



Intelligent Infrastructure

About Halff

Halff professionals provide interdisciplinary technology solutions through a broad range of services from more than 30 locations in Arkansas, Florida, Louisiana, Oklahoma and Texas. Our staff is well versed in using innovative technologies to provide our clients with people-centered solutions.

Our areas of expertise include the following:



Connected/Autonomous Vehicles



Asset Management



Intelligent Transportation Systems (ITS)



Machine Learning/
Artificial Intelligence



Geospatial Services/
Lidar



GIS and Digital Twins



Fiber and Broadband



Scenario Planning



Building Management Systems (BMS)



Automation



Intelligent Building Maintenance Systems



Virtual Reality/
Augmented Reality



Building Automation and Controls



Virtual Engagement



Lidar to BIM/CAD and Revit



Renewable Energy and Efficiency



ABOUT US



OUR WORK



HALFF NEWS

Halff is an employee-owned full-service engineering and architecture firm headquartered in Richardson, Texas. The firm provides services throughout the Southeast from more than 30 offices in Arkansas, Florida, Louisiana Oklahoma and Texas. The firm's staff of more than 1,400 includes engineers, architects, planners, scientists and surveyors. Halff is ranked #85 in Engineering News-Record magazine's list of the top 500 design firms in the United States. The firm was founded in Dallas in 1950 by Albert H. Halff, PhD-Eng., PE. Today, Halff preserves Dr. Halff's legacy of integrity, dedication to client service and commitment to quality. We are a progressive firm committed to providing value with creative solutions to design challenges.

Our people are individuals with diverse, yet complementary, professional backgrounds. Most of our professional staff started with Halff straight out of college and have grown in their careers knowing the commitment to quality which is the cornerstone of the firm. We know this attribute, more than any other, allows us to maintain a loyal client base. We are members of a company built on integrity, technical knowledge and commitment to client service.

Halff's Unique Qualifications

Halff understands there are many important qualifications to selecting an engineering firm. Halff has assembled a highly-qualified team with a proven history of working together and specialized experience in all aspects of the anticipated project. Our team is committed to the success of the project and will apply our knowledge and experience to:

- Be available and immediately responsive
- Listen to and understand your objectives, goals and constraints
- Understand the regulatory and permitting requirements associated with the project
- Provide varying options for each design problem to enable selection of solutions which best fit your needs
- These factors will contribute to a successful project that meets your needs, goals, milestones, budget and schedule

Halff by the Numbers



5
STATES

Arkansas, Florida,
Louisiana, Oklahoma
and Texas



30+
OFFICES



1,400+
EMPLOYEES



The future is coming faster than you think Halff is ready. Are you?

Our cities and communities are changing faster than ever before. Many are struggling to respond to concurrent disruptions—increases in cost of development and inflation, fast or negative growth, aging infrastructure, labor force issues, a changing climate, the digitalization of everything and continued transformations stemming from the COVID-19 pandemic. These disruptions impact where people live, work and play. Significant changes in urban mobility are also right around the corner—a disruption to our built environment that will be as significant as the rise of the automobile itself.

Halff is a leading engineering and architecture firm with more than 70 years of experience in delivering innovative solutions to communities. Our purpose is to improve lives and communities by turning ideas into reality. Our goal is to improve the quality of life for people by providing exceptional design and planning services that create livable and sustainable environments.

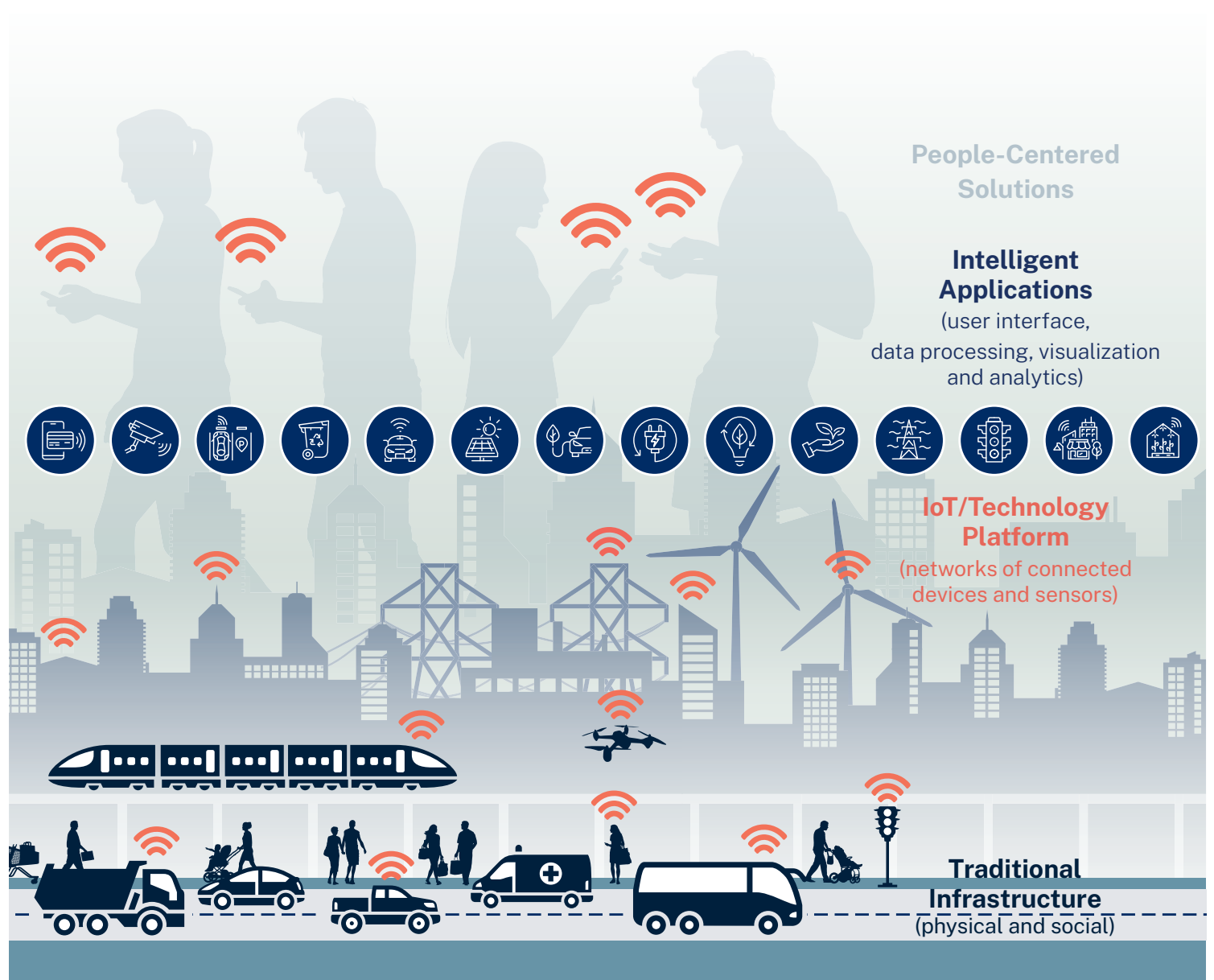
As experts in intelligent cities planning and development, Halff helps cities create the infrastructure and systems needed to support the demands of a growing population while minimizing their impact on the environment. From urban planning and transportation to energy management and sustainability, Halff has the expertise to help cities thrive. Our interdisciplinary team of planners, designers, engineers and technology specialists offer expertise in the full life cycle of an intelligent city or technology-related project—from initial planning and funding through design and installation on the ground. At Halff, intelligent-city strategies start with people, not technology.

