep x 16" high "wood look" coffee table.
L5-MG-25(450 SF)	Trash / Recycling Enclosures	1	EA	4' wide x 3' deep x 3'-6" tall enclosures for trash and recycling bins.
	Curved Bench	25	LF	Curved Bench.
	Lounge Chair	6	EA	Lounge Chair Seating.
	Coffee Table	5	EA	30.5" wide x 30.5" deep x 16" high "wood look" coffee table.
L5-MG-17 (2000 SF)	Curved Bench	25	LF	Curved Bench.
	Shuffleboard Table	2	EA	22' long x 31" wide x 30" tall "wood look" shuffleboard table.
	Light Pole	10	EA	Timber Light pole with brushed metal base and luminaire top
	Lounge Chair	20	EA	Lounge Chair Seating.
	Coffee Table	16	EA	30.5" wide x 30.5" deep x 16" high "wood look" coffee table.
Accent Floor TBD	Accent Terrazzo	1400	SF	Decorative Terrazzo with complex aggregate and inlay design
Landside Wayfinding		1	EA	Landside Wayfinding Element (South Entrance) as revised by BSL Item X.03
INFO Desk		1	EA	Visitor Desk around Jeppesen. Jeppessen sitting on storage with counter surrounding.
Level 5: IMG Plaza				
Plaza Furniture				
	Trash / Recycling Enclosures	1	EA	4' wide x 3' deep x 3'-6" tall enclosures for trash and recycling bins.

LEVEL 5				
LOCATION	**TYPE**	**COUNT**	**UNIT**	**NOTES**
L5-IMG-3 (640 SF)	Curved Bench	30	LF	Curved Bench.
	Lounge Chair	8	EA	Lounge Chair Seating.
	Coffee Table	6	EA	30.5" wide x 30.5" deep x 16" high "wood look" coffee table.
INFO Kiosk		1	EA	Digital multilineal display
Accent Floor TBD	Accent Terrazzo	1400	SF	Decorative Terrazzo with complex aggregate and inlay design
Total	Trash / Recycling Enclosures	18		
Location	TYPE	COUNT	Unit	NOTES
LEVEL 5: AIRSIDE PLAZA				
Trellis (four central area islands). Variable geometry	Rafters	1448	LF	8" wide x approximately 14" "wood look" rafters.
	Purlins	200	LF	8" x 14" "wood look" purlins.
	Columns	16	EA	8" wide x approximately 14" "wood look" rafters.
Trellis (East and West)	Rafters	1200	LF	8" wide x approximately 14" "wood look" rafters.
Neutral Piers	Piers	20	EA	Common airport provided vertical dividers between in-line concessions tenants. Steel base, "wood look" above to match soffit. 12” wide x profile
Level 5: Landside Plaza Piers				
Neutral Piers	Piers	9	EA	Common airport provided vertical dividers between in-line concessions tenants. Steel base, "wood look" above to match soffit. 12” wide x profile
Level 5: South Bridge Trellis				
Trellis (Level 6 only)	Rafters	560	LF	8" wide x approximately 14" "wood look" rafters.
	Purlins	50	LF	8" x 14" "wood look" purlins.
	Columns	3	EA	8" wide x approximately 14" "wood look" rafters.
LEVEL 5: Incubator				
	Suspended Ceiling	1190	SF	Wood look linear suspended ceiling similar to terminal ceiling

LEVEL 5				
LOCATION	**TYPE**	**COUNT**	**UNIT**	**NOTES**
	Slat Wall	1155	SF	Wood look slat wall.
	Terrazzo	1190	SF	Light colored terrazzo similar to concourse
	Retail Storage	6	EA	Small Retail Gondola with end panel, shelves and hooks.
	Retail Storage	4		Large Retail Gondola with shelves and hooks
	Retail Storage	6		4-Way Apparel Rack.
	Retail Storage	6		Mobile Display Counter. 48"L x 18"D x 38"T
	Kiosks	2		Custom Mobile Kiosk 3'-0"W x 8'-0"L x 8'-0" T
	Table & Chairs	2		30" round dining table with a "wood look" top and metal legs. (2) Chairs with "wood look" seat and metal legs
	Quarry Tile	180	SF	
	Quarry Tile Base	53	LF	
	FRP Wall Finish	424	SF	
	Vinyl-clad ACT Ceiling	180	SF	
	2x2 Lay-in Fluorescent Fixtures	16	EA	
	3-Comp Sink	1	EA	
	Grease Trap	1	EA	
	Hand Sink	1	EA	
	Stainless Steel Prep Table	1	EA	96"W x 30"D x 3'-0"T
	Chain link fencing	230	SF	
	Lockable Chain Link Door	2	EA	

LOCATION	TYPE	COUNT	UNIT	NOTES
LEVEL 5 & 6: Non- Plaza Furniture				
	Public Seating	264	EA	3-seat classic airport seating. Airport currently has about 525 individual seats around ticketing and bag claim.
	Tree Planters	64	EA	Airport currently has about 64 planters with plants. Planters to match plaza planters 48" tall planters
	Artificial Tree	64	EA	Artificial plants, 1 tree per planter.
	Phone Kiosks	10	EA	Airport currently has 10 individual kiosks for phones
	Phone Kiosks	6	EA	Airport currently has 6, 4-phone kiosks for
	Interior Trash/Recycling Receptacles	30	EA	30 non-blast guard trash receptacles at the Terminal interior.
	Airline, & Ground Transportation Counters-Millwork	393	LF	
	Media Room Work Counters	90	LF	
	Furniture Unidentified	1	LS	
Level 6: TSA Checkpoint Furniture				
	Screening rooms, foldable partitions	2	EA	
	Raised podium for the TSA supervisor	2	EA	
	Raised podium for law enforcement, bullet resistant walls/glass partitions	2	EA	
	Gun cabinets	2	EA	
	Desks for travel document checker	34	EA	
	Tables for passengers	34	EA	
	Desks for Known-Crew-Members, TSA officers,	34	EA	

LOCATION	TYPE	COUNT	UNIT	NOTES
	and Law enforcement officers			
	Printer station Desk	2	EA	

ATO, TSA & AOB FURNITURE			
LEVEL	TYPE	UNITS	NOTES
AOB Corridor	Office Furniture		
L6	**Credit Union (AOB)**		**~400 SF**
	Offices	1	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Transaction Counter		w/ Non-Plaza Furniture
	Transaction Furniture	2	Office chairs
	Reception	1	Each Reception contains: (1) Office chair (3) Guest chair (1) Office desk (1) Lateral file cabinet
L6	**TSA Breakroom**		**~2430 SF = 450 SF Breakroom, 650 SF Remote Monitoring, balance is unfurnished**
	Breakroom Cabinets		w/ Cost of Work Estimate
	Breakroom Tables & Chairs	1	(9) Tables (36) Chairs
	Breakroom Appliances		w/ Cost of Work Estimate
	Remote Monitoring	1	(3) Chairs (3) Desks
L6	**LS & AS Offices**		**~16320 SF = 4000 SF Conference Room, 2000 SF Meeting Rooms, 400 SF Reception, 400 SF Breakroom, remainder Office**

ATO, TSA & AOB FURNITURE			
LEVEL	TYPE	UNITS	NOTES
	Offices	50	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Conference Rooms	1	(30) 72" Movable conference room tables (90) Conference room chairs
	Meeting Room	1	(15) 72" Movable conference room tables (45) Conference room chairs
	Reception	2	Each Reception contains: (1) Office chair (5) Guest chair (1) Office desk (3) Lateral file cabinet
	Breakroom Cabinets		w/ Cost of Work Estimate
	Breakroom Tables & Chairs	2	(2) Tables (8) Chairs
	Breakroom Appliances		w/ Cost of Work Estimate
L5 & L6	**GHP Offices**		**~8420 SF = 800 SF Conference Room, 200 SF Reception, 200 SF Breakroom, remainder Office**
	Offices	36	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Conference Rooms	1	(8) 72" Movable conference room tables (24) Conference room chairs
	Reception	1	Each Reception contains: (1) Office chair (5) Guest chair (1) Office desk (3) Lateral file cabinet
	Breakroom Cabinets		w/ Cost of Work Estimate
	Breakroom Tables & Chairs	1	(2) Tables (8) Chairs

ATO, TSA & AOB FURNITURE			
LEVEL	TYPE	UNITS	NOTES
	Breakroom Appliances		w/ Cost of Work Estimate
Terminal	Office and Other Furniture - DEN Program		
L5	Event Storage (MOD 3 West Corner)		No Furnishings
L5	Available Space (MOD 1 West)		No Furnishings
L5	Terminal Ops Storage (MOD 1 West Corner)		No Furnishings
L5	DEN Available Space (MOD 1 East Corner)		No Furnishings
L5	Ambassadors Office (Breakroom)		
	Lockers		Not Included
	Breakroom Cabinets		Not Included
	Breakroom Tables & Chairs		Re-use existing
	Breakroom Appliances		Re-use existing
L5	DEN Availble Space (MOD 1 East)		~500 SF
	Offices	3	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
L5	Plaza Snow Team		No Furnishings
L5	Permit Sales		~500 SF = 400 SF Public & Office, 100 SF Storage
	Offices	2	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Service Counter		w/ Non-Plaza Furniture

ATO, TSA & AOB FURNITURE			
LEVEL	TYPE	UNITS	NOTES
	Service Window		w/ Cost of Work Estimate
	Service Furniture	2	Office chairs
	Storage Racks	3	Assume 72"W x 48"D x 72"H
L5	Ground Transportation Center		~2200 SF = 1200 SF Public, 1000 SF Storage
	Offices		None
	Transaction Counter		w/ Non-Plaza Furniture
	Transaction Furniture	20	Office chairs
	Storage Racks	30	Assume 72"W x 48"D x 72"H
L5	Term Ops Storage		~245 SF
	Storage Racks	7	Assume 72"W x 48"D x 72"H
L5	Tech Storage		~245 SF
	Storage Racks	7	Assume 72"W x 48"D x 72"H
L5	DEN Available Space (MOD 1 West)		No Furnishings
L5	DPD & Media		~490 SF (All Media)
	Built-In Counters		w/ Non-Plaza Furniture
	Chairs	18	Office chairs
L5	DPD in DEN Available Space (MOD 3 East)		~400 SF for Public & Office
	Office Furniture	2	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Transaction Counter		w/ Non-Plaza Furniture
	Transaction Furniture	2	Office chairs

ATO, TSA & AOB FURNITURE			
LEVEL	TYPE	UNITS	NOTES
	Seating Area	1	(1) Table (4) Chairs
L5	TSA Pre-Check		~800 SF
	Office Furniture	2	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Reception Counter		None
	Reception Furniture	2	Office chairs
	Seating Area	1	(1) Table (4) Chairs
L5	Prayer Rooms		
	Chairs	1	
L6	Wheelchair Room (MOD 3 West Corner)		No Furnishings
L6	Wheelchair Room (MOD 1 West)		No Furnishings
L6	United Global Services		No Furnishings
L6	Paramedics (MOD 1 West Corner)		~500 SF
	Office Furniture		None
	Breakroom Cabinets		w/ Cost of Work Estimate
	Breakroom Tables & Chairs	1	(2) Tables (8) Chairs
	Breakroom Appliances		w/ Cost of Work Estimate
	Treatment Room Cabinets		Not Included
	Treatment Room Furniture	2	(1) Office chair (2) Side chairs (1) Exam Table
L6	Ferrovial Storage		No Furnishings

ATO, TSA & AOB FURNITURE			
LEVEL	TYPE	UNITS	NOTES
L6	DEN Available Space (MOD 1 West)		No Furnishings
L6	Wheelchair Room (MOD 1 East)		No Furnishings
L6	Wheelchair Room (MOD 3 East corner)		No Furnishings
Terminal	Office and Other Furniture - Airline Baggage Offices		
L5	Spirit Baggage Office		~300 SF Public & Office
	Office Furniture	2	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Transaction Counter		w/ Non-Plaza Furniture
	Transaction Furniture	2	Office chairs
L5	Alaska Baggage Office		~300 SF Public & Office
	Office Furniture	2	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Transaction Counter		w/ Non-Plaza Furniture
	Transaction Furniture	2	Office chairs
L5	United Baggage Office		~4000 SF = 300 SF Public, 1800 SF Office, 1900 SF Storage
	Office Furniture	12	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Transaction Counter		w/ Non-Plaza Furniture
	Transaction Furniture	5	Office chairs

ATO, TSA & AOB FURNITURE			
LEVEL	TYPE	UNITS	NOTES
	Storage Racks	60	Assume 72"W x 48"D x 72"H
L5	Southwest Baggage Office		~1500 SF = 300 SF Public , 600 SF Office, 600 SF Storage
	Office Furniture	5	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Transaction Counter		w/ Non-Plaza Furniture
	Transaction Furniture	5	Office chairs
	Storage Racks	18	Assume 72"W x 48"D x 72"H
L5	Delta Baggage Office		~800 SF = 300 SF Public & Office, 500 SF Storage
	Office Furniture	2	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Transaction Counter		w/ Non-Plaza Furniture
	Transaction Furniture	2	Office chairs
	Storage Racks	15	Assume 72"W x 48"D x 72"H
L5	Frontier Baggage Office		~800 SF = 300 SF Public & Office, 500 SF Storage
	Office Furniture	2	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Transaction Counter		w/ Non-Plaza Furniture
	Transaction Furniture	2	Office chairs
	Storage Racks	15	Assume 72"W x 48"D x 72"H

ATO, TSA & AOB FURNITURE			
LEVEL	TYPE	UNITS	NOTES
L5	American Airlines Baggage Office		~400 SF = 300 SF Public & Office, 100 SF Storage
	Office Furniture	2	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Transaction Counter		w/ Non-Plaza Furniture
	Transaction Furniture	2	Office chairs
	Storage Racks	3	Assume 72"W x 48"D x 72"H
L5	Bags Inc Baggage Office		~400 SF = 300 SF Public & Office, 100 SF Storage
	Office Furniture	2	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Transaction Counter		w/ Non-Plaza Furniture
	Transaction Furniture	2	Office chairs
	Storage Racks	3	Assume 72"W x 48"D x 72"H
L5	Other Airlines Baggage Office		~3900 SF = 0 SF Public , 2000 SF Office, 1900 SF Storage
	Office Furniture	15	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Transaction Counter		None
	Transaction Furniture		None
	Storage Racks	57	Assume 72"W x 48"D x 72"H
Terminal	Office and Other Furniture - Airline Ticketing Offices		

ATO, TSA & AOB FURNITURE			
LEVEL	TYPE	UNITS	NOTES
L6 POD A	South West & Jet Blue ATO		~2445 SF = 300 SF Breakroom, balance Offices
	Office Furniture	17	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Lockers		Not Included
	Breakroom Cabinets		w/ Cost of Work Estimate
	Breakroom Tables & Chairs	1	(3) Tables (12) Chairs
	Breakroom Appliances		w/ Cost of Work Estimate
	Training Rooms		Assume None
L6 POD B	South West & British ATO		~1050 SF
	Office Furniture	8	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Lockers		Assume None
	Breakroom Cabinets		Assume None
	Breakroom Tables & Chairs		Assume None
	Breakroom Appliances		Assume None
	Training Rooms		Assume None
L6 POD C	American Airlines & New Carrier ATO		~1910 SF = 100 SF Breakroom, 200 SF Training Room, balance Offices
	Office Furniture	13	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet

ATO, TSA & AOB FURNITURE			
LEVEL	TYPE	UNITS	NOTES
	Lockers		Not Included
	Breakroom Cabinets		w/ Cost of Work Estimate
	Breakroom Tables & Chairs	1	(2) Tables (8) Chairs
	Breakroom Appliances		w/ Cost of Work Estimate
	Training Rooms	1	(2) Table (8) Chairs
L6 POD D	Frontier & New Carriers ATO		~2590 SF
	Office Furniture	21	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Lockers		Assume None
	Breakroom Cabinets		Assume None
	Breakroom Tables & Chairs		Assume None
	Breakroom Appliances		Assume None
	Training Rooms		Assume None
L6 POD E	Delta, Spirit & New Carriers ATO		~2825 SF = 1,250 SF Training, Conference & Breakroom, all other Office
	Office Furniture	14	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Lockers		Not Included
	Breakroom Cabinets		w/ Cost of Work Estimate
	Breakroom Tables & Chairs	1	(2) Tables (8) Chairs
	Breakroom Appliances		w/ Cost of Work Estimate

ATO, TSA & AOB FURNITURE			
LEVEL	TYPE	UNITS	NOTES
	Training Rooms	1	(3) Table (12) Chairs
	Conference Rooms	1	(1) Table (4) Chairs
L6 POD F	Alaska, Virgin, Lufthansa, Volaris & United ATO		~1910 SF
	Office Furniture	15	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Lockers		Assume None
	Breakroom Cabinets		Assume None
	Breakroom Tables & Chairs		Assume None
	Breakroom Appliances		Assume None
	Training Rooms		Assume None
L6 PODs G & H	United ATO		~4545 SF
	Office Furniture	37	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
	Lockers		Assume None
	Breakroom Cabinets		Assume None
	Breakroom Tables & Chairs		Assume None
	Breakroom Appliances		Assume None
	Training Rooms		Assume None
L6	Training / Briefing		No Furniture
L6	Offices		~400 SF

ATO, TSA & AOB FURNITURE			
LEVEL	TYPE	UNITS	NOTES
	Offices	4	Each office contains: (1) Office chair (1) Guest chair (1) Office desk (1) Lateral file cabinet
L6	IT Support Room		~400 SF
	Offices	2	Each office contains: (1) Office chair (1) Office desk (1) Lateral file cabinet
L6	Screening Rooms		~400 SF
	Offices	4	Each office contains: (1) Office chair (1) Guest chair (1) Office desk
	Conference Rooms	2	Each conference room contains: (1) Conference room table (4) Conference room chairs
L6	TSA Breakroom		See AOB

FINISH SCHEDULE FOR SELECT ROOMS ANNEX

Space	Level	Edges	Flooring	Ceiling	Walls	Internal Partitions	Mechanical	Electrical	Plumbing	IT	Furniture	Fixtures	Equipment	Millwork
ATO	6	various	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	13'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	Ref Furniture Package	None	None	None
Airlines Office 5	5	various	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	13'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	Ref Furniture Package	None	None	None
UA Global Service	6	W8N28	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	13'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	Ref Furniture Package	None	None	None
TSA Offices	6	W4N30	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	As shown on AA103	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	Ref Furniture Package	None	None	None
TSA CMF	3		Carpet on access	Gyp Board	Paint	As shown on AA109	Provided VAV+ 3rd fix	lighting + power	NA	connectivity to the required equip.	None	None	None	None
TSA Extra	6	E2N35	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	18'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	Ref Furniture Package	None	None	None
TSA Pre check	5	E3N4	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	13'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	network termination	Ref Furniture Package	None	None	None
TSA Pet shop	6	E5N13	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	None	Provided VAV+ 3rd fix	lighting + power	NA	network termination	Ref Furniture Package	None	None	None
Prayer room	5	E4N2	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	13'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	Ref Furniture Package	None	None	None
Paramedics	6	W8N29	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	13'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	Ref Furniture Package	None	None	None
DPD	5	E4N21	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	13'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	telecom outlet	Ref Furniture Package	None	None	None
Wheelchair provider	6	various	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	None	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	Ref Furniture Package	None	None	None
DEN Storage	5 and 6	various	Sealed concrete	Shell&Core	W8 FRP	None	no service	lighting + power	NA	no service	None	None	None	None
DEN Offices	6	E4N37	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	18'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	Ref Furniture Package	None	None	Office Breakroom Casework (10 EA)
DEN available spaces	5 and 6	various	Sealed concrete	GYP, board and painting	Paint	None	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	None	None	None	None
Bussines center	6	E4N37	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	18'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	Ref Furniture Package	None	None	None
Media	5	E4N21	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	13'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	media outlet	Ref Furniture Package	None	None	None
Gym	6	W3N37	Exposed concrete	Shell&Core	Shell&Core	None	Provisions	Provisions	Provisions	Provisions	None	None	None	None

Credit Union Offices	6	W3N35	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	18'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	Ref Furniture Package	None	None	None
Ground Transportation	5	W3N12	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	13'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	None	None	None	None
Permit Sales	5	W3N2	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	13'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	Ref Furniture Package	None	None	None
Ambassador´s Office	5	E8N28	Carpet	2X2 Lay-in panel, exposed suspended ceiling grid	Paint	13'-0 grid	Provided VAV+ 3rd fix	lighting + power	NA	multiuser telecom outlet	Ref Furniture Package	None	None	None
Public Circulation FF&E	5 and 6	various	-	-	-	-	Provided VAV+ 3rd fix	lighting + power	NA	telecom outlet	Ref Furniture Package	None	None	None

DEN DISPLAYS TABLE ANNEX

SCHEDULE OF FIDS / BIDS / PIDS

LEVEL	TYPE	COUNT (ea)	LOCATION	SPECIFICATION
05 & 06	FIDS / BIDS (New)	38	TBD	Samsung 460UT-B (720P, 1366x768) or equal
05 & 06	FIDS / BIDS (Existing - Reused)	36	TBD	Existing Displays
06	Airline Branding Displays	240	Check-In PODS	Samsung 460UT-B (720P, 1366x768) or equal

EXISTING FIDS

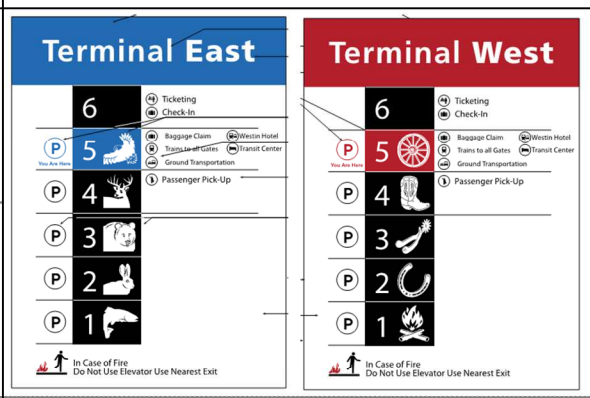
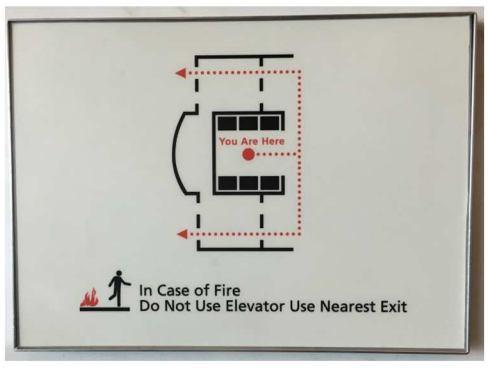
EXISTING BIDS

