Design for the Repair Center Runway B-17235 at Vance AFB

Mason & Hanger + Mead & Hunt Joint Venture

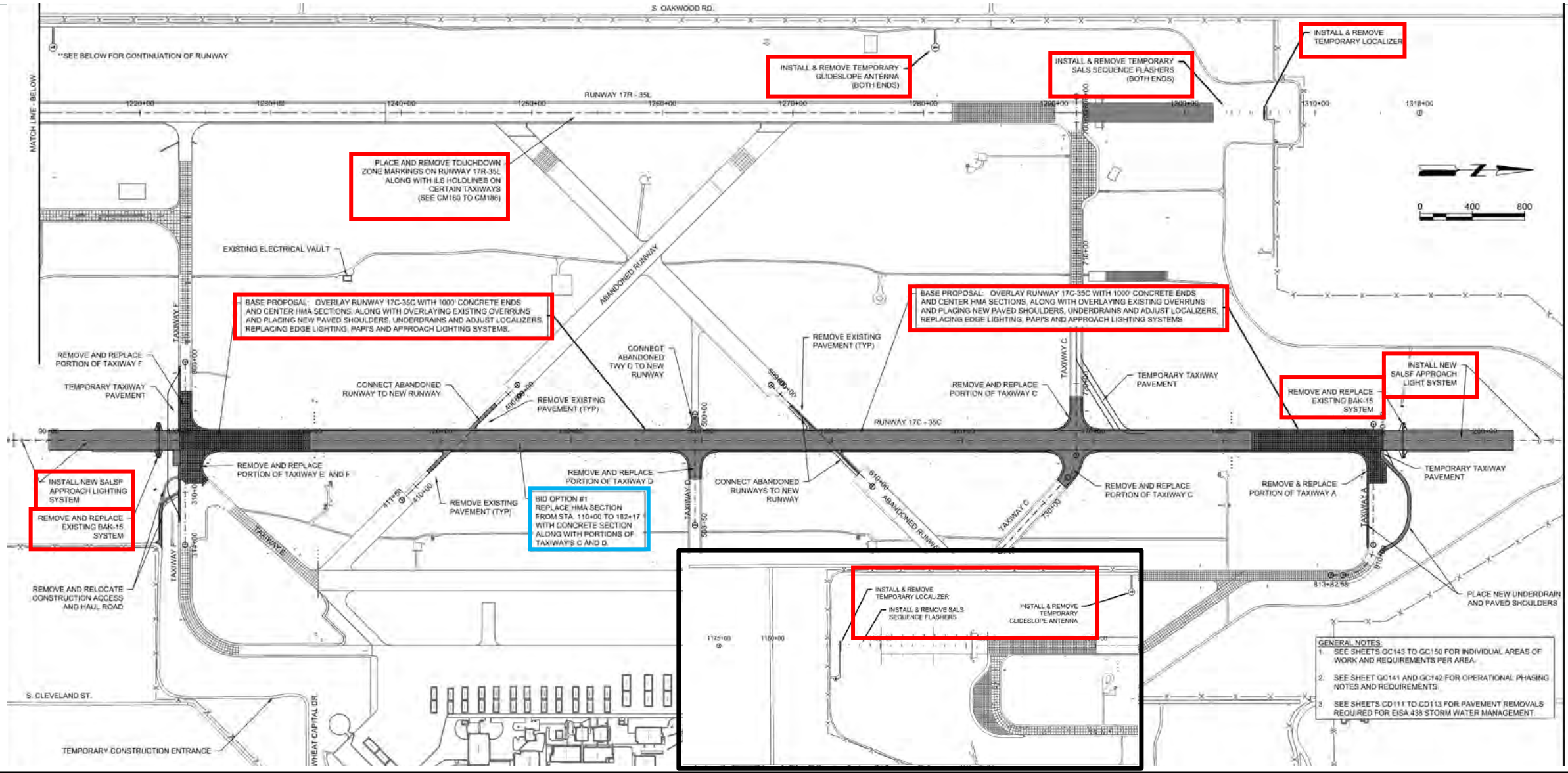
Firms Involved with Design

- MH + MH JV
  - Mead & Hunt Inc.
  - Mason & Hanger
- Applied Pavement Technology (APTech) – Pavement Evaluation & Design
- Guy Engineering - Surveying
- A & M Engineering & Environmental Services – Geotech
- Quantum Spatial– Aerial Photography/Mapping of Approaches
- Flight Tech – Design of Temporary Approach Procedures
- Strategic Value Solutions (SVS) – Value Engineering Study

Agenda

- Design Overview
- Expedited Design Schedule & Execution In a Virtual Environment
- Temporary Instrument Landing System
- Airfield Electrical – Runway 17C/35C Systems
- Pavement Section Design & Layout
- Storm Drainage
- Pavement Markings
- Project Construction Phasing
- Construction Schedule

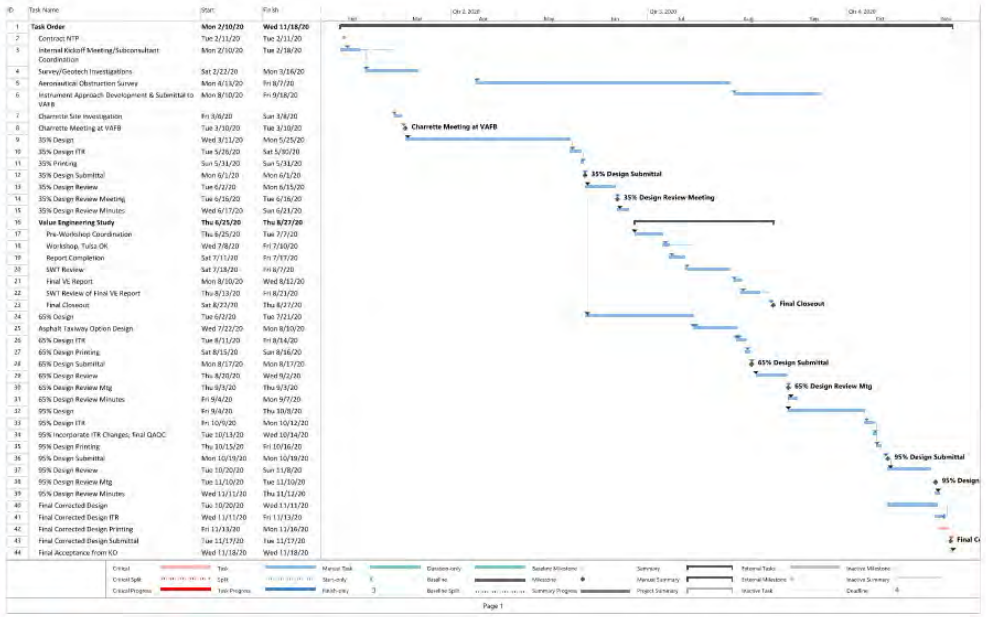
Design Overview – Project Scope of Work



Expedited Design Schedule & Execution in a Virtual Environment

Expedited Design to Meet Critical Vance AFB Requirement

- 11-month performance period – completed 35 days early
  - Conducted critical investigations ASAP – Geotech, Survey
  - Met aggressive submittal requirements
  - Multiple over-the-shoulder reviews and calls with SWT and VAFB to keep project moving
  - Began work on next design submittal without waiting on DrChecks comments and design review
  - Close design team collaboration and rolling quality reviews



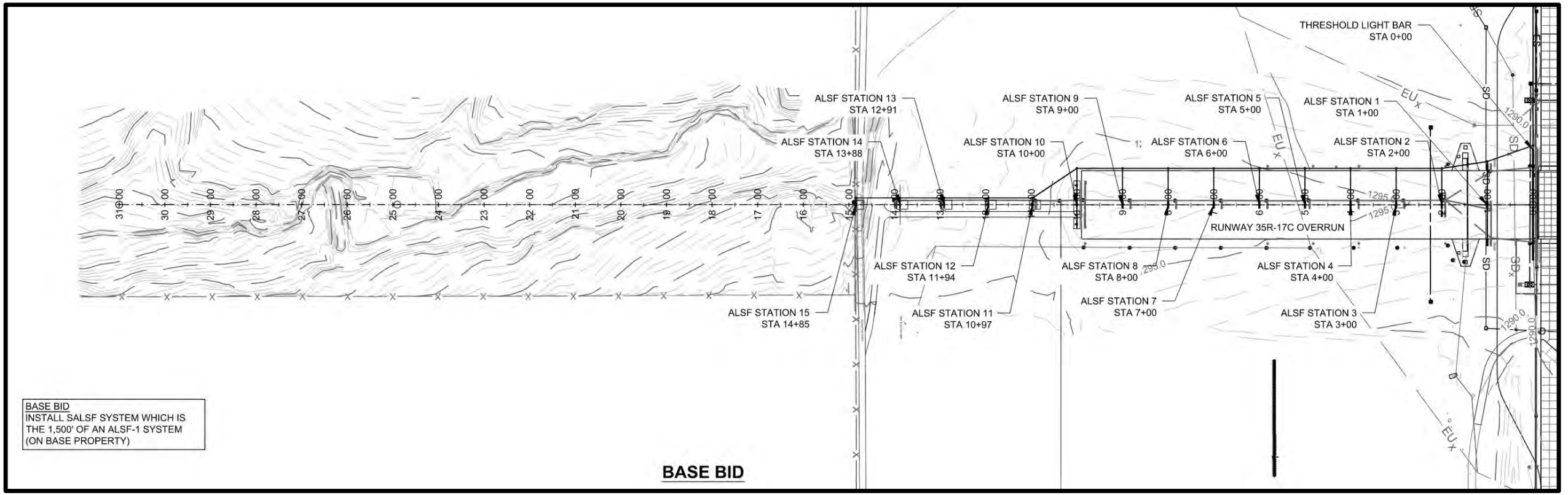
Design Execution in a Virtual Environment

- 35%, 65%, and 95% Reviews executed using Cisco Webex
- Over-the-Shoulder reviews and informal update Calls using Webex
- Internal design coordination via MS Teams
- Value Engineering Study executed using Webex
- File transfers and submittals executed using Newforma and DOD SAFE
- DrChecks used extensively for USACE comments and responses