What are Intelligent Cities?

An intelligent city is one that uses information and communication technologies (ICT) to improve the quality of life for residents, enhance sustainability and streamline urban services. It doesn't mean that the city is smart or intelligent. Rather, it signifies a city's choice to use smarter, more intelligent solutions and innovative technologies to create places and spaces that are more livable, efficient and responsive to the needs of the community.

Intelligent cities offer a range of benefits, including reduced traffic congestion, improved public safety, increased energy efficiency and a higher quality of life for residents. By using technology to manage resources and create a more sustainable environment, cities can improve the lives of their residents while also reducing their impact on the environment.

Intelligent cities are comprised of multiple layers: 1) traditional physical and social infrastructure, 2) infused with technology-based devices and sensors connected through the Internet of Things (IoT), 3) being used by computers and/or people using intelligent applications, 4) to create people-centered solutions.





Intelligent Infrastructure in Action



Intelligent Mobility



Intelligent Buildings



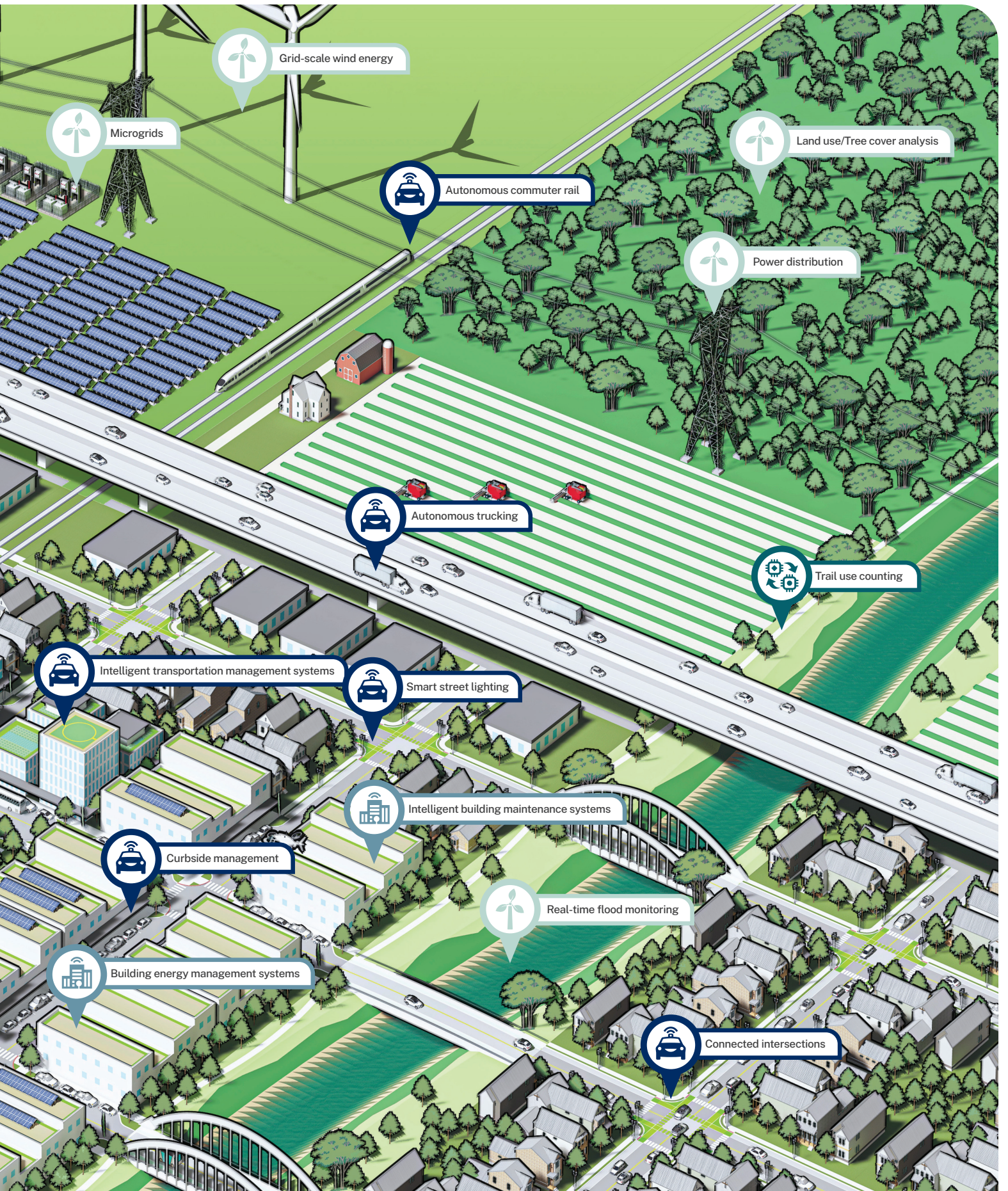
Intelligent Infrastructure



Intelligent Operations/
Governance



Intelligent Environment



Grid-scale wind energy

Microgrids

Land use/Tree cover analysis

Autonomous commuter rail

Power distribution

Autonomous trucking

Trail use counting

Intelligent transportation management systems

Smart street lighting

Intelligent building maintenance systems

Curbside management

Building energy management systems

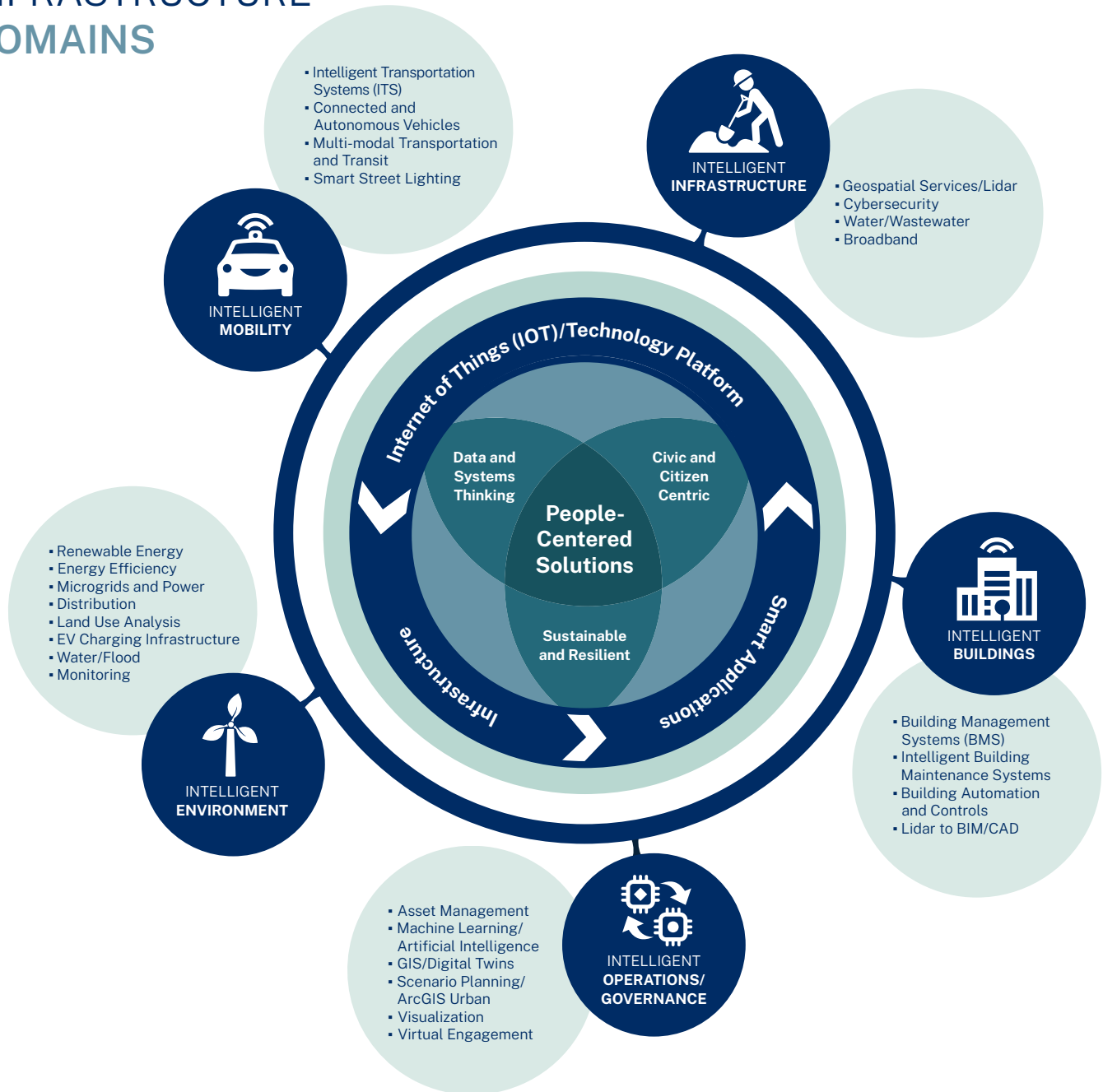
Real-time flood monitoring

Connected intersections

