

KANSAS CITY INTERNATIONAL AIRPORT

# Terminal/Virtual Ramp Control





# Presenters



**Bart Gilbreath, PE, LEED AP**  
**"Locutus"**

*Electrical Senior Project Manager*



**Eric Farmer, PE**  
**"Gandalf"**

*Aviation Quality Manager*

# First Things First

## Legal Disclaimer

- Kansas City International Airport
- ICAO: KMCI / MCI
- Locals Refer to it as KCI
- Actual legal disclaimer: some photos herein are not property of Garver and are used for educational purposes.





# Project History

## Previous Terminal Layout

- 3 Terminal Configuration opened November 21, 1972
- The Airport considered the "future of aviation" by Lufthansa





# Project History

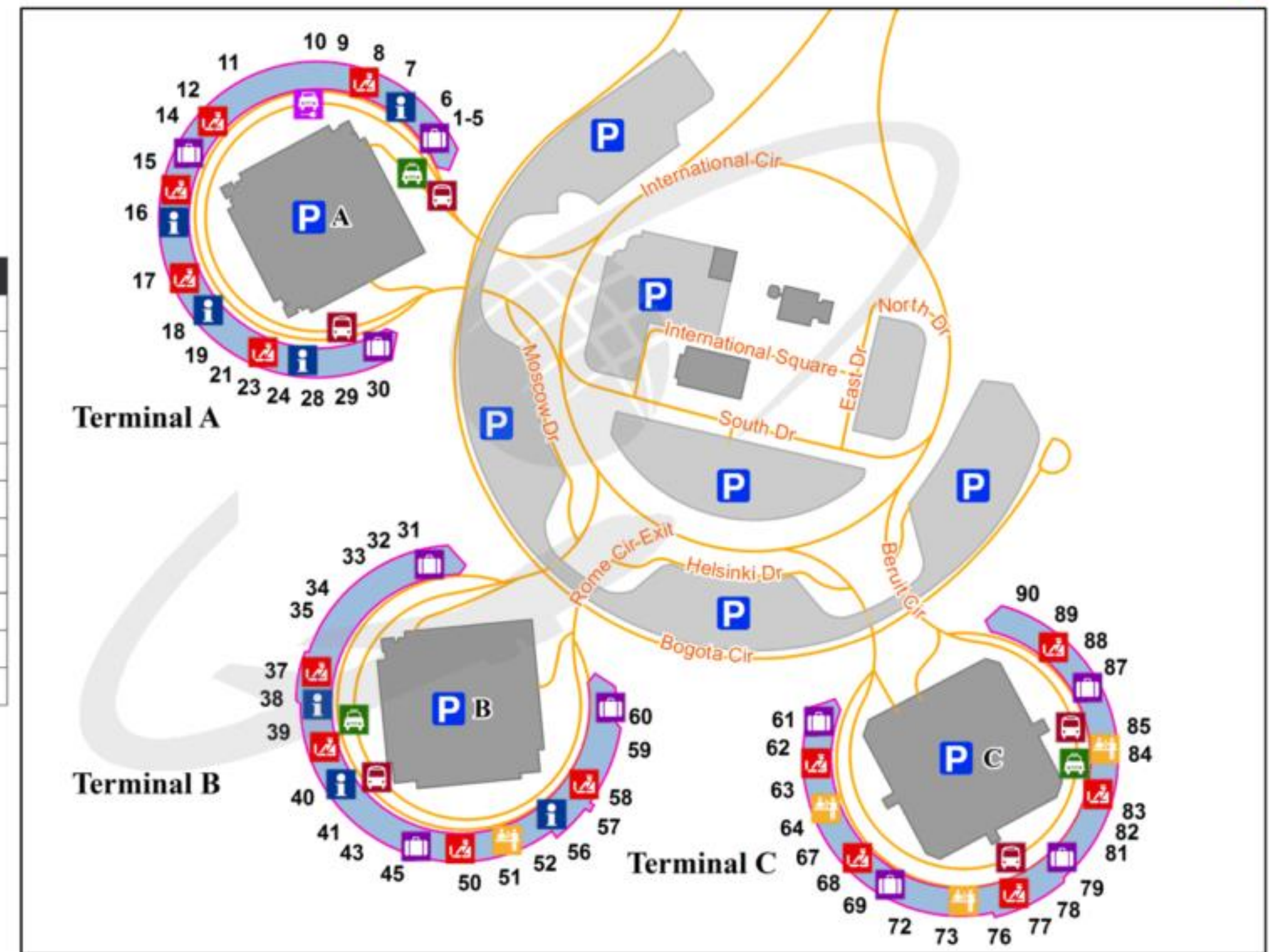
## Previous Terminal Layout

- Consolidation of terminals a result of airline consolidation



## Kansas City International Airport (MCI) - Overview

Legend	
	Ticketing
	Baggage Claim
	Security
	Information
	Taxi Rank
	Bus
	Train
	Car Rentals
	Parking
	Road
	Train

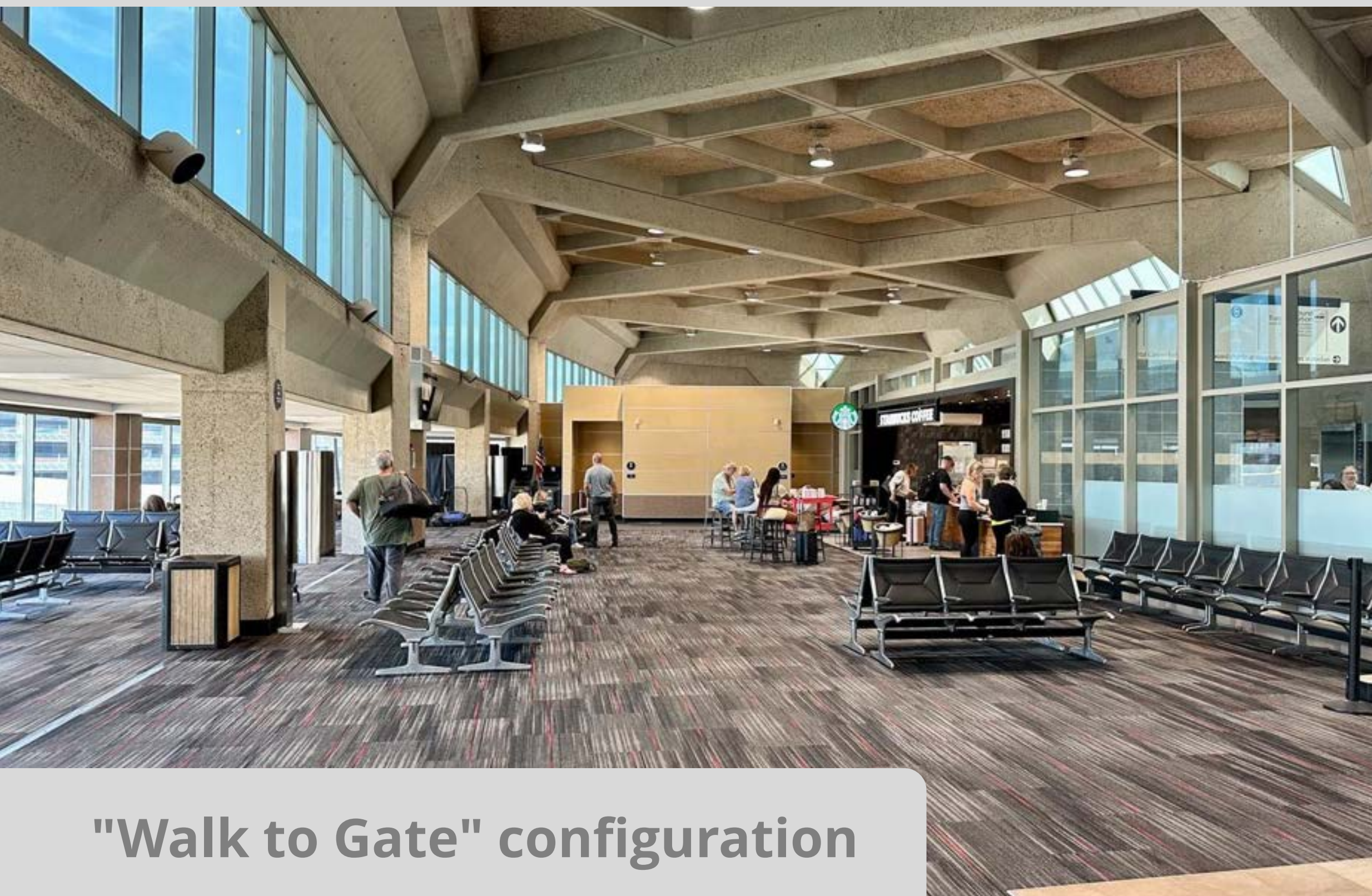


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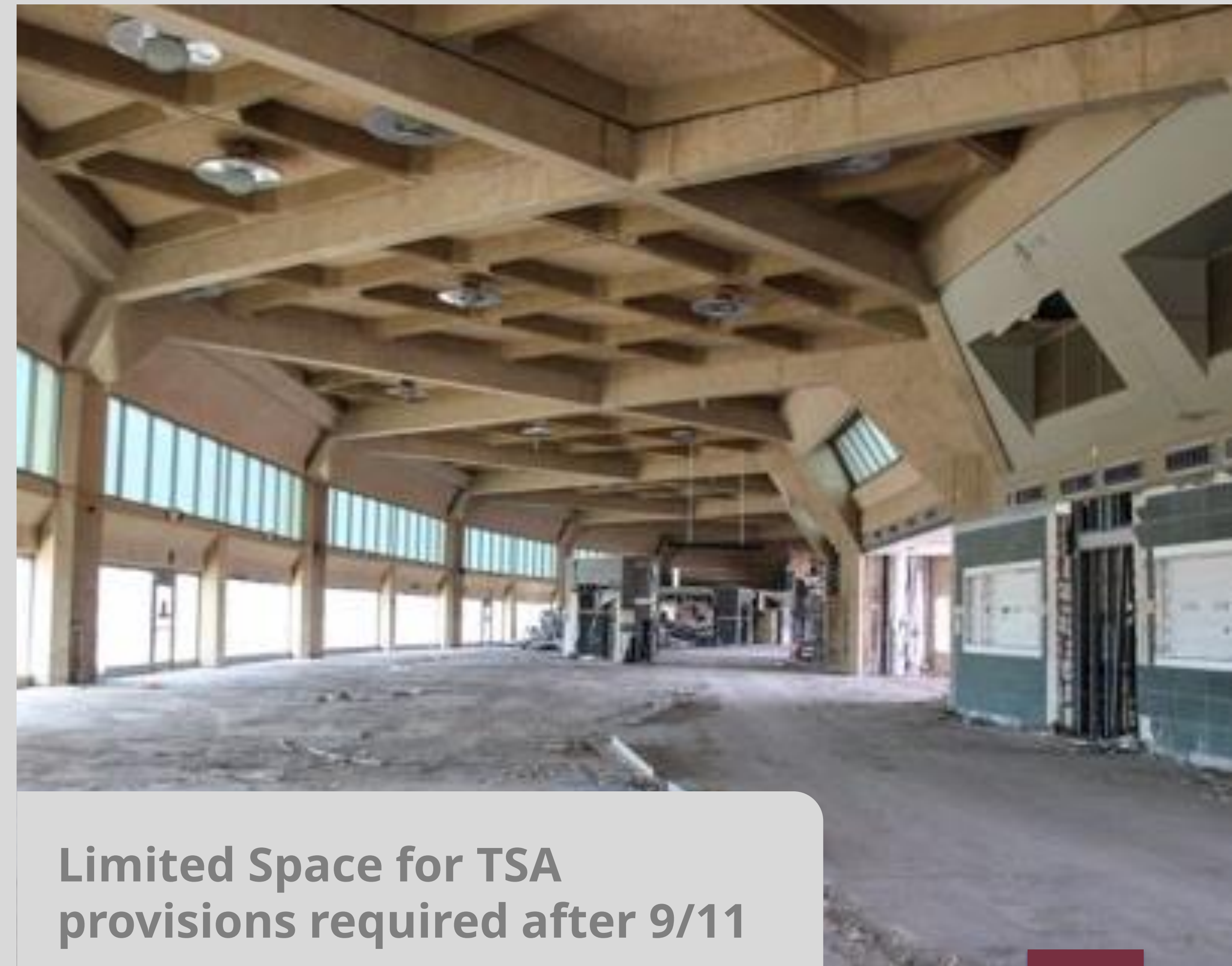


# Project History

Previous Terminal Layout

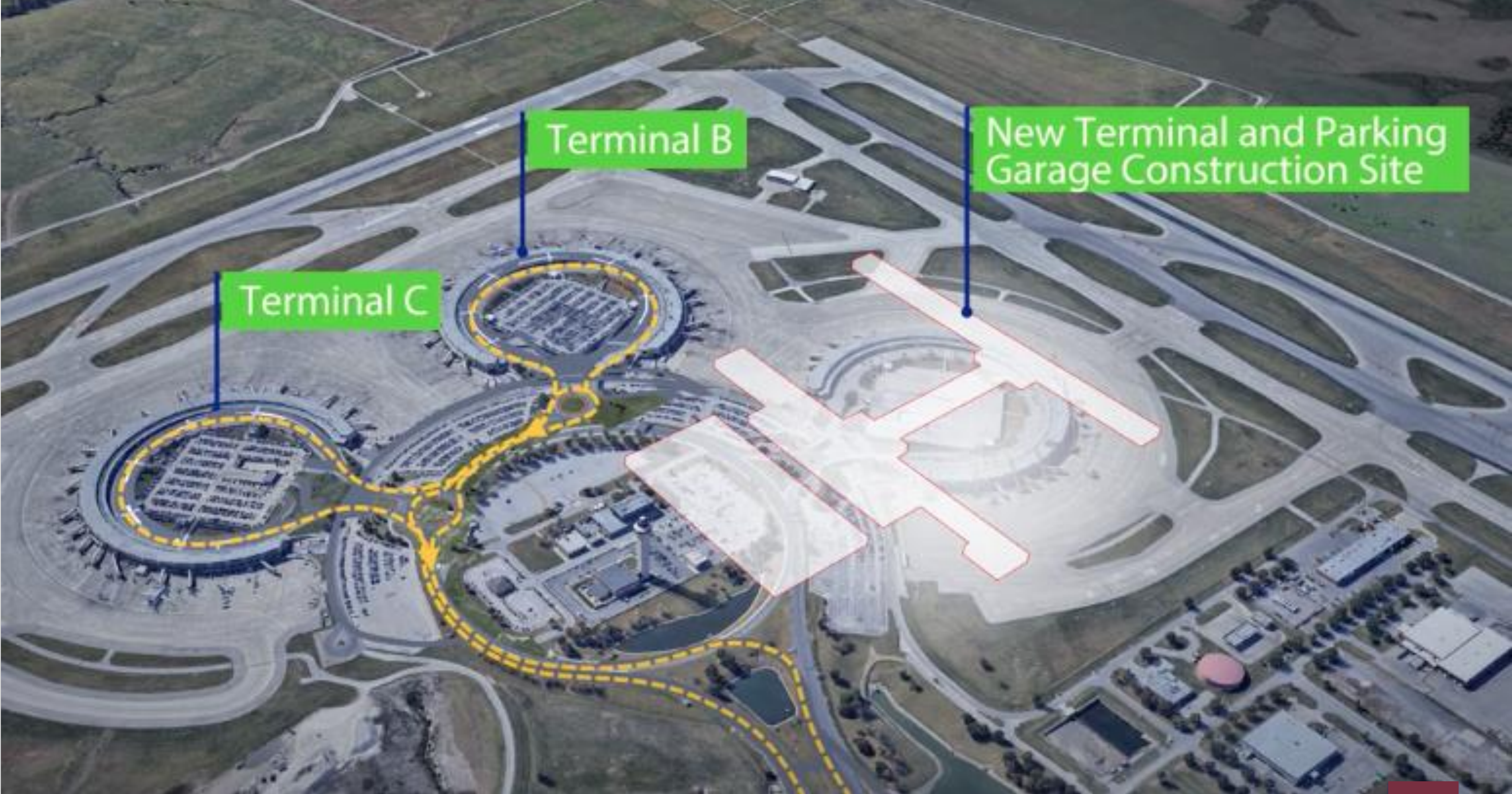


"Walk to Gate" configuration



Limited Space for TSA provisions required after 9/11



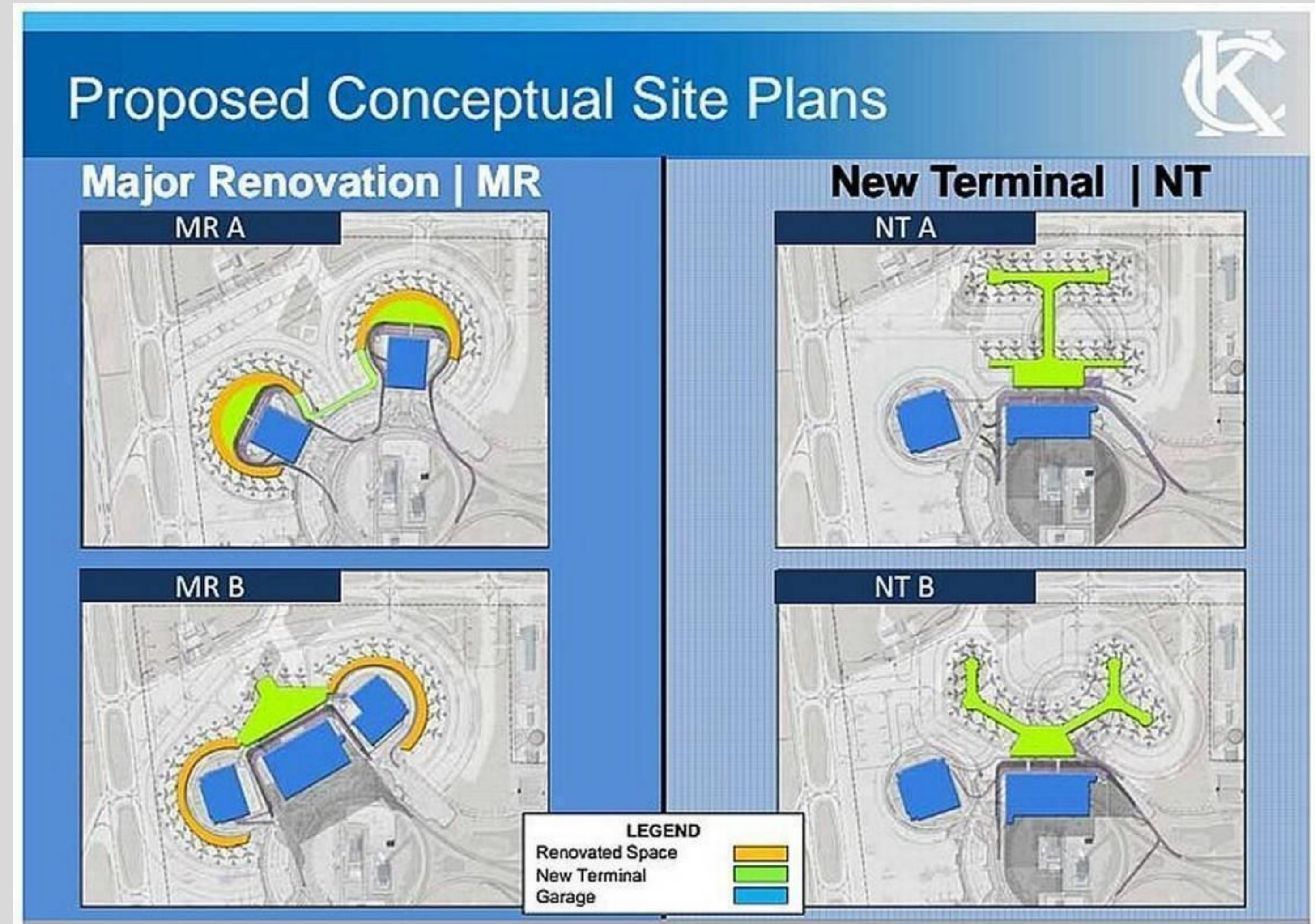




# Project History

## New Terminal Layout

- 4 locations analyzed
- Evaluated both renovations and new construction
- 1,090,000 sqft – largest single infrastructure project in city history
- 70ft tall
- 10,000 acres





# Project History

## New Terminal Layout

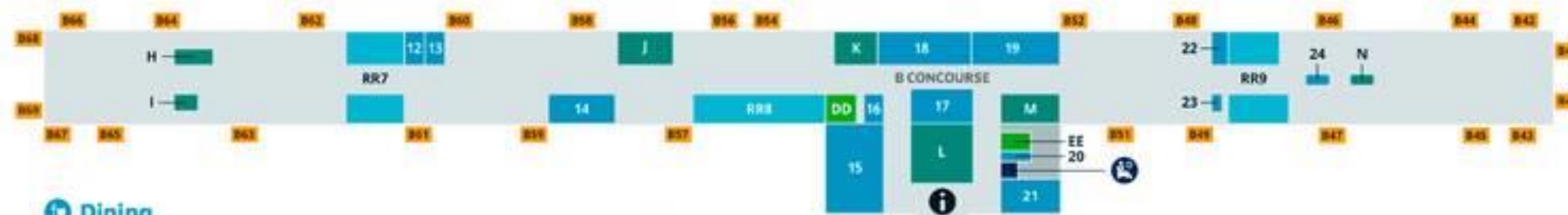
- 39 gates – expandable to 50
- 6,300 space parking structure
- Opened February 28, 2023
- \$1.5 billion in total cost
- LEED BD+C NC Gold





# General Terminal Review

## DEPARTURES



### Dining

- 1 Dunkin'
- 2 Urban Cafe
- 3 Dunkin'
- 4 Soiree Steak and Seafood House
- 5 Martin City Brewing Company
- 6 Parisi Coffee
- 7 Grapes & Grains
- 8 Meat Mitch
- 9 Made of Kansas City Food Hall
  - Bloom Baking Co.
  - Bo Lings
  - The Hungry Hatch
  - Jay Hootie McShann's
  - Polo
- 10 Hearth Locavore Kitchen
- 11 Smoothie King
- 12 Big Chicken
- 13 Salumeria Cervasi Deli Modern Italian

- 14 The Leagues Sports Lounge & Eatery
- 15 City Market Food Hall
  - Bo Lings
  - Boulevard Beer Hall
  - Buffalo State Pizza Company
  - Pigwich
  - Taste of Brazil
- 16 Safi Fresh
- 17 City Market Coffee Roasters
- 18 Stockyards Brewing Co.
- 19 Made for KC Barbecue Experience
- 20 Auntie Anne's
- 21 Brown & Loe
- 22 Guy's Deli and Pub
- 23 Cinnabon
- 24 Messenger Coffee Co.
- 25 Mother Earth Coffee (Arrivals)

### Shops and Services

- A 18th & Vine Travel Essentials  
 B Directors Cut Take 2  
 C Made in Kansas City  
 D Lego  
 E InMotion  
 F Johnston & Murphy  
 G Market at 18th & Vine  
 H & GO