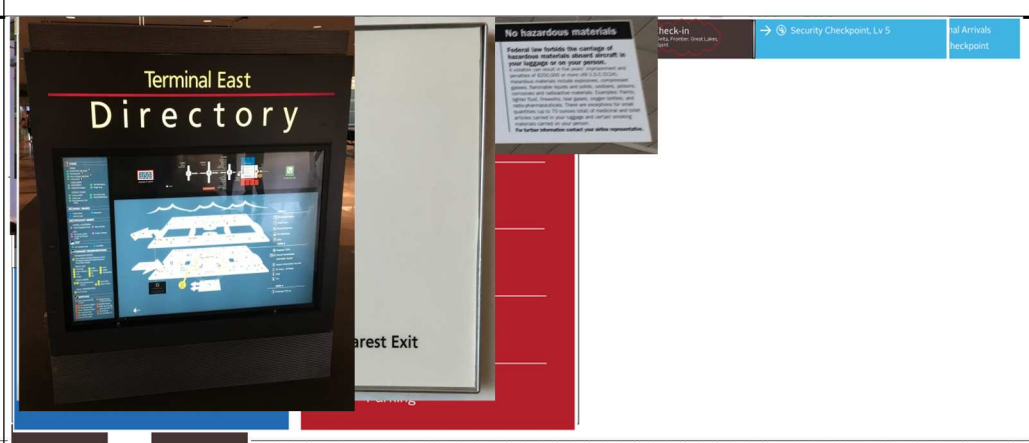
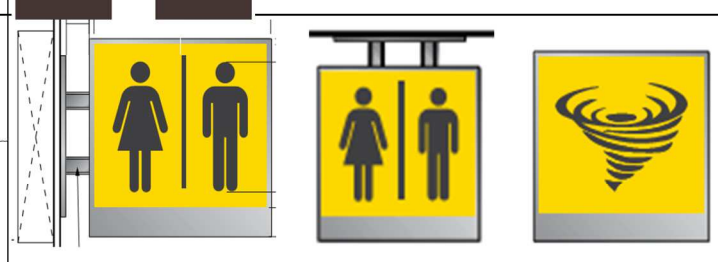
EXISTING AIRLINE INFORMATION DISPLAYS

EXAMPLE OF AIRLINE BRANDING DISPLAYS

SIGNAGE MATRIX ANNEX

LEVEL	TYPE	COUNT (ea)	SIZE (FT-IN) (width)	(height)	REPRESENTATIVE IMAGES
05	CURBSIDE OVERHEAD SIGNS	39			
06	CURBSIDE OVERHEAD SIGNS	53			
05	ENTRY DOOR APPLIED NUMBERS	128	1-4 dia		
06	ENTRY DOOR APPLIED NUMBERS	128	1-4 dia		
05	OVERHEAD SIGNS (TYPE 1)	2	8-0	2-0	
05	OVERHEAD SIGNS (TYPE 2)	2	16-0	2-0	
06	OVERHEAD SIGNS (TYPE 2)	4	16-0	2-0	
05	OVERHEAD SIGNS (TYPE 3)	22	24-0	2-0	
06	OVERHEAD SIGNS (TYPE 4)	1	27-0	2-0	
05	OVERHEAD SIGNS (TYPE 5)	7	30-0	2-0	
06	OVERHEAD SIGNS (TYPE 5)	13	30-0	2-0	
06	OVERHEAD SIGNS (TYPE 6)	11	52-0	2-0	
05	OVERHEAD SIGNS (TYPE 7)	4	56-0	2-0	
06	OVERHEAD SIGNS (TYPE 7)	4	56-0	2-0	
05	TSA INSTRUCTIONS OVERHEAD SIGN	12	12-0	2-0	
06	FREE STANDING PYLONS (TYPE 1)	2	3-0	8-0	
05	FREE STANDING PYLONS (TYPE 2)	6	3-0	10-0	
06	FREE STANDING PYLONS (TYPE 2)	5	3-0	10-0	
05	FREE STANDING PYLONS (TYPE 3)	4	3-0	12-8	

LEVEL	TYPE	COUNT (ea)	SIZE (FT-IN) (width)	SIZE (FT-IN) (height)	REPRESENTATIVE IMAGES
05	FOUR SIDED PYLONS	10	3-0	7-0	
	BAGGAGE CLAIM PYLONS	4	3-6	23-0	
06	DIRECTORY KIOSKS	8	6-0	6-9	
05	DIRECTORY KIOSKS	8	6-0	6-9	
06	ELEVATOR DIRECTORIES - EXTERIOR	24	0-11	1-3	
05	ELEVATOR DIRECTORIES - EXTERIOR	24	0-11	1-3	
06	IN CASE OF EMERGENCY	24	0-11	1-3	
05	IN CASE OF EMERGENCY	24	0-11	1-3	

LEVEL	TYPE	COUNT (ea)	SIZE (FT-IN) (width)	SIZE (FT-IN) (height)	REPRESENTATIVE IMAGES
	ELEVATOR DIRECTORIES - INTERIOR	34	0-11	1-3	
05	OVERHEAD SYMBOL SIGN - LED edge lit, two sided	24	1-8	1-8	
06	OVERHEAD SYMBOL SIGN	24	1-8	1-8	
05	OVERHEAD ELEVATOR SIGN - LED Lit	10	14-0	2-0	
06	OVERHEAD ELEVATOR SIGN - LED Lit	10	14-0	2-0	
05	MEN / WOMEN SIGNS	14	1-1	1-1	
06	MEN / WOMEN SIGNS	8	1-1	1-1	
05	INDIVIDUAL ROOM SIGNS	150	0-11	0-11	
06	INDIVIDUAL ROOM SIGNS	100	0-11	0-11	
05	ROOM / DOOR NUMBERS	300	0-8	0-2	
06	ROOM / DOOR NUMBERS	250	0-8	0-2	
05	INFORMATION SIGNS	500	1-0	2-0	
06	INFORMATION SIGNS	500	1-0	2-0	
05	DIMENSIONAL SIGN LETTERS	200		0-4	
06	DIMENSIONAL SIGN LETTERS	200		0-4	
	TOTAL COUNT	**2897**			

DENVER INTERNATIONAL AIRPORT

DEN

GREAT HALL PROJECT

A PROJECT THAT WILL INSPIRE THE AIRPORT INDUSTRY

Structures

1B Scope Exhibits

12 July, 2017

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TABLE OF CONTENTS

3. STRUCTURES

3.5. DESIGN LOADS

The Design Loads considered in the application of forces result from the weight of building materials, occupants and their possessions, environmental effects, differential movement, and restrained dimensional changes.

3.5.1. Dead Loads

The proposed structure for the Terminal addition is assumed to be Steel Deck slabs supported by steel structure. Design Dead Loads are defined in the following table:

Element	**Load**
Steel Deck Slab System (light weight concrete):	50 psf
Floor finishes, lights, and mechanical	40 psf (32 psf terrazzo and setting bed)
Roofing and suspended ceilings, lights, and mechanical	20 psf

Other dead assumed loads are summarized below.

Element	**Load**
Video wall (level 6)	0.7 kip/ft
Escalators	40 kips – 20 kips top, 20 kips bottom
Elevators	50 kip pit load

3.5.2. Live Loads

Live loading considered in the design of the Terminal renovation is summarized in the table below:

Area	**Load**
Level 6 (IBC 2015)	100 psf
Level 6 at baggage conveyors (DEN Design Standards Manual)	125 psf
Level 5 (DEN Design Standards Manual)	125 psf
Level 5 at baggage carousel (DEN Design Standards Manual)	160 psf
Automated Guideway Transit System platform (AGTS)	150 psf
Level 4 AGTS Platform	100 psf

According to IBC 2015/1607.5, no partition loads apply for areas with live loads of 80 psf or greater.

3.5.3. Wind Loads

Per the Denver Building Code Amendments to the IBC and ASCE7 the design Basic Ultimate Wind Speed = 120 miles per hour for Risk Category III. The City of Denver allows for a reduction for air density in calculation of wind velocity pressures as follows: using Eq. 6-15 27.3-1, 28.3-1, 39.3-1 and 30.3-1 in ASCE 7, the numerical constant, 0.00256, may be reduced to account for air density. Reductions comply with ASCE 7, Section C27.3.2, and in no case do the reduction in the numerical constant exceed fifteen percent. Meets DEN amendments.

3.5.4. Snow Loads

The ground snow load for use with ASCE 7 calculations shall be 35 pounds per square foot per the Denver Building Code. The snow load importance factor, Is, shall be replaced by 1.20 for Risk Category III. Meets DEN amendments.

3.5.5. Seismic Loads

A geotechnical report has not been commissioned for this project so site soil classification will be defined as Site Class D as outlined in IBC 2015. The seismic design information is as follows for Risk Category III per IBC 2015, based on the USGS online mapping tool:

SS = 0.159 g, S1 = 0.054 g, SMS = 0.255 g, SM1 = 0.130 g, SDS = 0.170 g, SD1 = 0.087 g.

Lateral story and base shears are controlled by wind. The seismic mass added to the Terminal building with the addition of the Level 6 floor area, is not sufficient to increase overall lateral demand on the building lateral system which remains controlled by wind effects.

3.5.6. Other Loads

Temperature, differential settlement, creep and shrinkage and any other load are considered when their structural effects are not expected to be negligible.

3.11. STRUCTURE DESIGN DESCRIPTION

3.11.1. Structural Work Scope

The areas where structural work scope is required to support the Architectural Program.

1. A floor addition toward the Center of the Great Hall at Level 6 (Between Grid Lines W3 and W2 on the West and Between Grid Lines E3 and E2 on the East).

2. The expansion of the South Bridge Connecting the East Wing and West Wing of Level 6.

3. Partial demolition and infill of the structure and the facade at Level 5 and Level 6 (Between Grid Lines W8 and W9 and E8 and E9) at the curb bag locations.

4. The addition of a roof structure over the existing roof at Level 6 at AOB corridor (East and West sides).

5. The expansion of the Level 6 North floor South of grid N30 to support a new stair and escalators.

6. Addition and alteration of structure at Level 4, 5 and 6 to support vertical circulation program.

7. Select alteration of existing steel braced frames at Level 6 to support layout of queues, screening equipment, ticketing, and other architectural functions.

8. Canopy structure has not been analyzed at this point. During the detailed design the structural definition and the potential implications in the existing structure will be performed.

3.13. DESIGN SOLUTIONS

3.13.1. Level 6 Floor Extension

A 30’ floor extension is added at Level 6 which is supported by the existing columns at grid lines E3/W3 and new posts supported by new concrete encased steel transfer beams at Level 5.

There are two existing East-West expansion joints at grid N10 and N22 that will be maintained through the new floor addition.

3.13.2. South Bridge Framing

A new floor structure is added on level 6 between gridlines N12/N14 and E3/W3 replacing the existing bridge between East and West areas. Likewise, the North Bridge will be extended one and a half bay approximately (cf. drawings 5/6 chapter 15).

The structure has an expansion joint on grid line N10 which will be continued into the new bridge structure.

Cast in-place concrete shear walls will provide support for new columns at level 5 in grid lines W1.8, W1, E1 and E1.8.

3.13.3. North Bridge Framing

A new floor structure is added on level 6 between gridlines N29 and N30 and E3/W3 extending the existing North bridge toward the South.

Cast in-place concrete shear walls will provide support for new columns at level 5 in grid lines W1.8, CL and E1.8.

3.13.3. Floor Infill Framing at Level 5 and 6 Bag Drop Towers

The addition of floor framing at Levels 5 and 6 to support new escalators and restrooms will be accomplished by adding two new columns at E9 and W9 that will be supported on the existing cast-in-place framing at Level 3.

3.13.3.2. Level 4 and Level 5 Vertical Circulation

The addition various new elevator and escalators between levels 4, 5 and 6 will require new floor openings and new pits. Generally, where new pits are added at existing precast framing, the precast is removed and replaced with composite steel and slab-on-metal deck.

3.13.4. North Terminal Roof

A new floor structure is proposed for level 6 roof (cf. drawing 9 chapter 15). The substructure is expected to support these new elements since additional floors had been considered in the original design

A new floor structure is proposed for level 7 roof (cf. drawing 9 chapter 15). The substructure is expected to support these new elements since additional floors had been considered in the original design.

It has to be noted that in the affected area the level 6 roof was modified during an expansion which took place in 2004 between gridlines E2/E4 and N40/N44. Columns from the new level 7 roof will be supported directly on those from that expansion. Since record drawings from the 2004 expansion are missing, existing members have to be verified once the pertaining information is available.

Record drawings show that North Terminal columns between gridlines N33 and N43 are prepared to support additional loads in provision of future floor expansions which range from additional 650 to 2500 kips. However, the proposed level 6 floor expansion exceeds this area by about 23’ towards gridline N44. In order to avoid new columns requiring reinforcing existing floor members and new foundations, this area will be cantilevered over the columns of gridline N43.

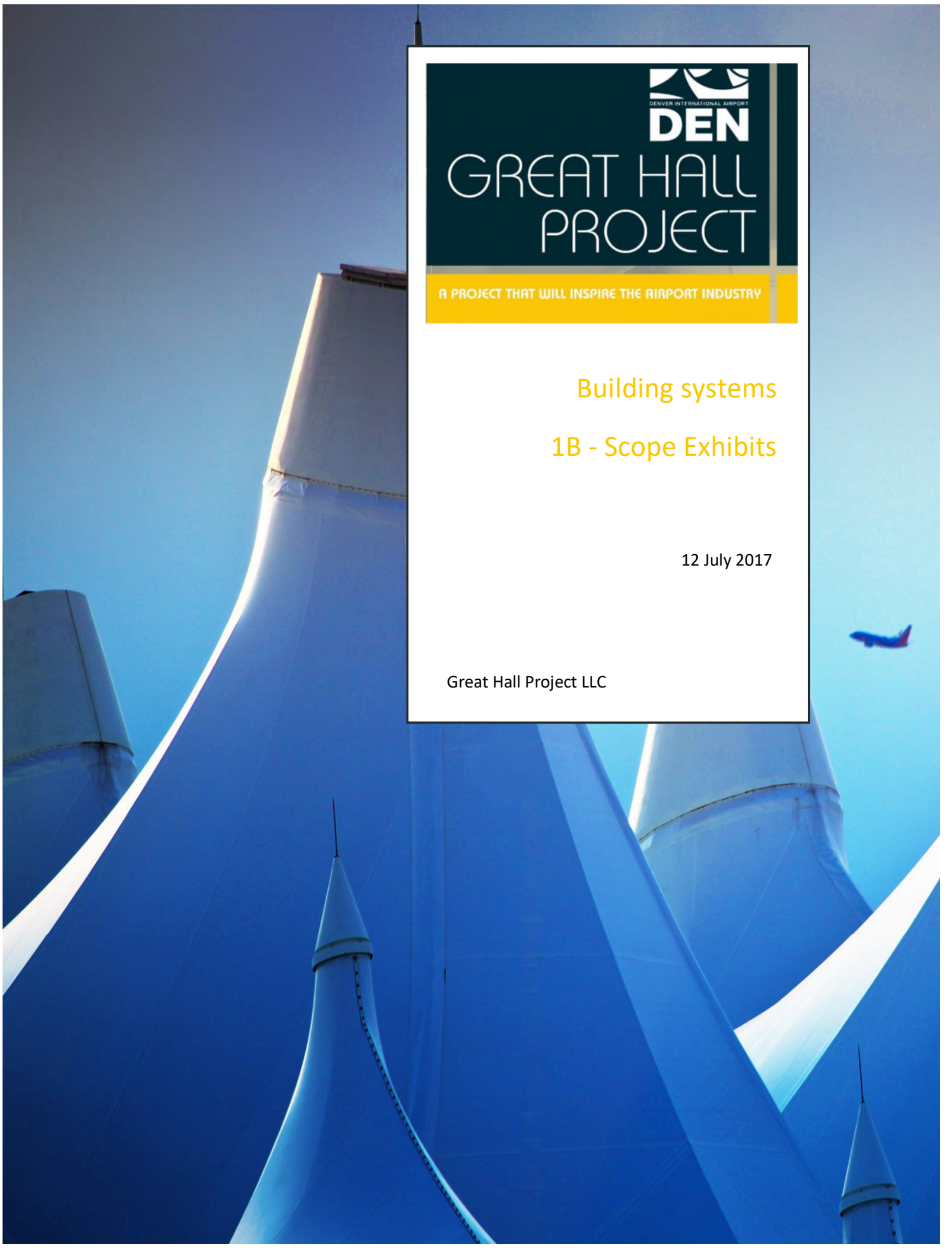
3.13.5. Addition or Alteration of Structure at Level 5 and 6

Some elevator and stair openings will be closed or moved and local infills provided. Infill will consist of composite steel and slab-on-metal deck.

3.13.6. Braced Frame Alterations at Level 6

The existing braced frame configurations of 6 consist of one and two-bay chevron braced frames.

Where braced frames require alteration or modification, existing columns and beams will be strengthened to achieve a moment frame of identical stiffness to the existing braced frame. Strengthening will consist of the addition of built-up steel shapes, welded to the existing steel members to achieve the required stiffness. Moment frames should be proportioned similar to the layout of the existing braced frames maintaining the same horizontal location in the diaphragm as intended in the original lateral design. Relocation of the vertical frame elements would change the center of rigidity inducing torsion in the diaphragm redistributing forces in the diaphragm and existing braced frames.



DENVER INTERNATIONAL AIRPORT

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GREAT HALL PROJECT

A PROJECT THAT WILL INSPIRE THE AIRPORT INDUSTRY

Building systems

1B - Scope Exhibits

12 July 2017

Great Hall Project LLC

Denver International Airport
Great Hall Renovation

Basis of Design Report
Building Systems

Contents

4. BUILDING SYSTEMS

4.1. BUILDING SYSTEMS DESIGN ANALYSIS

4.1.1. HVAC SYSTEMS

1. Systems Adaptation to New Project Design

General

Air handling units serving the automatic guideway transit system are not in the scope of this project.

Levels 4 (limited to passenger entrance and elevator lobbies), 5 and 6 will have refurbished air handling systems to serve the new spaces for the Great Hall renovation project. For perimeter areas (South facades) refurbishment of the existing CAV single zone systems will be provided. Refurbishment will include replacement of the vane axial fans with plug fan arrays and variable speed drives, replace coils and filters. Additionally, there were three AHUs that had rust damage to their casings. Repair or replace the sheet metal on those casing sections.

The AOB corridor and tenant spaces will be served by two new Variable Air Volume chilled and heating water air handling units. These units will be located on the new roof of the AOB corridor and will be configured similar to the refurbished units. Refer to below for a description of components expected in these units.

Doors on East and West facades will be treated with hydronic heating air curtains. In Terminal interior zones, VAV single duct systems will be installed. For tenant areas, access to outdoor air ventilation ductwork, and chilled/heating water be provided for tenants to utilize for fan coil units (FCU) or similar. The outside air ventilation will be provided by tapping into main ductwork from the new air handling systems. Ventilation has been considered based on the occupant density table shown later in this document. Design of the final connections for ventilation, chilled/heating water, and fan coil units or similar is out of scope.

Except for the two air handling systems that serve the south wall of the terminal building, the air handling systems are variable air volume (VAV) complying with the requirements of DSM section 300.1 - Air Handling Systems for air handling system requirements. Generally, the units have a section to mix return and outside air, a filter section, a heating coil section with access, a cooling coil section with access, an inlet sound attenuator section, plug fan array section with access and an outlet sound attenuator section. The current HVAC system was designed to meet the ASHRAE Std. 62.1 1989, the new design will utilize ASHRAE td. 62.1-2016, as well as any applicable IMC and City and County of Denver amendments. Since new coils will be provide in the refurbished units, they will be sized according to the new outside air requirements. Outside air will be filtered with, as a minimum, the use of 2" dry type pre-filter section having a minimum rating of MERV 7, 12” dry type filters section having a minimum rating of MERV 13.

Interior non-retail tenant spaces will utilize pinch down type variable air volume units. Perimeter spaces, especially those glass wall areas with varying envelope load will use fan powered terminals with hydronic heating coils. The supply air ductwork system will consist of medium pressure ductwork upstream of variable volume terminal boxes serving space diffusion devices. Terminal units will be tied to the building EMCS system. Refer to the EMCS section of this report for further information on this system.

The tent roof will be conditioned by ductwork along the high perimeter with jet nozzle diffusers directing air toward the Great Hall and upward along the tent roof. This air distribution is mainly to keep the air mixed for a somewhat uniform return air temperature back to the air handling systems.

Since outside air ventilation in the air handling units was sized using standards in place at the time of design and construction of the original terminal building. Ventilation requirements have been evaluated for the new terminal building occupant densities stated below, it has been determined that while the per occupant ventilation requirements are reduced, the overall ventilation requirements remain nearly the same as existing due to an increase in number of occupants. Demand controlled ventilation will be utilized to maximize energy efficiency in the air handling systems. The demand control will utilize CO_2 sensors located in high occupancy spaces. These CO_2 sensors will vary the amount of outside air supplied from the air handling units to use only what is necessary to satisfy the occupants in the space. Relief fans will be staged and speed will be varied in response to the amount of outside air supplied, and to maintain the building pressure relative to an offset determined by the building's fixed exhaust air plus approximately 10% added for positive pressure. Refer to Appendix A for a table that evaluates the ventilation and pressurization modes of operation.

Mod 1 duct shafts from level 4 air handling unit rooms to the roof are severed at level six for this renovation project. New shaft locations are provided at Level 6 but they aren't vertically continuous with those on Level 5. It is intended for the architectural design to provide horizontal shafts to interconnect the Level 5 and 6 vertical shafts to provide continuous 2-hour fire resistant shafts to allow the intended operation of the air handling systems. These shafts are an integral and vital part of the HVAC and smoke control systems that serve Levels 4, 5 and 6. All duct penetrations of these shafts will be provided with combination fire and smoke dampers. Standard HVAC return air utilizes the free area of the shaft for conveyance back to the air handling units. There are return air openings, in the shaft above the ceiling, with fire/smoke dampers. There are five smoke zones in levels 5 and 6 of the Great Hall/Terminal; level 5 east terminal wing, level 6 east terminal wing, level 5 west terminal wing, level 6 west terminal wing and the Great Hall. In the event of a fire alarm the fire department manually activates the smoke control systems for the zone in alarm. This activation is done in Level 6 fire command center. The Baggage Makeup Exhaust ductwork will be inside the 2-hour rated enclosure from the Level 4 mechanical rooms to the rooftop point of exit.

