Terminal Facilities

Construction Program and Projects

Presented to: Service-Disabled Veteran-Owned Small Business Vendors

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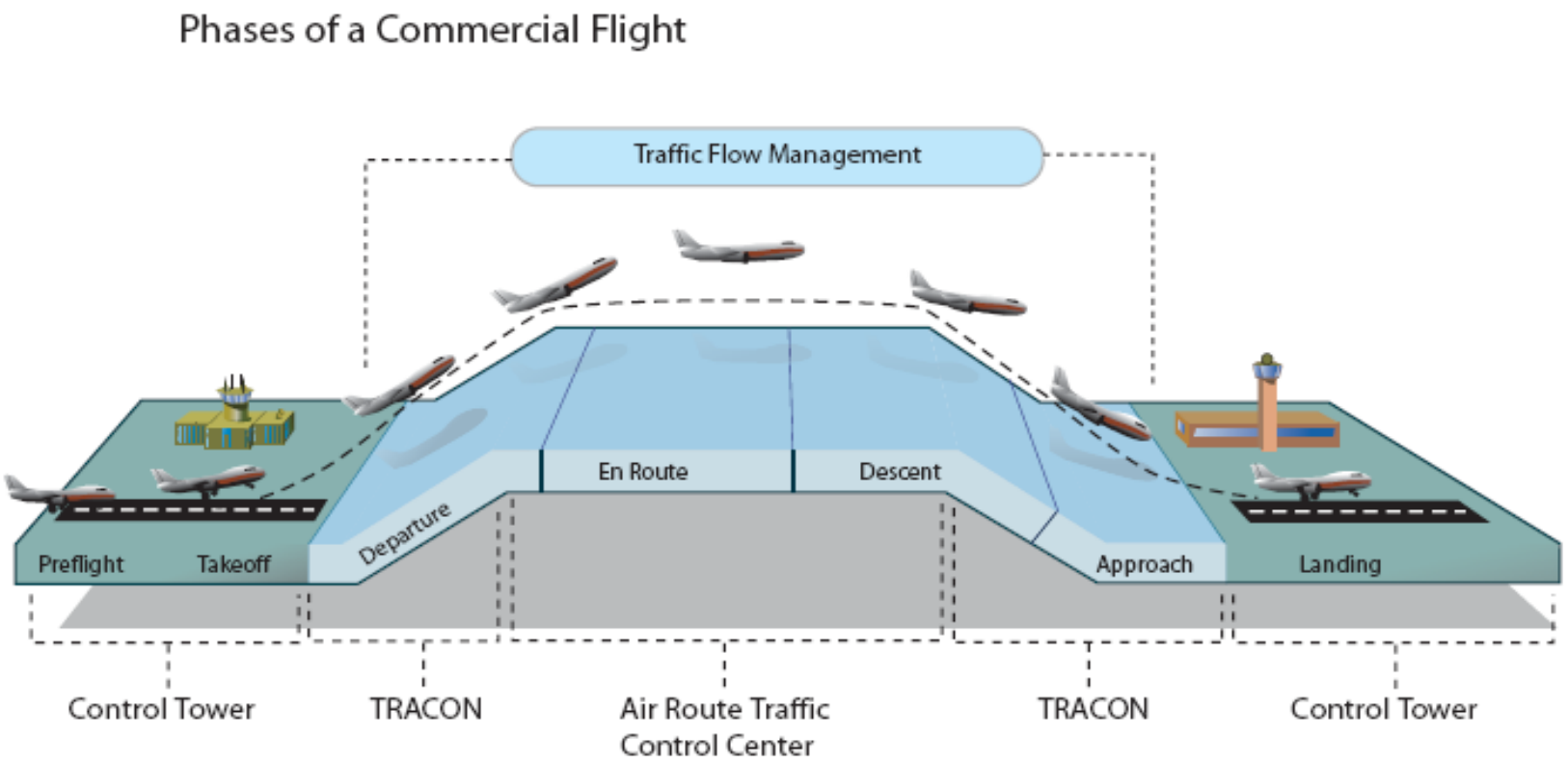
Federal Aviation Administration