Intelligent Infrastructure Solutions

Halff offers a range of services to help cities become intelligent cities. From urban planning to transportation and energy management, Halff partners with clients to create customized solutions that address their specific needs. One of our key services is urban planning, where we help cities create sustainable, livable communities. We also provide transportation planning and design services, including the development of intelligent transportation systems (ITS) and smart mobility solutions. Halff's expertise in energy management and sustainability helps cities reduce their carbon footprint, lower energy costs and improve the overall efficiency of their systems.

INTELLIGENT INFRASTRUCTURE DOMAINS



Digital Twins/GIS



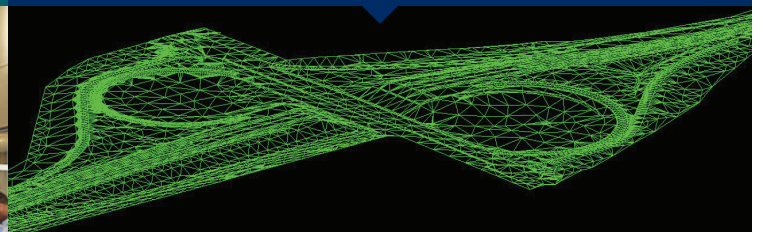
Mobile, Land, Rail, Aerial and Drone Geospatial/Lidar



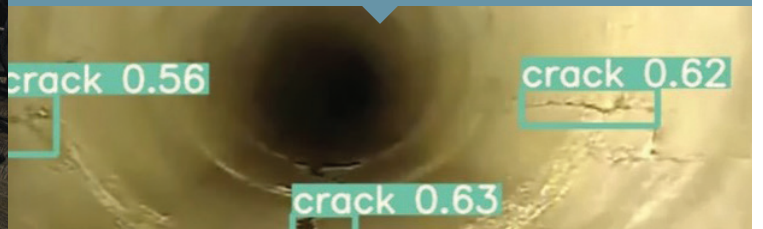
Intelligent Transportation System and Management Technologies



Enhanced Analytics



Machine Learning/Artificial Intelligence



Intelligent Mobility

Intelligent mobility refers to the integration of innovative technologies and data-driven solutions aimed at enhancing the efficiency, safety and sustainability of transportation systems. This encompasses a wide range of areas, such as connected vehicles, intelligent infrastructure, intelligent transportation systems and alternative mobility options. The goal of an intelligent mobility project is to improve the user experience while reducing congestion, emissions and other negative impacts of transportation on our cities and communities. By utilizing cutting-edge technologies such as artificial intelligence and the Internet of Things, intelligent mobility projects aim to transform the way we move and live in the 21st century.