- I The Pitch  
 J Brookside Local  
 K Old World Spices & Seasonings, Inc.  
 L City Market Retail  
 M Turn the Page KC  
 N Everything Travel  
 O Aeguana (Arrivals)  
 P & GO (Arrivals)

For more details on our shops and restaurants, please scan the QR code below:

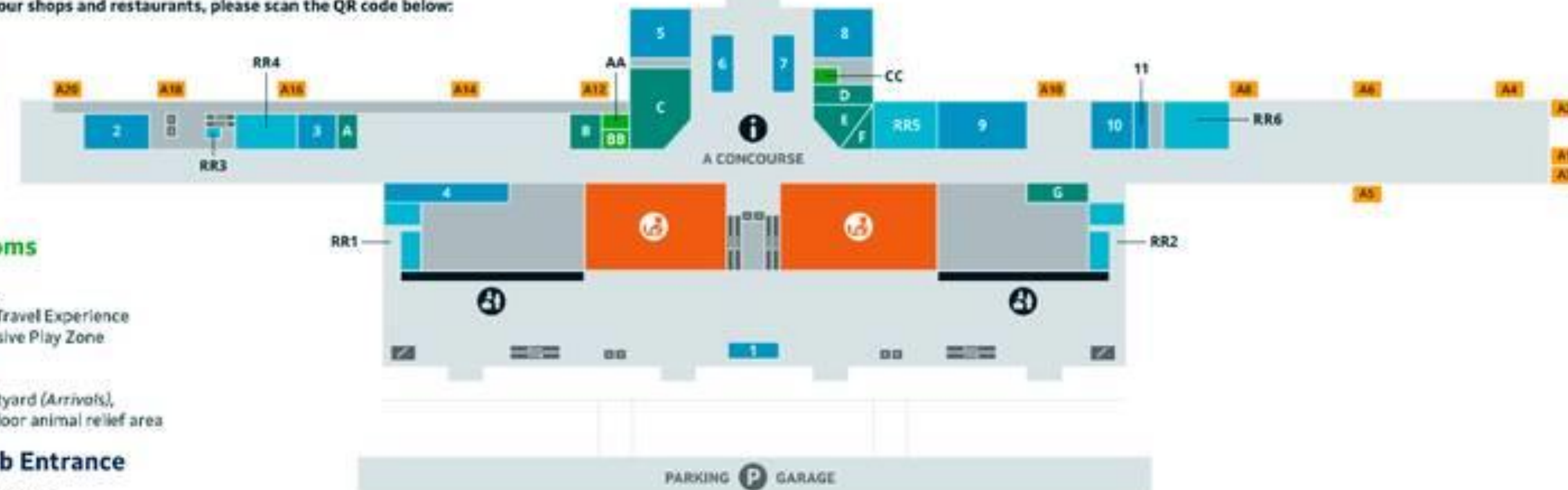


### Specialty Rooms

- AA Quiet Room  
 BB Business Center  
 CC Kansas City Air Travel Experience  
 DD Variety KC Inclusive Play Zone  
 EE Sensory Room  
 FF USO (Arrivals)  
 GG The North Courtyard (Arrivals), includes an outdoor animal relief area

### Delta Sky Club Entrance

### Historical Display



## ARRIVALS (Lower Level)



- Arrivals-level curbside ground transportation includes:
- Parking Shuttles
  - Rental Car Shuttles
  - Rideshare
  - RideKC Bus
  - Limos
  - Prearranged Shuttles
  - Hotel Shuttles
  - Taxis

### TSA Screening Area

### Customs (Arrivals)

### Baggage Claim (Arrivals)

### Ground Transportation (Arrivals)

### Information Desks

### Flight Check-in Counters and Kiosks

### Restrooms

- RR1 Men's Restroom, Women's Restroom (Pre-security)  
 RR2 Men's Restroom, Women's Restroom (Pre-security)  
 RR3 Service Animal Relief Area (International)  
 RR4 Men's Restroom, Women's Restroom  
 RR5 All Gender Restroom, Adult Assist Changeroom  
 RR6 Men's Restroom, Women's Restroom, Pet/Service Animal Relief Area  
 RR7 Men's Restroom, Women's Restroom  
 RR8 All Gender Restroom, Adult Assist Changeroom, Pet/Service Animal Relief Area  
 RR9 Men's Restroom, Women's Restroom  
 RR10 Men's Restroom, Women's Restroom (Customs)  
 RR11 Women's Restroom (Arrivals)  
 RR12 Men's Restroom (Arrivals)

All restroom blocks include at least one Family Restroom and Changing Room.

Nursing Rooms are located at each Women's Restroom and each All Gender Restroom.



# Project Structure

- Public Private Partnership
- Edgemoor – Prime Financier
- CWC – Prime Contractor
- SOM – Prime Architect
- Over 30 additional firms in support

## Garver design components

- Airside Civil
- Airside Electrical
- Virtual Ramp Control System

**EDGEMOOR**  
INFRASTRUCTURE & REAL ESTATE  
533 Mexico City Avenue, Kansas City, MO 64153  
DESIGN-BUILDER

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**CLARK** **WEITZ** **CLARKSON**  
CONSTRUCTION CONSTRUCTION COMPANY  
A JOINT VENTURE  
533 Mexico City Avenue, Kansas City, MO 64153

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ARCHITECT & STRUCTURAL ENGINEER  
**SOM**  
**Skidmore, Owings & Merrill LLP**  
7 World Trade Center  
250 Greenwich Street, New York, NY 10007

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CONSULTANT TEAM

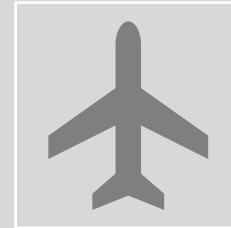
**Draw Architecture** - Collaborating Architect  
**Wellner Architects** - Collaborating Architect  
**HJM Architects Inc.** - Collaborating Architect  
**FSC Inc.** - Fire Protection / Code / Life Safety  
**Henderson** - MEP / FA / PA / Sec Engineer of Record  
**LAND3 Studio** - Landscape Architect  
**Garver** - Airside Civil  
**Entro** - Signage / Wayfinding  
**Olsson** - Traffic Planning  
**BNP** - Baggage Handling  
**Vanderlande** - Baggage Handling  
**Michele & Associates** - ADA  
**Thornton Tomasetti** - Protective Design  
**SK Design Group** - Glycol / Landside Utilities  
**Trekk Design Group** - Airside Storm Drainage  
**Arora Engineers, Inc.** - AIS / ICT  
**ARUP** - Aircraft Parking / Gate Eqp. / AIS / ICT / FA  
**Taliaferro & Browne Inc.** - Landside Civil  
**Custom Eng. Inc.** - Landside Utilities / Airside Utilities  
**3T Design & Development** - Landside Utilities  
**HG Consulting Group** - Permitting  
**Lightworks** - Lighting / Landside Lighting  
**Dubois Consultants** - Struc. Terminal  
**Leigh & O'Kane** - Roadway Structure  
**Argus Consulting** - Hydrant Fuel System  
**Transsolutions** - Terminal Planning  
**Premier Engineering** - Demolition  
**ICF** - Concessions  
**Lerch Bates** - VHT Consultants  
**Cityfi** - Smart Technology  
**Priority Engineers** - Traffic Engineering



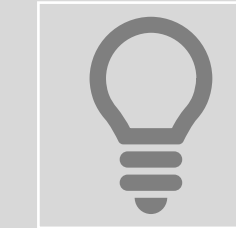
# Project Challenges



Multiple design-bid-build packages requiring subconsultant and contractor input



Had to adjust on the fly



Coordinating lighting conflicts with ever changing joint plan



Created special light details for  $\leq 2'$  from joint



Garver managing 7 firms



Over 120 people working on project last week



# Project Challenges



# COVID-19

Coronavirus Disease 2019

Architect's server couldn't handle everyone working remotely

Worked in shifts to allow server to handle it



# Lessons Learned

- 3D modeling of all utilities early
- Have one firm control model
- FAA coordination w/ RAs in place early
- Have lot of options for joint conflicts available
- Plan for the inevitable so you have details to turn to
- The lead of a project of this magnitude should give up other responsibilities and focus on the project





# Airside/Ramp Design

## Civil vs. Electrical Issues

### PPP Project Dynamics – Ongoing Design

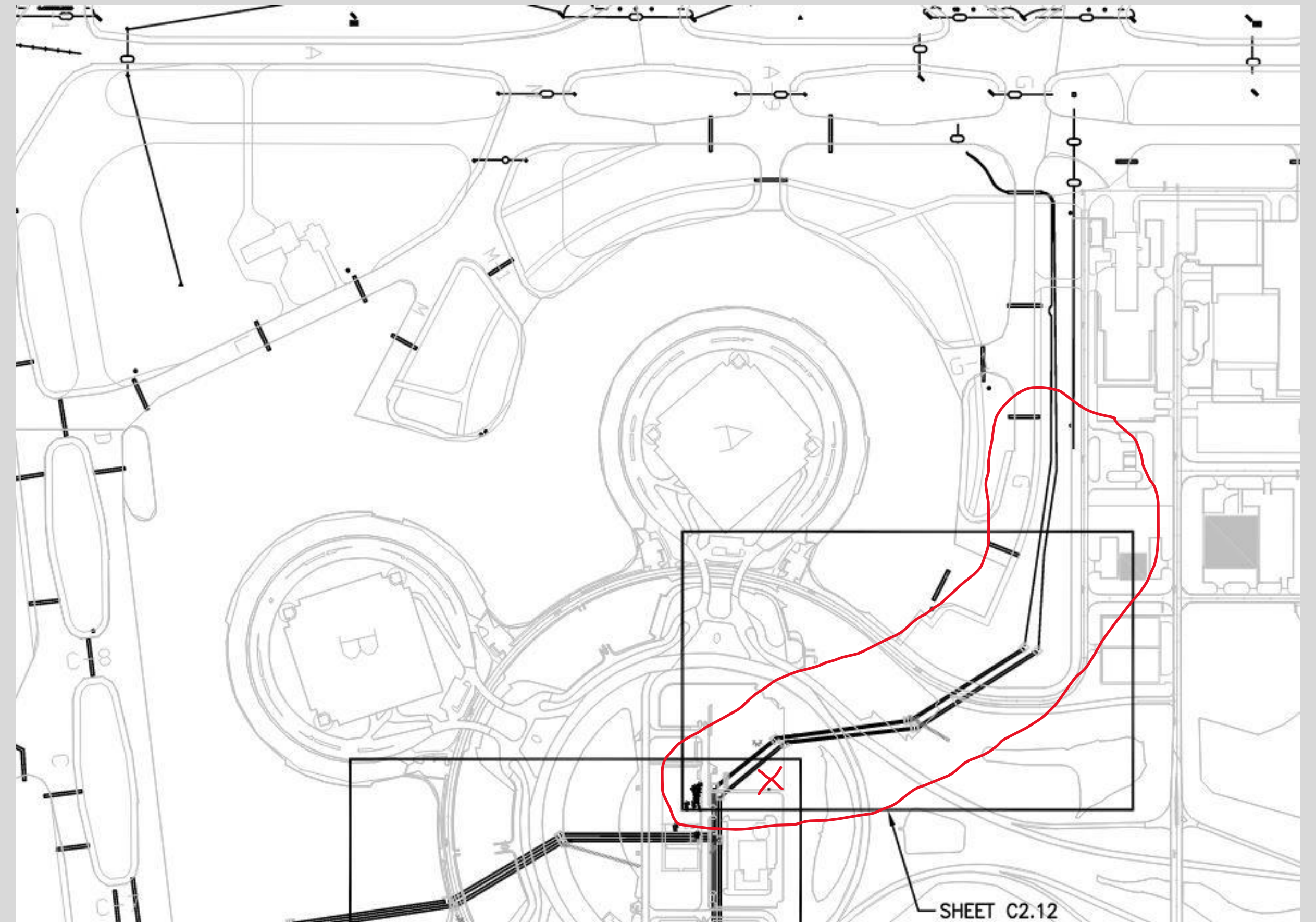
- Cost Implications to Coordinate/Discuss
- New Site will have 7' fall from south to north resulting in large retaining wall
- Tight tolerance for terminal finished floor elevation
- Existing box structure from 1960s to remain under parts of new structure (spread footings)

### So, first challenge:

- Electrical Duct Bank Impacts



## Heart of the Matter – Start at the Crossroads



Majority of the airfield lighting and communication duct bank system would require relocation to the east and north.



# Airside/Ramp Design

Civil vs. Electrical Issues



Terminal A to be Demolished

## Northside Would Have 7' Elevation Change



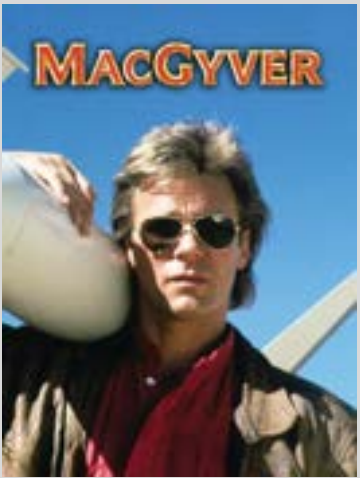
New design challenge, 7'+ increase elevation at existing duct bank routing along edge of ramp



# Airside/Ramp Design

Electrical Research

How to MacGyver our way out of this?



Site Visits – Know the Unknowns  
 Airport/FAA Staff – Learn Things  
 Avoid Confined Space Issues - Accessibility

Start at Electrical Vault - Work Your Way to the Field  
 Communicate – Airport/FAA/Stakeholders  
 Constant Current Regulator Switchgear - Coordination

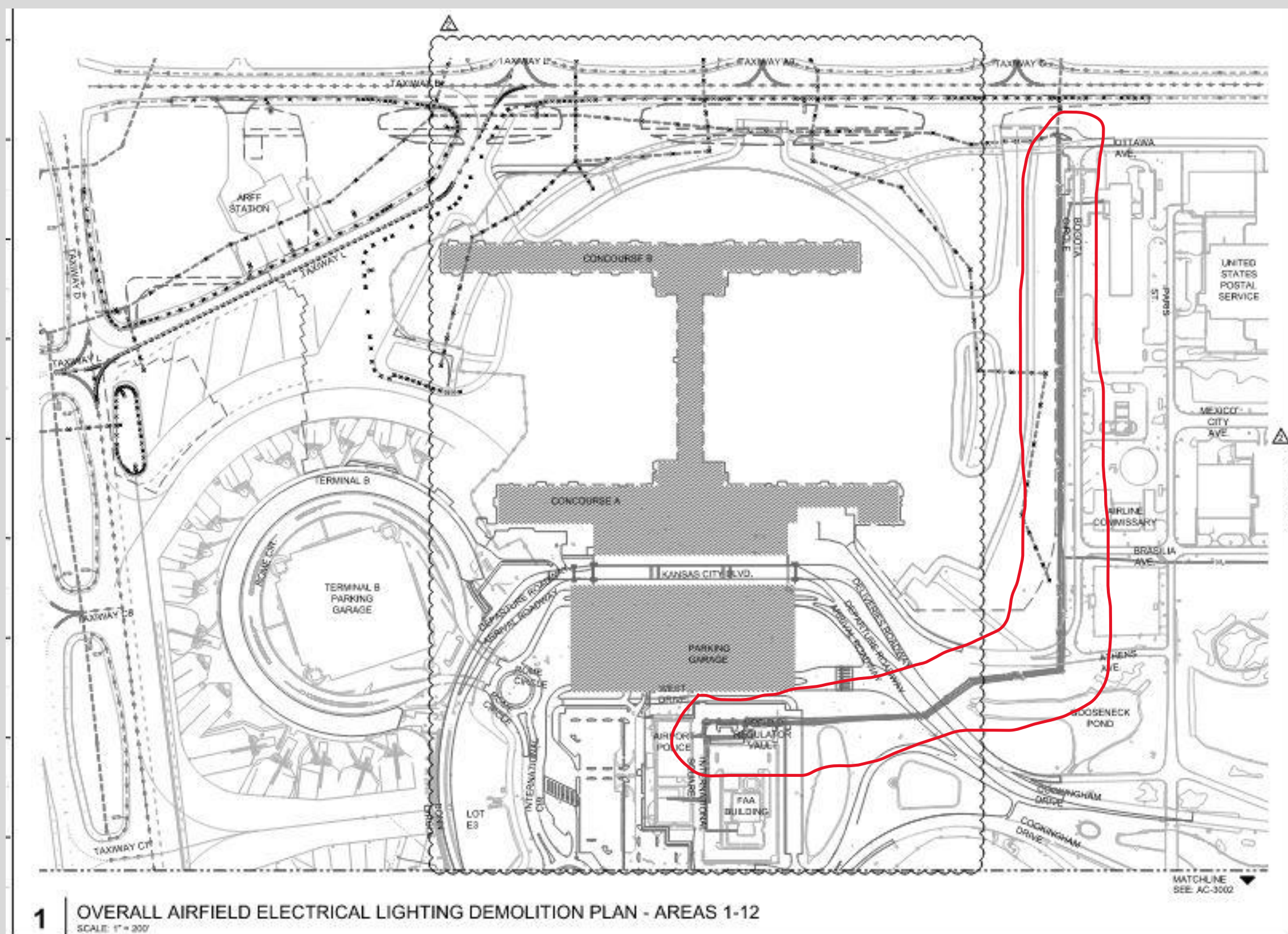




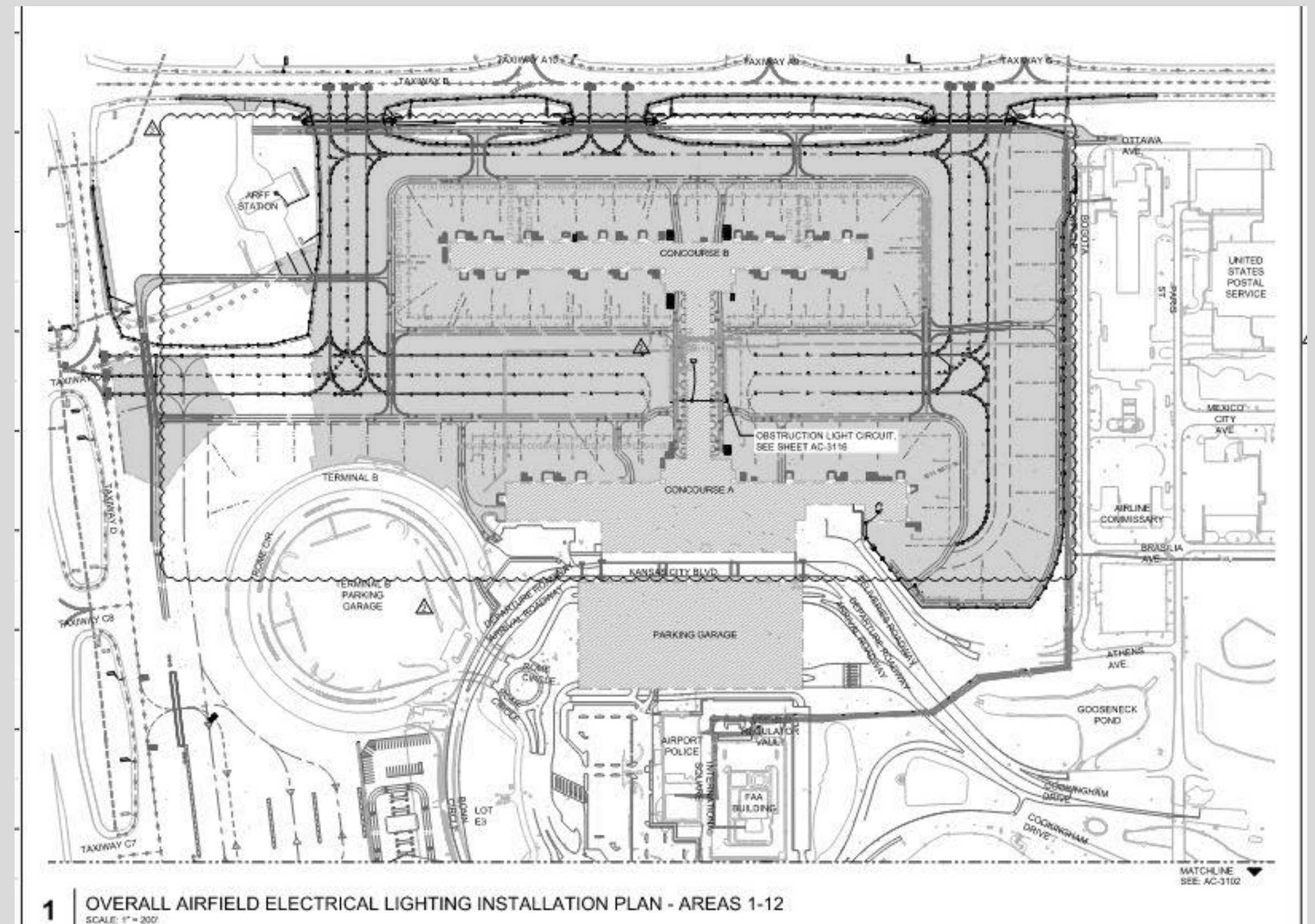


# Airside/Ramp Design

## Phased Construction Deliverables (Bulletins)



## Phased Construction Critical New Enabling Work Package



## Phased Construction Critical New Airside Construction Package



# Airside/Ramp Design

Phased Construction Deliverables (Bulletins)

It's All About the Phasing!

