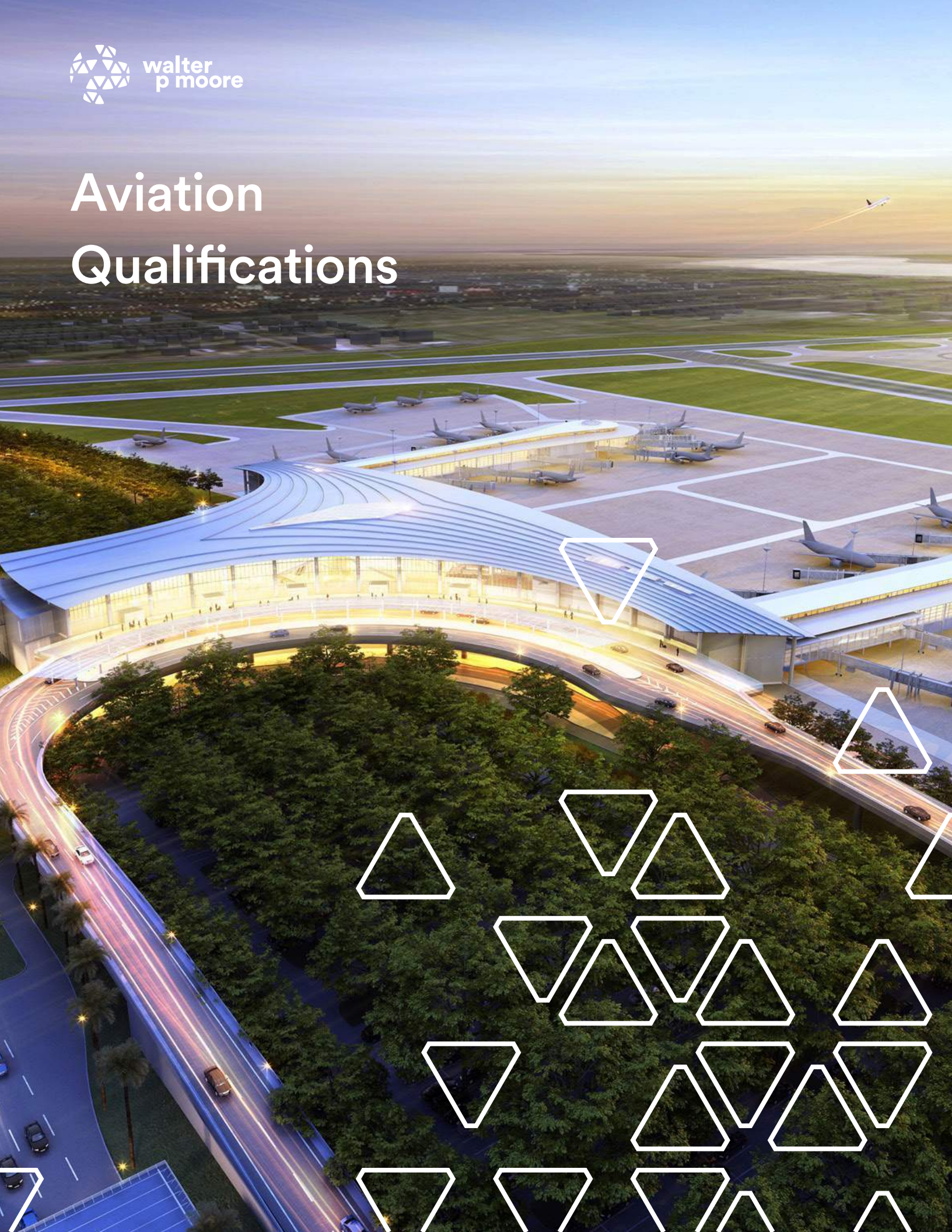
walter p moore

Aviation Qualifications




P
Parking

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01 Introduction

Walter P Moore is an international company of engineers, innovators, and creative people who solve some of the world's most complex structural, technological, and infrastructure challenges. Providing structural, diagnostics, civil, traffic, parking, transportation, enclosure, technology consulting, and construction engineering services, we design solutions that are cost- and resource-efficient, forward-thinking, and help support and shape communities worldwide. Founded in 1931 and headquartered in Houston, Texas, our 700+ professionals work across 20 U.S. offices and five international locations.

FOUNDED
1931

OFFICES
29

TOTAL STAFF COUNT
700+

STRUCTURES

Structural Engineering
Enclosure Engineering
Parking
Secure Design
Construction
Engineering

DIAGNOSTICS

Restoration & Renovation
Enclosure Diagnostics
Parking Restoration
Forensic Analysis

INFRASTRUCTURE

Civil Engineering
Water Resources Engineering
Traffic Engineering & ITS
Transportation Engineering

TECHNOLOGY

IT Managed Services
Software Development
Virtual Reality
BIM Project Coordination

OFFICES

Atlanta
Austin
Calgary
Charlotte
Chicago
Dallas
Denver
Durham
EL Paso
Fort Worth
Houston
Kansas City
Las Vegas
Los Angeles
Mexico City
New Work City
Oklahoma City
Orlando
Panama City
Pune
Raleigh
San Diego San Francisco
Tampa
The Woodlands
Toronto
Tulsa
Vancouver
Washington DC

02 Firm Profile

Structures Group

Walter P Moore's Structures Group offers an integratedsuite of engineering services that provide value-based solutions for clients worldwide. We collaborate with architects, owners, and builders to develop elegant, cost-efficient, and constructible structural systems for buildings of all types, focusing on those with the most interesting and challenging opportunities.

Our complementary services include enclosure engineering, parking consulting, construction engineering, secure design, sustainability, and structural diagnostics, providing a holistic design approach that brings value at every step in a structure's life cycle. Our passion drives us to find better solutions for our client's challenges. Sports venues, airports, hospitals, convention centers, performance venues, and tall buildings are among our most active sectors. We leverage teamwork and expertise across our entire platform of resources to provide an extraordinary client experience. For us, innovation is a design imperative, not optional. Finally, we strive to be engineering leaders at every stage of each project, bringing ideas and stewardship to our client's visions and our world's resources.

Structural Engineering

New Building Design
Building Expansions
Adaptive Reuse
Seismic Design and Retrofits
Structural Peer Review

Enclosure Engineering

Performance Specification
Design Criteria
Development
Façade Structural Design
Procurement Guidance
Performance Validation

Construction Engineering

Long Span Roof Erection Engineering
Steel Connection Design
Temporary Underground Structures
Steel Fabrication Optimization

Parking

Design Team Project Management
Parking Consulting
Parking Design
Construction Engineering
Long Span Roof Erection Engineering
Steel Connection Design
Temporary Underground Structures
Steel Fabrication Optimization

Secure Design

Threat and Protection Criteria
Blast Design
Bullet and Forced Entry Resistant Design
Glass Hazard Mitigation
Progressive Collapse Design and Analysis
Ram Resistant Construction
Structural Retrofits and Hardening

Structural Engineering

New Building Design
Secure design
Sustainable design
Parametric modeling
Performance based design
BIM capabilities
Long span structures
Kinetic structures
Membrane structures

Building Expansions
Foundation & column strengthening
Vertical expansions
Sequencing & phasing design
Evaluation of undocumented structures

Adaptive Reuse
Feasibility studies & conceptual design
Review for conformance
with changing codes
Increases in load capacity
for heavier occupancy
Improvement of performance
under vibration loads
Installation of new functional elements

Seismic Design and Retrofits
Complete seismic evaluation
Performance based design
Seismic retrofit
Site evaluation
Special strengthening materials
& techniques

Structural Peer Review
Progressive multi-stage review
of design criteria
Independent review of representative
elements & specifications
Evaluate constructibility
& cost efficiency

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Enclosure Engineering

Performance Specification and Design Criteria Development

Load Criteria
Materials Performance
Testing Regimen
Environmental Performance
Coordination & Review
of Façade Related Specifications

Façade Structural Design

Façade Systems Conceptualization
& Optimization
Materials Research, Selection,
& Specification
Integrated Design of Façade/Structure
Detailed Membrane & ETFE
BIM Modeling of Complex Façades
Façade Assembly Detailing
Seismic Engineering of Façades
Secure Design Including Blast Analysis
Building Physics Modeling
Thermodynamic Modeling
Waterproofing Services

Procurement Guidance

Optimum Procurement Methodology
Identification/Prequalification of Vendors
Design Criteria and Bid Documents
Evaluation of Bids and Proposals
Evaluation of Proposed Alternates

Performance Validation

Performance & Visual
Mock Up Assessment
Shop Drawing &
Engineering Report Review
Peer Review Services
Quality Assurance
& Installation Oversight
Oversight of Façade Site Testing
Installation Punch List

More so than any other building component, the enclosure – including its facades, roofing and subsystems – influences the aesthetics and life-cycle performance of a building. A fine balance of design aesthetics, system performance and cost are critical to a successful project. The ever increasing complexity in enclosure design including both aesthetics and performance concerns, coupled with rising costs and compressed schedules can challenge even the most skilled design teams to delivery comprehensive enclosure solutions. The resulting need for a highly specialized expertise in this area led to the creation of our building enclosure practice.

