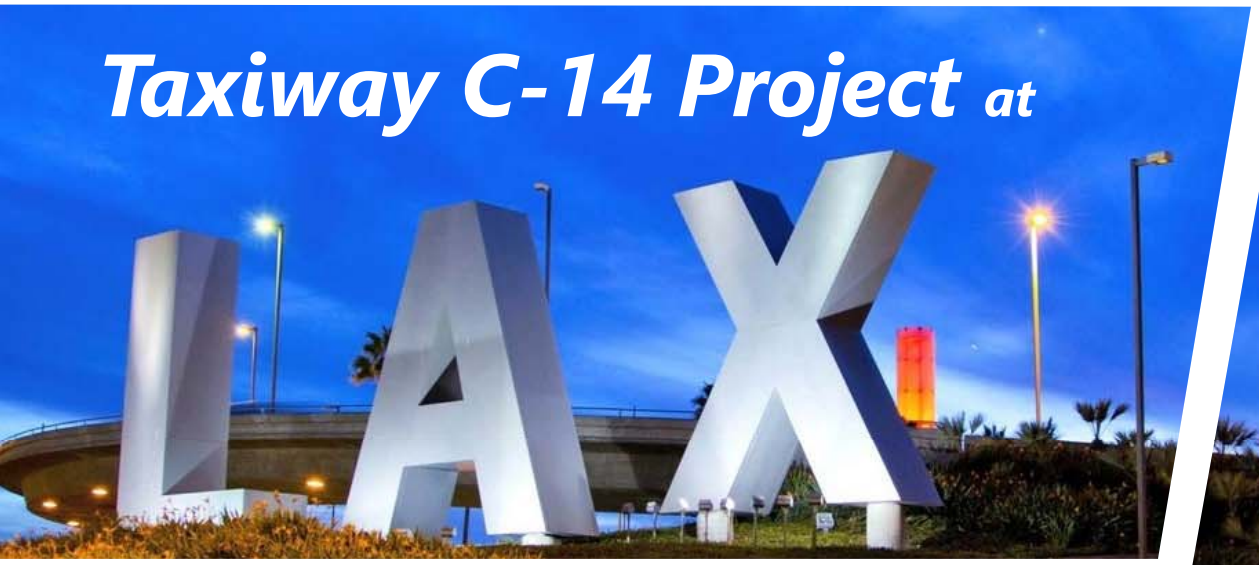
Taxiway C-14 Project at



2019 IES ALC TECHNOLOGY MEETING

CRAIG TWIBELL, PE
JEFF ANDERSON
OCTOBER 22, 2019

RS&H

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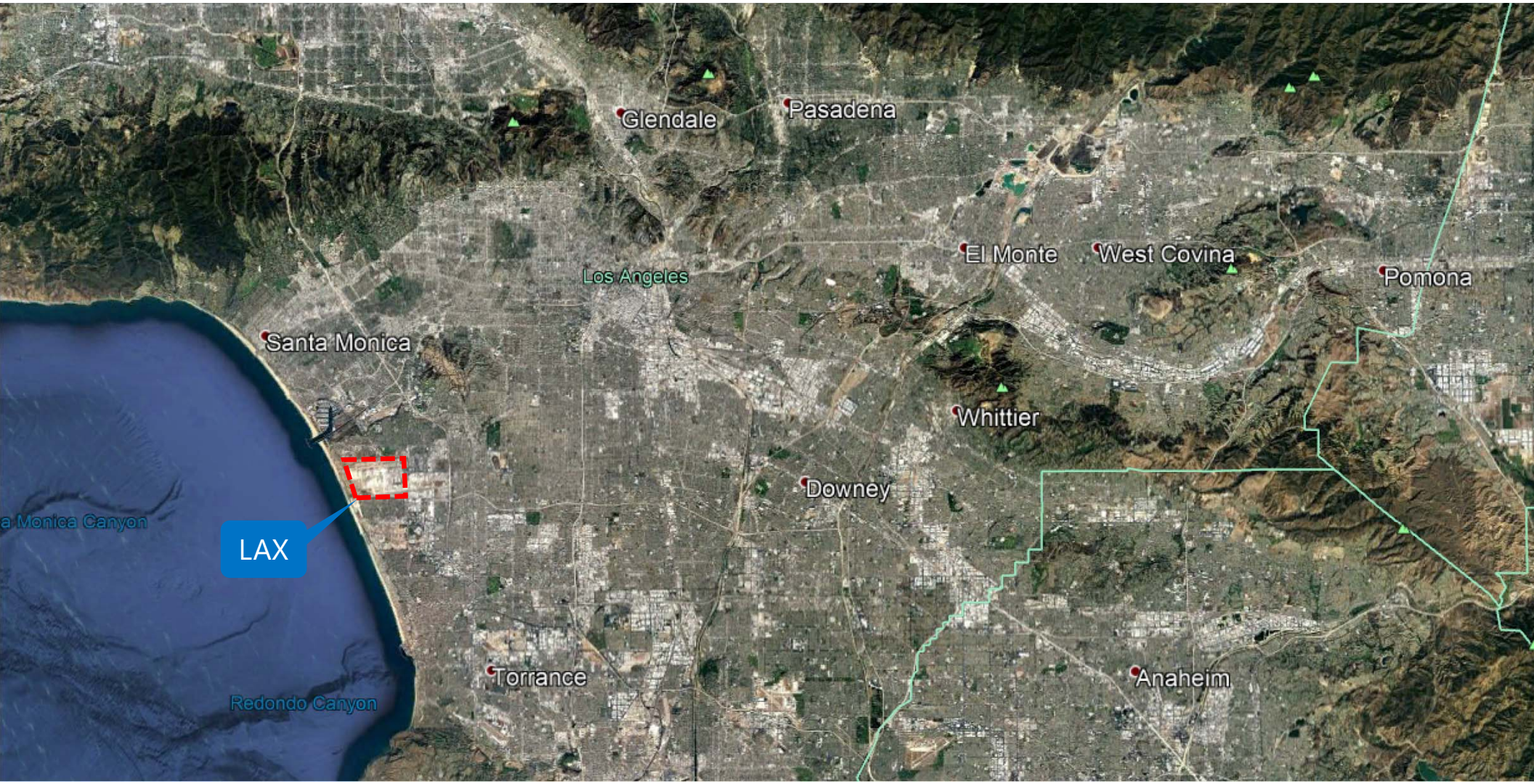
Los Angeles World Airports (LAWA)

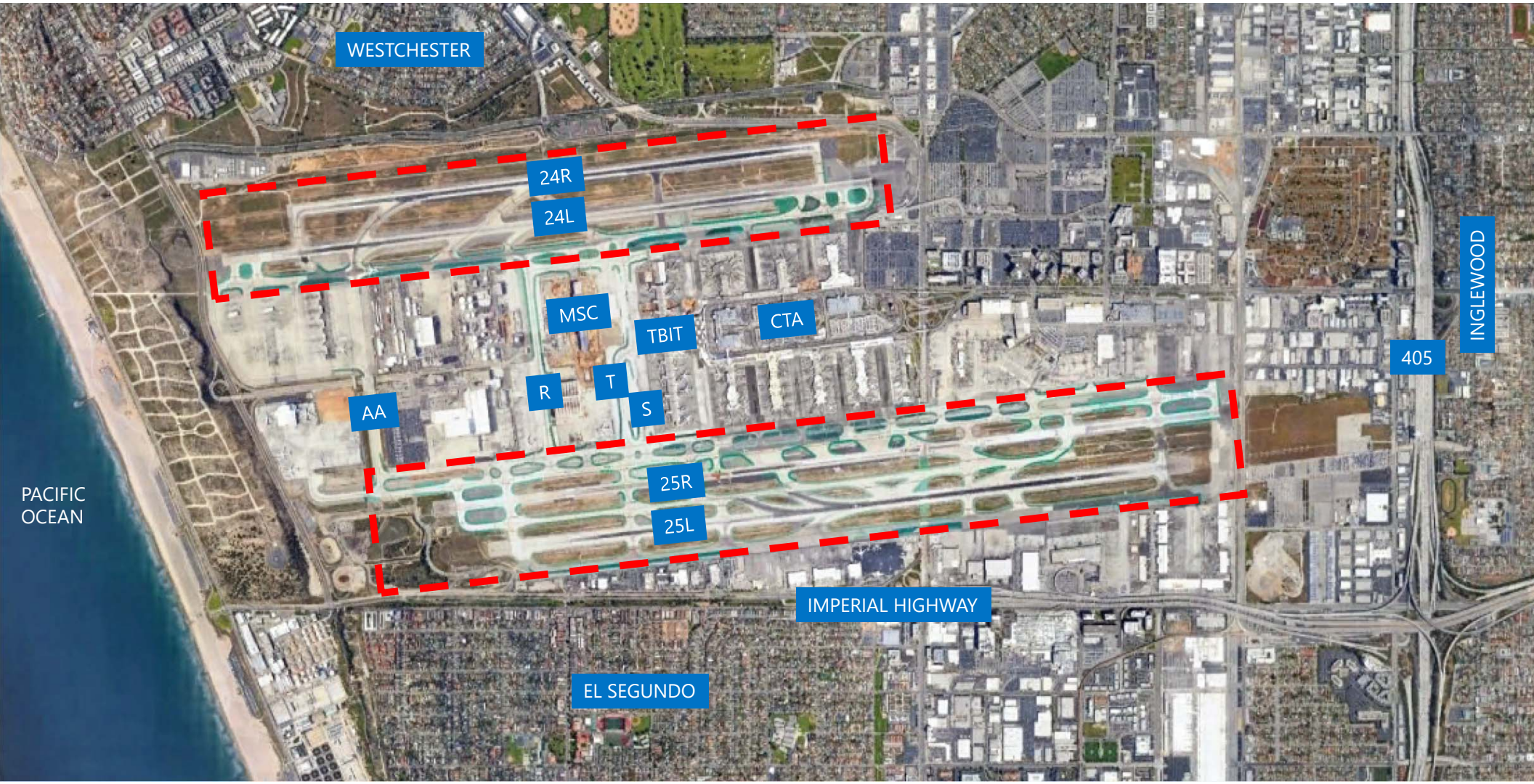
- Owns and operates two Los Angeles airports
  - Los Angeles International Airport (LAX); and
  - Van Nuys Airport (VNY)
- Self-supporting department
  - Governed by a seven-member board of commissioners
- Staff of nearly 3,500 employees
  - Admin, technical, and law-enforcement

LAX in 2018

- Second busiest in the US, fourth busiest in the world
  - More than 87.5 million passengers
  - Average of 700 daily nonstop flights to 109 cities in the US
  - 1,281 weekly nonstop flights to 93 markets in 47 countries on 69 commercial airlines
  - 707,883 operations
- First nationally in number of O&D passengers
- 10th busiest in the world in air cargo
  - 2.4 million tons of air cargo



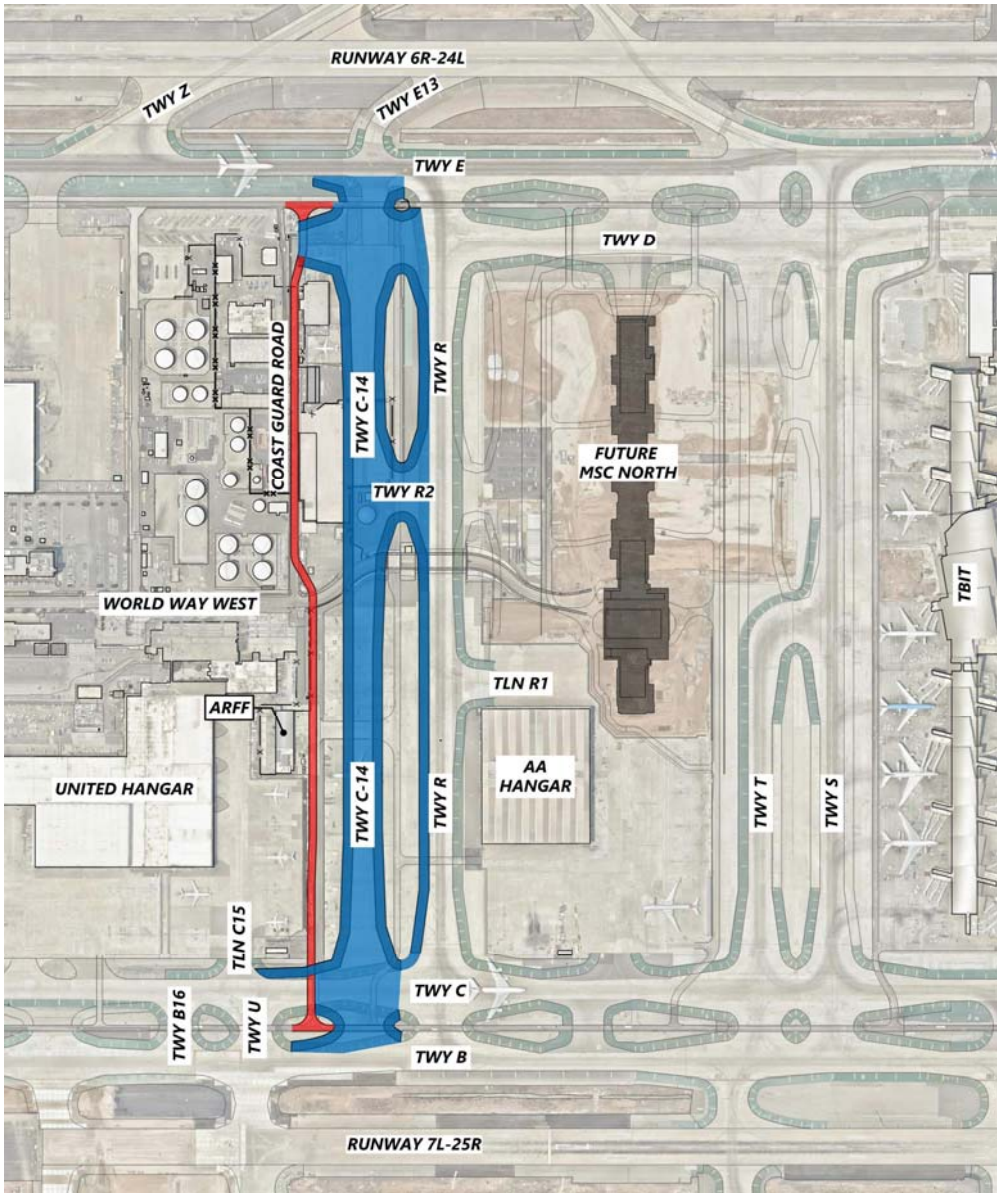
Los Angeles International Airport (LAX)