Airfield Lighting & Electrical Systems – Approach Lighting System (ALS) & Instrument Landing System (ILS)

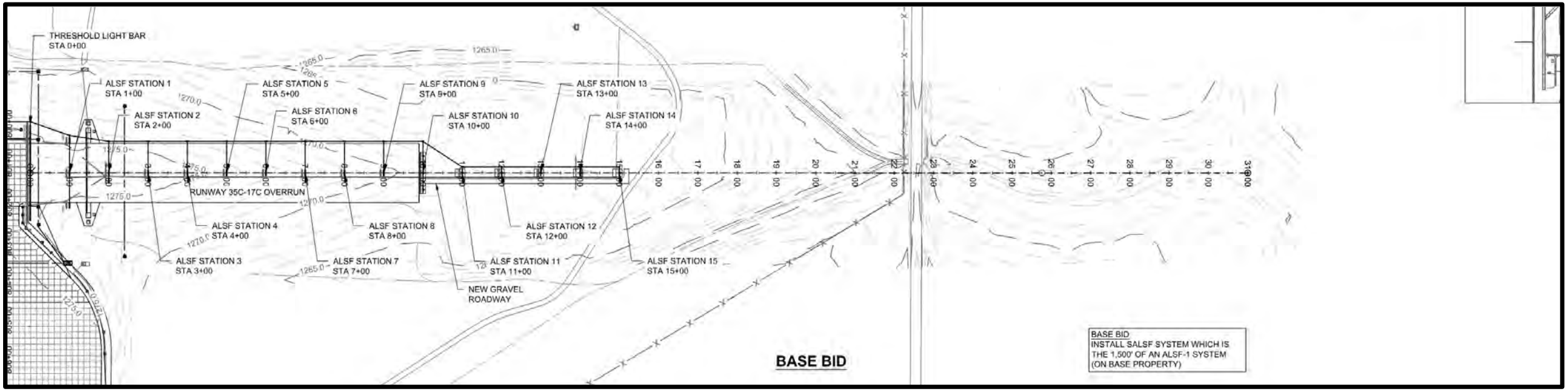
- **Runway 17C / 35C**
  - Existing ALS System is a non-standard SALSF with flashers installed on a precision Runway
  - Proposed ALS System will be SALSF placed under Base Bid on each end of Runway 17C / 35C (Installed on current Base property & capable of being expanded to an ALSF-1 in the future)
  - Existing ILS System includes Glideslope and Localizer antennas and are in good condition. This system will be shut down once the project starts, with localizers adjusted in height due to the Runway profile being raised.
- **Runway 17R / 35L**
  - Existing ALS system is a SALS (without Flashers)
  - Proposed ALS system includes adding Flasher lights to the existing SALS system. This matches the system currently on Runway 17C / 35C (SALSF).
  - No ILS system exists currently
  - A Glideslope and Localizer is to be added to this Runway prior to the Center Runway construction. New Instrument approaches were developed for Runway 17R and 35L
  - Additional pavement markings are to be added to the Outside Runway per the layout required for a Precision Instrument Approach Runway.
  - Intent is to upgrade Runway 17R / 35L to match the systems currently operated on the Center Runway, so no capability is lost during the Center Runway Construction.
  - Systems and pavement markings will be removed at construction completion.

Airfield Lighting & Electrical Systems – South SALSF/ALSF-1



- Land Acquisition Required to Place a Full UFC Compliant 3,000’ ALSF-1
- SALS-F capable of being placed on current Base property
- SALS-F same as ALSF-1 for first 1,500’ from Runway Threshold
- Full System Designed for easy modification to ALSF-1 in the future

Airfield Lighting & Electrical Systems – North SALSF/ASLF-1



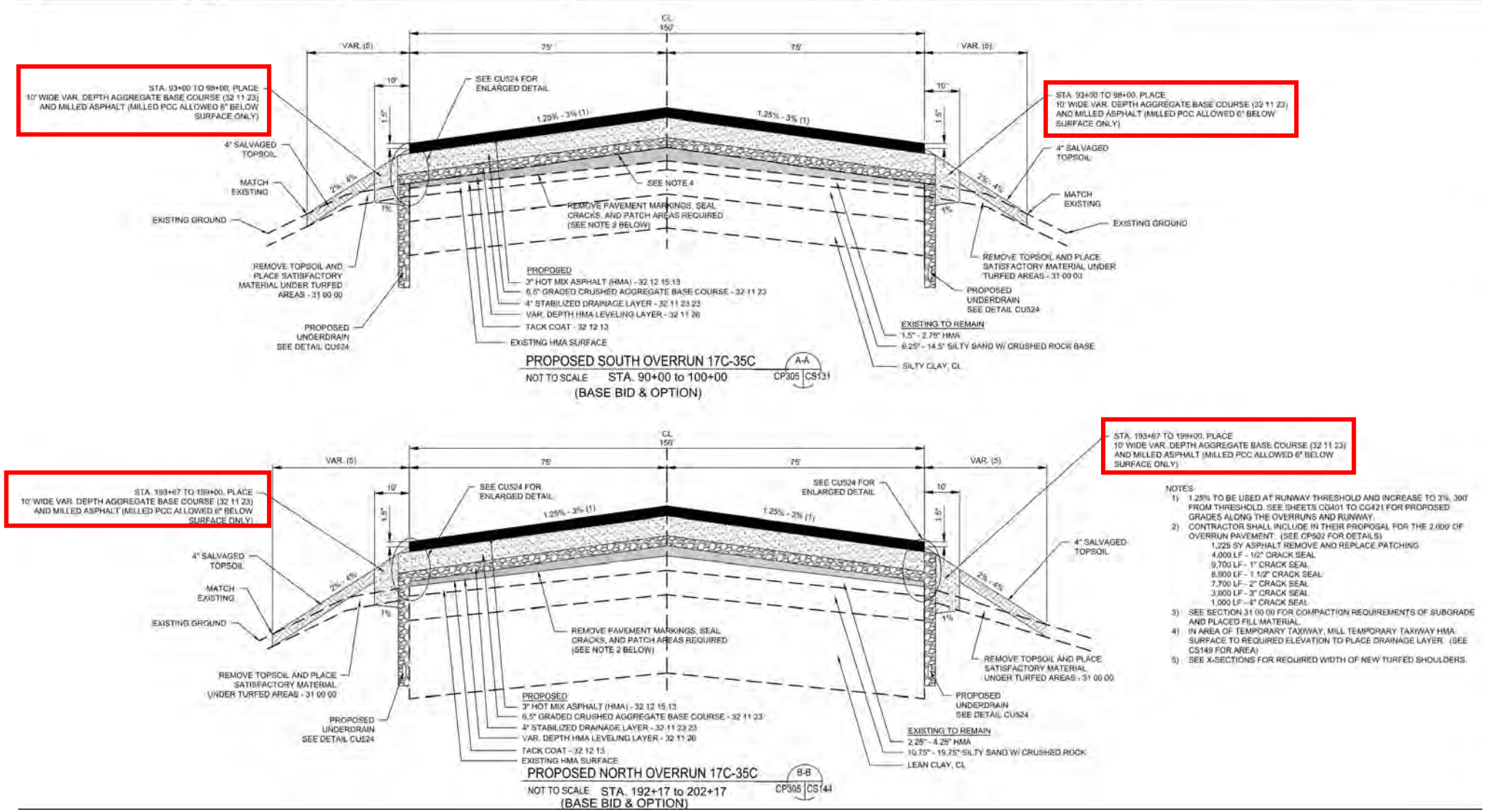
Airfield Lighting Systems Affected

- New SALS-F Approach Lighting Systems Placed
- New Runway Edge Lighting w/ Threshold Light Bars
- Taxiway Edge Lights to Re-use Existing Fixtures
- New PAPI's on both 17C and 35C
- Taxiway Guard Lights Installed
- New Taxiway Hold Signs Placed where needed
- Existing Distance Remaining Signs Re-used
- New Windcones placed at Both Runway Ends
- Replaced all Non-Loading Bearing Manholes/Handholes in Shoulder areas
- New Homerun Circuits placed from Circuits to Electrical Vault
- New Constant Circuit Regulars (CCR's) Placed in Vault
- Modification to the existing ALCMS to incorporate the changes required for the project.

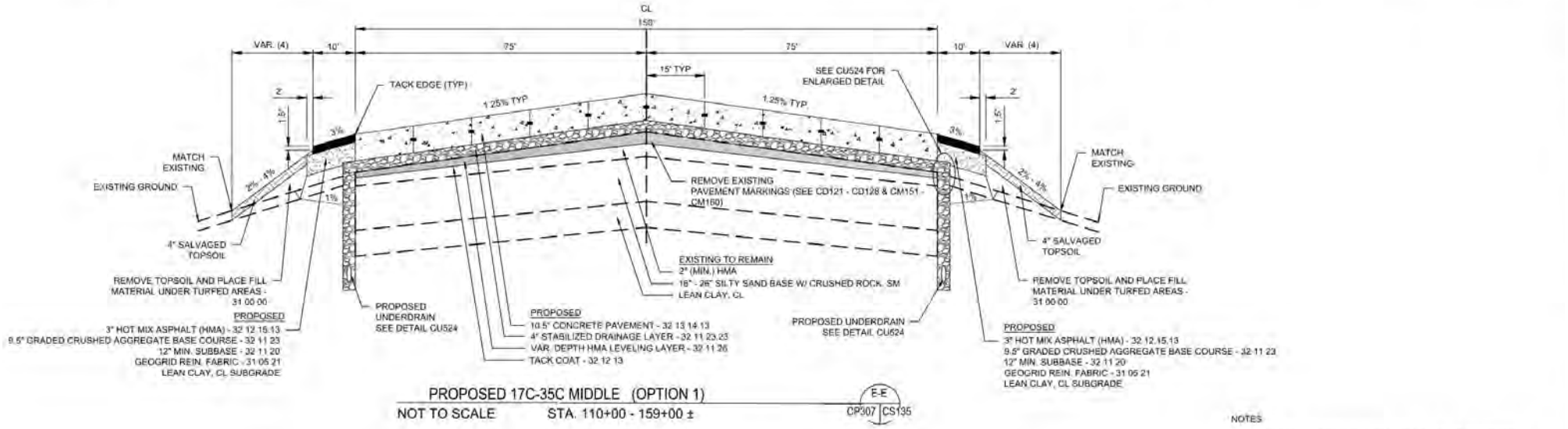
Design Overview – Runway Pavement Section Design

- Existing Pavement to Remain on Runway & Overruns
  - Reduces Construction Costs & Duration
  - Reduces Risk of Exposing Clay Subgrade Materials
- Combination of Variable Depth Milling and HMA Overlays on Existing Surface to Achieve UFC Compliant Profile and Transverse Grades
- New Drainage Layer and Pavement Section Placed on top of Existing Sections
- Proposed Surface was able to be Raised to Correct Adjacent Shoulder Grades
- Provided Option for Full Concrete Runway. Base Bid provided center HMA section.