About the Speaker

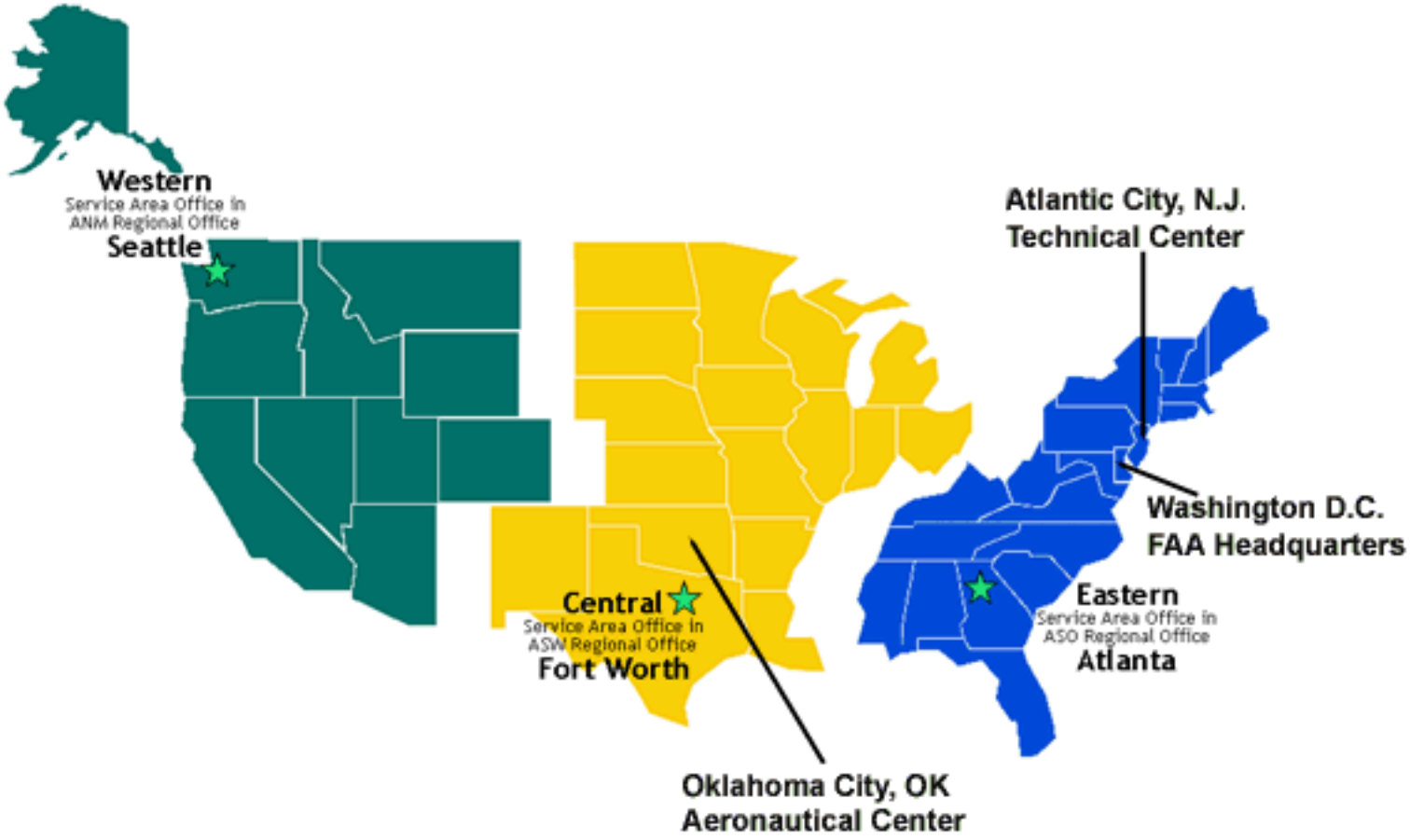
- **Education**
  - BSCE, University of California 1982
  - BS WFB, University of California 1982
- **Work History (FAA)**
  - Resident Engineer 1982 - 1987
  - Project Engineer 1987 - 1991
  - Field Supervisor Construction 1991 - 1993
  - Manager Engr/Construction (Enroute) 1993 - 1998
  - Manager Engr/Construction (Terminal) 1998 - Present
- **Professional Licenses**
  - Civil Engineering – California

Phases of a Commercial Flight

FAA
Air Traffic Organization



FAA Service Area Map



Terminal Facilities in WSA

- **Airport Traffic Control Tower (ATCT)**
- **Terminal Radar Approach Control Facility (TRACON)**
- **485 ATCT's Nation-wide (267 FAA Operated)**
- **139 ATCT's in Western Service Area**

Facility Activity Level

Our Facilities

Facility Levels

The ATO has several classification levels for over 300 facilities that are based on numerous factors including traffic volume, complexity and sustainability of traffic. Facilities are monitored continuously for upward and downward trends to adjust staffing levels and provide the appropriate level of support.