Los Angeles International Airport (LAX)

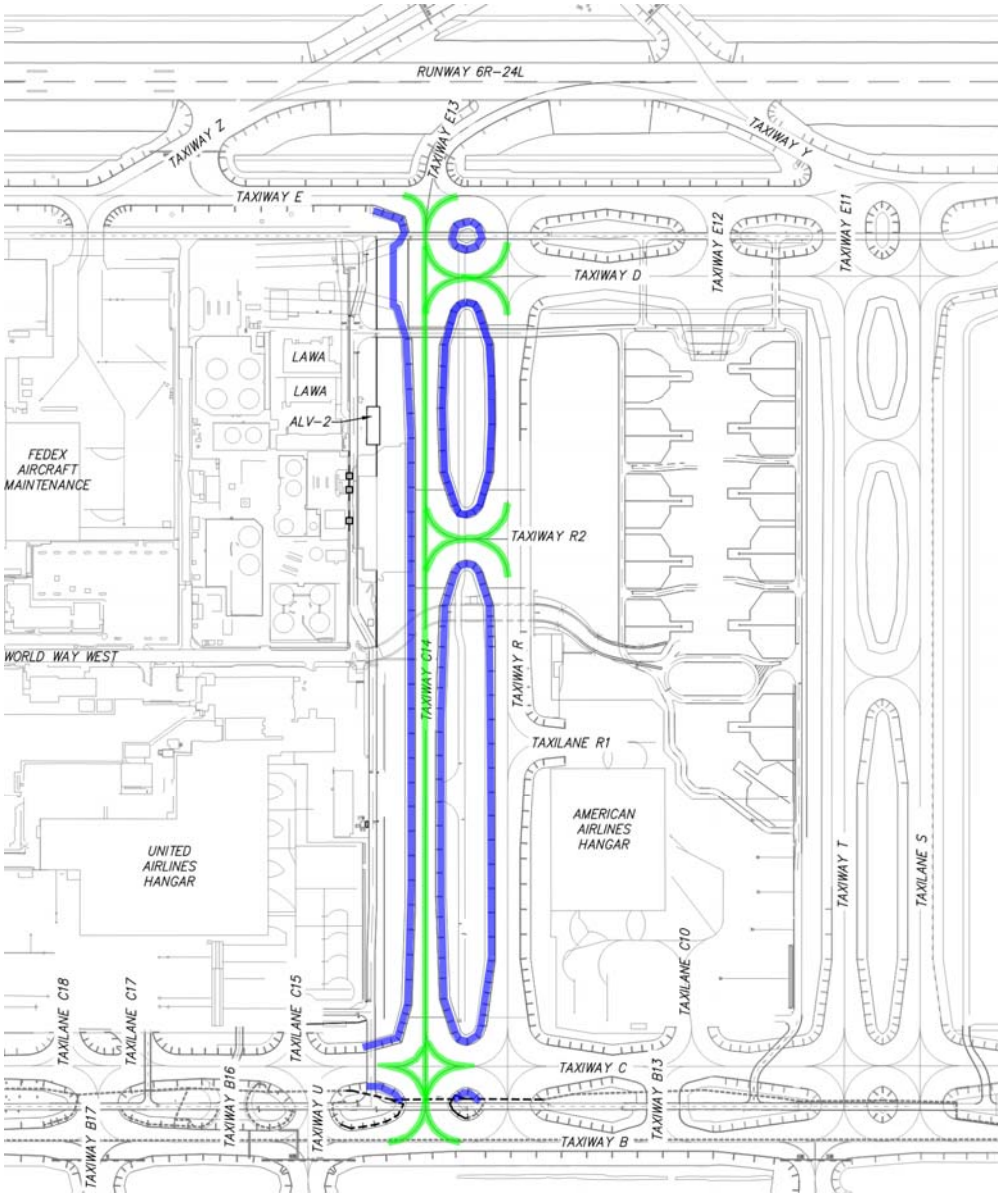
Taxiway C-14

- » New Crossfield Taxiway
  - – Airplane Design Group VI
  - – Taxiway Design Group 7
  - – A380-800 Critical Aircraft
  - – No Mods to Standards
- » One Connector TWY R2
- » New VSR C-14
- » Extends TWY D outside of C-14 TOFA for future extension
- » Numerous Enabling Projects
- » Numerous Tenant Impacts



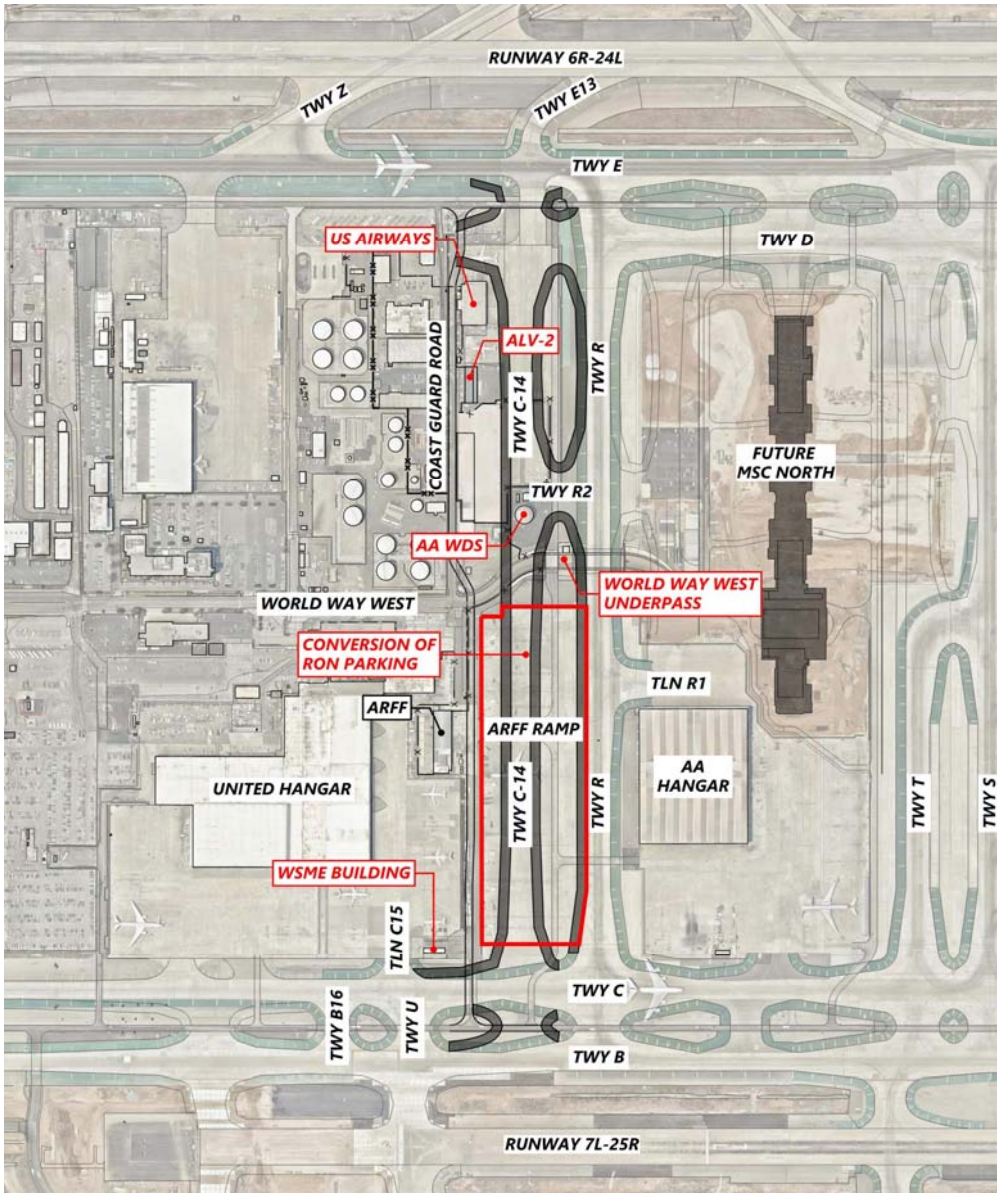
Taxiway C-14

- » Taxiway Centerline Lights
  - – 12.5′ spacing for main taxiways
  - – 25′ spacing for connectors
- » Taxiway Edge Lights
- » Two dedicated CCRs
- » Guidance Signs
- » Half New and Half Existing Concrete
- » Home Run Duct Bank Impacts