Design Overview – Runway Pavement Section Design & Layout

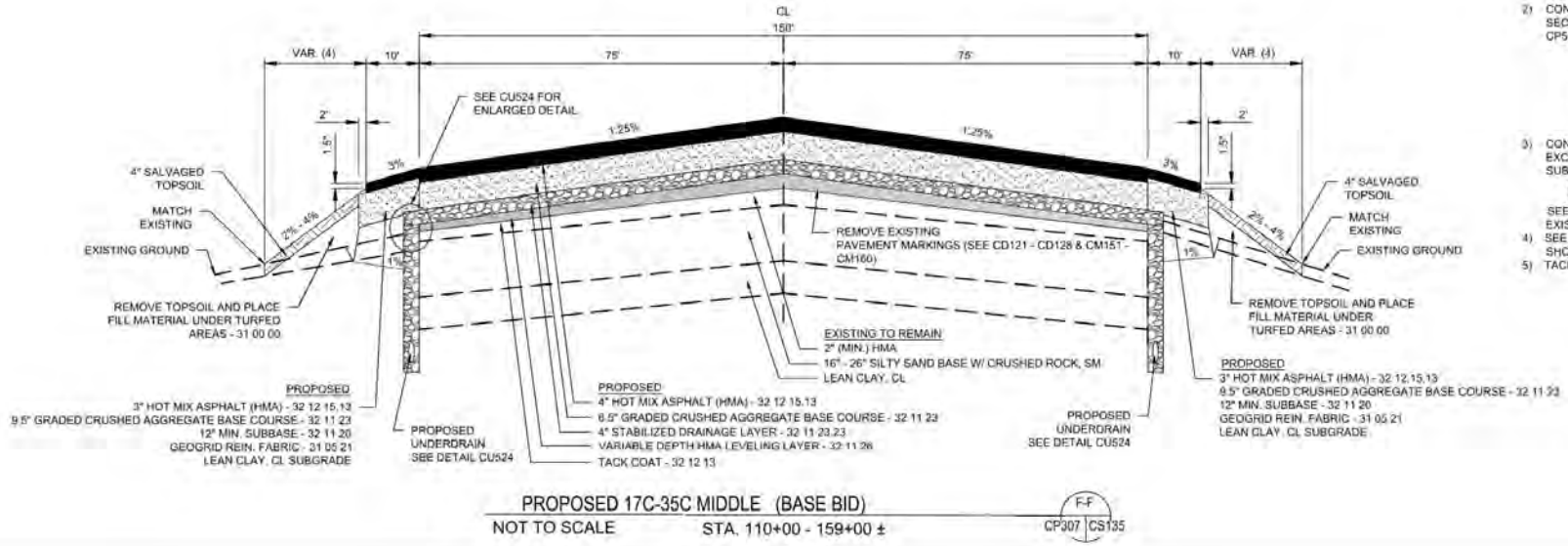


Design Overview – Runway Pavement Section Design & Layout



PROPOSED 17C-35C MIDDLE (OPTION 1)

NOT TO SCALE STA. 110+00 - 159+00 ±



PROPOSED 17C-35C MIDDLE (BASE BID)

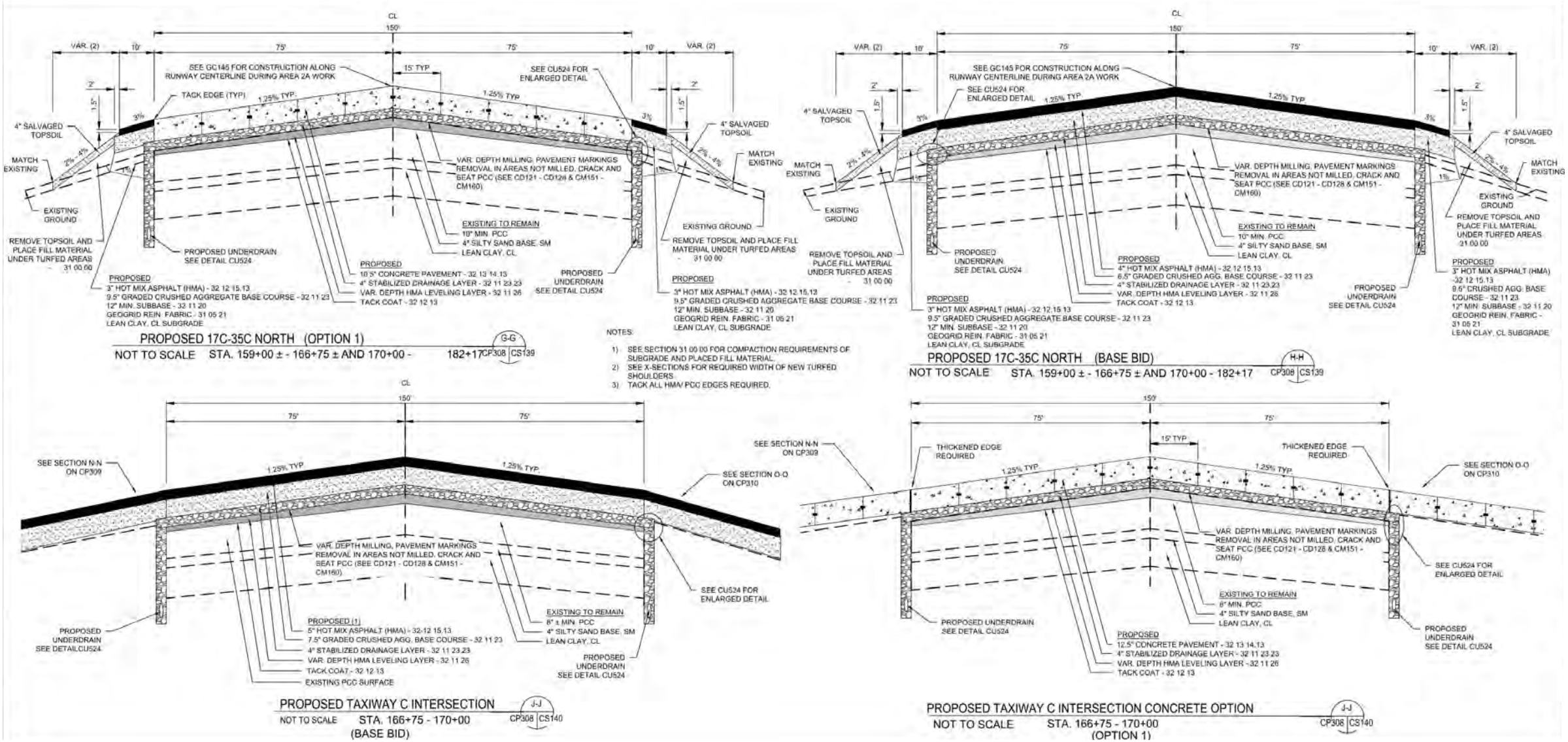
NOT TO SCALE STA. 110+00 - 159+00 ±

NOTES

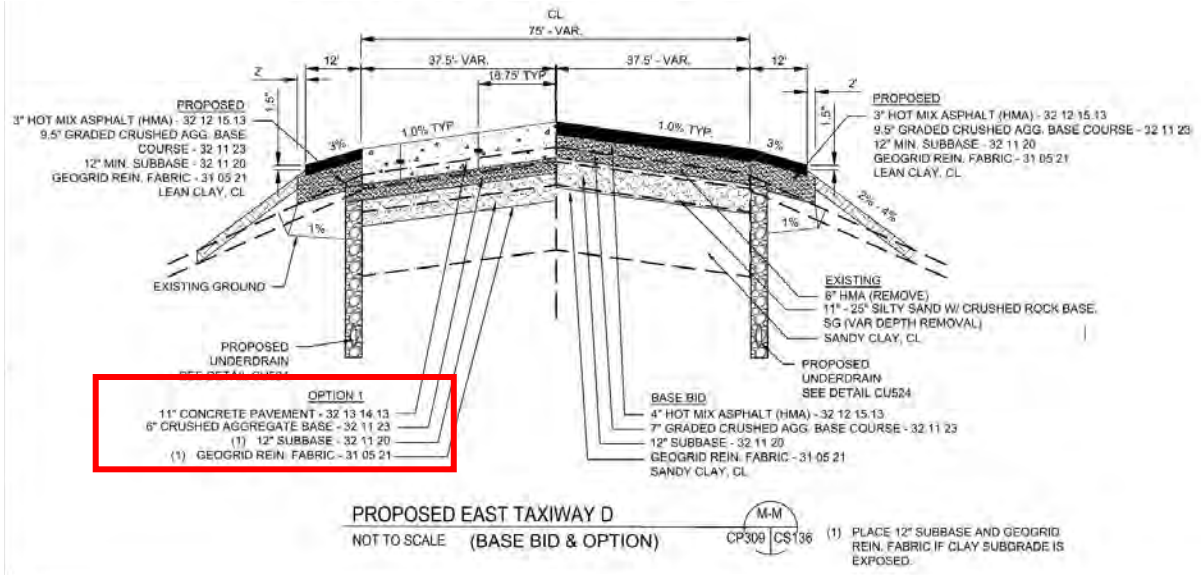
1) SEE SECTION 31 00 00 FOR COMPACTION REQUIREMENTS OF SUBGRADE AND PLACED FILL MATERIAL.
2) CONTRACTOR SHALL INCLUDE IN THEIR PROPOSAL FOR THE SECTION OF RUNWAY BETWEEN STA. 110+00 TO 159+00: (SEE CP502 FOR DETAILS)
   - 50 SY ASPHALT REMOVE AND REPLACE PATCHING
   - 4,900 LF - 1/2" CRACK SEAL
   - 25,350 LF - 1" CRACK SEAL
   - 9,000 LF - 1 1/2" CRACK SEAL
   - 10,650 LF - 2" CRACK SEAL
   - 3,300 LF - 2 1/2" CRACK SEAL
   - 11,000 LF - 3" CRACK SEAL
3) CONTRACTOR SHALL INCLUDE IN THEIR PROPOSAL FOR OVER EXCAVATION THAT MAY BE REQUIRED IN AREAS WHERE EXISTING SUBGRADE IS EXPOSED.
   - 2000 CY EXCAVATION
   - 2000 CY SATISFACTORY FILL

