Jacobs

TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

Client
U.S. Air Force

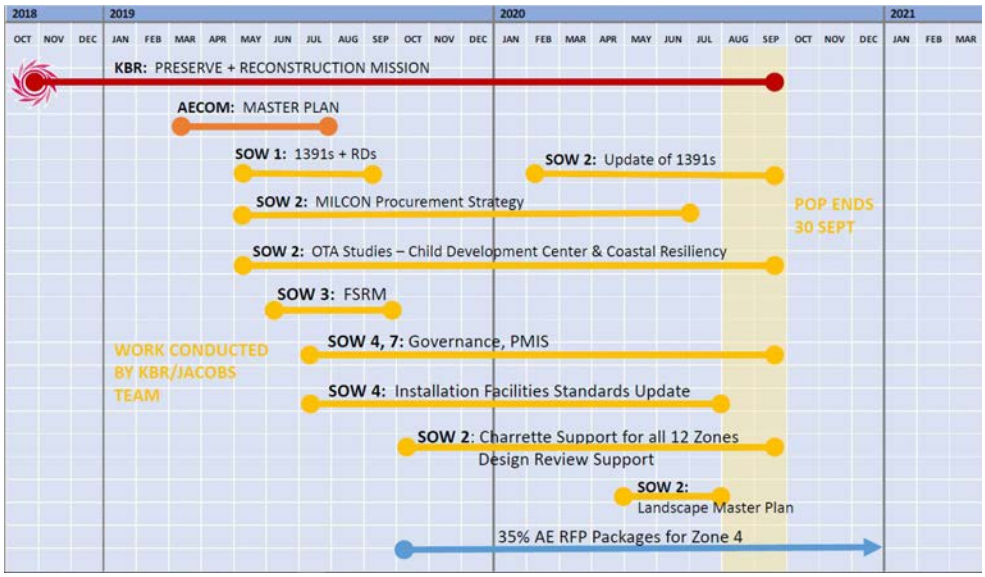
Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

Services
- DD 1391 and Requirements Document for 42 Projects
- MILCON Procurement Strategy
- FSRM for 37 Projects
- IFS Update & Program Management Governance Documents

Points of Contact
John Mogge
Hollie Schmidt
Chad St. John

PROGRAM SUPPORT SERVICES



155 MPH
Sustained Winds

15.55’
Storm Surge at Mexico Beach

FY19/FY20 MILCON
95 Buildings
2,386,000 SF

Future Master Plan
49 Buildings
625,000 SF

Total Proposed Buildings
144 New Buildings
3,011,000 SF

In October 2018, Tyndall AFB was hit with a Category 5 hurricane, which damaged or destroyed 100% of its assets. Jacobs joined the KBR team in this Emergency Response effort in March 2019. The program’s overarching intent was to rebuild the base to be more a more resilient and sustainable installation and to incorporate smart technologies into the reconstructed projects. Our team was tasked with responding to Military Construction (MILCON) Programming (DD 1391) and Requirements Documentation for 42 projects, developing design guidelines for the Rebuild Program, and creating a Master Plan Refinement and Implementation Strategy to reimagine Tyndall AFB as the Installation of the Future.

Our teaming solution was a true integrated, multi-disciplinary delivery approach. Approximately 300 Jacobs personnel worked on this program, spanning numerous performance units and technical disciplines. The core team was predominately located on-base for a large portion of the time and interacted with the client daily. Our ability to assemble such a large and diverse team in a short period allowed us to bring unmatched innovation, problem solving, and dedication to the program.

The improvements to enhance the base’s resiliency presented a modest increase in initial capital cost and a quick payoff with two to almost three times the overall resiliency, sustainability, and smart technology performance delivery over the life cycle. This demonstrated that the Installation of the Future was not only achievable, but also a sound investment that mitigated risks from future climate impacts, increased the mission capability of the base, and provided a safe haven for the military and surrounding community in future events.

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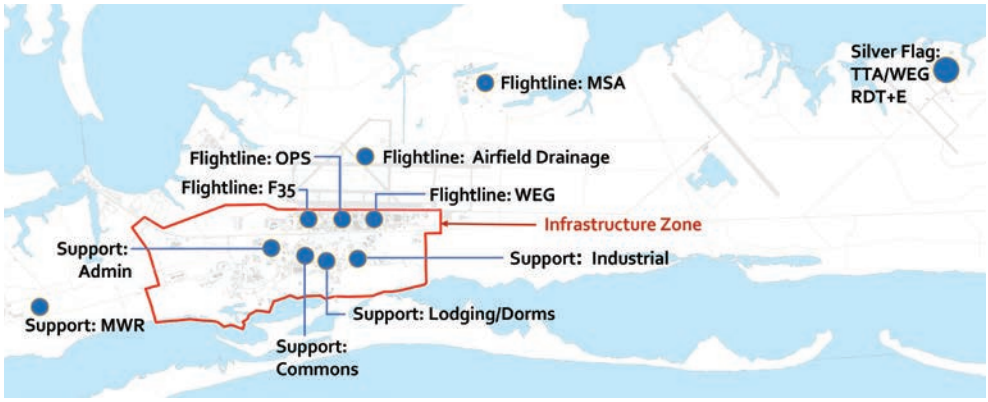
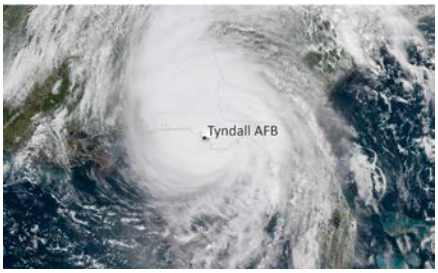
Services
DD 1391s and Requirements Documents for 42 Program Packages and 12 Zone Packages

Points of Contact
John Mogge
Josh Rose
Laura Lavelle

SOW 1: DD 1391S AND REQUIREMENTS DOCUMENTS FOR 42 PROJECTS





Category 5 Hurricane Michael hit Tyndall AFB in October 2018, damaging 100% of the base's assets.

In October 2018, Tyndall AFB was hit with a Category 5 hurricane that damaged or destroyed 100% of its assets. The KBR/Jacobs team quickly assembled as a rapid-respond team to support the Tyndall Program Management Office (PMO) to address the completion of DD 1391s and Requirements Documents (RDs) for 42 programmed projects. The team worked closely with the PMO under a tight schedule to complete funding documents as the first step toward the rebuilding Tyndall AFB into the Installation of the Future.

To address the scope of work properly, the KBR/Jacobs team created a multi-disciplinary team that worked at the installation to complete the DD 1391s and RDs in time for Congressional approval. The estimate for completing all 42 projects was approximately $3.2 billion, which was approved by Congress to fund the rebuild of the base into a more resilient and durable Installation of the Future. To arrive at the estimate, the KBR/Jacobs team conducted interactive planning sessions with the PMO and met with others at the base to confirm all programmatic requirements to support the DD 1391 and RD effort. For a few of the projects, the team conducted charrettes to validate the requirements.

Because of the installation's hurricane-prone coastal location, USAF requested that a more robust consideration for resilience be included in the 42 DD 1391 packages. The team emphasized resilience to extreme weather, storm surge, and flooding as priorities. Sustainability was another planning priority, and the team pursued cost-saving resource efficiencies, improved environmental performance, and augmentation of resilience performance.

The team reviewed and updated the 42 DD 1391s during a second phase and finalized the Detail Deficiency Data and Certificate of Compliance forms. The team continued to support the PMO by tracking scope changes and impacts to the Current Work Estimates by attending design review meetings, reviewing A/E deliverables, and updating project cost estimates based on cost changes received in design meetings or at the direction of the PMO.