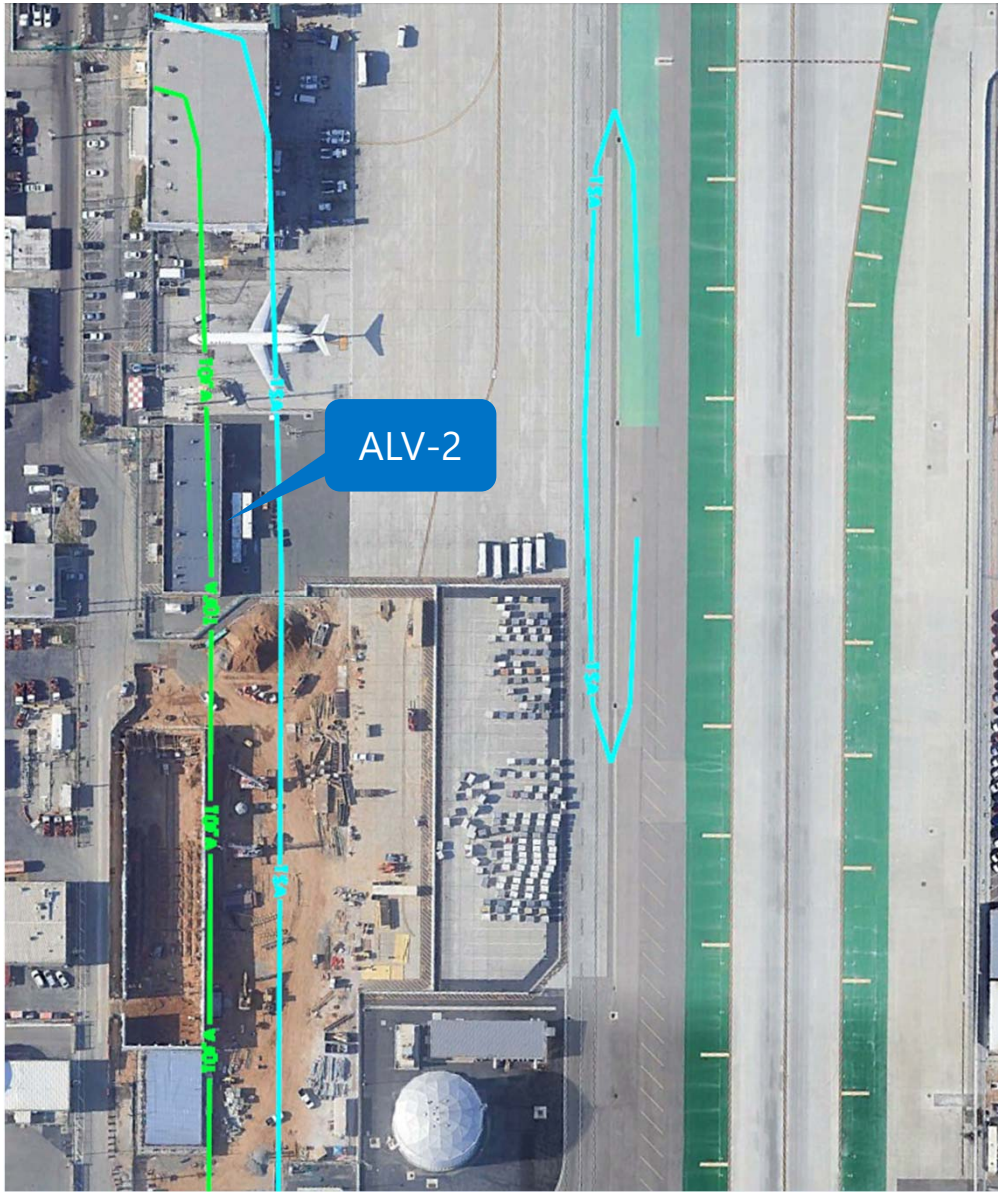
Enabling Projects

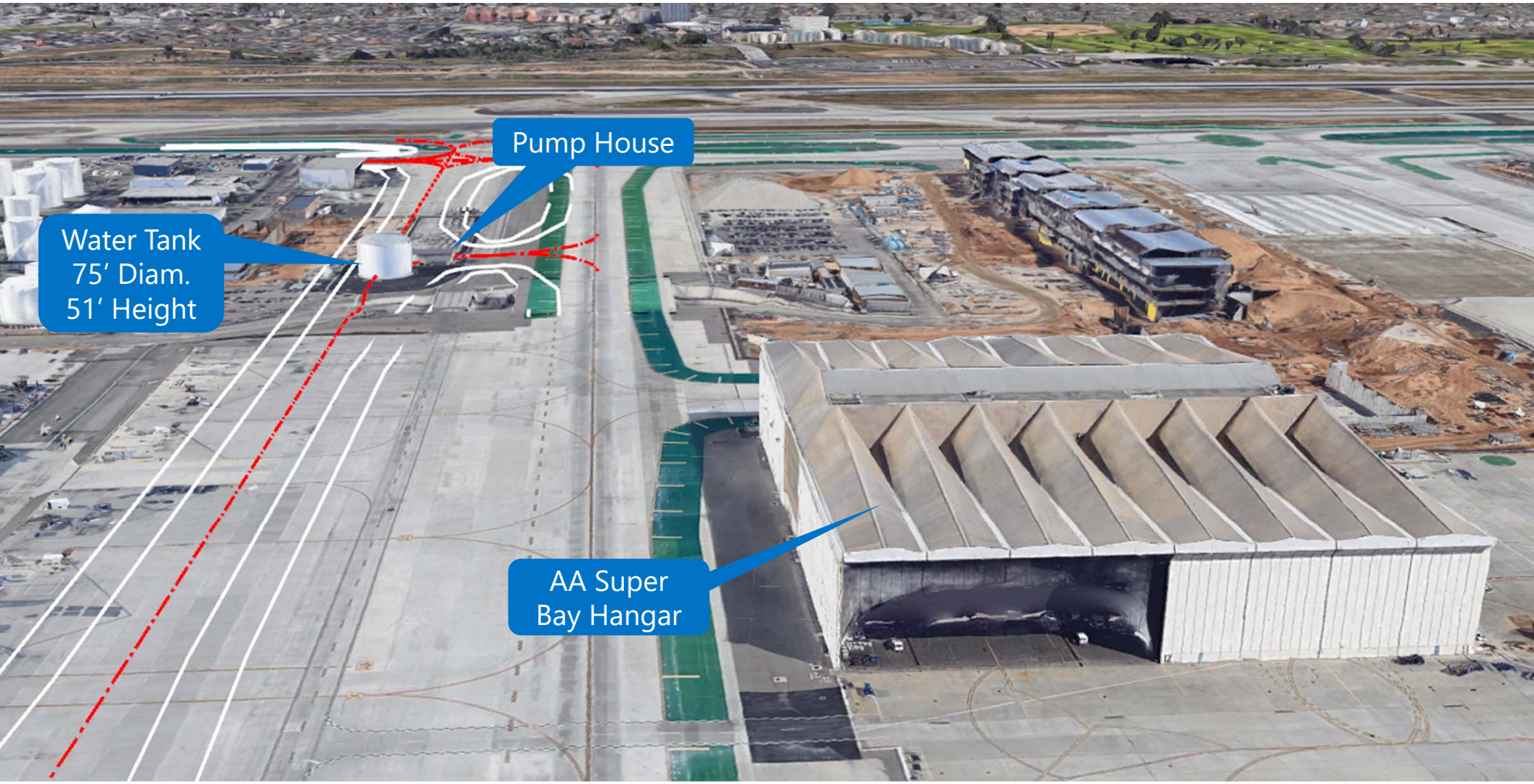
- US Airways Hangar
- Airfield Lighting Vault No. 2
- Conversion of Coast Guard Rd.
- Relocation of Water Deluge
- World Way West Underpass
- Conversion of RON Parking
- Demo WSME Building



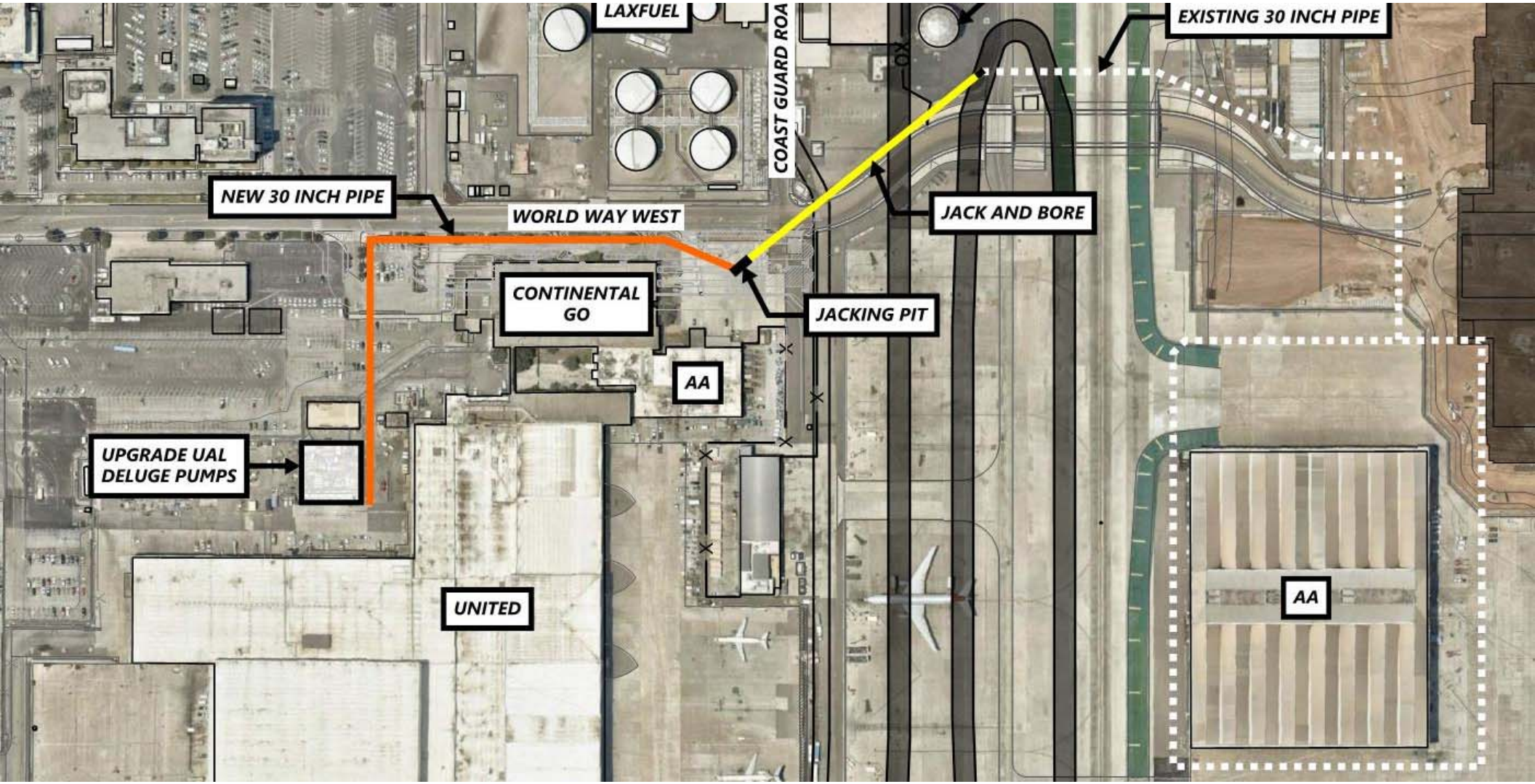
Airfield Lighting Vault

- » 51′-4″ Wide, 150′ Long
- » Powers northern half of airfield
- » Initial study performed for reduction vs. relocation
  - – Building reduced by approximately 1/3 of its width
- » Sequencing
  - – Relocate all electrical equipment
  - – Demo building
  - – Build new wall





American Airlines Water Deluge System

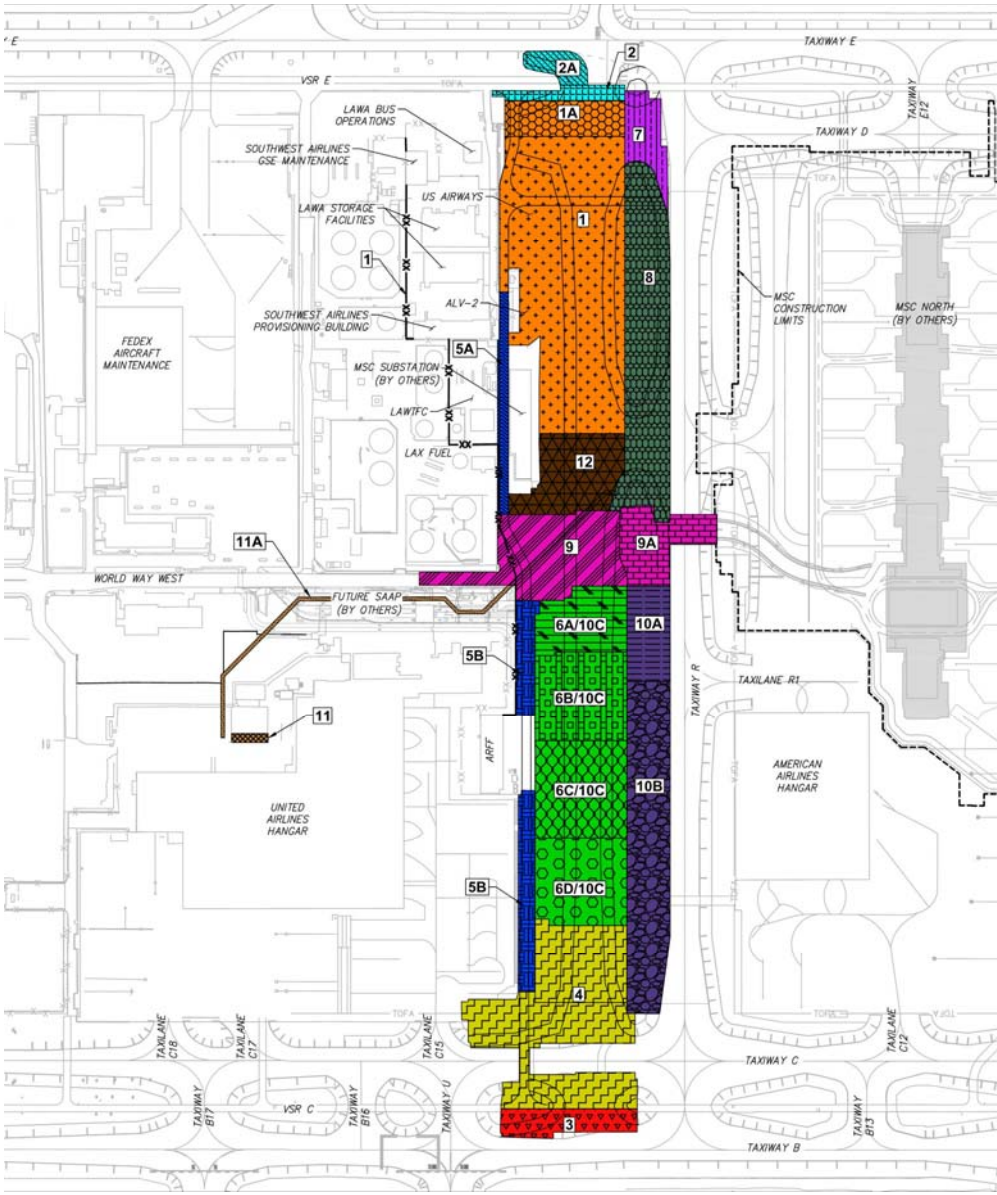


American Airlines Water Deluge System

Phasing & Sequencing

» 22 Phases

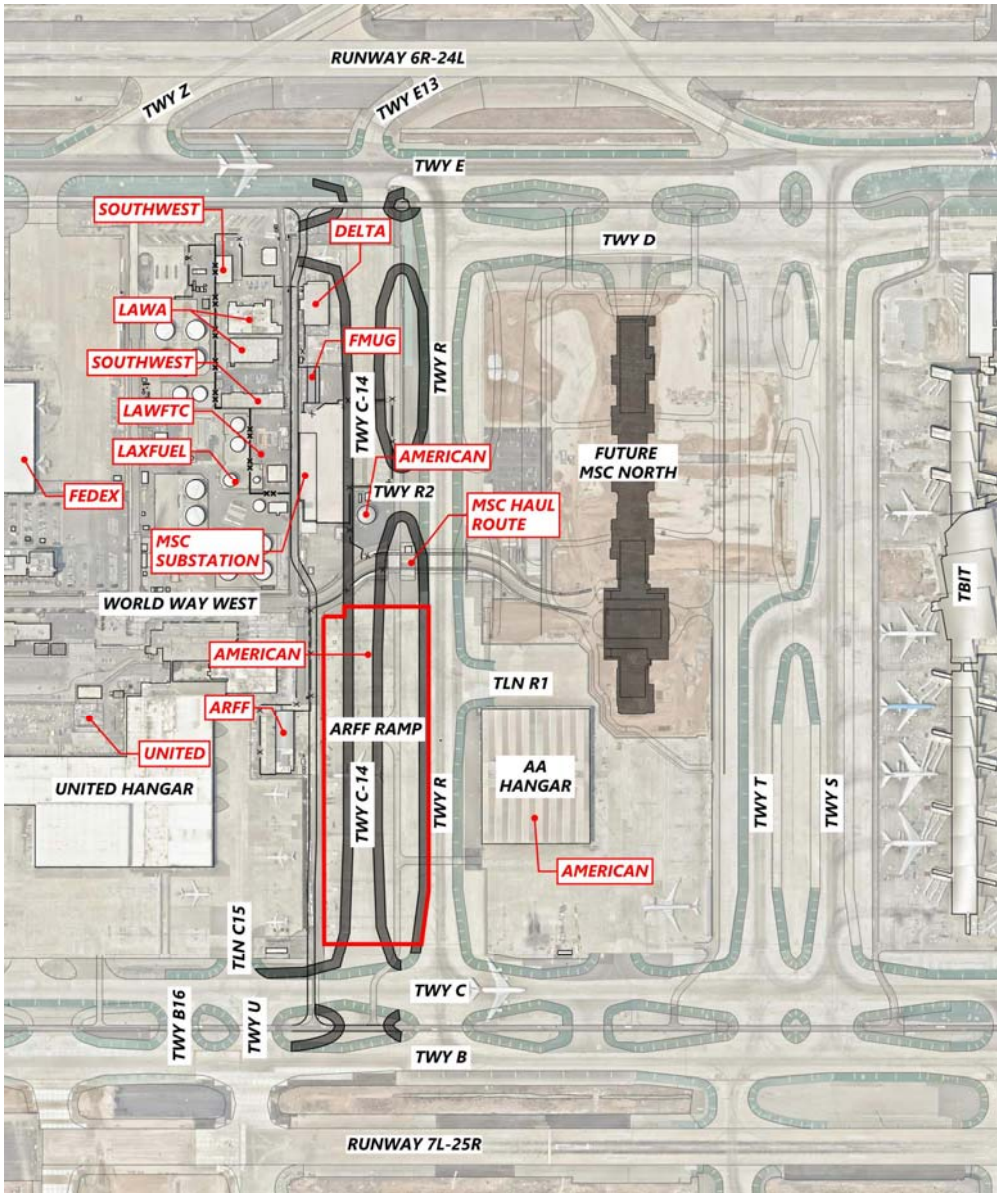
» Numerous Restrictions
- East/West and North/South TWYs
- TW E Nighttime Work
- Relocating VSR's
- AA RON one at a time
- Access to Taxilane R1
- No interruptions to ARFF
- Other project coordination
  - *MSC North*
  - *MSC Industrial Substation*
  - *Secured Area Access Post 5*