Our multi-disciplinary team collaborates across the entire project team – touching nearly every discipline at some point to address the 'gap' – to supply timely and objective input regarding material and system selection; system interface definition; performance objectives and coordination; holistic waterproofing strategies; and design detailing and coordination. Our specialists bring expertise across all enclosure design and performance criteria including thermal behavior, acoustics, structure, air and water management, hygrothermal performance, solar reflectivity, heat gain, shadowing, glare, daylighting and tuning of enclosure systems for optimal HVAC performance. We advise on procurement strategies and can guide the design process through performance-based-design (performance specification) or full prescriptive assignment methodologies for procurement.

Construction Engineering

Steel Connection Design
Fabricator Collaboration
Connection Strategies
Conceptual Detailing
Fabrication Documentation
3D Evaluation

Erection Engineering
Erection Strategy & Sequencing

Structural Analysis for Erection Loads
Sequential Stability Analysis
Storm Loading Evaluation on Partially Erected Structures
Critical Lift Engineering

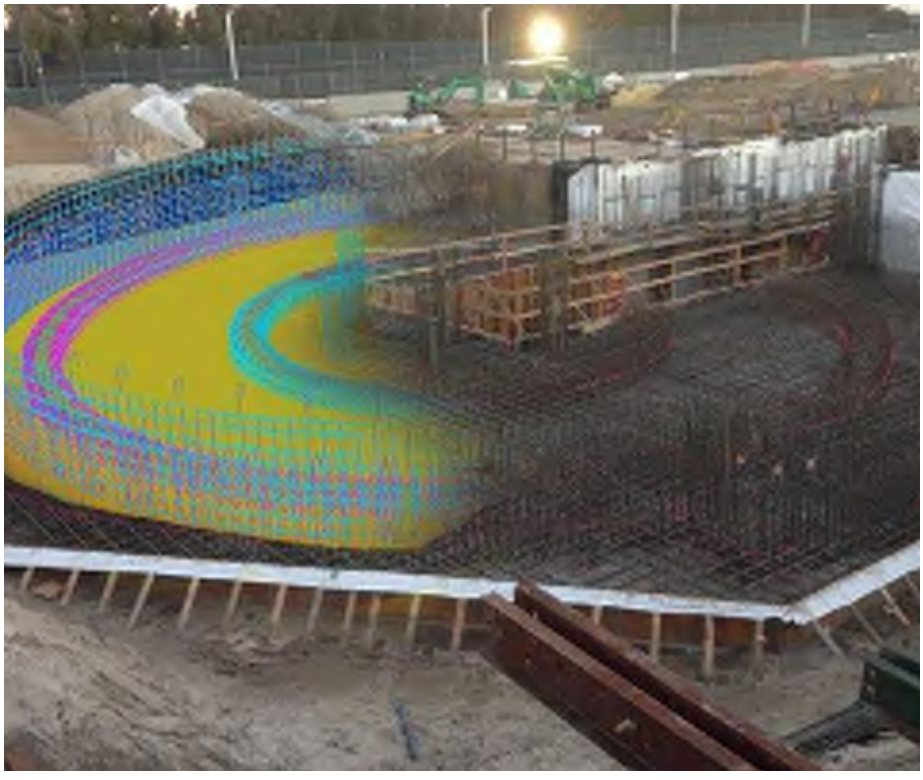
Design of Temporary Works
Excavation Support Systems
Soil/Structures Interaction Analysis
Shoring and Retention Structures
Construction Bracing
Fabrication Modeling and Detailing

Fabrication Modeling
3D Steel Reinforcing Detailing
3D Cold-Formed Steel Detailing
Sequence, Splicing, Grouping & Connection Optimization
Conflict and Clash Resolution
Refined Quantity Estimates
Mill Order Modeling
Placing Aids for Congested Areas

The construction of complex structures presents a range of challenges to builders, fabricators, and erectors. Long span structures require careful attention to a variety of concerns, including crane and lift locations, erection stability, temporary stresses, and movement compatibilities. Complex connections demand careful coordination of clearances, attention to overall weight and fabrication complexity, and constructability. Temporary excavation support systems demand reliable and affordable solutions for uncertain subsurface loadings. Structures involving multiple trades without a single source of modeling and detailing information are often subject to field conflicts and schedule delays.

These challenges are commonly delegated by the design team to the builder, leaving a gap that must be filled with a qualified construction engineer who intimately understands the design behavior of modern structures and brings a practical understanding of how they are built.

Walter P Moore fills the gap between design and construction with a team of specialty consultants who provide a range of services needed to safely and economically build these structures. Each team member brings individual experience with structural design as well as construction sensibility. We bring a holistic approach to our work that considers the desired aesthetic of the finished product while seeking construction speed, simplicity, and economy. We use digital tools to accelerate our work and produce highly reliable deliverables.



Parking Services

Planning
Mobility Master Planning (Pedestrian, Traffic, Parking and Transportation)
Parking and Transportation Planning
Parking Supply and Demand Studies
Parking Shared Use Analysis
Feasibility Studies
Traffic Engineering and Impact Analysis

Design
Design Team Project Management
Architectural Design
Structural Engineering
Functional Design
Parking Access and Revenue Control
Parking Count and Guidance Systems
Parking Wayfinding
Sustainable Parking Consulting (Parksmart)
Owner's Representative
Comprehensive Peer Reviews

Operations Consulting
Financial Audits
Operations Consulting
Operator Selection
Parking Technology Selection

Facility Assessment
Parking Technology
Signage & Wayfinding Graphics
Functional Flow
Handicap Accessible Parking (ADA)
Structural & Waterproofing
Capital Asset Management Plans (CAMP)

Walter P Moore's Parking Services Group is a full service parking and mobility consulting practice that provides technology-enabled solutions to complex parking and mobility challenges. We collaboratively partner with our clients to develop highly functional, efficient, cost-effective, and durable parking solutions that are value based and provide maximum return on investment.

Our integrated national platform, combined with our experience in the planning and design of over 1,000 parking facilities across the globe, provides us with the unique ability to bring holistic and sustainable solutions at each phase of a development. Our passion drives us to find better solutions for our client's unique challenges across a broad spectrum of project types, market sectors, and locations. We leverage our teamwork and expertise to provide an extraordinary client experience. For us, innovation is a design imperative, and is not optional. We strive to be leaders at every phase of each project, bringing ideas and stewardship of our client's visions and our world's resources.

Market Sectors
Healthcare
Education
Commercial
Mixed-Use
Aviation
Municipal
Sports
Transit

Project Delivery Experience
Design-Bid-Build
Design-Build
CM / CMaR
P3
IPD
Owner's Representative

Secure Design

Services

Threat and Protection Criteria
Blast Design
Bullet and Forced Entry
Resistant Design
Glass Hazard Mitigation
Progressive Collapse Design & Analysis
Ram Resistant Construction
Structural Retrofits & Hardening

Walter P Moore provides a full range of secure design services that create practical, technologically-advanced solutions for physical security and structural protection against threats from natural disasters and terrorism.

Fully integrated with our structural design capabilities, our secure design services include preliminary security planning and site layout, threat and risk assessment and mitigation, designs to resist extreme loadings, protection from blast, progressive collapse, forced entry, ballistics, and vehicle ramming.

Our specialty team of secure design engineers also provides blast load prediction, vehicle ramming threat analysis, secure design of glazing and framing, and structural component response prediction for elements subjected to blast loading. Single and multiple degree-of-freedom tools and finite element analysis help us determine structural response to complex dynamic loadings.