Due to the location of new duct shafts and reconfiguration of all twelve return and relief shafts, the building relief fans will require reconfiguration. All seventy-two existing relief fans will require replacement with new fans correctly sized for the air flow and static pressure requirements at each location. New rooftop spaces will be required for these relief fans. The relief fans will be staged and each will be provided with variable frequency drives to control air flow as the outside air economizer varies. These fans will be

provided with air flow monitors for feedback to the EMCS for the fan tracking building pressure control scheme.

New toilet exhaust systems will be required since the toilet rooms will be relocated. These systems will be sized at 2.0 cfm/sf of floor area or 15 ac/hour whichever is larger for small and low use toilet rooms. Toilet rooms with extremely high traffic areas (levels 5 and 6 of Great Hall) will be exhausted at a rate of 2.5 cfm/sf. This information is in accordance with DEN Mechanical DSM 303.4. The exhaust fans will be located on the roof above level 6.
New electrical rooms that are added to the scope of this project have been evaluated and will utilize chilled water cooled fan coil units for conditioning the heat rejected from step down transformers in each room. Similarly, the IT/comm. rooms, containing server equipment, will be conditioned in a similar fashion. Comm. Rooms will be humidified with point of use electric steam generating electrode type humidifiers. The capacity of each will be 20 lbs/hr, 7.5kW, 277V/1ph. These units will require a ½" domestic cold water connection. These units will be connected to the EMCS system for status and alarms.

Heating only air curtains will be utilized to condition the passenger entry areas of the building. It is anticipated these air curtains will recirculate air during cooling periods, but will have supplemental heating to provide a thermal break during heating periods.

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Tenants

The Tenant hydronic loop will be design according with an allowance of 4500sf connections.

Tenant Chilled Water Allowances

Tenant Size	Chilled Water Allowance (GPM)
0-1500 s.f.	10.0
1501-3000 s.f.	20.0
3001-4500 s.f.	30.0

Tenant Ventilation Air Allowances

Tenant Size	Ventilation Allowance (CFM)
0-1500 s.f.	1,100
1501-3000 s.f.	2,200
3001-4500 s.f.	3,300

Note: These allowances are based on outside air at approximately 30% of supply air for the air handling units. The ASHRAE 62.1-2016 per occupant and outside air/s.f. is approximately 11 cfm/occupant combined. The occupant density for the retail spaces is one person per 50 gross square feet.

4.1.2. Energy Management Control System (EMCS)

1. Systems Adaptation to New Project Design

Compatibility of the existing EMCS system with the systems required for the Great Hall renovation project will need to be assessed according to new HVAC equipment to be installed, and considering that there are approximately 30,000 licensed ILON control points with approximately 26,000 of them that are being used. However, all the replaced equipment will release some control points which will release licensed ILON points. As noted, these points will be replaced with BACnet points that do not require individual licensing. The new EMCS components are not intended to be limited to Honeywell products, but should be considered open to other BACnet compatible manufacturer's. Honeywell products are noted throughout only from the standpoint that they are being used for some projects and our design team has access to some information related to these systems.

Controllers, expansion modules, etc. should be added for new added HVAC systems. As required by DEN, new HVAC controls equipment and unitary controllers shall be replaced with new BACnet certified devices and technologies instead of LonWorks. Existing LonWorks routers, not being replaced in this project, can be integrated into the new BACnet using a ILON to BACnet integrator controller (Honeywell CP-600E model controller (router) or approved equivalent).

2. New Systems Criteria

General

EMCS system is to be used for HVAC systems only. EMCS systems will be integrated into the exising EMCS systems working over BAC-Net data communication protocol.

Additions to the existing HVAC Control system will consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus and accessories to control mechanical systems, and software connected to distributed controllers.

Basic Control Architecture will be a network backbone with routers to connect HVAC Controllers with the EMCS Workstation where view and trending equipment data will be monitored and supervised:

Following HVAC equipment will be controlled:

- Constant Volume Air Conditioning Unit
- Variable Air Volume Air Handling Unit
- Fan Coil Units
- VAV Box
- Fan Powered VAV Box
- Hydronic Pumps
- Building Relief Air Fans

- Exhaust fans
- Electrical room ventilation fans
- Plumbing hot water recirculation pumps
- Domestic water booster pumps
- Fittings, thermometers, gauges, etc.

We have attempted to include all HVAC equipment, to the list above, that is being added or replaced in this project.

The control and monitoring of the aforementioned devices will be done through the following hardware elements:

- Necessary Sensors and Data Field Bus Devices
- VAV Controllers, Small Point Controllers
- Fan Coil Unit Controllers
- Distributed I/O Controllers for larger systems like air handling units
- Existing EMCS Servers
- Existing EMCS Operator Workstation and monitor

The software elements to perform the control and monitoring of the HVAC systems include Control and Supervisory software.

Routers

A LonWorks network backbone with routers was installed in 2012 with connection to new head-end controls - Honeywell EBI. This ILON system is currently only used for the air handling unit control valves. These ILON routers will be replaced, for air handling units in the scope of this project, with new BACnet controllers.

In this sense, connection from all new HVAC Controllers provided for Great Hall Renovation Project to these routers will be implemented. If any of the existing routers does not support too many new connections, router expansion or new routers will be provided.

Servers

The Terminal and North Terminal are together in Hot Virtual Mirror, the system is run from one server and contains a live back-up and switches based on load. One server is in the Data Center and the other in the Concourse A.

Great Hall Renovation Project will be in charge of the integration of all new HVAC equipment in the currently working Servers which includes a Real-Time Database (RTDB) to store the data gathered and process these data according to the monitoring and control functionalities defined. Therefore, necessary modifications in RTDB to integrate new HVAC equipment will be implemented.

HVAC Controllers

EMCS will be limited to Control Systems for HVAC which are Direct Digital Control (DDC) controllers for specific HVAC equipment.

DDC Systems will consist on a microprocessor-based monitoring and control including analog/digital conversion and program logic. A control loop or subsystem in which digital and analog information is received and processed by a microprocessor, and digital control signals are generated based on control algorithms and transmitted to field devices to achieve a set of predefined conditions.

DDC system will consist of a peer-to-peer network of distributed DDC controllers, other necessary network devices, operator interfaces, and software.

Controls for this HVAC equipment will be designed according to DEN Mechanical Design Standards Manual, Section 502. It should be considered that all sensors and devices for proper control of the systems listed above, and as required for the control points list, should be included in the price of this project. Additionally, any existing control points removed as a result of equipment removed should also be considered before router, controller or software licensing are increased.

Following is a list of control points for each HVAC equipment is an illustrative guide to estimate the whole volume of signals to be treated:

CONSTANT VOLUME AIR CONDITIONING UNIT	Digital Output	Digital Input	Analog Output	Analog Input
AHU				
Supply Fan Start-Stop and Status	X	X		
Return Fan Start-Stop and Status	X	X		
Fan Run Time	x	x		
Outside Air Temperature (system shared point)				X
Mixed Air Temperature				X
Discharge Air Temperature				X
Discharge Air CFM				X
Outside Air CFM				X
Mixing Dampers			X	
Heating Coil Control Valve			X	
Heating Water Supply Temperature				X
Heating Water Return Temperature				X
Cooling Coil Control Valve			X	
Chilled Water Supply Temperature				X

CONSTANT VOLUME AIR CONDITIONING UNIT	Digital Output	Digital Input	Analog Output	Analog Input
Chilled Water Return Temperature				X
Low Temperature Sensor		X		
High Pressure Sensor/Switch		X		
Duct Smoke Detectors (as needed)		X		
Dirty Filter		X		
Duct Smoke Detectors (as needed)		X		
TOTAL	**2**	**7**	**3**	**9**

VARIABLE AIR VOLUME AIR HANDLING UNIT	Digital Output	Digital Input	Analog Output	Analog Input
AHU				
Supply Fan Start-Stop and Status	X	X		
Supply Fan Speed Control			X	
Fan Run Time				
Outside Air Temperature (system shared point)				X
Mixed Air Temperature				X
Discharge Air Temperature				X
Discharge Air Static Pressure				X
Space Static Pressure				X
CO2 Sensors (avg.)				X
Discharge Air Velocity Pressure (as needed)				X
Discharge Air CFM				X
Outside Air CFM				X
Mixing Dampers			X	
Heating Coil Control Valve			X	
Heating Water Supply Temperature				X
Heating Water Return Temperature				X
Cooling Coil Control Valve			X	
Chilled Water Supply Temperature				X
Chilled Water Return Temperature				X
Low Temperature Sensor		X		
High Pressure Sensor/Switch		X		

VARIABLE AIR VOLUME AIR HANDLING UNIT	Digital Output	Digital Input	Analog Output	Analog Input
Duct Smoke Detectors (as needed)		X		
Duct Static High Limit		X		
Dirty Filter		X		
Duct Smoke Detectors (as needed)		X		
TOTAL	**1**	**7**	**4**	**13**

VAV BOX	Digital Outputs	Digital Inputs	Analog Outputs	Analog Inputs
VAV Box				
Space Temperature				X
Space Temperature Setpoint				X
Space Occupancy	X	X		
Discharge Air Temperature			X	
CFM				X
Damper Position			X	
Heating Valve Position (where required)			X	
TOTAL	**1**	**0**	**3**	**3**

FAN POWERED VAV BOX	Digital Outputs	Digital Inputs	Analog Outputs	Analog Inputs
Fan Powered VAV Box				
Space Temperature				X
Space Temperature Setpoint				X
Space Occupancy	X	X		
Discharge Air Temperature			X	
CFM				X
Damper Position			X	
Heating Valve Position (where required)			X	
Fan Control	X			
TOTAL	**2**	**1**	**3**	**3**

HYDRONIC PUMPS	Digital Outputs	Digital Inputs	Analog Outputs	Analog Inputs
Hydronic Pump				
Status	X			
Pump Speed Control			X	
Pump Inlet Pressure			X	
Pump Discharge Pressure			X	
Flowrate GPM				X
Pump Run Time				X
TOTAL	**1**	**0**	**3**	**2**

RELIEF AIR FANS	Digital Outputs	Digital Inputs	Analog Outputs	Analog Inputs
FAN				
Fan Start-Stop and Status	X	X		
Fan Run Time				
Fan Speed Control			X	
Flowrate CFM				X
Fan Run Time				X
TOTAL	**1**	**1**	**1**	**2**

EXHAUST FANS	Digital Outputs	Digital Inputs	Analog Outputs	Analog Inputs
FAN				
Fan Start-Stop and Status	X	X		
Fan Run Time				
Fan Speed Control			X	
Fan Run Time				X
TOTAL	**1**	**1**	**1**	**1**

Plumbing Pumps	Digital Outputs	Digital Inputs	Analog Outputs	Analog Inputs
HW Recirculation Pumps				
Start-Stop and Status	X	X		
Run Time				X
Domestic Water Booster Pumps				
Start-Stop and Status	X	X		
Pump Speed			X	
Run Time				X
TOTAL	**2**	**2**	**1**	**2**

The following control functions will be programmed into the control system:

- Use of economizer controls to utilize free cooling when possible on some AHUs
- VAV boxes will be controlled by the temperature control system.
- The total supply air volume will be controlled by static pressure sensors located in the main supply air duct. Duct static pressure setpoint is to be maintained through a modulated supply fan's motor speed controller.
- Variable air systems that have heating coils at the VAV terminal units will be designed with a control sequence to be approved by DEN Mechanical Engineer.

DDC systems could interface existing systems to achieve integration. Operator of existing system will be able to upload, download, monitor, trend, control and program every input and output point in DDC system from existing control system using existing control system software and operator workstations. Interface of DDC system into existing control system will have to be transparent to operators of existing control system and allow operators to monitor and control DDC system from any operator workstation connected to existing control system.

Existing control system performance requirements will be satisfied when monitoring and controlling existing control system through DDC system. Interface of existing control system I/O points into new DDC system will be transparent to operators.

DDC system could interface with an existing enterprise system to adhere to Owner standards already in-place and to achieve integration.

Functional Requirements

The proper functioning of HVAC Controls depends on the correct design, installation and configuration of all hardware and software elements. HVAC controls will be designed following standards and keeping up with new energy-efficient technologies.

Functionalities of the HVAC Control equipment will be carried out with a response time as low as to deem it as negligible. The general real-time functional requirements that the system will try to fulfil are listed below:

- Instantaneous monitoring and collection of values related to the system field equipment (either analogic or digital data);
- Real time reception of any notification or alarm coming from the low-level field that reveals a malfunctioning in any of the devices under the scope of the HVAC Control;
- Order and command transmission to any of the final devices;
- HVAC control equipment will grant real-time data interchange and process with the final monitored devices.

Performance Requirements

System performance objectives are basically:

a. Mainly DDC systems will manage HVAC systems.
b. Control system will operate HVAC systems to achieve optimum operating costs while using least possible energy and maintaining specified performance.
c. Control system will respond to power failures, HVAC equipment failures, and adverse and emergency conditions encountered through connected I/O points.
d. Control system will operate while unattended by an operator and through operator interaction.
e. Control system will record trends and transaction of alarm events and produce report information such as performance, energy, and equipment operation.

4.1.3. TENANT BUILDING MANAGEMENT SYSTEM (BMS)

1. New Systems Criteria

General

BMS system is to be used for HVAC systems only. BMS systems will be integrated into the existing BMS systems working over BAC-Net data communication protocol.

Additions to the existing HVAC Control system will consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus and accessories to control mechanical systems, and software connected to distributed controllers.

Basic Control Architecture will be a network backbone with routers to connect HVAC Controllers with the BMS Workstation where view and trending equipment data will be monitored and supervised:

Following HVAC and Plumbing equipment will be controlled and/or monitored:

- Food Service Grease Exhaust Fan

- Food Service Makeup Air Unit
- Fan Coil Units

We have attempted to include all HVAC equipment, to the list above, that is being added in this project.

The control and monitoring of the aforementioned devices will be done for the following hardware elements:

- Necessary Sensors and Data Field Bus Devices
- Small Point Controllers
- Fan Coil Unit Controllers
- Tenant Electrical Meters
- Tenant BTU Meters
- Tenant Natural Gas Meters
- Tenant Water Meters

The software elements to perform the control and monitoring of the HVAC systems includes Control, Supervisory and Graphic Interface software.

BMS Workstation

A new BMS workstation is required and will be located in a Ferrovial operations room to be determined. This workstation provides access for appropriate Ferrovial maintenance personnel for monitoring and control of Tenant HVAC systems and meters.

Operation Workstations will be designed to display the information to the operator in an intuitive way. Information will be displayed based on a schematic representation of the different equipment to be controlled, using schematics with the different devices located on their position. The operator will be able to change easily to the different locations using navigation bars or through a global schematic of all the Great Hall.

Trend logs and graphing capability will be provided. Display application in the Workstation will be based on color codes and dynamic color graphic display indicating different operating states, as well as the use of blinking and sounds to indicate the presence of alarms in the system. The alarms will be configured with different severity levels, configured with different colors and sounds.

Displayed information will include permanently basic information of the whole system and the different locations, so that the operator will have direct visibility to this information, regardless of the location that the operator is supervising at a given time. An alarm list will be permanently shown as well.

Software for BMS workstation program will be non-proprietary and reprogrammable by user.

Routers

Router is a BTL-listed BACnet B-BC device with the BACnet options specified below, non-volatile memory for operating system software; read/write memory for custom control programming, trending, scheduling, and alarming; real time clock; and network communications to all device types.

Router/Panel Network: Provide 10baseT Ethernet communications using the BACnet/IP data link layer for interconnection to other Routers/Panels, Operator Interfaces, and to an Internet/Intranet connection, if specified.

Routing – Provide BACnet Clause 6 Routing (between the specified Router and Controller Network technologies) and BACnet/IP Broadcast Management (BBMD).

Controller Network: Router shall be a Master to one or more 76.8Kbps BACnet MS/TP data link layer communications connections for DDC Controllers and Application Specific Controllers.
Optional Point Termination – DDC Routers may be utilized for direct point termination through either integral point connections or point expansion devices.

1. Each BO point termination (including those on expansion devices) shall be provided with an integral hand/off/auto switch to allow for manual point override. An adjacent LED shall indicate the energized/de-energized status of the output relay.
2. Point Expansion Devices shall communicate with the DDC Router via the Router's microprocessor bus (i.e., not using EIA-232 or LAN communications).

Servers

The system is run from a server(s) that is BACnet BTL listed with Microsoft Internet Explorer Web Browser. Shall be up to 100 HMI Web Browser or Full Client Workstation supported. Shall be capable of over 300 simultaneous easy mobile or mobility clients. It shall support distributed system architecture and have publisher client capabilities. Software shall include graphical interface, control and supervisory capabilities necessary to perform the functions described. It shall be provided with a full program and global application library.

HVAC Controllers

BMS will be limited to Control Systems for HVAC which are Direct Digital Control (DDC) controllers for specific HVAC equipment.

DDC Systems will consist on a microprocessor-based monitoring and control including analog/digital conversion and program logic. A control loop or subsystem in which digital and analog information is received and processed by a microprocessor, and digital control signals are generated based on control algorithms and transmitted to field devices to achieve a set of predefined conditions.

DDC system will consist of a peer-to-peer network of distributed DDC controllers, other necessary network devices, operator interfaces, and software.

It should be considered that all sensors and devices for proper control of the systems listed above, and as required for the control points list, should be included in the price of this project.

Following is a list of control points for each HVAC equipment is an illustrative guide to estimate the whole volume of signals to be treated:

FAN COIL UNITS	Digital Outputs	Digital Inputs	Analog Outputs	Analog Inputs
Fan Coil Units				
Status	X			
Space Temperature				X
Heating Water Valve Position				X
Chilled Water Valve Position				X
Supply Air Temperature				X
Run Time				X
TOTAL	**1**	**0**	**0**	**5**

EXHAUST FANS	Digital Outputs	Digital Inputs	Analog Outputs	Analog Inputs
FAN				
Fan Start-Stop and Status	X	X		
Fan Run Time	X	X		
Fan Speed Control			X	
TOTAL	**2**	**2**	**1**	**0**

PLUMBING PUMPS	Digital Outputs	Digital Inputs	Analog Outputs	Analog Inputs
HW Recirculation Pumps				
Start-Stop and Status	X	X		
Run Time				X
TOTAL	**1**	**1**	**0**	**1**

TENANT METERS	Digital Outputs	Digital Inputs	Analog Outputs	Analog Inputs
Tenant Meters				
Water Meter				X
Electrical Meter				X
BTU Meter				X
Gas Meter				X
TOTAL	**0**	**0**	**0**	**4**

Functional Requirements

The proper functioning of HVAC Controls depends on the correct design, installation and configuration of all hardware and software elements. HVAC controls will be designed following standards and keeping up with new energy-efficient technologies.

Functionalities of the HVAC Control equipment will be carried out with a response time as low as to deem it as negligible. The general real-time functional requirements that the system will try to fulfil are listed below:

- Instantaneous monitoring and collection of values related to the system field equipment (either analogic or digital data);
- Real time reception of any notification or alarm coming from the low-level field that reveals a malfunctioning in any of the devices under the scope of the HVAC Control;
- Order and command transmission to any of the final devices;
- HVAC control equipment will grant real-time data interchange and process with the final monitored devices.

Performance Requirements

System performance objectives are basically:

a. Mainly DDC systems will manage HVAC systems.
b. Control system will operate HVAC systems to achieve optimum operating costs while using least possible energy and maintaining specified performance.
c. Control system will respond to power failures, HVAC equipment failures, and adverse and emergency conditions encountered through connected I/O points.
d. Control system will operate while unattended by an operator and through operator interaction.
e. Control system will record trends and transaction of alarm events and produce report information such as performance, energy, and equipment operation.

4.1.4. PLUMBING SYSTEMS

1. Systems Adaptation to New Project Design

Domestic water, waste, vent and storm sewer systems will be redesign for the new toilet room locations and to provide continuity of existing systems severed by relocation of mechanical shafts on Level 6. Refer to the physical project plans and schematic diagrams for reconfiguration of these systems. Electric water heaters will continue to be utilized in plumbing chases or closets near the toilet groups.

Although the SEBESTA report indicates 50% of the sanitary sewer piping requires replacement, there was no way for us to validate this. For this project, it is anticipated to extend waste and vent piping from the new toilet groups to existing waste and vent risers. Routing of the piping will require close coordination since DEN requires waste piping to be sloped at ¼"/foot instead of a combination of 1/8"/foot and ¼"/foot. Each toilet group will be piped to the nearest available sanitary riser.

Domestic Cold Water (DCW)

The existing domestic water service will be increased from its current 4-inch, 500 gpm size to a 6-inch service plus a second 6-inch tap off the east 12-inch water main on the east side. The two 6-inch lines will combine into one 8-inch service. The 8-inch combined service of the domestic water system will be installed with a meter located in a service vault. The existing 500 gpm duplex pump will be replaced with a new triplex 690 gpm, variable speed booster pumps will provide water service throughout the Terminal Building. Two pumps are necessary for the required flow at 50% each, the third pump at 50% capacity shall be for redundancy. The estimated full load of the domestic cold water system is approximately 575 gpm with 20% future growth thus requiring 690 gpm. Distribution will be revised for service to the new toilet rooms and risers for future connection by the retail tenants. The water supply will be distributed from (3) three main zones; 6" CW to serve west side of terminal, 6" DCW to serve east side of terminal and 4" DCW to serve the north terminal.

Each pressurized CW branch will have a reduced pressure valve maintaining a setpoint pressure of 60 psi minimum. All domestic, or cold, water distribution pipework will be insulated to prevent condensation forming on pipework or other components. It is considered that the domestic water quality provided is at a potable level whereas and there is no need for water treatment.

Back flow preventers, as required by the International Plumbing Code (IPC) 2015 and 2016 Denver Amendments to the IPC, will be installed at the water entry and connections to devices that have potential for backflow contamination of the domestic water system. No such connections are anticipated for the base building renovation, but future restaurant tenants will likely have domestic water connections requiring backflow prevention.

Potable water will be utilized for the following:

- Drinking Water
- WC and Urinal Flushing
- Lavatories
- Janitors sinks or mop service basins
- Future Kitchens/restaurants/bar (Retails)

Design of the potable water system will be designed as per IPC Code 2015 and the 2016 Denver Amendments to the IPC, and the requirements of water utility, Denver Water. Water fixtures will be selected to be in accordance with LEED requirements unless stated otherwise.