Halff offers the following intelligent mobility solutions:

Intelligent Traffic Management Systems

- Regional ITS planning
- Construction documents
- Fiber-optic design/splice diagrams
- ITS fiber management systems
- Intelligent traffic signal systems

Intelligent Transportation Demand Management

- Real-time public transportation tracking and scheduling

Connected and Autonomous Vehicles

- Dedicated short-range communications (DSRC) radio and cellular strategies for vehicles, bicycles and pedestrians
- Design/testing of connected vehicles to infrastructure

Multi-Modal Route Planning and Information Systems

Parking Management Systems

- Commercial truck parking/rest area/weigh station integration to RTMC
- Dynamic message signs for vacant commercial parking
- Smart parking

Last-Mile Delivery Solutions

Traffic Engineering Technologies

- Transportation planning and complete streets design
- Connected intersection design
- Traffic signal design and warrant studies
- Traffic signal timing coordination and modification
- Level of service analysis
- Corridor, grid and time of day coordination
- Traffic modeling, Synchro and SIDRA analysis
- Smart street lights

Transit Systems

- Bus station and transfer facility design
- Transit design and engineering
- Transit center planning and design
- Transit operations planning and analysis
- Traffic analysis and simulations
- Microtransit
- Real-time public transit information

Alternative Transportation Planning and Design

- Trail planning and design
- Active transportation planning and infrastructure development
- Trail and park visitation counts

Location: Florida | FDOT Regional Fiber Optic Network/ITS Plans

Location: Florida | FDOT Regional Transportation Management Design



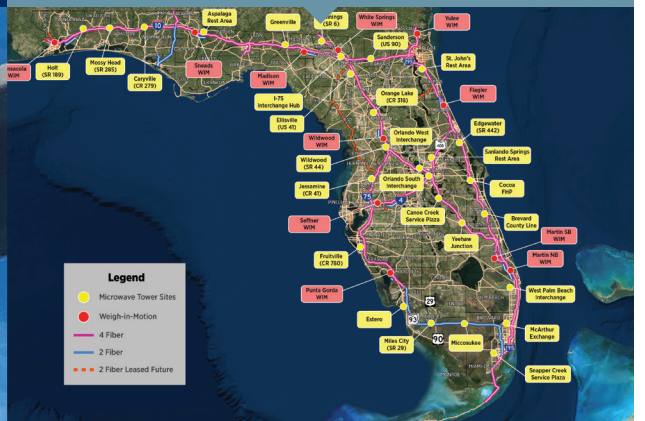
Location: Florida | FDOT MCSAW Fiber Optic and Electronic Trucking Bypass System



Location: Florida | FDOT US 19 Connected Vehicle and SPaT Support



Location: Florida | FDOT Statewide Fiber Optic System



Intelligent Infrastructure

Intelligent infrastructure projects refer to the use of advanced technologies and digital solutions to improve the design, construction and management of physical infrastructure such as roads, bridges, water systems, and energy networks. These projects aim to make infrastructure more efficient, sustainable and resilient through the use of sensors, IoT devices, geospatial analysis and other digital technologies. The goal is to create a more integrated and connected infrastructure network that can better respond to changing demands, minimize downtime and disruptions and enhance overall performance. Today, more than ever, there is an increased focus on cybersecurity which is the practice of protecting critical systems and sensitive information from digital attacks. Through the design, construction and implementation of intelligent infrastructure, cities and communities can achieve improved quality of life for their citizens, greater economic growth and a more sustainable future.

Half offers the following intelligent infrastructure solutions:

Lidar Collection Methods

- Aerial photogrammetry (fixed-wing and UAS)
- Aerial Lidar (fixed-wing and UAV)
- Terrestrial Lidar

Geospatial Services

- Modeling of architectural interior and exterior building elements
- Modeling of structural elements both visible and plenum space
- Modeling of visible piping, conduits and ductwork
- Bridge and facility inspections
- Digital documentation of mechanical and electrical assets
- Photogrammetric mapping
- Lidar bare earth surface models
- Topographic Mapping
- Planimetric data collection
- Orthophotography
- Digital Terrain/Elevation/Surface Modeling (DTM/DEM/DSM)
- Aerial imagery and videos
- Scan to BIM, CAD or Revit

Electronic Security System and Cybersecurity

- Enterprise electronic safety and security design
- Complete integration with video surveillance and monitoring, access control, intrusion detection and intercom systems
- Video surveillance design
- Intelligent cameras with gunshot, aggression, motion, infrared and night enhanced detection features
- Authorized access control design
- Door breach with door ajar alerts and notification design
- Visitor passes, door breach with door ajar alerts and notifications
- Complete design for new systems, rip and replace, and enterprise expansion that include new construction and remodeling requirements