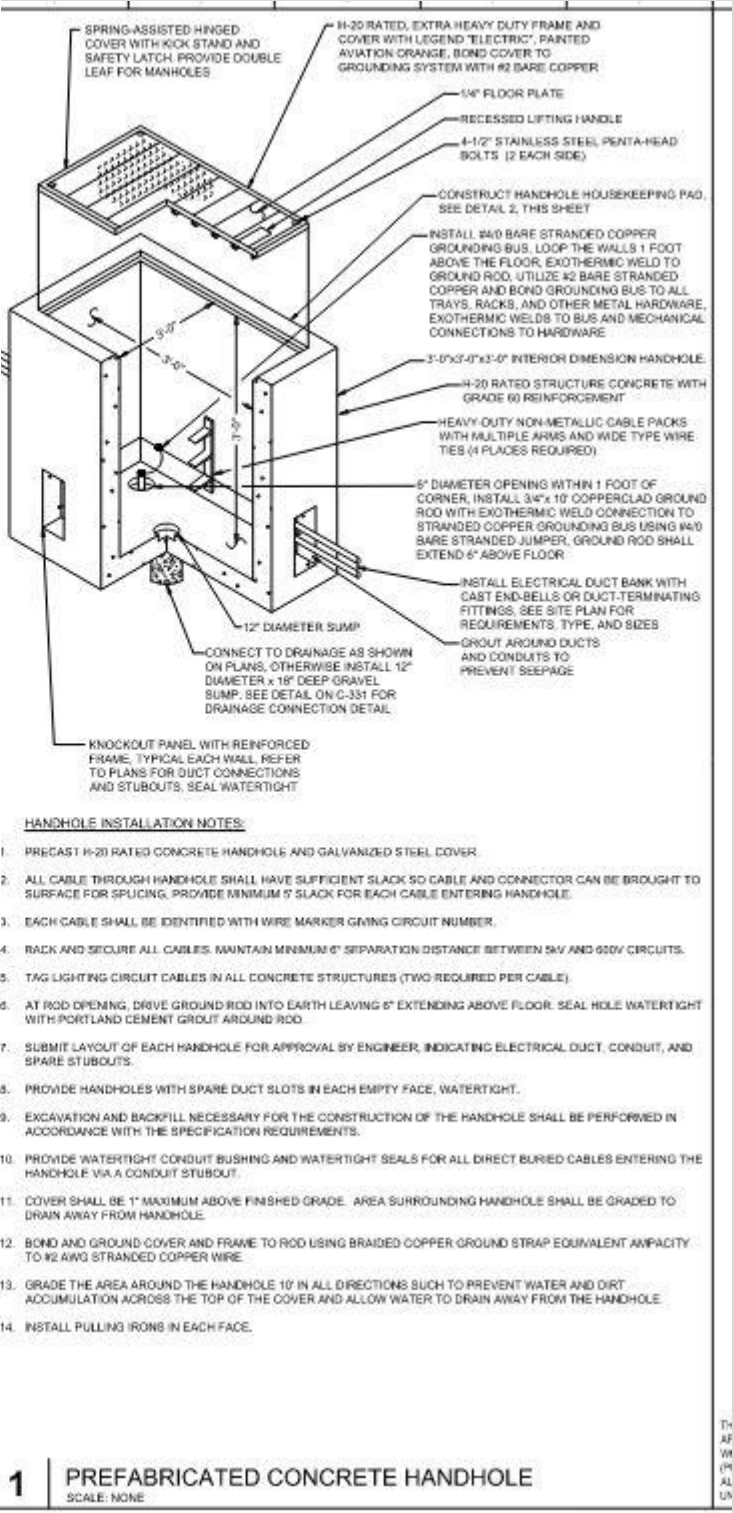
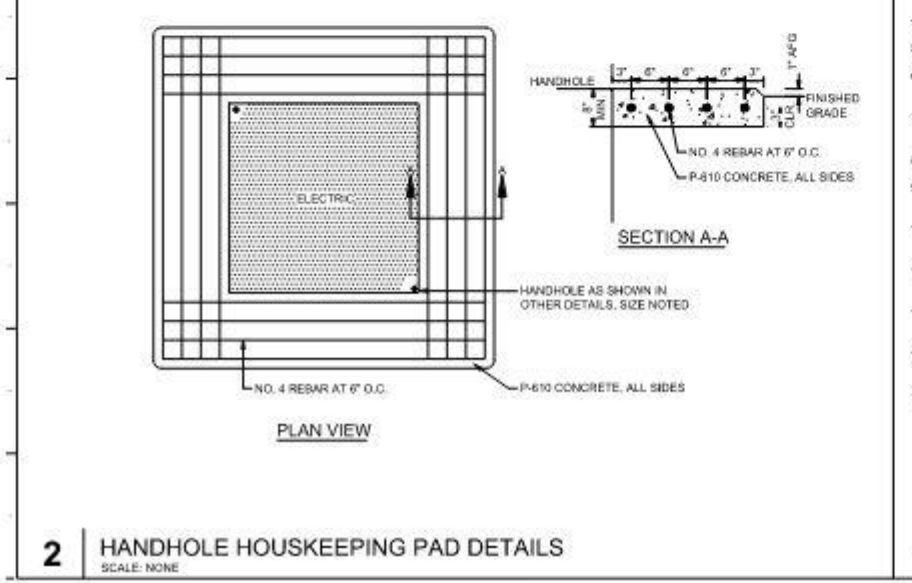
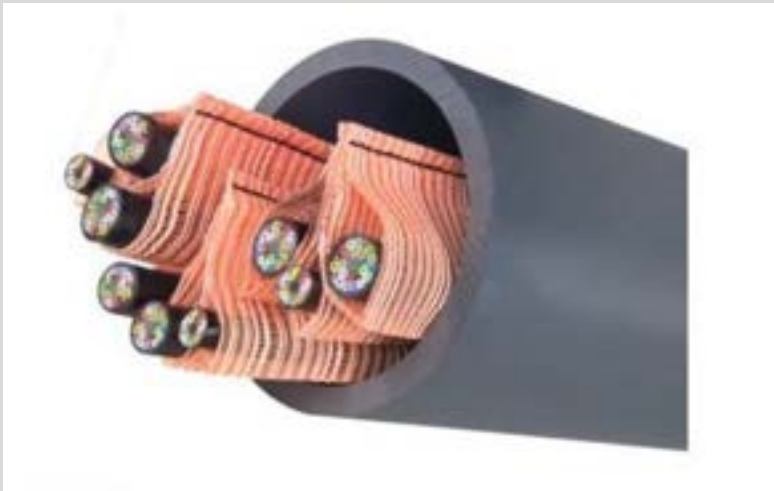
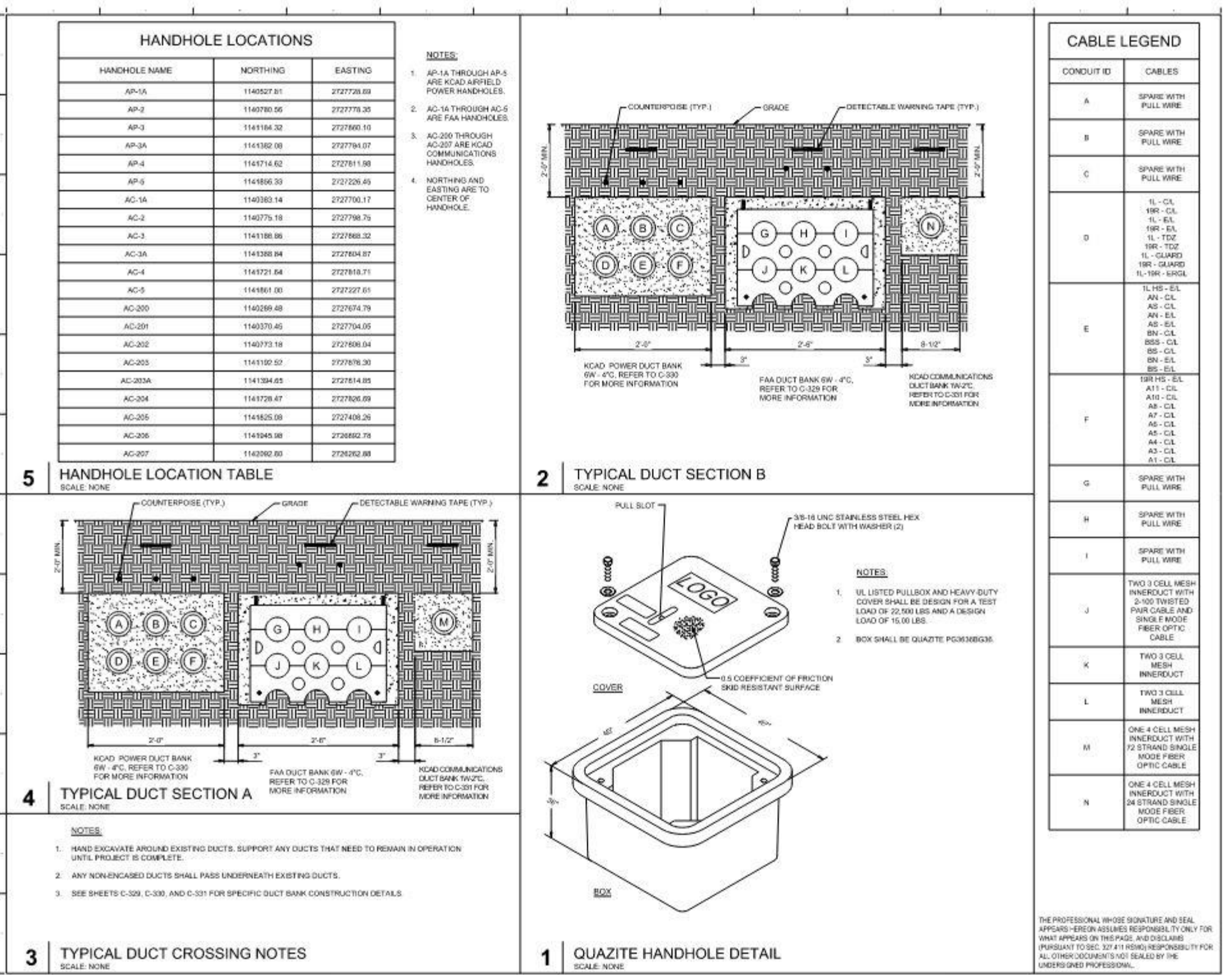
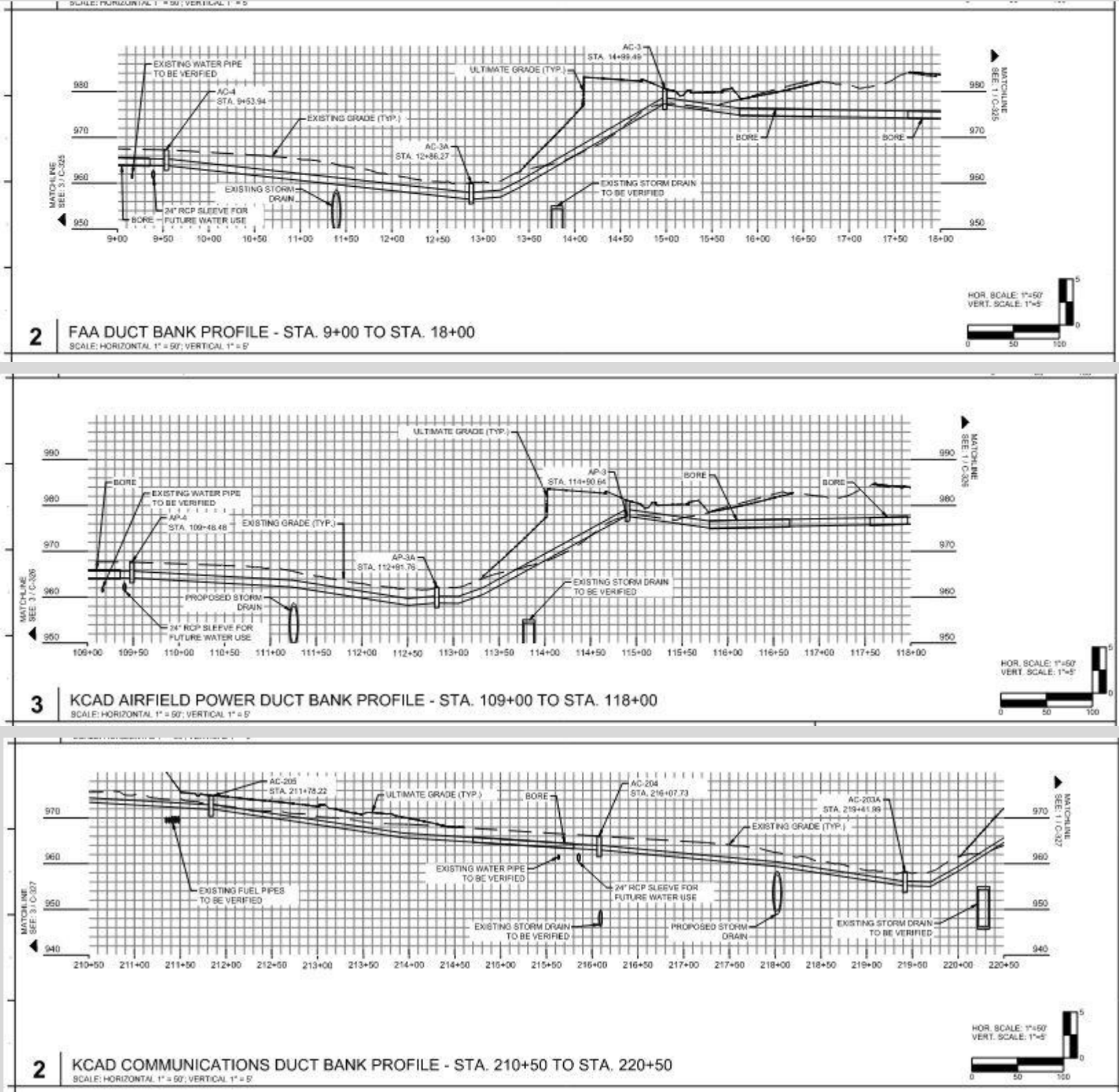


Phased Construction Critical  
New Enabling Work Package



# Airside/Ramp Design

## Enabling Work Project



Profiles for All Duct Banks - Critical Future Existing Work Coordination!

Duct Banks and Cables Placement Identified Precast Handholes with Housekeeping Pads





# Airside/Ramp Design

## Lighting Design Issues

### Usual suspects:

- Lighting homeruns solved, but a few circuits remain
- LED Ramp Edge Lighting
- LED Guidance Signs

### So, what about the ramp taxilanes?

- Initially were to be normal on/off taxilane centerline lights
- Next switched to possibly only installing centerline markers
- Then back to taxilane centerline lighting
- Spacing criteria for the Non-Movement Area (Ramp)

### Recall the Bulletins, dynamics of PPP, some wheel spinning here....

- Ultimately, go with taxilane centerline lighting systems





- Bore Launch Pit Details







## On the Fly Changes!

## Phasing Plans:

- Look at all the Pretty Colors!
- Operational Notes

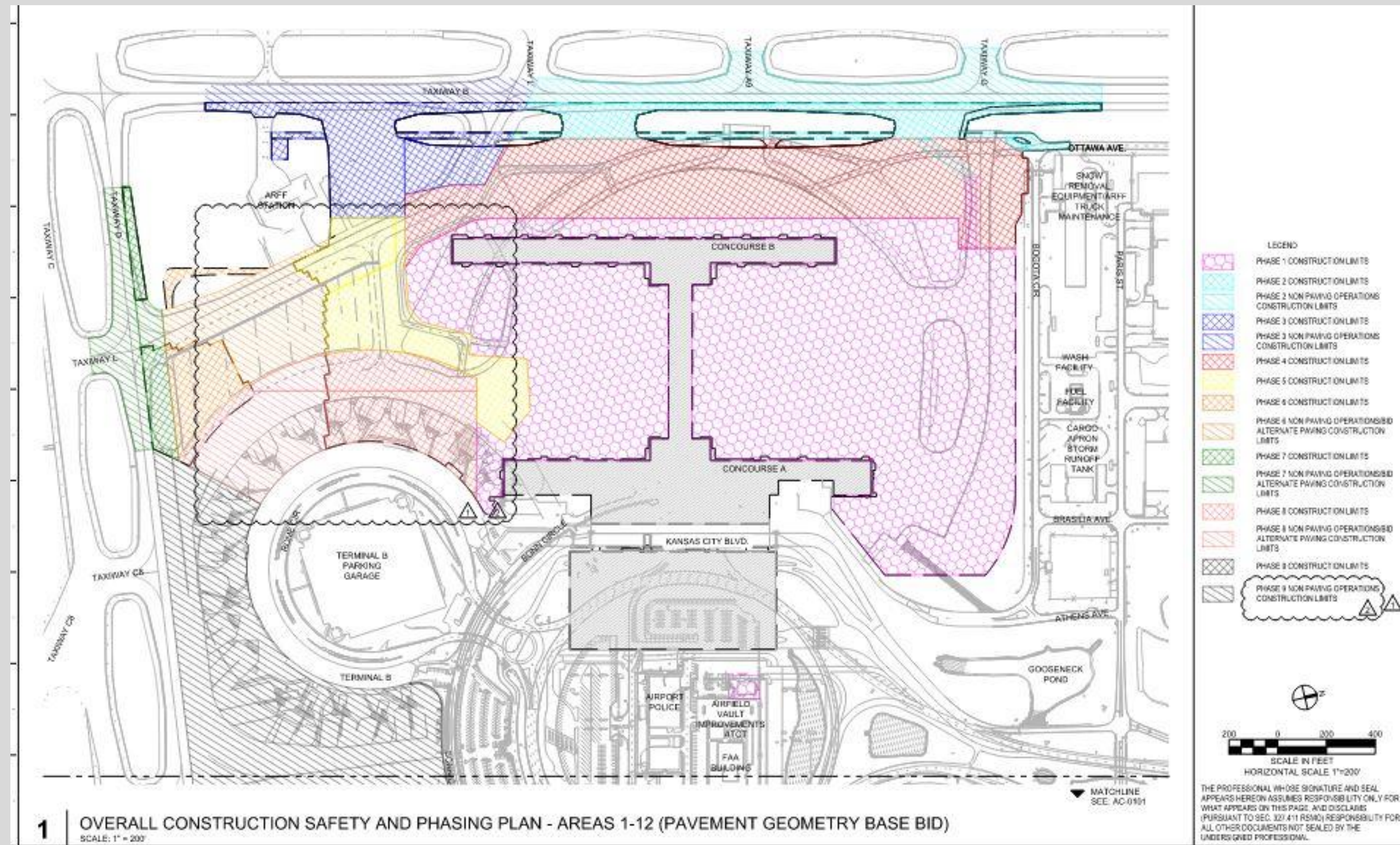
## Address Every Issue:

- Multiple Bulletins, Bulletins, Bulletins Used
- Some Rework Required / Maintain Operations

[illegible]

1 CONSTRUCTION SAFETY AND PHASING NOTES IV

The professional school structure and legal approach to on-campus responsibility for sexual assault in this paper are discussed subsequent to the 2014 amendments to the Title IX regulations that resulted in the current on-campus responsibility model in the United States.





# Airside/Ramp Design

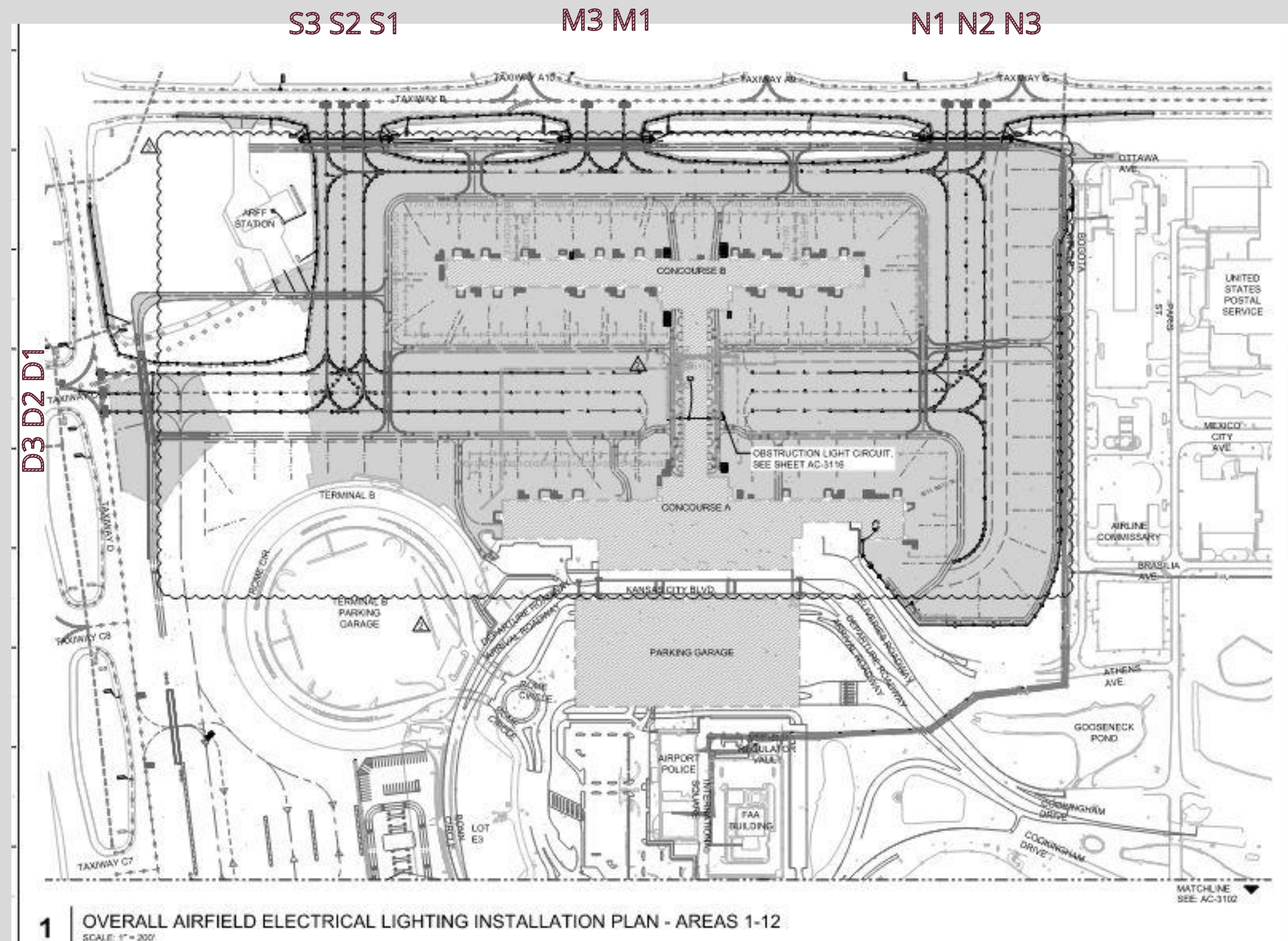
## Lighting Design Calculations / Configuration

### Criteria and Calculations:

- Ramp Edge Lighting and Signs System
- Taxilane Centerline Lighting Systems
- Design Criteria – Airport / Non-Movement
- Straight Segment 100' Max Longitudinal Spacing
- Approximately 17,500 VA for all taxilane centerline lighting equipment
- Taxilane Identifiers List at Right

### Design Considerations:

- Concept of Operations - New Ramp Operations - Existing SMGCS Plan
- Lighting Control and Monitoring System Selected
- Existing CCR Switchgear
- Other Projects in Construction – Deck of Cards (CCR) Shuffle