Walter P Moore's designs fully incorporate various General Services Administration (GSA), Department of Defense (DOD), Interagency Security Committee (ISC), and Department of Veterans Affairs design criteria documents. Our team is active in the physical security community, including participation in further development of these documents and design methods for use throughout the industry.

Infrastructure Group

Thriving, vibrant communities begin with intelligent engineering. We know this from firsthand experience. We collaborate with architects, owners, and public agencies to meet the challenges inherent in providing new infrastructure and maintaining existing facilities.

Our complementary services include civil engineering, traffic engineering, transportation engineering, and water resources engineering, laying the groundwork for dynamic places and spaces. Our passion drives us to find better solutions for our client's needs while maintaining the public's trust. We leverage teamwork and expertise across our entire platform of resources to provide an extraordinary client experience. Our proactive involvement and innovative ideas allow us to provide cost-effective and community-enhancing solutions.

Civil Engineering

Master Planning
Land Development
Site Development
Roadway Design
Utility System Design
Geomorphology

Water Resources Engineering

Water Supply
Floodplain Management
Storm Water Services

Traffic, ITS, and Transportation Planning

Transportation Planning
Traffic Engineering Studies
Traffic Engineering Design
Intelligent Transportation Systems

Transportation Engineering

Highways / Toll Roads / Roadways
Transportation Structures

Civil Engineering

Master Planning
Site
Utility System Design
Large Development
Campus Design
Drainage
Sustainable Sites

Land Development
Special Funding Districts
Site Assessment
Master Planning
Campus Design
Governmental Relations/Permitting
Sustainable Design and Certification

Roadway Design
Local Streets
Thoroughfares
Master Planning
Intersections
LID/Green Infrastructure

Site Development
Site Design
Site Assessment
Master Planning
Governmental Relations/Permitting
Sustainable Design and Certification

Utility System Design
Municipal Systems (Stormwater/Water/Wastewater)
Franchise Utilities (Electrical/Gas/Communication/Thermal)

Geomorphology
Stream Bank Restoration
Scour Studies
Erosion Control

The practice of civil engineering allows us to serve the communities where we live, work, and play. We take our role seriously as advocates for a better quality of life, solving problems and creating great places. As civil engineers, our clients task us to develop creative, cost-effective solutions to oftentimes challenging problems. We provide quality based solutions for coordination of multiple private and public utilities in densely populated activity centers, for protecting critical infrastructure from rising flood waters, for sequencing the work in order to minimize the construction schedule, and for providing aesthetic, cost-effective, and functional designs.

Walter P Moore provides comprehensive civil engineering services, including project development and management, design, and construction oversight for all types of infrastructure projects. Our project experience includes land and site development, public and private utility systems, drainage studies, and streetscape improvements.

Traffic, ITS, and Transportation Planning

Transportation Planning
Travel Demand Modeling
Corridor Studies
Thoroughfare Planning
Multi-Modal Planning
Regional Transportation Planning
Campus Master Planning
Scenario Planning
Event Planning
Site Circulation
Suitability Analysis
Carrying Capacity
Urban Centers
Funding Strategies

Traffic Engineering Design
Signalization
Traffic Control
Intersections
Roadways

Traffic Engineering Studies
Traffic Impact Studies
Corridor and Feasibility Studies
Access Management
Safety

Intelligent Transportation Systems
Advanced Transportation Management Systems (ATMS)
Communications Engineering
Control Center Design and Operations
Systems Integration and Software Development

The Walter P Moore Traffic, ITS, and Transportation Planning team is committed to improving mobility through a wide range of transportation tools. More than 200 commercial, institutional, and industrial clients have utilized our suite of services to address new and existing planning, design, and management issues. We apply innovative techniques to traffic signal design, transit system and transportation planning, and traffic impact study projects. Walter P Moore considers all users of the transportation system including vehicles, bikes, transit, and pedestrians, in our plans and designs.

Much of our work focuses on solving our clients' existing and future traffic management challenges while trying to help our clients reduce infrastructure improvement costs. By taking a higher level view on transportation conditions, our team assists in setting mobility priorities and helps create a vision for the future.

Transportation Engineering

Highways/Toll Roads/Roadways
Highway and Toll Road Design
Route Studies and Schematic Design
Hydrology and Hydraulics

Transportation Planning
Regional Planning
Urban/Livable Centers
Campus Planning
Special Districts
Funding Strategies

Transportation Structures
Rail Bridge
Roadway Bridge
Pedestrian Bridge
Retaining Walls
Grade Separator
Culverts and Tunnels
Bridge Restoration

Today's motorists demand transportation facilities that are safe and efficient. As transportation providers across the country plan solutions to improve our nation's transportation network, creative design approaches are required to balance growth and the environment.

At Walter P Moore, we understand the impact of transportation improvements, the need for sustainable development, and transportation's role in improving a community's quality of life. Our full range of transportation engineering services includes planning and design of roadways, freeways, toll facilities, bridges, and water resources. We know our communities because we live in them and we help facilitate stakeholder support for improvements. Communications between engineers and end users brings about effective solutions.

We work with the latest analysis and design software for geometric design, transportation modeling, visualization, hydraulic modeling, cost estimating, project scheduling, and traffic management.

Our experience allows us to manage and execute complex transportation projects through design excellence, dependable project delivery, and exemplary client service.

Water Resources Engineering

Floodplain Management
Floodplain Studies
Flood Control Works
Flood Warning Systems
Dam Safety
Forensic Analysis

Storm Water Services
Drainage Master Planning
Drainage System Design
Low Impact Development (LID)
Stream Restoration
Storm Water Quality and NPDES Consulting

Water Supply
Water Supply Master Planning
Sustainable Water Systems
Reservoir Planning and Design
Water Distribution Systems

Water — inspiring with its beauty and tranquility, yet at times overwhelming with its excess and force — is elemental to life on Earth and is perhaps our most valuable natural resource. Effective planning and management of our water resources are ever-critical to our collective health, safety, and well-being.

Walter P Moore's Water Resources Group focuses on responsible water use and management to supply and protect the needs of communities, industry, agriculture, and the natural environment. This includes preserving our river systems, improving the quality of our streams, designing and implementing sound water management practices to accommodate ever-increasing demand, and developing innovative, predictive tools to manage risk, prevent loss of life and property, and mitigate damage.

Diagnostics Group

Walter P Moore helps clients maximize their return on building investment. Backed by a long history of successful engineering and forensic analysis, our Diagnostics staff consists of licensed professional engineers, registered architects, and building enclosure consultants that assess existing conditions and determine causes of distress. Our projects involve restoring and renovating structures and building enclosures. We design practical, cost-effective solutions to restore and extend the life of your assets. Existing structures are our main focus, but we also provide third party review services for new construction.

Enclosure Diagnostics

Assessments
Repair/Recladding
Roofing
Waterproofing
Performance Modeling
Third-Party Design Review
Enclosure Commissioning

Forensic Analysis

Failure Analysis
Litigation Support
Insurance Claims Consulting
Vibration Consulting
Emergency Response
Fire Damage Assessment
Fire Damage Repair

Parking Restoration

Assessment and Repair
CAMP (Capital Asset Management Plan)
Durability and Life-Cycle Analysis

Restoration / Renovation

Structural Assessment
Structural Strengthening
Historic Restoration
Corrosion Mitigation
Nondestructive Evaluation
Materials Consulting
Stadium/Venue Restoration
Bridge Assessment
Bridge Rehabilitation
Third-Party Design Reviews

Enclosure Diagnostics

Façade Assessment/Repair
Condition assessments
Due-diligence/asset management
Water infiltration and leakage
Repair and restoration
Recladding/modernization
Facade maintenance/access
Water infiltration and leakage

Roofing/Waterproofing
Roofing/waterproofing replacement
Water infiltration and leakage
Vegetated (“green”) roofing
Detention (“blue”) roofing
IRMA/plaza waterproofing
Below-grade/foundation waterproofing
Balcony waterproofing

Consulting/Commissioning
Third-party design review
Design assist
Enclosure commissioning/
retro-commissioning (BECx)

Performance Modeling
Hygrothermal analysis
Thermal bridging
Condensation
Air infiltration issues
Performance comparison
Solar and comfort studies

A building’s main purpose is to protect from the elements. Enclosure Diagnostics is dedicated to improving the in-service performance of all aspects of building enclosure systems. Walter P Moore applies the fundamentals of building science, energy modeling, and testing to develop solutions for owners and design professionals. We provide guidance at all stages of project development for the rehabilitation of existing buildings and new construction. Our solutions create superior building performance by:

- Managing rainwater and water vapor transmission
- Controlling air infiltration/exfiltration with proper air barrier design
- Controlling energy consumption by managing heat gain and loss through the building envelope

Forensic Analysis

Services

Emergency Response

Failure Analysis

Litigation Support

Insurance Claims Consulting

Vibration Consulting

Fire Damage Assessment

Fire Damage Repair

Failures in the built environment can range from performance failure of discrete systems to catastrophic structural collapse. Minimizing risk and preventing further damage are our priorities when helping our clients move forward after a failure event.