Tenants & Permitting

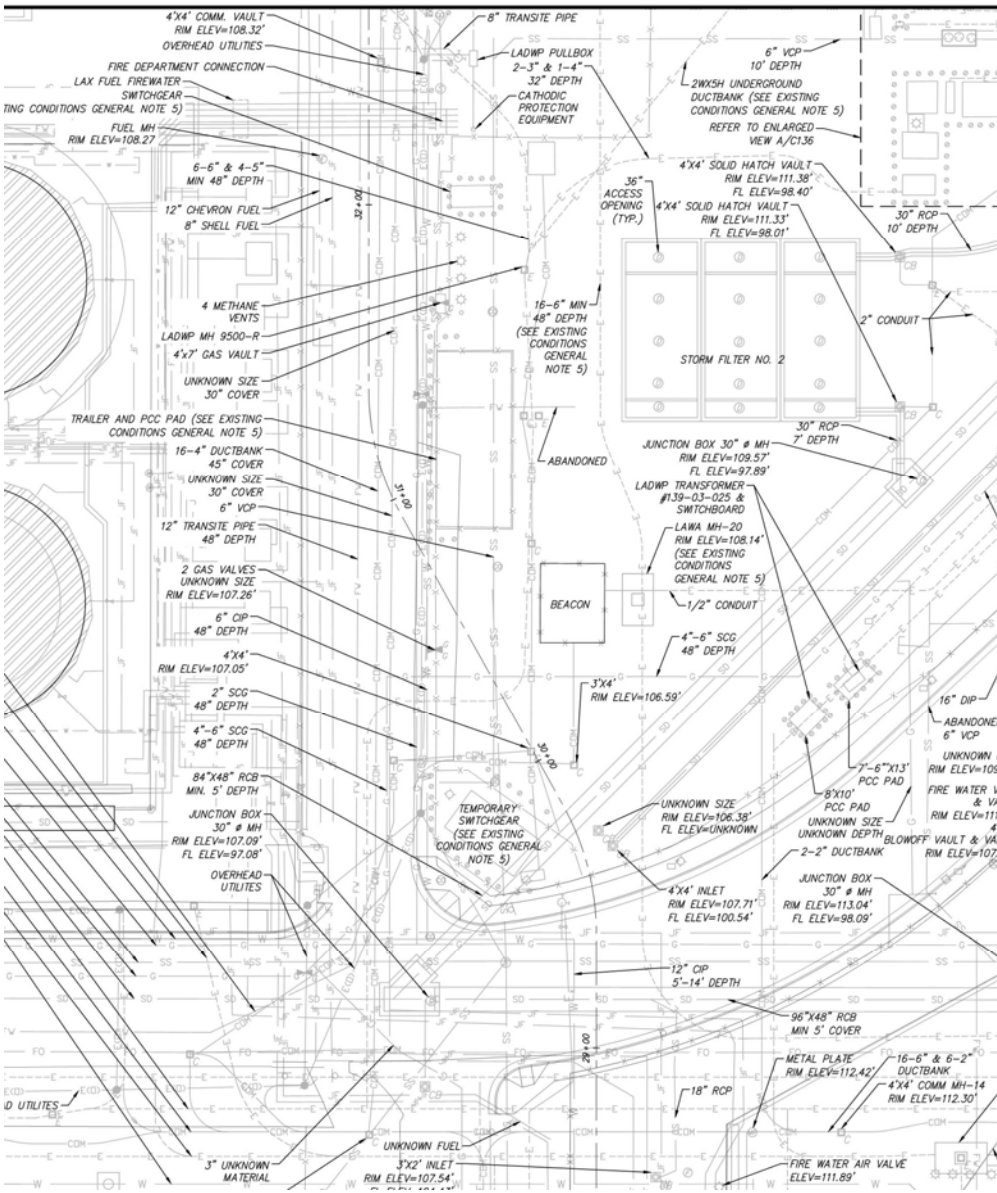
» Impacted Tenants
  – Southwest Airlines, Delta Airlines, American Airlines, United Airlines, FedEx, ARFF, LAXFUEL, LAWFTC, LAWA Facilities, Maintenance, and Utilities Group, MSC Construction, LADWP

» Permitting
  – LADB&S (Architectural, Electrical, Mechanical, Structural), LABOS, LAFD (2 Groups), LABOE, Disabled Access, Green Building, Health Department, Low Impact Development



Taxiway C-14 Challenges?

- » Schedule
- » Familiarity
- » Non-Standard Conditions
- » Phasing
- » Tenant & Permitting Coordination
- » Utilities



Intro/Agenda

- Spent Past 5 Years Reconstructing LAX Runways 6R-24L, 6L-24R, 7L-25R, 7R-25L and New Midfield Taxiway C14
- Nearly $60M Electrical
- Wanted to share a few Lessons Learned with you
- Agenda:
  1. Taxiway C14 – Vault Reconfiguration
  2. Displaced Threshold Interface between MALSR and Runway CTL
  3. Retrofit of Base Cans in Existing Concrete
  4. Airport Wide Electrical Methane Mitigation

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Item #1:

Airfield Lighting Vault #2 Reconfiguration for North Field Runways and Taxiways

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Existing Airfield Lighting Vault #2

Vault # 2 East Wall Impacted by Taxiway C14 TOFA

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Existing Airfield Lighting Vault #2

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Panoramic Photos of Airfield Lighting Vault #2

The CCRs are laid out so the taxiway CCRs are in the middle of the vault on the raised step and runway CCRs are on the perimeter of vault room.

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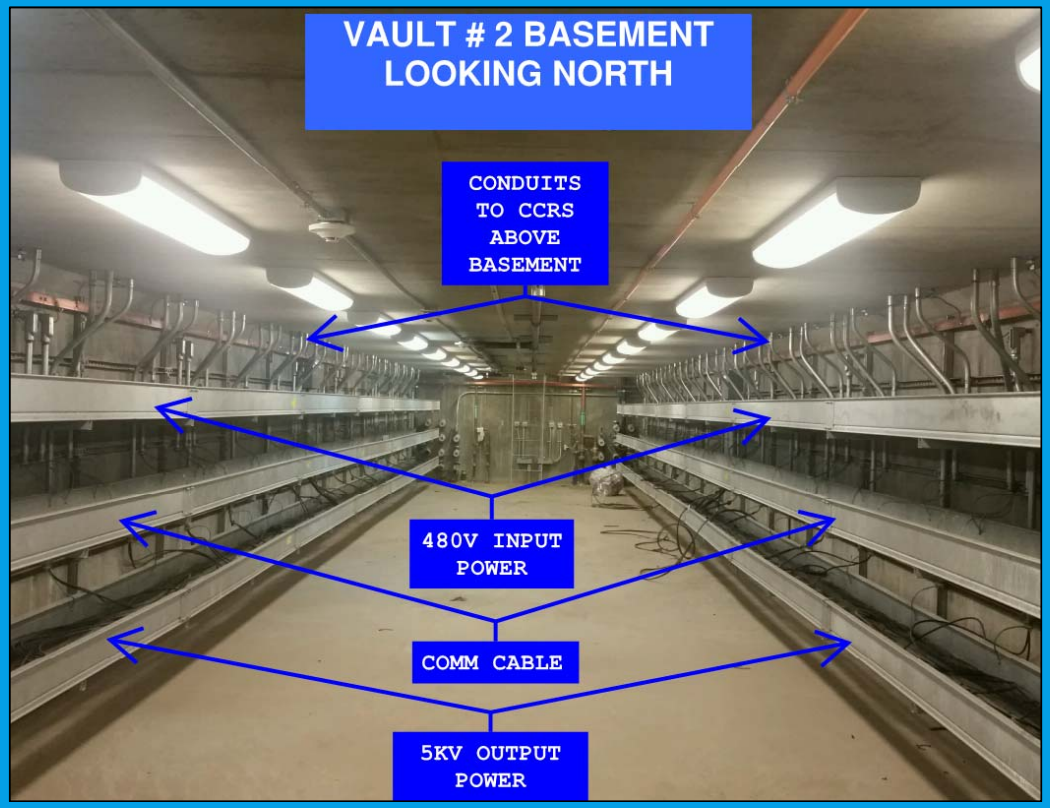
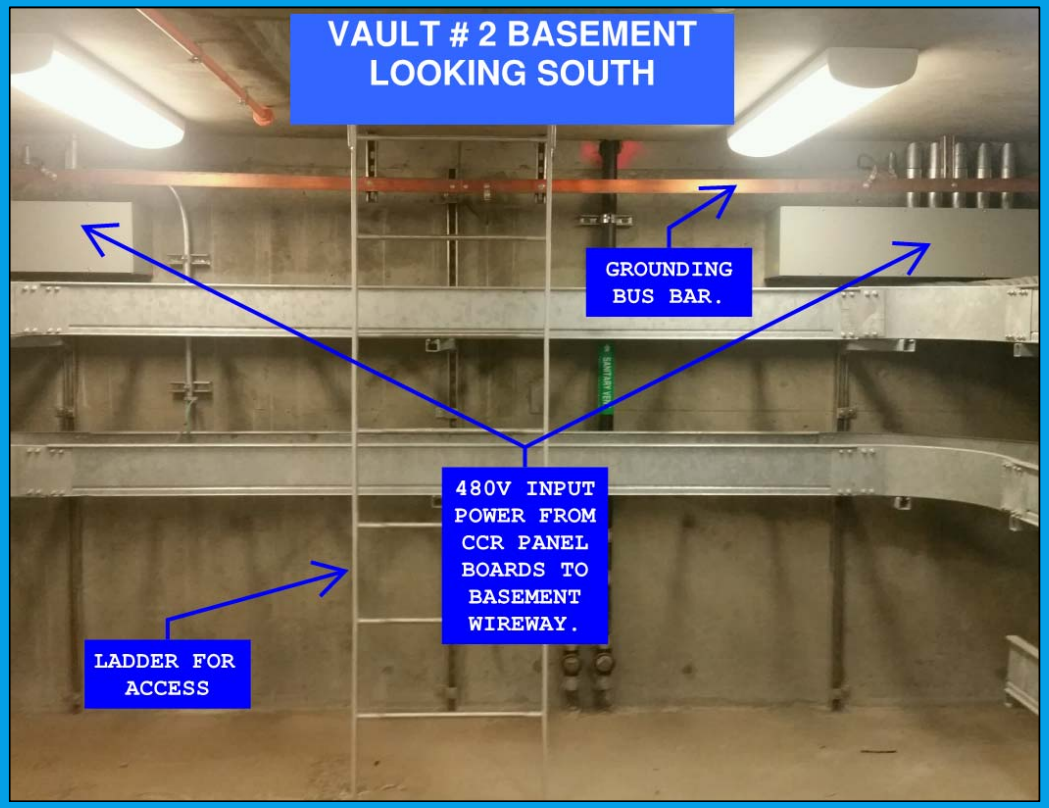
Existing Airfield Lighting Vault #2 (Basement)





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Existing Vault #2 Configuration – Summary

Advantages:

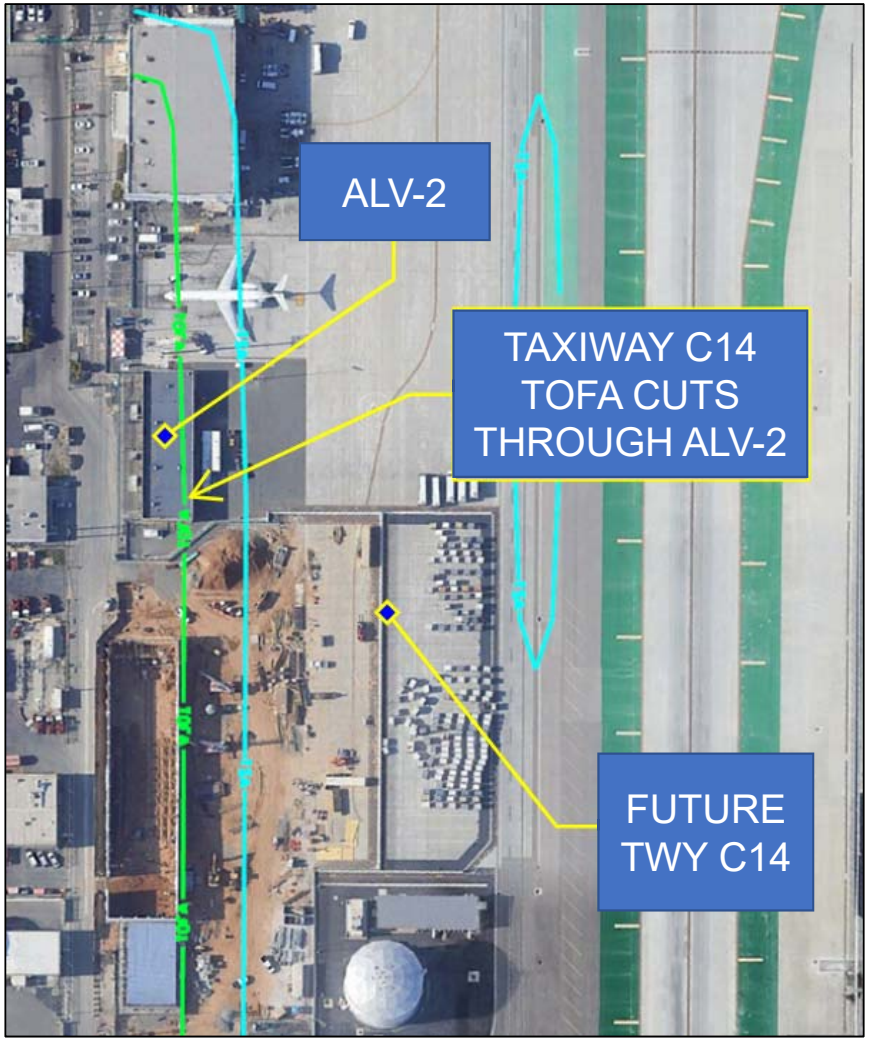
- No overhead conduit, wireways or cable
- Ample amount of clearance on all sides of the CCRs for maintenance and proper cooling
- Plenty of spare CCRs

Disadvantages:

- Access to basement
- Flooding
- Drilling into concrete floor
- Makes it difficult to reconfigure CCR locations due to the basement
- Step in the middle of the vault