# Airside/Ramp Design

## Lighting Design Calculations / Configuration

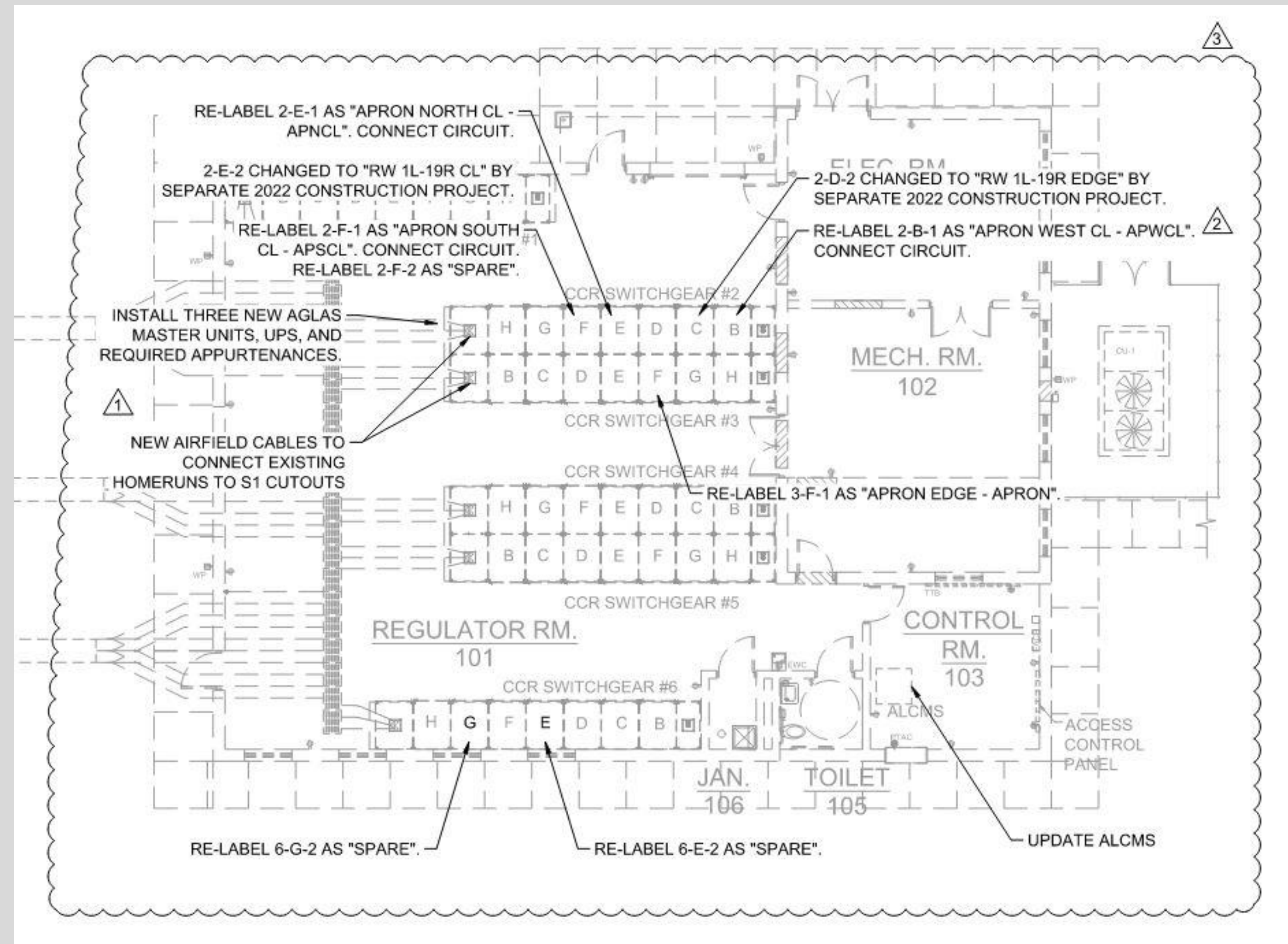
### CCRs Repurposed:

- Available Sizes Included 4, 10, 15, 20, and 30kW
- 20kW to serve Apron Edge Lights (APRON)
- 15kW to serve Apron North CL (APNCL)
- 10kW to serve Apron West CL (APWCL)
- 15KW to serve Apron South CL (APSCL)

### Vault Cable Index:

- Updated per the New Terminal & Other Ongoing Projects

VAULT CABLE INDEX					
SWITCHGEAR AND CCR NUMBER	CCR DESCRIPTION	CABLE TAG TEXT	SWITCHGEAR AND CCR NUMBER	CCR DESCRIPTION	CABLE TAG TEXT
1-B-1	A11 LEAD ON / OFF CL	A11CL	4-B-1	C APRON	C APRON
1-B-2	TW A 10 HSTO CL	A10CL	4-B-2	RW 1R-19L GUARD LTS	1R19LGRD
1-C-1	TW A6 HSTO CL	A6CL	4-C-1	TW F CL S	FXCL
1-C-2	TW A7 HSTO CL	A7CL	4-C-2	TW F EDGE E	FEL
1-D-1	TW A6 HSTO CL	A6CL	4-D-1	TW F CL N	FCL
1-D-2	TW A5 HSTO CL	A5CL	4-D-2	RW 19L GUARD LTS	19LGRD
1-E-1	TW A4 HSTO CL	A4CL	4-E-1	RW 1R GUARD LTS	1RGRD
1-E-2	TW A3 HSTO CL	A3CL	4-E-2	FUTURE 6	-
1-F-1	A1 LEAD ON / OFF CL	A1CL	4-F-1	FUTURE 4	-
1-F-2	TW A EDGE S	ASEL	4-F-2	FUTURE 5	-
1-G-1	TW A EDGE N	ANEL	4-G-1	FUTURE 2	-
1-G-2	FUTURE 1	-	4-G-2	FUTURE 3	-
1-H-1	FUTURE 2	-	4-H-1	SPARE 4	-
1-H-2	SPARE 1	-	4-H-2	SPARE 5	-
2-B-1	APRON WEST CL	APWCL	5-B-1	RW 1R-19L CL	1R19LCL
2-B-2	RW 1L HSTO EDGE	1LHSEL	5-B-2	RW 1R-19L EDGE	1R19LEL
2-C-1	RW 19R HSTO EDGE	19RHSEL	5-C-1	RW 1R TDZ LTS	1RTDZ





# Airside/Ramp Design

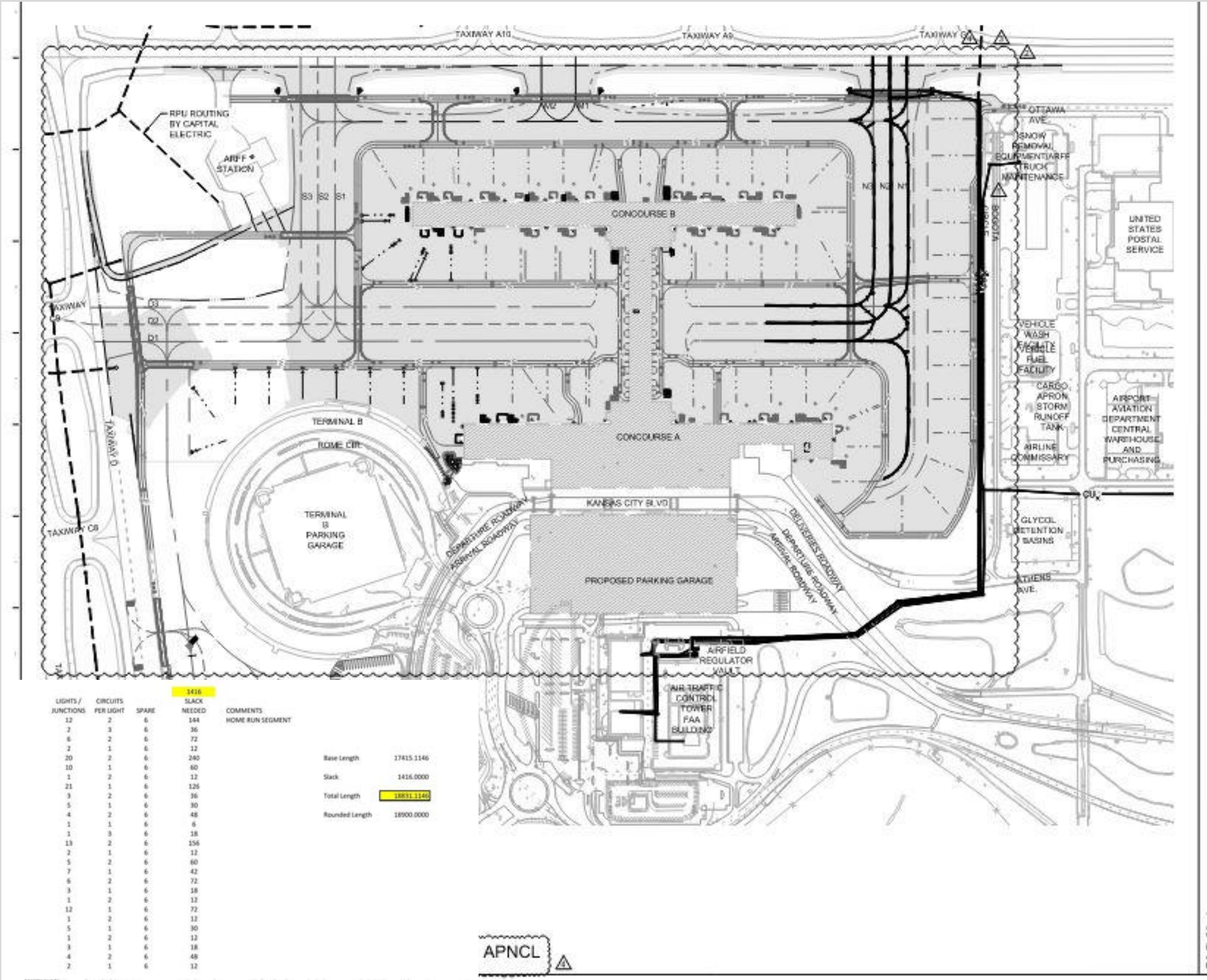
## Lighting Design Calculations / Configuration

- CCRs Repurposed:**
- Minimum 7.5kW Needed
  - 15kW to serve Apron North CL (APNCL)

- Cable Length:**
- Approximately 19k FT

GARVER AVIATION ELECTRICAL CONSTANT CURRENT REGULATOR DESIGN SPREADSHEET					
REGULATOR DATA			REGULATOR CALCULATIONS		
CCR Number:	1 - APNCL		Style:	1	
FAA Type:	L-828		Power Factor:	0.90	
Manufacturer:	ADB		Efficiency:	0.90	
Model Number:	Ferroresonant		Regulator Load Rating (va):	10,560	
Kilowatt Rating:	7.5		Input Current:	22	
Input Voltage:	480		Overcurrent Protection:	28	WARNING
Output Current:	6.6				
Current Steps:	3				
Spare Capacity:	10%				
DESIGN LOAD CALCULATIONS					
Type	Description	Quantity	Units	Unit Load (va)	Subtotal Load (va)
L-852C-LED	L-852C, Taxiway Centerline Inpavement Light, LED Type	53	EA	27	1,431
L-852D-LED	L-852D, Taxiway Centerline Inpavement Light, LED Type	84	EA	33	2,772
L-852F-LED	L-852F, Taxiway Centerline Inpavement Light, LED Type	3	EA	39	117
AGLAS-C-Remote	Reliance Intelligent Lighting AGLAS-C - Remote	140	EA	8.8	1,232
AGLAS-C-Master	Reliance Intelligent Lighting AGLAS-C - Master (Powered by 6.6	1	EA	72.22	72
L-824C	L-824C, No. 8 AWG, 5kV Lighting Cable	18900	LF	0.0279	527
				Regulator Design Total Load:	6,152
				Plus Spare Capacity:	750
				Calculated Design kVA Rating:	6,902
				Regulator Kilowatt Rating:	7.5

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# Airside/Ramp Design

# Lighting Design Calculations / Configuration

## CCRs Repurposed:

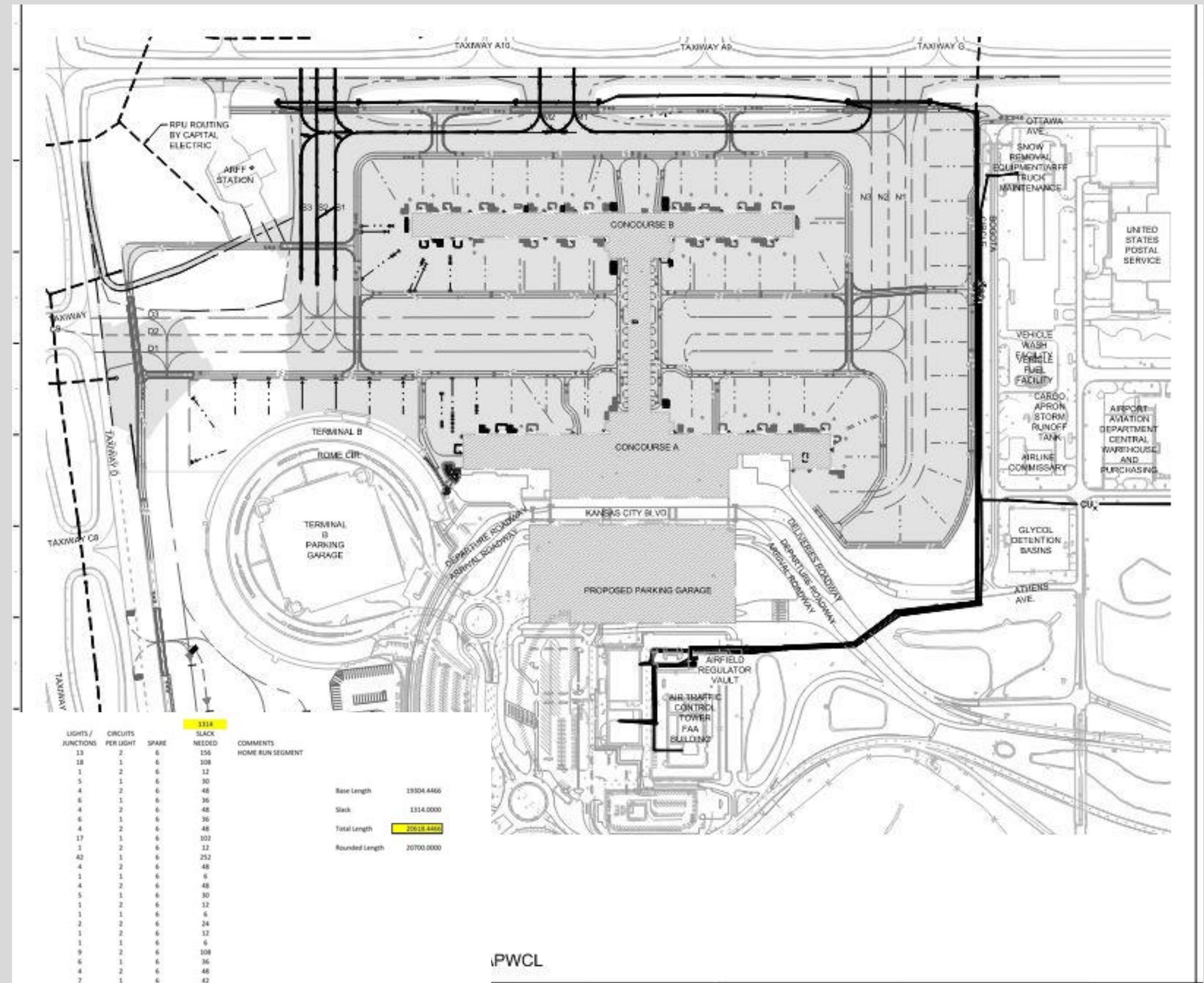
- Minimum 7.5kW Needed
- 10kW to serve Apron West CL (APWCL)

## Cable Length:

- Approximately 20k FT

GARVER AVIATION ELECTRICAL CONSTANT CURRENT REGULATOR DESIGN SPREADSHEET						
REGULATOR DATA			REGULATOR CALCULATIONS			
CCR Number:	2 - APWCL		Style:	1		
FAA Type:	L-828		Power Factor:	0.90		
Manufacturer:	ADB		Efficiency:	0.90		
Model Number:	Ferroresonant		Regulator Load Rating (va):	10,560		
Kilowatt Rating:	7.5		Input Current:	22		
Input Voltage:	480		Overcurrent Protection:	28		WARNING
Output Current:	6.6					
Current Steps:	3					
Spare Capacity:	10%					
DESIGN LOAD CALCULATIONS						
Type	Description	Quantity	Units	Unit Load (va)	Subtotal Load (va)	
L-852C-LED	L-852C, Taxiway Centerline Impavement Light, LED Type	59	EA	27	1,593	
L-852D-LED	L-852D, Taxiway Centerline Impavement Light, LED Type	52	EA	33	1,716	
L-852F-LED	L-852F, Taxiway Centerline Impavement Light, LED Type	5	EA	39	195	
AGLAS-C-Remote	Reliance Intelligent Lighting AGLAS-C - Remote	116	EA	8.8	1,021	
AGLAS-C-Master	Reliance Intelligent Lighting AGLAS-C - Master (Powered by 6.6		EA	72.22	72	
L-824C	L-824C, No. 8 AWG, 5kV Lighting Cable	20700	LF	0.0279	578	
Regulator Design Total Load:					5,175	
Plus Spare Capacity:					750	
Calculated Design kVA Rating:					5,925	
Regulator Kilowatt Rating:					7.3	

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# Airside/Ramp Design

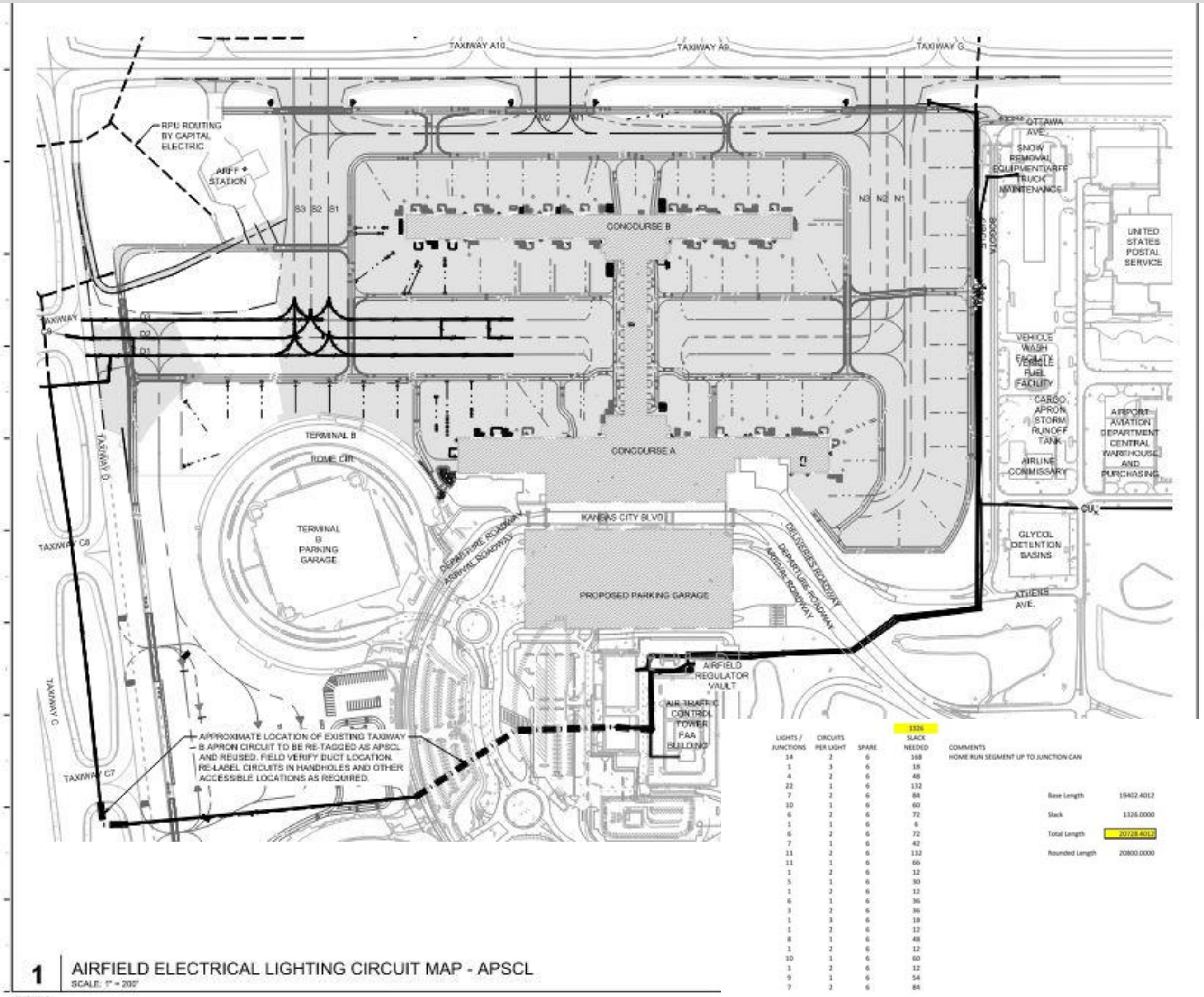
## Lighting Design Calculations / Configuration

- CCRs Repurposed:**
- Minimum 7.5kW Needed
  - 15KW to serve Apron South CL (APSCL)

- Cable Length:**
- Approximately 20k FT

GARVER AVIATION ELECTRICAL CONSTANT CURRENT REGULATOR DESIGN SPREADSHEET					
REGULATOR DATA			REGULATOR CALCULATIONS		
CCR Number:	3 - APSCL		Style:	1	
FAA Type:	L-828		Power Factor:	0.90	
Manufacturer:	ADB		Efficiency:	0.90	
Model Number:	Ferroresonant		Regulator Load Rating (va):	10,560	
Kilowatt Rating:	7.5		Input Current:	22	
Input Voltage:	480		Overcurrent Protection:	28	WARNING
Output Current:	6.6				
Current Steps:	3				
Spare Capacity:	10%				
DESIGN LOAD CALCULATIONS					
Type	Description	Quantity	Units	Unit Load (va)	Subtotal Load (va)
L-852C-LED	L-852C, Taxiway Centerline Inpavement Light, LED Type	67	EA	27	1,809
L-852D-LED	L-852D, Taxiway Centerline Inpavement Light, LED Type	70	EA	33	2,310
L-852F-LED	L-852F, Taxiway Centerline Inpavement Light, LED Type	3	EA	39	117
AGLAS-C-Remote	Reliance Intelligent Lighting AGLAS-C - Remote	140	EA	8.8	1,232
AGLAS-C-Master	Reliance Intelligent Lighting AGLAS-C - Master (Powered by 6.6	1	EA	72.22	72
L-824C	L-824C, No. 8 AWG, 5kV Lighting Cable	20800	LF	0.0279	580
Regulator Design Total Load:					6,121
Plus Spare Capacity:					750
Calculated Design kVA Rating:					6,871
Regulator Kilowatt Rating:					7.5

Filename: L:\2013\13161010 - KCI Terminal Airfield Design\Design\Calculations\ELECTRICAL\CCR\2022 Updates to Apron CL\Option 4 - 3 Circuits\2022-01-19 Apron CL CCR Calc - Op