Walter P Moore provides forensic services to determine the cause(s) of failure through a combination of analysis, field assessments, and testing. We can assess structural stability, provide repair solutions, conduct peer reviews, and provide technical consulting for complex projects under construction. Additionally, we often provide expert testimony for legal proceedings or for the insurance claims process relating to failures.

Parking Restoration

Services

Assessments

Document review

Nondestructive testing

Repair

Performance improvements

Restoration

CAMP (Capital Asset Management Plan)

Durability and Life-Cycle Analysis

Throughout their service life, parking structures are exposed to harsh conditions due to moisture and environmental extremes such as freezing temperatures, heavy wind, and seismic forces. Walter P Moore assists owners in identifying, prioritizing, and addressing ongoing maintenance and repair needs to preserve asset value, functionality, and public safety. Our expertise in the design, repair, and maintenance of parking garages comes from a long history of parking structure projects across North America.

Walter P Moore addresses structural, waterproofing, and other performance deficiencies, as well as the mechanisms of parking garage deterioration to reduce the likelihood of further distress and extend service life. We also develop facility-specific maintenance manuals and Capital Asset Management Plans (CAMP).

Restoration/Renovation

Services

Structural Assessment

Structural Strengthening

Seismic Analysis/Retrofit

Stadium/Venue Restoration

Tenant Improvements

Historic Restoration

Corrosion Mitigation

Nondestructive Evaluation

Materials Consulting

Bridge Assessment

Bridge Rehabilitation

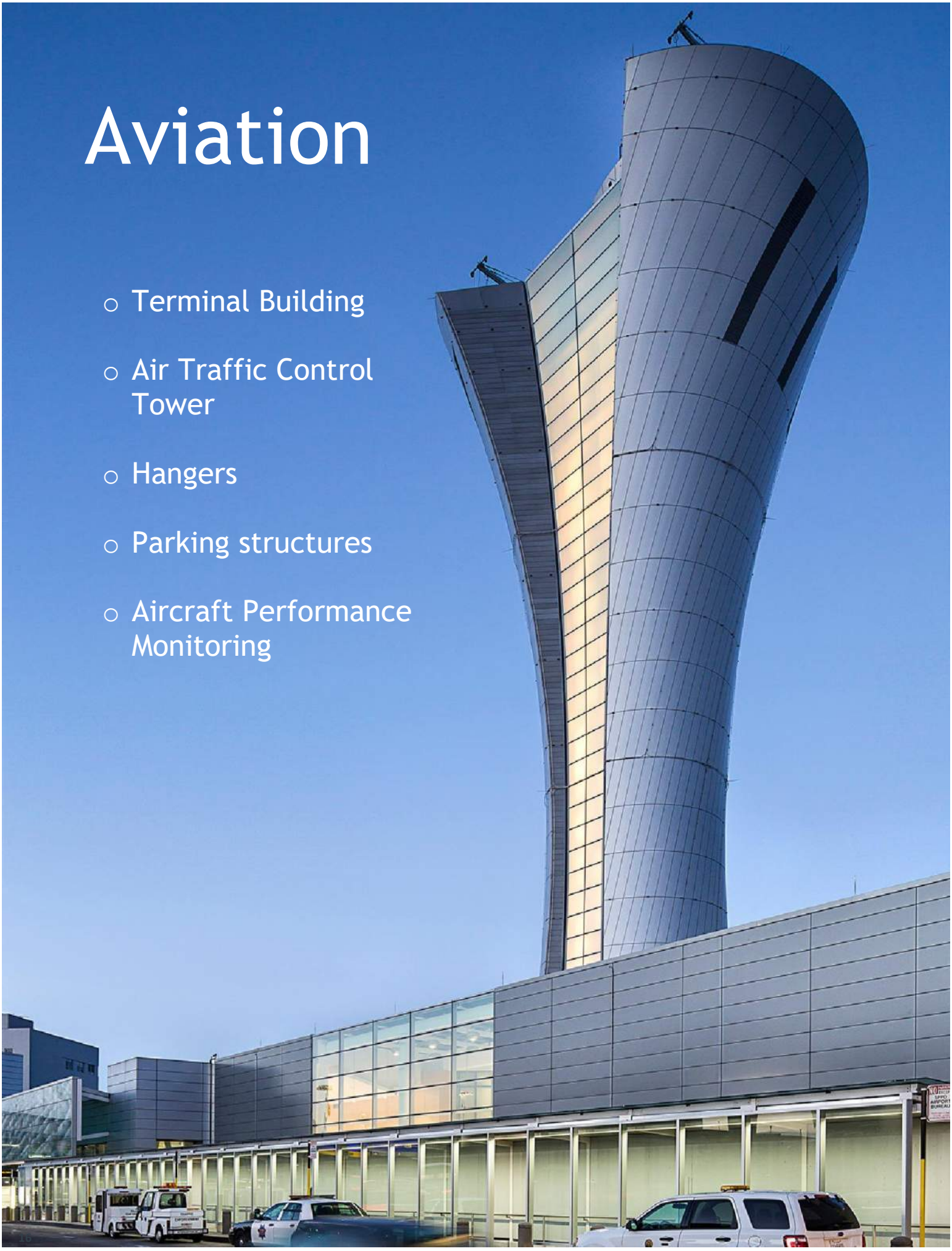
Third-Party Design Reviews

Structures may require restoration or renovation for a variety of reasons such as repairing distress, repurposing for a new use, strengthening to increase load capacity, as well as correction of design and construction defects. Effective restoration requires a clear understanding of the causes of distress symptoms to reduce the likelihood of recurrence. Walter P Moore has taken a significant structural role in the restoration and renovation of thousands of buildings. We combine state-of-the-art forensic and analytical tools along with our passion for renovation to provide tailored solutions for structures big and small.

Walter P Moore provides assessment, testing, analysis, design, and construction administration services to diagnose the restoration needs and engineer necessary repairs. Our assessment plans are tailored to your project requirements and often include nondestructive testing and materials testing to understand the condition of the existing construction.

Aviation

- Terminal Building
- Air Traffic Control Tower
- Hangers
- Parking structures
- Aircraft Performance Monitoring



03 Relevant Experience

San Francisco International Airport Air Tra□c Control Tower

San Francisco, California

Services Provided
Structural Engineering
Secure Design

Owner
Federal Aviation Administration
San Francisco
International Airport

Project Details
Construction Cost: $122 million

Completion Date: Aug 2015

Project Size: 55,000 SF

Sustainability
LEED Gold®

The seventh-busiest airport in North America, San Francisco International (SFO) is also one of the most challenging for air tra□c controllers, who safely guide more than 1,000 aircraft daily on four runways. New technologies and a seismically vulnerable existing tower — just four miles from the San Andreas Fault — led SFO to develop a new facility that exempli□es structural engineering innovation as it provides a safe, stable, and best-in-class workspace for controllers.

The Air Tra□c Control Tower and Integrated Base Facility represent several □rsts for the Federal Aviation Administration (FAA) — the □rst tower delivered with the airport in the lead, □rst delivered using a Design-Build bridging documents package, and the □rst to o□er an observation cab with a 270-degree unobstructed view.

The tower's structural system, a cast-in-place reinforced concrete core cylinder was selected employing performance-based seismic design. The tower was designed using vertical post tensioning to provide a self-centering action in the event of a major earthquake as well as a tuned mass damping system to mitigate accelerations due to wind. At the tower base, a three-story Integrated Base Facility (IBF) serves as o□ce and administrative space for both the airport and the FAA. The IBF incorporates blast resistant design along the roadway and performance-based seismic design. We performed a nonlinear time history response analysis with Perform 3D to verify that the expected behavior of the structure would meet the airport's performance objective of remaining operational at the Maximum Considered Earthquake.

