

Navigating a Path to Successful Airport Expansions and Renovations

The Federal Aviation Administration reports that the nearly 20,000 airports in the United States host more than 2.5 million passengers daily. With airports in the U.S. averaging 40 years old, many are long overdue for expansion and modernization projects.

The drive to improve the customer experience also demands airport renovation. To remain competitive to travelers and retail leasing, airport authorities choose to transform and modernize airports from uninspiring stop-overs into destinations delivering an elevated customer experience. Upscale casual dining, enhanced retail, spas and gyms in airports are part of this movement and add to the complexity of the design and renovation of the space. Ensuring guests have an enjoyable experience while accommodating the environmental, safety and way-finding requirements of an airport are design challenges for architects and engineers.

Experience Matters

Airport renovations are complex projects due to both the impact on daily operations and the sophisticated nature of the remodel itself. To reduce risks while navigating the complicated process of an airport renovation, experience matters.



For more than 15 years, NV5 has provided construction services to aviation projects around the globe, including 18 of the busiest U.S. airports. NV5's experience airside and landside, combined with our technical expertise and breadth of capabilities, make us exceptional partners in

large aviation renovations and expansions. Our project planning methodology ensures the multitude of players—airport authorities, architects, contractors, subcontractors, consultants—are informed and on task. Whether we're involved in engineering and technology design, program management, civil engineering services, commissioning/ retro-commissioning, surveying, terrestrial scanning or materials testing, our knowledge and foresight ensure a smoother project.

Exterior (Airside) Concerns – Site Development and Planning

Before a renovation can occur, airport authorities need a vision that includes a master plan encompassing a myriad of technical, spatial, environmental and design concerns. NV5 has a long history of this visionary work. Engaging NV5 early during the development and planning process allows us to provide expertise for a broad scope of planning and design tasks, both exterior and interior. Our significant experience in master planning utilizes our design abilities along with aerial photography/ground topography, surveying and mapping, erosion control planning, FAA regulatory compliance, air permitting, sustainability planning and much more.

From Vision to Reality – Creating the Interior (Landside) Destination

Improved reliability, comfort, safety and performance are the goals of nearly all aviation construction projects. To achieve these results, the engineering behind the finished environment of an airport is crucial. When engineering the interior environment, NV5 takes into consideration the ease of traveler navigation through the crowded airport, air quality, environmental comfort, way-finding, audio visual usage and Wi-Fi, to name a few. We also seamlessly incorporate safety factors such as fire code requirements and security measures that are essential to airport operations.

NV5's interior environmental design experience ensures these measures do not detract from the guest experience. Our design work on the D gates concourse in Las Vegas showcases this expertise. NV5's aviation background extends

THOUGHT LEADERSHIP

to designing mass evacuation strategies within the life safety systems. In Phoenix, we integrated the primary alert system with additional visual elements throughout the building, making it clear to travelers in the airport what actions to take during an emergency.

On-Time and On-Budget

Large aviation projects face many challenges that can disrupt the schedule and budget. The sheer complexity of maintaining operational functionality for the mandatory large systems of an airport can wreak havoc with budgets and timelines. NV5's experience and expertise within multiple disciplines gives us foresight into problems that may occur and helps us make recommendations that minimize risks to the timeline and budget.

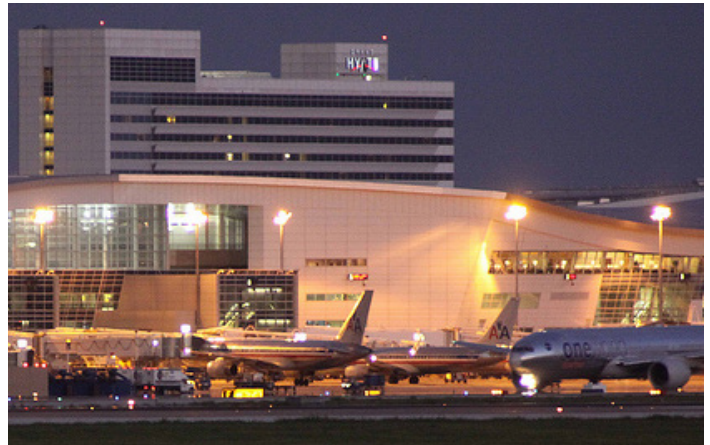
Involvement and Intervention

NV5 delivers a holistic approach that takes into account potential project risks. It also requires having the right resources, such as a commissioning agent, in place early in a project even during the design phase. Commissioning agents should be chosen based on their comprehensive analysis of the project, including management, verification, scheduling and testing. They also take on the role of problem solver—identifying potential hazards and creating alternative strategies to minimize delays and project cost overruns. Involving NV5 early during the design phase ensures clients receive objective insight into the project from its initiation.

The Right Process

NV5 serves as the commissioning agent for several aviation projects across the country, including the DFW Airport Authority. In this role, we use the Challenges – Solutions – Insights (or CSI) methodology to create a risk mitigation strategy. This proactive approach allowed the entire team involved in construction to have a plan in place before problems occur.

1. **Challenges.** To begin, we comprehensively assess the challenges these projects could face. We start with a broad view of the entire project and ask questions of the experts involved to evaluate where problems may occur.
2. **Solutions.** Based on the identified project challenges, we create a set of solutions to address each situation.



3. **Insights.** Pulling from our team of experts, we provide insight and reinforcement throughout the project in order to help the team make informed decisions—before, during and after a situation arises.

When NV5 is involved in the project early on, we are able to identify problems quickly with the CSI process and develop solutions to be implemented before significant delays occur.