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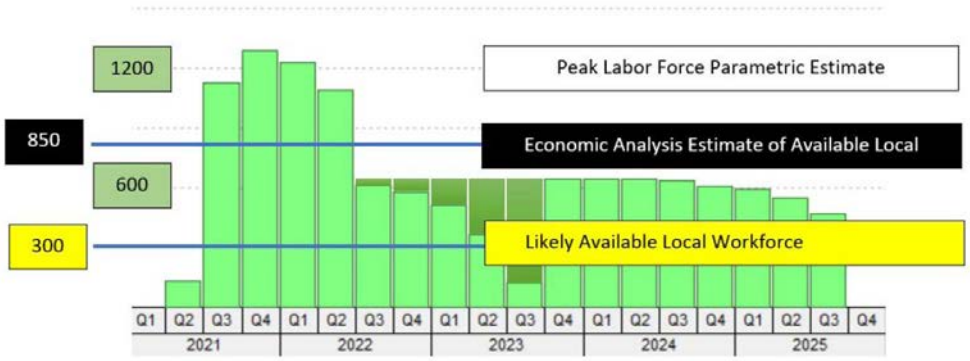
Services
Risk and Opportunity Management Plans (ROMPs)
P6 Resource Loaded Schedule
Critical Path Method Analysis
OTAs for 3 Case Studies

Points of Contact
John Mogge
Hollie Schmidt
Chad St. John

CDC Case Study

MILCON PROCUREMENT STRATEGY



The Military Construction (MILCON) Procurement Strategy for the Tyndall AFB Rebuild Program was an extension of the initial MILCON Programming & Acquisition Support Service Statement of Work (SOW). The KBR/Jacobs team was responsible for developing the required contractor tasks, deliverables, and timelines to support the programmatic Market Analysis and Delivery Method Planning for each programmed DD 1391 package. The intent of the MILCON Procurement Strategy was to support the Program Management Office's (PMO's) decision making and acquisition processes and help them achieve cost and schedule certainty for the Program.

This work was executed in parallel and beyond the preparation of the DD 1391 packages and Requirements Documents for the approximately 42 programmed projects and 12 zone packages that comprised the overall Tyndall Rebuild Program. These tasks included:

- Performing delivery method analysis and risk and opportunity management plans for each of • the 42 packages as configured in the 12 zones
- Developing a full integrated resource-loaded program schedule (P6) that enabled us to perform "what if" scenarios to help the client develop space planning and financial alignment of the packages to the MILCON and FSRM funding avenues
- Performing two Critical Path Method analysis for the F-35 beddown packages

In addition to these tasks, the KBR/Jacobs team provided analysis and approaches to develop Other Transactional Authorities (OTA), which included developing a robust list of potential Alternative Financed Projects in the event that only partial funding was provided by Congress and the Air Force decided to engage the community in higher levels of support or privatized endeavors.

The team identified nine projects and conducted case studies on the following three: (1) Coastal Resiliency; (2) Child Development Center Financing, and (3) Energy Resiliency.

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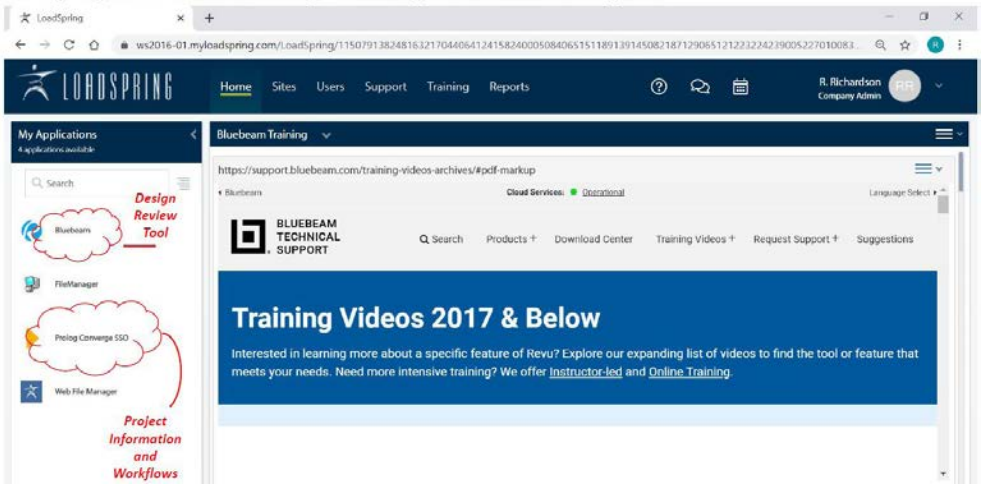
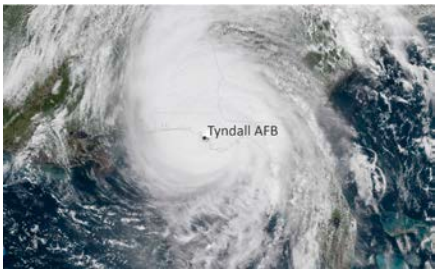
Services
Program Management
Governance Documents

Points of Contact
John Mogge
Randy Richardson
Hollie Schmidt

PROGRAM MANAGEMENT GOVERNANCE DOCUMENTS

LoadSpring Portal to the TAFB Program Management Information System





View of Hurricane Michael over Tyndall AFB

In October 2018, Tyndall AFB was hit with a Category 5 hurricane that damaged or destroyed 100% of its assets. Jacobs joined the KBR Team in this Emergency Response effort in March 2019. The goal of this project is to rebuild the base to be more resilient and sustainable, as well as incorporate SMART technologies.

As part of the reconstruction project, the KBR/Jacobs team developed Governance Documents and a Program Management Plan to guide the Tyndall Rebuild Program. Under this task, the team developed a series of tools for the Program Management Office could use to efficiently manage and implement every project under the Rebuild Program.

These functions and associated software implemented included the following:

FUNCTION	PMIS SOFTWARE
File Management	LoadSpring File Manager
CAD and BIM File Management	Bentley ProjectWise
Team Collaboration	Microsoft SharePoint
Design Reviews	Bluebeam Revu
RFI Processing	Trimble Prolog
Change Management	Trimble Prolog
Integrated Master Schedule	Primavera P6
Dashboards	LoadSpring Platform
Dashboards	MS Power BI
Additional Process Workflows	Trimble Prolog
Construction Management	Trimble Prolog
Project Management	Trimble Prolog

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Services
Facilities, Sustainment, Restoration and Modernization (FSRM) for 37 projects

Points of Contact
John Mogge
Blaine Paxton
Hollie Schmidt
Chad St. John

FACILITY SUSTAINMENT, RESTORATION, AND MODERNIZATION (FSRM) PLANNING FOR 37 PROJECTS

1. **Filter** – Remove **Existing Buildings to Remain**
2. **Filter** - Remove **Phase 1-5 Demolition**
3. **Identify** buildings to receive **FY 19 FSRM Repairs**
4. **Filter** – Include only Buildings located on the **Flightline** and **Support** zones

7 FACILITIES NEED SWING
673 OCCUPANTS IMPACTED
2 LOCATIONS (FLIGHTLINE + SUPPORT)

As part of the revitalization effort, the KBR/Jacobs team was tasked with the Facilities, Sustainment, Restoration, and Modernization (FSRM) planning for 37 projects at Tyndall AFB. The Air Force identified scope for a number of FY19 FSRM projects that have Authority to Advertise subject to funding availability.

A number of undefined FSRM repair/renovation projects were on the Unfunded Requirements List, as well as significant master cleanup and facility demolition work that needed to be defined and scoped in short order for FY19 award.

The KBR/Jacobs team provided defined the design packages for the removal/demolition of supporting Real Property/Real Property Installed Equipment (RP/RPIE), construction material and debris, natural/material debris caused by the Hurricane Michael and/or storm recovery efforts in areas that were either (1) more than 25 feet from existing facilities; or (2) where previously demolished facilities stood, but the supporting RP/RPIE was not removed. The team provided defined bid packages for the demolition of facilities and supporting RP/RPIE, construction material and debris of facilities slated for demolition, as directed by the PMO. The team also developed Ready to Advertise (RTA) packages for each repair/renovation, master cleanup and facility demolition project for execution along with a recommended schedule for follow-on work to incorporate into the corresponding RTA packages. The team executed this work in accordance with applicable Air Force Instruction, Unified Facilities Criteria, regulatory, and other federal agency guidance.

As part of this FSRM work, the team supported the PMO with the siting of $20 million worth of temporary space to be used as buildings were demolished and/or to be used as swing space to accommodate the overall program over the 5-year program timeframe.