Project Impact to Airfield Lighting Vault #2

Taxiway C14 TOFA passes through the east side of Airfield Lighting Vault #2



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Project Impact to Airfield Lighting Vault #2

Runway CCRs

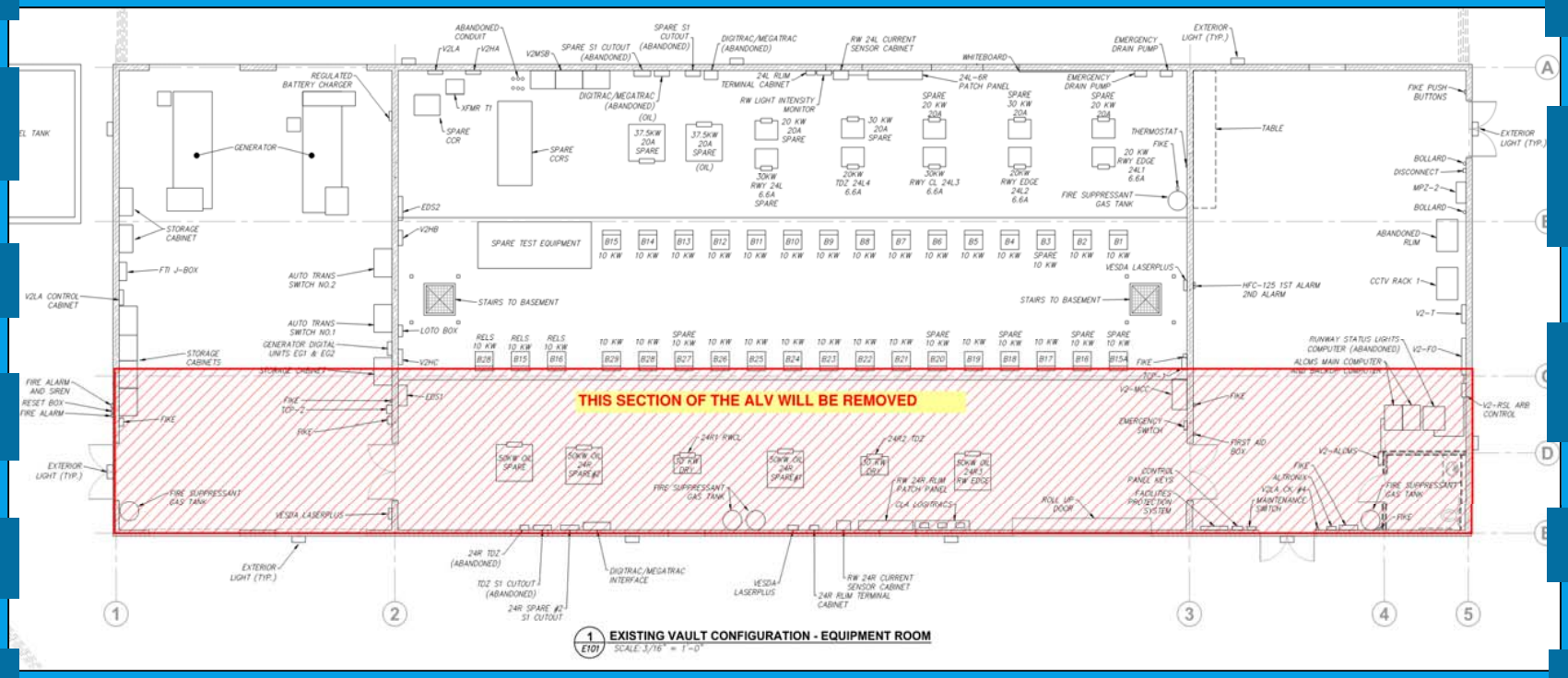
Taxiway CCRs

Generators

Storage Room

FAA RLIM

5kv Breakout Cabinets



Fire Suppression System

ALCMS Computer Rack

480V CCR Breaker Panels

Bathroom

FAA & LAWA Fiber Cabinet

Airfield Lighting Vault #2 Reconfiguration

Key Items Required for Vault Reconfiguration:

- *Problem:*
  - o Existing rebar in vault foundation
  - o Coordination with Civil/Structural for drilling holes
- *Solution:*
  - o Coordination with civil and architectural
  - o Radar Penetrating Technology

Concrete Scanning Equipment for Locating Existing Utilities and Rebar

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Airfield Lighting Vault #2 Reconfiguration

Key Items Required for Vault Reconfiguration:

- Maintaining Operational Integrity during entire project duration (i.e. keeping the lights on)
- Solution:
  a. 12 steps – each step got the following drawings:
     i. Area Plans
     ii. Power Single Lines
     iii. Comm Single Lines
     iv. Elevations

     All 4 drawings were critical in providing detailed roadmap for the contractor

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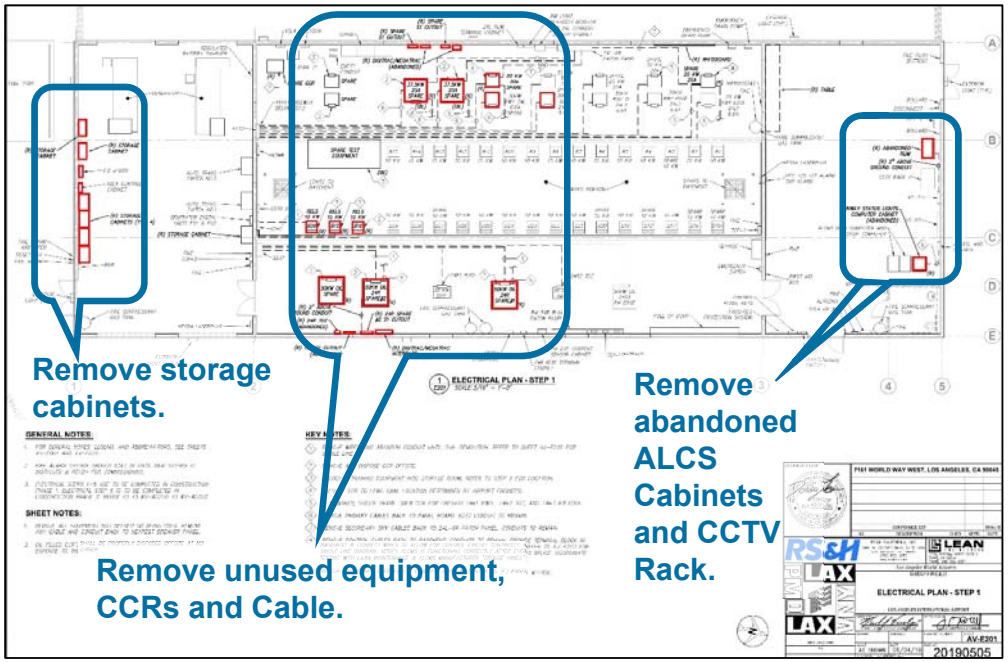
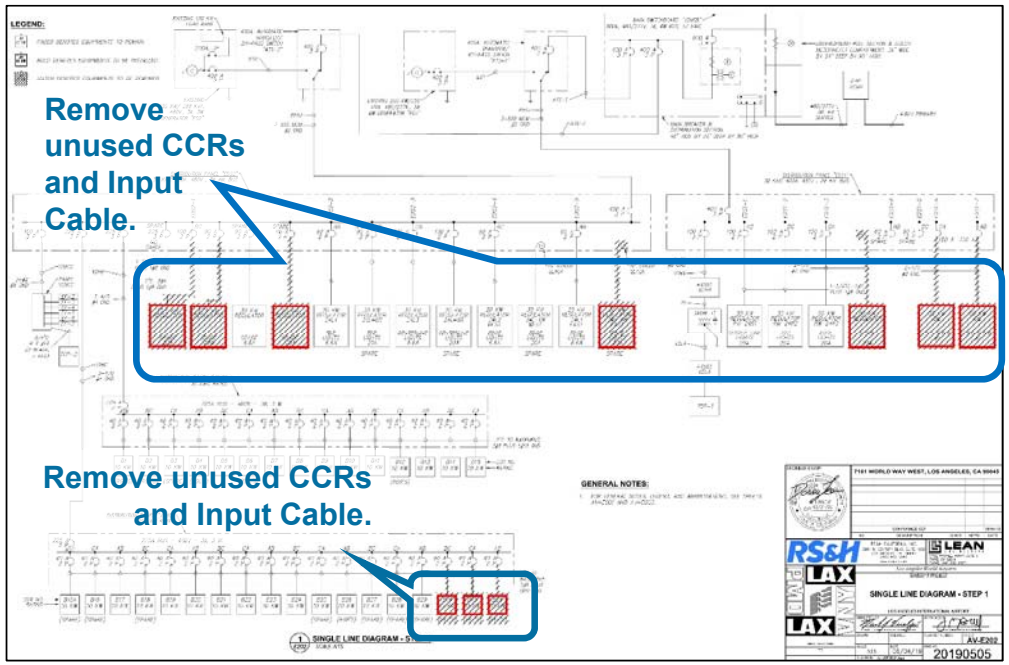
Vault #2 Reconfiguration: Step 1



Area Plan



Power Single Line

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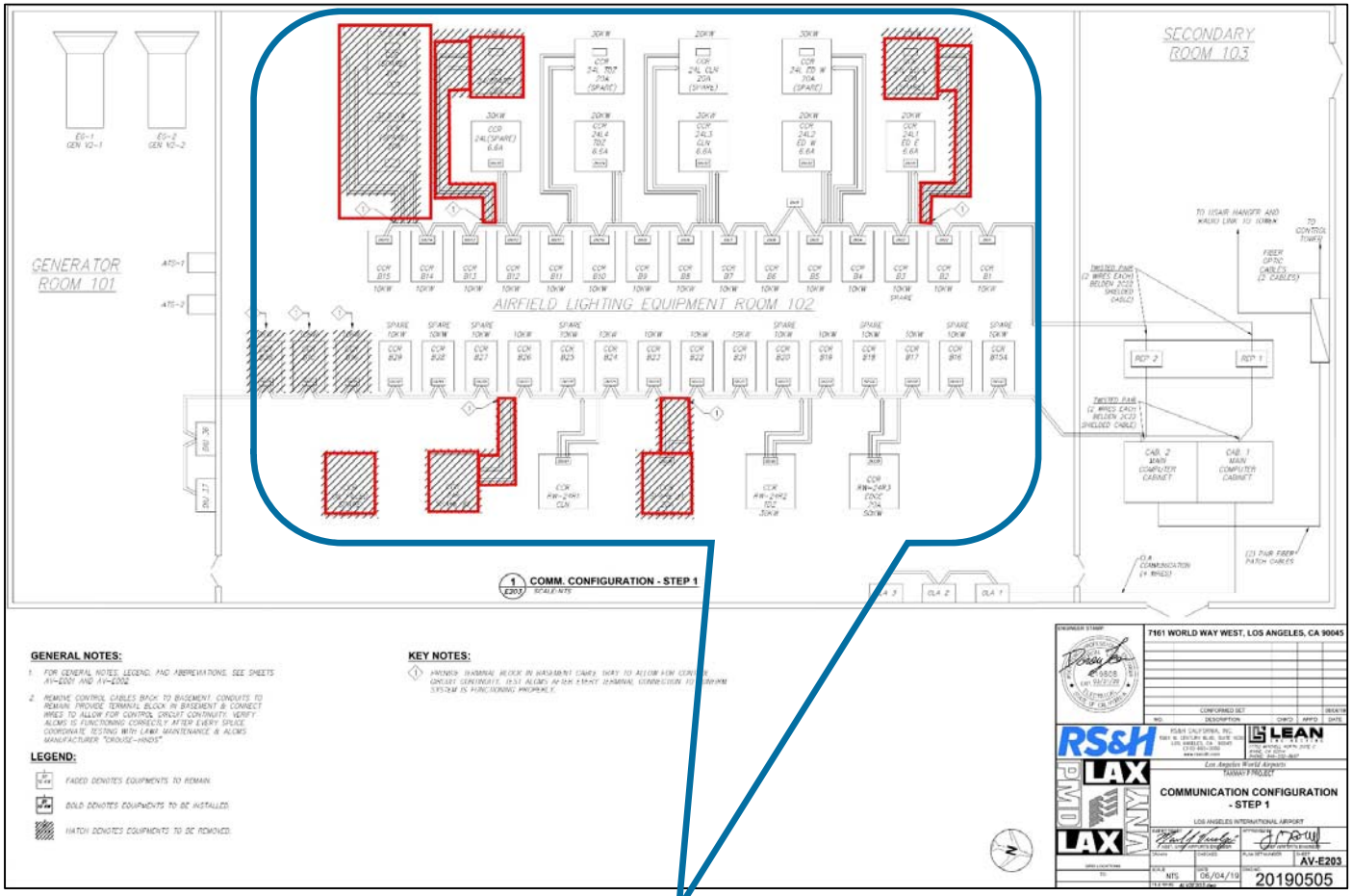
Vault #2 Reconfiguration: Step 1

Communication Single Line:



Remove unused CCRs communication cable and install temporary splices to maintain circuit continuity