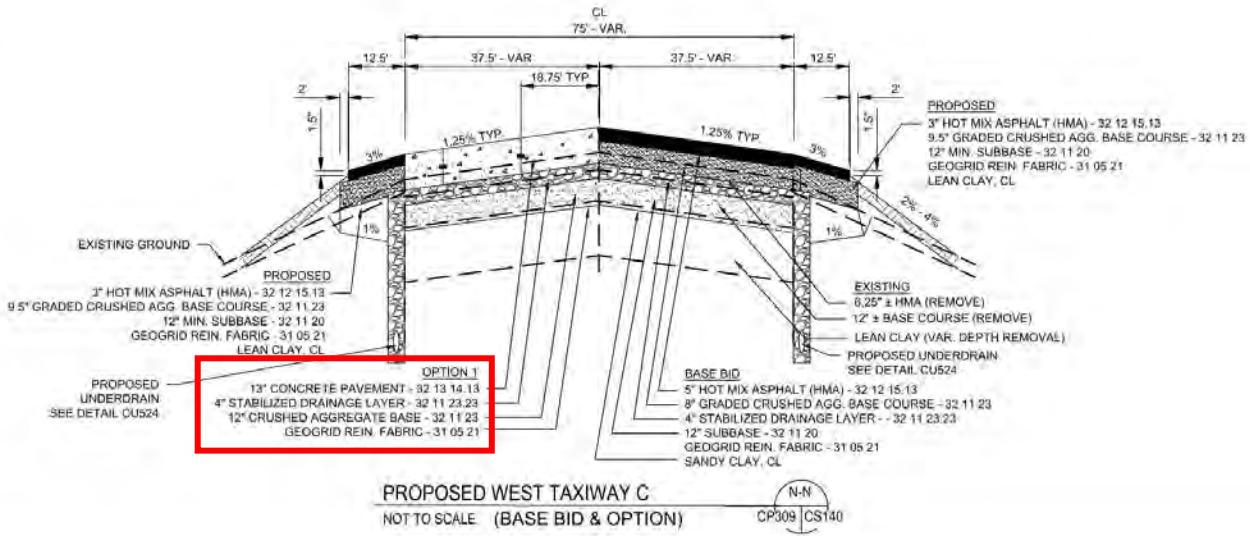
   SEE SECTION 31 00 00 FOR REQUIREMENTS ON PROTECTING EXISTING SUBGRADE MATERIAL.
4) SEE X-SECTIONS FOR REQUIRED WIDTH OF NEW TURFED SHOULDERS.
5) TACK ALL HMA/ PCC EDGES REQUIRED.

Design Overview – Runway Pavement Section Design & Layout

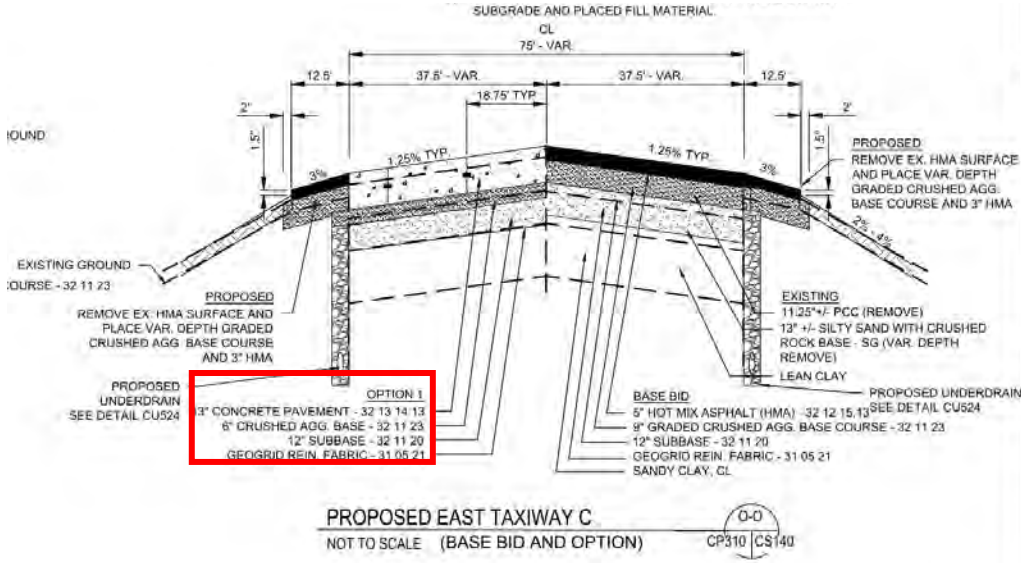


Design Overview – Pavement Section Design & Layout





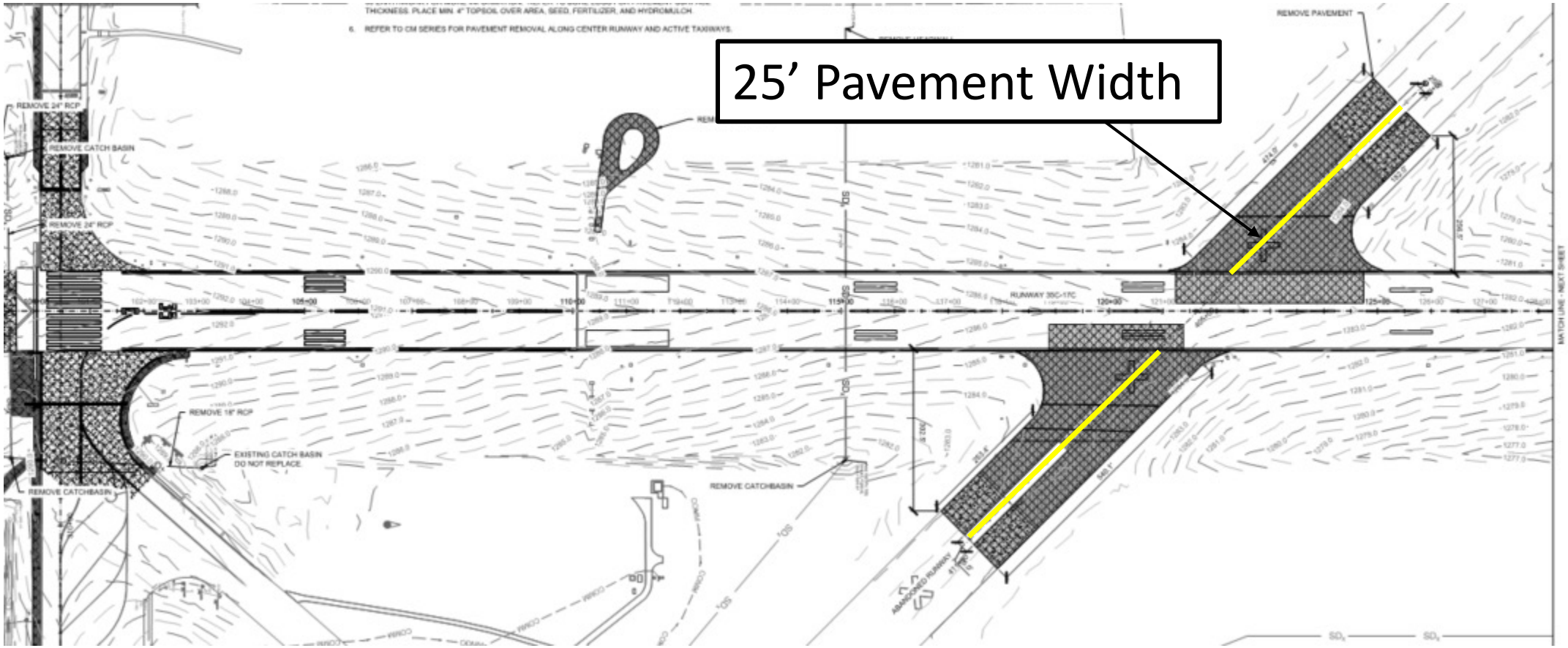
- Base Bid = HMA Section (Type A Traffic Area for Taxiway C and Type C Traffic Area for Taxiway D) with Asphalt Shoulders
- Option = PCC Section (Type A Traffic Area for Taxiway C and Type C Traffic Area for Taxiway D) with Asphalt Shoulders
- Taxiway A and E/F to remain PCC for both