Provisions will be made for tenants with domestic CW piping extended to the tenant space with a valve and drain for future connection by the tenant. The tenant will provide a water meter in their domestic CW piping, downstream of the isolation valve. The water meter will be connected to the Tenant BMS system for reading and tracking tenant water consumption. The water consumption meter will be above the service corridor adjacent to the tenant space.

Domestic Hot Water (DHW)

All hot water distribution systems will be designed in accordance with ASHRAE Applications Chapter 50 and the International Plumbing Code.

Hot water demand for plumbing fixtures will be determined based on the hourly demand in accordance with ASPE Data Book, ASHRAE 90.1, and the Denver Amendments to the International Codes. New electric water heaters will be provided in plumbing chases at the new toilet rooms. This domestic hot water will serve the Men's and Women's toilet rooms, the janitor's closet and multi-purpose toilet room.

The domestic hot water system shall be designed for a supply temperature of 122°F for circulated systems and 140°F for storage systems per OSHA requirements. For the public spaces, provide lavatories with 102°F water at each point of use.

Where lengths in excess of 25 feet of hot water distribution pipework are necessary, DHW return circulation pumps, complete with hot water secondary return pipework will be installed to ensure acceptable hot water temperatures and draw off durations are achieved at every outlet.

Outlets in areas that are accessible to the public will be provided with terminal blending to avoid scalding. Given the problems with the operation of thermostatic terminal blenders on potable water with elevated temperatures, blending will take place in the single tap/faucet that is supplied with hot and cold water.

Hot water storage units will be insulated in accordance with ASHRAE 90.1-2013 Section 7 and OSHA requirements, direct fed and suitably rated for the maximum possible pressure, provided with pressure/temperature relief and vacuum relief all as IPC Section 504 with pressure temperature relief

discharging through an air-gap. Hot water vessels will be insulated as IPC Section 505. Water heaters will be provided with thermal expansion tanks.

Hot water pipework will be insulated to all outlets.

CW and HW systems will be designed and installed with drain points at all system low points to facilitate the complete evacuation of the water content.

Legionnaires Disease Prevention

DHW water systems will be designed to ensure that the risks of harboring and spreading legionella pneumophila are eliminated. Systems will be designed to minimize pipework installations that may promote standing water temperatures of between *68°F – 113°F* as recommended by health institutions.

DHW System designs will adhere to guidance provided in ASHRAE handbooks as listed below:

- 2013 ASHRAE Fundamentals
- 2015 ASHRAE Applications

Given that in line with normal practice, facilities will not be provided with chemical treatment, the design has to be executed so that:

- Long dead legs where infrequently drawn water can accumulate and age are avoided;
- Oversized pipes with very low velocities (<2 ft/s) will be avoided.
- Testing points at remote sections of the networks are provided with clear instructional signage;
- Hot water is stored and distributed at temperatures in excess of 110°F.
- Systems are designed and installed so that they can be completely drained;
- Full instructions on how to maintain system cleanliness are included in the Operating and Maintenance instructions

2. Design Criteria

Domestic Water Criteria

Parameter or Strategy	Data or Description		Source
Static Pressure at The Point of Connection to the existing water network	65psi		DSM section 801.3
Minimum Water Pressure at Outlets Under Peak Demand Periods	25 -45 psi depending upon what the fixture is.		Required for proper operation of WC and UR flush valves.
Temperature of Incoming Domestic Hot Water	122°F for circulated systems, 140°F for storage systems, 102°F public lavatories at point of use.		DSM Section 802.2 and 803.2
Water Velocities in Pipework	Cold water	< 8 fps	DSM Section 801.3
	Hot water (up to 140 ºF)	< 5 fps	
Internal Domestic Water Pipework Type	Copper and Galvanized Steel		DEN Specification Section 221116
Internal Potable Water Pipework Rating	Varies with pipe materials used		See DEN Specification Section 221116
Booster Pump Configuration	The existing domestic water service will be increased from its current 4-inch, 500 gpm size. The 4" service is supplied from a 6" tap at the 12" main. The 4" pipe will be increased to 6" and connected with a second 6" line in a water meter vault prior to running to the building. A new second 6" tap at the water main will run to the building and tie together with the first 6" pipe into a combined 8" service. The new 8" domestic water system will supply water to a triplex 690 gpm, variable speed booster pump system. All three pumps will be sized for 50% of the load. Pumps 1 and 2 are normal operation with the third pump acting as stand-by. All the pumps will have lead-lag capability. The estimated full load of the domestic cold water system is approximately 690 gpm.		Calculations and IPC.

Parameter or Strategy	Data or Description	Source
Demand Assessment (Sanitary Fixtures)	When using the International Plumbing Code (IPC) water fixture unit calculation method, only the flushometer table for conversion to flow rate will be used since all concourse and terminal domestic water mains ultimately connect to public restrooms.	DSM Section 801.3
Backflow Protection	All domestic water connections to mechanical, plumbing, and fire protection systems, including lawn sprinkling systems, will be protected from backflow by use of backflow preventers installed in the piping. Provide	DSM Section 801.10
WC and Urinal Water Source	Potable water	DSM Chapter 8
WC Flushing Method	Automatic flush device valves	DSM Section 802.2 and DEN Specification Sections 224213.13
Urinal Flushing Method	Automatic flush device valves	DSM Section 802.2 and DEN Specification Section 224213.16
Minimum Cold Feed Temperature	40°F	Good engineering practice to prevent freezing
Hot Water Storage Unit Sizing Method and Recovery Period	2 hours	ASHRAE Applications, Chapter 50
Method Of Heating Water	Electrical resistance heaters	DSM Section 802.1

The following flow rates and fixture units are the basis of fixture unit calculations included in Appendix B of this report. These are a complete list of systems that are currently included in the base building portion of the design. All future tenant fixtures are unknown, so allowances have been made for water and waste calculation purposes.

Water Distribution Systems - Required Capacity at Outlets

Outlet Type	Flow Rate (gpm)	Source
Lavatory Basin	0.4	IPC 2015 Table 604.3
Shower	2.5	IPC 2015 Table 604.3
Kitchen Sink	1.75	IPC 2015 Table 604.3
WC Flush (Valve)	25	IPC 2015 Table 604.3
Laundry Sink	4	IPC 2015 Table 604.3
Urinal, valve	12	IPC 2015 Table 604.3

Gravity Drainage - Fixture Units

Fixture Type	Drainage Fixture Unit Value	Source
Lavatory Basin	1	2015 IPC Table 709.1
Shower	2	2015 IPC Table 709.1
WC Flush	4	2015 IPC Table 709.1
Kitchen Sink	2	2015 IPC Table 709.1
Laundry Sink	2	2015 IPC Table 709.1
Urinal	2	2015 IPC Table 709.1

Water hammer arrestors will be installed at the end of each CW and HW branch where quick response fittings are installed. All sanitary fittings will be installed with flow restricting devices and services valves to control pressure and flowrates and to facilitate ease of maintenance. All cold-water pipework will be insulated to avoid condensation forming.

All water supplies to fixtures where back flow is possible will be protected by an approved vacuum breaker.

Metering

Provisions for additional sub meters will be made for each retail, restaurant, concession, etc., for potable water and as required satisfying the requirements of the USGBC LEED building accreditation strategy. Meters will be suitable for remote monitoring via the Tenant BMS.

The meters will be open protocol type BACnet and will be connected to the Tenant BMS which will monitor and log all the data to provide:

- Hourly, daily, weekly, monthly and annual water consumption;
- Compare consumption for trend analysis; and
- Determine out of range values and alert building operators.

The meters will monitor unusually high water consumption to buildings and raise an alarm at the Tenant BMS should the flow rate exceed a pre-set maximum. An alarm will also be raised at the Tenant BMS if a continuous flow of water passes through the water meter at a flow rate above a pre-set minimum for a pre-set period. The Tenant BMS should be able to identify between different leakage rates, e.g. continuous, high and/or low level leaks, over set time periods. The Tenant BMS monitoring of the meters should be programmable to suit the user's needs.

Sanitary and Waste Water Drainage

All sanitary and waste water from plumbing fixtures will be designed as a two pipe systems where sanitary and waste water drainage will be collected separately, but combine into a common sewer system. All fixtures will be vented, but vents will not be installed within 10 feet of fresh air intakes louvers, or building openings, etc.

The systems will be designed in accordance with local regulations as well as with international design standards (IPC Chapters 7-10).

Grease waste drainage from kitchens will be connected to new grease interceptors. The grease traps will be connected as close to the point of use as is practicable. The maximum length of grease contaminated horizontal pipes will not exceed 50 ft. before the grease is intercepted. However, longer lengths are allowed if the drain is heat traced to prevent coagulation of grease inside the drain pipe. Drainage pipework will be sloped to promote gravity discharge as far as is practicable. Minimum slopes inside building will be at least ¼''/foot.

The existing 1500 gallon grease interceptors on the south end (east and west) will be replaced. The methodology required by Denver wastewater for calculating the size of the grease interceptor capacity has greatly increased. The grease interceptor on the southwest side will increase to a 2,000 gallon grease interceptor. A new grease interceptor will be required for the northwest side with the capacity of 2,000 gallons. The grease interceptor on the southeast side will be replaced with a 6,000 gallon grease interceptor. A new grease interceptor will be required for the northeast side with the capacity of 7,000 gallons. Due to limited accessibility to these interceptors, multiple vacuum cleaning trucks will be required to service the interceptors for cleaning purposes.

Sanitary waste from WC's will be via 4-inches and this diameter will be maintained throughout the drainage system i.e. pipework diameters from WC's will not be less than 4-inches. To prevent urine salt buildup, urinal drains will connect directly downstream of water closet sanitary sewer main for allowance of future low flow fixtures. Urinals will be connected per schematic drawings and directed to the waste riser. Because the urinals are low flush type, they will be located downstream of water closets to assure adequate removal of liquid waste.

All urinal and water closets will have a double cleanout on the sanitary or vent riser prior to connection to the main piping to allow for cleaning of piping to the fixture and from the fixture branch to the main.

Drainage for sprinklers or hose bibs operation will be provided.

For food service tenants, a waste and grease waste pipe will be extended into each tenant space for future connection by the tenant. There is a cast-iron cap on the end of the future piping.

Condensate Drainage

Condensate water from central air conditioning units, fan coils units and CRAC units will be collected through condensate drain lines and discharged to the nearest sanitary water stack and thereafter to utility network. Condensate drain lines will be installed with deep sealed traps to prevent airflow via the drainage pipework and to prevent the transfer of smells. Condensate drainage from OA-AHUs will discharge into an indirect waste receptor with minimum 1-inch air gap.

Storm Water Drainage

Storm water collected by roof drainage systems will consist of roof drains connected to vertical drain pipes to subgrade storm water utility infrastructure. The annual rainfall amount noted in the DSM is 3.0 inches per hour and will be the basis of design for the storm drainage systems. All new roofs will be provided with primary roof drains and over-flow drains coordinated with the roof slopes and/or roof cricketing. The current storm overflow piping system draining into the horizontal storm drain shall be utilized, whereas, it was installed prior to the requirement for two separate systems. The current storm drains at Level 6 will require relocation due to the shafts on Level 6 being removed. The new vertical drops will be in walls or furred out spaces.
All horizontal storm and storm overflow drainage piping within conditioned areas will be insulated. The new expansion area at the north end will require a separate overflow storm system independent of the storm system to be in compliance with the new codes. Discharge of the storm overflow system will daylight at grade.

Natural Gas Piping Distribution for Future Restaurant Tenants

The existing natural gas service is located at Level 3 on the north end of the terminal west side. The series of (3) existing gas meters serving various functions will be consolidated into one main meter.

From the existing gas meter location, the new gas piping will be routed on Level 3, separated into four zones. Each zone will have a gas pressure regulator valve reducing the gas pressure from 5 psi to 8” w.c. before entering the building for the Food and Beverage Tenants. The gas mains will extend from Level 3 up Level 5 ceiling and routed to the tenant spaces. Under the tenant improvement process the various Food and Beverage tenants will extend the gas service from a tenant sub-meter located within the appropriate tenant space.

Capacity for each of the (4) tenant zones will be in a range from 1,218,000 BTUH to 5,604,000 BTUH with a main pipe header size of 6" diameter at 8" w.c.

- Southwest Zone: 3,093,000 BTUH
- Northwest Zone: 1,218,000 BTUH
- Southeast Zone: 5,351,400 BTUH
- Northeast Zone: 5,604,000 BTUH

The tenant gas load capacities based on 18 potential kitchens is 15,266,400 BTUH. This was based on 600 BTUH/S.F. of food service tenant space. Individual tenant space gas load varies from 438,000 BTUH to 1,459,000 BTUH. The present building service gas load is 2,900,000 BTUH requiring a total gas load capacity demand of 18,166,400 BTUH.

Natural gas piping branches, with shut-off valves, will be provided to each tenant space for future connection to their appliances. The shut-off valves will be located in the service corridor adjacent to the tenant spaces. A tenant gas meter is provided for monitoring consumption of tenant natural gas. This meter is tied into the tenant BMS system.

3. Tenant Allowances

Each tenant will have allowances for domestic cold water, waste/vent connections and restaurant tenants will have allowances for connection to the grease waste systems provided in the terminal building. Separate toilet facilities will not be allowed for the tenants. They are expected to utilize the public toilet facilities in the terminal buildings. Utilities of gas and water to tenant spaces will be sub-metered with capability to report to the BMS. Following are tables of the tenant allowances for the plumbing utilities provided:

Tenant Food and Beverage Domestic Water Allowances

Tenant Size	Domestic Water Allowance (WSFU)
0-1500 s.f.	7.0
1501-3000 s.f.	15.0
3001-4500 s.f.	25.0

Tenant Food and Beverage Sanitary/Grease Allowances

Tenant Size	Sanitary/Grease Waste (DFU)
0-1500 s.f.	24.0
1501-3000 s.f.	45.0
3001-4500 s.f.	105.0

4.1.5. FIRE PROTECTION SYSTEMS

1. Systems Adaptation to New Project Design

The fire suppression systems are required to be retrofitted to accommodate the new architectural changes in accordance with the current adopted codes and standards. This section only describes the anticipated work for the fire suppression system within the proposed project scope. This section was prepared based on the assumption that the Great Hall areas (Levels 5 and 6 of the Terminal Complex) are not considered as a high-rise building per Denver Building Code. In addition, this section is written based on the assumption that the Covered Mall requirements in the building code are adopted for the Great Hall project.

It should be noted that sprinkler systems are required to be installed under the membrane roof due to the newly added retail spaces in the Great Hall. However, due to the physical constraints of anchoring sprinkler piping to the membrane roof, it is not feasible to install sprinkler systems under the membrane roof. Therefore, this section also assumes that a separate fire/smoke modeling will be conducted to justify the omission of sprinklers and prove all fire protection systems and fire prevention means provided will meet the intended fire protection goals. The fire/smoke modeling will be performed in the detail design phase but no in current PDA phase.

Fire Suppression System Water Supply

The system shall be sized to the supply maximum calculated sprinkler demand plus a minimum of 500 gpm for hose streams according to NFPA 415 section 4.5.5. Maximum water demand shall be determined through hydraulic calculations at the most remote area for each sprinkler system for at least 1 hour. The majority of the existing fire sprinkler/standpipe system mains and risers are adequately sized for use in the Great Hall project. However, the elimination of two existing stairwells on Level 6 along Grid Line N23 will also eliminate the two 6-inch risers to Level 6. Therefore, both 6-inch risers will be transferred to the two new stairwells along Grid Line N19 to Level 6 through 6-inch horizontal piping on Level 5.

Based on our understanding, all fire suppression systems will remain as a standard-pressure fire suppression system (system pressure not exceed 175 psi). For design purposes, a pressure safety cushion of 10% or 10 psi, whichever is smaller shall be added to the flowrate stated above (DFC 903.3.5).

It should be noted that the proposed sprinkler system remodel does not change the hazard occupancy to a more hazardous group than the one used during the original design. Therefore, the required fire protection water demand of the existing fire pump is deemed adequate.

Wet-Pipe Sprinkler System

Sprinklers will be provided throughout the interior of Levels 5 and 6 of the building, except the area directly under the membrane roof. The existing combined wet pipe sprinkler system and standpipe risers

will be kept and re-used for the new sprinkler systems serving this renovation project. However, all cross mains, branch lines, as well as individual sprinkler heads will be replaced to accommodate the new architectural layout, MEP system routing and new space functions. The zoning of the new sprinkler systems will be reconfigured to match the new smoke control zones as well as the new space arrangement. The fire alarm system needs to be programmed so that the water flow alarm signals from these sprinkler zones within the same smoke control zone can activate the smoke control sequence properly.

The new sprinkler system will be hydraulically designed. The hydraulic criteria will be based on the hazard occupancy classifications, type and classification of commodities for storage/retail applications in accordance with NFPA13, as well as the use and function of the spaces per amended NFPA 415. The table below summarizes the hazard occupancy classification as well as the hydraulic criteria to be used. The minimum operation pressure of any sprinklers will not be less than 7 psi. In order to maximize the flexibility for future renovations after this project, the system will be hydraulically designed to achieve criteria for Ordinary Hazard Group 2. It should be noted that the following Hazard Occupancy classifications and hydraulic criteria will be finalized during the detail design phase with the review from both the project architect (LVA) and DEN. The storage racks and shelves in future tenant spaces are assumed to be no more than 12 ft which meet the miscellaneous storage definition in NFPA 13.

Rooms/Spaces	Hazard Occupancy Classification	Density[1] / Application Area	Hose Allowance	Duration
Passengers-handling areas	Ordinary Hazard Group 1	0.16 gpm/ft^2 / 1500 ft^2	250 gpm	60 min
Baggage, package and mail-handling areas	Ordinary Hazard Group 2	0.20 gpm/ft^2 / 1500 ft^2	250 gpm	60 min
Ticketing areas	Ordinary Hazard Group 1	0.16 gpm/ft^2 / 1500 ft^2	250 gpm	60 min
Storage rooms	Ordinary Hazard Group 2	0.20 gpm/ft^2 / 1500 ft^2	250 gpm	60 min
Tenant Spaces (i.e. retails)	Ordinary Hazard Group 1	0.16 gpm/ft^2 / 1500 ft^2	250 gpm	60 min
Restrooms	Light Hazard	0.10 gpm/ft^2 / 1500 ft^2	250 gpm	60 min
Utility Spaces	Ordinary Hazard Group 1	0.16 gpm/ft^2 / 1500 ft^2	250 gpm	60 min
Other areas (i.e., offices)	Light Hazard	0.10 gpm/ft^2 / 1500 ft^2	250 gpm	60 min

All new sprinklers to be provided in spaces with suspended ceilings (i.e. ceiling tiles or gypsum wallboard ceilings) will be concealed sprinkler heads. Spaces with exposed ceilings will be provided with upright type sprinklers. All sprinkler heads will be quick response type where the thermal elements will be the glass-bulb in general. Fusible link type sprinkler heads are permitted for concealed sprinkler heads. In general,

[1] The density used here is based on the most restrictive values provided in NFPA 13 and the amended NFPA 415.

all sprinklers will be ordinary temperature type sprinklers. However, in any electric rooms, high temperature sprinkler heads shall be provided. Ordinary temperature sprinklers will be provided per NFPA 13 based on the specific use and function of the room. The cover plate of any concealed sprinkler heads will be provided with the color that matches the color of the ceiling. Sprinkler heads in spaces with elevated moisture or corrosive environment (i.e. toilet rooms and janitor's closet) will be corrosion resistive type sprinkler heads. Arm-over installation will be provided for each sprinkler head connection to the maximum extent.

Sidewall sprinklers will be provided where it is not practical to use pendant or upright sprinkler heads or the use of pendant or upright sprinklers is not desired due to architecture features. When sidewall sprinkler are used, concealed type of sidewall sprinklers will be used unless the technical specification of the concealed sidewall sprinkler heads cannot meet the specific wall/ceiling configuration. Sidewall sprinklers will also be installed along the edges and store fronts to the Great Hall atrium opening. These sidewall sprinkler installations around the Great Hall atrium are to continue the existing scheme of using the sprinklers around the atrium floor opening edge. The intent of these sidewall sprinklers is not to control a fire in the Great Hall atrium; they will be used to pre-wet items within the Great Hall atrium so that they can hardly be ignited by a fire near the atrium edge.

Sprinkler head spacing requirements will strictly comply with the listing requirements, the hazard occupancy classification of the spaces, as well as all detail requirements contained in NFPA 13. All sprinklers shall be standard coverage type. In general, sprinklers installed under ceilings will be spaced 12 ft by 10 ft. Sidewall sprinklers shall be spaced 10 ft apart.

Since the building was constructed with noncombustible materials. There is no need to provide sprinklers in above-ceiling concealed spaces per NFPA 13. New shafts, which are considered as concealed spaces, are not required to be provided with any sprinklers as well. All floor openings for the escalators, open stairs, as well as conveyors (except the Great Hall atrium) will be protected to maintain the current protection with closely spaced sprinklers (max. 6 ft apart), with noncombustible draft curtains. These protections will be considered to separate the smoke zones of the floor below and above such floor openings. In areas where sprinkler heads may suffer from mechanical damage, listed metal guards will be provided. These areas likely include all mechanical and electrical rooms, storage closets, and underside of the escalator when sprinklers are not concealed type sprinklers. The area under escalator or other similar obstruction over four (4) feet wide shall be provided with additional sprinklers.

Existing sprinkler system risers and system mains will be reused to the maximum extent as indicated in the drawing. Schedule 40 black steel (Seamless) piping will be used for all new cross mains and branch lines of the reconfigured and new wet pipe sprinkler systems. In order to ensure the sprinkler system can get the optimum hydraulic performance in such large facility, gridded layout will be utilized all reconfigured and new sprinkler systems in majority of the areas while tree layout can be used in each tenant space and individual rooms
Pipe supports and fittings will comply with the methods approved by NFPA 13. All new components of the sprinkler systems will be UL listed and/or FM approved unless it is specifically permitted in accordance with NFPA 13.

The sprinkler system will be zoned and each zone shall be provided with an isolation valve supervised electrically, flow switch (connected to the fire alarm system) test and drain valve (with sight glasses), pressure gauge, etc. to comply with NFPA 13. In order to accommodate future tenant space fit-out projects, the sprinklers and their piping with in each tenant space will be provided with a control valve with a tamper switch. These control valves must be serviceable. When located above ceiling, an access panel must be provided for the ease of maintenance. The outlet of the drain valve shall be connected to the nearest drain riser or floor drain. Auxiliary / remote drains will also be provided for each sprinkler system per NFPA 13. Automatic air release valves shall be installed at the elevated level of each riser with an isolation valve and end cap.