Level 12 facility
Examples: New York Center, Memphis Center, Potomac TRACON, Atlanta TRACON, Charlotte/Douglas Intl Tower, Chicago O'Hare Tower

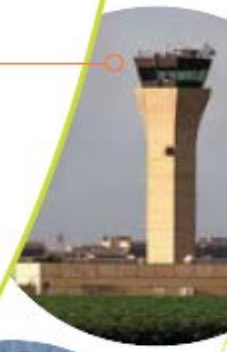
Level 11 facility
Examples: Houston Center, Kansas City Center, Minneapolis TRACON, Las Vegas TRACON, Phoenix Sky Harbor Tower, Los Angeles Intl Tower

Level 10 facility
Examples: Albuquerque Center, Seattle Center, Salt Lake City TRACON, St. Louis TRACON, San Antonio Intl Tower, Pittsburgh Intl Tower

Level 9 facility
Examples: San Juan CERAP, Anchorage TRACON, Portland TRACON, Port Columbus Intl Tower, Daytona Beach Intl Tower

Level 8 facility
Examples: Tucson TRACON, Chicago Midway Tower, Atlantic City Intl Tower, Will Rogers World Airport Tower, Van Nuys Tower

Level 7 facility
Examples: El Paso Intl Tower, Fort Wayne Intl Tower, East Texas Regional Tower, Grand Forks Intl Tower



Level 6 facility
Examples: Andrews AFB Tower, Duluth Intl Tower, Sacramento Intl Tower, Flying Cloud Tower

Level 5 facility
Examples: Ann Arbor Municipal Tower, Great Falls Intl Tower, Juneau Intl Tower, Grand Canyon National Park Tower