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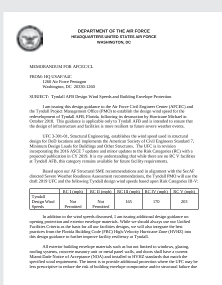
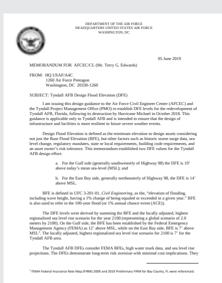
Services
Installation Facilities Standards Update

Points of Contact
John Mogge
Hollie Schmidt
Chad St. John

Design Wind Speeds and Building Envelope Protection Memo


DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, DC

Design Flood Elevation (DFE) Memo



TYNDALL AFB INSTALLATION FACILITIES STANDARDS UPDATE

Architecture
Image and character for the vertical environment, which includes all enclosed and open structures.

Site & Land Management
Image and character for the horizontal maintained and manicured environment, which includes roads, parking, pathways, site furnishings, site lighting, landscape, and hardscape.

Coastal Resiliency
Focus on creating opportunities for innovative solutions that integrate nature-based and structural elements to minimize coastal risk and to restore, maintain, and protect the coastal integrity.

As part of the reconstruction effort, the KBR/Jacobs team was charged with updating the Tyndall AFB Installation Facilities Standards (IFS). The scope included conducting a thorough review of the IFS in place prior to Hurricane Michael in October 2019, and compare the standards to design and construction standards of Miami Dade County, FL. The team updated the IFS by incorporating the latest DoD Unified Facilities Criteria (UFC), industry codes, current post-hurricane Base Master Plan, and Miami Dade County Hurricane Standards as approved by 325th Fighter Wing. In addition to climatic resiliency, the team revised these standards to consider energy efficiency, resiliency, smart buildings, and installation technologies factors.

The Tyndall AFB IFS Rebuild Appendix was developed to providing design guidance that would support the vertical and horizontal Military Construction (MILCON) projects to rebuild the base following the devastation of Hurricane Michael. The Rebuild Appendix clearly articulates the additions of sustainability, resilience, and SMART solutions that clarify or exceed baseline UFC requirements, provides "guardrails" for the rebuild without inhibiting innovation and creativity, expedites the design phases of the rebuild by consolidating design guidelines and intent in a single resource, and specifies guidelines that enable the Installation of the Future.

The technical approach for the Rebuild Appendix was conducted in three phases. During Phase 1, the team updated the current IFS to include design criteria for high velocity wind zones. In Phase 2, the team conducted a detailed and comprehensive update for new and existing and approved modifications to the IFS. Because of the timing constraints, these phases ran concurrently and involved consensus building events and government reviews. Lastly, during Phase 3, the team Integrated the updated IFS into a digital, web-based tool.

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Services
Installation Facilities Standards Update/
Resiliency, Sustainability & Smart Technology

Points of Contact
John Mogge
Hollie Schmidt
Chad St. John

TYNDALL - RESILIENCY, SUSTAINABILITY & SMART SYSTEMS

As part of the Tyndall Rebuild efforts the KBR/Jacobs team alongside with the USAF developed performance indicators and metrics to update the Installation Facilities Standards (IFS) and evaluate the planned future projects. This frame was developed based on the USAF's doctrine known as the "5 Rs" of Resiliency: Robustness, Redundancy, Resourcefulness, Response, and Recovery.

The 5 Rs also encompass facility standards, including its energy, utilities, communications, and facility structural systems, as well as wind loading requirements, the base master plan and the more specific area development and facility site plans, the design flood elevation, construction methods and materials, and the base's respect for the natural environment and the power of nature. For the Tyndall AFB IFS, the 5 Rs provide the five primary performance indicators as the base establishes itself as the Installation of the Future (IoTF).

With respect to sustainability, Tyndall AFB's IoTF will be designed, constructed, and operated with sustainable features as unifying priorities for all horizontal and vertical efforts. Tyndall AFB projects will incorporate criteria from a variety of proven strategies, including best practices from private sector and U.S. Department of Defense agencies, as well as framework from third-party rating systems that specifically address aspects of Tyndall AFB's natural coastal context, infrastructure, energy and water systems, and buildings, and include aspects of occupant and community experiences.

The following installation topics were analyzed and run through the 5 Rs and performance indicator and metrics: Resiliency and Sustainability; Structural Load-Resisting Systems and Related Envelope Elements; Architectural Systems; Energy, Power and Electrical Distribution; Telecom and Fiber Utility; Domestic Water and Fire Water; Wastewater; Stormwater; Transportation Systems; and Coastal Resilience.

Emphasis was placed on resilience to extreme weather, storm surge, and flooding as a priority planning consideration. Sustainability also was a planning priority that pursued cost-saving resource efficiencies, improved environmental performance, and augmentation of resilience performance. The IoTF is to be designed with SMART building solutions that will be employed to collect, display, record, analyze, and disseminate information, and to provide centralized visibility and communication of monitored building and utility subsystems in a uniform, secure, and affordable manner.

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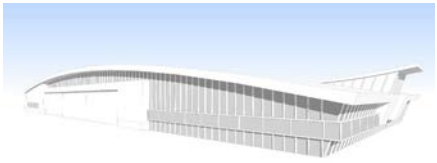
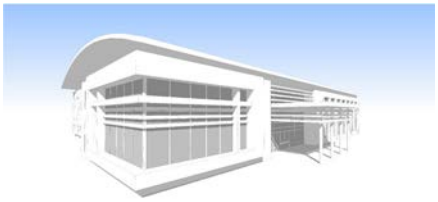
Services
Installation Facilities Standards Update/
Architecture, Image & Character

Points of Contact
John Mogge
Hollie Schmidt
Chad St. John

TYNDALL REBUILD DESIGN INTENT: ARCHITECTURAL IMAGE & CHARACTER



Hangar



Maintenance Headquarters

Child Development Center

As part of the Tyndall AFB Installation Facilities Standards (IFS) Rebuild Appendix, the KBR/Jacobs team developed and defined the Design Intent for the architectural image and character principles that define the guidance for Tyndall AFB to become the Installation of the Future. The Rebuild Design Intent provides a basis for the planning and design of buildings to ensure a high quality, attractive, sustainable, resilient, smart, secure, and user-friendly development of Tyndall AFB. These planning standards were developed to be used in coordination with the Tyndall AFB IFS, providing additional planning and design considerations.

The goal of this design guidance was to provide a framework and the limits of the "guardrails" the designers are required to perform within, providing innovative design solutions, and balancing creativity, cost, and cohesive design solutions. The design concepts in the design guidance will provide a hierarchy of buildings that supports the long-term development of Tyndall AFB.

The buildings typology developed in the design guidance followed the architectural style, design vocabulary, landscape character, and material and color palettes were developed and selected as appropriate for Tyndall AFB. The style incorporates materials and technologies with expressive forms, shapes, and textures that reflect the highly technical activities housed in these buildings. In total, 12 building type samples were developed as representative of the range of facilities on the Installation.

Building types from each of the Air Force Corporate Facilities Standards Groups included: Maintenance Headquarters, Chapel, Dormitory, Research Facility, Simulator, Fire Station, Lodge, Child Development Center, Community Commons, Hangar, and Vehicle Maintenance Facility.

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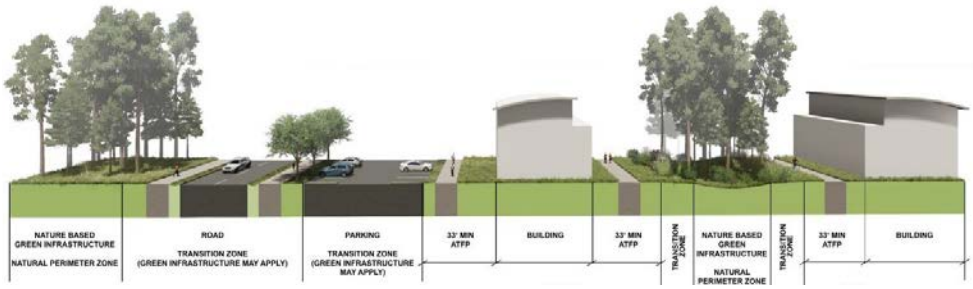
Services
Installation Facilities Standards Update/
Coastal Resiliency

Points of Contact
John Mogge
Hollie Schmidt
Chad St. John

REBUILD DESIGN INTENT: SITE & LAND MANAGEMENT

Land Management Districts



Maintained Zone - Typical Transect

Existing Landscape Character

As part of the Installation Facilities Standards update, the KBR/Jacobs Team developed the Rebuild Design Intent chapter of the Tyndall Air Force Base (AFB) Installation Facilities Standards (IFS) Appendix which defines the Architectural Image and Character, Site and Land Management, and Coastal Resilience principles that define the guidance for Tyndall AFB to become the Installation of the Future. The Rebuild Design Intent provides a basis for the planning and design of buildings, site and landscape improvements, roads and pathways, and landscape management zones to ensure a high quality, attractive, sustainable, resilient, smart, secure, and user-friendly development of Tyndall AFB.