For each individual tenant space, a basic "core/shell" design and installation will be provided to protect the space so that the space is protected even if the space is not yet occupied by a tenant. In the basic "core /shell" design and installation, sprinklers, piping, and all other accessories needed for a fully functional system will be provided. Sprinkler heads and pipe routing may be revised during the "tenant improvement" project to match the new layout once a tenant moves in.

Dry-Pipe Sprinkler System

It is our understanding that within the proposed project, sprinkler systems will only be provided for interior spaces where heating will be provided. Therefore, no dry-pipe sprinkler systems are anticipated to be reconfigured or installed in this proposed project.

Wet Standpipe System

Existing combined standpipe mains and risers will be utilized to the maximum extent for the modified systems. However, it is expected that the hose connections and hose cabinets will be relocated to accommodate the proposed architectural layout. Additional piping shall also be provided for these new hose connection/cabinet locations and new standpipe risers as well.

Class III hose cabinets will be provided where the following are provided within each cabinet:

1. One of 2 ½" diameter landing valve – Fire Department Valve
2. One of 1 ½" Hose rack – for use by Trained Personnel
3. One portable Fire Extinguisher

Minimum residual pressure at the 2 ½"outlet of the most remote landing valve shall be 100 psi according to Section 7.8.1 NFPA 14 (2013 and 2016 editions). Minimum residual pressure at the 1 ½"outlet of the most remote landing valve shall be 65 psi according to section 7.8.1 NFPA 14 (2013 and 2016 editions). Maximum pressure at any point of the system shall not exceed 350 psi according to section 7.2.1 NFPA 14 (2013 and 2016 editions).

Class III standpipe system are currently provided at each floor level in the common areas near the staircases. Class III hose cabinets will be provided throughout the Great Hall and the wing spaces. The location of Class III hose connection cabinets will also be provided at the following locations (DFC 905.3.3, 905.3.8, 905.4 and 905.6; 2016/2013-NFPA 14, 7.3.2 and 7.3.4):

1. At the intermediate landing of exit stairways, between stories, unless otherwise approved by the AHJ[2]
2. On each side of the wall adjacent to the exit opening of horizontal exits (if provided).
3. In each exit passageway (if provided) at the entrance from the building areas into the passageway.
4. At locations as necessary so that the distance to reach all portions of a tenant space does not exceed 200 ft from a hose connection.
5. The hose connection must be accessible and located so that all portions of the building are within 30 ft of nozzle attached to 100 ft of hose.
6. At the highest landing of stairways with stairway access to a roof.
7. Interior side of building at each roof courtyard so that rooftop garden can be provided to these roof courtyards.

An approved pressure regulating device is required to limit static and residual pressures if the pressures exceed 175 psi according to point NFPA 14. Based on the fire pump test report, a pressure of 175 psi or more will not occur. Thus it is not anticipated the reconfigured standpipe systems will need any pressure regulating devices.

The entire system shall be fitted with the appropriate devices and fittings along the piping route to provide a fully functional system.

Recessed type cabinets will be used throughout wherever it is feasible. When cabinets are installed in fire rated walls, the cabinet will also be rated and UL Classified (7N43) to maintain the fire resistance integrity of the wall.

The two existing roof manifold hose connections on the top of the roof of the main terminal are located at the vicinity of the two existing stairwells along Grid Line N13. These manifold hose connections will be maintained for the proposed project.

Dry Standpipe System

Dry pipe system is not permitted to any space that is not subject to freezing. Therefore no dry pipe system is expected to be added within the building. Based on the review of the record drawing, no dry standpipe system is located within the area to be renovated. Thus the proposed renovation will not impact any existing dry standpipe system.

Fire Hydrants

The proposed renovation includes interior space reconfiguration and exterior facade upgrade. Thus, the existing exterior hydrants can remain unchanged and no new fire hydrants are expected to be provided.

[2] The existing hose cabinets are located in the enclosed hallway that connects to the stairwells. It is our understanding these locations are approved by the AHJ. It is anticipated that similar locations will also be approved in this project as well.

Fire Extinguishers

Portable fire extinguishers shall be provided in accordance with NFPA 10 throughout the space. Extinguishers will be provided at all hazard areas based on the nature of the potential fire. Class A, B, and C fire extinguishers will be provided throughout, in respect to the protected space. The size, the number and placement of the extinguishers will be based on ordinary hazard occupancy throughout per Chapter 6 of NFPA 10. Due to the expected amount of combustibles present, the ordinary hazard occupancy classification should be used to determine extinguisher capacity, number, and location. Per Tables 6.2.1.1 and 6.3.1.1, 2-A-20-B extinguishers with a maximum travel distance of 50 ft should be used as the criteria. Class K extinguisher should be provided during the tenant fit out phase if kitchen to be provided. However, Class K extinguishers are not to be included in the current "core and shell" design.

Portable fire extinguishers shall be mounted in easily accessible positions at a suitable height per Section 6.1.3.8 of NFPA 10, on special wall brackets, near exits from protected areas, and in exit access corridors. Portable fire extinguishers in public areas shall be placed inside fire cabinets according to NFPA 10 section 6.1.3.10. Fire extinguisher placement shall be reviewed and approved in writing by the DEN Life Safety group.

Refer to the sections in the architectural design for more details on fire extinguishers.

Other Fire Suppression Systems

According to DEN Design Standards Manual (DSM) Life Safety Systems Section 404.2, UL 300 listed kitchen hood fire suppression system per NFPA 17, 17A and 96 must be provided for any kitchen hood in the terminal. This type of suppression system will not be included in the proposed project as it focuses on the "core and shell" of the Great Hall. These systems should be determined during the tenant fit-out phase.

4.1.6. ELECTRICAL SYSTEMS

1. Systems Adaptation to New Project Design

Following is a description of proposed systems adaptation to the new project design:

Level 4 Electrical Rooms Serving Mechanical Rooms

Modifications to the Level 4 floor plan will be limited to areas of the vertical transportation elements at the Automated Guideway Transit System (AGTS) departing platform and any revisions associated with modifications to HVAC equipment in order to accommodate the requirements of the new Levels 5 and 6 design.

As stated in the Due Diligence Report, the existing electrical equipment on Level 4 is in very good condition, well maintained, and not displaying evidence of deterioration due to age. It is not anticipated that the new project design will require any modifications to the equipment ratings, capacities, or distribution infrastructure.

The basis of design is that this equipment will remain intact and not be replaced with new equipment. As the mechanical design progresses further, an evaluation will be made on whether modifications or additions will be required to any of the existing components, such as motor controllers and circuit breakers, within the motor control centers and electrical panels.

Level 5 Electrical Rooms

Refer to Physical Project Plan Drawing E-101 for Level 5 Electrical Room and Equipment Layout Plans. Also, refer to Drawings E-201 through E-221 for Electrical One-Line Diagrams.

According to the current architectural design intent, ten (10) of the existing Level 5 Main Electrical Rooms will remain intact and will not be relocated. Two (2) Main Electrical Rooms, located in Areas 11A and 11B will be relocated due to the addition of stairs in their current location.

All of the perimeter Satellite Electrical Rooms serving exterior lighting, signage, and curbside power will be eliminated. The circuits currently being served from these rooms will be intercepted and extended inward to the Main Electrical Room within the same area. It is anticipated that all of the existing circuits can be intercepted above the ceiling. A new 277/480V panel, stepdown transformer, and 120/208V panel will be placed in the Main Electrical Room for these circuits.

As stated in the Due Diligence Report, the existing electrical equipment on Level 5 is in very good condition, well maintained, and not displaying evidence of deterioration due to age.

The *Preliminary Electrical Load Tabulations* included in *Appendix C* of this report provide strong evidence that the existing equipment ratings, capacities, and distribution feeders are currently capable of supporting the new design program for Level 5. This assumption will be further verified as the design progresses.

For the Level 5 Main Electrical Rooms, the basis of design is that most of the existing electrical equipment will remain intact and not be replaced with new equipment for the ten (10) rooms that are not being relocated. For the two (2) rooms that are being relocated, new electrical equipment will be provided. As the design progresses further, an evaluation will be made on the extent of circuit modifications or additions required for any of the panels. Due to the increase in Retail and Food & Beverage tenants,

additional Tenant Distribution Panels will be required in most of the rooms but there appears to be sufficient physical space in the rooms to accommodate them. Each new Tenant Distribution Panel will be subfed from the House Distribution Panel within the same room. It is the assessment that there is enough physical space in the House Distribution Panels for an additional circuit breaker to subfeed the Tenant Distribution Panels.

All new electrical equipment overcurrent protection devices will be designed to be selectively coordinated with the existing electrical system overcurrent protection devices.

Level 6 Electrical Rooms

Refer to Physical Project Plan Drawing E-102 for Level 6 Electrical Room and Equipment Layout Plans. Also, refer to Drawings E-201 through E-221 for Electrical One-Line Diagrams.

According to the current architectural design intent, four (4) of the existing Level 6 Main Electrical Rooms, located in Areas 8A, 8B, 8C, and 8D are in conflict with the proposed TSA Security Checkpoint areas. Therefore, these rooms will require relocation. The 8A and 8B rooms will be moved to the office area at the north end of the TSA Security Checkpoints. The 8C and 8D rooms will be moved into the 11A and 11B Ticketing/Check-In areas respectively, as there are no demised spaces with Areas 8C and 8D to place these rooms. Although the 8C and 8D rooms will be geographically relocated to Areas 11A and 11B, they will still remain as separate and distinct rooms and riser systems that continue to serve their designated areas. There will be no physical or electrical interconnectivity with the Areas 11A and 11B rooms.

All of the perimeter Satellite Electrical Rooms serving exterior lighting, signage, and curbside power will be eliminated. The circuits currently being served from these rooms will be intercepted and extended inward to the Main Electrical Room within the same area. It is anticipated that some of the existing circuits can be intercepted above the ceiling. However, it is understood that several of the circuits are embedded in the Level 6 floor slab as they run out towards the garage. It will therefore be required that the concrete slab be chipped up at an appropriate location to intercept the circuits for extension to the Main Electrical Room. Any disrupted slab locations must be fully restored to original condition at a minimum. A new 277/480V panel, stepdown transformer, and 120/208V panel will be placed in the Main Electrical Room for these circuits.

For the Level 6 Main Electrical Rooms, the basis of design is that most of the existing electrical equipment will remain intact and not be replaced with new equipment for the eight (8) rooms that are not being relocated. However, new equipment is also being added to some of these rooms, so it is possible that existing equipment may need to be relocated within the room to make space for the new equipment. For the four (4) rooms that are being relocated, new electrical equipment will be provided. As the design progresses further, an evaluation will be made on the extent of circuit modifications or additions required for any of the panels.

It is important to note that the *Ferrovial/Saunders Assumptions Report* assumes a new distribution panel for each two areas on Level 6 (i.e. one distribution panel for Areas 8A & C; one distribution panel for Areas 8B & D; etc.). The basis of design is that the electrical equipment will be replaced on a one-for-one basis in lieu of a one-for-two basis (i.e. existing Area 8A distribution panel is replaced in kind by new Area 8A distribution panel in new location). All electrical risers will remain separate and distinct; no risers will be combined or eliminated. As stated above, however, the Areas 8C and 8D rooms and risers are physically being relocated to Areas 11A and 11B respectively although they will continue to remain separate and distinct electrically.

The *Preliminary Electrical Load Tabulations* included in *Appendix C* of this report provide strong evidence that the existing equipment ratings, capacities, and distribution feeders are currently capable of supporting the new design program for Level 6. This assumption will be further verified as the design progresses.

The existing feeders are currently run up through the Level 5 Main Electrical Rooms to the Level 6 Main Electrical Rooms. For the Areas 8A, 8B, 8C and 8D rooms that will be relocated, the existing feeder conductors will be removed all the way back to the main switchgear on Level 2. The existing conduits will be intercepted in the Level 5 Main Electrical Rooms and then routed over to the new Main Electrical Room locations. The routing will require careful coordination with ongoing work not in this project scope in order to avoid conflicts. New feeder conductors will then be run all the way from the main switchgear on Level 2 to the new distribution panels in the relocated electrical rooms.

The Main Electrical Rooms on Level 6, Areas 5B and 5C of the bridge to Concourse A will be relocated and enlarged. The new rooms will be more centrally located within the office space planned under the new design program.

All new electrical equipment overcurrent protection devices will be designed to be selectively coordinated with the existing electrical system overcurrent protection devices.

Emergency Power

The *Preliminary Electrical Load Tabulations* included in *Appendix C* of this report provide strong evidence that the existing emergency equipment ratings, capacities, and distribution feeders are currently capable of supporting the new design program for Levels 5 and 6. This assumption will be further verified as the design progresses.

The basis of design is that the existing emergency distribution system is currently sized adequately to support the new design program. Therefore, the ratings of the existing emergency panels on Levels 4, 5, and 6 will not be modified under the scope of this project. As described above, where electrical rooms are to remain intact, the associated emergency panels in those rooms will also remain intact. Where electrical rooms are to be relocated, the associated emergency panels in those rooms will also be relocated.

The existing exit sign and emergency egress lighting circuits on Levels 5 and 6 emanate from panels in the Level 4 electrical rooms. These panels are fed from existing central UPS systems on Level 2. Since these

UPS systems also serve other areas outside the scope of this project, the exact capacity available for this project from these systems is uncertain. Additionally, the condition and expected longevity of these systems is difficult to ascertain. It is therefore the basis of design that each Main Electrical Room on Levels 5 and 6 will be provided with a new UL924 Compliant Battery Inverter System consisting of an Electronics Cabinet and a Self-Contained Maintenance Free Battery Cabinet sufficient to deliver a minimum 90 minute run time at full load in order to comply with NFPA 101, *Life Safety Code,* and National Electrical Code Article 700, *Emergency Systems*. The electrical ratings of each Battery Inverter Systems are indicated on the Electrical One-Line Diagrams.

According to assumptions of the Ferrovial/Saunders proposal, additional UPS modules will be added to provide backup support for other non-life safety related systems such as Communications Equipment, Computer Equipment, Security Systems, Telephone and Electronic Systems, and other systems as required. The exact sizes and ratings of the additional UPS modules will be determined as the design progresses.

In *RFQ Supporting Document SD6, Terminal MEP Capacity Study – Baseline Analysis of the Mechanical, Electrical & Plumbing Systems,* it is noted that the existing emergency switchboards on Level 2 are not in compliance with National Electrical Code (NEC) 700.10(B)(5)a because the Life Safety (NEC Article 700) and Legally Required (NEC Article 701) loads appear to be sharing the same vertical switchboard sections. It is anticipated that the addition of the new Battery Inverter Systems in the Levels 5 and 6 Main Electrical Rooms as described above will alleviate this issue as they now become the source of Life Safety Power.

Tenant Electrical Power Capacity Allowance and Service Provisions

Retail and Food & Beverage Tenants will be provided the following electrical power capacity allowances for their respective spaces:

Tenant Type	Electrical Power Capacity Allowance (VA/SF)
Dry Goods Retail	14.0
Food & Beverage (Seated Dining)	30.0
Food & Beverage (Food Court & Walk-Up Concession)	70.0

Refer to Physical Project Plan Drawings E-113 and E-114 for Tenant Power and Communications Conduit Provision Plans. These drawings specify the quantity and size of empty conduits to be run from the Main Electrical Rooms and the Main Communications Rooms to each Tenant Space. In general, the following breakdown of scope responsibility for Tenant Electrical Services will apply:

1. Developer to provide (2) 2" empty conduits from Tenant space to corresponding switchboard in DEN Electrical Room for Tenant electrical service.
2. Developer to provide Energy meter and current transformers (CTs). Energy meter to be installed in DEN Electrical Room.
3. Service feeder conductors and circuit breaker shall be provided by Tenant and shall comply with DEN specifications. Tenant to install circuit breaker in DEN switchboard and make service conductor terminations under DEN supervision.

Energy Sub-Metering

All switchboards and distribution panels will be sub-metered by DEN through a BACNet based metering system which will tie into the DEN EMCS network. Each sub-feed circuit breaker in switchboards and distribution panels will be equipped with a compatible metering module. The module is to be installed at the output legs of the circuit breaker, with internal Current Transformers (CTs) monitoring the current in the conductors passing through it. The module will be connected via low voltage communications cabling to the EMCS network.

The meters will have a digital display and be capable of measuring and reporting energy consumption and energy demand. The meters will conform to ANSI C12.20, Class 0.5, with +/- 0.5% accuracy. Each meter will be provided with a fuse block/shorting switch assembly mounted in an enclosure adjacent to the meter.

In addition to House loads, every Retail and Food & Beverage tenant service will be individually sub-metered through the Tenant BMS network.

All required programming and address assignments for each metering module is to be included under the scope of this project.

Voltage Drop

According to DEN electrical Design Standards, Electrical feeders and branch circuits will be designed to have a maximum cumulative voltage drop, from source to load including all system components, of 5%. Maximum voltage drop for feeders to be 2%. Maximum voltage drop for branch circuits to be 3%.

Power Factor

"Power Factor" is defined as the ratio of "usable power delivered by a load" divided by "the overall power delivered to a load". The ideal power factor is 100% but this is rarely achievable. The *DEN Electrical Design Standards Manual* sets a design guideline of 95% and a minimum value of 90% for facility load power factors. Where measured power factors fall short of these values, capacitors are to be added in order to correct the shortfall.

It is understood that the existing electrical system is currently equipped with power factor correction where needed to achieve target values. Most motor and lighting loads installed during the original construction of the Main Terminal Building have lower power factors than equivalent products manufactured today.

It is anticipated that if the existing facility electrical system is currently corrected to a minimum 90% or preferred 95% power factor, any new electrical loads added under the scope of this project will not result in a reduction of the current power factor level. However, if the actual results demonstrate resultant power factors below the target levels, additional power factor correction may be required.

Excess Capacity

Electric power distribution systems and components shall be designed to provide a minimum load growth of 25% without the need for modifications or additions to the electrical system. Special cases my require provisions for larger growth.

Lightning Protection System

Refer to Drawing E-115 for modifications to the existing Lightning Protection System on the roof of the Area 5 North Bridge.

Lighting Systems

Refer to Drawings E-104 and E-105 for Levels 5 and 6 General Lighting Plans respectively.

Lighting Control System

Refer to Physical Project Plan Drawings E-110 and E-111 for Levels 5 and 6 Lighting Control Zone Plans respectively. Also, refer to Physical Project Plan Drawing E-222 for Lighting Control Riser Diagram.

1.4.6. FIRE DETECTION AND ALARM SYSTEMS

1. Systems Adaptation to New Project Design

General

The scope of work for the fire detection and alarm system will be a retrofitting of the existing Simplex fire alarm/ECS system which includes re-use and relocation of all existing Simplex devices such as smoke detectors, heat detectors, duct mounted smoke detectors, manual pull stations, monitor and control relay modules, and fire alarm notification power supplies. This retrofit work will also include re-using of existing back-boxes, wiring and conduit to the maximum extent. To accommodate new spaces on the Level 5 and Level 6 of the proposed Great Hall project area, new fire alarm initiation devices and ECS notification appliances will be added. Any new fire alarm expansions will remain manufactured by Simplex.

The fire alarm system expansion scope will be designed and installed in compliance with Denver Building/Fire Codes, NFPA 72 (2016 edition), DEN Design Standards Manual (DSM) requirements, ADA requirements, as well as standards from the Insurance Carrier.

The fire alarm system expansion will also include new network fire alarm sub-panels for both Levels 5 and 6 that will both be included onto the existing Simplex Network System. The fire alarm system expansion will be a complete addressable, networked system to match existing conditions. The fire alarm system expansion will consist of new initiating devices, notification devices, monitoring and control devices, workstations, fire alarm transponder panels, notification power expansion panels, and all required components as necessary to ensure the fire alarm system expansion is compliant with the existing fire alarm system and the proposed spaces.

Fire alarm control panels and power boosting panels will be provided throughout the project area in order to optimize the quantity of fire detection loops and alarm annunciation circuits. All initiation devices shall be addressable. Conventional initiation devices are permitted only if no addressable device is available to the specific environment where it is to be placed. When conventional initiation devices are provided, an addressable module shall be provided.

The current pre-signal feature and building wide alarm notification scheme will be assumed to remain applicable and to be maintained throughout the Great Hall renovation work, unless the latest risk analysis (prepared by *Jensen Hughes* for the Simplex fire alarm system replacement project) was deemed to be obsolete due to the new security concerns. This determination will be made during the detail design phase.

For each individual tenant space, a basic "core/shell" design and installation will be provided to protect the space so that the space is protected even if the space is not yet occupied by a tenant. In the basic "core /shell" design and installation, fire alarm strobes, required smoke detectors, wiring, and all other accessories needed for a fully functional system will be provided. In addition, the public address/ECS speakers will also be included in such "core/shell" design and installation. The location of notification appliances and initiation devices as well as their wirings may be revised during the "tenant improvement" project to match the new layout once a tenant moves in.

It should be noted that this section was prepared based on the assumption that the Great Hall areas (Levels 5 and 6 of the Terminal Complex) are not considered as a high-rise building for this design iteration. In addition, this section is written based on the assumption that Covered Mall requirements are adopted for the proposed project.

Initiating Devices - General

The area of coverage of any automatic detection device shall comply with the recommendation of NFPA 72. Positioning and selection of detection devices and siting of automatic detection shall be in strict compliance with NFPA 72.

Detectors shall be located to minimize the influence of air movement caused by any air supply, extract grille, etc. On all ceilings, detectors shall be positioned in a neat symmetrical pattern aesthetically coordinated with other installed items such as luminaires, sprinkler outlets and grille arrangements to the extent that NFPA requirements for positioning allow. NFPA 72 does not require detection within non-combustible and inaccessible areas.

According to the amended section 4.5.2 of NFPA 415 (Appendix S of DBC) and DFC, smoke detection will be provided in following areas:

- Electrical, transformer, telephone equipment or similar rooms (i.e. IT rooms and telecommunication rooms).
- Elevator machine rooms.
- Elevator lobbies.
- In the outlet of fans for pressurization of stairways, hoist ways, and refuge areas.
- At the top of pressurized stairwells and elevator hoistways.
- In supply air system with a design capacity greater than 2,000 cfm.
- In the main return air and exhaust air plenum of each air-handling system with a capacity of more than 2,000 cfm.