Level 4 facility
Examples: Columbus Metropolitan Tower, Purdue University Tower

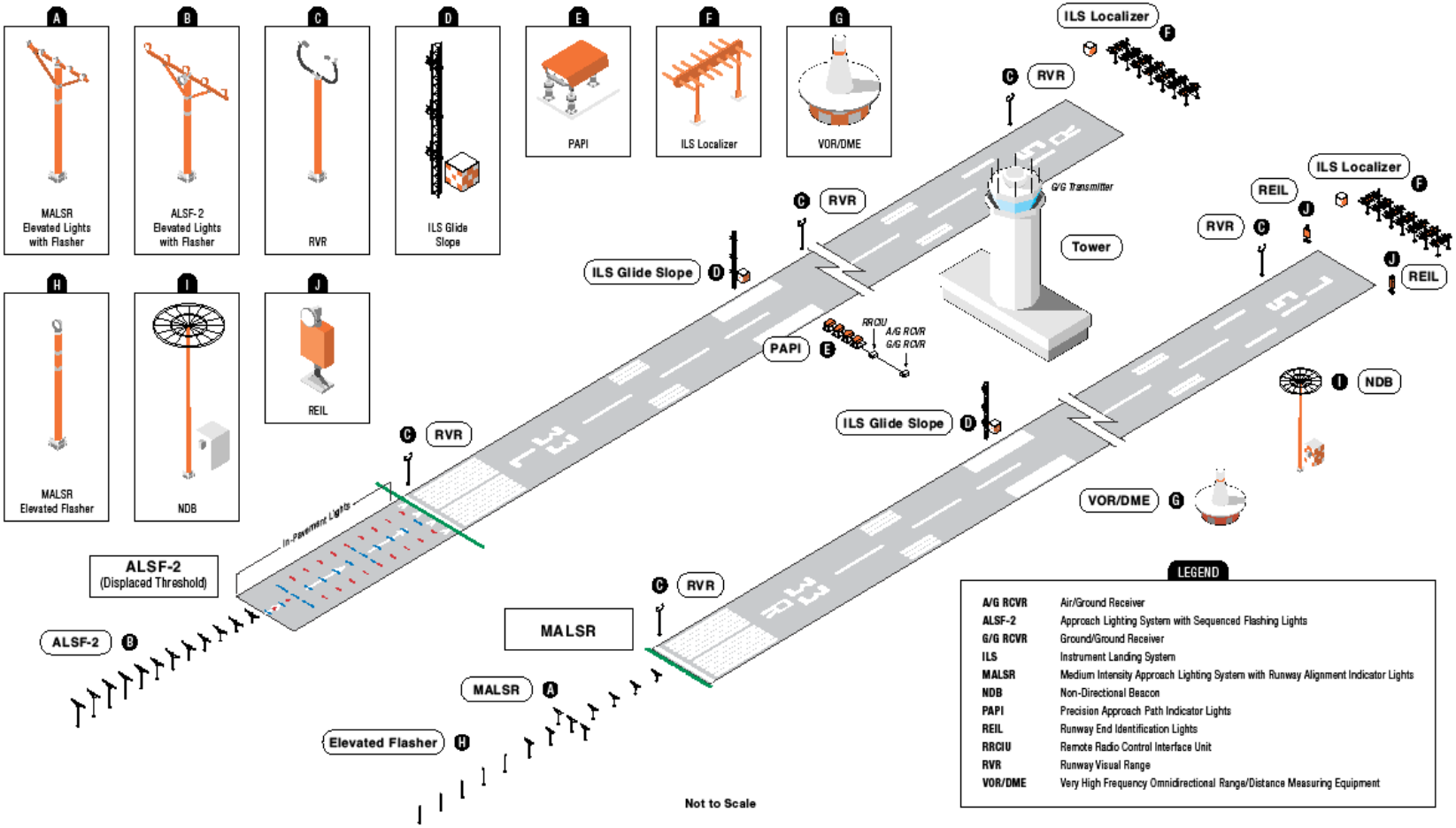
Commonly Used Acronyms

Commonly Used Acronyms

Acronym	Definition
ADS-B	Automatic Dependent Surveillance Broadcast
AIP	Airport Improvement Program
AMASS	Airport Movement Area Safety System
ANSP	Air Navigation Service Provider
ASAP	Aviation Safety Action Program
ASDE-X	Airport Surface Detection Equipment-Model X
ARP	Airports
ATC	Air Traffic Control
ATCS	Air Traffic Control Specialist
ATSS	Airway Transportation Systems Specialist
ARTCC	Air Route Traffic Control Centers
ATCSCC	Air Traffic Control System Command Center
AT-CTI	Air Traffic Collegiate Training Initiative
ATO	Air Traffic Organization
AVS	Aviation Safety
CAEP	ICAO Committee on Aviation Environmental Protection
CAST	Commercial Aviation Safety Team
CEDR	Center for Early Dispute Resolution
COSP	Continued Operational Safety Program
EASA	European Aviation Safety Agency
ERAM	En Route Automation Modernization
FAA	Federal Aviation Administration
FOQA	Flight Operational Quality Assurance
FY	Fiscal Year
GNSS	Global Navigation Satellite System
ICAO	International Civil Aviation Organization
JPDO	Joint Planning and Development Office
NAS	National Airspace System
NextGen	Next Generation Air Transportation System
NOTAM	Notice to Airmen
OEP	Operational Evolution Partnership
PBO	Performance-based Organization
PMA	President's Management Agenda
PRM	Precision Runway Monitor
RNAV	Area Navigation
RNP	Required Navigation Performance
SIDs	Standard Instrument Departures
SRM	Safety Risk Management
SMS	Safety Management System
STARS	Standard Terminal Automation Replacement System
STARs	Standard Terminal Arrival Routes
TFM	Traffic Flow Management
TMA	Traffic Management Advisor
TRACON	Terminal Radar Approach Control
UAS	Unmanned Aircraft System
UTC	Coordinated Universal Time
VASIP	Voluntary Aviation Safety Information Program
WAAS	Wide Area Augmentation System

Standard ATCT Facilities

Navigation & Landing Equipment



General Nav-Aids Description

Ground-Based Navigation

Ground-based navigation capability is provided by the traditional, currently installed and operating systems described below.

Instrument Landing System (ILS)

The ILS has been the mainstay of landing aids for well over 50 years. The modernized versions in the FAA inventory today provide aircraft with precision vertical and horizontal navigation guidance information during approach and landing. Associated marker beacons and Distance Measuring Equipment (DME) identify distance to the runway. The attractiveness of ILS lies in the economy of its avionics costs and its wide acceptance. Technology advances over the years have yielded great improvements in accuracy, dependability, and maintainability.