Design Overview - Storm Drainage

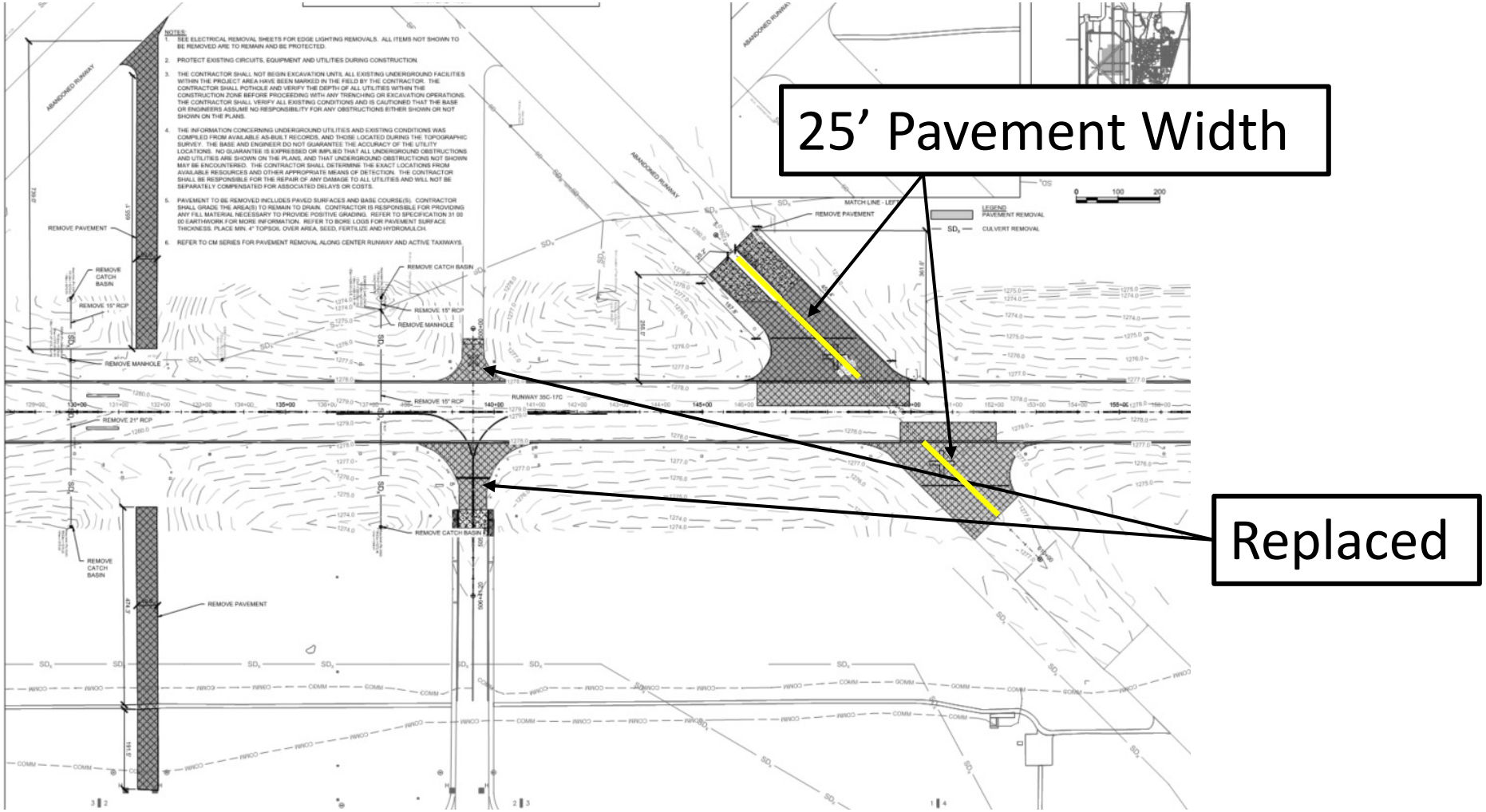
- All new runway and overrun pavement sections will have a new drainage layer placed within the section due to existing high surface water.
- An underdrain system will be placed along the pavement edges of the Runway, overruns, and portions of connecting Taxiways.
- Underdrain outlet pipes drain to existing structures or ditch lines.
- Capacity of 4 existing culverts under runway was increased for flow capacity.
  - Increased slopes, diameter, and both where possible
- Grading of Runway and Taxiway shoulders to improve drainage.

Design Overview - Storm Drainage



Pavement Removal for EISA 438 Compliance

Design Overview - Storm Drainage



Pavement Removal for EISA 438 Compliance

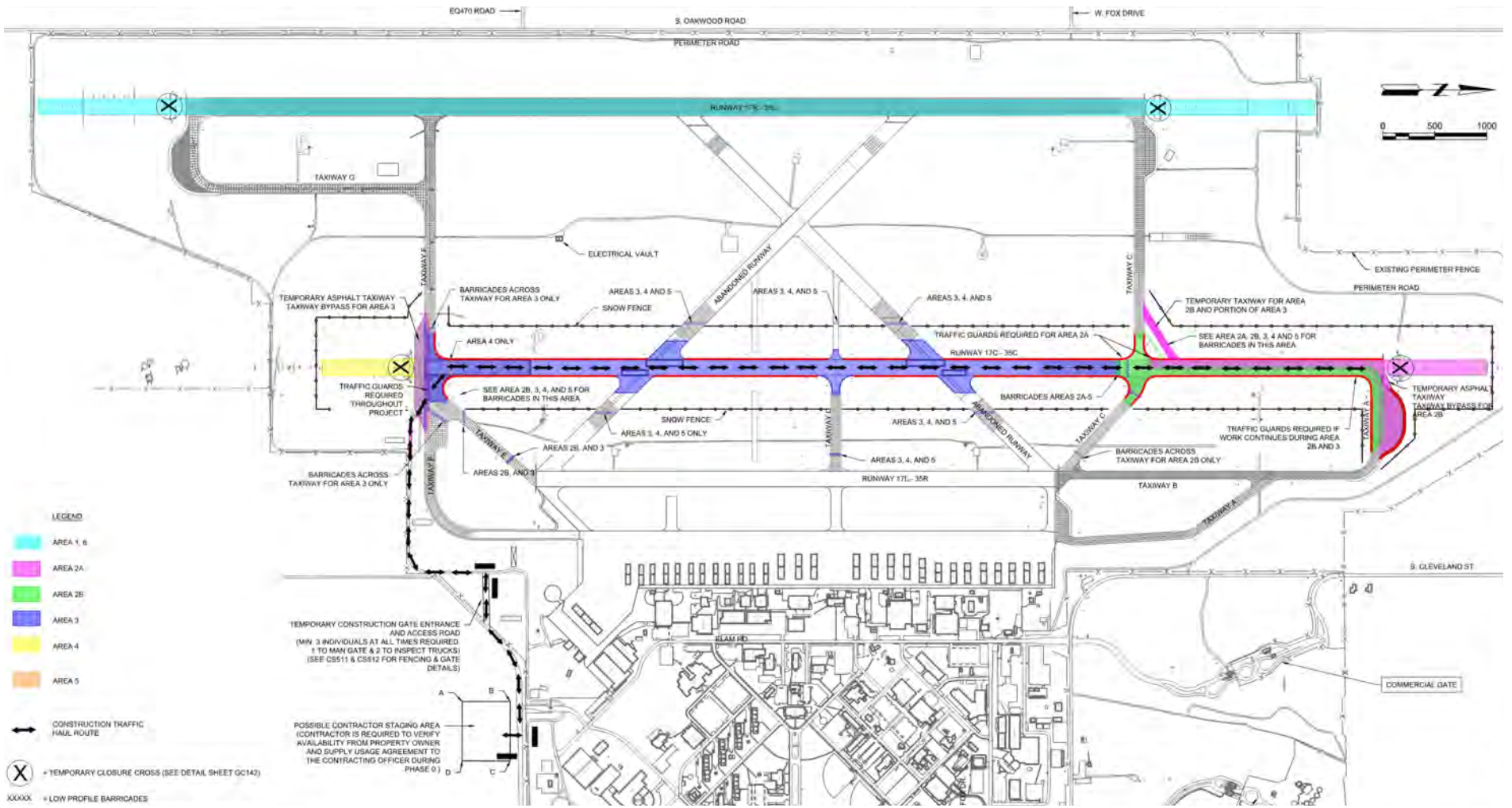
17C/35C Pavement Markings

Pavement Markings

- **Existing:** The existing Runway is currently marked as a Precision Instrument Runway in each direction. The markings consist of solid threshold, Runway designation, fixed distance, centerline, edge stripes, and touch down zone markings.
- The Overruns are currently marked per the old UFC criteria with the solid yellow chevron points starting at the Runway threshold location.
- **Proposed:** The new Runway, Taxiway and Overrun markings were designed according to the current UFC 3-260-04.
- The Runway will be marked as a Precision Instrument Runway. The markings will closely mimic the existing, with the addition of a threshold bar placed. Taxiways to be re-marked to the existing hold lines, with deceptive markings placed on the new paved shoulders.

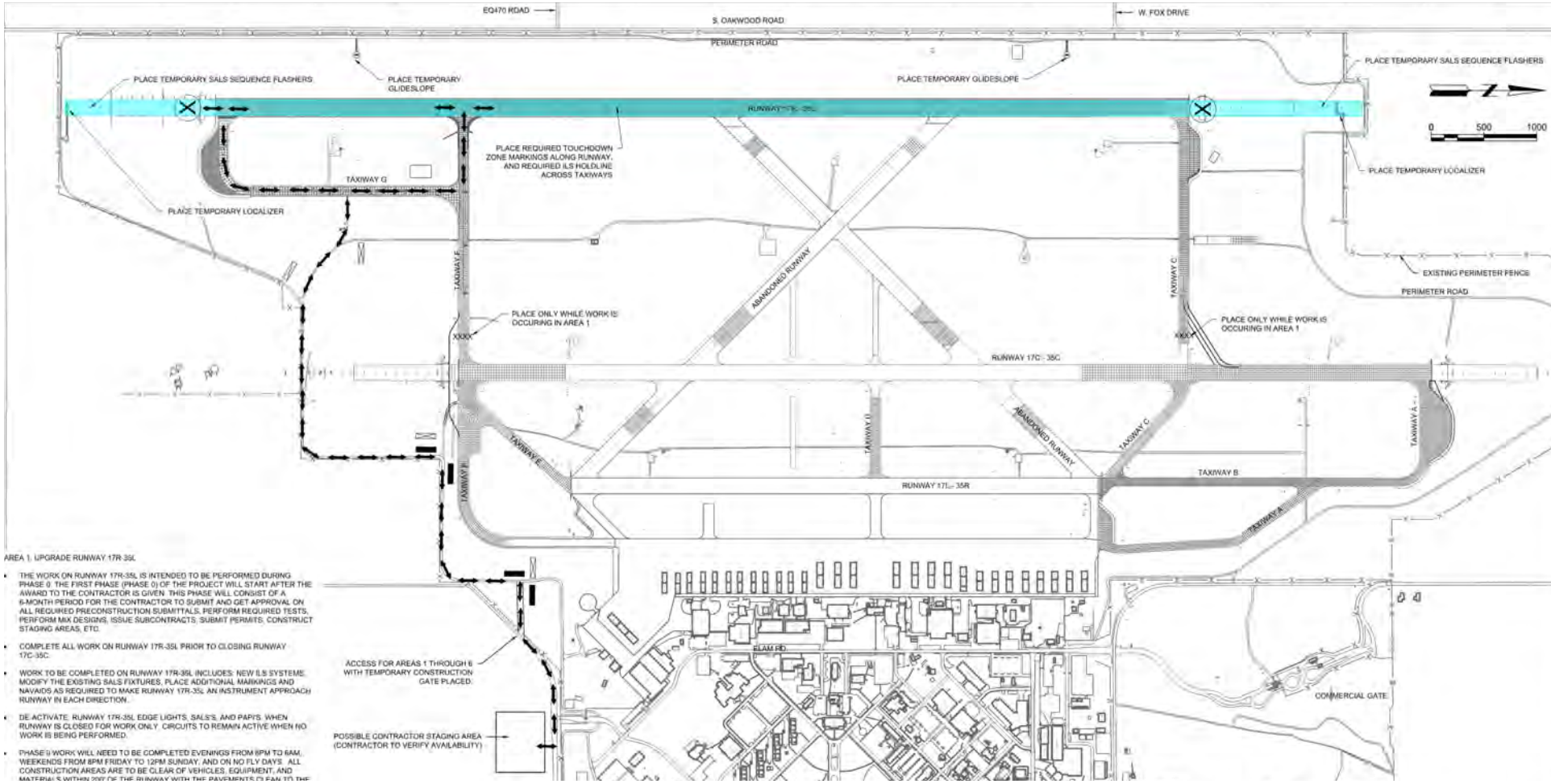
Project Construction Phasing – Overall Project Phasing