- For tenant openings into the Great Hall common area that are larger than 30 lineal feet, one additional smoke detector shall be provided for each 30 linear feet or fraction thereof.
- Tenant electrical rooms with sprinklers. Smoke and heat detector shall be provided for tenant electrical room without sprinklers.
- Areas where fire alarm control panel is located at.
- Atrium

Fire detection for majority of the project area and the areas not specifically required to be provided with smoke or heat detectors can be achieved by the sprinkler systems through the system waterflow switch. Thus no additional smoke or fire detectors are needed.

Manual initiation pull stations are also provided throughout the project area at each exits to manually initiate fire alarm signal.

Heat Detectors

Heat detection devices shall be re-settable rate of rise, fixed temperature or combined type to suit the environment to which they are being installed. Detectors installed in areas incorporating blasted hot air heating systems shall be fitted with fixed temperature detectors. The temperature setting must be adjusted per installation height and ceiling condition per NFPA 72.

Smoke Detectors

Spot type smoke detectors shall be used in majority of the project area and generally be photoelectric types. Smoke detectors shall operate satisfactorily in the positions installed taking into account the speed of airflow caused by natural or forced ventilation acting on the area.

The current beam smoke detectors are installed roughly 40 ft below the membrane roof. In addition, the beam projection is configured in west-east direction only. This type of installation may not provide effective early detection. The beam detectors will be relocated to a higher location so that the beam is immediately below the membrane roof. Additional beam detectors should also be provided to provide beam protection also runs diagonally between each west-east beam projection lines.

The performance adequacy of the existing beam smoke detectors installed in the Great Hall under the membrane roof will be evaluated in the fire/smoke modeling during the detailed design phase. Due to the hardship to maintain and reset the vent opening and smoke exhaust fans in each peak, it is our understanding the detection must be featured with high false alarm immunity. If the simulation results indicate these beam detectors are not adequate for smoke exhaust system initiation, air sampling detection would be provided for the Great Hall area at each of the mask top. Each of the Great Hall mask top will have its own dedicated air sampling aspiration nozzles. The air sampling detection units will be installed on the Level 6. These air sampling detectors can provide higher detection sensitivity with high false alarm immunity which can facilitate the Fire Modeling and Administrative Modification mentioned in the Smoke Control System Section of this document. In addition, this type of detector is provided with the ability to conduct maintenance, service, and testing at the detection unit which is installed near the floor

of Level 6. Alternatively, video image based smoke detection system may be evaluated during the detail design phase.

Fire Alarm Pull Stations

Pull stations must be provided at each required exit and each zone shall be annunciated individually or by zone as approved (amended Section 4.5.2 of NFPA 415 in Appendix S of DBC). Pull station points are visible at exits, in positions requiring minimal deviation from the line of the exit route to utilize them. According to NFPA 72, the mounting height shall be normally at 4 feet (1200mm) above the finished floor. Glass shall be of the pre-weakened, frangible non-splintering type with a protective plastic coating to prevent operator injury during and after breaking.

Notification Appliances

Audio and visual alarm notification will be provided throughout the entire project area. The notification will include both fire alarm notification appliances as well as speakers of the public address system and the selected visual displays. All dynamic visual displays where the display is 60" or larger will interface with the ECS to display alarm notification messages. Other non-dynamic visual displays and displays that are less than 60" will be provided with shunt trip to shut down the display when occupant alarm notification sequence is activated.

Audible Alarms Notification Appliances

The design of the audible alarm signals shall meet the audibility requirements (minimum dB) in accordance with NFPA 72 and ambient noise levels per DSM Life Safety Systems Section 200.7 (reproduced in table below), throughout the project area.

Areas and Locations	Measured Average Ambient Noise Level
AGTS Tunnel	80 dBA
Baggage Tunnel	80 dBA
Mechanical Room	78 dBA
Holding Areas	63 dBA
Retail Spaces	63 dBA
Computer Room	70 dBA

Office	52 dBA
Restaurant	71 dBA
Lobbies	60 dBA
Hotel Room	52 dBA

All public spaces, including tenant and airline spaces, must be provided with audible coverage through the ECS speakers. The speakers shall be designed in accordance with acoustically distinguishable spaces assigned by the designer. The audible alarm message shall be intelligible: at least 90% of the measurement locations within each space have a measured STI of not less than 0.45 (0.65 CIS) and an average STI of not less than 0.5 STI (0.70 CIS). In order to meet the intelligibility requirements, layout of speakers will be verified using acoustic modeling.

The system shall be designed to be able to broadcast live voice messages and pre-recorded messages. A discussion with DEN will be required during the detailed design phase to determine the content of the pre-recorded voice alarm messages (i.e. alarm message type, and language).

Speakers of the public address system will utilized for emergency communication purposes. Tone notifications (i.e. fire alarm horns and chimes etc.) can be used in non-public areas with high ambient noise levels.

Directional exit sounders are not required and are not anticipated to be necessary for the proposed renovation. Therefore they will not be included in the design.

Private and tenant audio systems will be shunt during emergency messaging procedures.

Visual Alarms Notification Appliances

Strobes shall be visible at exits, in positions requiring minimal deviation from the line of the exit route to utilize them. Strobes shall provide full coverage to all public/common spaces, including public toilet rooms.

Strobes shall be installed in back of house utility areas and staff areas where ambient noise is continually or periodically sufficiently high to reduce the effectiveness of the sounders in signaling a fire. Strobe mounting height in back of house areas to be 6 inches (150mm) below ceiling, or 7 feet (2150mm) from finished floor level. Strobes shall be listed for mass notification systems, with white body and red letter that read “Alert”.

Textual visual notification devices, including Flight Information Displays (FIDs), Gate

Information Displays (GIDs), Baggage Information Displays (BIDs), Train Information Displays (TIDs), LCD, and advertising displays will provide textual messaging. LCD text messaging appliances will be installed in baggage tunnels/tug ramp areas and high ambient noise areas.

Private and tenant visual systems or other visual advertising media will be shunt during emergency messaging procedures.

Firefighter Radio Communication System and Two-Way Wired Communication

Based on discussion with DEN and Jensen Hughes, the existing firefighter radio communication system was not required to be upgraded during the Terminal Fire Alarm System Replacement project and the radio coverage in project area on Levels 4, 5, and 6 are adequate. In addition, the north east fire command center on Level 6 will remain unchanged for the proposed project. Therefore, no upgrade effort will be needed for this system in the fire command center. However, the existing receivers (antenna) need to be relocated and new receivers need to be provided for the new architectural layout on Levels 5 and 6. These locations need to be determined based on the radio signal heat-map. For the purpose of the Physical Project Plan design, it is assumed that one receiver is needed for each 900 square feet of the floor and half of these receivers will be the re-used existing receivers.

The two-way wired communications fixed handsets provided in the locations are not be removed in the proposed project. Therefore no new work is to be included for this system.

System Wiring and Power Supply

All cables shall meet the requirements of NFPA 72 and NEC. All wiring shall be installed in conduit. Level 1 Survivability for the circuit pathways will be maintained as the system will continue to utilize the building-wide notification scheme (NFPA 72, 24.3.13.4.1). Color scheme and designation for the wiring will comply with DEN requirements.

All fire alarm control panels will continues the use of 120 volts, 60-hertz, single-phase power source and connected to emergency power source. Battery backup will be kept for existing fire alarm panels and provided for any new panels with the capacity as required by NFPA 72. UPS power with a minimum runtime of 4 hours will kept and provided for all graphic workstations.

Fire Alarm System Interfaces

The following interfaces shall be included for the fire alarm system:

- Initiate the pre-signal feature and alert operations control center staff.
- Initiate building-wide alarm notification either by the operator or automatically with 1 minute delay. The activation of occupant notification sequence will actuate all fire alarm notification appliances, speakers of the public address system, as well as dynamic displays which are larger than 60”. Smaller or non-dynamic display will be shut down.
- Monitor status and operation of automatic fire suppression equipment, including but not limited to status of waterflow switches, tamper switches, high and low pressure switches.

- Interact with the building normal HVAC systems (not part of smoke control system) to initiate shutdown procedure for normal HVAC systems when smoke control mode is activated.
- Initiate the building smoke control system operation sequences for smoke exhaust system, and stairwell and hoist way pressurization systems. The fire alarm system will be programmed and zoned to accommodate the new smoke control zones and operation sequences.
- Upon activation of the fire alarm system, a fire condition signal is sent to the escalator controllers to enable any predetermined fire mode required.
- Interact with the building security system[3] (i.e. unlock sequence of locked security doors).

1.4.7. SMOKE CONTROL SYSTEMS

1. Systems Adaptation to New Project Design

The smoke control systems are required to be retrofitted to accommodate the new architectural changes in accordance with the current adopted codes and standards. This section only describes the anticipated work on the smoke control system within the proposed project scope. This section was prepared based on the assumption that the Great Hall area (Levels 5 and 6 of the Terminal Complex) is not considered as a high-rise building per Denver Building Code. In addition, this section is written based on the assumption that the Great Hall is also considered as a Covered Mall for code compliance purposes.

Elevator Hoistway and Stairwell Pressurization Systems

The existing elevator hoistway and stairwell pressurization systems can be maintained as-is to the maximum extent. Therefore, the existing fans and ductwork should still be considered code compliant. However, the activation and operation sequence will be reconfigured as part of the effort of the new fire alarm system design. These pressurization systems will be configured that in the event of a fire, all elevator hoistway and stairwell pressurization systems will be activated automatically as long as they are located in the same smoke zone where the fire is detected. In addition, if a fire is detected in the Great Hall atrium part, all elevator hoistway and stairwell pressurization systems through Levels 5 and 6 will be activated. Furthermore, the removal and relocation of stairwells on Level 6 will require all these stair pressurization systems to be re-balanced.

It should be noted that the proposed addition in the north terminal will include new stairwells and elevator hoistways. Per DBC Appendix S (amended NFPA 415) Section 4.6.4 Exception 2, these shafts are not required to be provided with pressurization systems.

[3] The interface and sequence with security system are considered security sensitive materials which are not made available to the design time. The interface with security system will be included in detail design phase.

Although it is expected that the existing fans have sufficient capacity where fan replacements are not needed, it is expected that all the pressurization systems need to be balanced so that it can provide the maximum and minimum positive pressure within the shafts when other smoke exhaust systems are operational. A CONTAM network modeling will be necessary to balance all the pressurization systems. Without this model, these systems will need to be physically balanced in the construction phase.

Smoke Exhaust Systems

According to the Denver Fire Code amendment, the smoke exhaust system serving a covered mall must be provided with an air change of at least 6 air changes per hour. However, the existing smoke exhaust systems for the Great Hall as well as its associated wing spaces are only sized to achieve 4 air changes per hour.

It should be noted that the code language contained in the amended NFPA 415 requires at least 4 air changes per hour for airport terminal. The building code does not require a smoke control system in a covered mall with an atrium connecting two stories only. Great Hall area (Level 5 and Level 6) is interconnected with Level 4 through multiple escalator openings as well as Concourse A through the enclosed bridge in north terminal. It is our interpretation that the smoke exhaust system for the Great Hall must comply with the smoke control criteria of both covered mall requirement in Building and Fire Codes as well as the amended NFPA 415. Therefore, the most restrictive 6 air changes per hour is applicable. As such, all exhaust fans need to be replaced with higher capacities to achieve the covered mall criteria of 6 air changes per hour.

It should be noted that the Denver Building Code and Fire Code allow providing a design which is not strictly in compliance with the language of the code through an Administrative Modification process. In addition, DFC 909.1 Exception 1 allows the performance based design. We believe the existing smoke control system capacity should be sufficient to maintain a tenable condition with an adequate period of time allowing occupant evacuation, even if the spaces are considered as a covered mall with a higher fuel load[4]. The reconfigured smoke exhaust systems in the Great Hall as well as its wing spaces will meet the following goals and features:

1. The smoke exhaust system for Great Hall area will maintain tenable conditions for the occupants directly under the membrane roof on both Levels 5 and 6, for the safe egress.
2. The smoke exhaust system for the Great Hall area will effectively exhaust the smoke outside so that no smoke will migrate into the adjacent wing spaces located on Levels 5 and 6.
3. The smoke exhaust systems for the wing spaces on Levels 5 and 6 will be modified with multiple smoke control zones, on each side and on each level. The size of the zone will be determined based on the estimated egress time for occupants to travel to areas outside smoke zone with a fire.
4. Each TSA security screening area on Level 6 will be reconfigured as a separate smoke zone due to the high occupant load and physical partitions.

[4] For estimation on materials (bill of quantity), it is assumed that fans serving the Great Hall area to be replaced to achieve 6 air change per hour.

5. The primary goal of the smoke exhaust systems for the wing spaces on Levels 5 and 6 will be reconfigured so that smoke can be contained within the smoke zone with fire. The intent is to ensure smoke migration into another smoke control zone will be kept to the minimum and a tenable condition can be maintained for all other non-fire smoke zones. However, it is not the intent of the system to maintain a tenable condition within the smoke control zone with the fire or the area immediately near the fire. Provisions will be made so that smoke control zones on Levels 5 and 6 can allow smoke migration into the Great Hall to utilize the huge smoke reservoir in the Great Hall.
6. DSM Mechanical Section 1001.5 requires a separate smoke control zone and system for tenant spaces (adjoining spaces) over 5,000 ft^2. Each single new enclosed tenant space (retail stores, restaurants, etc.) on Level 5 appears to be less than 5,000 ft^2. However, they forms a cluster of tenant space more than 5,000 ft^2. For effective use of the smoke control system, no separate smoke control zone or system will be provided. These tenant spaces will be considered part of the Great Hall smoke control zone. Spill plume scenarios will be used in the fire modeling.
7. For tenant spaces under 5,000 ft^2 "wing" smoke control systems are used for smoke removal during fire events. The ceiling plenum is the conveyance path for the smoke removal. Tenant are required to provide man bar protected openings in demising walls between adjacent spaces to keep an open path for smoke removal. In addition, smoke generated in tenant spaces open to the atrium can "spill" into the atrium and removed by the atrium smoke exhaust system.
8. All new smoke exhaust fans will be UL-ZAXH listed for smoke control systems. If any new ducts are provided as part of the smoke exhaust system, the duct will be at least 0.0217 inches thick. New ducts as part of stair pressurization systems or elevator pressurization systems will be protected by means to achieve 2-hour rating in accordance with the Denver Fire Code.

Based on the latest proposed architectural plan, the reconfigured passenger walkway corridor on Level 6 of the north terminal will stay roughly same as the original corridor where the footprint is slightly smaller due to the alteration on both sides. The following goals and features will be included for the smoke control system serving this area:

1. The existing smoke exhaust fans will continuously serving the AOB corridor area. It is anticipated that the fire /smoke modeling can justify the existing exhaust capacity is adequate.
2. The new stair opening within the walkway corridor to Level 5 will be provided by draft stops with closely spaced sprinklers to separate the smoke zone of Level 5 from Level 6 walkway corridor area.
3. Provisions (i.e. unobstructed ceiling) will be made to allow smoke to migrate into the Great Hall to utilize the huge smoke reservoir readily available.
4. Provisions (i.e. draft stops or similar obstruction) will be made to prevent smoke from moving into areas outside the renovation area (i.e. the walkway connected to AOB and Conc. A).

New smoke exhaust systems will be provided for the new addition on Level 5 (GHP Office) and Levels 6 (new spaces on both sides of the corridor) in the north terminal. These systems will meet the following goals and features:

1. The smoke exhaust system for the new additions on each side of the Levels 6 passenger walkway corridor will be design to meet the exhaust rate of 6 air change per hour since this space is

interconnected to the Terminal section of the building. However, since the space is only used as a passenger walkway, it is likely the actual exhaust rate will be much smaller. It is anticipated that the exhaust rate per DBC Appendix S Section 4.6.2 – 4 air change per hour or 20,000 cfm per smoke zone, can be sufficient. For the purpose of the PDA phase, 6 air change per hour is use as it is more conservative. Makeup air, introduced at low points, will be included to effectively exhaust smoke within these new smoke zones.

2. Each of the east and west office areas Levels 6 will be considered as a single smoke zone. These result two new smoke zones and smoke exhaust fans for the proposed additions per DSM Mechanical Section 1001.5.
3. The new GHP Office on Level 5 will be considered as a part of the smoke zone of Level 5. However, a new smoke exhaust fan needs to be provided for the addition to meet the requirement of 4 air change per hour or 20,000 cfm per smoke zone. The operation of the new smoke exhaust system for GHP Office will follow the existing north terminal Level 5 operation.

In order to achieve the goals and features above, a fire smoke simulation using CFD software will be needed. A preliminary smoke exhaust model for the Great Hall area was prepared and documented in Appendix D. This model utilizes the empirical equations provided in NFPA 92 (2015 edition - latest edition) as well as *Handbook of Smoke Control Engineer*. It should be noted that it was confirmed only two fans are provided in each mask top where the record drawing stated three fans. Appendix D was prepared assumed the two fans provided in each mask top provides the same capacity of three fans shown in the record drawings.

This preliminary smoke model provides some rough estimations. However, these results are not considered very accurate since this modeling method should only be applicable to the spaces and volumes that are highly similar to the tested spaces where these empirical equations are developed. Several assumptions were made so that the model can be applied to the space. In addition, this type of model is not capable of including the unique geometry and ventilation condition of the space. Therefore, a fire smoke simulation using CFD software will be conducted during the detailed design phase.

Based on the results from the preliminary model, we anticipate that the CFD modeling results can also justify that the existing capacity of the smoke exhaust systems is sufficient. Therefore, the existing smoke exhaust system can remain as-is to the maximum extent.

Modifications of the systems will be included to incorporate the goals and features previously described. These modifications include:

1. Automatic initiation will be provided to all smoke exhaust fans in this project. The manual initiation only scheme for the Great Hall smoke exhaust fans will be modified to include automatic initiation. New aspiration smoke detection systems may be provided for faster detection and system activation per fire /smoke modeling results.
2. The smoke control system operation sequence will be reconfigured to the new smoke zones. As discussed previously, the Great Hall smoke exhaust and the wing space smoke exhaust systems are not directly provided with any mechanical vented makeup air. The current systems rely on the “free air” within the building and other interconnected volumes (i.e. Concourse A, through the

enclosed pedestrian walkway in the North portion of the building). The CFD modeling will also evaluate if the current operation scheme is valid and determine if any of the supply fans and AHUs need to be used for makeup air supply. If the need of makeup air are determined, makeup air can be introduced through automatically opened exterior doors or mechanical means through vent locations near the floor.

3. New ductwork for the AHUs and fans for the exhaust systems serving the Great Hall and wing spaces to accommodate the elimination of vent and MEP shafts as part of the architectural changes.
4. New smoke exhaust fans, makeup-air fans and ductwork will be included for the proposed addition on Levels 5 and 6 of the north terminal.

1.4.8. INFORMATION TECHNOLOGY/LOW-VOLTAGE SYSTEMS

1. Systems Adaptation to New Project Design

The following table summarizes adaptation to new project. When no action specified, a third party designer shall provide designs to supersede.

	Recondition	Upgrade	Rearrange	Remodeling	Redesign	Design from Scratch
DEN Communications Rooms	x	x	x			x
Airlines Technical Rooms			x		x	
DEN Conference Rooms			x		x	
Airlines Conference Rooms			x		x	
Pathways & Cable Management		x		x		
IT Optical Fiber Backbone		x				
Structured Cabling & Premises Wiring Communications Services		x	x	x		x
DEN Enterprise Local Area Network		x				
DEN Security Local Area Network		x				
DEN Wi-Fi Access Points		x	x	x		
Common-Use Terminal Equipment			x			
Common-Use Self Service Kiosks		x	x			
Common-Use Airline Dynamic Signage						x
Common-Use Airline Bag Drop						x
Airline Passenger Processing Systems						
DEN Unified Communications, Telephony			x	x		
Courtesy Phones		x	x			
Airlines Phones			x			
Payphones		x	x			
Visual Information Displays			x	x		
Large Venue Displays						x
Multimedia / Experience Systems						x
Public Information Displays			x			
Public Affairs TV Hybrid Fiber-Coaxial CATV		x		x		
Divest Dwell Time Beacon Registry System		x			x	
DEN Physical Door Access Controllers			x	x		
DEN CCTV Cameras		x	x	x		
Emergency Communications, Paging & Public Address System		x	x		x	
Distribution Antenna System O&M, Public Safety Radio & Airlines			x		x	
Airline Radios						
TSA Security Screening Check Point						
TSA CCTV cameras						
TSA Communications Rooms			x			x
TSA Networking						
Concessions (ClearChannel, etc.)						

Figure 1. Design Scope Summary Table

All IT and Low Voltage installations shall comply with the following:

- *All DEN design standards and technical specifications.*
- *DEN master specifications in division – 26, 27 and 28.*
- *DEN Technologies Division. Technologies Capabilities and Associated Standards.*
- *DEN Design Standards Manual. Electronic Data Collection and Interchange (EDCI) Compliance.*

Salvage of existing items is required due to demolition and removal of selected portions of building or structure, and relocation or reconfiguration of site elements and IT/LV infrastructure.

Recondition means to provide design for adaptation, enhancement and adequate condition for operation.

Upgrade means to show the necessary materials or functions.

Remodel means to provide design for re-building using the existing design criteria.

Rearrange means to deliver system elements in new locations.

Redesign means to provide design with new design criteria.

Design from scratch means to provide design that is new.

In addition:

a) *Remove* means detach items from existing premises and legally dispose of them, off-site, unless indicated to be removed-and-salvaged or removed-and-reinstalled.
b) *Remove-and-salvage* means carefully detach from existing premises in a manner to pre-vent damage, and deliver to DEN, ready for reuse.
c) *Remove-and-reinstall* means detach items from existing premises, prepare for reuse, and reinstall where indicated.
d) *Existing-to-remain* means existing items of premises that are not to be permanently removed (that are not otherwise indicated to be removed, removed-and-salvaged, or removed-and-reinstalled).

Ferrovial/Saunders is responsible for providing and coordinating phased activities and construction methods that minimize disruption to Terminal operations, and provide complete and operational systems and facilities.

IT/LV equipment and devices shall not be removed or reconfigured until removal or reconfiguration has been coordinated with DEN, and approval is given in writing.

DEN Communications Rooms

Description: Since all areas of the Great Hall need to be reachable by IT/LV cables from Communications Rooms, the number of rooms required is dependent upon the building zones and the amount of coverage area required. DEN communications rooms shall cover the entire terminal space.

Existing DEN Communication Rooms are distributed throughout Levels 5 and 6, and contain equipment, network switches, controllers, power supplies, patch panels, cross-connects, and other equipment associated with many of the above listed systems. Head-end programming and control for most of the above systems reside in Data Centers that are located outside the scope of this project.