Runway Visual Range (RVR)

The RVR system combines the measured values of visibility, background light level, and runway light intensity to determine the runway visual range, the distance a pilot should be able to see down the runway on takeoff and landing. This value is used by air traffic controllers to define the precision category of operations at an airport. The new generation RVR system (on right) incorporates the latest technology, including the forward scatter visibility sensor. This sensor determines visibility by measuring the amount of light scattered off obscuring matter such as fog, rain, or snow. The new generation RVR operates in all meteorological conditions and can accurately measure runway visual range values between 6,500 and 150 feet.

High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2)

The ALSF-2 is a high intensity approach lighting system (ALS) installed symmetrically along the extended centerline starting at the runway threshold and extending a distance of 2,400 up to 3,000 feet outward into the approach zone. The ALSF-2, consisting of a combination of steady burning light bars and sequenced flashers, provides visual information to pilots on runway alignment, height perception, roll guidance, and horizontal references for Category II and III precision approaches.

Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR)

The MALSR is a medium intensity approach lighting system (ALS) installed in airport runway approach zones along the extended centerline of the runway. The MALSR, consisting of a combination of steady burning light bars and flashers, provides visual information to pilots on runway alignment, height perception, roll guidance, and horizontal references for Category I precision approaches.

Runway End Identifier Llights (REIL)

The REIL is a visual runway end identifier system consisting of two synchronized flashing white lights, one on each side of the runway landing threshold. The REIL system helps pilots quickly identify the runway threshold that otherwise might be obscured by a variety of environmental conditions.

Precision Approach Path Indicator (PAPI)

The PAPI is a visual glide slope indicator system consisting of four light boxes arranged perpendicular to the edge of the runway. The PAPI projects a pattern of red and white lights along the desired glide slope. This relatively inexpensive system, installed at large and small airports throughout the country, provides visual approach slope information to pilots operating under visual flight rule (VFR) conditions. It enables them to make stabilized descent and approach-slope clearance over obstructions. It is also being used for land and hold short operations (LAHSO) as well as in instrument flight rule (IFR) conditions to improve safety.

VHF Omnidirectional Range (VOR)/Distance Measuring Equipment (DME)

The Very-high frequency (VHF) Omnidirectional Range/Distance Measuring Equipment (VOR/DME) network provides users with a highly reliable primary means of navigation for enroute flight and non-precision approaches. The network consists of more than 1,000 VOR, VOR/DME or VORTAC (VOR co-located with Tactical Air Navigation (TACAN)) facilities.

To supplement the VOR/DME network, the FAA provides more than 700 Non-Directional Beacons (NDB) that are used as compass locators to aid in finding the initial approach point for non-precision approaches at low-traffic airports, without convenient VOR approaches, and for enroute operations in some remote areas. NDBs are also used in transitioning from oceanic to domestic en route airspace.

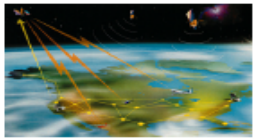
Satellite-Based Navigation

Satellite-based navigation capability of the future is based on the Global Positioning System (GPS), augmented by the two NAS systems described below.

Global Positioning System (GPS)

The technology behind GPS is relatively simple. A constellation of 24 satellites orbiting 11,000 miles above the earth emits signals to receivers on earth. By measuring the travel time of a signal transmitted from each satellite, a receiver can calculate its distance from that satellite. Satellite positions are used by a receiver as precise reference points to determine the location of the receiver. When receiving the signals from at least four satellites, a GPS receiver can determine latitude, longitude, altitude, and time.

Wide Area Augmentation System (WAAS)



The WAAS will allow GPS to be used as a primary means of navigation from takeoff through Category I precision approach. WAAS is a critical component of the FAA's strategic objective for a seamless satellite navigation system for civil aviation. This system will improve the accuracy, availability, and integrity, thereby improving capacity and safety currently provided by GPS.

Local Area Augmentation System (LAAS)

LAAS is an augmentation to GPS that focuses its service on a local area (approximately a 20 -30 mile radius), such as an airport. It broadcasts its correction message via a very high frequency (VHF) radio datalink from a ground-based transmitter. LAAS will yield the extremely high accuracy, availability, and integrity necessary for Category I, II, and III precision approaches, and will provide the ability for more flexible, curved approach paths.