Awards
American Council of Engineering Companies (ACEC): 2016 Grand Conceptor Award

ACEC CA: 2016 Golden State Award, 2016 Honor Award of Engineering Excellence

SEAONC 2016 Excellence in Structural Engineering - Award of Excellence, Landmark Structures

IPI 2016 John L. Martin Partnered Project of the Year Award

ENR Regional Best Projects - Best Project, Airports/Transit

NCSEA Excellence in Structural Engineering Outstanding Project Award

DBIA Western Paci□c Region: Design Excellence Award and Distinction Award

Airports Going Green - Chicago Department of Aviation Honorable Mention

Dallas/Fort Worth International Airport

As the fourth busiest airport in the nation, Dallas/Fort Worth International Airport strives to o□er world-class service to its travelers whether they are Texas natives or passing through on their international journey. Home to the world's largest airline - American Airlines - and servicing 255 destinations,

Dallas/Fort Worth International Airport embodies local culture and hospitality for its customers and partners. Walter P Moore has completed numerous projects at the airport, providing a range of engineering services to assist the airport in its mission to rede□ne travel expectations every step of the way.

Terminal D Parking Garage

Terminal E Enhanced Parking Garage

Terminal A Parking Garage

**Image © Kurt Griesbach | Corgan.*

International Terminal D


Terminal A DART Rail Station

Department of Public Safety

Dallas/Fort Worth International Airport International Terminal D

Dallas/Fort Worth, Texas

Services Provided

Structural Engineering
Parking Consulting

Owner

Dallas/Fort Worth
International Airport

Project Details

Construction Cost: $698 million

Completion Date: 2005

Project Size: 2 million SF

Walter P Moore provided structural engineering in conjunction with two other □rms for the new International Terminal D and Terminal D Parking Garage at DFW International Airport. We also provided parking consulting services for the $112 million parking garage.

To keep up with the strong domestic and international passenger growth, DFW embarked on a $2.5 billion Capital Development Program (CDP). A major feature of the CDP is a new consolidated international terminal that houses all international arrivals and departures in one location, and also has “swing” capability for both international and domestic service. A centralized federal inspection facility with the capacity of handling over 2,800 passengers per hour is contained within the terminal building.

Louis Armstrong New Orleans International Airport North Terminal

New Orleans, Louisiana

Services Provided

Structural Engineering
Enclosure Engineering
Enclosure Diagnostics
Secure Design
Parking Consulting

Owner

Louis Armstrong New Orleans International Airport

Project Details

Construction Cost: $650 million

Completion Date: March 2019

Project Size:

972,000 SF
35 airplane gates,
2,000 space garage

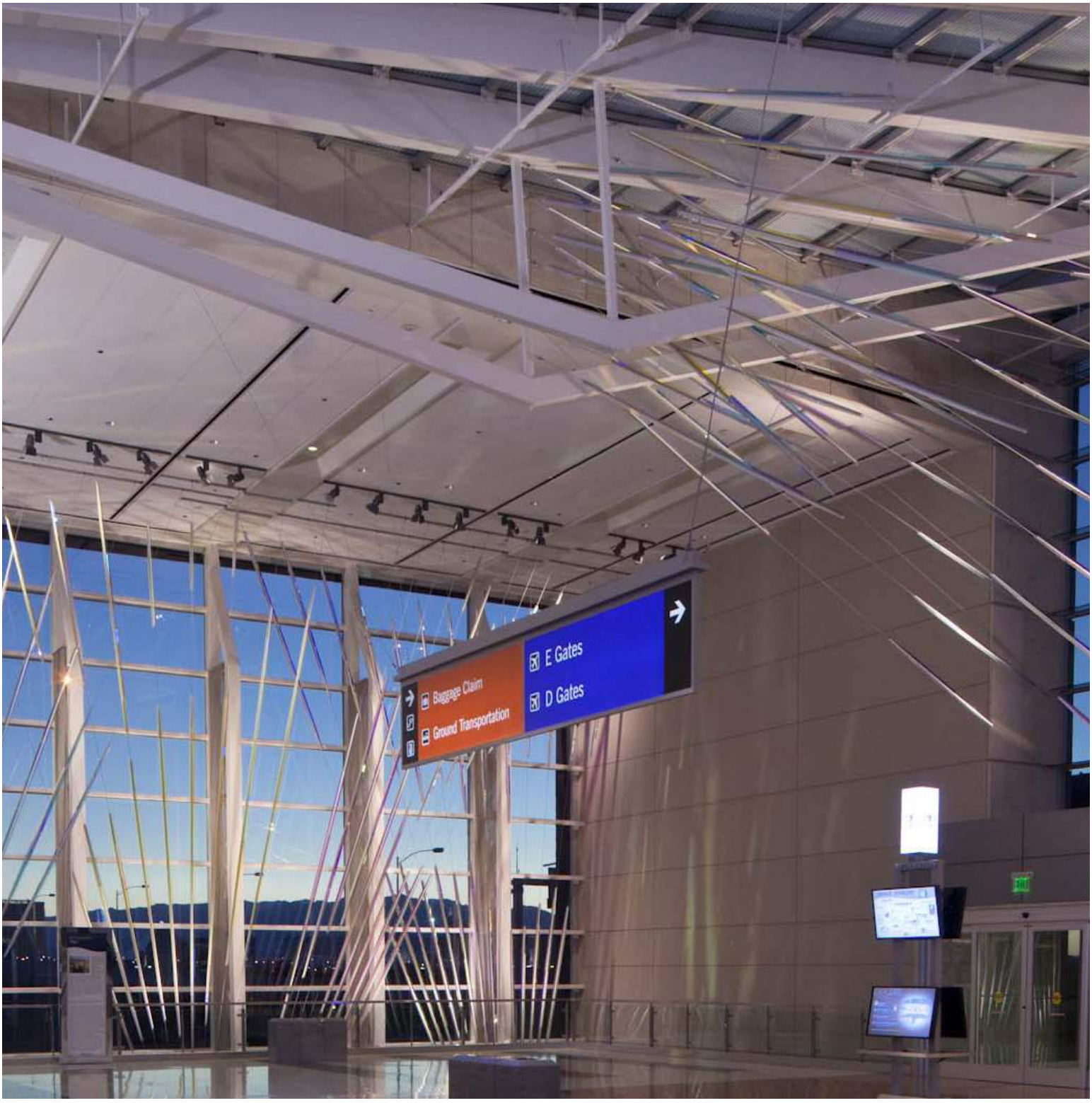
In 2011, New Orleans city o□cials announced plans to create a new world-class main terminal. As the gateway to the city for 11 million travelers a year, the original 1959 structure was well overdue for a refresh in order to address vastly di□erent traveler expectations for convenience and safety, as well as keep the Crescent City competitive as a preferred tourist destination.

Late in the design development process, a cost reducing e□ort substantially reduced the building size while maintaining its distinctive crescent shape. By drawing on the □uidity of our digital work□ow, Walter P Moore modi□ed the geometry in a matter of days rather than the several weeks that a traditional change process would have required. In late 2016, with the project already under construction, an in□uential new director won approval for a much grander vision for the airport resulting in the addition of a new international concourse. With 30% of the foundations for the domestic terminal already in place and structural steel being fabricated, our team again leveraged digital work□ow to seamlessly incorporate the new international concourse into the existing, partially built design. We then collaborated extensively with the steel fabricator and detailer to minimize changes to sizes, reducing the cost impact of this substantial change and maintaining the original construction schedule.

Our combined structural engineering and enclosure engineering team delivered a complex and evolving airport project on time and within budget. Our advanced digital work□ows allowed us to □uidly incorporate and analyze multiple signi□cant architectural design changes while maintaining e□cient and elegant structural solutions. When the new terminal opened in early 2019, travelers began experiencing an industry-leading aviation terminal made possible behind the scenes by an industry-leading delivery process.