The goal of this design guidance was to provide a framework and the limits of the "guardrails" the designers are required to perform within, providing innovative design solutions, and balancing creativity, cost, and cohesive design solutions. The design concepts in the design guidance will provide a hierarchy of buildings, public spaces, roadways, and landscaping that supports the long-term development of Tyndall AFB.

Guidelines for landscape character were also presented divided into Tyndall AFB's five primary Landscape Zones. These guidelines provide designers and contractors a clear vision of not only the intended landscape character; including plant palette, hardscape materials and colors but also level of maintenance expectations; within their construction boundaries, but also how the landscape character of adjacent construction zones interface with each other.

The Site & Land Management section of the Rebuild Design Intent address the following specific topics: Existing Landscape Character, Landscape Communities, Buildable Areas based on Flood Elevations, Land Management Districts, Construction Zones, Proposed Landscape Character, Integrated Natural Resources Management Plan, Landscape Framework Goals, Proposed Landscape Character, and Design Elements of Landscape Character among others.

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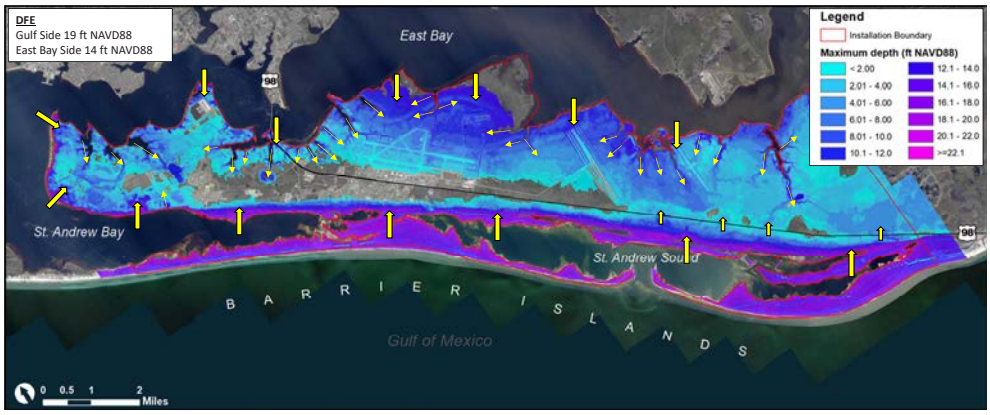
Services
Installation Facilities Standards Update/
Rebuild Design Intent: Coastal Resiliency

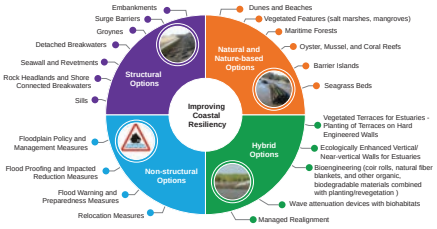
Points of Contact
John Mogge
Hollie Schmidt
Chris Allen

REBUILD DESIGN INTENT: COASTAL RESILIENCY



Surge Water Model

Integrated Land Management



Improving Coastal Resiliency

Coastal Resiliency was another aspect covered under the Rebuild Design Intent chapter of the Tyndall Air Force Base (AFB) Installation Facilities Standards (IFS) Appendix. The team provided multiple nature-based design solutions that were developed to satisfy a critical Design Objective of providing Resiliency and to satisfy the national defense authorization act requiring an understanding of resiliency in capital projects. This was done through the USAF's "5 Rs of Resiliency" into the project.:

- ROBUSTNESS: Reconstructed wetlands, restored coastal areas and aquatic ecosystems are designed to dissipate floodwaters and absorb storm surge
- REDUNDANCY: Integrated systems approach to mitigation through grey and green solutions, including a hybrid system
- RESOURCEFULNESS: Use of systems-wide benefits derived from interactions between various ecosystems, including the watershed, wetlands, dunes, scrub, grasslands, and forests
- RESPONSE: An array of coastal protection measures that help mitigate flood risk and accelerate recovery from events to support mission effectiveness.
- RECOVERY: Surge threats and resultant damage are reduced and mitigation measures enable quick recovery

The team also provided solutions that infused resiliency into land management that considered the holistic environment in which the project was being executed, including:

- Infuse land management practices from Integrated Natural Resources Management Plan into the developed land areas;
- Re-vegetation strategies to become aligned and consistent across all districts;
- Stormwater Management strategies that were synchronized with coastal surge mitigation for maximum threat reduction; and
- Water Management as the synergy between the coastal zones and upland areas.

Four Pilot Projects have been developed with inputs from USAF, USFWS, USACE and KBR Jacobs.

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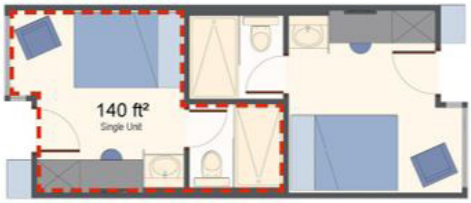
Services
Construction Worker Logistics / Accommodation Strategy

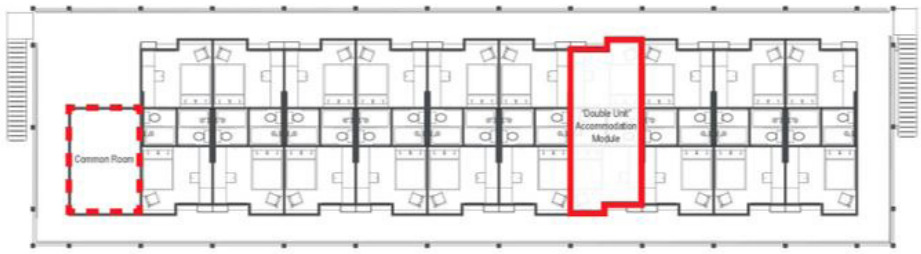
Points of Contact
John Mogge
Hollie Schmidt
Megan Holder

CONSTRUCTION WORKER LOGISTICS / ACCOMMODATION STRATEGY



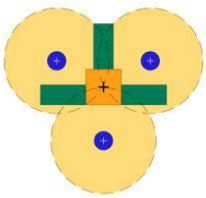
"Double Unit" Accommodation Module

"Double Unit" Accommodation Module Perspective

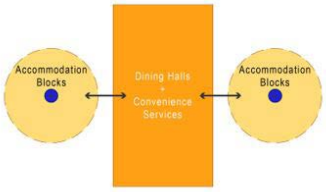


Typical Floor Plate

Block Configuration Layout



Village Layout: Centralize the community core and leisure and recreation areas within the accommodation village.



Community Core: Locate dining halls, places of worship, and convenience centers near accommodation blocks.

The devastation of Hurricane Michael severely impacted Tyndall AFB and its surrounding communities. There are now multiple projects requiring significant labor resources to support the Tyndall Recovery efforts. These labor demands, in addition to aggressive construction schedules to quickly rebuild, will require a robust worker accommodation strategy.

As part of the Tyndall Recovery effort the KBR/Jacobs team support the Program Management Office (PMO) in the developing of a Construction Worker Logistics Accommodation Strategy. The driving force behind the worker accommodation strategy for the recovery efforts was to provide housing that achieves worker welfare goals, a strategy that elevated workforce productivity, and a strategy that was a "good neighbor" to Tyndall AFB and the surrounding community.