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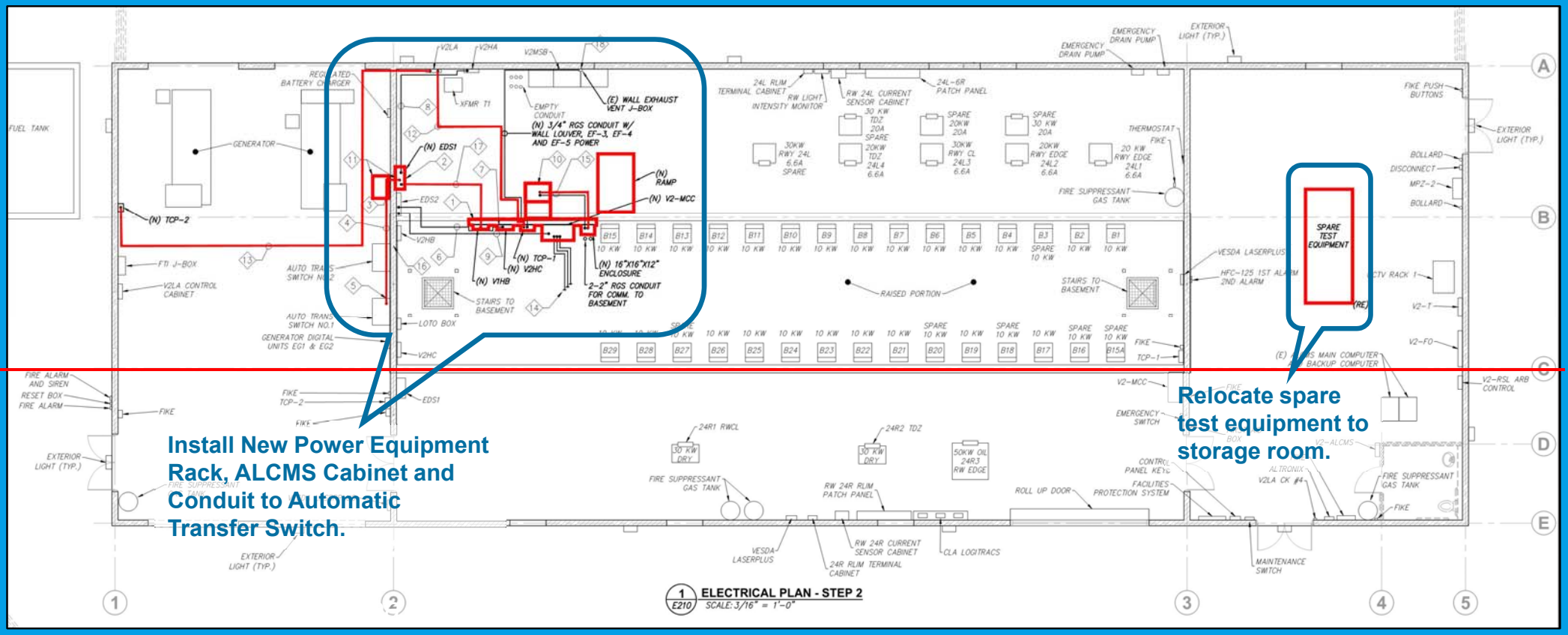
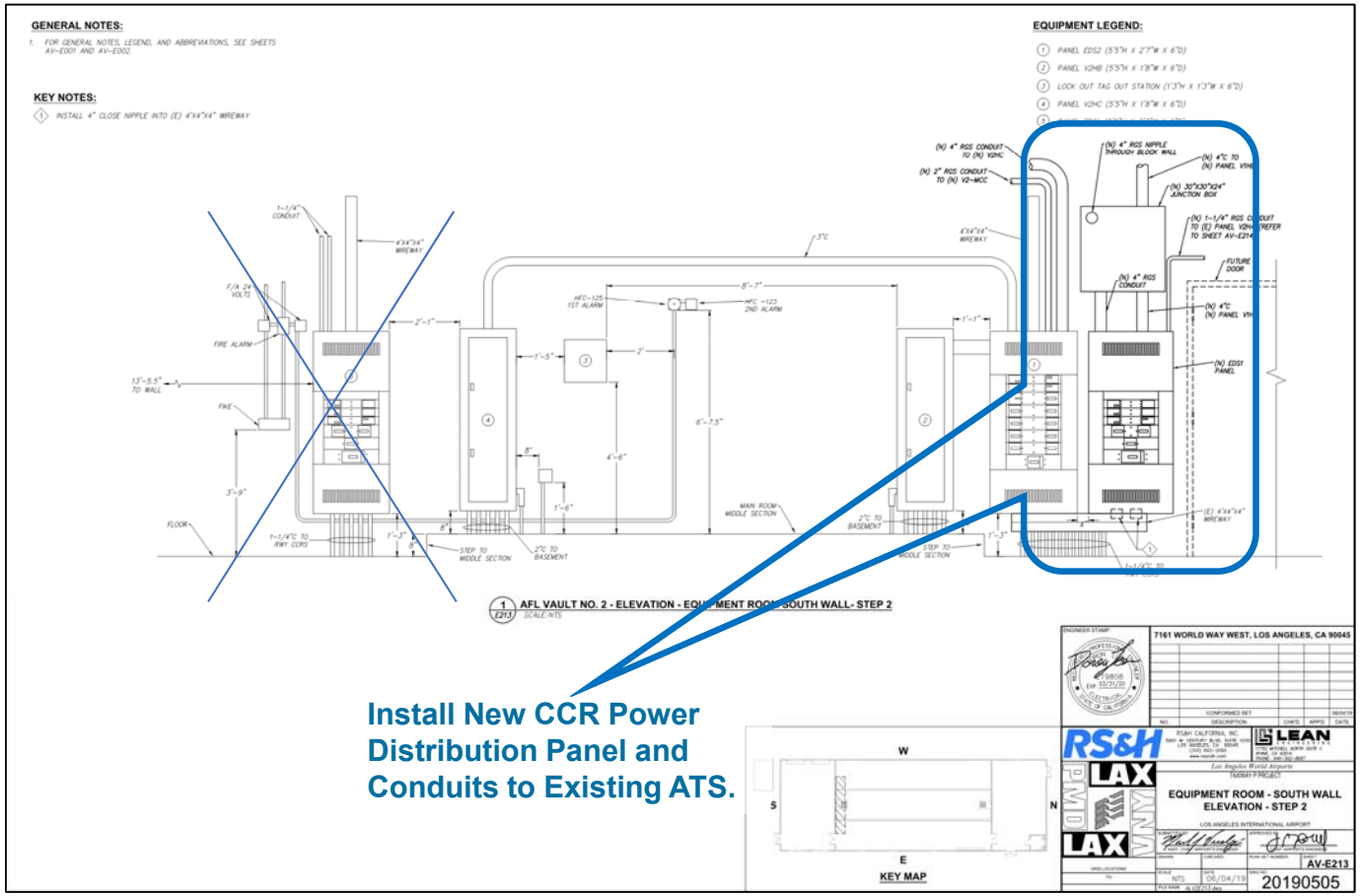
Vault #2 Reconfiguration: Step 2



Vault #2 Reconfiguration:

Very Useful:
At each step,
we gave contractor
Elevation View,
Power Single Line,
and Comm Single Line



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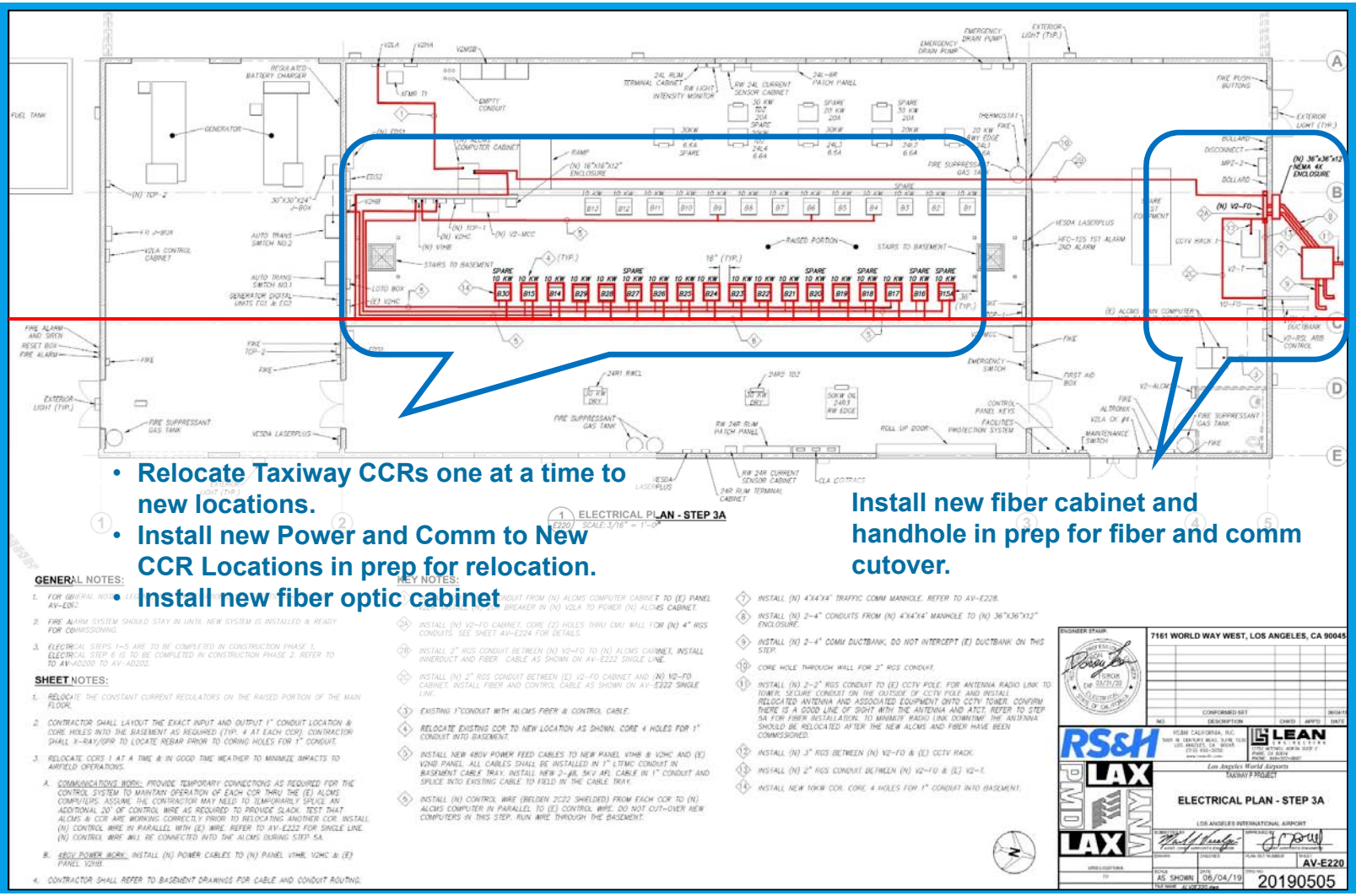
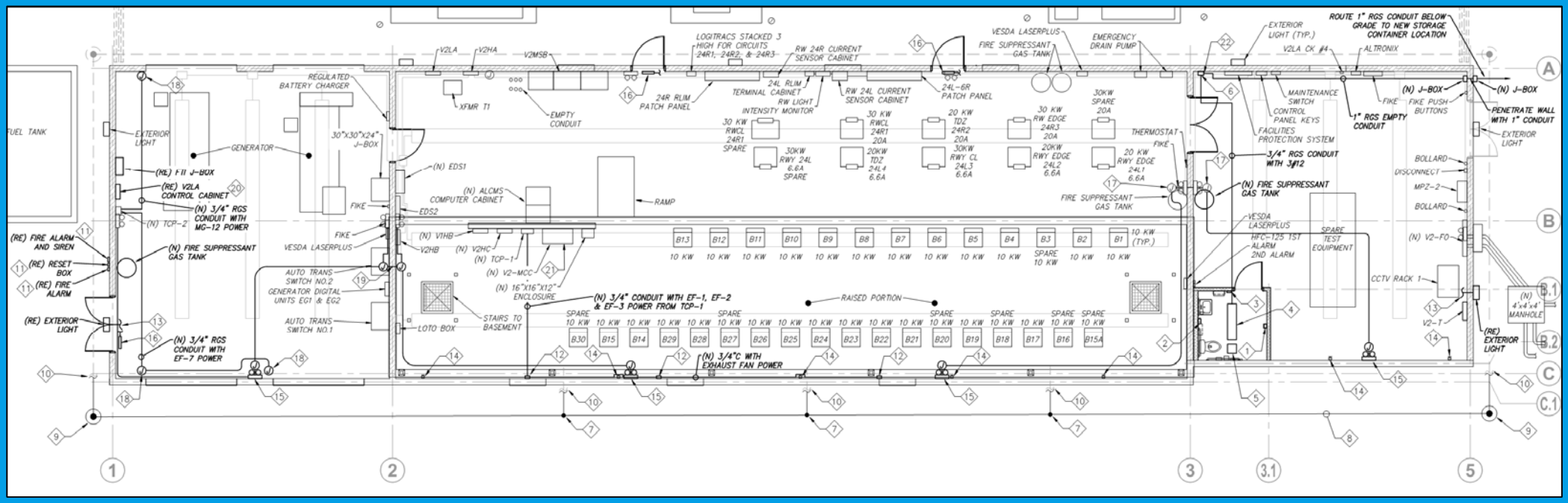
Vault #2 Reconfiguration: Step 3



- **Relocate Taxiway CCRs one at a time to new locations.**
- **Install new Power and Comm to New CCR Locations in prep for relocation.**
- **Install new fiber optic cabinet**

Install new fiber cabinet and handhole in prep for fiber and comm cutover.

Vault #2: Final Reconfiguration



Lesson Learned:

- **By using step-by-step drawings, we were able to lay out all the equipment in accordance with code and stakeholder requirements, with the exception of storage.**

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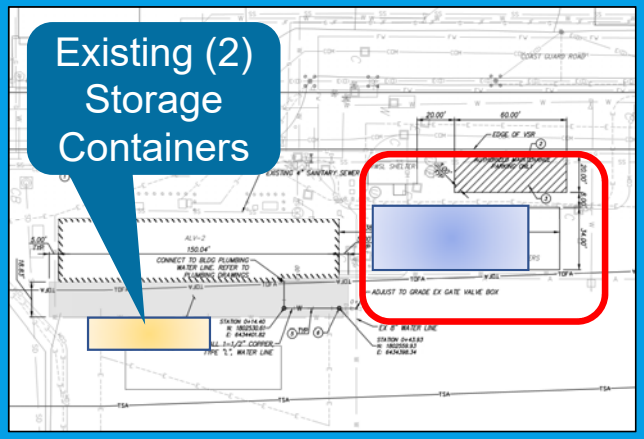
Vault #2 Reconfiguration

Existing Storage:

- Storage is very important for maintenance
- The master plan will be to construct a large storage shop once future projects remove existing structures and provide additional real estate

Existing Storage Racks for Spare Lights and Transformers.

Existing Storage Containers for Spare Lights and Transformers. (Total of 2)



New Storage Containers for Spare Lights and Transformers. (Total of 4)

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Item # 2:
Control System for Displaced Threshold

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ALCS Displaced Threshold Requirement

FAA AC 150/530-30J requires:

Standards for Airport Markings, for additional information about runway centerline marking widths and locations.