McCarran International Airport Terminal 3

Las Vegas, Nevada



Services Provided

Structural Engineering
Secure Design

Owner

Clark County
Department of Aviation

Project Details

Construction Cost: $1.2 billion

Completion Date: 2012

Project Size:

2,145,000 SF
3-levels
14 gates

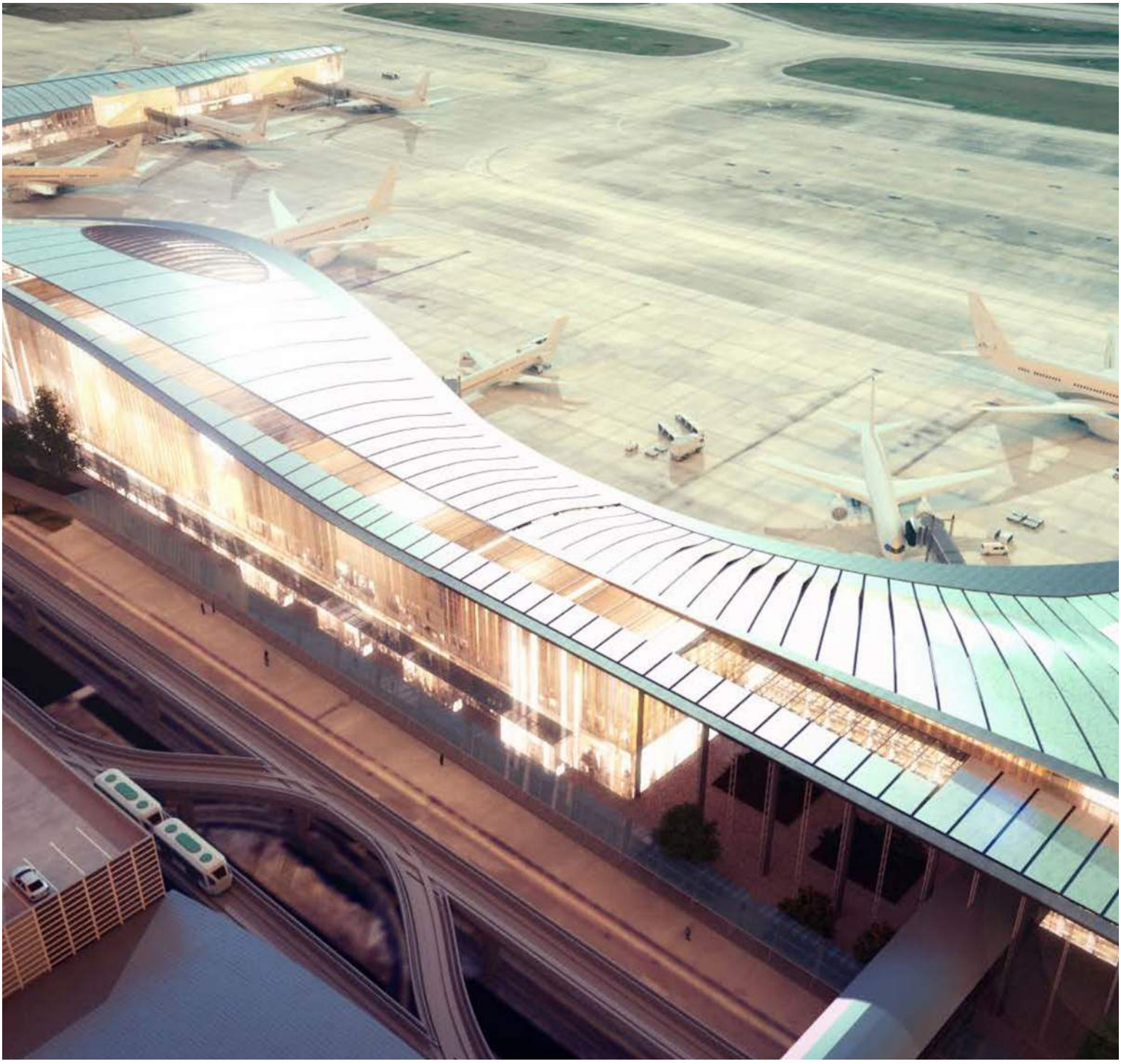
Walter P Moore provided full structural engineering and secure design services for Terminal 3 which provides over 2.0 million square feet of space in three levels. The project includes an underground ATS Station integral with the Terminal 3 structure and an ATS Tunnel to connect passengers from Terminal 3 to the existing 26 gates in Satellite D. A people mover system connects Terminal 3 to Concourse D. The completion of Terminal 3 allows the aging Terminal 2 to be abandoned. A & B Concourses will be demolished.

The secure design services included a threat assessment and damage estimate, as well as structural hardening recommendations and design.

Terminal 3 is used for all international flights as well as some domestic airlines. In addition to hosting all international carriers, Terminal 3 houses Alaska Airlines, Frontier Airlines, JetBlue Airways, Sun Country Airlines, Virgin America, operating out of Concourse E and, Hawaiian Airlines and United Airlines, which continue to operate out of Concourse D.

George Bush Intercontinental Airport Mickey Leland International Terminal Replacement

Houston, Texas



Services Provided

Structural Engineering
Enclosure Engineering

Owner

Houston Airport System

Project Details

Construction Cost: $490 million

Completion Date: 2024

Project Size: 860,000 SF

This major expansion and refurbishment project includes demolition of the 20-year-old terminal D building and construction of a new state-of-art facility that will reiterate the image of George Bush airport as a premier global gateway. The new building will be 780,000 SF and feature a total of 15 gates that will be capable of accommodating wide-body aircraft. Four of these gates will be able to handle Group VI aircraft such as the Airbus A380. Passenger facilities will include spacious ticket counters, an expanded security checkpoint, waiting lounges, modern concessions, clubrooms and modern bathrooms.

George Bush Intercontinental Airport Federal Inspection Services (FIS) Facility

Houston, Texas

Services Provided

Structural Engineering
Parking Consulting

Owner

Houston Airport System
City of Houston

Project Details

Construction Cost: $200 million

Completion Date: January 2005

Project Size: 785, 000 SF

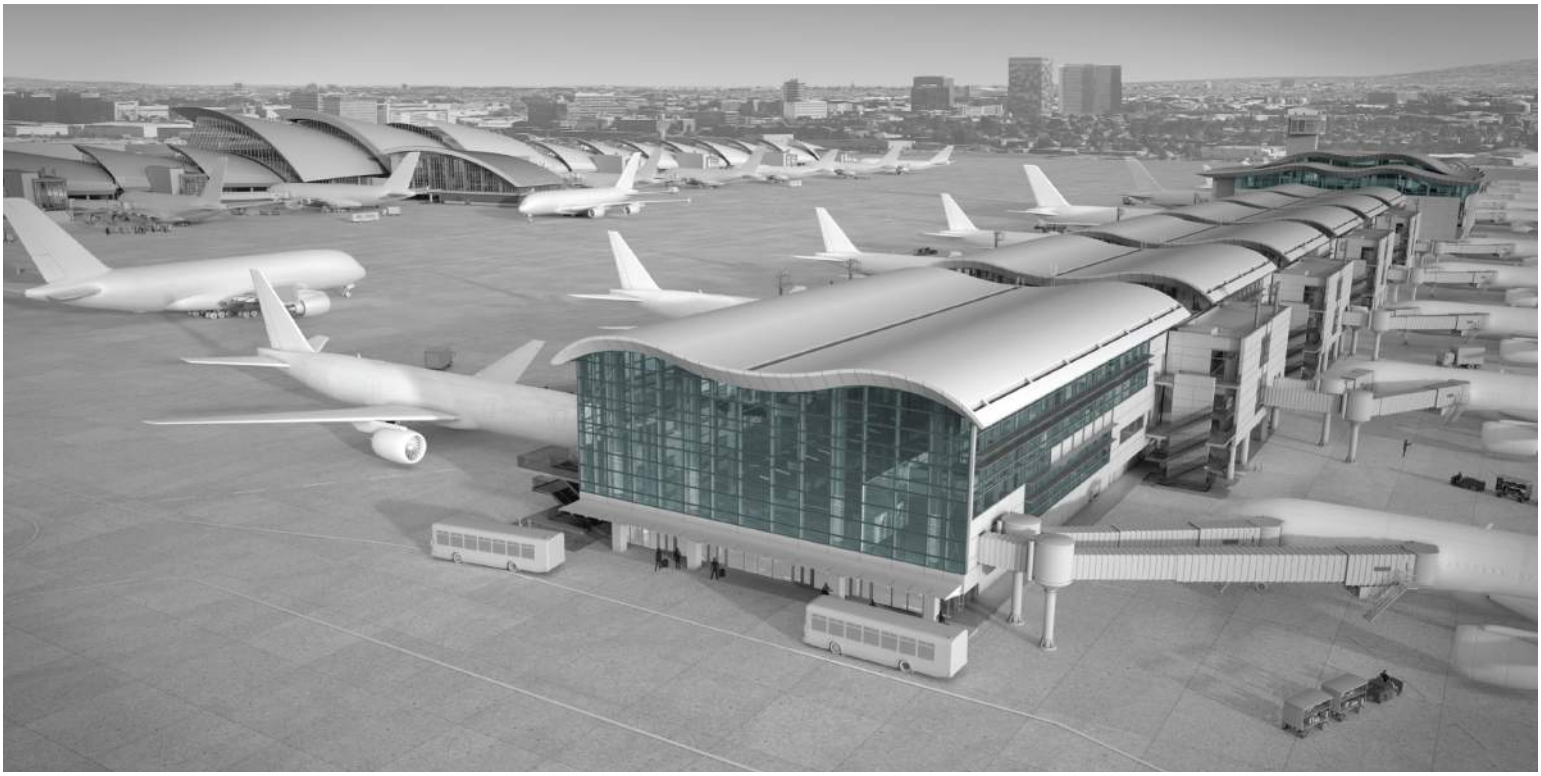
Walter P Moore provided complete structural engineering and parking consulting services for the Federal Inspections Services (FIS) facility, which handles processing of all arriving international passengers through U.S. customs and immigration.