# General Taxi Action and Centerline Lighting

KCI TERMINAL/VIRTUAL RAMP CONTROL





# Airside/Ramp Design

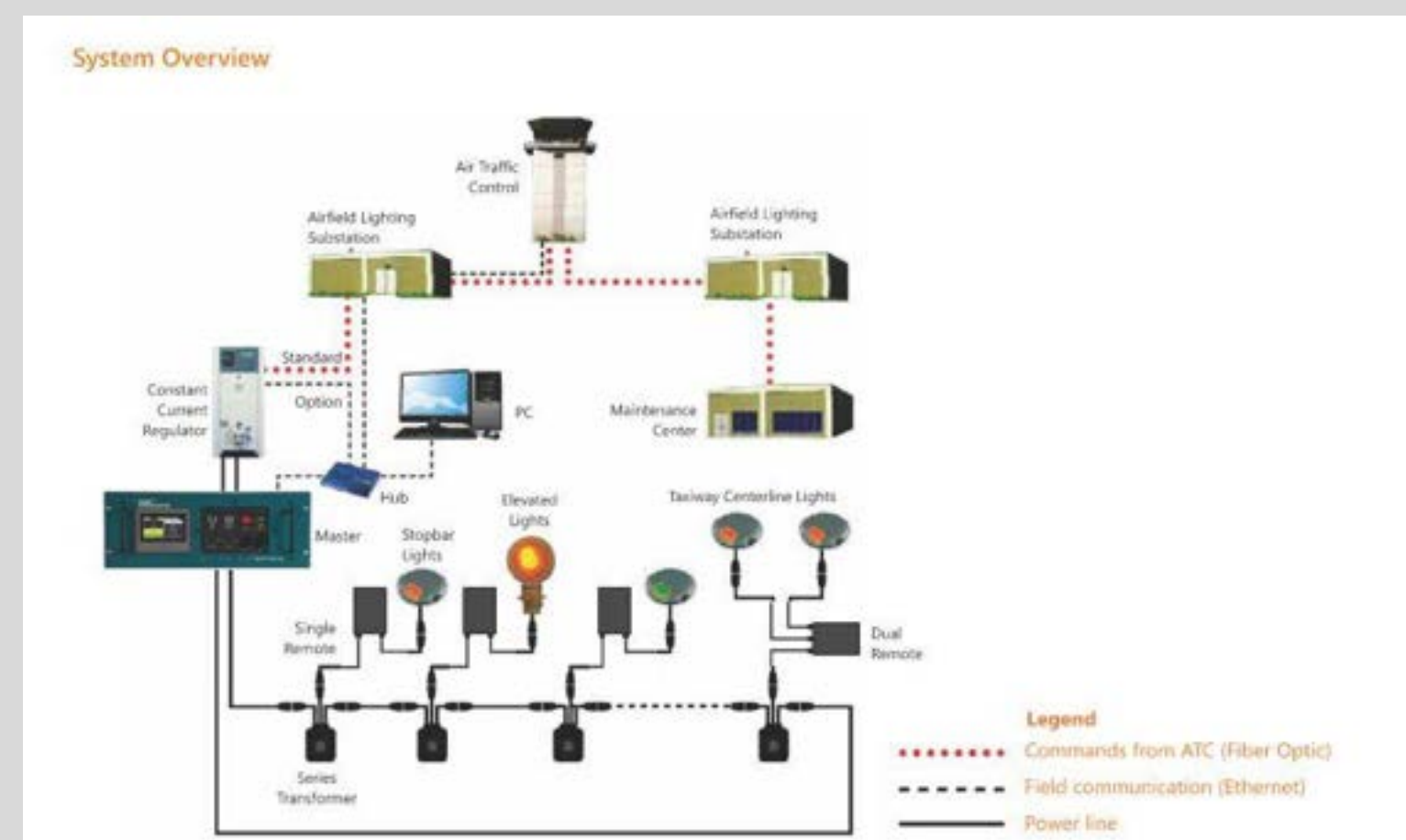
## ALCMS & Lighting Control and Monitoring

### Concept of Operations

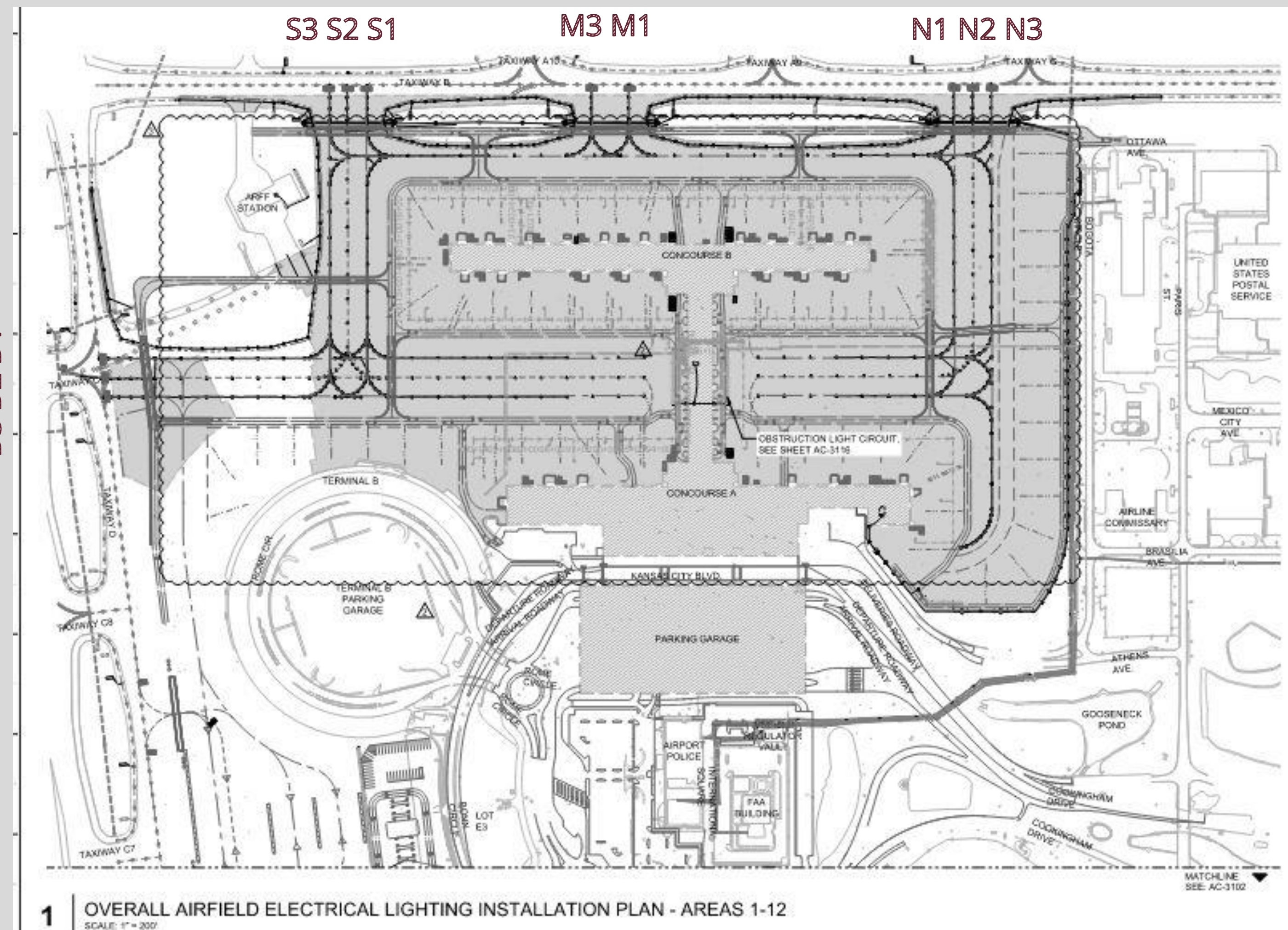
- Normal Operations
  - ADG III – Taxilanes N1, N3, M1, M3, S1, S3, D1, D3
  - Two-way Traffic
- Special Operations
  - ADG V – Taxilanes N2, S2, D2 only

### How is this Operation Change Managed?

- CCR SWGR - ADB AGLAS in use for several circuits already
- Lighting Control and Monitoring System selected
- Unique Solution is Needed and Falling into Place but...



D3 D2 D1





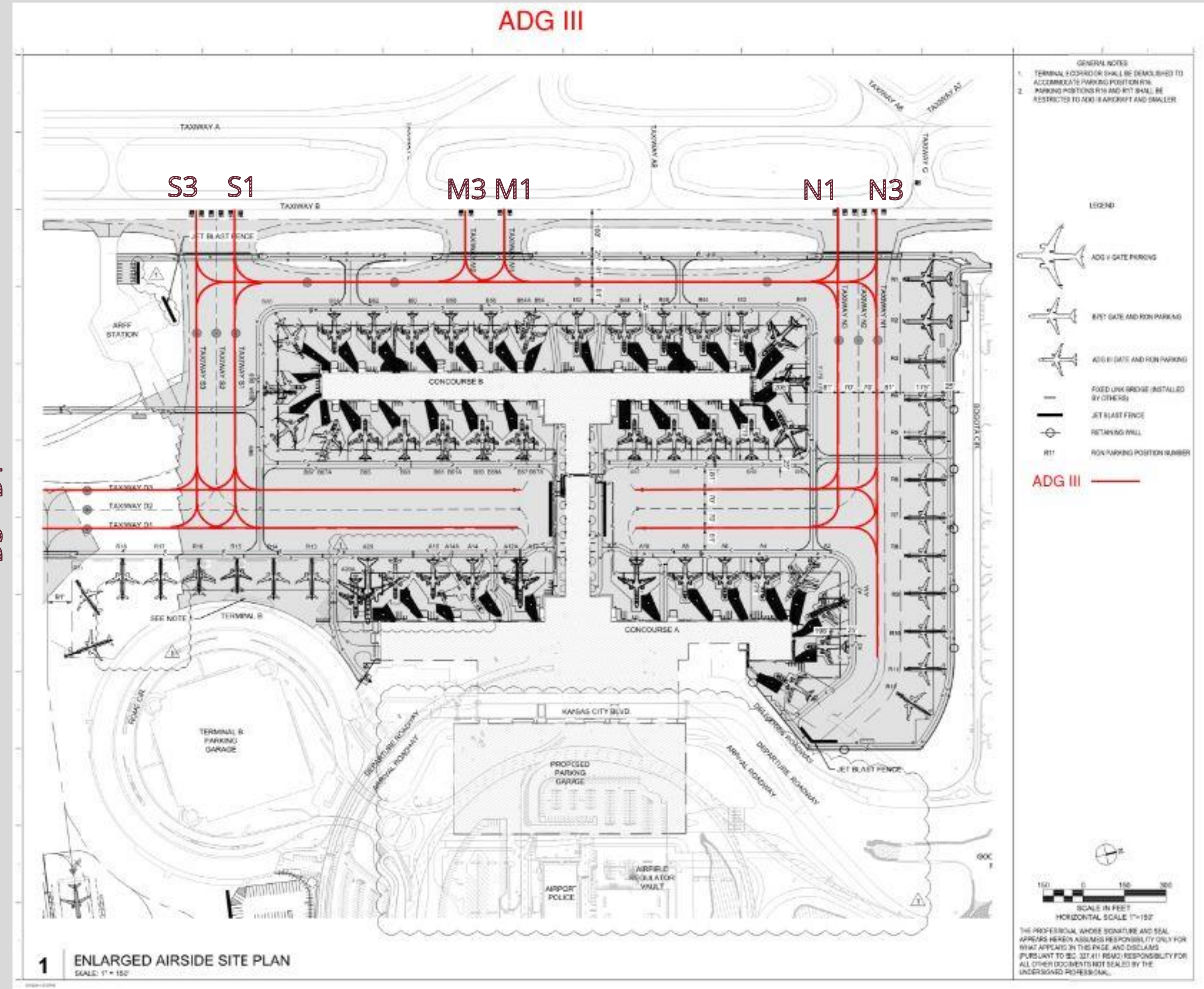
# Airside/Ramp Design

ALCMS & Lighting Control and Monitoring

## Concept of Operations

- PPP Project Dynamics – Ongoing Design
- **Normal Operations**
  - ADG III – Taxilanes N1, N3, M1, M3, S1, S3, D1, D3
  - Two-way Traffic
- **Special Operations**
  - ADG V – Taxilanes N2, S2, D2 only

D3 D1









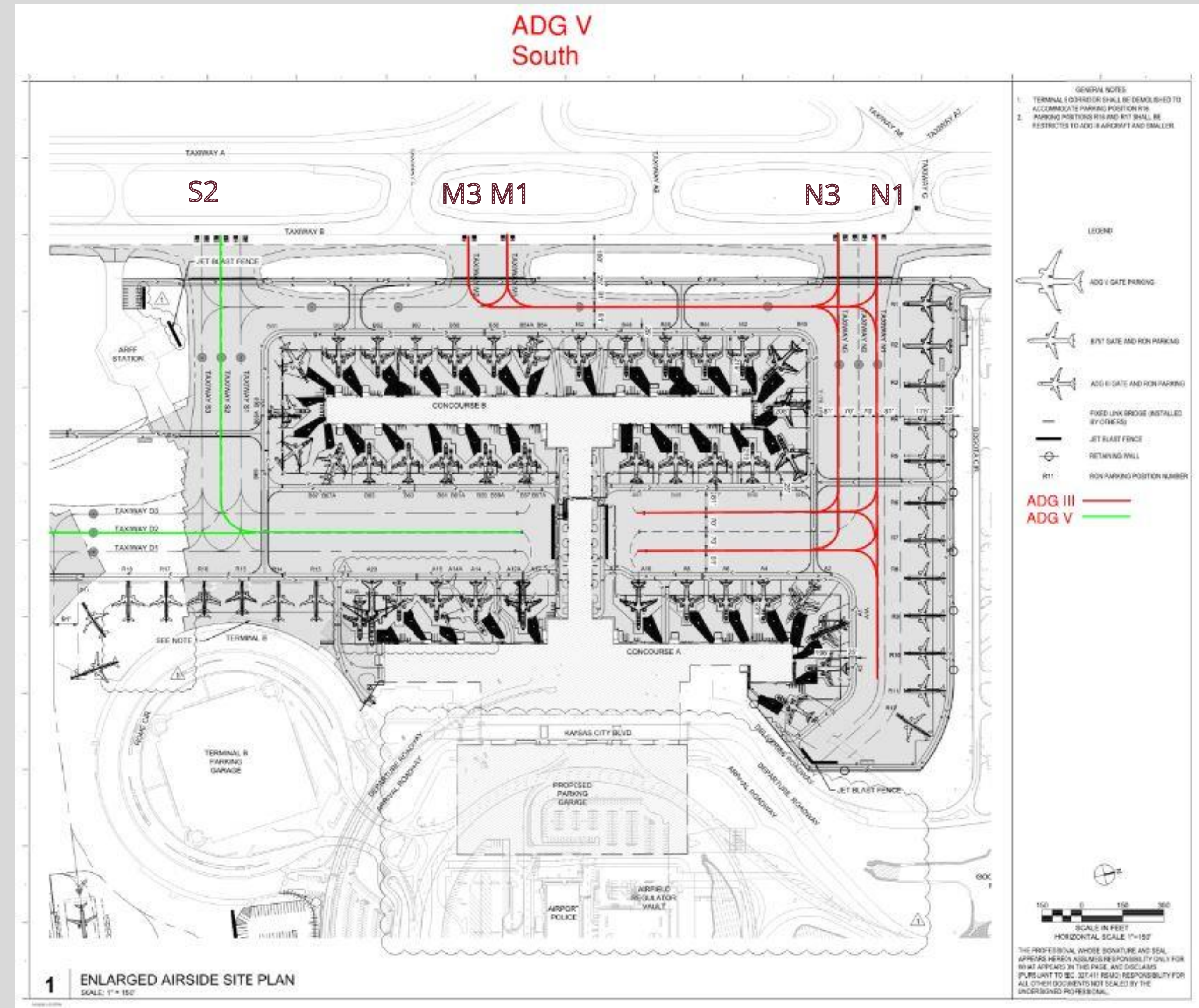
# Airside/Ramp Design

ALCMS & Lighting Control and Monitoring

## Concept of Operations

- PPP Project Dynamics – Ongoing Design
- Normal Operations
  - ADG III – Taxilanes N1, N3, M1, M3, S1, S3, D1, D3
  - Two-way Traffic
- Special Operations
  - ADG V – Taxilanes N2, S2, D2 only

D2





# Airside/Ramp Design

## ALCMS & Lighting Control and Monitoring

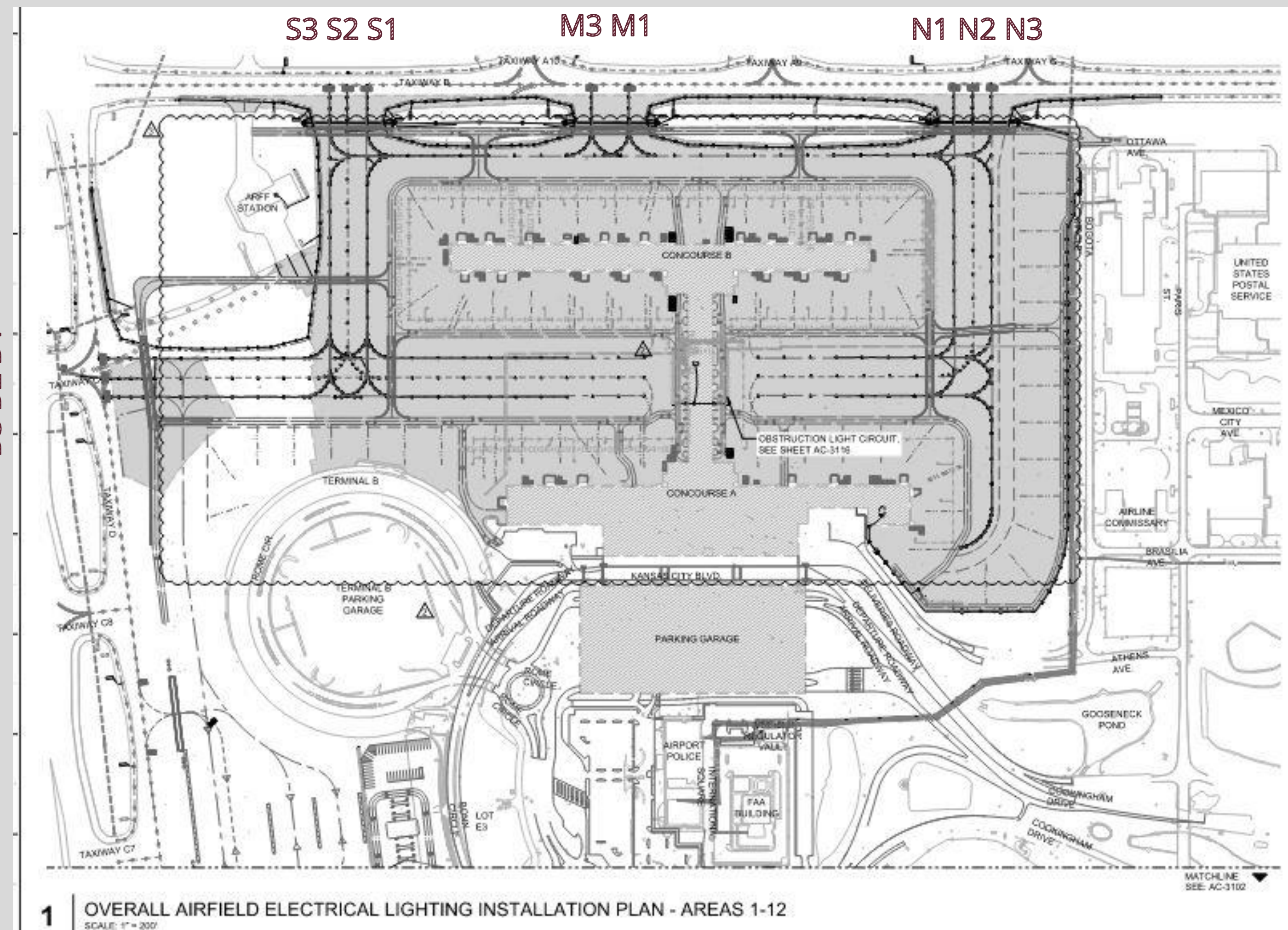
### Concept of Operations

- But what if concept of operations is that the ADG III centerline lights are to stay on, how do we provide additional guidance to a ADG IV or V size aircraft to utilize N2, S2, or D2?

### It is almost Christmas time, so as the song goes:

- 'These Blinkin Lights'
- N2, S2, D2 taxilane centerline lights blink during operation
- Provides the pilot additional visual guidance to the specific taxilane centerline for ADG IV and V size aircraft
- Ultimately, the concept of operations is that ADG III steady burning are shut off when the ADG V blinking are energized.