Water/Wastewater

- SCADA, monitoring instrumentation and controls

Broadband

- Fiber system planning and design
- Network resilience
- Telecom consultation

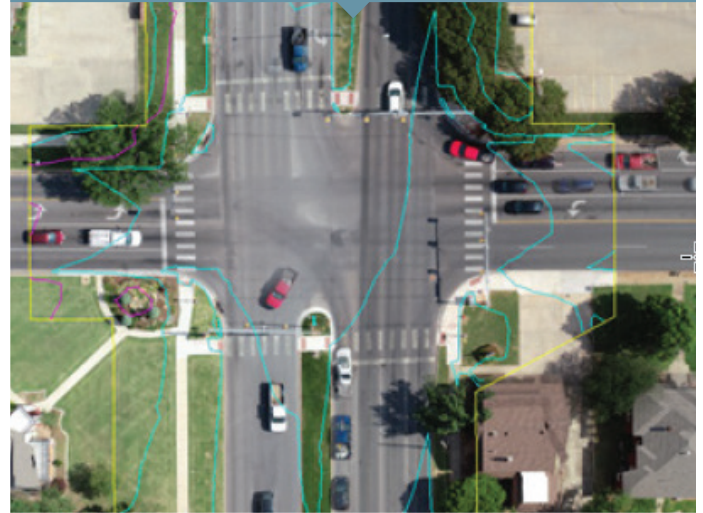
Location: Mount Dora, Florida

Mount Dora Cybersecurity Risk and Resilience Assessment



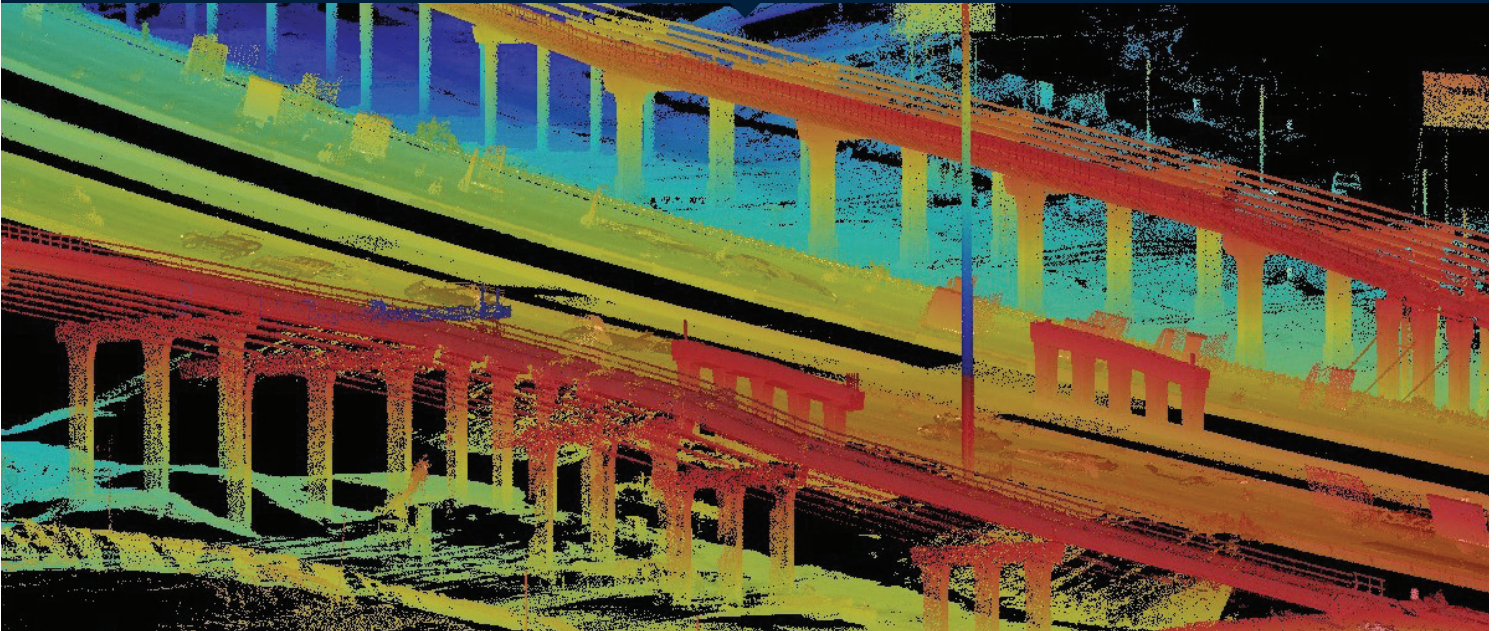
Location: Monahans, Texas

Monahans Mobile Lidar and 360 Imagery



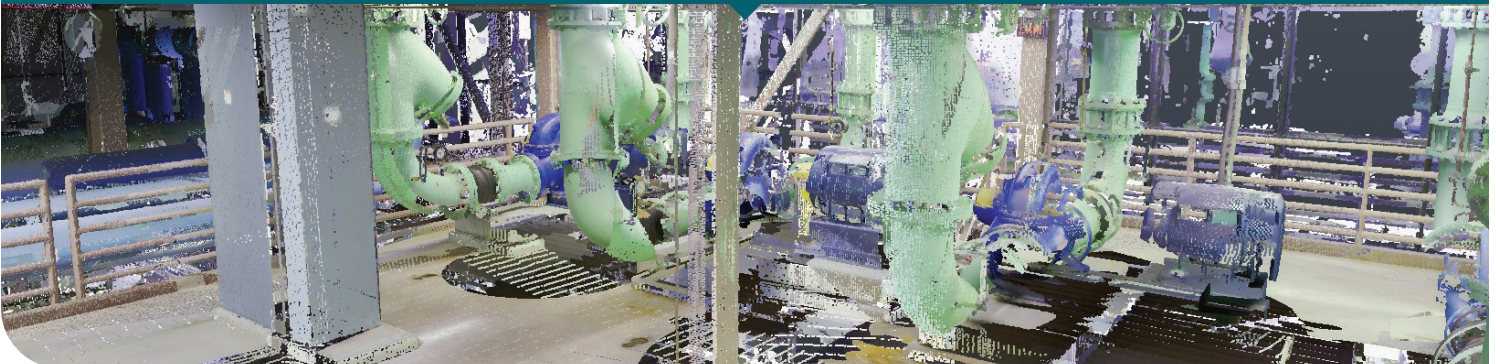
Location: El Paso, Texas

TxDOT El Paso District I-10 Bridge Modeling Construction Verification



Location: Denton, Texas

University of North Texas BIM Modeling of Discovery Park Cup



Intelligent Buildings

Intelligent building projects refer to the integration of advanced technologies and digital solutions into the design, construction and management of buildings. The goal of these projects is to create buildings that are more energy efficient, secure and comfortable, while also improving overall building performance and reducing operating costs. This is achieved through the use of sensors, IoT devices, building automation systems and other digital technologies. Intelligent buildings offer a range of benefits, including improved indoor air quality, optimized lighting and heating, enhanced security and greater energy savings. They also provide valuable data insights to building managers, enabling them to make informed decisions and continually improve the building's operations.

Half offers the following intelligent building solutions:

Building Systems

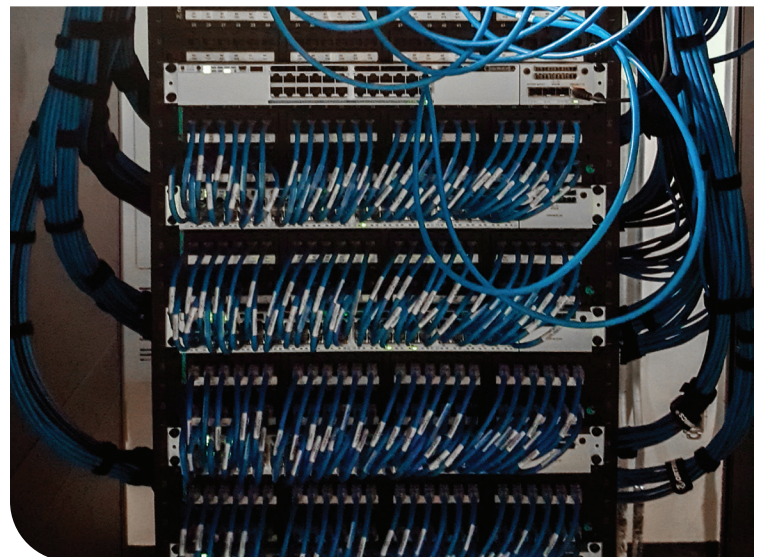
- Building Management Systems (BMS)
- Smart lighting systems
- Access control and security systems
- Fire safety and life safety systems (smoke evacuation)
- Intelligent building maintenance systems

Green Building Design

- Lighting and HVAC control systems
- Solar panels and photovoltaic systems
- Micro wind turbines
- Water conservation
- LEED® certification

ICT Security

- Structured cabling (backbone and horizontal)
- Electronic security systems
- Intercom systems
- Fire alarm systems
- Surveillance camera systems
- Intrusion detection
- Access controls
- Uninterruptible power supplies (UPS)
- Data centers
- Water/wastewater instrumentation
- Water/wastewater SCADA networks
- Lift station controls
- Lift station automation