The architectural concept provides a grand and memorable space for arriving travelers, using clean and elegant exposed roof trusses with columns located at 50 foot centers. The articulated trusses are curved, with clerestories to draw in natural light to the main arrivals hall. Similar exposed roof trusses in the adjacent Central Ticketing area make that space equally memorable. Following the tragic events of 9/11, the design was modi□ed to meet new FAA security screening protocols. The design was revisited in order to incorporate various security upgrades, without delaying the completion date.

Walter P Moore adapted emerging structural technology to economically solve the key structural design challenges. The FIS opened on schedule and within budget in January 2005 and was instantly lauded as a highly functional and attractive new city and airport asset. Its construction accommodated ongoing airport activities, integrated seamlessly with the adjacent facilities and transportation links, and incorporated post 9/11 security changes with minimal impact.

Los Angeles International Airport Mid□eld Expansion

Los Angeles, Cal□ornia



Services Provided

Enclosure Engineering

Owner

Los Angeles World Airports

Project Details

Construction Cost: $1.6 billion

Completion Date: Est. 2020

Project Size:

- 800,000 SF
- 21 gates
- Gateway Building
- PAX Tunnel
- 5-level concourse

Walter P Moore joined the Los Angeles International Airport Mid□eld Satellite Concourse Project to provide enclosure engineering services. The $1.6 billion, 750,000-sf project is a 12-gate addition to the Tom Bradley International Terminal. The project will be completed in phases, with the □rst phase being the MSC North project. The project will include a central terminal processor, conveyance systems for passengers and baggage and new taxiways. The upgrades will allow Los Angeles World Airports to provide superior service to customers by allowing greater □exibility in scheduling □ights without interrupting operations.

Airport projects in California are particularly challenging because they require enhanced building performance related to seismic activity, weather conditions, acoustics and aesthetics.

Part of the design-build team, Walter P Moore engineers worked to deliver a unique solution that accounted for large drift conditions. The answer came in a proposal that incorporated an independent steel backup system and disconnected the drift of the building and that of the curtain wall.

Engineers worked in Rhino and Revit to model their design, automating the digital process for e□cient communication with the architects, including real-time updates of models.

Los Angeles International Airport Bradley West Terminal 4 Connector

Los Angeles, California

Services Provided

Structural Engineering
Enclosure Engineering

Owner

Los Angeles World Airports

Project Details

Construction Cost: $148 million

Completion Date: 2016

Project Size: 110,000 SF

Walter P Moore provided structural and enclosure engineering services for the Design-Build Bradley West Terminal 4 Connector, a new multi-use, multi-level facility that creates a secure connection between the Tom Bradley International Terminal and Terminal 4. A secure bridge allows passengers to transfer □ights without having to re-enter security checkpoints. It includes a sloping, 65 foot-high open area visible from the roadway and a plaza area with planters and seating for airport patrons to use. The new space will also include a Checked Baggage Inspection System (CBIS) and a □ve lane Passenger Security Screening Check Point. A South Terminals Passenger Busport will be built to reduce walking distance between terminals, easing the transfers of passengers with checked luggage.

The overall construction project will integrate sustainable building practices into LAX's new architectural vision for the airports, adding an environmentally friendly element to the improvement of passenger circulations.

Los Angeles International Airport
Terminal 4 and 5
Automated People Mover Core

Los Angeles, California

Services Provided

Enclosure Engineering

Owner

Los Angeles World Airports

Project Details

Construction Cost: $1.6 billion

Completion Date: 2022

Walter P Moore is providing enclosure engineering services for the first step of American Airline's re-imagine of their Terminals 4 and 5. A new "Terminal Core" is being built between the two terminals in order to streamline the passenger experience and facilitate the movement of guests between the terminals and the Automated People Mover station that will be built. The terminal core is the start of a larger addition, which will include the Automated People Mover and a Terminal 4 and 5 United Departure Hall.

The Automated People Mover is slated to be completed in 2023 and the Terminal Core will be connected to the United Departure Hall via an elevated walkway expected to open in 2024.

The Terminal Core will eventually house 16 lanes of security and passengers be able to transfer between the two terminals airside without having to use the current underground passageway.

****Renderings courtesy of © Gensler.*

Tampa International Airport Featured Projects

Tampa, Florida

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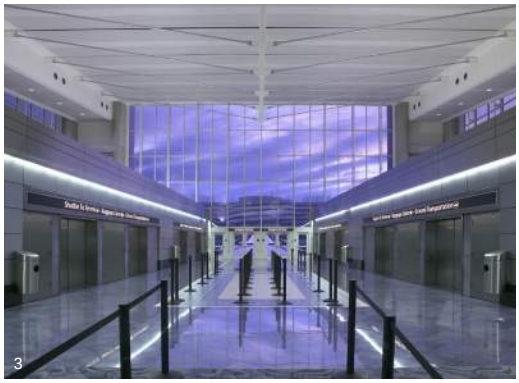