The existing Level 5 Communication Rooms TML_05_14W_076 (54C14), TML_05_11W_110 (51C14), TML_05_11E-014, TML_05_8W_092 (58C14), TML_05_14E_016 (54D14), TML_05_14E_014 (51D14), TML_05_8E_018 (58D14), TML_08_092 will remain (Existing to Remain) and will not be relocated. The rooms are compatible with any equipment and/or cabling modifications required for the new project design.

The existing Level 6 Communications Rooms TML_06_14W_015 (64C14), TML_06_11W_112 (61C14), TML_06_14E_018 (64D14) and TML_06_11E_012 (61D14) will remain (Existing to Remain) and will not be relocated. Rooms TML_06_8W_022 (68C14) and TML_06_8E_010 (68D14) will be relocated to TSA area with renovation.

The new TSA Security Checkpoint area in Level 6 requires two (2) new TSA Communications Rooms and the North Office Building preliminary design in Level 6 requires two (2) new DEN Communications Rooms and one (1) new TSA Communications Room.

Basis of Design: All communications rooms shall have fire detection and protection system. Renovations that have plumbing in the ceiling should have that plumbing rerouted away from the space. If re-routing is not possible, then equipment cabinets and wall-mounted equipment shall be protected by installing aluminum sheet metal collector and deflector pans to channel water away from equipment cabinets and wall-mounted equipment.

IT equipment shall be protected in place during survey, discovery, construction, bypass, and cutovers. All IT equipment cabinets shall be wrapped in a protective wrap to keep out dust and dirt. All cooled IT cabinets with active equipment shall be kept cool during renovation. After renovation, all equipment cabinets should be restored to pre-renovation condition or reinstalled and all dust and debris shall be removed.

Minimum requirements for new Communications Rooms are:

- Enclosed space with pathways
- Electrical power supply
- Switchboard panel
- Telecommunications Grounding
- Lighting and emergency lighting
- Air cooling and conditioning
- Fire detection and protection
- Secured Access
- Remote monitoring
- Uninterruptible power supply

Common element topics in Communications Rooms include:

- Door
- Wall
- Floor
- Drilling
- Riser
- Pathways
- Raised access floor
- Cable Route Management System
- Electrical
- Grounding
- Lighting
- HVAC
- Fire Detection/Protection
- Cabinet Conduits
- Cabinet Electrical
- Cabinet Grounding
- Cabinet Lighting
- Equipment Racks
- Structured Cabling System
- Distribution frames
- Uninterruptible Power Supply
- Monitoring
- Security
- Safety
- Telephone
- Furniture

Communications Rooms shall offer floor loading capacity of minimum 100 lb./sq2 with no suspended ceiling.

Rooms shall be rectangular or square in shape, laid out to have one (1) or two (2) rows of continuous cabinets.

Building columns and pathways that intrude into the room space shall be located in the corners of the room to minimize disruption, and if a column protruding from the wall cannot be in the corners, then the room shall be upsized to offset the protrusion.

Rooms shall be accessible from a corridor, and shall not be constructed so that access is through a tenant area.

Doors shall be minimum 36” x 80” and rated a minimum of 1-hour fire protection.

All penetrations into communications rooms shall be fire stopped.

Doors shall seal so that outside air, dust, and dirt cannot get into the room, door closed.

All in scope DEN communications rooms will have an entry and exit badge reader located near the door which ties into the airport access control system.

Communications Rooms shall have temperature control, humidity control and clean room positive pressure ventilation/air filtering.

Communications Rooms shall have mutually agreed upon infrastructure monitoring equipment (Netbotz) installed and integrated with the DEN managed system.

Sanded fire-rated plywood shall be installed above a cove molding on all walls of Communications Rooms, painted offsite with two coats of white semi-gloss water based paint and fastened with toggle bolts or drop-in anchors or equivalent.

Lighting shall be bright enough to provide at least 525 lux measured at 18 inches off the finished floor.

Cabinets shall be anchored, shall have split mesh doors, size 34” W x 36” D x 84” H.

Cabinet electrical feeds shall be located as far to the rear of the cabinet as is possible and shall terminate in a box. Cabinet electrical shall be on one side of cabinet rear with only one power strip.

Cabinets shall have a grounding busbar connected to the TGBB. Cabinets shall have lighting fixtures mounted either on the top rear or side rear of the cabinet.

Cable ladders and pathways shall be provided to connect interior frames and cabinets with each other and with the pathways that penetrate the communications room.

Telecommunications cables (fiber, copper and coax) shall be neatly and professionally secured and labeled. Bend radii shall not exceed standards and particular specification. Bundles of cables shall be combed and secured with velcro-type fasteners and labeled. Cables in cable trays, ladder rack, and wire basket shall be combed and shall follow parallel lines and wide sweeping bends. From cabinet centerline, cables left of centerline shall be swept and dressed to the left into the cabinet cable management space, and cables right of centerline shall be swept and dressed to the right into cabinet cable management space. Jumper cables shall be neatly dressed.

Rooms and their associated pathways shall be grounded. All grounding wires shall be copper, stranded, insulated, green colored, protected in conduit. Grounding busbars shall be listed with a recognized testing laboratory and sized at a minimum of 2” x 18” x 1/4” thick and have sufficient pre-drilled holes for fifteen (15) standard-sized 2-hole compression lugs. Busbars shall be wall-mounted and located at 18” above finished floor level.

Equipment racks and cabinets shall connect to the TGB (or TMGB) through telecommunications bonding conductor that provides a common pathway to the busbar.

Grounding busbar surfaces shall be cleaned with a scrubbing pad prior to lug attachment, and covered with an anti-oxidant cream between the grounding lug and the busbar to decrease corrosion.

All grounding conductors shall be attached with 2-hole long-barrel compression lugs and have a 2-crimp minimum. Grounding conductors may have exothermic welded joined segments but shall not have any splices. Cabinets and rack busbars shall pigtail off the TBC and shall not have their grounding cables daisy-chained from cabinet-to-cabinet.

Floors shall have anti-static tile completely covering the room, glued to the sub-floor, and shall be bonded to the telecommunications grounding system.

Grounding shall be validated with an earth ground resistance tester. Tests to be conducted between the TGB and Equipment racks and cabinets, cable trays, conduits and Electronic equipment.

Communications Rooms shall have one (1) wall-mount telephone installed near the door of the room.

UPS shall be sized according to the load served.

All components in Communications Rooms shall have an approved labeling scheme and shall be labeled.

Seismic anchoring shall be provided.

Airlines Technical Rooms

Description: Airline's business support operations is now accommodated in Level 6, and a number of IT/LV systems by Airlines shall be relocated in new Airlines communications rooms inside the Check-in pods. Some Airlines use Common-Use Passenger Processing System (CUPPS) and some other require proprietary passenger processing equipment designed by third party. All Airlines have IT infrastructure.

Basis of Design: Build technical rooms for Airlines. Each pod shall have the possibility of accommodating one or more Airlines Communications Room (leasehold).

Tenant Technical Rooms

Description: Other different from Airlines.

Basis of Design: Build technical space for IT/LV rooms when required.

DEN & Airlines Conference Rooms

Description: Support for Conference Rooms including IT connectivity for desktops, laptops, TV, Projectors, Sound Systems, Video and Web/Conferencing.

Basis of Design: Provide CAT6 cabling infrastructure from Communication Rooms to Conference Rooms, with RJ-45 data outlets provided at designated Conference Room locations. Provide interconnecting pathways and cabling within Conference Room. Not included are desktop or laptop computers, video monitors, projectors, sound system equipment, video web-conferencing equipment, or any other active electronic components. Also not included are software and programming.

Pathways & Cable Management

Description: Inside-plant pathways include underfloor, infloor, above ceiling, in-wall, surface-mount and pole-mount. For operational and mission-critical facilities, DEN requires a Cable Route Management System for separate, redundant, and geographically diverse method of connecting facilities in hierarchical topology. Physical ring and logical star topology is used, and cables are physically connected in a loop from Communications Room to Communications Room and Data Center, around a ring.

Communications Rooms shall have either a minimum 12" W x 4" H cable tray and a minimum 18" W ladder rack around the room perimeter, down the middle of the room, centered over the tops of the equipment cabinets, and across the center of the room, all for copper and fiber cables.

Metallic cable trays and tube conduits, conduit bodies, pull boxes to store cable slack, covers and pull strings tied to each end shall be used for indoor pathways and raisers (vertical), separated from fluorescent light fixtures and other utilities by a minimum of 6". Pull boxes with hinges shall have unobstructed access.

Horizontal common-use cable trays shall be sized for the calculated load at a minimum of 24" to 36" wide by 4" to six 6" tall and shall have a ladder rack bottom and an uncovered top.

Conduits and connectors shall have protective bushings and metal bushings shall be grounded.
Conduit expansion joints with internal grounding or bonding straps for expansion coupling and external grounding shall be used as required.

Corrugated High Density Polyethylene inner-ducts shall be used to protect optical fiber cables between conduits.

Surface-mount and pole-mount raceways, approved by DEN, are acceptable for office furniture.
For fiber optic and CAT6/A copper cables, the bend radius for a 2" conduit shall be a minimum of 24" and the bend radius for a 4" conduit shall be a minimum of 48".

The new Level 6 Communications Rooms in Airline Ticketing area and TSA Security Checkpoint area will

require core drilling of existing floor structure and pathways to lower level Communications Rooms.

TSA Security Checkpoint area floor finishes shall support infloor duct system 2". Existing concrete underbed 2-1/2" shall be surveyed and raised floor shall be considered as an option.

Permits for core drilling through concrete floors for proposed conduit pathways shall be requested through DEN and may be issued upon review and comment by DEN, provided that structural integrity and other utilities are not compromised. The concrete pathway shall be X-rayed prior to drilling and results and physical laid markup shall be submitted to DEN for review and approval. Provisions shall be made to allow fire stopping and protection of the environment with plastic tarps and dry rags to contain the concrete slurry from the drilling, not being allowed to cause damage or stain anything either above or below coring operation. Vacuum shall be used continuously during coring operations.

All penetrations made through fire-rated structures by conduits, cables, inner-ducts, cable trays and duct banks shall be sealed with approved fire-stopping materials, sufficient to restore the fire-rating of the penetrated structure.

Refer to Premise Wiring Communication Services (PWCS) for additional design criteria.

IT Optical Fiber Backbone

Description: DEN utilizes a fiber ring system consisting of two (2) 144-strand fiber optics cables, red and blue. Rings originate at Level 5 in MOD 2W room TML_05_11W_110 (51C14) and in MOD 2E room TML_05_11E_014 (51D14) allowing aggregation into primary and secondary Cisco switches.

Blue cable covers the south and red cable covers the north. The cables are routed through the Level 3 cable tray system except for vertical segments that terminate in 144-strand patch panels in 51C14 & 51D14 rooms. Additional individual 24-strand cables are extended from splice cases at the Level 3 rooms to 24-port patch panels at Levels 5 and 6 rooms in each module.

In the splice plan, the first buffer (blue) of the 144-strand cable is broken at the first communications room and all twelve strands from each direction are terminated on a patch panel; the remaining buffers express through the splice case unbroken. At the next room the second buffer (orange) is broken and terminated on a patch panel with the remaining buffers expressing through the splice case unbroken. This process continues (green, brown, slate, white, red, black, yellow, violet, rose, and aqua) with each of the remaining ten buffers allowing the cable to service twelve communications rooms.

The first ten strands in each direction are terminated with LC connectors to service the Enterprise, Emergency Communications and Access Control networks. Strands 11 and 12 in each direction are terminated with APC connectors to support DIA Hybrid Fiber-coaxial Public Affairs CATV service.
The 12 communications rooms in MOD 2W, MOD 2E, MOD 3W and MOD 3E use the blue cable. Red cable picks up the 6 communications rooms located in MOD 1W and MOD 1E and other rooms in the north Terminal.

Basis of Design: Upgrade the fiber backbone by means of a new 144-strand Green cable between Cisco aggregation switches. Rearrange all 24-strand cables and build new ones for all new communications rooms including pathway diversity (secondary cable route).

Premises Wiring Communication Services & Structured Cabling System

This project at DEN includes the design of Structured Cabling System (SCS) and Cable Management. PWCS includes:

- Telecommunications Vertical and Horizontal Backbone Infrastructure, consisting of pathways, CRMS and backbone cabling. Further analysis of the existing fiber and copper backbone infrastructure will be required in order to determine whether current capacity and physical/environmental provisions are suitable to accommodate the requirements of the new project.
- Horizontal Distribution IT/LV Infrastructure, consisting of CRMS, CAT6/A and fiber drop cables, coaxial cables, etc.
- Associated Distribution frames, Equipment racks and cabinets for structured cabling.

Telecommunications Horizontal copper data cabling shall be CAT6 4-pair unshielded twisted-pair (UTP).

CAT6 structured cabling shall be installed in all new and renovated areas as per industry-standards-based infrastructure where the manufacturer specifies the TO, CP, MUTOA, patch-panel and cabling components for a complete permanent link. The manufacturer shall require certified installers and that the installation get inspected, with minimum 20 year warranty. Tests shall be conducted using frequencies from 1 MHz to 250 MHz in UTP cables.

CAT6 cables may land in a mid-span Consolidation Point (CP) or in a Multi-user Telecommunications Outlet Appliance (MUTOA).

CAT6A cables shall be installed and terminated using a **Panduit** biscuit jack and patch cord for the wireless access points, cameras etc.

Shall install outlet box size 4-11/16" x 2-1/2" deep equipped with a 2-gang device ring.
Junction boxes in a conduit run shall be a minimum of 6" square.

Each Telecommunications Outlet (TO) shall consist of a 2-gang, 2-1/8” deep back box with single-gang reducer ring, containing dual RJ-45 jacks.

Shall run two (2) CAT6 cables in minimum 1” conduit to each TO with maximum wiring distance to horizontal cross-connect in Communications Room to not exceed 295 feet.

Where UTP is not appropriate, single-mode fiber cable shall be offered for data communication.

Ferrovial Airports, when specifying and designing spaces that contain DEN modular office furniture, shall be required to initiate a coordination meeting with DEN Technologies Division to develop connectivity

requirements of the space. Placement of TOs in offices is dependent upon the furniture layout and must be consulted. Floor boxes may contain both TOs and electrical outlets sized for the required need.

Connectivity requirements in TSA Security Checkpoint area and Airline common-use spaces shall consider heavy-duty Infloor Duct System with full capability to install Telecommunications cables, flush fitted.

Connectivity requirements in Concession areas Retail/Food Beverage/Others shall consider one (1) 1-1/2" metallic conduit terminated in Network Termination (NT) fully capable to install Telecommunications cables.

Cable trays are subdivided into segments. Where facilities that include a cable tray segment between the TO and the serving Communications Room, Ferrovial Airports shall be mindful of and coordinate the conduit termination requirements into the proper cable tray segment to ensure service type compliance.

Radio frequency transmission shall be provided using Zinwave equipment consisting of a master hub at the Concourse "A" tower to one or more slaves hubs at the Terminal, each of which serves up to eight remote units. Cabling from the master to slave hubs and from slave hubs to remote antenna units is single mode fiber. Each remote unit uses two (2) omni-directional antennas, (uplink and downlink), that must be separated by 40dB. RAU's are powered from the slave hub locations via CAT6 cable and there is a Code requirement for 12-hour UPS backup.

Refer to Public Affairs TV System (PATV) for CATV cabling.

Refer to Public Address/Voice Alarm (PA/VA) for intercom/speakers cabling.

Ferrovial Airports shall survey and test all required fiber cables and jumpers for any fiber optic cutover.

Rack-mount fiber patch-panels shall be factory-polished connectorized and if fiber pigtails are all the same color then each pigtail shall be labeled with the fiber strand number. All fiber requires labeling.

DEN Enterprise LAN & Security LAN

Description: Separated wired LAN networking for the Denver International Airport, for Airlines, Concessions & Tenant services (enterprise LAN), for Airport security systems (security LAN), and for the Denver Police Department (security LAN).

Basis of Design: Existing Cisco switches to Remain and Upgrade of Enterprise and Security LANs by means of Cisco switches and Network Interface Cards. Provide cabling infrastructure to support existing equipment, relocated, and added within the scope of this project.

Tenant IT/Communications Service Provisions

Description: Scope responsibility between Developer and Tenant for IT/Communications service to Tenant premises.

Basis of Design: In general, the following breakdown of scope responsibility for Tenant IT/Communications Services will apply:

1. Developer to provide (1) 2" empty conduit from Tenant space to corresponding DEN Communications Room for Tenant IT/Communications Service. Data cable not included.

DEN Wi-Fi Access Points

Description: Wireless (Wi-Fi) services associated to Enterprise LAN including traveling public audiences.

Basis of Design: Rearrangement (Remove and Reinstall) of all Wireless Access Points omni and directional.

Wireless Access Points (APs) shall be mounted on technical room sidewall, suspended ceiling tile, suspended ceiling T-bar mounting bracket, or hard lid, as discreet as possible and accessible for maintenance. Provide cabling infrastructure by means of two (2) CAT6A cables terminated directly to equipment, to support a wireless mesh system that serves all areas within the scope of this project. DEN wireless system is proprietary to Cisco. DEN will define the locations of Wi-Fi access points and be responsible for the overall Wi-Fi mesh design (radio planning) and procurement. Wi-Fi access points are currently concentrated at the north and south ends of Level 5 to provide security checkpoint line coverage. Under the new project scope, an additional concentration of access points will be required at Level 6, MOD 1, for the security checkpoint lines in that area. All Wi-Fi access points are to be closely coordinated with the architectural design.

A "Heat Map Study" will be conducted after installation to verify coverage and determine if additional access points will be required to address dead spots.

Common Use Passenger Processing

Description: CUPPS provides participating Airlines and Handling/Cargo/Ground Support under International Air Transportation Association (IATA) with a common environment that allows ticketing, boarding, baggage handling, flight operation etc. through the following:

- Common Use Terminal Equipment (CUTE)
- Common Use Self Service (CUSS) Kiosks
- Boarding Pass Printers (BPP)
- Baggage Tag Printer (BTP)
- Boarding Gate Reader (BGR)
- General Purpose Printer (GPP)
- Shared Use Systems (SUS)

- Terminal Area Support System (TASS)
- Visual Docking and Guidance (VDGS)
- Baggage Input Console (BIC)
- Common Use Passenger Processing (CUPPS)

Basis of Design: Rearrangement of existing CUPPS and associated subsystems. Incorporate Common-Use Airline Bag Drop and Common-Use Airline Dynamic Signage.

Provide cabling infrastructure by means of CAT6 cables and outlets to support endpoint device locations with RJ-45 data outlets located at each terminal or device specific location. Workstations and peripherals rearrangement at all Common-use check-in desks including boarding pass printers, boarding gate readers, etc. Typical Gate agent equipment set consist of SUS workstation, specialty keyboard, access facility, OCR/MSR reader, boarding pass printer, general purpose document printers (8.5" x 11"), etc.

Currently, the main Airlines use Proprietary systems for passenger processing, however Airlines shall take advantage of Common-Use.

Airlines Proprietary Passenger Processing

Description: Consists of proprietary equipment from Airlines and Handling/Cargo/Ground Support with a particular configuration that allows ticketing, boarding, baggage handling, flight operation etc.

Basis of Design: Provide technical rooms and cabling infrastructure by means of CAT6 cables and outlets to support endpoint device locations with RJ-45 data outlets located at each device specific location.

Unified Communications

Description: Integration of a broad range of technologies including traditional enterprise voice connections, collaborative and interactive messaging, audio/video conferencing, telepresence and social media. Rearrangement of Airlines Phones, Courtesy Phones and Payphones.

Basis of Design: Provide cabling infrastructure by means of CAT6 cables and outlets to support new end-point device locations. Not included are servers, phone switches, conferencing equipment, terminal computers, or any other active electronic components. Also not included are software and programming. Network switches will be included as required. Switches will be provided to DEN Technologies for configuration.

Emergency Communications Paging & Public Address Speakers

Description: Voice paging, public addressing and voice alarm system. Interface with Fire and Life Safety system. Public announcement system manufactured by IED, for the purpose of providing PA microphone stations for public information messages and emergency mass notifications through amplifiers and loudspeakers.

Basis of Design: In coordination with DEN, GHP shall provide acoustical modeling and design of sound system as discreet as possible. Provide new speakers and evaluate the existing ceiling-mounted speakers for possible re-use. Provide upgrade for wide areas by means of sound projectors. Evaluate existing long-range customized speakers for possible re-use. If re-use is not viable, provide new speakers as deemed by acoustical modeling and/or other code requirements. Installation shall be accessible for maintenance. ECS to have a connection to the DEN network Fire and Life Safety for override of normal audio content in the event of an emergency.

Visual Information Displays

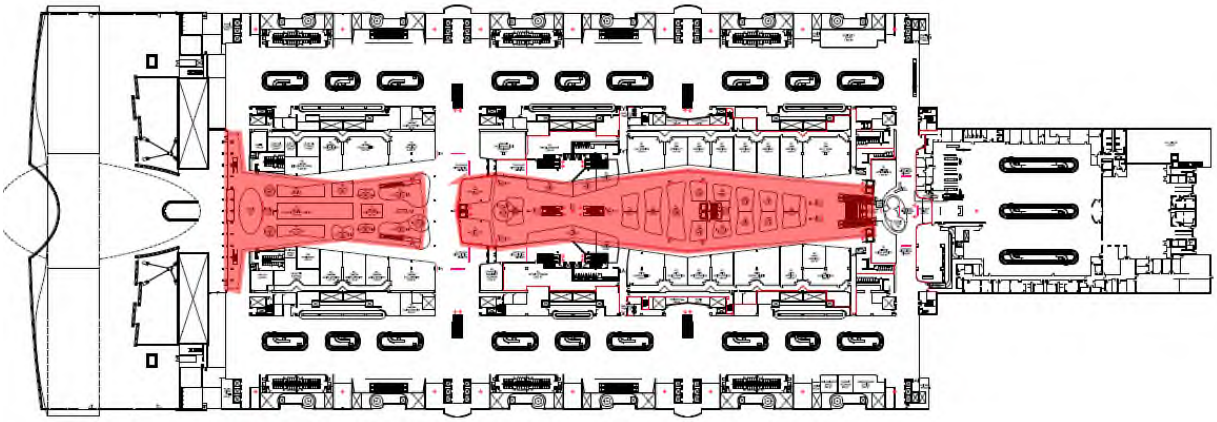
Description: Visual Information Displays at DEN provide video in digital screen monitors for displaying flight information schedules, baggage location, checkpoint information, visual paging, counter signage, baggage claim signage etc. and visual alarms to public. Flight Data Information System (FDIS) head-end servers communicate with digital video converters (DVCs) that are located in the FID and cables are extended to the individual display. A group of displays utilizes a dedicated wired LAN switch for clustering. Display monitors and equipment at locations beyond existing / relocated locations shall be included as part of the GHP design and installation.