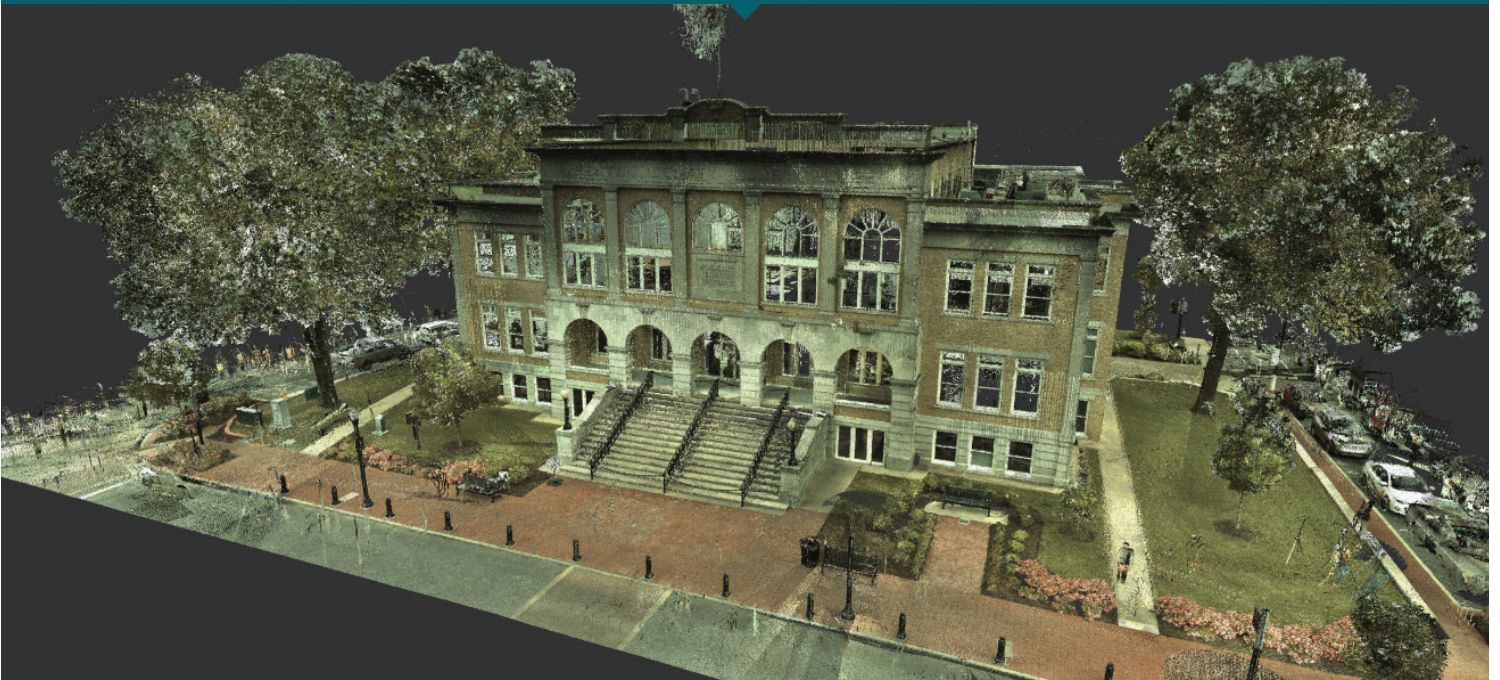
Location: McAllen, Texas

McAllen ISD Six Middle School Video Surveillance System



Location: Benton County, Texas

Benton County Courthouse BIM Modeling



Intelligent Governance/Operations

Intelligent governance/operations projects refer to the implementation of advanced technologies and digital tools to optimize and streamline various processes within an organization. These projects aim to increase efficiency, reduce costs and improve overall performance through the use of artificial intelligence, machine learning, Internet of Things, GIS data management and services and other digital solutions. The goal is to create a smarter, more automated and data-driven approach to operations allowing our clients to make better decisions, respond faster to changes and enhance customer experience.

Half offers the following intelligent governance/operations solutions:

GIS Services

- ArcGIS Urban
- Spatial analysis
- Data development
- GIS database and web map hosting
- Application integration
- Custom programming

GIS Data Management

- Geodatabase design
- Digital conversion
- Georeferencing and transformation

GIS Mapping Services

- Asset tracking and inventory management systems
- GIS Lidar Large Scale Automated Engineering (LSAE) for hazard mapping
- Mobile GIS
- Trimble and Leica integration

Remote Sensing Services

- Lidar and traditional topographic analysis
- Aerial and satellite image classification
- Multi-spectral analysis
- Ground truthing
- Feature extraction

Visualization

- CAD to SketchUp to Lumion digital renderings
- Drone to SketchUp to Lumion video flythroughs
- 3D visualization

Virtual Citizen Engagement and E-Governance Platforms

- Virtual engagement rooms
- Virtual design charrettes
- Interactive web mapping
- Web pages
- Interactive surveys
- QR codes

Machine Learning/Artificial Intelligence

- Smart likelihood of failure (LOF) machine learning prediction
- AI CCTV defect detection
- AI road crack detection
- AI data retrieval from documents
- Data science
- Model calibration
- Geospatial AI
- Digital data transformation
- 3D point cloud detection

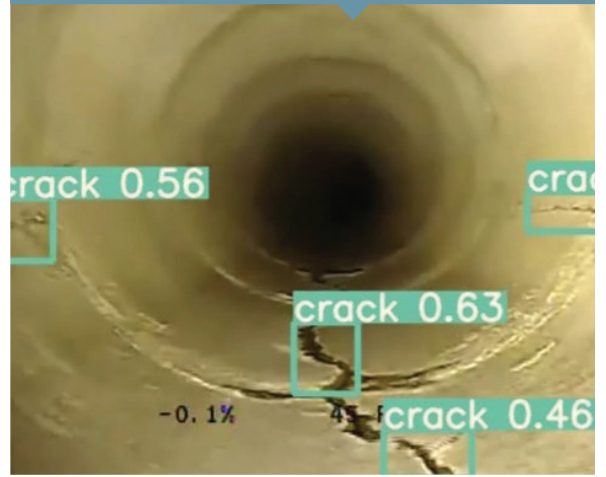
Location: Lubbock, Texas

Lubbock Parks Conditions Assessment and Asset Management Program



Location: Fort Worth, Texas

Fort Worth CCTV Analysis and Object Detection



Location: Oklahoma City, Oklahoma

Oklahoma City Parks Digitally Rendered Video Fly-Through



Location: El Paso, Texas

El Paso County Parks Master Plan Virtual Engagement Room



Intelligent Environment

Intelligent environment projects refer to the implementation of advanced technologies and digital solutions aimed at improving the management of natural resources and the protection of the environment. These projects aim to address a range of environmental challenges, such as air and water pollution, climate change and waste management, by leveraging the power of digital technologies. Examples of intelligent environment projects include the use of sensors to monitor air and water quality, and the implementation of renewable energy systems. By creating a smarter, more sustainable approach to managing the environment, these projects can help to preserve natural resources for future generations, reduce the negative impact of human activity on the environment and improve overall quality of life for people and communities.