3.3.1.2 **Color Coding.**
The last 3,000 ft (900 m) portion of the runway centerline lighting system is color coded to warn pilots of the impending runway end. Alternating red and white lights are installed, starting with red, as seen from 3,000 ft (900 m) to 1,000 ft (300 m) from the runway end, and red lights are installed in the last 1,000 ft (300 m) portion.

3.3.1.3 **Displaced Threshold.**
On runways with centerline lights, the centerline lights are extended into the displaced threshold area.

3.3.1.3.1 If the displaced area is equal to or less than 700 feet (110 m) in length, the centerline lights are blanked out in the approach direction.

3.3.1.3.2 For displaced threshold areas over 700 ft (110 m) in length, the centerline lights in the displaced area are circuited separately from the centerline lights in the non-displaced runway area to permit turning "off" the centerline lights in the displaced area during landing operations.

3.3.1.3.3 If the displaced threshold area also contains a medium intensity approach light system, the control of the approach lights and displaced threshold area centerline lights is interlocked to ensure that when the approach lights are "on", the displaced area centerline lights are "off", and vice versa.

3.3.1.3.4 If the displaced threshold area contains a high intensity approach lighting system, separate circuiting of the centerline lights in the displaced area is not required since the high intensity approach lights will "wash out" the centerline lights.

Example of Runway 7L Displaced Area

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ALCS Control of Displaced Threshold

- **Challenge:**
  - Runway CTL belongs to the Airport. MALSR belongs to FAA
  - Any modifications to the MALSR control scheme or MALSR shelter requires approval from FAA Power Systems Group
  - The airport wanted electronic verification that MALSR is indeed energized. Concern was that ATCT “thinks” MALSR is on and turns off the runway centerline lights
  - Utilize existing off the shelf technology
  - Utilize the airports existing control system (C-H)

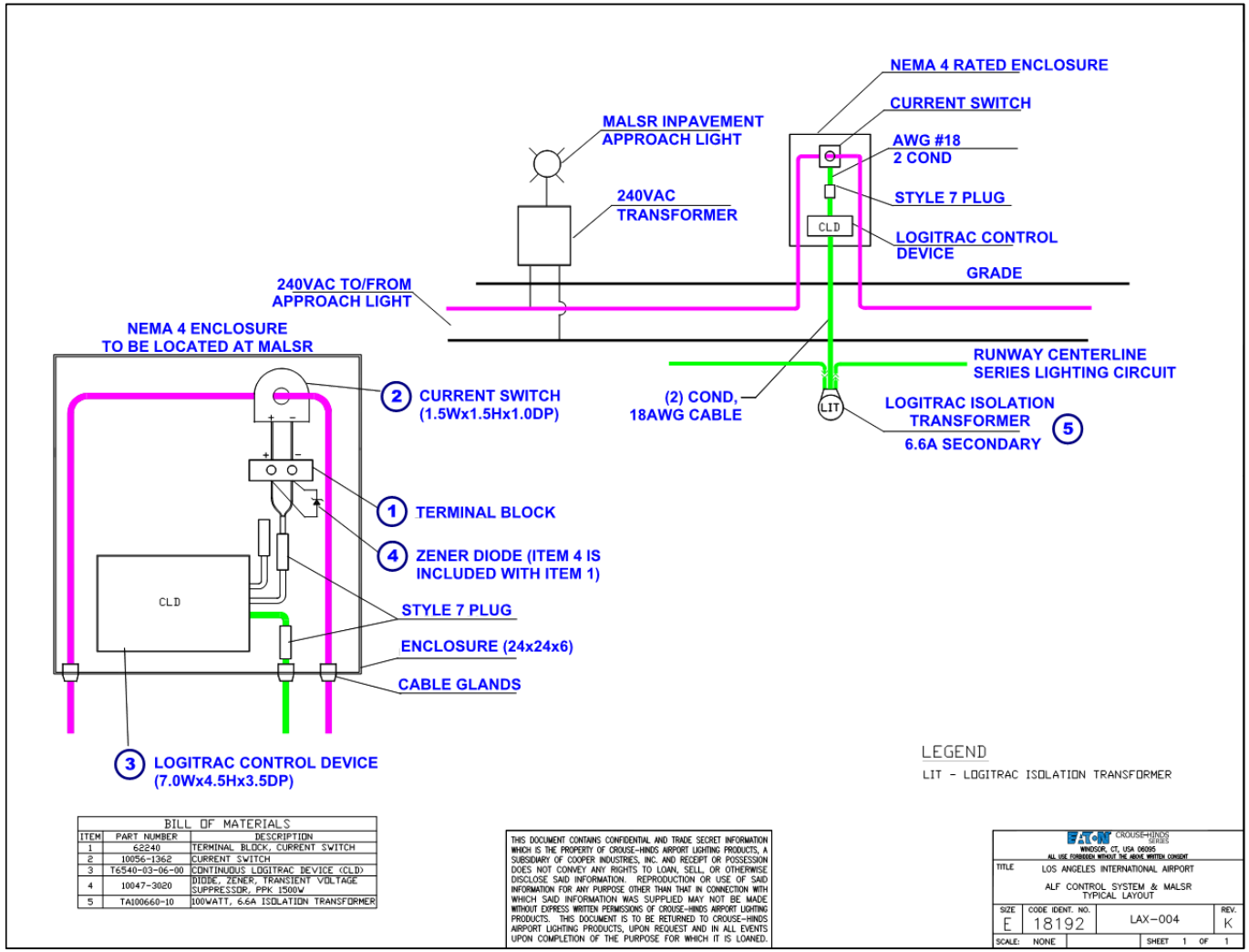
ALCS Control of Displaced Threshold

- **Solution**
  - Utilize Runway Centerline circuit to monitor the MALSR lights (on/off) and trigger a signal to the ALCS using power line carrier
  - Install Interlock Cabinet outside the RSA where the MALSR circuit and Runway Centerline circuit meet

Single Line for MALSR Interlock

MALSR Interlock Cabinet Single Line:

MALSR power cable passes through this cabinet which also has the Runway Centerline circuit. When the Current switch senses current, the Logitrac device sends a signal to the ALCS.



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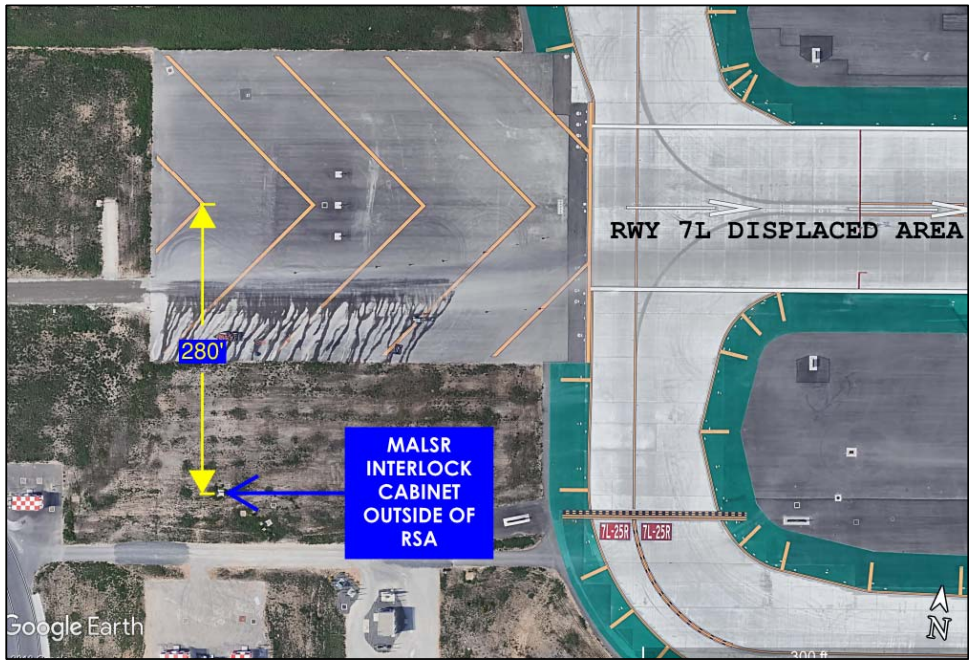
Picture of Runway 7L & 25R MALSR Interlock Cabinets

Runway 7L MALSR Interlock Cabinet



Runway 25R MALSR Interlock Cabinet

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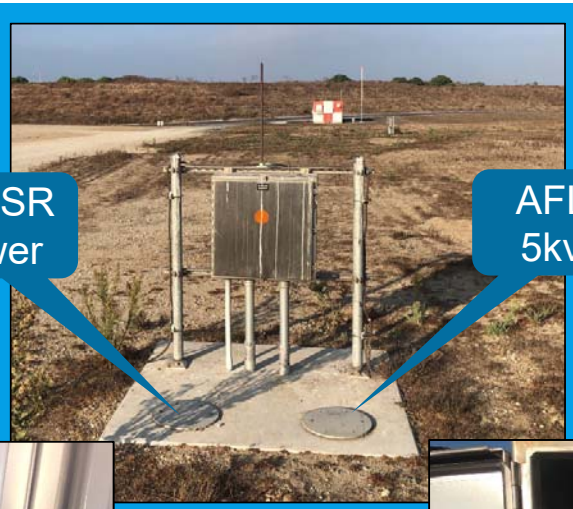
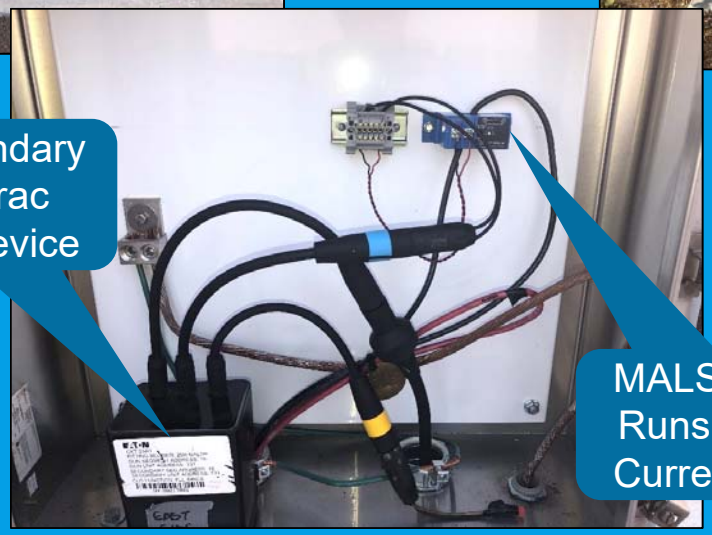
Picture of Runway 25R & 7L MALSR Interlock Cabinets





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ALCMS Display & Function to Enable MALSR Interlock

1. Select the 7L-25R MALSR Interlock Button
2. Select the “ENABLED” Option
3. The Logitrac that monitors MALSR Approach Lights detects ON status

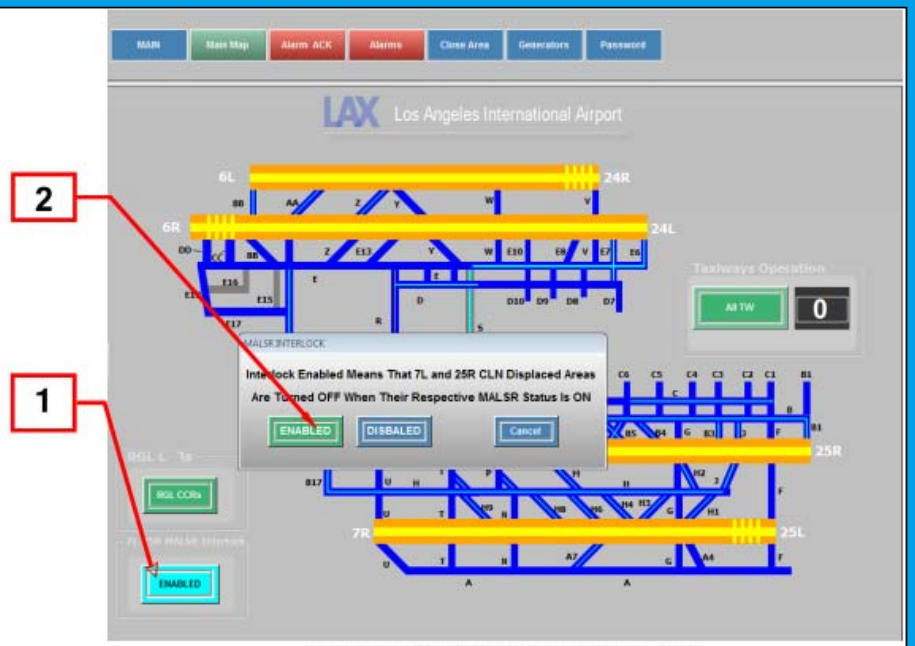

Figure 1. MALSR Interlock is Enabled

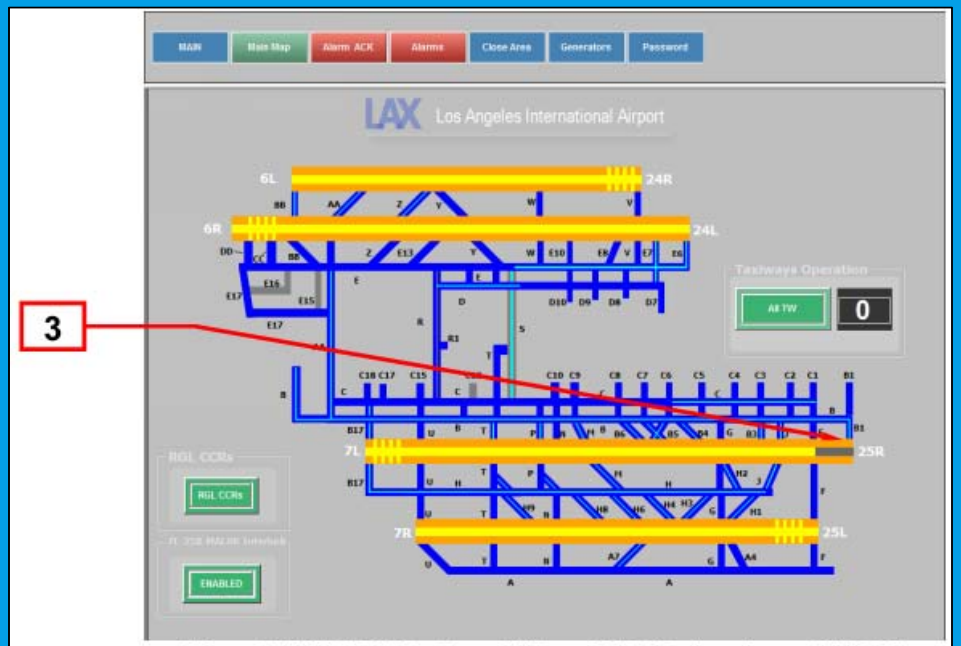

Figure 2. MALSR 25R status ON turns 25R Displaced area CLN OFF

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Item # 3:
TDZs in Existing Concrete

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Base Cans in Existing Concrete (TDZs)

- **Problem:**
  - 4 new sets of TDZs required due to the Runway 6R threshold shift
  - The concrete was in good shape and relatively new to justify panel replacement
  - Airport did not want to trench through good concrete and create future maintenance issues

Areal view of TDZ in existing concrete.