Basis of Design: Rearrange clusters and individual FIDs (Remove and Reinstall). Provide cabling infrastructure whether fiber or copper based to support new FIDs locations as approved by DEN. Not included are servers, and any other head-end components. Also not included are software and programming. FDIS to have a connection to the DEN network Fire and Life Safety for override of normal video content in the event of an emergency.

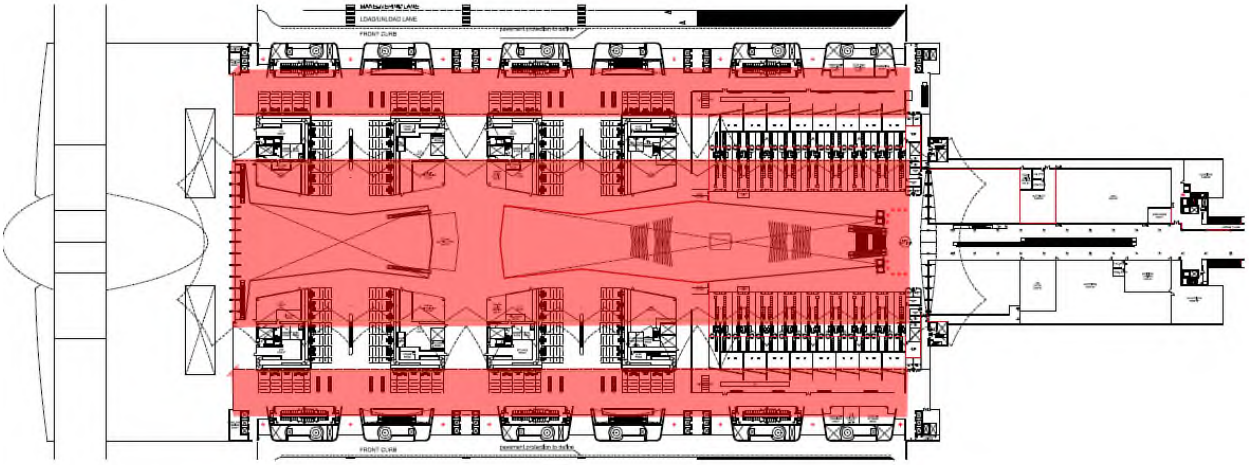
Acoustic Modeling

Acoustic modeling will be necessary in the Detailed Design Phase to specify the type, dimensioning and positioning of the loudspeakers. The areas of possible acoustic problems or non-compliance have been identified in the following figures, coinciding with very high ceilings. It is also remarked that the architectural constraints such as finishes of materials or very open spaces are usually very important when finding an acoustically optimal solution.

Level 5:



Level 6:



Large Venue Displays

Description: Large displays in video walls.

Basis of Design: Provide structured cabling infrastructure by means of CAT6 cables and outlets to support locations for LVDs, capable of IPTV.

Hybrid Fiber-Coaxial Public Affairs CATV

Description: Public Affairs Television system distributes video signals throughout facilities at DEN. Communications Rooms house one optical distribution frame where SC-APC fiber connectors are available for delivering TV channels transmitted from head-end Erbium Doped Fiber Amplifiers to local RF converters. RF signals can then be distributed from the rooms to tenants, offices, etc. by means of RF splitters and 75Ω cables.

Basis of Design: Rearrangement of converters and splitters to cover all premises.

Physical Door Access Controllers

Description: Security Access Control System integrates door alarm monitoring, card readers, biometric readers, magnetic door locks and intelligent door controllers.

Basis of Design: Existing SACS to Remain and Rearrangement of some Door Access Controllers (Remove and Reinstall). Provide metallic conduits and cable infrastructure design in coordination with the door hardware Contractor for the rearrangement and for additional or new access control panels, door alarm monitoring contacts, card readers, biometric readers, magnetic door locks, intelligent door controllers, and other devices as required, to support the new design program. The existing DEN access control system is a proprietary system that will remain. All proposed products to be reviewed and approved by DEN.

DEN CCTV Surveillance System and Cameras

Description: The existing DEN Security Camera Surveillance System is based on Genetec Video Management System (VMS) and Axis Cameras. The system functions include digital video systems, surveillance and analytics, situational awareness, incident review, and provision of video segments to vendors specific to their area.

Basis of Design: Rearrangement of surveillance IP cameras (Remove and Reinstall) as well as new cameras and equipment shall be included as part of the design for added locations. Provide cable infrastructure by means of one (1) CAT6A cable terminated via Panduit biscuit jack. Design new coverages and cameras to support the new design program. Exact camera locations, coverages, performance and types to be coordinated with DEN Security. All cameras are to be IP based, capable of high definition (HD) images and Power over Ethernet (PoE). Network data switches are to be equipped with PoE of sufficient capacity to support the full functionality of all cameras. If necessary, additional power supplies will be designed.

Sufficient CCTV image data storage will be provided in order to accommodate the additional cameras and the enhanced HD images. Exact storage requirements (location of storage arrays, duration for maintaining stored images, frame rate, resolution, compression, etc.) to be defined by DEN during Detailed Design Phase.

Aviation Channeling TSA Security Screening Check Point

Description: Security systems for designated aviation channeling including screening for evaluating a person or property to determine whether poses a threat to security. TSA currently uses approximately 80 Invonics wireless duress alarm buttons that communicate with Invonics receivers (some through repeaters) located at level 6 MOD 3E control room. These receivers in turn connect to dispatch system multiplexers at the level 6 MOD 3E IDF room. TSA alarms are reported to dispatch consoles at the AOB 19th floor communications center. This system shall be reconfigured for the new TSA screening configuration. TSA to provide wireless alarm button.

Basis of Design: Provide interface with DEN IT and cabling infrastructure by means of CAT6 cables and outlets to support endpoint device locations. Not included are security systems design, TSA network switches, TSA Access Control System, phones and terminal computers or any other active electronic components. Also not included are software and programming.

Public Safety Radio, Trunking and O&M Distribution Antenna System (470-800 MHz)

Description: The PSRS is an airport-wide radio communication system for use by DEN Technologies Division and by public safety personnel. Key functions include the ability to communicate with First Responders, Operations, and Maintenance. The existing PSRS is a legacy system consisting primarily of perforated ("leaky") coaxial cable. DEN is in the process of evaluating a new mobile communications system.

Basis of Design: Remove existing. Provide IT/LV cabling, electronics, and infrastructure to support the new PSRS technology within the scope of this project. A new PSRS will be implemented.

A "Heat Map Study" will be conducted after installation to verify coverage and determine if additional repeaters will be required to address dead spots.

Dwell Time Beacon Registry System

Description: A Divest Time Queue Monitoring System.

Basis of Design: WirelessWERX is the currently installed system at the TSA checkpoints. Evaluate existing system for possible re-use. Each TSA checkpoint line will require dwell time monitoring beacons and cameras as required.

Multimedia / Experience Systems

Description: Different Multimedia / Experience systems enrich the Great Hall: Media Projection Area, Media Escalators, Reactive Floor, Interactive Kids Playground, Water Curtain, Overhead Clouds, Media Ribbon Displays, etc.

Basis of Design: Provide structured cabling infrastructure by means of CAT6 and fiber optics cables and outlets to support locations for Multimedia / Experience systems.

Public Media Outlets

Description: Public Media Outlets for remote television station connectivity.

Basis of Design: Provide structured cabling infrastructure by means of CAT6 and fiber optics cables and outlets to support locations for Public Media Outlets. Provide two (2) locations inside terminal (locations TBD) and one (1) location outside (location TBD) for satellite truck hook up. This cabling does not require network connectivity.

APPENDIX I

TENANT UTILITIES ROSTER

Utility Allowance Roster
Updated: 6/27/2017

Entry	Area	Landside/ Airside	Level	Level & Unit	Type	Sqft	Sub-type	Kitchen	Electrical	Electrical Capacity Allowance (kVA)	Fire Alarm	IT/Communications	Water Supply	Domestic Water Allowance (WSFU)	Drainage	Sanitary/Grease Waste Allowance (DFU)	Chilled Water	Chilled Water Allowance (GPM)	Heating Water	Heating Water Allowance (GPM)	HVAC	Gas	Gas Allowance (Btu/h)	Fire Supression
1	Airside	A	5	A5-18	F&B	2,220	Casual Dining	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	67	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	15	Drain connection with an end cap	45	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	20	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	20	Make up duct into space with motorized damper and capped for future connection Plenum Air Return Kitchen exhaust duct capped for future connection Kitchen make-up air duct capped for future connection Smoke exhaust by open return air plenum Occupant ventilation air duct capped for future connection	Valved and capped pipe roughin. Gas Meter.	1,332,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
2	Airside	A	5	A5-17	F&B	1,170	Quick Service	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	82	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	20	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	20	Make up duct into space with motorized damper and capped for future connection Plenum Air Return Kitchen exhaust duct capped for future connection Kitchen make-up air duct capped for future connection Smoke exhaust by open return air plenum Occupant ventilation air duct capped for future connection	Valved and capped pipe roughin. Gas Meter.	702,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
3	Airside	A	5	A5-16	F&B	1,160	Quick Service	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	81	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	10	Make up duct into space with motorized damper and capped for future connection Plenum Air Return Kitchen exhaust duct capped for future connection Kitchen make-up air duct capped for future connection Smoke exhaust by open return air plenum Occupant ventilation air duct capped for future connection	Valved and capped pipe roughin. Gas Meter.	696,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
4	Airside	A	5	A5-15	F&B	1,345	Quick Service	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	94	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	10	Make up duct into space with motorized damper and capped for future connection Plenum Air Return Kitchen exhaust duct capped for future connection Kitchen make-up air duct capped for future connection Smoke exhaust by open return air plenum Occupant ventilation air duct capped for future connection	Valved and capped pipe roughin. Gas Meter.	807,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
5	Airside	A	5	A5-14	F&B	2,680	Casual Dining	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	80	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	15	Drain connection with an end cap	45	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	20	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	20	Make up duct into space with motorized damper and capped for future connection Plenum Air Return Kitchen exhaust duct capped for future connection Kitchen make-up air duct capped for future connection Smoke exhaust by open return air plenum Occupant ventilation air duct capped for future connection	Valved and capped pipe roughin. Gas Meter.	1,608,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
6	Airside	A	5	A5-13	Retail	1,490	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	21	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	10	Make up air ended in a manual regulation damper Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
7	Airside	A	5	A5-12	Retail	900	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	13	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	10	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
8	Airside	A	5	A5-11	Retail	2,080	Convenience	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	29	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	20	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	20	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
9	Airside	A	5	A5-8	F&B	2,220	Full Service	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	67	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	15	Drain connection with an end cap	45	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	20	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	20	Make up duct into space with motorized damper and capped for future connection Return air by plenum Kitchen exhaust Kitchen supply air Smoke exhaust by plenum	Valved and capped pipe roughin. Gas Meter.	1,332,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant

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Utility Allowance Roster
Updated: 6/27/2017

Entry	Area	Landside/ Airside	Level	Level & Unit	Type	Sqft	Sub-type	Kitchen	Electrical	Electrical Capacity Allowance (kVA)	Fire Alarm	IT/Communications	Water Supply	Domestic Water Allowance (WSFU)	Drainage	Sanitary/Grease Waste Allowance (DFU)	Chilled Water	Chilled Water Allowance (GPM)	Heating Water	Heating Water Allowance (GPM)	HVAC	Gas	Gas Allowance (Btu/h)	Fire Supression
10	Airside	A	5	A5-7	Retail	1,172	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	16	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
11	Airside	A	5	A5-6	Retail	1,162	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	16	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
12	Airside	A	5	A5-5	Retail	1,345	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	19	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
13	Airside	A	5	A5-4	Retail	1,260	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	18	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
14	Airside	A	5	A5-3	Retail	1,369	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	19	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up air ended in a manual regulation damper Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
15	Landside	L	6	L6-3	F&B	2,500	Bar w/ Food	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	75	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	15	Drain connection with an end cap	45	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	20	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	20	Make up air ended in a manual regulation damper Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
16	Landside	L	6	L6-5	F&B	800	Quick Service	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	56	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	10	Make up duct into space with motorized damper and capped for future connection Return air by plenum Kitchen exhaust Kitchen supply air Smoke exhaust by plenum	Valved and capped pipe roughin. Gas Meter.	480,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
17	Landside	L	6	L6-2	F&B	800	Quick Service	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	56	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	10	Make up duct into space with motorized damper and capped for future connection Return air by plenum Kitchen exhaust Kitchen supply air Smoke exhaust by plenum	Valved and capped pipe roughin. Gas Meter.	480,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
18	Landside	L	6	L6-1	Retail	1,475	Convenience	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	21	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant

APPENDIX I – TENANT UTILITIES ROSTER

Utility Allowance Roster
Updated: 6/27/2017

Entry	Area	Landside/ Airside	Level	Level & Unit	Type	Sqft	Sub-type	Kitchen	Electrical	Electrical Capacity Allowance (kVA)	Fire Alarm	IT/Communications	Water Supply	Domestic Water Allowance (WSFU)	Drainage	Sanitary/Grease Waste Allowance (DFU)	Chilled Water	Chilled Water Allowance (GPM)	Heating Water	Heating Water Allowance (GPM)	HVAC	Gas	Gas Allowance (Btu/h)	Fire Supression
19	Landside	L	6	L6-4	Retail	1,475	Convenience	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	21	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
20	M&G	L	5	L5-MG-19	F&B	850	Bar w/ Food	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	26	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
21	Airside	A	5	A5-2	Retail	1,484	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	21	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up air ended in a manual regulation damper Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
22	Airside	A	5	A5-1	Duty Free	3,027	Duty Free	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	42	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	30		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
23	M&G	L	5	L5-MG-8	F&B	2,270	Casual Dining	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	68	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	15	Drain connection with an end cap	45	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	20	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	20	Make up duct into space with motorized damper and capped for future connection Return air by plenum Kitchen exhaust Kitchen supply air Smoke exhaust by plenum	Valved and capped pipe roughin. Gas Meter.	1,362,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
24	M&G	L	5	L5-MG-5	F&B	2,420	Full Service	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	73	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	15	Drain connection with an end cap	45	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	20	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	20	Make up duct into space with motorized damper and capped for future connection Return air by plenum Kitchen exhaust Kitchen supply air Smoke exhaust by plenum	Valved and capped pipe roughin. Gas Meter.	1,452,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
25	M&G	L	5	L5-MG-4	F&B	1,070	Quick Service	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	75	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	10	Make up duct into space with motorized damper and capped for future connection Return air by plenum Kitchen exhaust Kitchen supply air Smoke exhaust by plenum	Valved and capped pipe roughin. Gas Meter.	642,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
26	M&G	L	5	L5-MG-3	F&B	1,170	Quick Service	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	82	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	10	Make up duct into space with motorized damper and capped for future connection Return air by plenum Kitchen exhaust Kitchen supply air Smoke exhaust by plenum	Valved and capped pipe roughin. Gas Meter.	702,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
27	M&G	L	5	L5-MG-2	F&B	1,260	Quick Service	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	88	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	10	Make up duct into space with motorized damper and capped for future connection Return air by plenum Kitchen exhaust Kitchen supply air Smoke exhaust by plenum	Valved and capped pipe roughin. Gas Meter.	756,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant

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28	M&G	L	5	L5-MG-1	F&B	1,475	Quick Service	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	103	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	10	Make up duct into space with motorized damper and capped for future connection Return air by plenum Kitchen exhaust Kitchen supply air Smoke exhaust by plenum	Valved and capped pipe roughin. Gas Meter.	885,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
29	M&G	L	5	L5-MG-18	F&B	500	Quick Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	35	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	300,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
30	M&G	L	5	L5-MG-30	F&B	970	Quick Service	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	68	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Kitchen exhaust Kitchen supply air Smoke exhaust by plenum	Valved and capped pipe roughin. Gas Meter.	582,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
31	M&G	L	5	L5-MG-31	F&B	970	Quick Service	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	68	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	10	Make up duct into space with motorized damper and capped for future connection Return air by plenum Kitchen exhaust Kitchen supply air Smoke exhaust by plenum	Valved and capped pipe roughin. Gas Meter.	582,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
32	M&G	L	5	L5-MG-7	Retail	1,280	Convenience	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	18	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
33	M&G	L	5	L5-MG-2	Retail	1,475	Convenience	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	21	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
34	M&G	L	5	L5-MG-9	Retail	2,430	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	34	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	20		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
35	M&G	L	5	L5-MG-15	Retail	530	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	7	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
36	M&G	L	5	L5-MG-14	Retail	850	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	12	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant

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Entry	Area	Landside/ Airside	Level	Level & Unit	Type	Sqft	Sub-type	Kitchen	Electrical	Electrical Capacity Allowance (kVA)	Fire Alarm	IT/Communications	Water Supply	Domestic Water Allowance (WSFU)	Drainage	Sanitary/Grease Waste Allowance (DFU)	Chilled Water	Chilled Water Allowance (GPM)	Heating Water	Heating Water Allowance (GPM)	HVAC	Gas	Gas Allowance (Btu/h)	Fire Supression
37	M&G	L	5	L5-MG-26	Retail	150	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	2	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
38	M&G	L	5	L5-MG-27	Retail	150	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	2	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
39	M&G	L	5	L5-MG-6	Service	1,190	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	17	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
40	M&G	L	5	L5-MG-1	Service	790	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	11	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up air ended in a manual regulation damper Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
41	M&G	L	5	L5-MG-17	Service	2,000	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	28	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	20		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
42	M&G	L	5	L5-MG-20	Service	450	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	6	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
43	M&G	L	5	L5-MG-3	Service	640	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	9	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up air ended in a manual regulation damper Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
44	M&G	L	5	L5-MG-21	Service	220	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	3	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
45	M&G	L	5	L5-MG-22	Service	1,630	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	23	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell spearkers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	20		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant

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Entry	Area	Landside/ Airside	Level	Level & Unit	Type	Sqft	Sub-type	Kitchen	Electrical	Electrical Capacity Allowance (kVA)	Fire Alarm	IT/Communications	Water Supply	Domestic Water Allowance (WSFU)	Drainage	Sanitary/Grease Waste Allowance (DFU)	Chilled Water	Chilled Water Allowance (GPM)	Heating Water	Heating Water Allowance (GPM)	HVAC	Gas	Gas Allowance (Btu/h)	Fire Supression
46	M&G	L	5	L5-MG-23	Service	220	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	3	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
47	M&G	L	5	L5-MG-24	Service	1,180	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	17	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
48	M&G	L	5	L5-IMG-32	Service	60	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	1	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up air ended in a manual regulation damper Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
49	M&G	L	5	L5-MG-25	Service	450	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	6	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
50	Airside	A	5	A6-35	F&B	1,350	Bar w/ Food	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	41	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	10	Make up duct into space with motorized damper and capped for future connection Return air by plenum Kitchen exhaust Kitchen supply air Smoke exhaust by plenum	Valved and capped pipe roughin. Gas Meter.	810,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
51	Airside	A	5	A6-34	F&B	1,350	Bar w/ Food	Yes	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	41	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10	Two pipe heating water pipe rough-in with valves and pipe cap Btu Meter	10	Make up duct into space with motorized damper and capped for future connection Return air by plenum Kitchen exhaust Kitchen supply air Smoke exhaust by plenum	Valved and capped pipe roughin. Gas Meter.	810,000	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
52	Airside	A	5	A6-33	Service	700	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	10	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
53	Airside	A	5	A6-31	F&B	900	Bar w/ Food	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	27	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up air ended in a manual regulation damper Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
54	Airside	A	5	A6-30	Retail	1,250	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	18	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant

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55	Airside	A	5	A5-29	Retail	1,200	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	17	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
56	Airside	A	5	A5-28	Retail	425	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	6	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
57	Airside	A	5	A5-27	Service	425	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	6	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
58	Airside	A	5	A5-26	Service	540	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	8	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
59	Airside	A	5	A5-25	Service	540	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	8	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
60	Airside	A	5	A5-24	Service	1,100	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	15	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
61	Airside	A	5	A5-23	F&B	920	Quick Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	64	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	Valved and capped pipe roughin. Water Meter.	7	Drain connection with an end cap	24	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
62	Airside	A	5	A5-20	Retail	1,750	Convenience	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	25	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	20		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
63	Airside	A	5	A5-19	Retail	870	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	12	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant

APPENDIX I – TENANT UTILITIES ROSTER

Utility Allowance Roster
Updated: 6/27/2017

Entry	Area	Landside/ Airside	Level	Level & Unit	Type	Sqft	Sub-type	Kitchen	Electrical	Electrical Capacity Allowance (kVA)	Fire Alarm	IT/Communications	Water Supply	Domestic Water Allowance (WSFU)	Drainage	Sanitary/Grease Waste Allowance (DFU)	Chilled Water	Chilled Water Allowance (GPM)	Heating Water	Heating Water Allowance (GPM)	HVAC	Gas	Gas Allowance (Btu/h)	Fire Supression
64	Airside	A	5	A5-10	Retail	950	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	12	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up duct into space with motorized damper and capped for future connection Return air by plenum Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
65	Airside	A	5	A5-9	Retail	870	Specialty	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	12	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	Make up duct into space with motorized damper and capped for future connection Smoke exhaust by plenum	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
66	Airside	A	5	A5-22	Service	1,500	Service	No	(2) 2" empty conduits from DEN Electrical Room to Tenant space Energy Meter (Feeder conductors and circuit breaker by Tenant)	21	Provide basic core/shell fire alarm system code required notification appliances (strobes), initiation devices (smoke detectors), and system wiring installation inside the tenant spaces. Provide core/shell speakers installation through building public address/ emergency communication system. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant	(1) 2" empty conduit from DEN Comm Room to Tenant space. Data cabling from Tenant space to DEN Comm Room to be acquired by Tenant. DEN will be responsible for installing cable between Comm Room and Tenant space.	No service	0	No service	0	Two pipe chilled water pipe rough-in with valves and pipe cap Btu Meter	10		0	This space is in the open Great Hall area and is open at its top to the Great Hall. Air conditioning, ventilation, return air and smoke exhaust from the Great Hall systems	No service	0	Provide basic core/shell sprinklers, tenant space system isolation valve (with tamper switch), and piping installation inside the tenant spaces. Once a tenant moves in the space, the system may be reconfigured to match the new layout brought in by the tenant
														209		654		800		290			16,320,000	

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