Half offers the following intelligent operations solutions:

Water

- Smart water management systems and metering
- Future floodplain forecasting
- Flood monitoring

Land Use

- Land use cover analysis
- Tree inventories and datahubs
- AI impervious surface detection
- Sustainable land use planning and development

Energy

- Renewable energy generation and storage systems
- Wind energy siting and design
- Solar farm siting and design
- Smart grid systems for energy distribution

Air Quality Monitoring and Management Systems

Environmental Sensors for Monitoring Ecosystems

Location: Tallahassee, Florida

Tallahassee International Airport Solar Farms 1 and 2



Location: Austin, Texas

Austin Tree Inventory and Datahub



Location: Lewisville, Texas

Lewisville Parks Urban Forest Deep Learning Tree Canopy Study



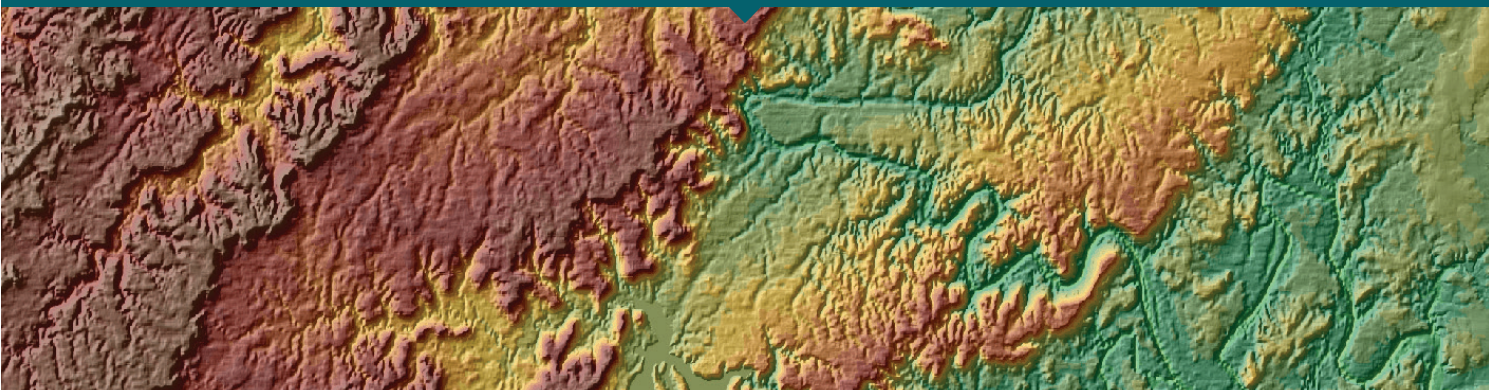
Location: Seguin, Texas

Seguin Land Cover Classification with Deep Learning



Location: Tarrant County, Texas

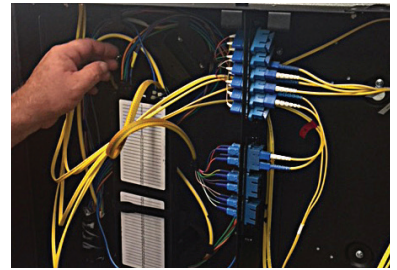
Tarrant Regional Water District Lidar Analysis



Case Study

Okaloosa County ITS and Continuing Services

Okaloosa County, Florida



Population

210,000

Completed

2022

Scope

Design of fiber optic network providing communications to County Facilities and design of a Transportation Management Center

Reference

Dr. R. H. Showers, P.E.,
Okaloosa County Public Works
South Traffic Division
850.609.6181
rshowers@myokaloosa.com

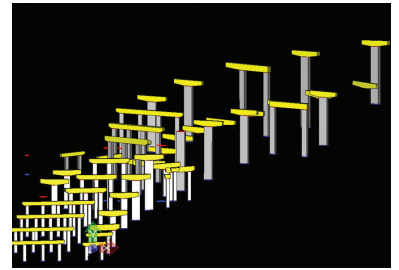
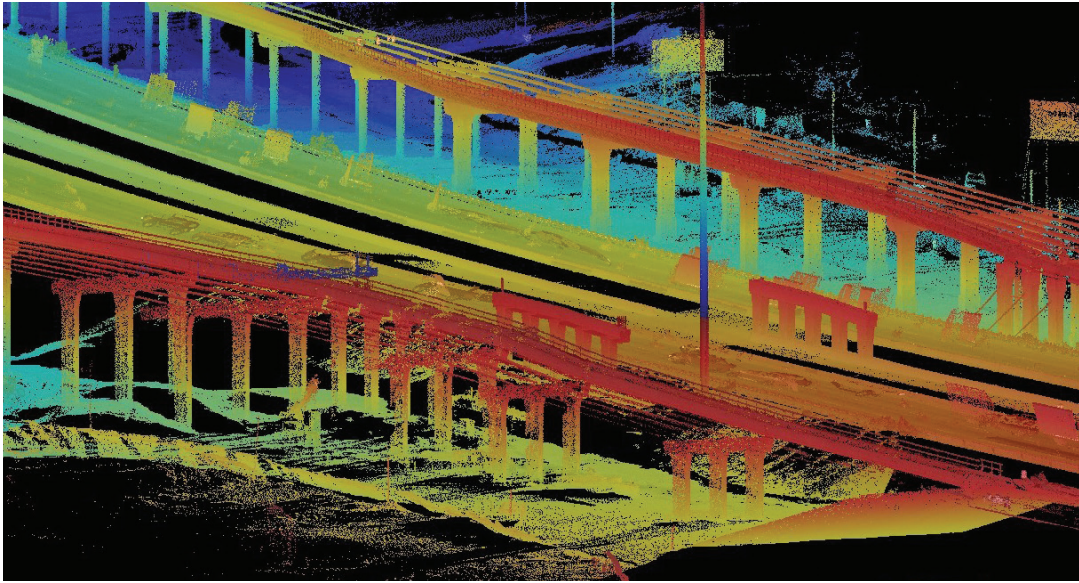
Halff was hired to perform an intelligent involving comprehensive and ongoing ITS services for Okaloosa County including the analysis, design, construction plans development and implementation of a county-wide fiber optic network. This network consists of more than 75 miles of high fiber count Corning® fiber and connects all County facilities on 16 different networks. The fiber optic network provides communication to County facilities, traffic signal controllers, CCTV cameras at intersections, RWISs and future DMSs. As a part of this effort, fiber optic capabilities were provided to Eglin Air Force Base facilities for communication to military installations across the Florida Panhandle.