It is anticipated that a 1,500-bed accommodation village would be needed to support the recovery effort for 4 years beginning in Quarter 2 of 2021. The projected number of workers available in the local market will not meet the workforce demands of this project, especially when combined with the other rebuilding efforts in the region. In order for Tyndall AFB to attract and retain the best workforce, the accommodation must be a differentiator.

Four Courses of Action with supportive economic analysis were developed. For the two scenarios that were on-base, three potential sites were identified: the Sabre Housing Site (existing), Bonita Bay Housing Site (existing), and the Silver Flag Site (proposed). The off-site scenario proposed is located at the Research, Development, Test and Evaluation (RDT&E) site.

Transportation, parking, access/circulation, site security, recreation, catering services, laundry and community facilities were among the aspects considered in the accommodation strategies. Accommodation units were laid out and detailed as shown in the graphic above.

Jacobs

TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

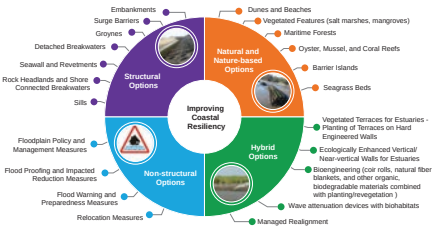
Client
U.S. Air Force (via KBR)

Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

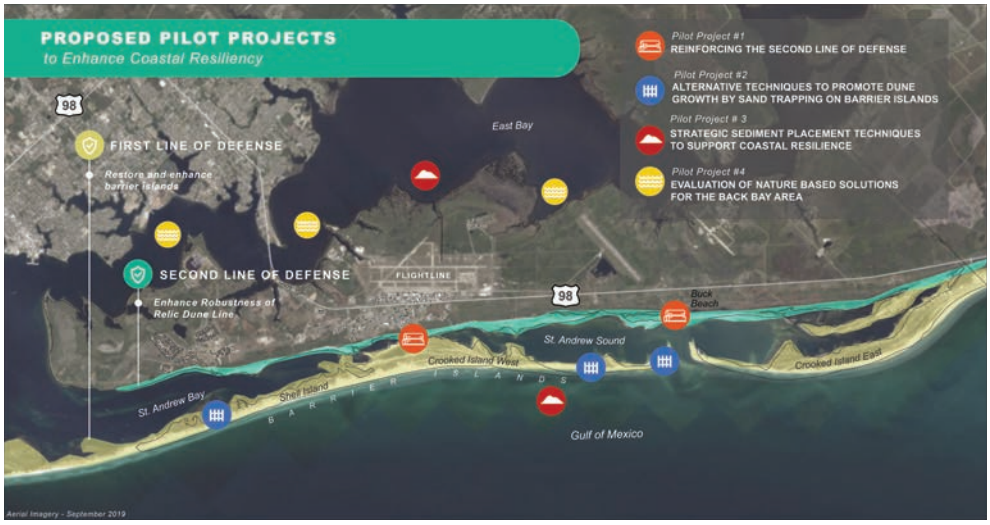
Services
Installation Facilities Standards Update/
Coastal Resiliency Pilot Studies

Points of Contact
John Mogge
Hollie Schmidt
Chris Allen



Improving Coastal Resiliency

COASTAL RESILIENCY PILOT PROJECTS



Coastal Resiliency is a key factor in the Tyndall Rebuild program, as well as to position Tyndall AFB as the Installation of the Future. The KBR/Jacobs team provided multiple nature-based design solutions that were developed to satisfy a critical design objective of providing resiliency and to satisfy the National Defense Authorization Act requiring an understanding of resilience in capital projects.

Four Pilot Projects were developed with inputs from USAF, USFWS, USACE, and KBR/Jacobs. The overarching aim of the four proposed Pilot Projects was to evaluate a range of nature-based solutions that can help reduce coastal flood risks and erosion while enhancing the natural environment. Pilots were conducted to:

- Engage stakeholders and exploring whether they are able to provide in-kind and/or financial resources to help with the coastal resiliency effort
- Allow trial of innovative construction approaches
- Allow further investigations of feasibility of these approaches

Pilot Project 1: This project will trial innovative methods for building and reinforcing enlarged dunes on the southern edge of the base. The intention is to upscale the successful dune construction approaches to provide defenses in front of vulnerable areas of the base. The project would provide increased habitat for threatened and endangered species such as beach mice and sea turtles.

Pilot Project 2: This project would trial rebuilding dunes on the barrier islands on the south of the base through trapping the naturally blown sand. Alternative approaches, such as sand fences, woody debris from wind damaged trees, and new plantings, would be investigates. The project would provide increased habitat for threatened and endangered species such as beach mice and sea turtles.

Pilot Project 3: Feasibility study for the strategic placement of subtidal sediments in the East Bay and sand placement off Gulf coast to enhance natural environments. Modeling would be used to identify locations where waves and tides would carry the placed sediment shoreward to enhance beaches and marsh, thus helping protect and enhance these areas. These enhanced areas would help buffer wave energy in storms and contribute to lowering water levels at the base.

Pilot Project 4: Feasibility study of nature-based options for the implementation in the East Bay, along the north side of the base. This would include evaluating sediment placements to enhance intertidal flats and salt marshes and using oyster reefs to reduce erosion. The feasibility of constructing low-gradient levees (horizontal levees) would also be evaluated.

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TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

Client
U.S. Air Force (via KBR)

Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

Services
Landscape Master Plan

Points of Contact
John Mogge
Hollie Schmidt
William Chung
Mark Kirby

OVERALL SITE & LANDSCAPE MASTER PLAN LAYOUT

Tyndall AFB Landscape Master Plan Layout

Key Planning Principles

Air Force Facilities Guidance Hierarchy

Tyndall AFB has been reimagined to be mission ready, resilient to flooding and wind speed, smart in terms of technology, and sustainable. In this new vision, the base workforce and families will also enjoy a more walkable and bike-friendly community. The Installation of the Future optimizes mission readiness while being sustainable, resilient, and equipped with self-monitoring analysis and reporting technology (SMART).

A comprehensive Landscape Master Plan was developed to support the redevelopment effort. To realize its goal of becoming the Installation of the Future, Tyndall AFB is constructing more than 100 new buildings, repairing existing buildings, and improving infrastructure throughout the base. These new buildings include replacing damaged facilities and developing new facilities to support the future F-35 mission. Totaling more than 2 million square feet, these new facilities will include maintenance, hangar, administrative, operations support, dormitory, temporary lodging, recreation, and community facilities, as well as a chapel. This Landscape Master Plan provide guidance and plans for the accompanying paths, landscapes, shared parking, utilities, stormwater management, site furnishings, signage, and lighting, all of which underscore the base's goal to deploy sustainable, resilient, and SMART solutions throughout the installation.

The Landscape Master Plan's guidelines align with the congressionally mandated Unified Facilities Criteria (UFC) of the U.S. Department of Defense. The UFC provide system-wide planning, design, construction, sustainment, restoration, and modernization criteria across all military and defense agencies. These guidelines also follow the Air Force Corporate Facilities Standards (AFCFS), an Air Force-wide facility program for quality and performance.

These Landscape Master Plan's guidelines were developed during the post-Hurricane Michael update of the Tyndall AFB Installation Facilities Standards (IFS), the base-level guide. The updated IFS addresses other important design and construction standards that directly impact Tyndall AFB, including design flood elevation and wind load requirements. Overtime and as the base is developed, these design guidelines will become part of the base's Installation Development Plan (IDP).