D3 D2 D1



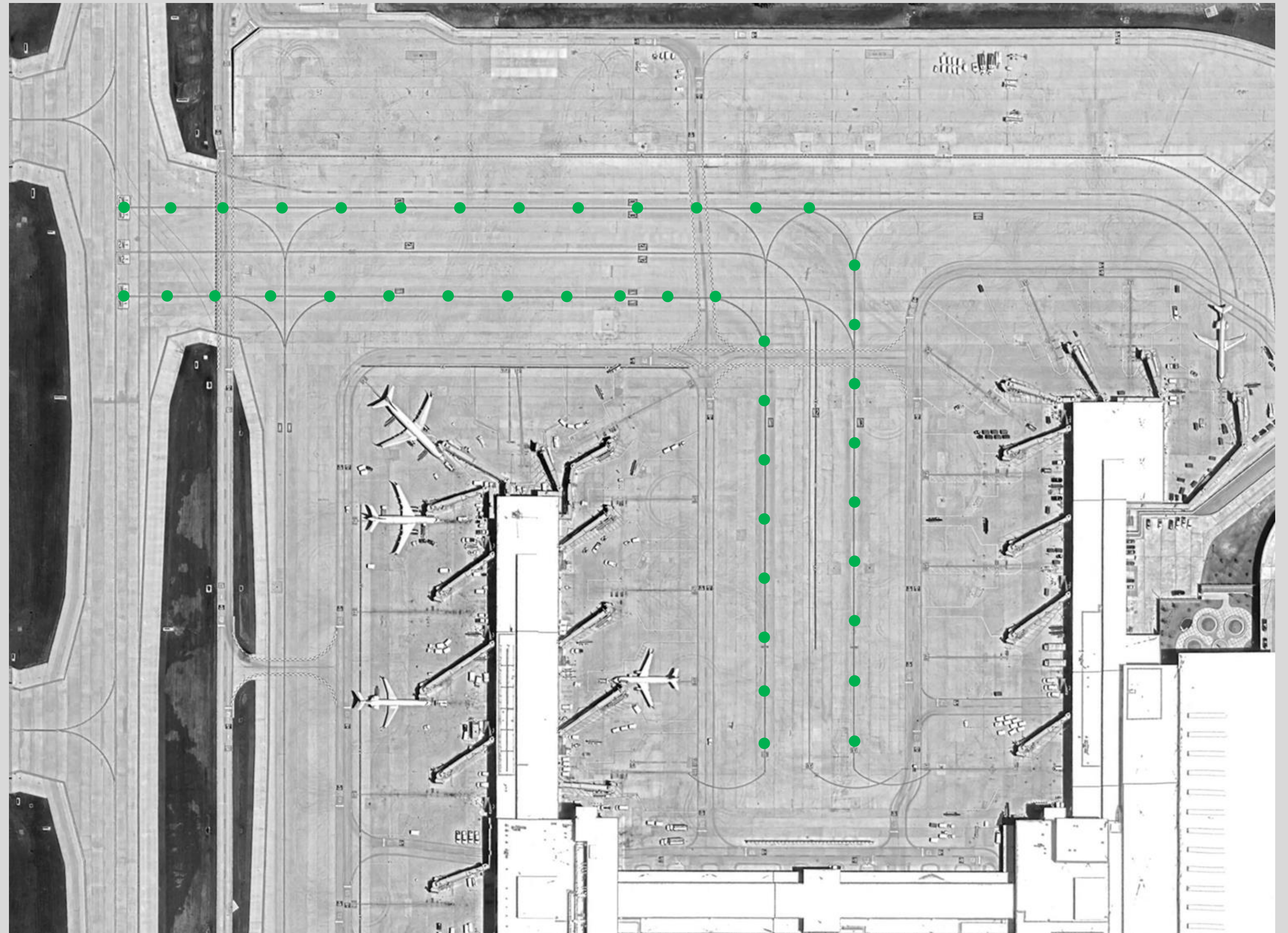


# Ramp CL Lighting

## Taxilane Lighting Control

### Concept of Operations

- Normal Steady Burning for N1 and N3



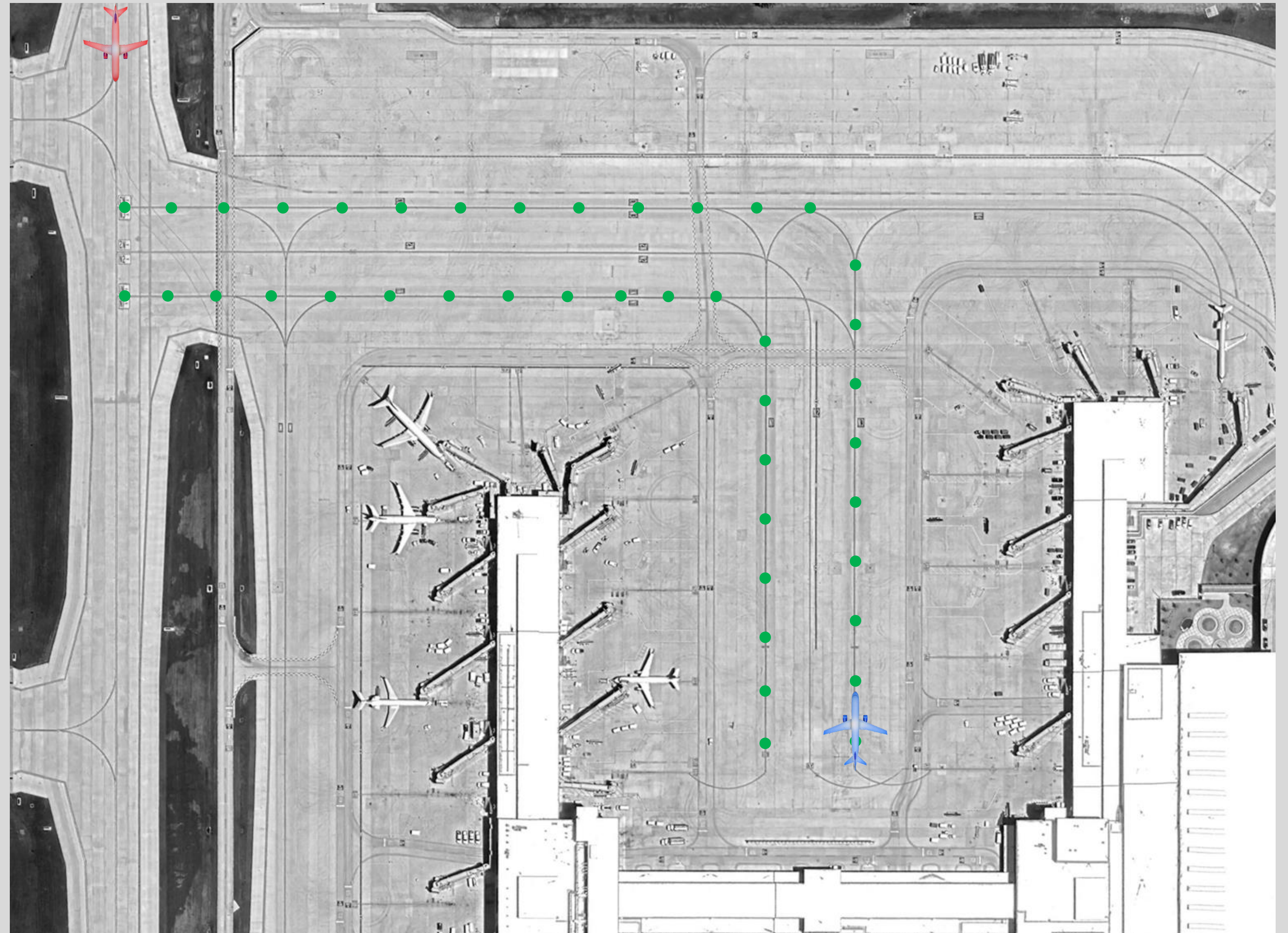


# Ramp CL Lighting

## Taxilane Lighting Control

### Concept of Operations

- Normal Steady Burning CL Lights for N1 and N3
- ADG III Aircraft enter and leave gate areas, Two-Way



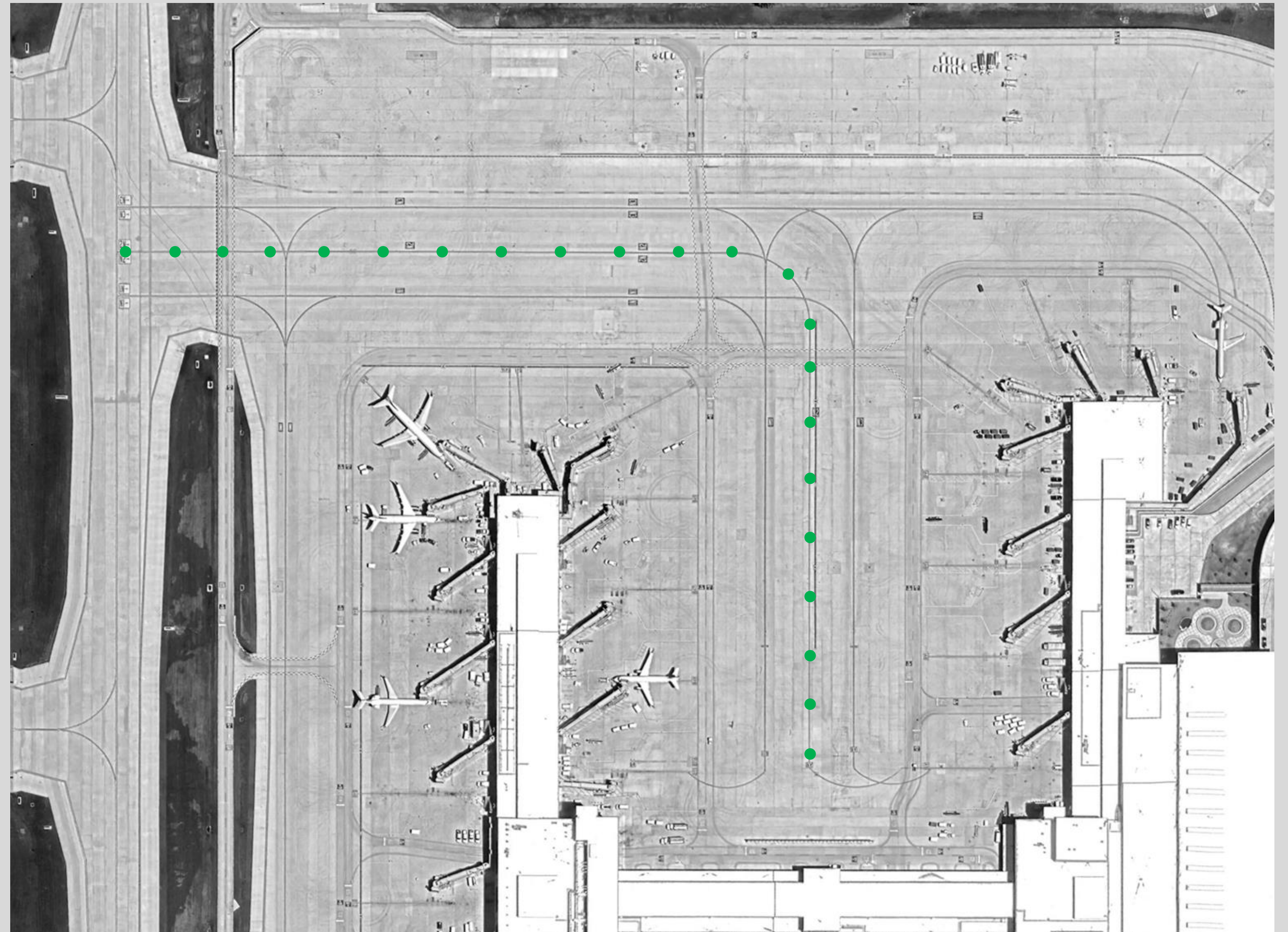


# Ramp CL Lighting

Taxilane Lighting Control

## Concept of Operations

- Special Blinkin CL Lights for N2



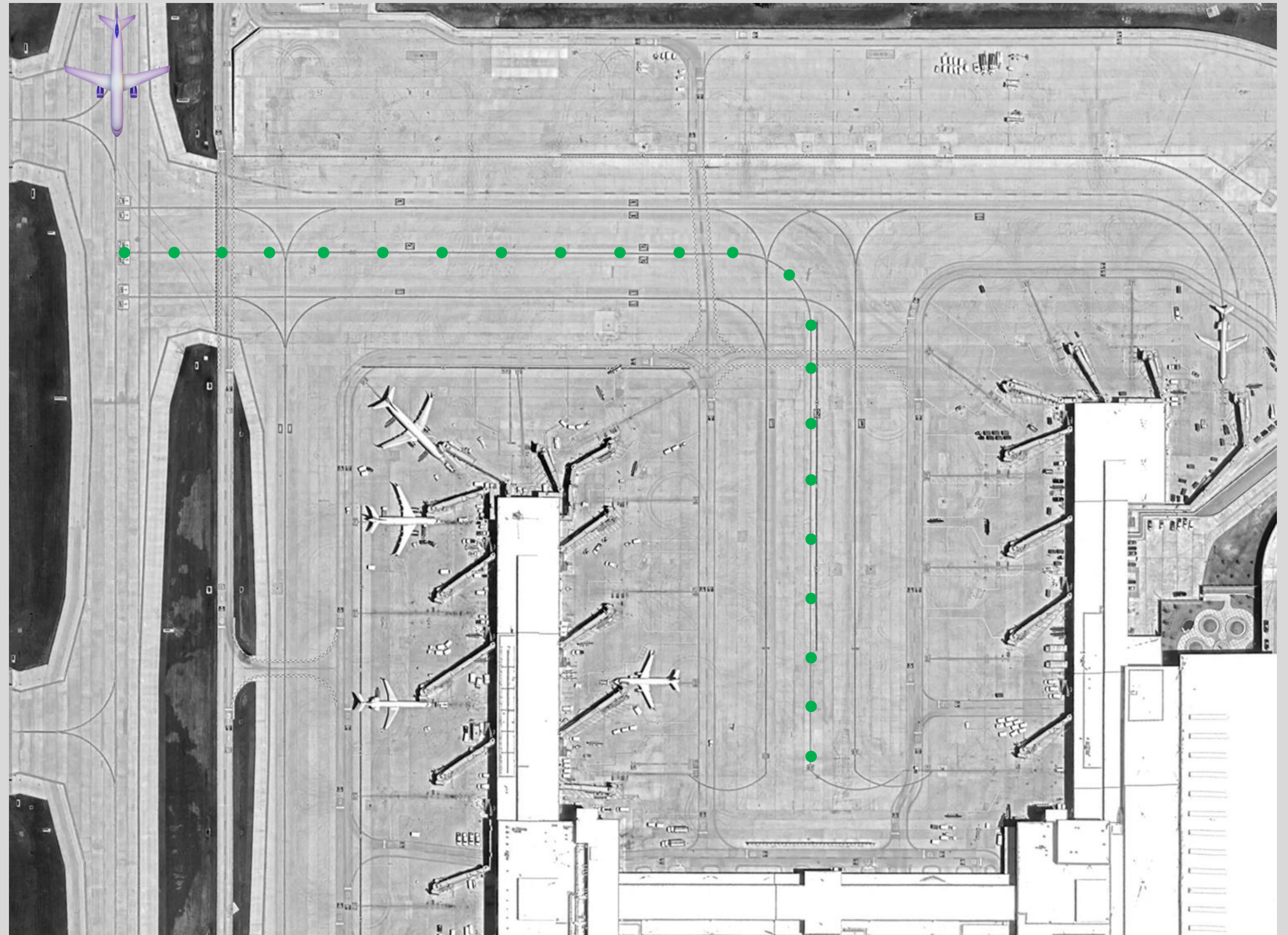


# Ramp CL Lighting

## Taxilane Lighting Control

### Concept of Operations

- Special Blinkin CL Lights for N2
- ADG IV and V, One-Way



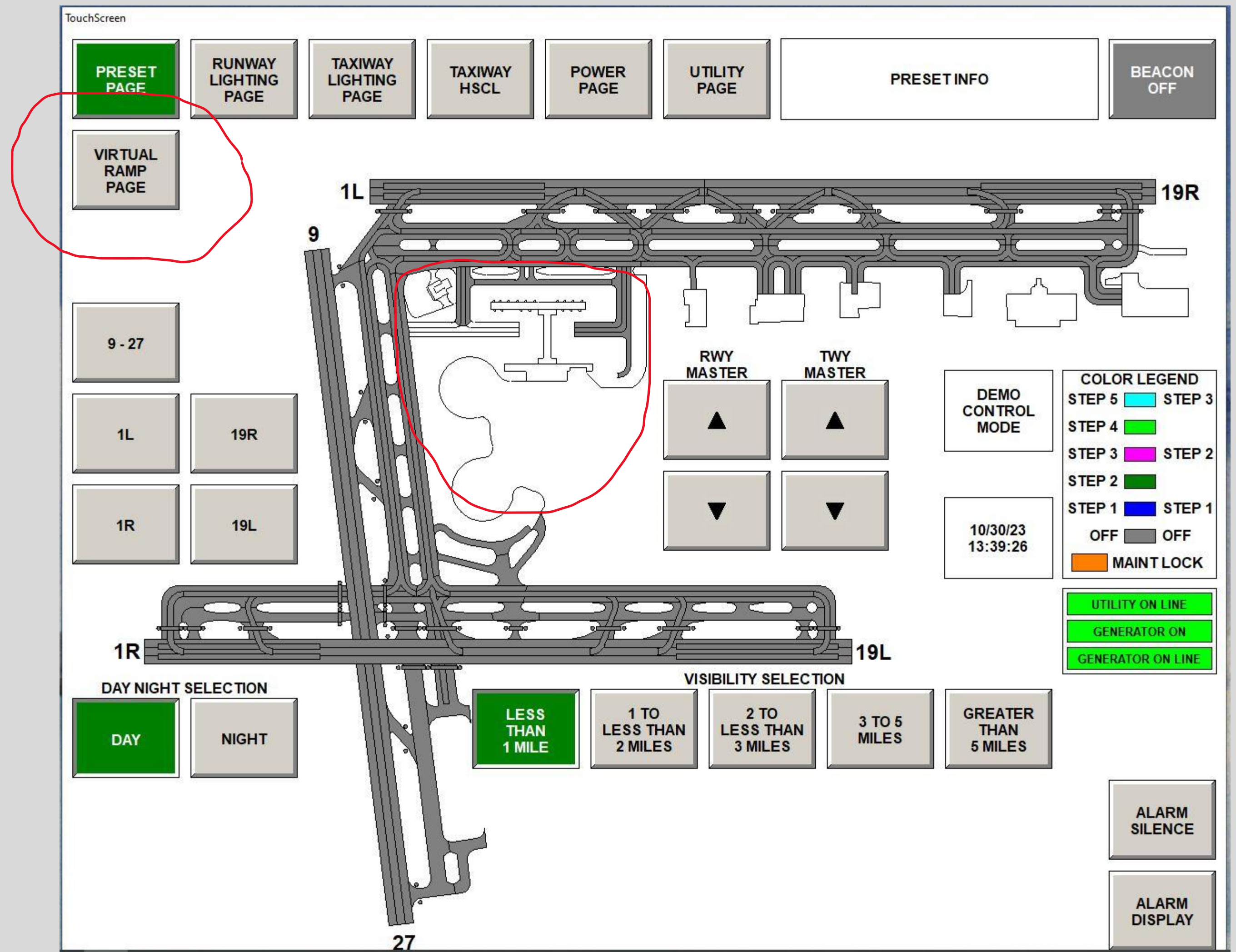


# ALCMS Integration

## New Updates

### ALCMS Updates Included

- New Virtual Ramp Preset Page
- Update Background and Functionality for New Ramp Edge Lighting and Ramp Taxilane Centerline Lighting Systems
- We will discuss VRCS Project next
- One of the first for a VRCR with ALCMS in US (20/7/365)
- Reverts back to FAA ATCT when VRCR is closed



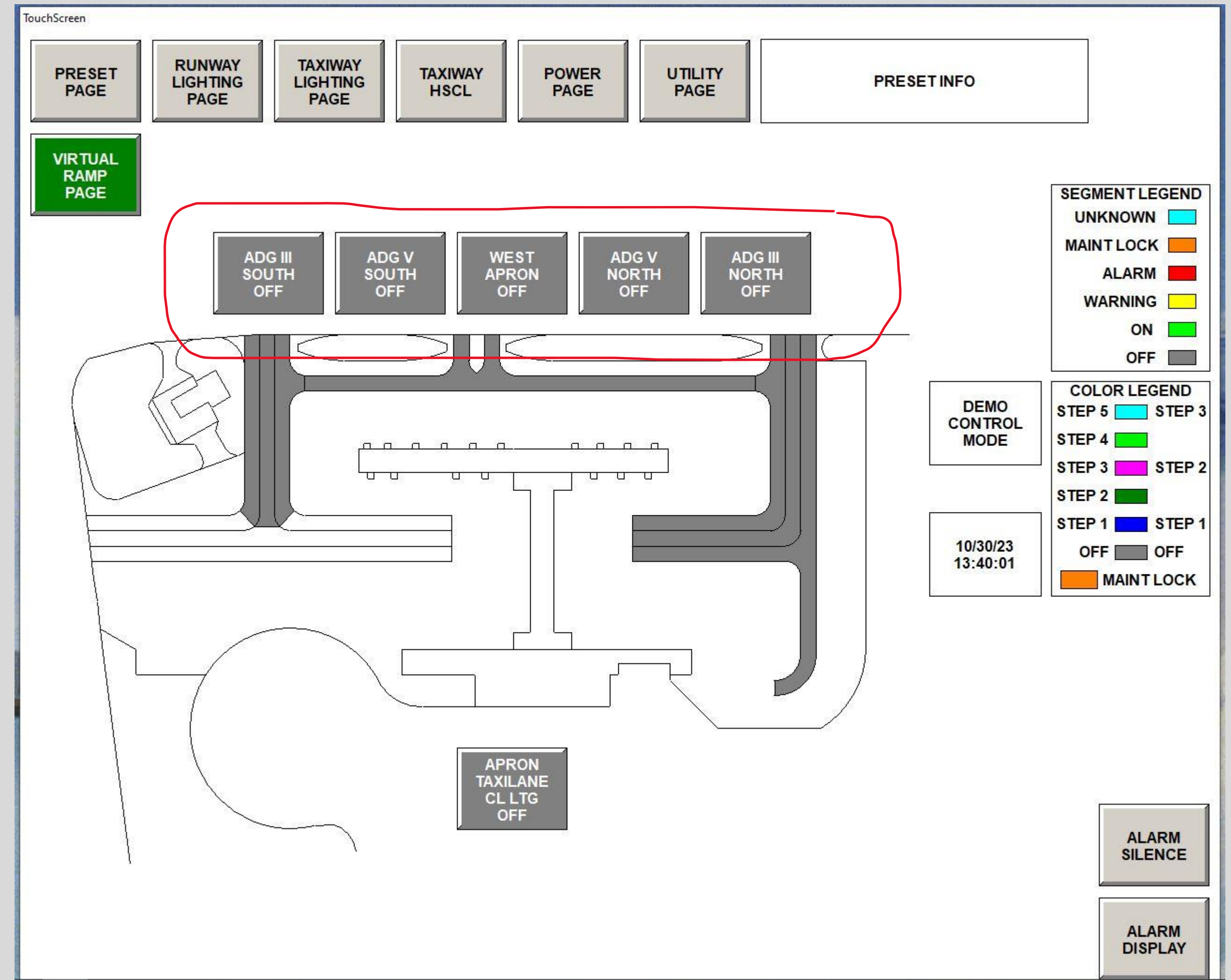


# ALCMS Integration

## New Preset Page

### Preset Page Included

- Update Background and Functionality for New Ramp Edge Lighting and Ramp Taxilane Centerline Lighting Systems
- PPP Dynamics – Provide Options for proposed/future Concept of Operations and Controlling the Taxilane Centerline Lighting
  - ADG III South CL
  - ADG V South CL
  - West CL
  - ADG V North CL
  - ADG III North CL