Base Cans in Existing Concrete (TDZs)

Installation of HDPE conduit by horizontal directional drilling under the runway

Rebar dowels epoxied into existing PCC concrete

Directional drill machine pulling in new HDPE conduit & 1/0 counterpoise under the Runway

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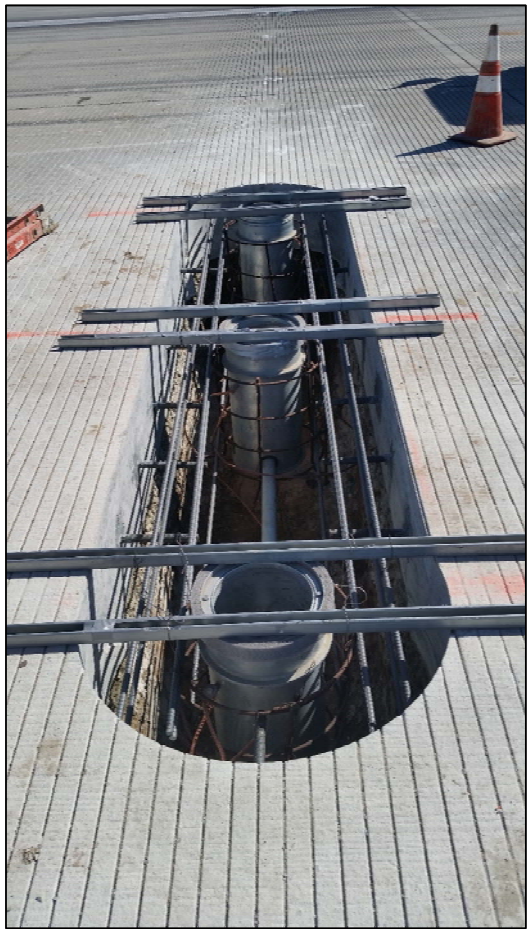
New TDZ Installation



Equipment installed:

- *L868B Base Cans*
- *Rebar*
- *Conduit*
- *Ground Rods*
- *Counterpoise*

P-610 Concrete installed

Method has been holding up for the past 5 years and counting.

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Los Angeles World Airports

Item # 4:
Methane Mitigation

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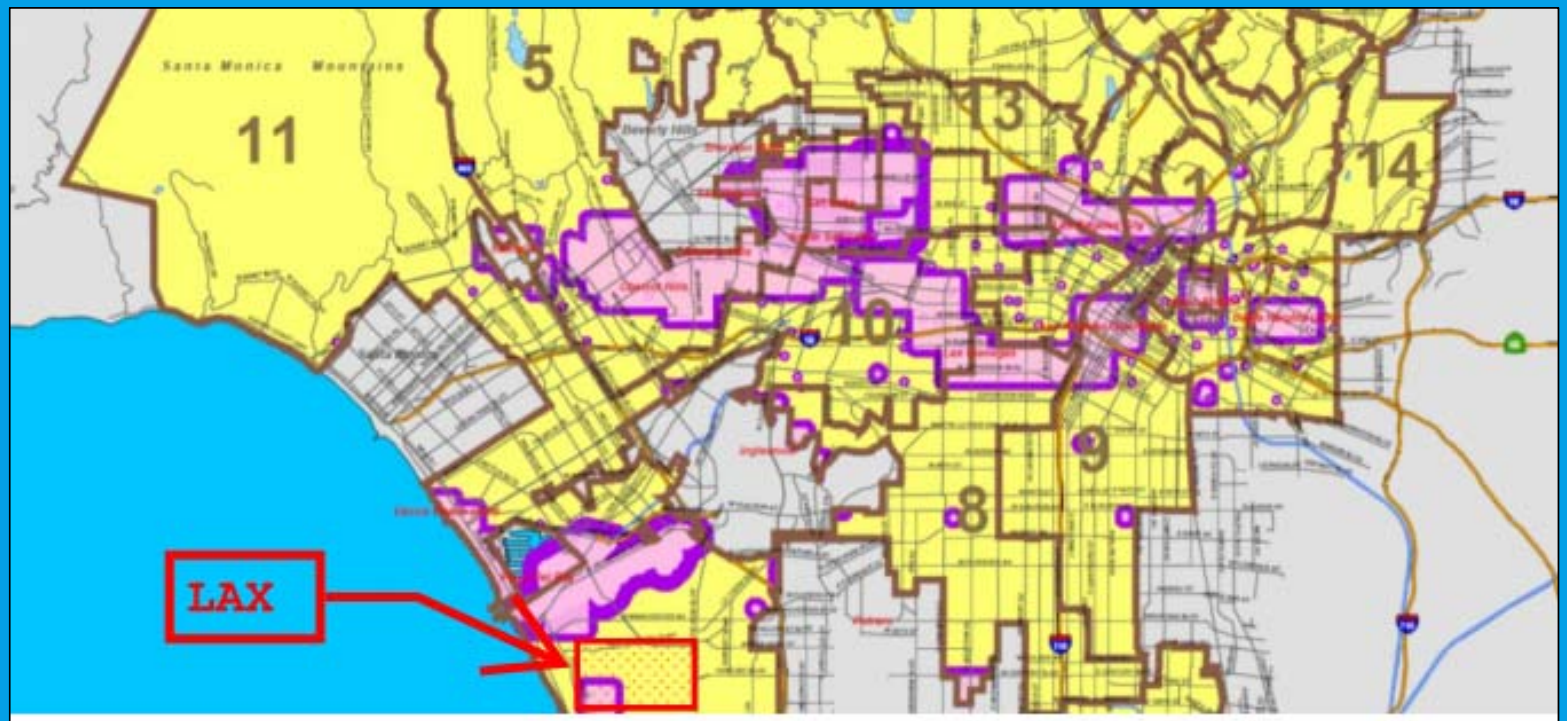
Methane

- Overall picture of where there exists in Methane in LAX

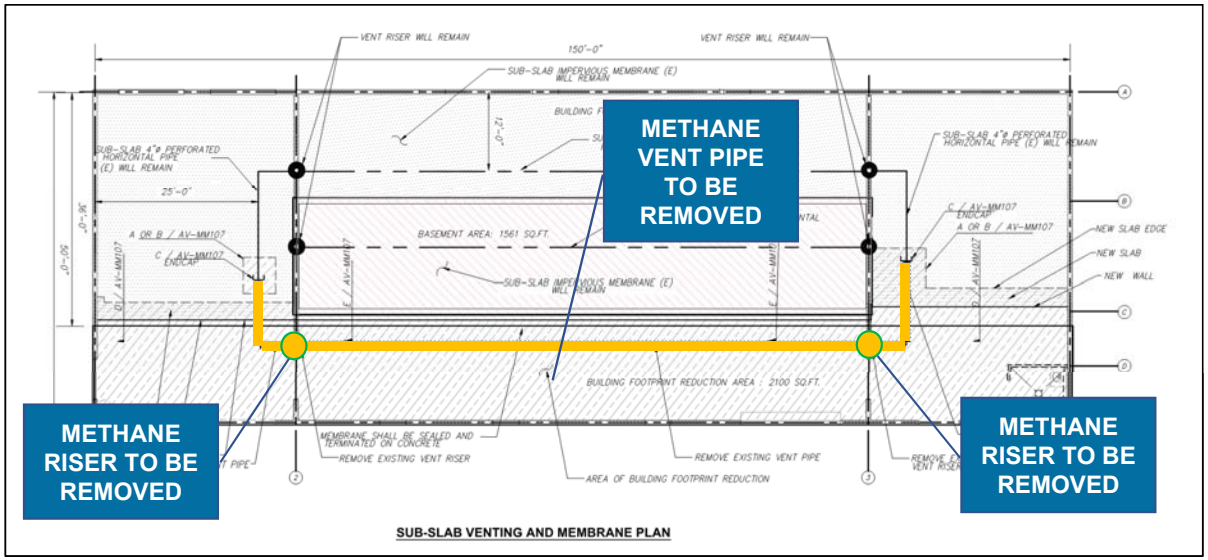


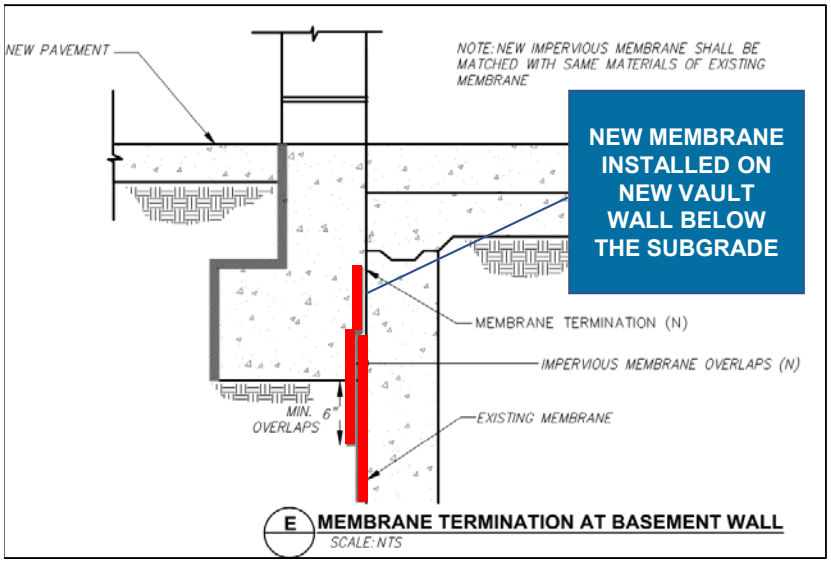
METHANE AND METHANE BUFFER ZONES

Methane Vault #2 Membrane Barrier

Vault methane vent pipes and risers to be removed and capped

Vault wall required membrane





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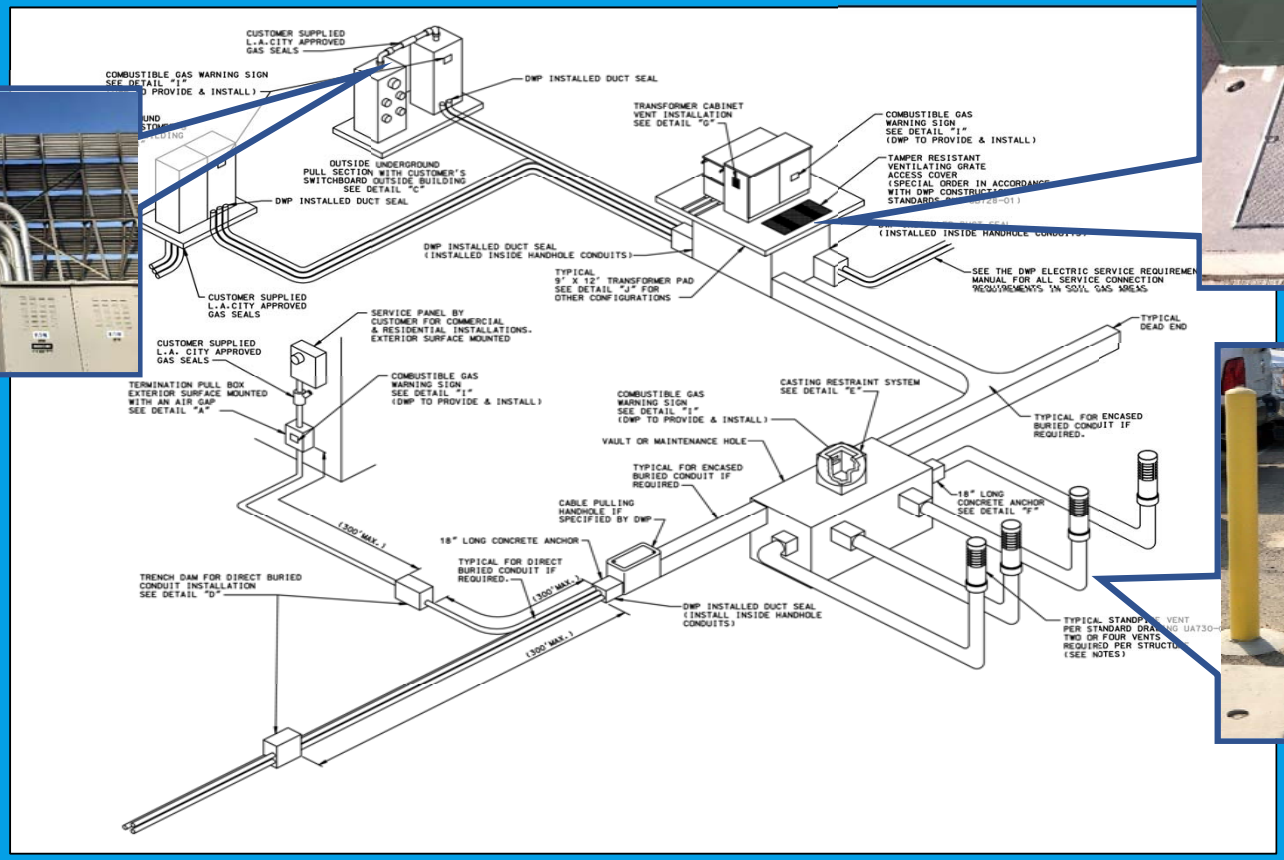
Methane Details and Pictures

Methane Gas Seals



Ventilation Grate for Xfmr Cabinets

Methane Vent Stand Pipes and In-pavement vents

LEAN ENGINEERING

Thank You

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