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TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

Client
U.S. Air Force (via KBR)

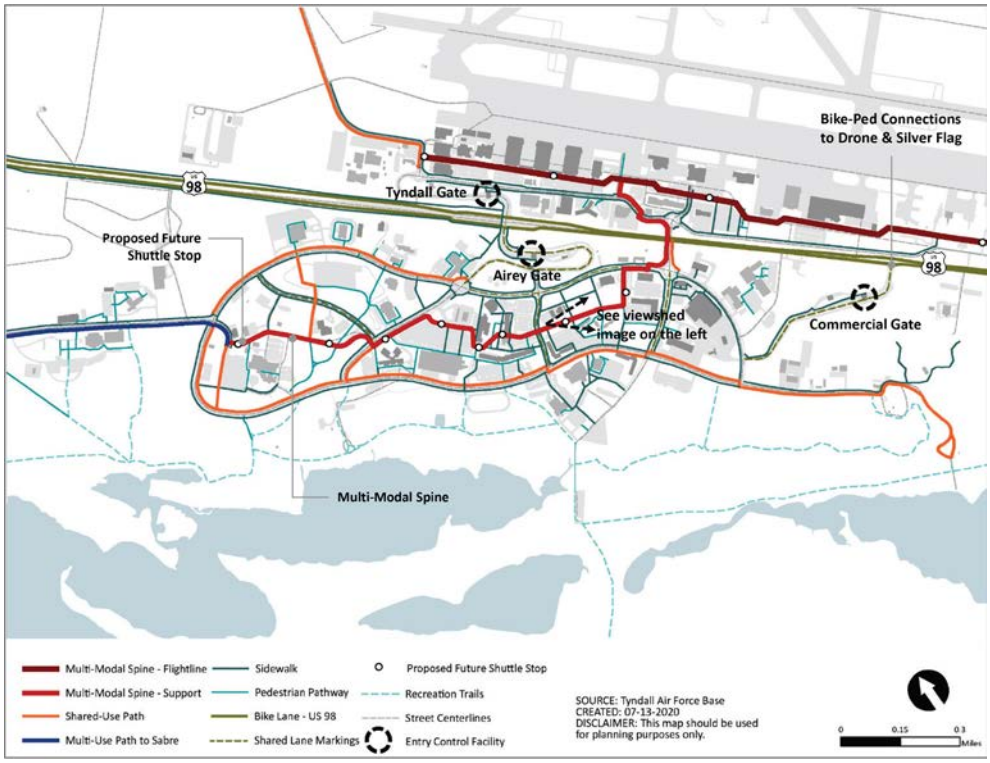
Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

Services
Landscape Master Plan /
Walkability and Bikeability Component Plan

Points of Contact
John Mogge
Hollie Schmidt
Matt Friesen

WALKABILITY AND BIKEABILITY COMPONENT PLAN



Integrated Mobility Framework – Support & Flightline Districts

Multi-Modal Spine

In October 2018 Hurricane Michael made landfall on the panhandle of Florida bringing widespread devastation to Tyndall AFB and the surrounding communities. Beginning in early 2019, Jacobs was engaged to support the $5 billion rebuild effort focused on design packages, implementation planning, design guidelines and site/landscape master planning. The vision guiding the rebuild includes transforming Tyndall AFB into an Installation of the Future. A core principle for the Air Force's vision is to encourage walking and biking as an alternative to automobile travel for short trips within the base.

As a part of the LANDSCAPE MASTER PLAN, the Jacobs team developed a walkability and bikeability component plan. The plan set forth goals and objectives, a mobility framework and a set of design criteria to guide future rebuild plans and designs. The component plan will help ensure the final rebuild yields a walkable, healthy Tyndall Community with less reliance on automobiles.

This vision of a walkable and healthy installation was realized through the current rebuild master plan and the DoD Military Construction (MILCON) packages that govern the reconstruction efforts. The main organizing element for the pedestrian circulation plan was the proposal of a central Multi-Modal Spine, stretching across the majority of the Support and Flightline Districts. This tree-lined spine, in combination with a coherent, connected bikeway and pedestrian network, provides safe efficient routes for the base population to travel between the dormitories, Community Common, recreational amenities, the base mission areas, and medical facilities. The result reduces the reliance on using POVs for common errands.

Specific direct objectives in support of the walkable and bikeable mobility goal included creating Bicycle/Pedestrian Advisory Committee to review installation development plans; maintaining a Bicycle and Pedestrian Plan; making information on local bicycling and walking facilities available to the base personnel; and developing an on-base bike-share program to promote alternative mobility on installation.

Jacobs

TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

Client
U.S. Air Force (via KBR)

Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

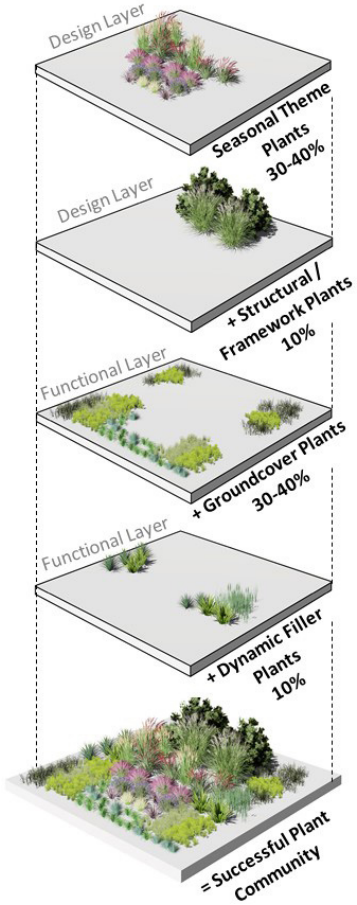
Services
Landscape Master Plan /
Re-Vegetation Strategy

Points of Contact
John Mogge
Hollie Schmidt
Chad St. John

LANDSCAPING, REVEGETATION

Rendering of Manicured Zone

Typical Section of Manicured Zone



Planting Design Components

A strategic objective of the Tyndall Rebuild program was a to create a resilient landscape through revegetation with native plant material to optimize co-benefits, including water quality.

This plan focused on revegetating Tyndall AFB with native plant materials that will result in optimized stormwater treatment, continued regulatory compliance, decreased maintenance costs and increased wellness and walkability. Some of the strategies developed for the Tyndall AFB revegetation included the following:

- Applying Integrated Natural Resource Management Plan (INRMP) land management strategies consistently across all developed portions of the base
- Enforcing a restricted planting pallet that complied with INRMP that drives out invasive species
- Planting tree species and re-vegetate with plant materials that are resilient to high winds and will not interfere with buried infrastructure
- Revegetating all land areas south of Mississippi Road, which is a critical zone for mitigating storm events that include both heavy rainfall and high storm surge
- Improving stormwater management and treatment to recover more quickly after storm events

As part of the re-vegetation plan, landscape zones were proposed for the Tyndall AFB. Five zones were proposed: Manicured Zone, Maintained Zone, Airfield Zone, Managed Zone, and Coastal Zone. The goals for the landscape character focus on the specifics required for each landscape zone in terms of it design, location and typical plant species needed for that particular zone.

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TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

Client
U.S. Air Force (via KBR)

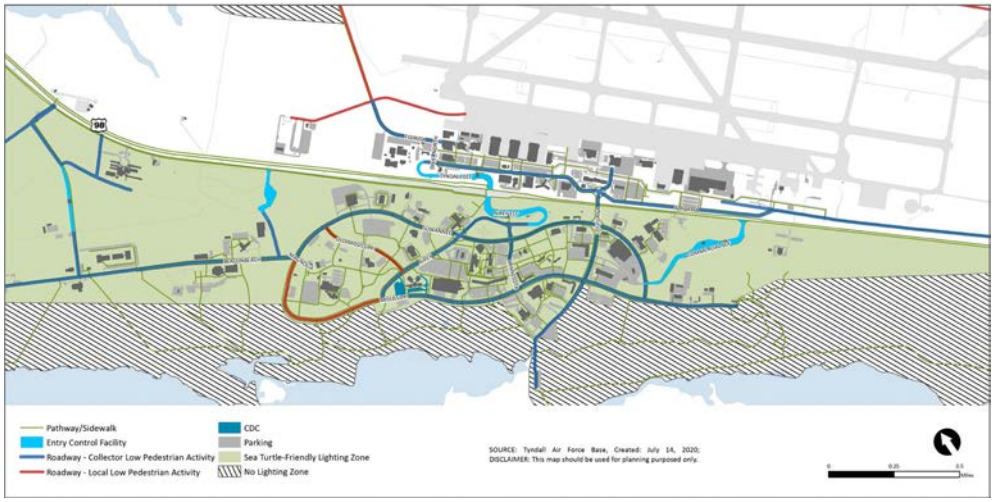
Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

Services
Landscape Master Plan / Lighting Plan

Points of Contact
John Mogge
Hollie Schmidt
Chad St. John
William Chung

LIGHTING MASTER PLAN



A Lighting Master Plan was developed for Tyndall AFB that expanded the requirements of the Installation Facilities Standards and UFC requirements to allow for a uniform design approach for the Base. The master plan considered local ordinances, DoD requirements, and environmental factors when establishing these lighting requirements.