Terminal Facilities' Projects

- **Establish/Replace**
  - New ATCT or TRACON
- **Modernization**
  - Major Remodel or Overhaul of the Building
- **Sustainment**
  - Minor Remodel or Overhaul of Single System

Establish/Replace Projects

- **Complete replacement of an existing of establishment of a new facility**
- **Cost from $10 Million to $100 Million**
- **Capital Projects with Congressional Approval**

Modernization Projects

- **Larger scale renovations of major areas, or multiple systems within a specific facility**
- **Generally costs exceed $1 Million**
- **Sometimes multi-year or multi-phased**

  (Set Up Mobil ATCT, FAA Installation, Contractor Construction, FAA Installation, Remove Mobil ATCT)

Sustainment Projects

- **Backlog of maintenance items**
- **Vast Majority of Current & Upcoming Work**
- **Generally below $1 Million**
- **Types of Projects:**
  - Upgrade HVAC System (Replace Chiller)
  - Electrical Upgrades
  - Replace Roof
  - Fire suppression/detection system upgrades
  - Interior finishes

Upcoming Terminal Projects

- **Modernization/Sustainment Projects:**
  - Replace ATCT Roof (Kenai, AK)
  - Caulk External Precast Vertical Joints ATCT (Denver, CO)
  - Replace Six (6) A/C Units on Base Building Roof (Moses Lake, WA)
  - Replace HVAC Units for Base Building (Klamath Falls, OR)
  - Replace ATCT Failed Window Glass Units (Pocatello, ID)

Upcoming Terminal Projects

- **Modernization/Sustainment Projects:**
  - Replace the Vertical Chilled Water Piping up the ATCT (Denver, CO)
  - Replace Rooftop HVAC Unit on ATCT (Olympia, WA)
  - Replace Equipment Room HVAC Unit (Tacoma Narrows, WA)
  - Replace All A/C Systems and All Associated Piping, Electrical (Pueblo, CO)
  - Replace Reciprocating York Chillers (Seattle, WA)

Upcoming Terminal Projects

- **Modernization/Sustainment Projects:**
  - Replace Stairs/Decking to Admin. Trailer (San Carlos, CA)
  - Replace Tower Cab Consoles (Hilo, HI)
  - Repair the ATCT and Base Building Roofs (Las Vegas, NV)
  - Replace Tower Cab Consoles (Santa Monica, CA)
  - Replace ATCT Roof (San Diego, CA)

Upcoming Terminal Projects

- **Modernization/Sustainment Projects:**
  - Repair Base Building Roof (Sacramento, CA)
  - Electrical Safety Replace/Relocate Equipment (Concord, CA)
  - Replace ATCT Cab Roof (Molokai Kauna, HI)
  - Replace Existing Control Cab & Facility A/C Systems (Saipan Obyan, CQ)
  - Replace Main Service Entrance Power to ATCT Building (Santa Ana, CA)

Upcoming Terminal Projects

- **Modernization/Sustainment Projects:**
  - Replace Fire/Life Safety UPS Batteries (Phoenix, AZ)
  - Replace Existing Air Handling Unit (Phoenix, AZ)
  - Modernize ATCT/TRACON Building Elevator (Santa Barbara, CA)
  - Refurbish ATCT Building Elevator (Burbank, CA)
  - Replace Exterior Lighting (Santa Barbara, CA)
  - Repair Roof Cab Walkway Area (Gillespie Field, CA)

Upcoming Terminal Projects

- **Modernization/Sustainment Projects:**
  - Repair Parking Lighting ATCT/TRACON Building (Phoenix, AZ)
  - Replace Existing Roof, Install PVC Membrane (Flagstaff, AZ)
  - Replace Existing Roof, Install PVC Membrane (Prescott, AZ)
  - Refurbish Control Cab Guardrail (Santa Monica, CA)
  - Replace Control Cab Roof (Brown Field, CA)

Upcoming Terminal Projects

- **Modernization/Sustainment Projects:**
  - Replace Existing Three (3) 50-Ton Chillers TRACON Building (Edwards AFB, CA)
  - Replace Emergency Lighting Power Conditioning System (Oahu, HI)
  - Replace Elevator Drive/Controller ATCT (Hilo, HI)
  - Optimize Existing or Install New Cooling at ATCT PCS Room (Anchorage, AK)
  - Replace Roof top HVAC Serving ATCT Equipment Room (Great Falls, MT)