- 2 Phases with 6 construction Areas
- Phase 0 is a 7-month period for Contractor prep time prior to Center Runway Closure, along with work performed in Area 1.
- Area 1 performed during Weekends, Night work, no fly days.
- Phase 1 is actual Center Runway Construction period (Areas 2-5)
- Area 6 performed after Center Runway is operational. Same work times as Area 1.
- All Areas maintain Aircraft taxi access to the Outside Runway via two locations throughout the duration of the project



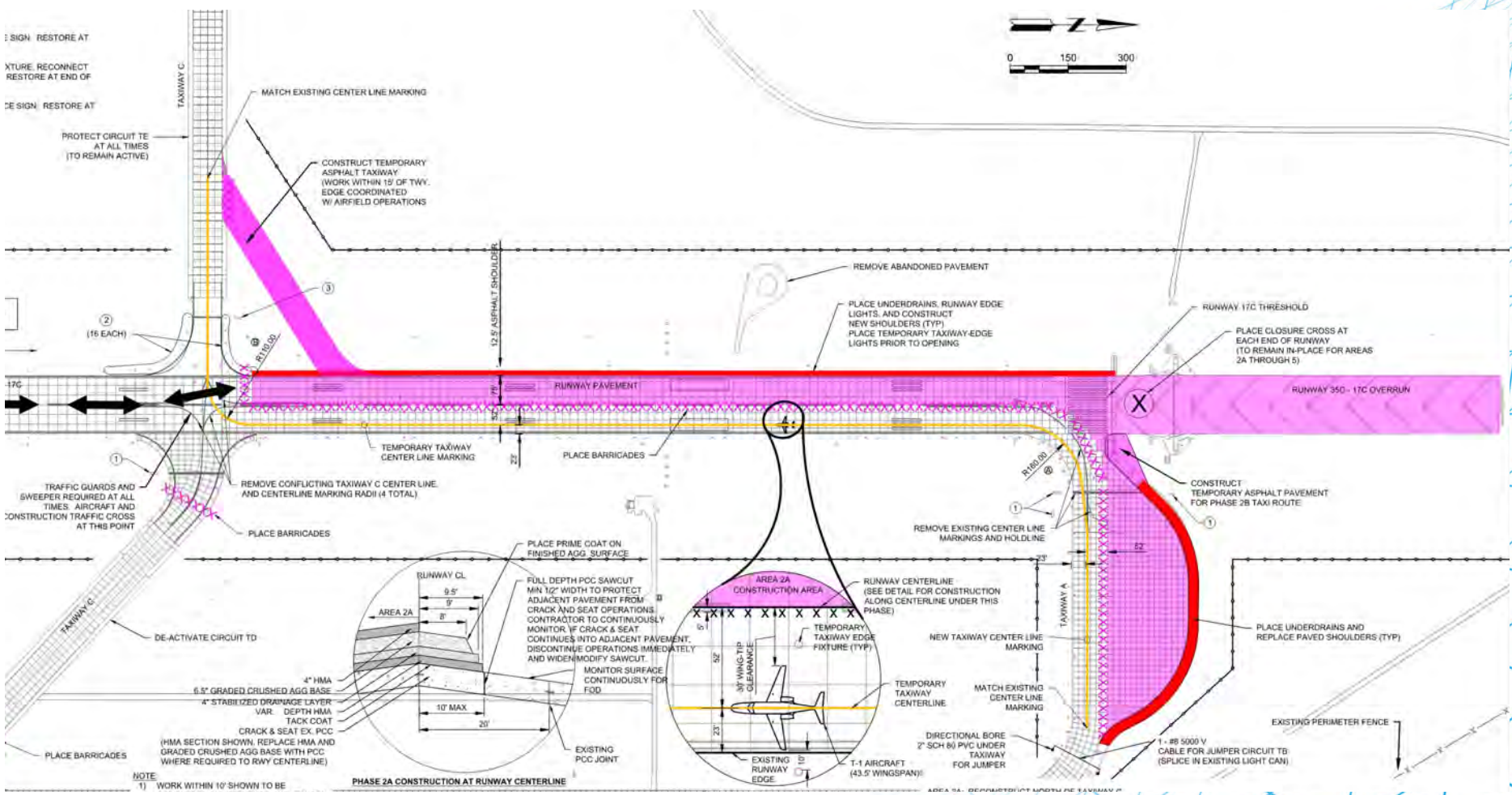
Project Construction Phasing – Area 1

- Area 1 – Completed prior to RWY 17C/35C shutdown
  - Install new ILS on Runway 17R/35L and add Sequence Flashers to SALS
  - Add additional markings to Runway 17R/35L
  - Runway 17R/35L would become a Precision Runway with Instrument Approaches to both Ends
  - Access to Runway 17R/35L by Perimeter Road



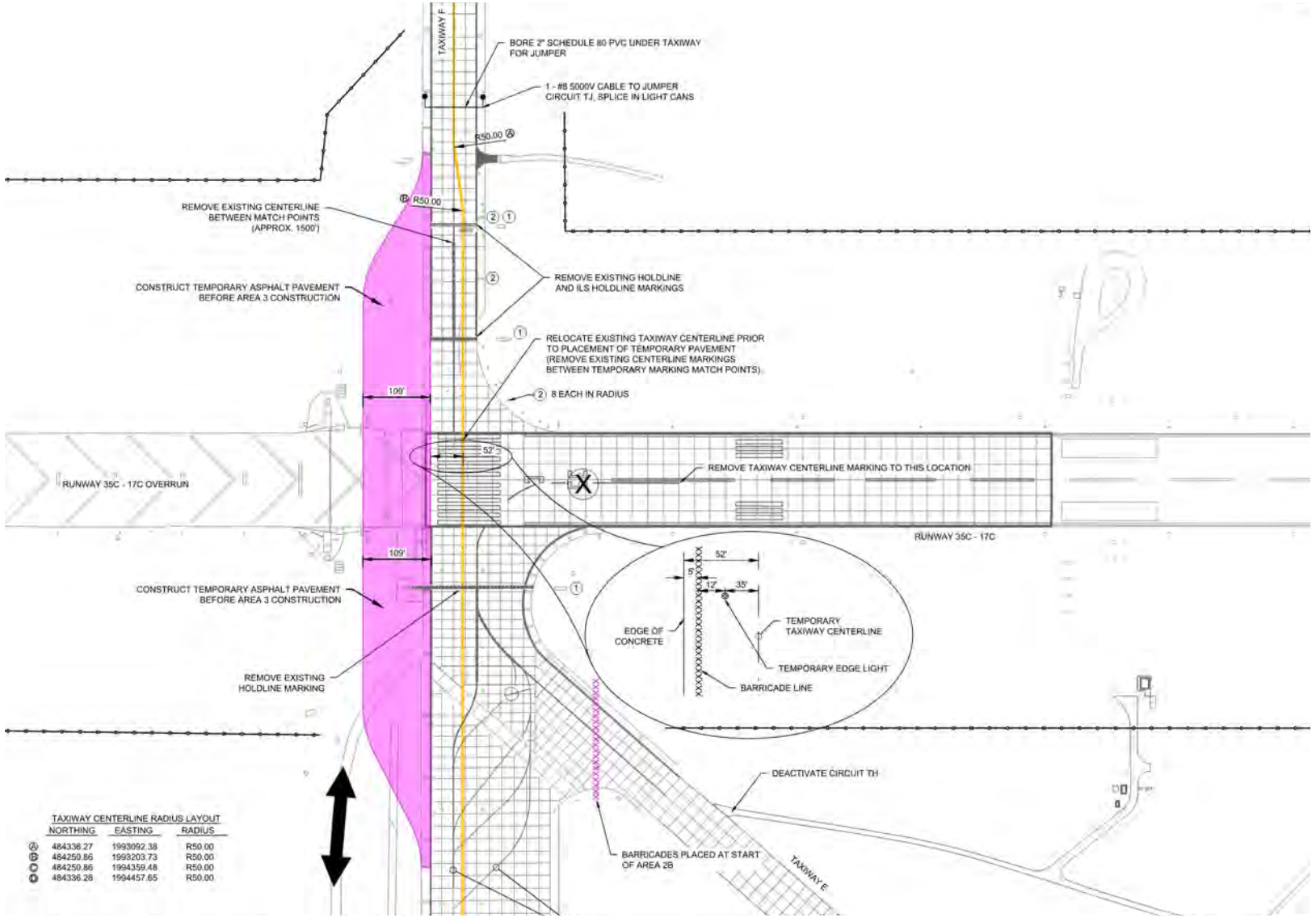
Project Construction Phasing – Area 2A

- Area 2A
  - Place required closure crosses on Runway 17C/35C (to remain entire project).
  - Remove Runway 17C/35C designations and threshold markings at each end of the Runway.
  - Construct the temporary taxiway at the intersection of Taxiway C and Runway 17C/35C.
  - Construct the temporary taxiway pavement at the intersection of the runway threshold and north warm-up apron.
  - Construct the western paved shoulder from the 17C threshold to north of Taxiway C.
  - Replace the western half of Runway from the 17C threshold to north of Taxiway C.
  - Provide a new asphalt surface on the northern Overrun.
  - Replace the required paved shoulder along the northern edge of warm-up apron in order to place an underdrain system to help remove the subsurface water issue in this area.
  - Replace Edge Lighting, Threshold Bar, BAK-15,and ALS items in the Overrun.