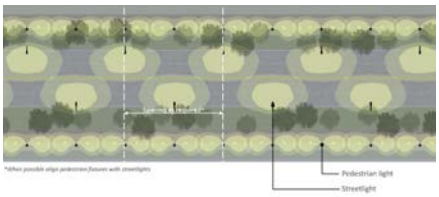
These requirements included light fixture specifications, control specifications, and lighting design approach. The base was divided into seven typologies, for which a different lighting design approach was developed. These typologies included roadways, sidewalks, parking lots, entry control facilities, child development centers, turtle-friendly lighting areas, and no-lighting areas. Special care was taken when defining the protective lighting requirements for a large area of the project site that is known as a nesting area for endangered sea turtles.

The lighting approach developed was based on three overarching objectives:

- Establish lighting typologies specific to Tyndall AFB and its districts that promote consistent lighting Applications.
- Provide consistent lighting materials.
- Comply with the UFC requirements and other relevant guidelines, including those defined in the Illuminating Engineering Society Recommended Practices.

This lighting plan enabled a consistent and uniform lighting design approach throughout Tyndall AFB. It is intended to harness the following opportunities:

- Standardize the various light fixtures used throughout the base.
- Add consistency to the base's light fixtures, lamp wattages, and pole types and height.
- Apply consistent lighting design standards throughout the base.
- Convert older high-intensity discharge (HID) light fixtures to light-emitting diode (LED) fixtures.



Typical Lighting Layout

Jacobs

TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

Client
U.S. Air Force (via KBR)

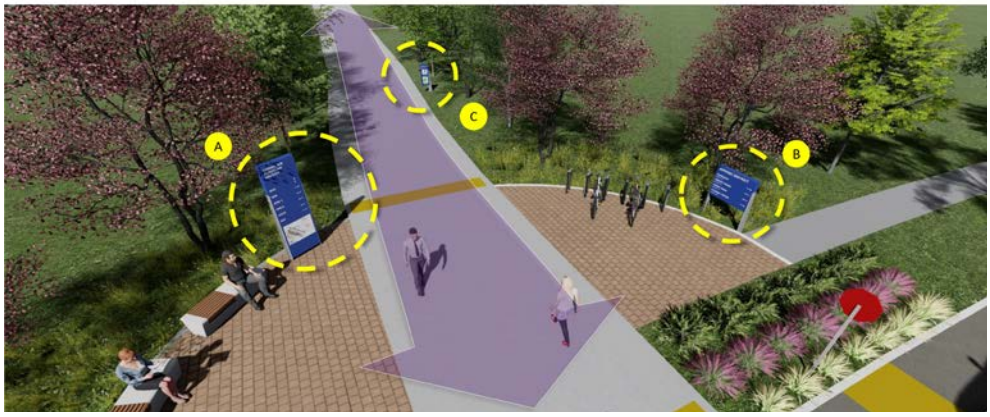
Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

Services
Landscape Master Plan /
Pedestrian Level Signage

Points of Contact
John Mogge
Hollie Schmidt
Chad St. John
William Chung

PEDESTRIAN LEVEL SIGNAGE PLAN



The KBR/Jacobs team developed a robust signage system to enhance wayfinding and transit movement for pedestrian on the campus of Tyndall AFB. The team designed and planned for signage components that would align with health, safety, walkability, and resilient construction as envisioned for the Installation of the Future.

The reconstruction of Tyndall AFB usher in a new type of campus layout optimized for pedestrian mobility. Core element of this new master plan is a multi-modal corridors prioritized for pedestrian and bike movement. To promote the use of this new network of connected pathways and to improve overall campus navigation, a new pedestrian level signage was envisioned. Signage design intended to complement the new architecture are carefully integrated into the multi-modal spine for both mission and support districts. This enhanced pedestrian signage system will serves as a sub-component of the overall landscape master plan strategy and provides additional signage guidance under current Unified Facilities Criteria and the Tyndall AFB Installation Facilities Standards.

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TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

Client
U.S. Air Force (via KBR)

Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

Services
Landscape Master Plan /
Site Furnishings

Points of Contact
John Mogge
Hollie Schmidt
Chad St. John

SITE FURNISHINGS PLAN

A Site Furnishings Plan for Tyndall AFB expanded upon the requirements found in the base's Installation Facilities Standards (IFS). This was developed under the Landscape Master Plan so that all site furnishing elements would be consistent and match across the entire base. The development of this plan was a coordinated, consistent inventory of site furnishings positively contributes to the landscaped environment, overall images and character, and unique identity of Tyndall AFB. The selections presented

In the Site Furnishings Plan support the base's commitment to using materials that are durable, easy to maintain, visually unified, and compatible with the installation architecture. They were selected based on the following criteria:

- Capable of withstanding hurricane winds of 165 miles per hour
- Capable of withstanding flooding
- Ability to be exposed to coastal salt environment
- Tailored for heavy public use
- Low-maintenance
- Reasonable cost
- Reflective of Tyndall AFB architectural style and colors

The Site Furnishings Plan included guidance for benches, picnic tables and benches, bike racks, security bollards, outdoor grills, flagpoles, fences and gates, playground equipment, fitness equipment, and safety surfacing.

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TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

Client
U.S. Air Force (via KBR)

Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

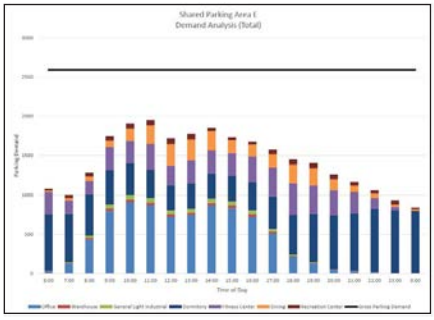
Services
Transportation

Points of Contact
John Mogge
Hollie Schmidt
Jeremy Wyndham
Emily Weigand

TRANSPORTATION PLANNING AND DESIGN

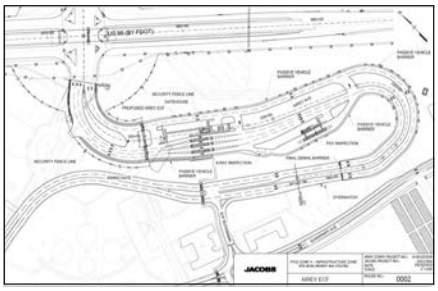
As part of the Tyndall Rebuild effort, the KBR/Jacobs team performed transportation planning and design support services. Transportation design began during the DD 1391 process, providing analysis and design related to the Entry Control Facilities (ECFs) and the roadways. The Transportation Needs Assessment and Requirements Document included analysis related to traffic projections, US Highway 98 reconstruction impacts, ECF queuing and safety analysis, pavement condition assessment, and proposed roadway elements.

Proposed designs included aspects of sustainability, resiliency, and SMART solutions such as bioswales to treat roadway runoff, long-life pavement design, roundabouts in lieu of traffic signals at intersections to eliminate downtime and storm projectiles, illumination with dimming technology and turtle-safe lighting, and recycled pavement. Coordination included communication with Florida Department of Transportation related to their US Highway 98 project which directly affects access to the base and security concerns for the proposed overpasses of the highway's main lanes. Traffic analysis included traffic estimation and projections, traffic data collection, trip generation, parking generation, intersection analysis, queuing analysis, and link capacity analysis.



Parking Demand Analysis

As part of the Landscape Master Plan, a coordinated parking study was completed by the transportation group. Coordinated parking is a broad framework that includes multiple strategies aimed to right-size parking assets on the base to reduce unnecessary costs and bolster base mobility in a campus-like environment. Using the Urban Land Institute publication Shared Parking, the team calculated parking demand based on UFC and ITE parking ratios depending on land use. Recommendations were provided for areas where shared parking, remote parking, parking structures, and efficient-mode priority parking could be implemented across the base.