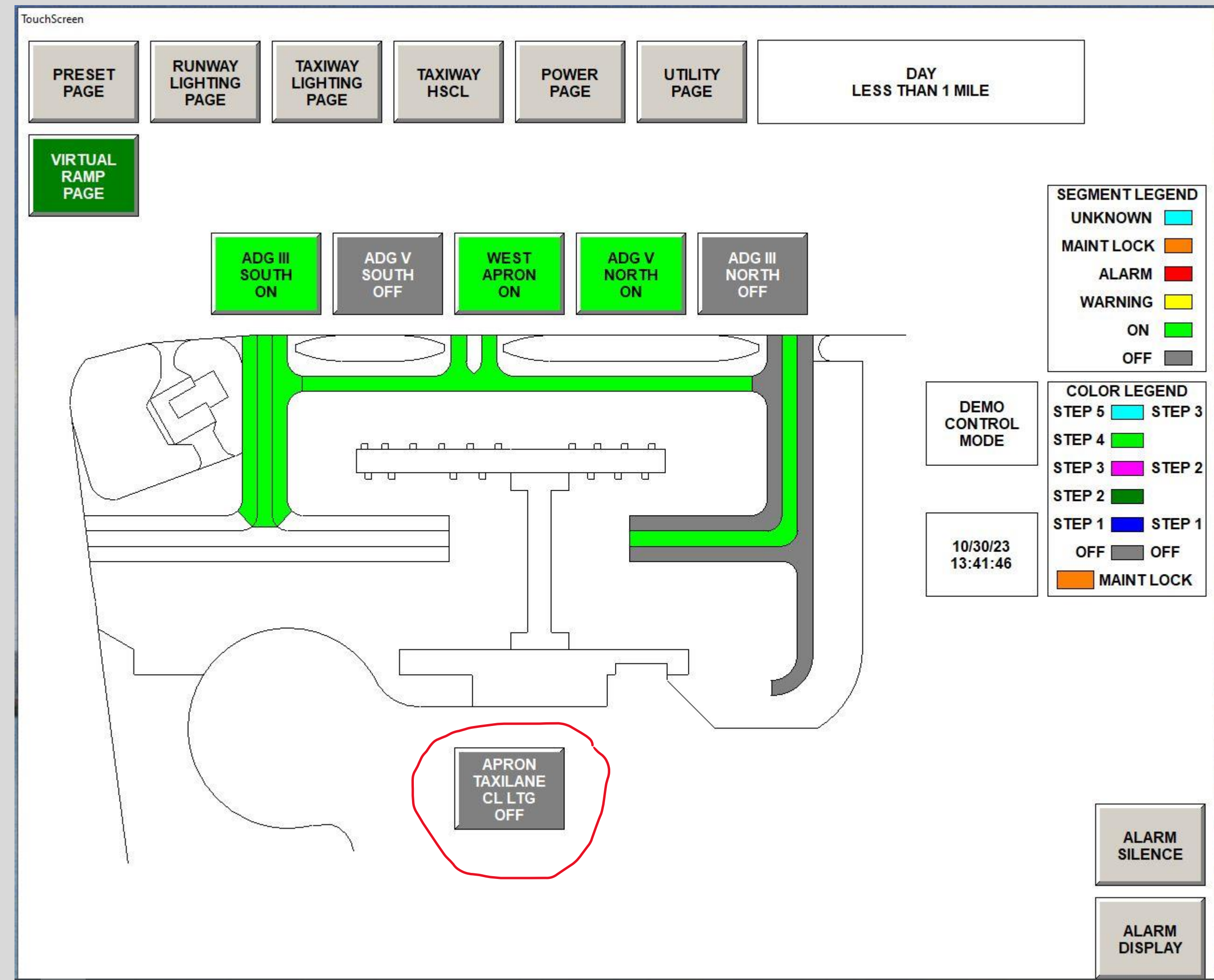


# ALCMS Integration

## New Preset Examples

### ALCMS Updates

- Normal Operation
  - ADG III aircraft
- ADG V North
  - Note graphic is from prefinal demo!
- Notes
  - More of West CL stays energized vs. earlier exhibits
  - Demo of existing Terminal B holding up completing the south taxilane centerline lighting (so graphic shows what is active now)





# ADG III Steady Burning Centerline Lighting

KCI TERMINAL/VIRTUAL RAMP CONTROL





# ADG V Blinkin' Centerline Lighting

KCI TERMINAL/VIRTUAL RAMP CONTROL





# Airside/Ramp Design

## ALCMS & Lighting Control and Monitoring

### Concept of Operations

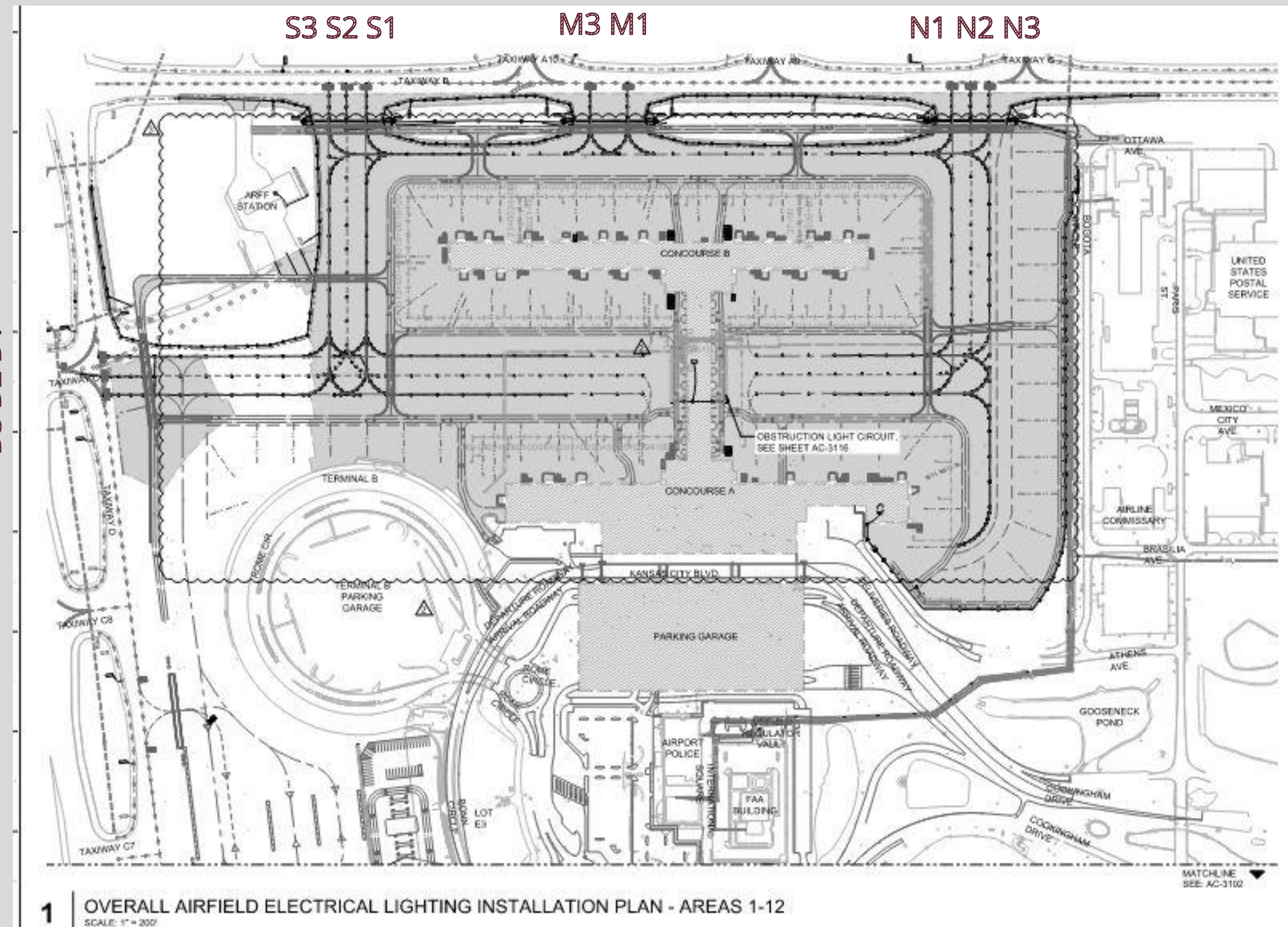
- So, are we done now? Not exactly... while in design and construction tasks...

### Airport RFP for a Virtual Ramp Control System

- Airport issued RFP
- SAAB interested and has previous special systems working experience with Garver (team up)
- Submitted and awarded contract
- Thus, additional ALCMS equipment and updates to implement but let's first look at what is a VRCS



D3 D2 D1





# Virtual Ramp Control System

## Make Your Choice

### What is a VRCS?

- A good game to download from STEAM.
- Highly qualified controllers on camera, I MEAN, actors.
- Exactly what it says it is.
  - A virtual ramp control room (or tower) being in a windowless room that houses screens and surface management systems that give the controllers a clear view of the airfield and ensure safe and efficient aircraft movement between the movement area managed by the FAA ATCT through the non-movement area to respective gates (or de-icing areas) as managed by the airport.
  - VRCS helps offload ramp operation tasks from the FAA ATCT, let them concentrate on movement area activities, and the VRCS controllers concentrate on activities in the non-movement for the gates and de-icing.





# Virtual Ramp Control System

## Overview

### Expedited Design and Construction

- New Terminal construction underway, opening date has been set (Feb. 28, 2023)
- SAAB Exhibit and Report to Define the System (January 2022).
- Expedited Design (Clock started a while ago...)
  - SAAB/Garver survey work.
    - For virtual ramp, this must be a view of all the non-movement areas.
  - Assist with room and support equipment room developments in new Terminal project (shell and other spaces, power, communication)
  - ALCMS Computer in VRCR!
  - Initial, preliminary, final design deliverables.
    - Each with SAAB and airport review.
  - 3 Packages for Permitting (City)
- Expedited Construction
  - Contractors, Construction, Testing, Commissioning

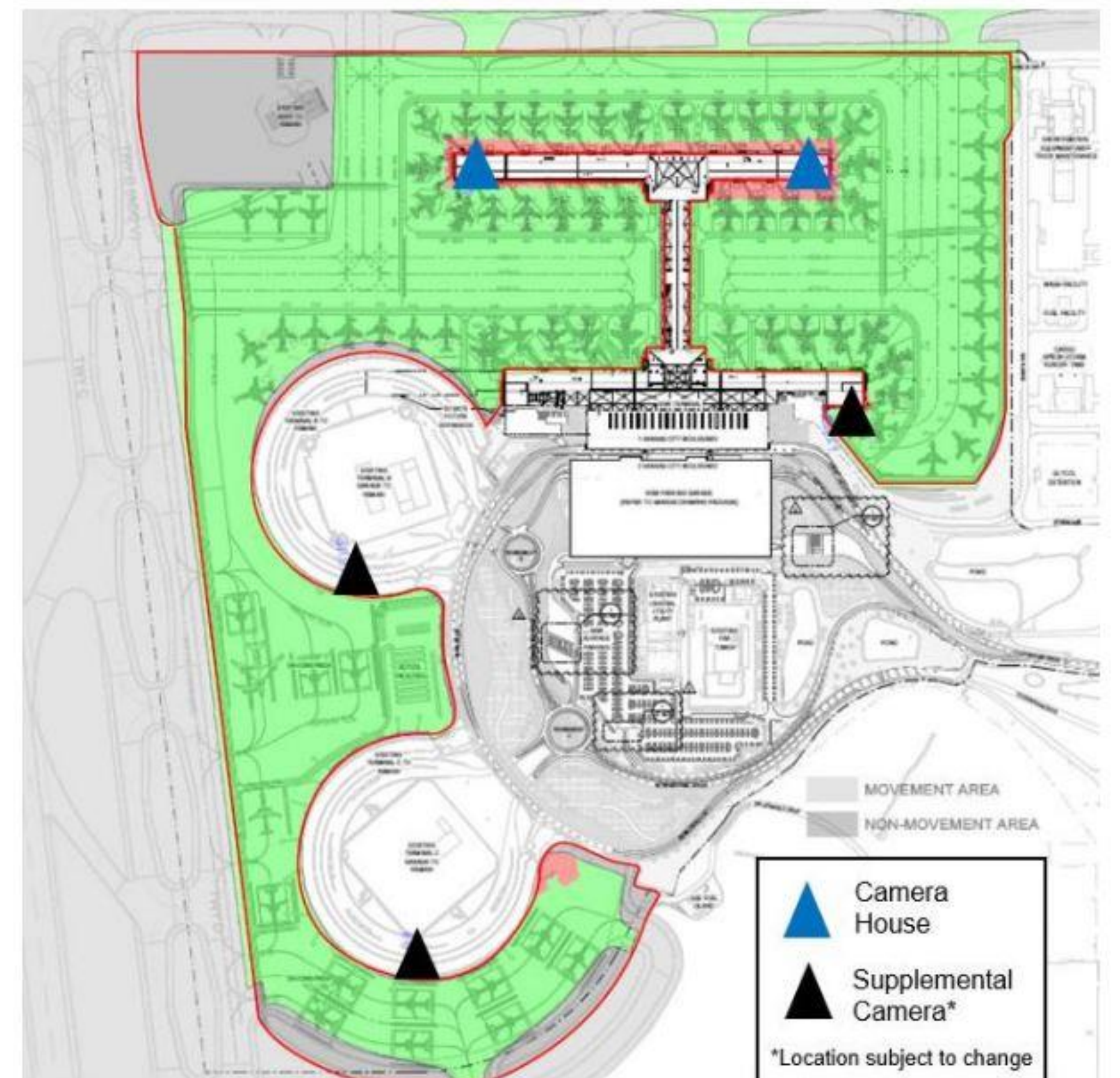


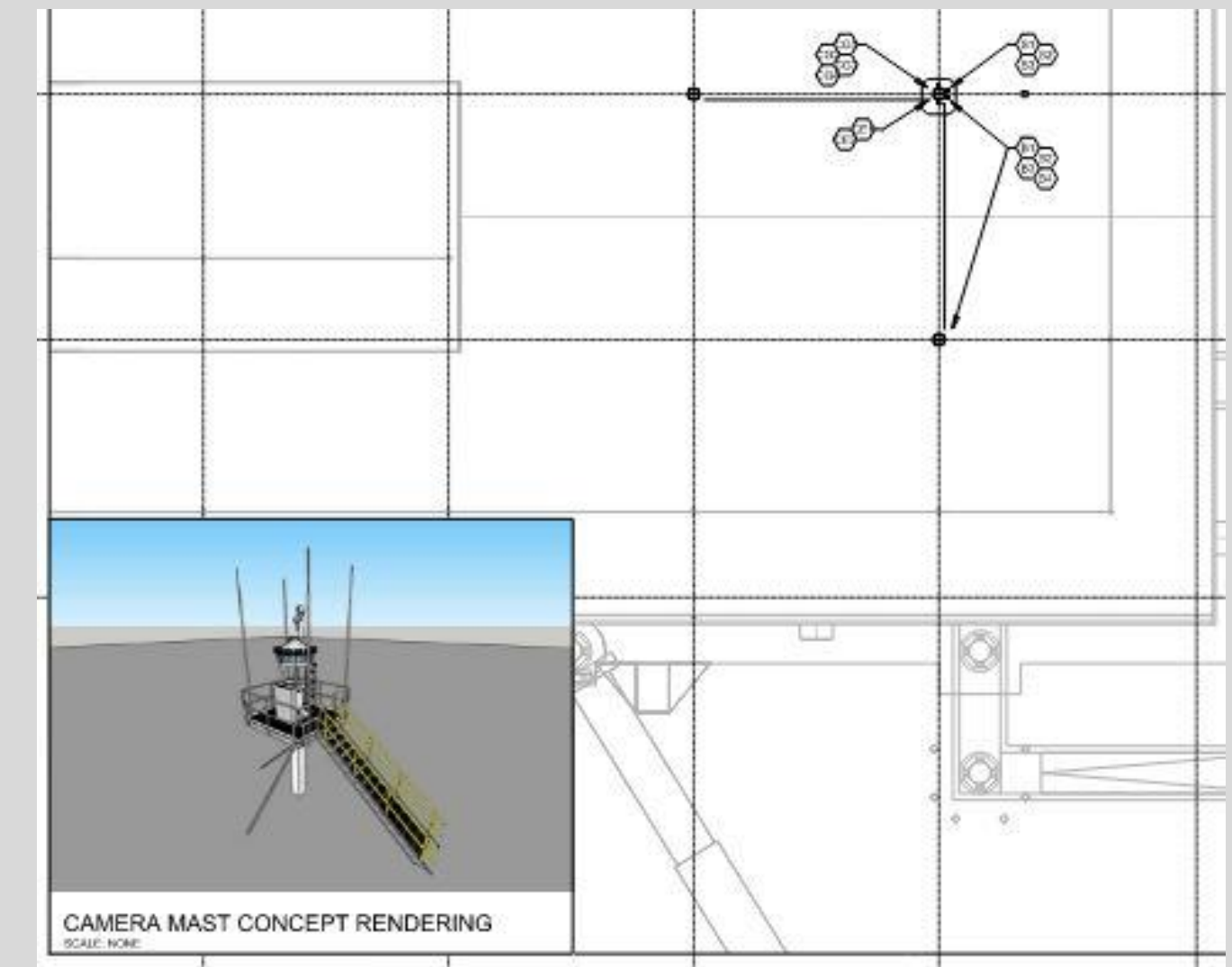
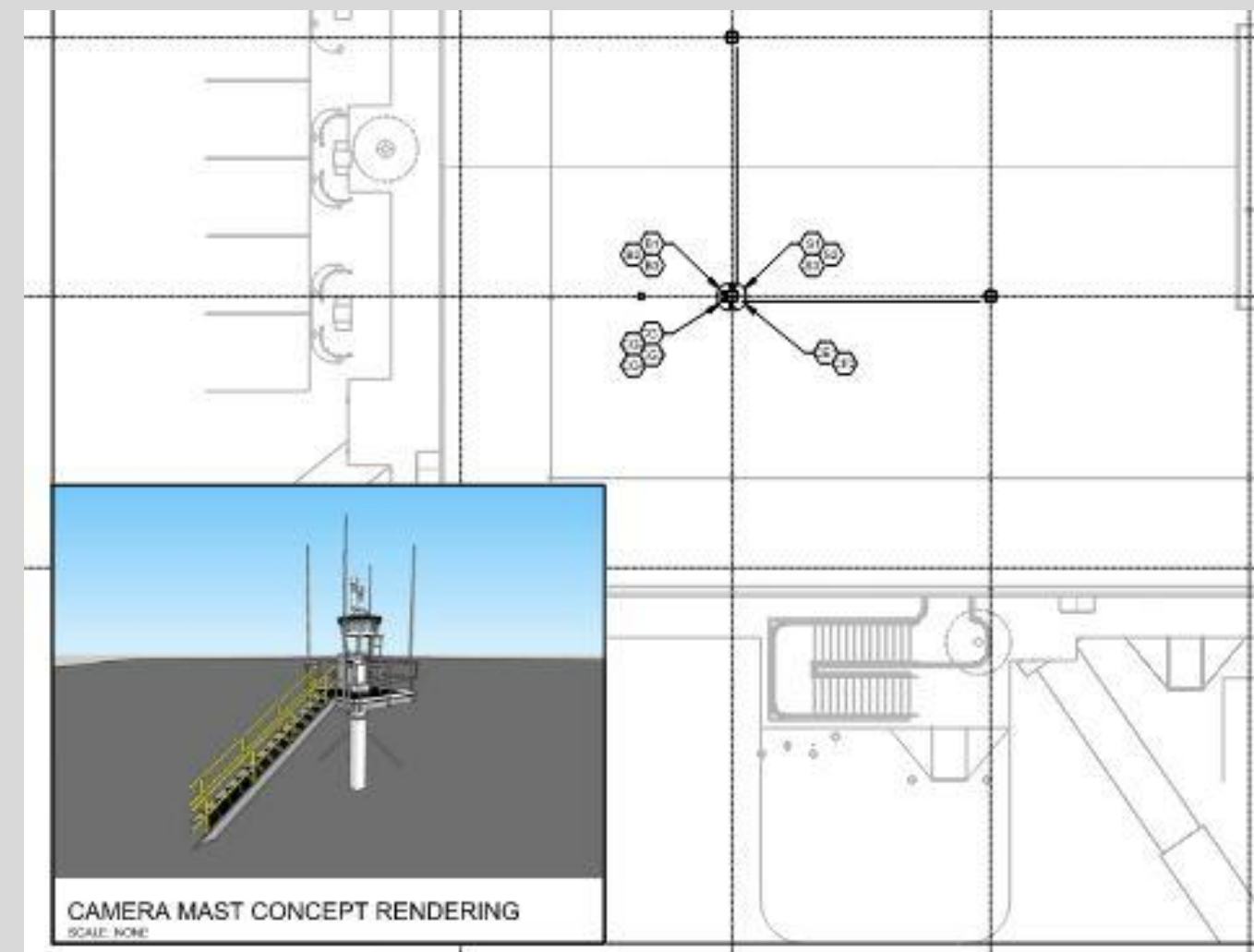
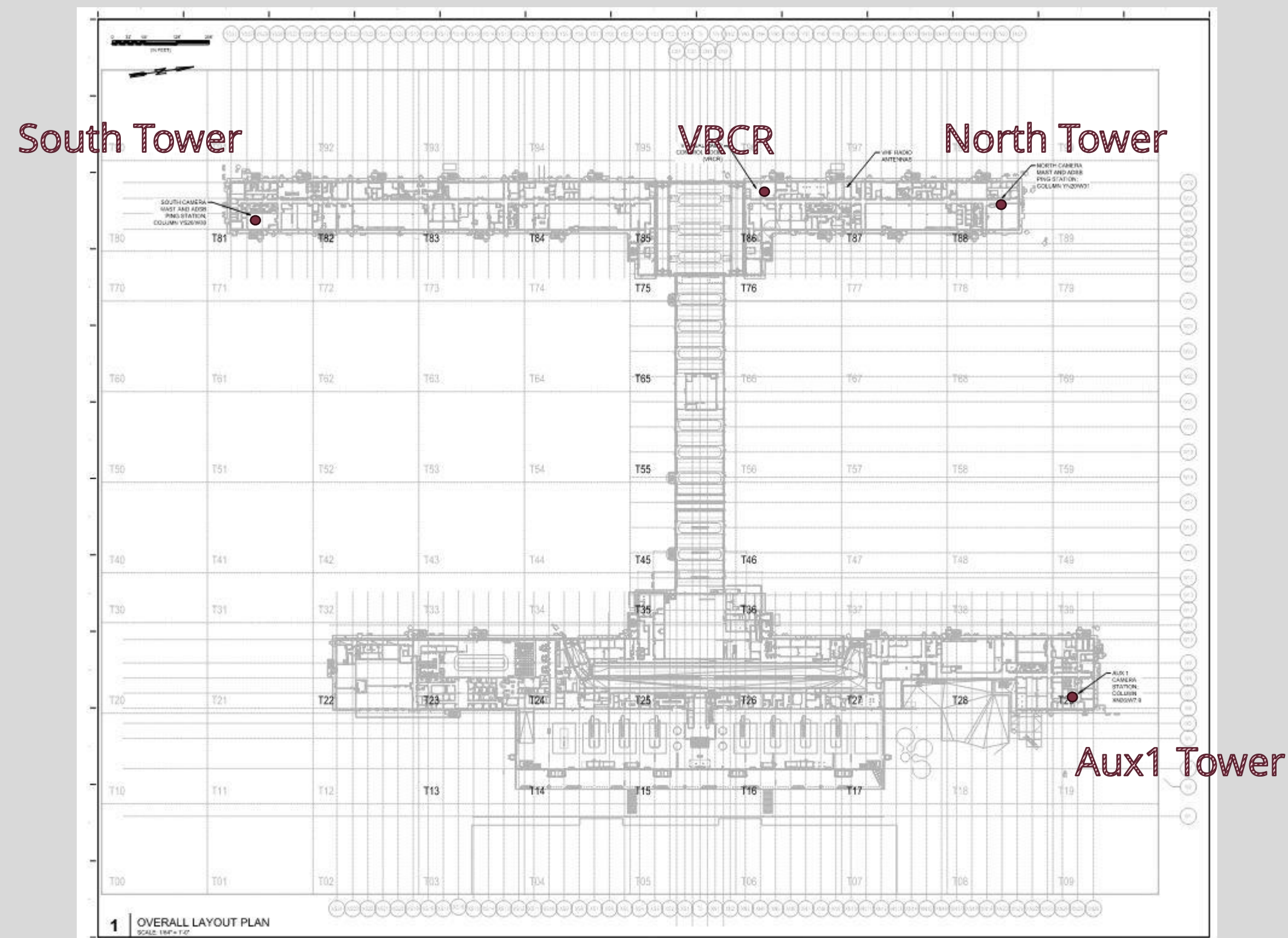
Figure 7 – Predicted final VRCS camera coverage