Regulatory Burdens

The heavy demands placed by regulatory agencies like the FAA, TSA and other local authorities pose additional challenges to aviation construction projects. NV5 has successfully navigated these regulatory agencies and has extensive experience in ensuring projects follow the FAA's standards and processes. We have worked in many levels of airport operations, project planning, management and construction, both airside and landside. Due to our commitment to meet airport construction schedules and our ability to work within the regulatory requirements, NV5 has longstanding relationships with several major airports.

Vision to Reality: Improving Sustainability and Energy Optimization

Energy efficiency significantly reduces operating costs at all stages of the building lifecycle and should begin during the design phase. NV5 helps clients achieve new standards in energy efficiency through both the engineering design of a building.

To begin the design process, NV5 performs dynamic energy modeling to measure existing energy usage and creates performance goals that minimize operations costs. Our

THOUGHT LEADERSHIP

“energy intelligence” services evaluate every area of a building to understand and monitor energy usage and create a plan for improvement. We help identify and install the proper technology and deploy energy management platforms. These integrated platforms monitor and record energy usage, enabling sophisticated analysis and continuous data for improving energy efficiency.

NV5’s hands-on approach ensures systems are installed properly and function at their highest performance. Design alone does not ensure efficiency. When installed, systems need to be adjusted to function at their peak performance, which is part of our enhanced commissioning process. Our comprehensive approach ensures that systems are set up properly and that they work correctly over time, whether inside or outside the building.



Our process is as follows:

Evaluation

NV5’s team of subject matter experts has current, specific experience in airport expansion and renovation, including integration of technology and mechanical/electrical/plumbing and fire protection (MEP/FP) systems. Whether engaged in design or commissioning, we begin all projects by evaluating the current facility operations, identifying potential risks, and learning from the in-house operations and maintenance staff and other project team members.

Expertise and Technical Support

NV5 supplies hands-on technical support and problem solving for the firms responsible for installation and integration of the MEP/FP and technical systems in the building. During our observation periods, we look at both the contractor’s installation methodology and the

physical installation. Our collaborative approach to field observations quickly addresses deficiencies before they become widespread installation and start-up issues.

Testing and Validation

Once the installation is validated, NV5 focuses on operational stability and optimization. In this phase, NV5 experts ensure the construction team has properly installed and tested the hardware and network components. We then perform our own tests, which incorporate diagnostic monitoring and testing strategies through which all modes, conditions, safeties, and failures are exercised and control loops for each sequence are analyzed. Our process always includes adjusting the operating parameters to resolve issues that occur under normal operating conditions.

Training and Turnover

To ensure airports achieve increased comfort and improved efficiencies, internal operations staff must be able to maintain the building operations long after the project is completed. NV5 facilitates customized training to the operations and maintenance team to ensure a smooth transition and optimal efficiency. We provide clear documentation to ensure knowledge transfer occurs that focuses on how to sustain performance for the long haul.

This is perhaps the most important stage of the process and continues through the Warranty Period Site Visits, when NV5 commissioning agents return to evaluate the ongoing performance of the installed systems and make necessary adjustments to operating parameters, timing sequences, etc., to ensure effective building operations.

A Long History

Whether involved in the design of the infrastructure or commissioning the building, NV5’s extensive aviation project expertise make us reliable partners on these complex projects. With offices nationwide and abroad, NV5 helps clients plan, design, build, test, certify, and operate projects that improve the communities where we live and work. We understand the challenges of the continuously evolving aviation industry and are here to assist.

Visit NV5.com to read more about our aviation experience and contact us for more information.



Airport Experience

NV5 professionals have worked on more than 70 airports throughout the United States. What follows is a partial list of those airport projects within the NV5 portfolio of work.

- Atlantic City International, NJ (ACY)
- Boston Logan International, MA (BOS)
- Charlotte-Douglas International, NC (CLT)
- Colorado Springs, CO (COS)
- Dallas Love Field, TX (DAL)
- Dallas/Ft. Worth International, TX (DFW)
- Denver International, CO (DEN)
- Fort Lauderdale-Hollywood International, FL (FLL)
- Fresno Yosemite International, CA (FAT)
- Garfield County Regional, CO (RIL)
- George Bush Intercontinental, TX (IAH)
- Hamilton Municipal, NY (LID)
- Hartsfield-Jackson International, GA (ATL)
- Henderson Executive, NV (HSH)
- Hensley Field Air National Guard Base, TX (NBE)
- Hollywood Burbank, CA (BUR)
- Houston-Hobby International, TX (HOU)
- Imperial County, CA (IPL)
- Indianapolis International, IN (IND)
- John F. Kennedy International, NY (JFK)
- John Wayne – Orange County, CA (SNA)
- Kendall Tamiami, FL (TMB)
- Long Beach, CA (LGB)
- Los Angeles International, CA (LAX)
- McCarran International Airport, NV (LAS)
- McClellan-Palomar, CA (CLD)
- Memphis Airport, TN (MEM)
- Miami International, FL (MIA)
- Newark International Metro, NJ (EWR)
- Newton Municipal, IA (TNU)
- Northern Colorado Regional, CO (FNL)
- O’Hare International, IL (ORD)
- Oakland International, CA (OAK)
- Ontario International, CA (ONT)
- Opa-locka Executive, FL (OPF)
- Orlando International, FL (MCO)
- Philadelphia International, PA (PHL)
- Phoenix Sky Harbor International, AZ (PHX)
- Ramona, CA (RNM)
- Reno-Tahoe Airport, NV (RNO)
- Rocky Mountain Metropolitan, CO (BJC)
- Sacramento International, CA (SMF)
- Salt Lake International, UT (SLC)
- San Diego International, CA (SAN)
- San Francisco International, CA (SFO)
- San Jose International, CA (SJC)
- San Luis Obispo County Regional, CA (SBP)