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Services Provided

Structural Engineering
Threshold Inspection

Owner

Hillsborough County
Aviation Authority

1. Consolidated Rental Car Facility and Automated People Mover System

Project Details

Construction Cost: $730 million

Completion Date: February 2018

Project Size: 1.4 miles APM, 2.4 million SF

2. Airside C Terminal

Project Details

Construction Cost: $120+ million

Completion Date: April 2005

Project Size: 16 gates, 275,000 SF

3. Airside E Terminal

Project Details

Construction Cost: $70 million

Completion Date: October 2002

Project Size: 14 gates, 276,000 SF

4. Main Terminal and Concessions Redevelopment

Project Details

Construction Cost: $120 million

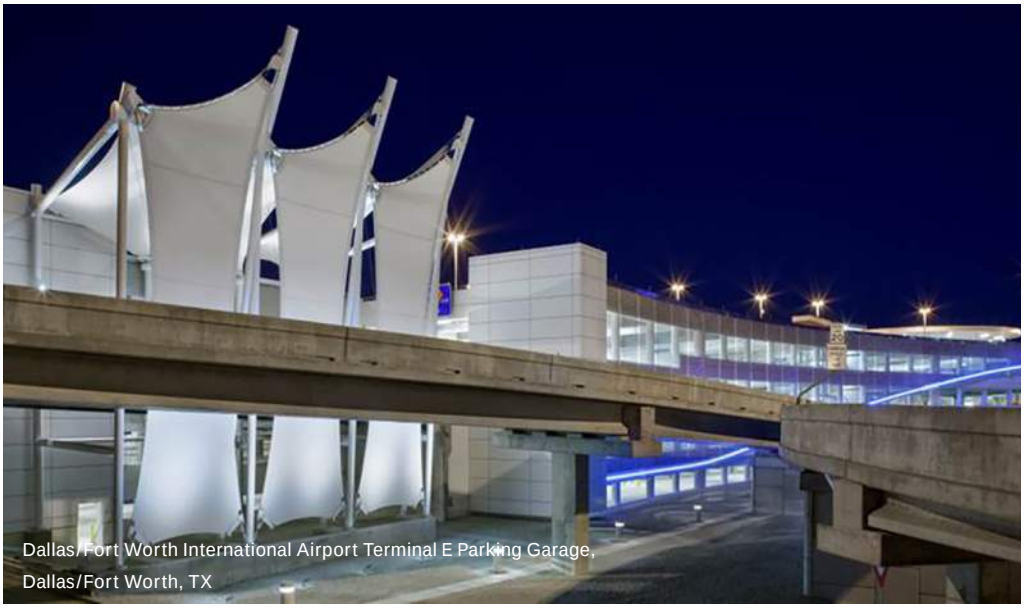
Completion Date: October 2017

Project Size: 80,000 SF

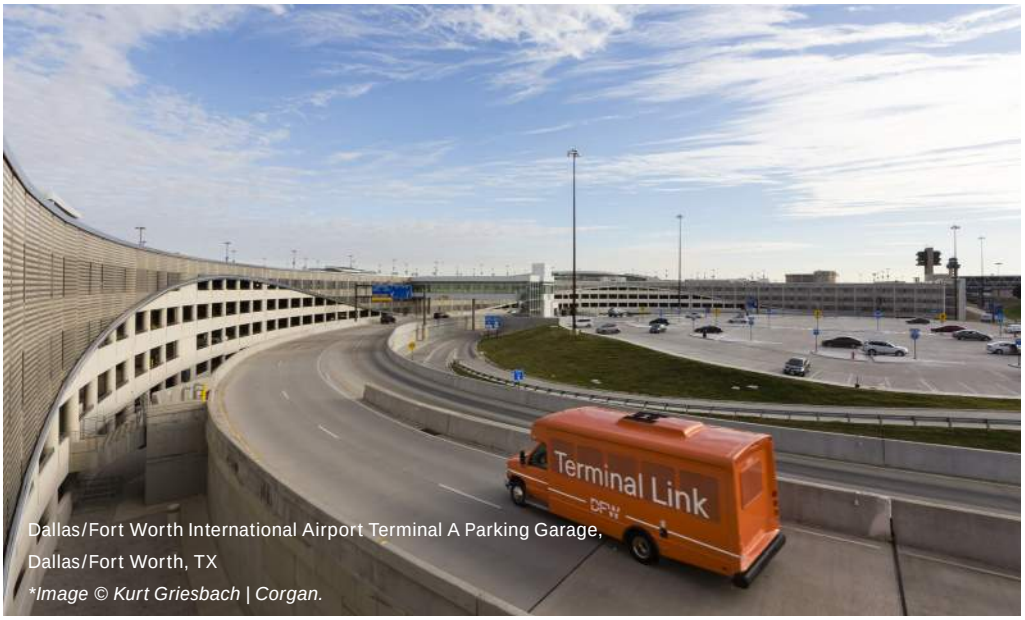
Aviation Parking

Walter P Moore has provided integrated parking solutions for some of the largest airport parking projects around the country. O□ering a range of parking consulting services including master planning, functional design, and operations consulting, our parking experts bring an average of over 20 years of experience at over 30 airports around the country. Specialties include site evaluation, functional design, graphics and way□nding, operator selection, revenue control systems, operations and maintenance programs, operations analysis and value engineering. The collaboration of our structural engineering and parking consulting services has produced economical and e□cient designs of over 50,000 spaces in garages and consolidated rental car facilities at airports around the U.S.

Boston Logan International
Consolidated Rental Car Facility,
Boston, MA



Dallas/Fort Worth International Airport Terminal E Parking Garage,
Dallas/Fort Worth, TX



Dallas/Fort Worth International Airport Terminal A Parking Garage,
Dallas/Fort Worth, TX
Image © Kurt Griesbach | Corgan.

Tampa International Airport
Economy Parking Garages,
Tampa, FL

Hartsfield-Jackson Atlanta International Airport
Consolidated Rental Car Facility, Atlanta, GA

Dallas/Fort Worth International Airport
Terminal D Parking Garage, Dallas/Fort Worth, TX

Automated People Movers

Walter P Moore has provided structural engineering services for automated people mover systems (APM) and light rails across the country. We have experience in the design of APM and rail elevated guideway superstructures, APM and rail stations and platforms and in the design of airport terminal and parking garage structures that support and enclose automated people mover systems.

Issues such as structural loading, performance criteria and vibration mitigation and isolation require strong, technical solutions. Close coordination with the APM supplier on the con□guration of elevated guideway, maintenance, access, and enclosure systems make the design of the supports and surrounding structure a key component to the success of any APM or transit project.

Orlando International Airport South Airport Automated People Mover Complex and Intermodal Terminal, Orlando, FL

Tampa International Airport Consolidated Rental Car Facility and Automated People Mover System, Tampa, FL

George Bush Intercontinental Airport
Automated People Mover System Expansion, Houston, TX

Los Angeles International Airport Terminal 4 and 5 Automated People Mover Core, Los Angeles, CA **Rendering © Gensler.*

Harts□eld-Jackson Atlanta International Airport
Automated People Mover Station at the Rental Car Center
Atlanta, GA

Services Provided

Water Resources Engineering
Civil Engineering

Owner

Bangalore International Airport Limited.

Completion date

Completed

Bangalore International Airport Limited.

Detailed Study on the Drainage Network & Rainwater Harvesting Systems.

Bangalore

Walter P Moore has provided Water Resources Engineering and Civil Engineering services for the design and development of an effective and innovative Drainage Network & Rainwater Harvesting Systems.

The scope of work included

- Review existing and master plan data provided.
- Understanding of on-site potable and non-potable water demand for various usage.
- Sizing and development of additional water bodies to maximize storage for reuse.
- The concepts shall be that of cost effective, environment friendly over the life cycle while integrating well with the existing infrastructure.
- Prepare and submit the Detailed Report along with cost estimate, detailed design and construction drawing of water bodies.

Services Provided

Traffic Simulation
Curb Side Utilization Analysis
Identification of Potential Conflict areas
Network improvements
Adequacy of curb side parking bays

Owner

GVK & CIDCO

Completion date

Ongoing

Navi Mumbai International Airport Limited

Traffic Simulation in Navi Mumbai International Airport

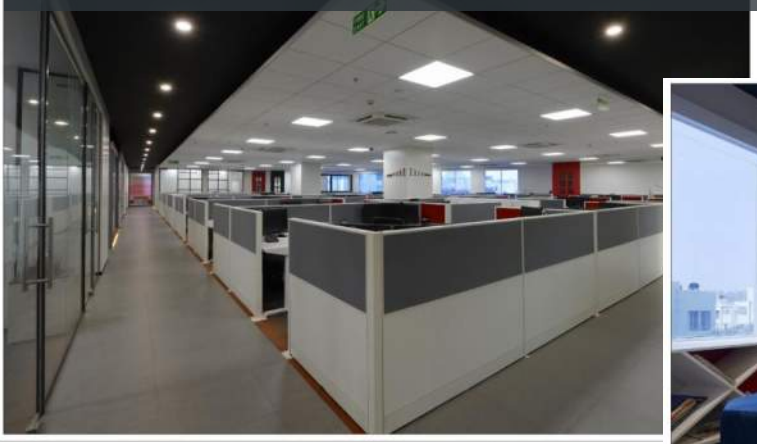
Navi Mumbai, Maharashtra

Navi Mumbai International Airport is a greenfield international airport which is planned to cater 60 million passengers per year. The airport is designed with 3 terminals where 2 are exclusively for domestic departures and arrivals whereas 1 terminal is for international departures and arrivals. Walter P Moore carried out micro simulation analysis using VISSIM and performed curb side area for various design options.

Within the terminal network, Walter P Moore identified various probable locations where conflicts are observed, and congestions are likely to happen. Different options related to capacity improvement were carried out with the help of micro-simulation analysis tool VISSIM. Curb side utilization ratio has been calculated for the terminal area within the terminal complex network. The study provided a concrete base to check the adequacy of lanes within the terminal network and the number of curb side parking bays.

The study also includes integration with the proposed metro line, bus terminal area and Multilevel Car Parking (MLCP).

PUNE OFFICE



Who We Are

Walter P Moore is an international company of engineers, architects, innovators, and creative people who solve some of the world's most complex structural, technological, and infrastructure challenges. Providing structural, diagnostics, civil, traffic, parking, transportation, enclosure, technology consulting, and construction engineering services, we design solutions that are cost- and resource-efficient, forward-thinking, and help support and shape communities worldwide. Founded in 1931 and headquartered in Houston, Texas, our 700+ professionals work across 20 U.S. offices and five international locations.

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