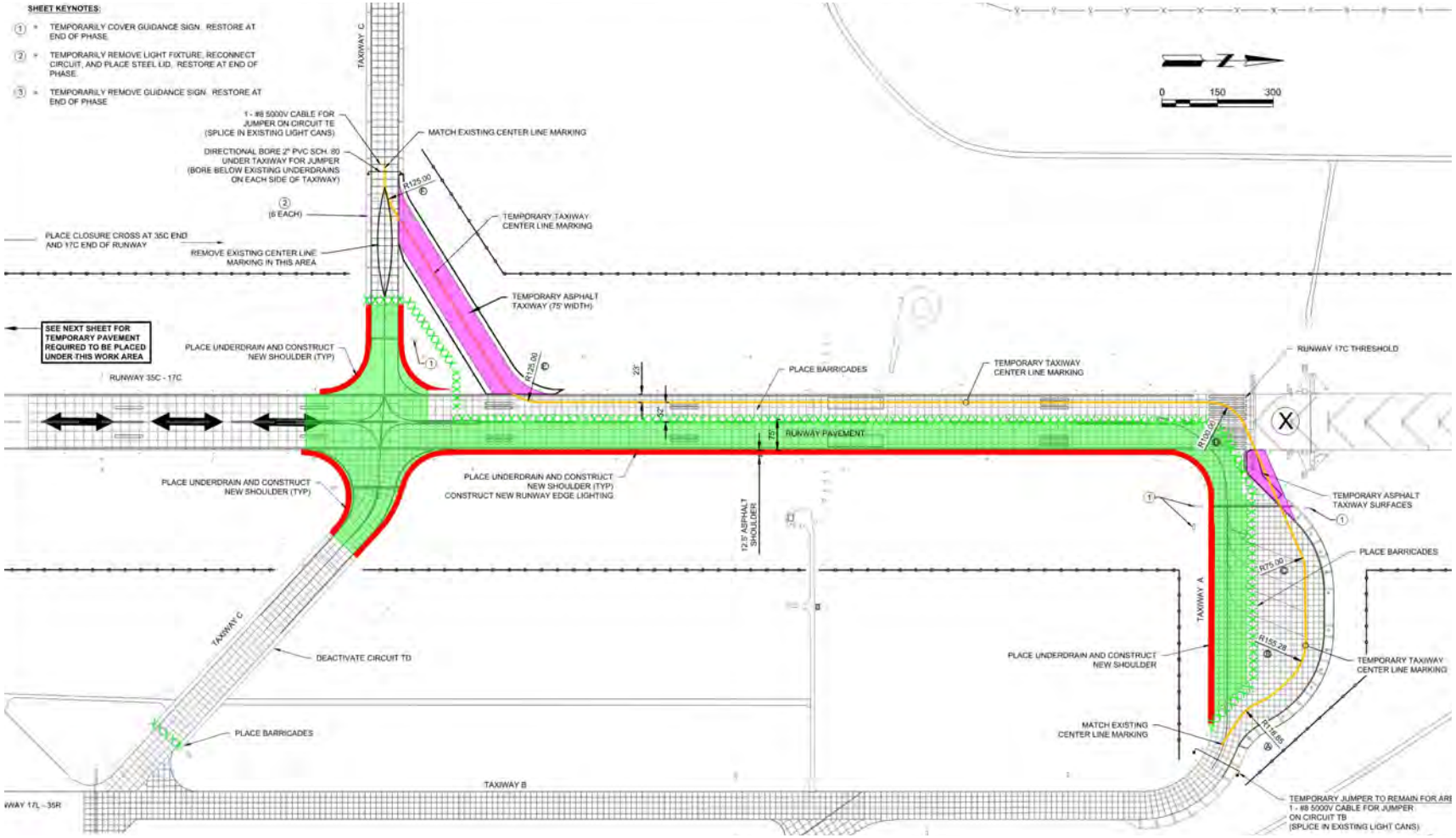
Project Construction Phasing – Area 2A South

- Area 2A
  - Construct a Temporary Taxiway along the Southern Edge of the 35C threshold for aircraft taxiing during Phase 3.
  - Length of Temporary Taxiway was driven by extent of work being completed on Taxiways E and F.



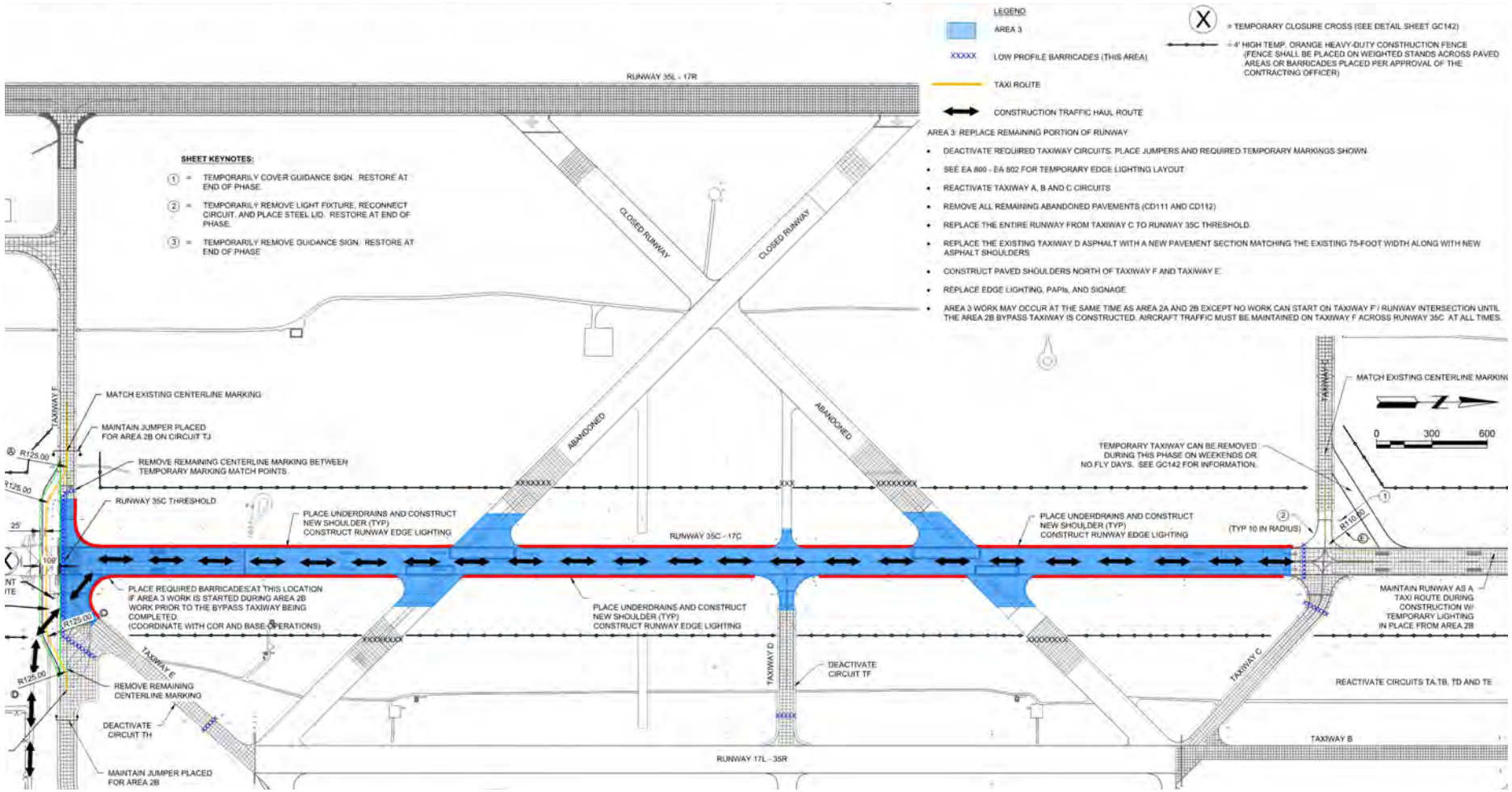
Project Construction Phasing – Area 2B North

- Area 2B North
  - Replace the eastern half of the Runway short of the 17C threshold to south of Taxiway C, including the entire Runway and Taxiway C intersection.
  - Construct the eastern paved shoulder along the Runway from the south side of Taxiway A to north of Taxiway C.
  - Replace the required paved shoulder along the southern edge of Taxiway A in order to place an underdrain system to help remove the subsurface water issue in this area.
  - Replace edge lighting, PAPI's, and signage