Upcoming Terminal Projects

- **Modernization/Sustainment Projects:**
  - Replace/Repair/Re-Caulk Exterior Metal Panels and Other Finishes (Kenai, AK)
  - Replace Membrane Roof on Engine Generator Building (Bellingham, WA)
  - Replace Multiple HVAC Equipment – Chillers, Pumps, Dry Fluid Coolers (Fairbanks, AK)
  - Repair Water Leak ATCT 10th Floor (Anchorage, AK)
  - Replace ATCT Roof (Pasco, WA)

Upcoming Terminal Projects

- **Modernization/Sustainment Projects:**
  - Replace ATCT Control System Pneumatic with Electronic (Anchorage, AK)
  - Refurbish Elevator & Fire Pump at ATCT Building (Ontario, CA)
  - Replace HVAC and Associated Systems Equipment ATCT Base Building (Colorado Springs, CO)
  - Refurbish Concrete Drainage & Install Safety Barrier ATCT Building (Denver, CO)
  - Elevate Console & Repl. Roof ATCT (Denver, CO)

Upcoming Terminal Projects

- **Modernization/Sustainment Projects:**
  - Refurbish HVAC Systems & Parking Lights (Hilo, HI)
  - Modernize Facilities in Multiple Categories for entire ATCT Building (Long Beach, CA)
  - Replace Roof & Fire Alarm System (Klamath Falls, OR)
  - Replace Chillers and Chilled Water System Components (Portland, OR)
  - Modernize Interior Stairs & Railings (Santa Monica, CA)

Project Working Conditions

- **Working Conditions for Projects:**
  - Electrical System
    - **FAA Requirements for electrical far exceed the NEC.**
  - Asbestos and lead abatement/demolition
    - **FAA Requirements for abatement are extensive.**
  - Projects Accomplished at Night.
  - Subject to Continuous Inspection
  - ATC Operations are Continuous
    - **FAA equipment continues to prove services even if the facility is closed.**

Successful Contractor Traits

- **Successful Traits**
  - Know the Plans and Specifications
    - **You shouldn't be surprised if you are asked to do all the work outlined in the contract.**
  - Quality Matters
    - **There are quality standards in the contracts.**
    - **You are expected to perform to them.**
    - **The FAA has the right to remove and replace non-conforming work at your expense.**

Successful Contractor Traits

- **Successful Traits**
  - Quality Control Starts with the Contractor
    - **You are responsible for having a quality control plan.**
    - **You are suppose to use the quality control plan.**
    - **You are suppose to do a quality review on documents.**
      - **RFI's**
      - **Submittals**
      - **Change Orders**
  - FAA COR
    - **The presence or absence of the COR does not excuse noncompliant work.**

Successful Contractor Traits

- **Successful Traits**
  - Subcontractor Management
    - You are responsible for subcontractor performance.
    - Subcontractor performance includes:
      - Coordination between subcontractors
      - RFI's
      - Submittals
      - Change orders
  - Coordinate the Work
    - If your subcontractor hangs a pipe in the way of HVAC duct it is the contractor's problem.

Successful Contractor Traits

- **Successful Traits**
  - FAA Electrical Work Exceeds the NEC
    - **FAA electrical standards include STD 19, 1217 and 1391.**
    - **You will be held to these standards.**
  - FAA Facilities Operate 24/7
    - **Even when the facility is closed FAA equipment is operating providing services.**
    - **Request outages in accordance with the contract.**

Successful Contractor Traits

- **Successful Traits**
  - Asbestos and Lead Containing Materials
    - **The FAA has labor agreements with the unions that represent FAA employees that cover facilities with asbestos and lead containing materials.**
    - **These agreements have specific requirements on the management and abatement of lead and asbestos.**
    - **The contract will specify the procedures to follow related to asbestos and lead abatement.**
    - **The contract will specify procedures for work impacting asbestos or lead containing materials.**

Successful Contractor Traits

- **Successful Traits**
  - Asbestos and Lead Continued
    - **Do not impact any surface without knowing it is asbestos or lead free.**
    - **Always ask if you don’t know.**
    - **If there is an incident notify the COR immediately.**
    - **Secure the site.**
    - **The FAA will assess the situation, determine a course of action, and make appropriate adjustments to the contract (could be positive or negative).**