# Virtual Ramp Control System

New Terminal

Room and Tower Locations





# Virtual Ramp Control System

New Camera Housings





# Virtual Ramp Control System

New Camera Housings and Auxiliary Cameras





# Ramp Action and Camera Housings

KCI TERMINAL/VIRTUAL RAMP CONTROL



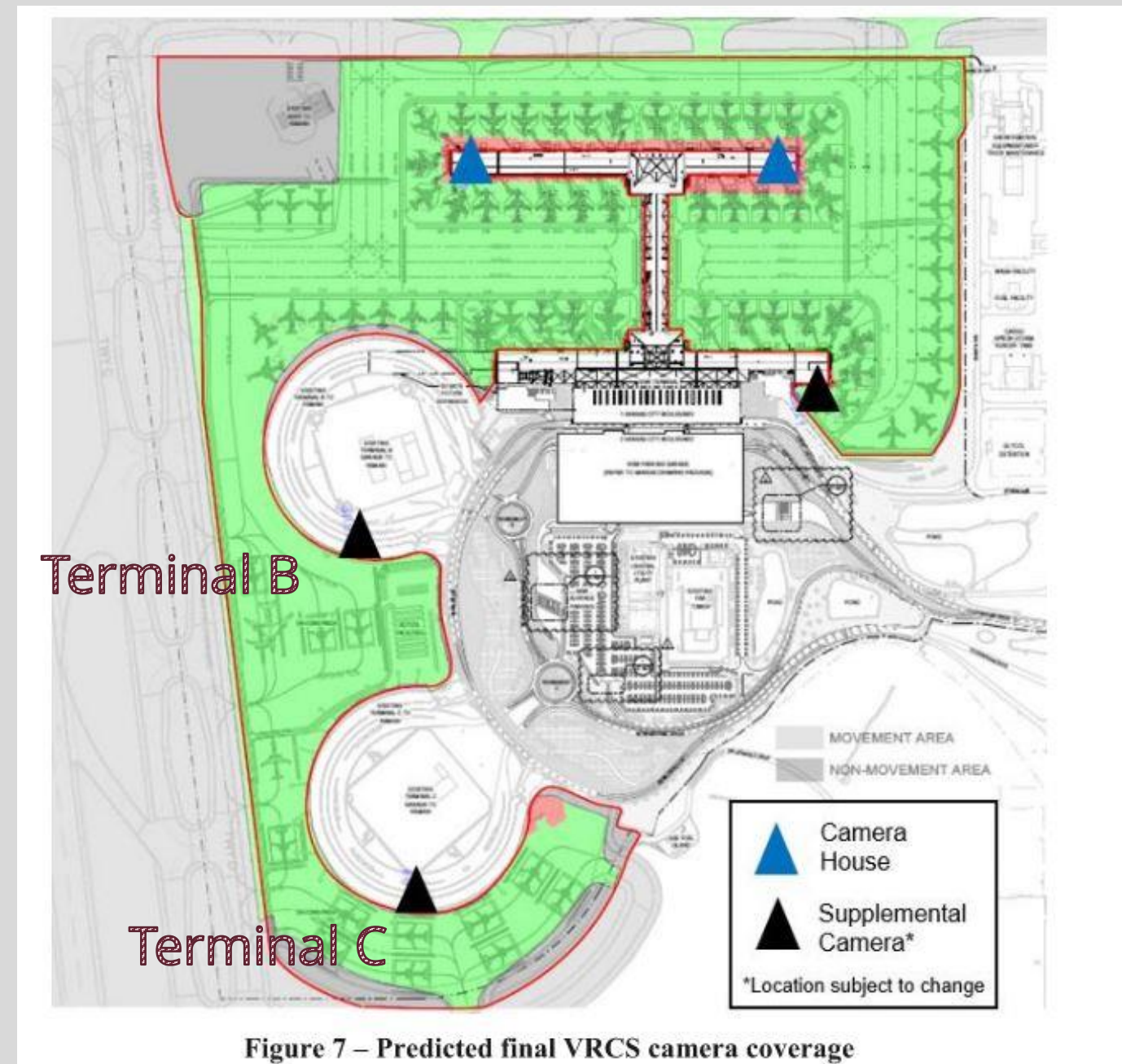


# Virtual Ramp Control System

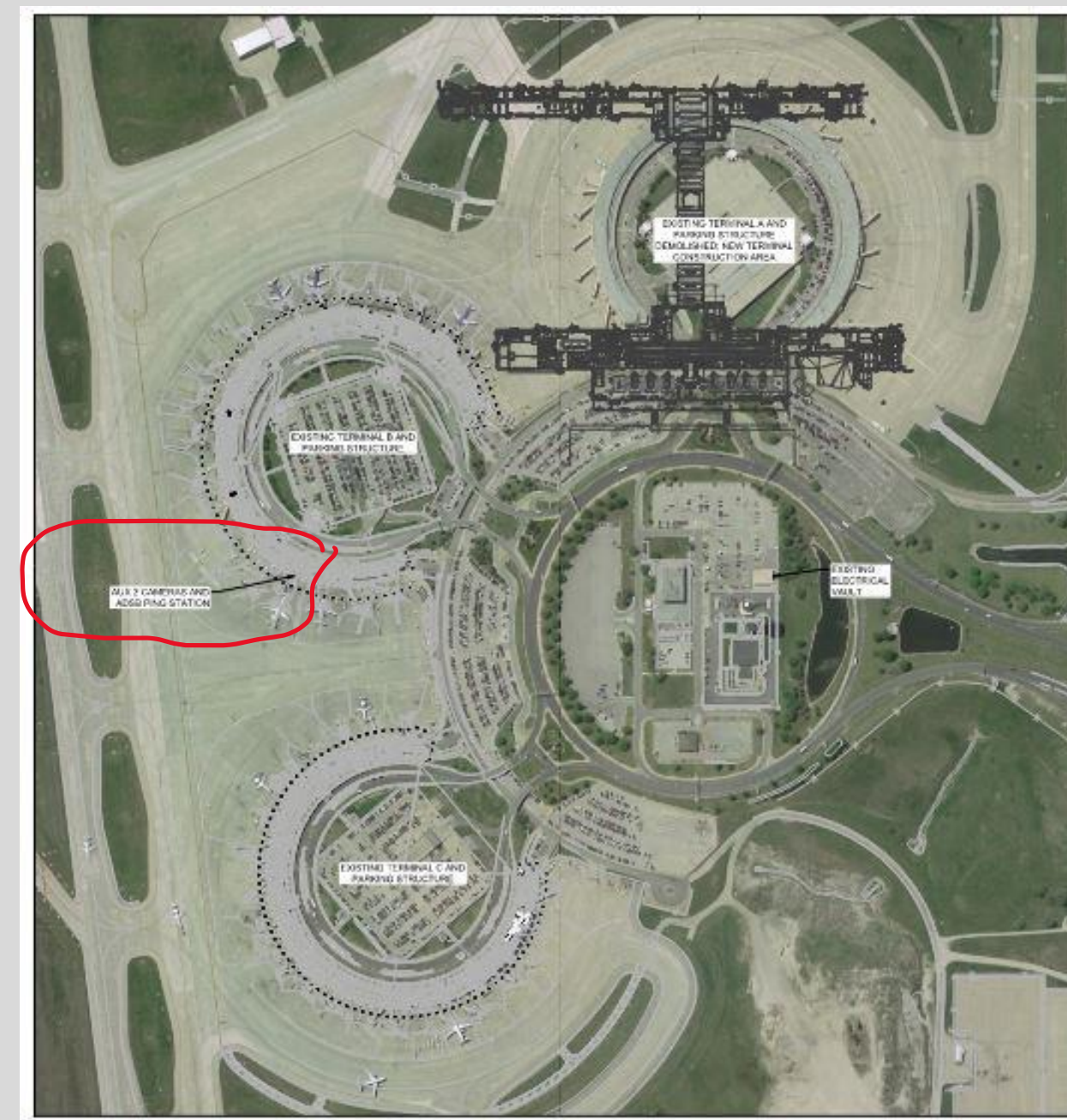
## Existing Terminals B and C

### Auxiliary Camera Locations

- Required Separate Packages for Permitting (Different Buildings)



Separate Structures



Terminal B



Terminal C

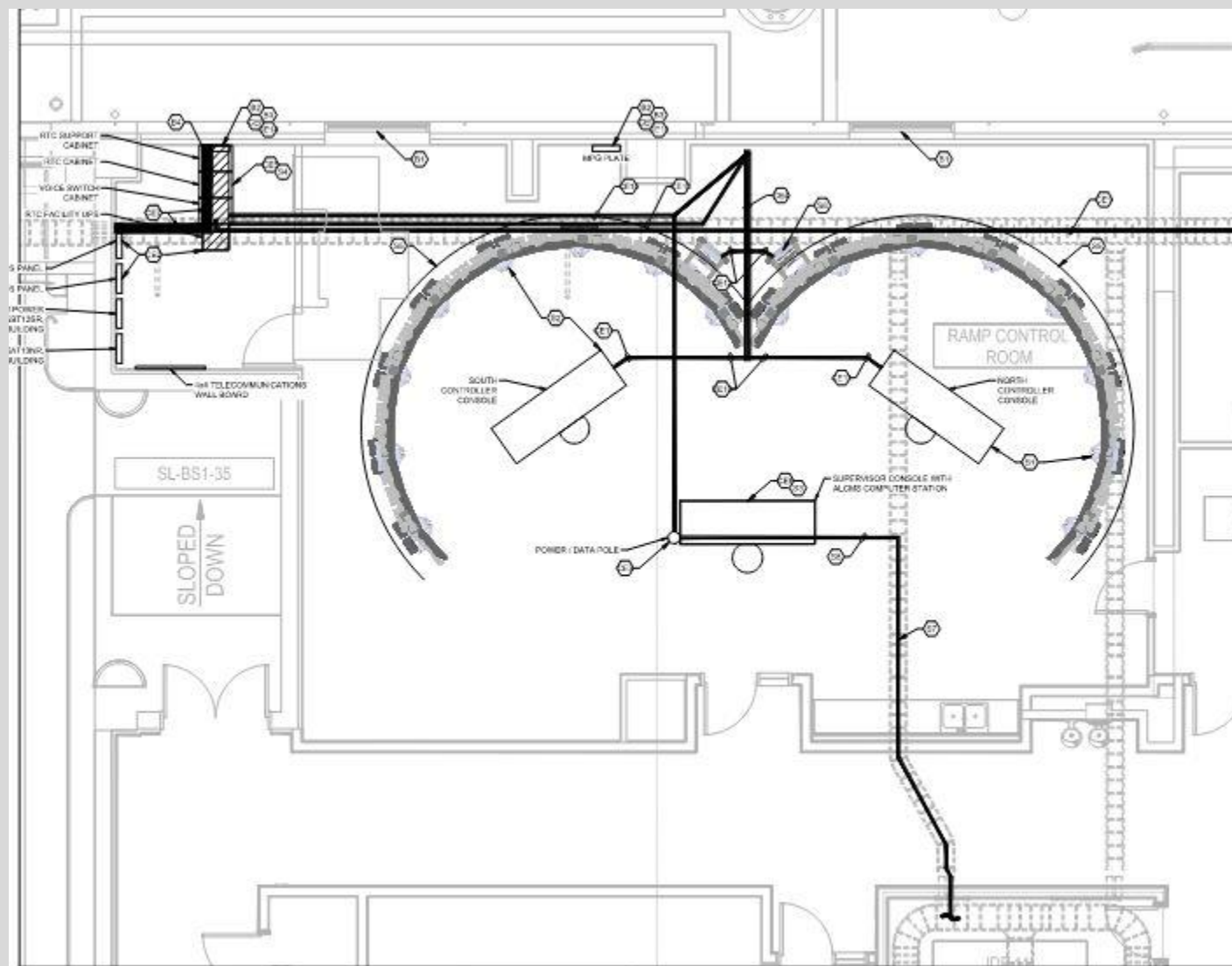


# Virtual Ramp Control System

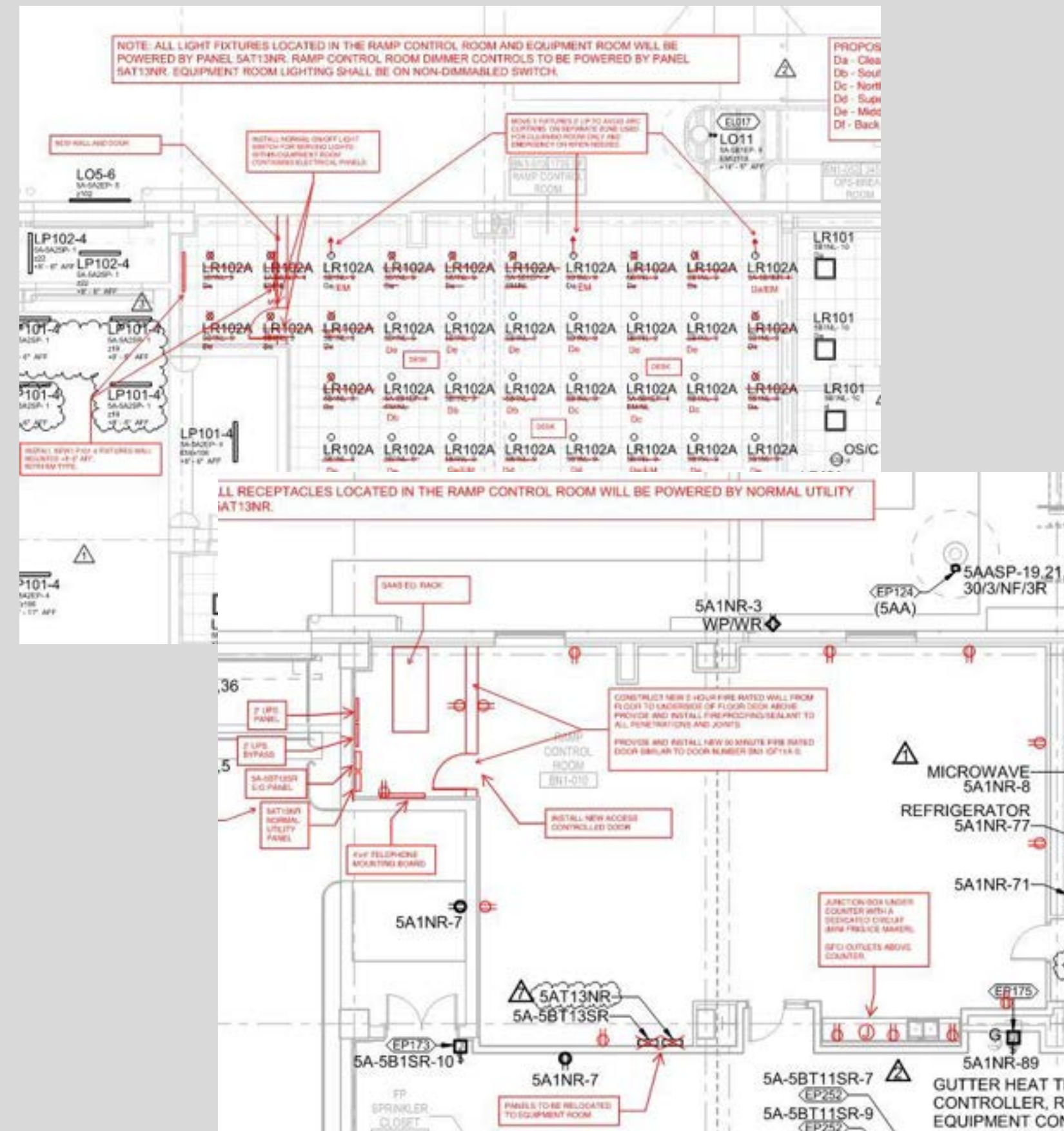
## VRCR

### Room and Equipment

- Electrical Power (On Backup Generator, UPS With System)
- Electrical Communication (Fiber Network, Radio Antenna Farm)
- Room Lighting and Power
- Room Mechanical

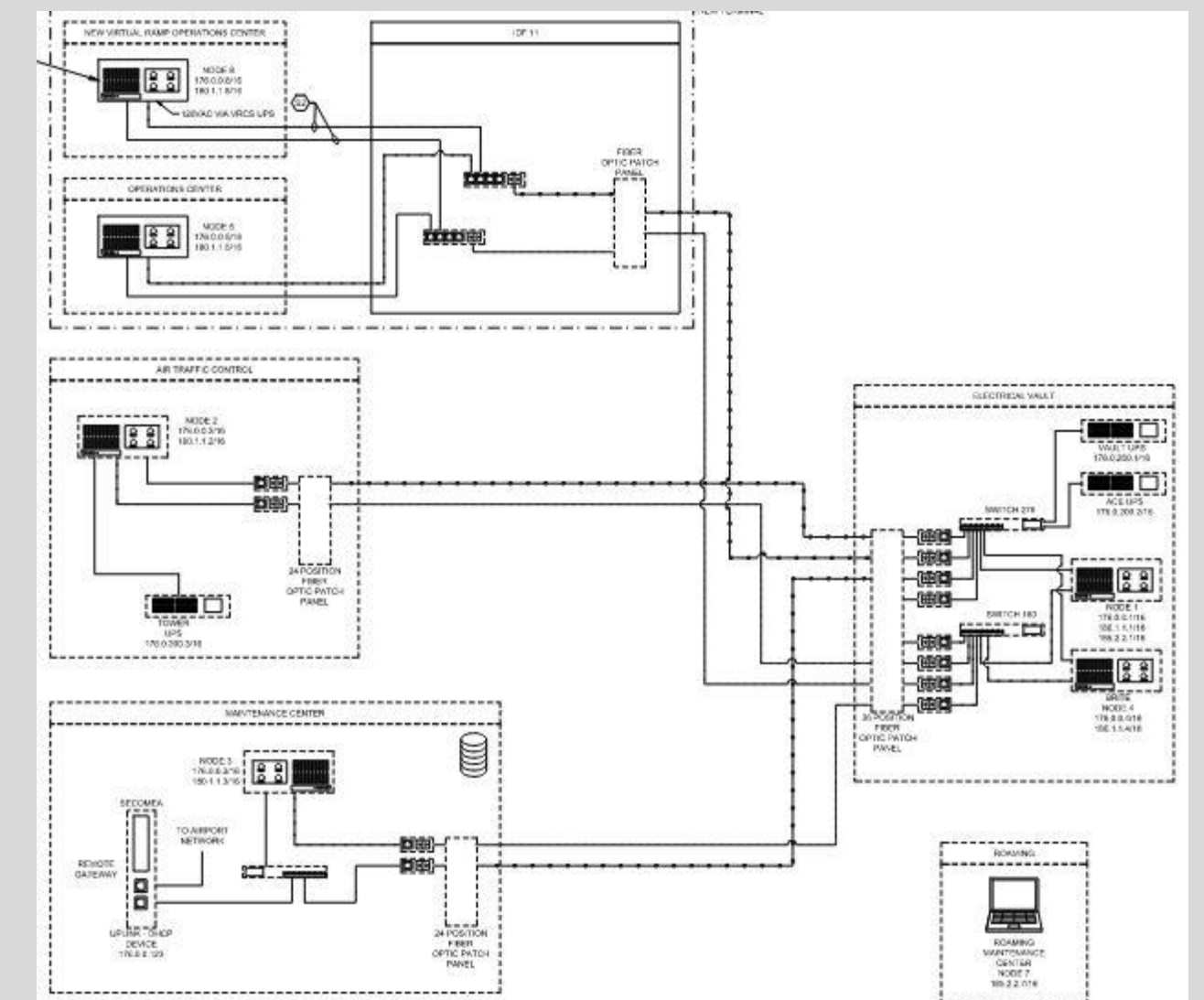


VRCR



Room Configuration Assistance  
(Construction in Progress – Plans in Fieldwire)

Operations Center is right next to VRCR, Awesome!

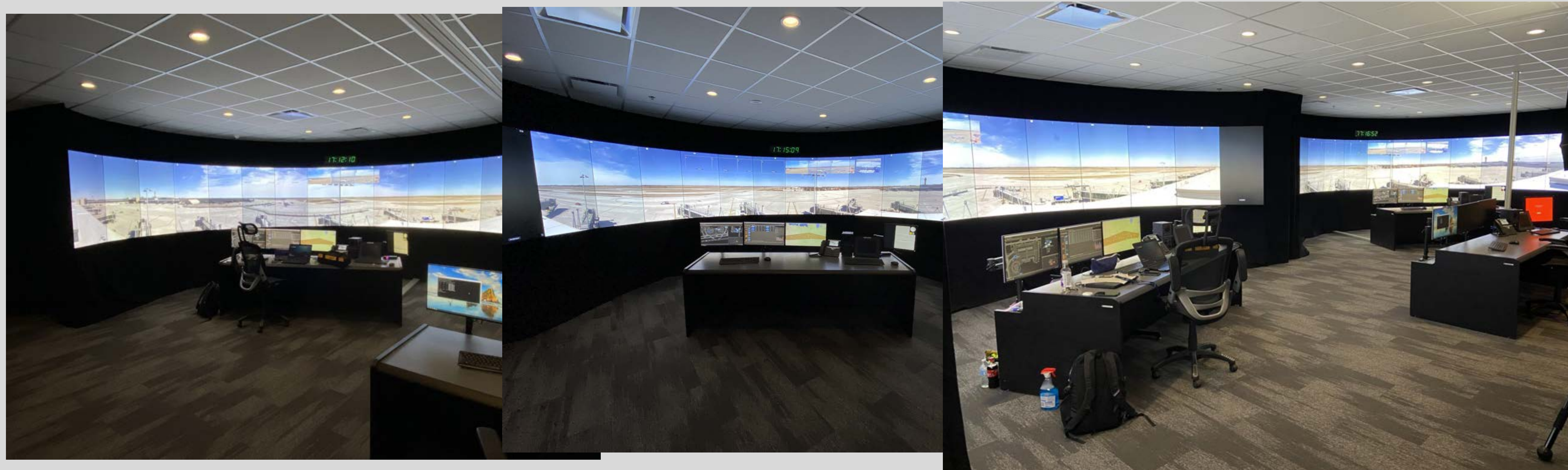


New ALCMS Node



# Virtual Ramp Control System

VRCCR





# Virtual Ramp Control Room

KCI TERMINAL/VIRTUAL RAMP CONTROL





# Thank You and Questions!

## THANK YOU!

- Thanks to everyone on the New Terminal Project, all the PPP team listed on Bart's earlier slide, all the contractors, all the airport and city staff.
- Thanks to everyone on the VRCS Project, all the staff at SAAB, ADB, all the contractors.
- Thank everyone at Garver that worked on these two projects for project success.

## CONTACTS

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A final note....