Halff also designed the new Transportation Management Center (TMC) for Okaloosa County that allows the County's fiber network to be utilized to monitor traffic from the new TMC using existing CCTV cameras and a new control center. This allows the TMC staff to respond to real-time operational adjustment needs and immediate incident response tasks. TMC operators monitor live traffic conditions and can adjust the signal timing at each intersection remotely to improve traffic flow or dispatch crews to respond to a roadway incident, stalled vehicle or weather-related incident. The TMC also provides real time operational opportunities for drivers that will save them time and money and reduce wasted fuel. Operators can also notify maintenance staff of malfunctions to help reduce response times. Higher quality video can be shared with the Emergency Operations Center (EOC) during major incidents or weather events. This has proven to be invaluable in emergency situations by giving decision makers access to live video of current conditions across the County. The TMC also enables Okaloosa County and neighboring TMCs to help each other during emergency conditions. All of these critical monitoring and incident-management services are made possible by the fiber optic network groundwork — the result of Halff's design and support services to Okaloosa County over the past 15 years.

Case Study

I-10 Bridge Modeling Construction Verification

El Paso, Texas



Population

678,415

Completed

2019

Scope

Geospatial/Surveying

Reference

Lucio Santos

Texas Department of
Transportation – El Paso

lucio.santos@txdot.gov

915.790.4391

The Texas Department of Transportation (TxDOT) El Paso District selected Halff for a 2017 Survey On-Call work authorization. The I-10 bridge modeling and construction verification project was a multi-phase roadway transportation project that would help address challenges for the densely populated and growing urban environment in El Paso.

Halff's Surveying and Geospatial team collected data throughout 16 bents and 65 columns for eastbound traffic, and another 16 bents and 66 columns for westbound traffic. The control was leveled to eliminate as many errors as possible when evaluating these structures to meet uniquely stringent accuracy requirements. The team used two terrestrial scanners to capture as many visible structural elements from the ground as possible. The caps of the bents were not visible from the ground position, so this data was collected with Lidar and structure-from-motion techniques using Halff's small unmanned aircraft system (sUAS) fleet. The tremendous amount of overlapping data created a complete and comprehensive point cloud dataset of the structures. This data was registered and calibrated to the leveled control.

Halff's Geospatial technicians then modeled these structures in high-definition 3D, working closely with TxDOT's survey and design teams and other consulting engineers to analyze the structures. The Lidar data Halff collected was vectorized, delivering one-foot contours, full planimetric detail and orthophotography with a quarter-inch pixel resolution. All of the datasets from the aerial mapping, mobile and terrestrial Lidar, and conventional surveying collections were merged using data fusion processes, creating a complete mapping solution that showed a comprehensive view of the bridge structures. All of the data was submitted to TxDOT with full deliverables, including point cloud .las, .tif image and .dgn files, as well as Geopak Microstation files and the mobile mapping system's 360 panoramic street-view imagery.

Halff Grant Funding Assistance

For decades, Halff has helped public agencies obtain funding assistance for their projects in the form of grants and low-interest loans. We have researched funding sources and prepared the applications for projects that enhance safety or improve quality of life, seeing many of them from the project development and planning stage through to construction and commissioning. The funding source often dictates the requirements of a project as well as the funding limits and application schedule. Halff has experience supplying the needed planning, environmental, design and construction administration documentation to meet the administrative requirements of different funding entities.

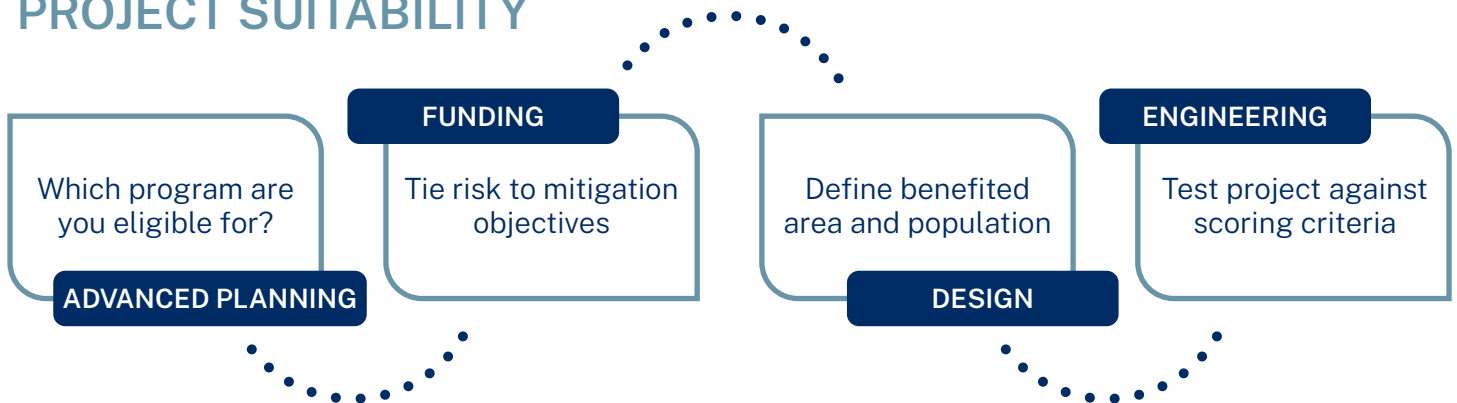
Types of Intelligent City and Technology Grants/Funding Available:

- National Science Foundation (NSF) Smart and Connected Communities program
- U.S. Department of Energy (DOE) Smart Cities and Communities program
- U.S. Department of Transportation (DOT) Smart City Challenge
- National Institute of Standards and Technology (NIST) Smart America Challenge
- U.S. Environmental Protection Agency (EPA) Smart Growth program
- U.S. Department of Housing and Urban Development (HUD) Sustainable Communities program



Halff has secured over \$150 million in grant funding and private funding for our clients.

DETERMINING PROJECT SUITABILITY



Note: Eligibility criteria and application requirements may vary, so it's important to research each program thoroughly and determine which, if any, align with the goals and objectives of your specific smart city project.

Halff Technology Specialists



Matt Bucchin, AICP
Intelligent Infrastructure Leader



Bill Swope
Geospatial Leader



Tracy Forester
ITS, Connected and Autonomous
Vehicles Leader



Matt Stahl
Machine Learning/Artificial
Intelligence



Jose Delgado
Information Communications
Technology Leader



Tim Jenkins
Cybersecurity Leader



Gini Connolly
GIS/Asset
Management Leader



Sean Droptini
Broadband Leader

We improve lives and communities
by turning ideas into reality.

Contact

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