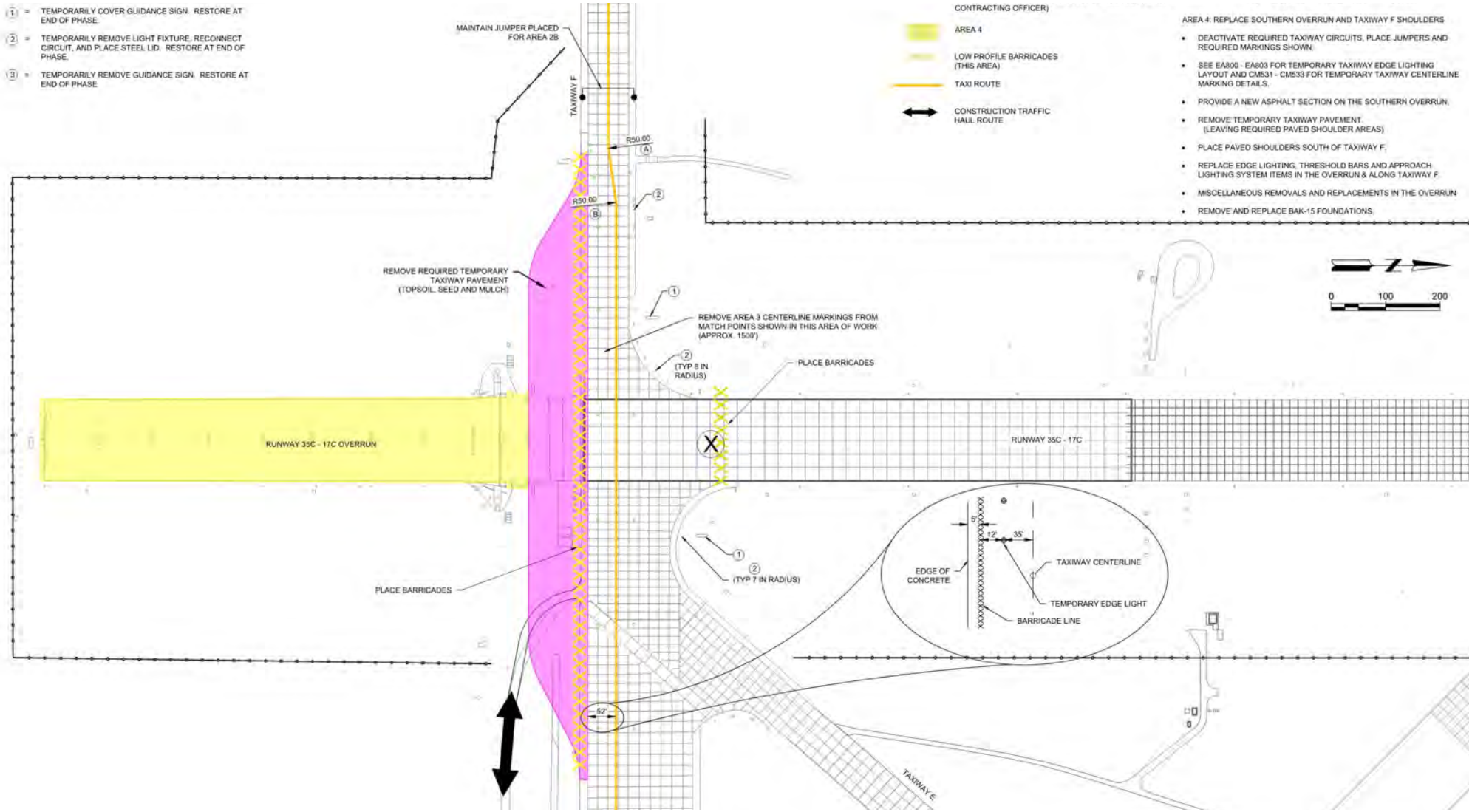
Project Construction Phasing – Area 3

- Area 3
  - Replace the entire Runway from Taxiway C to the Runway 35C threshold.
  - Replace the existing Taxiway D asphalt with a new pavement section matching the existing 75’ width along with new asphalt shoulders.
  - Construct paved shoulders along the Runway from Taxiway C to Taxiway F.
  - Construct paved shoulders north of Taxiway F and Taxiway E.
  - Replace edge lighting, PAPI’s, and signage.
  - Temporary Taxiway Removal



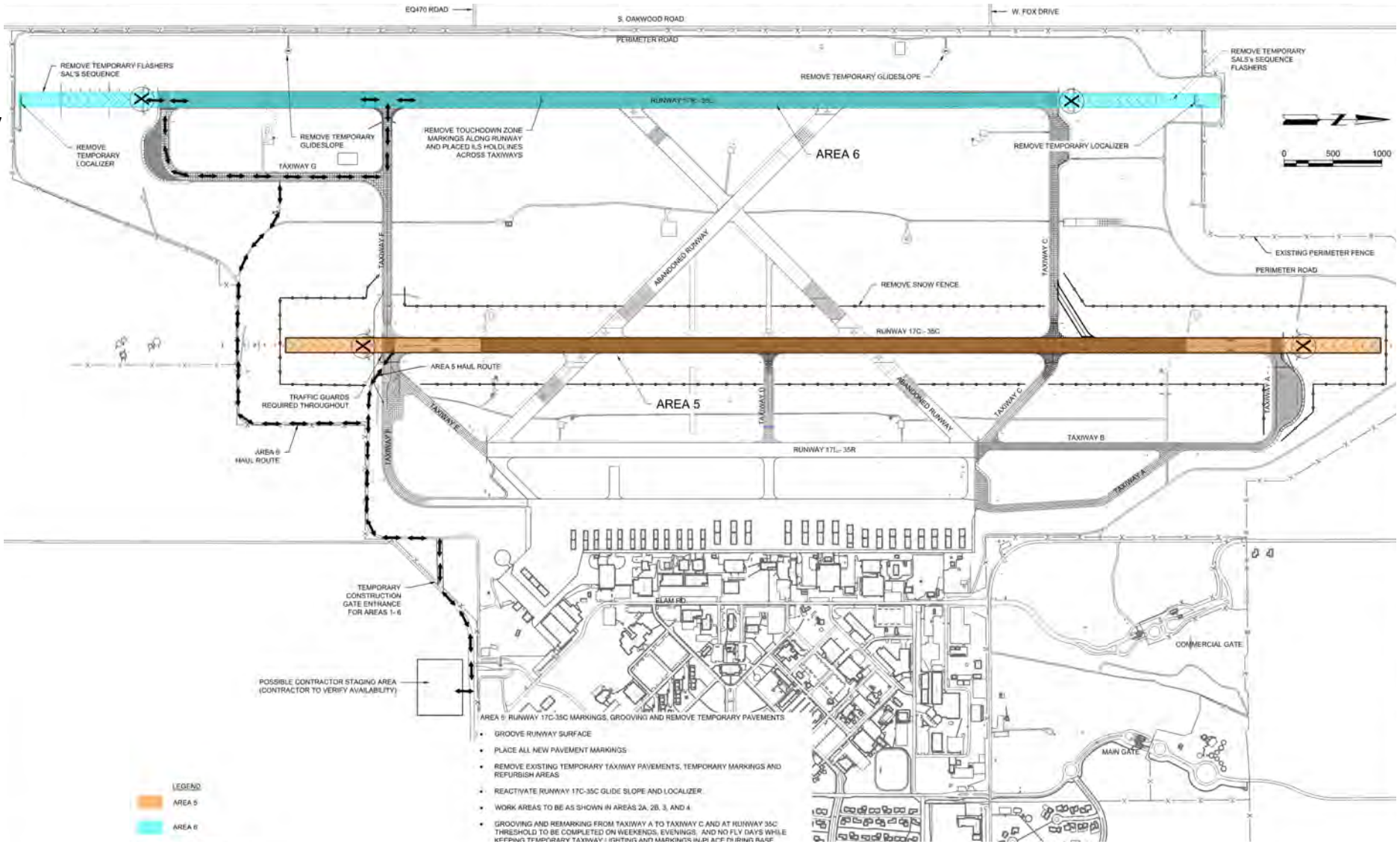
Project Construction Phasing – Area 4

- Area 4
  - Provide a new asphalt surface on the Southern overrun.
  - Place paved shoulders South of Taxiways E and F.
  - Replace edge lighting, threshold bars, BAK-15, and ALS items in the Overrun.
  - Remove Temporary Taxiway south of Taxiways E and F.



Project Construction Phasing – Areas 5 & 6

- Area 5
  - Place all new pavement markings.
  - Remove the existing temporary taxiway pavement at the Taxiway C intersection and refurbish areas.
  - Remove the haul routes and refurbish areas.
  - Remove the Runway closure crosses and barricades.
  - Remove erosion control items (silt fence).
- Area 6
  - Remove Runway 17R/35L installed ILS systems, SALS sequence flashers, markings and NAVAIDs that converted the Runway into a temporary precision instrument approach Runway. This work shall be completed on weekends, night work, and scheduled no-fly days.



Construction Schedule

Basis of Construction Schedule – Critical Path

- Award Contract – ?
- Project Startup – 15 Days
- Phase 0 – 183 Days
  - Subcontractor Agreements & Purchase Orders
  - Area 1 – RWY 17R-35L – 66 Days
    - Glideslope & Localizer Equipment Install – 45 Days
    - Flight Check – 14 Days
    - Punchlist & Acceptance of Area 1 Work – 7 Days
- Phase 1 – 403 Days
  - **Runway 17C-35C Shutdown**
  - Traffic Control – 2 Days
  - Area 2A
    - Temporary Taxiway Edge Lighting– 4 Days
    - Underdrains – 18 Days
    - Mill PCC – 9 Days
    - Crack & Seat existing PCC & Test Section – 16 Days
    - Var. Depth HMA Leveling Layer & Test Section – 30 Days
    - Drainage Layer & Test Section & Cure Time – 23 Days
    - PCC Pavement & Test Section – 50 Days
    - PCC Pavement Cure Time – 28 Days
    - HMA Pavement & Test Section – 37 Days
    - HMA Pavement Cure Time – 30 Days
    - Area 2A Acceptance – 6 Days
  - Area 2B
    - Traffic Control – 2 Days
    - Temporary Taxiway Edge Lighting – 3 Days
    - Underdrains – 15 Days
    - Mill PCC – 9 Days
    - Crack & Seat existing PCC – 7 Days
    - Var. Depth HMA Leveling Layer – 8 Days
    - Drainage Layer & Cure Time – 15 Days
    - PCC Pavement – 20 Days
    - PCC Pavement Cure Time – 28 Days
  - Area 5
    - Removal of Temporary Pavement Markings – 12 Days
    - Runway Grooving – 14 Days
    - Pavement Markings – 12 Days
    - Removal of Traffic Control – 3 Days
  - Weather Delays – 49 Days
  - **Runway 17C-35C Opening**
  - Area 6
    - Glideslope & Localizer Equipment & Pavement Marking Removal – 21 Days
    - Punchlist & Acceptance of Area 6 Work – 12 Days

Thank you