Airey Gate Design

The Zone 4 Bridging Documents included design of Site Infrastructure for both Support and Flightline sides of the base. The design included a multi-modal spine extending across the Flightline side, under US Highway 98, and across the Support side with designated pedestrian sidewalks, a bicyclist path, and two travel lanes for a shuttle or Autonomous Vehicles.

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TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

Client
U.S. Air Force (via KBR)

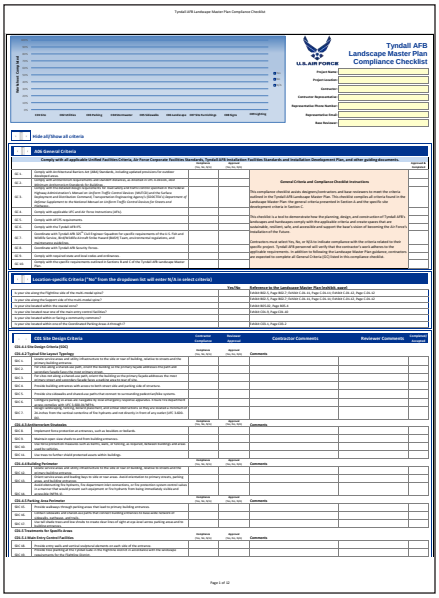
Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

Services
Policy /
Landscape Master Plan

Points of Contact
John Mogge
Hollie Schmidt
Chad St. John

POLICY – LANDSCAPE MASTER PLAN



As part of the effort to update the Tyndall AFB Installation Facilities Standards (IFS), the KBR/Jacobs team created a Landscape Master Plan to guide contractors and designers working on the base in the reconstruction effort. The intent of the Landscape Master Plan was to lay out specific design guidance in alignment with the future vision of the base as the Installation of the Future and in conformance with the multitude of design requirements established by the U.S. Department of Defense. These other requirements include the DoD's Unified Facilities Criteria standards, and the Air Force Corporate Facilities Standards, and IFS itself.

An important element of this effort was to assist the base staff in implementing these standards, and towards that end the KBR/Jacobs policy team led the drafting of the Landscape Master Plan in an easy-to-understand and follow format. Working with the many subject matter experts that developed the IFS and Landscape Master Plan , a master set of compliance criteria was crafted and integrated into the plan. The criteria were also compiled into a user-friendly Compliance Checklist in Microsoft Excel, providing an easy-to-use tool for contractors and base staff in reviewing construction projects on the base. In this way, the Landscape Master Plan and the Compliance Checklist supplements the IFS and is intended to be used as a companion resource for plan implementation and compliance with requirements.

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TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

Client
U.S. Air Force (via KBR)

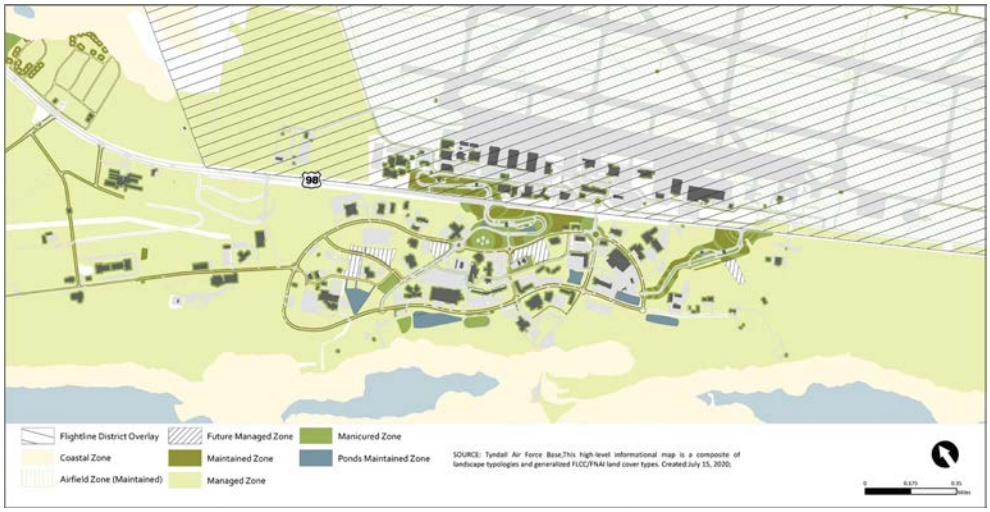
Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

Services
Landscape Master Plan / Maintenance Plan

Points of Contact
John Mogge
Hollie Schmidt
Randy Sorensen

LANDSCAPE MAINTENANCE MASTER PLAN



Landscape Zones

Always wear proper safety equipment

As part of the Tyndall AFB Landscape Master Plan the team developed maintenance guidelines formulated towards maintaining the landscape and hardscape of Tyndall AFB using a Sustainable Landscape Initiative. The guidelines comprise the standards to be followed by both Tyndall AFB Maintenance Staff and to outside contractors performing landscape maintenance on base.

The Sustainable Landscape Initiative is a comprehensive look at forward-thinking and sustainable approach to landscape design, maintenance, and operations. The five program categories addressed in the plan are:

- Sustainable lawn maintenance and landscaping
- Reduction of use of pesticides and herbicides
- Eradication of invasive species
- Selection of native plant species
- Conservation, retention, and recycling of water

Hardscape maintenance includes cleaning and repair of pavements, building cleaning, storm drainage system cleaning and other site elements also done in a sustainable manner.

Also included is a management plan and week-by-week maintenance schedule.

These maintenance guidelines focus on future activities once rebuild construction is complete and Tyndall AFB has achieved the functionality and aesthetic as the Installation of the Future. The maps included in the Maintenance Plan represent landscape zones or planning districts and are the best representation of these areas and zones at the time this document was produced. The buildings and other vertical items are also not an exact alignment, or location. The Maintenance Plan will continue to evolve and modify as Tyndall AFB moves closer to becoming the Installation of the Future..

Jacobs

TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

Client
U.S. Air Force (via KBR)

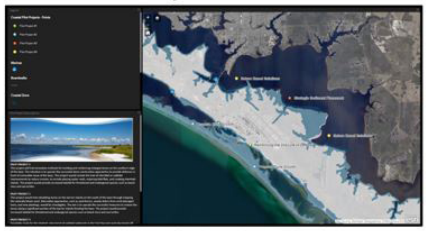
Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

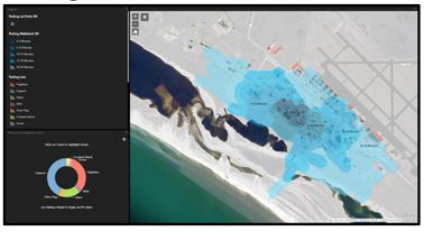
Services
Capital Improvement Planning
Flood Mitigation
Sea Level Rise Adaptation Plan
Resiliency

Points of Contact
John Mogge, Jacobs Program Director
Shannon McElvaney, Geodesign Lead
Rob Stauder, Lead Geodesign Developer
Mark Kirby, CAD and GIS Specialist
Edwardo Rendon, Urban Planner and Lead GIS
Marcus Ashdown, Transportation Planner/GIS
Joe Shoffner, GIS Analyst
Robyn Frelich, GIS Analyst and CAD/GIS

Coastal Pilot Projects



Parking and Walksheds



Land Management Strategy

GEOGRAPHIC INFORMATION SYSTEM AND GEODESIGN SERVICES

Jacobs provided geodesign, urban planning and design services to the United States Army Corps of Engineers (USACE) for the redevelopment of Tyndall Air Force Base in the panhandle of Florida. This effort was to help create a resilient, sustainable and smart installation of the future with campus-like, pedestrian- and bike-friendly environment for all base members and guests.

The project covered 30,000 acres and 129 miles of coastline. The effort required condition and vulnerability assessment, demolition and construction phasing, nature-based infrastructure design, landscape master planning, infrastructure planning and design, and coastal resilience planning.

Existing GIS data and recently flown LiDAR and aerial photography was used to characterize existing conditions and formed the base map from which planning activities began. The GIS team and data supported all other teams including stormwater, water, wastewater, electric, communications, transportation, buildings, environmental, landscaping, lighting, furnishings, sustainability, and coastal resilience.

A geodesign platform and host of spatial analytics and data visualization techniques from interactive maps to high-quality photorealistic visualizations were instrumental in gaining acceptance of proposed designs. To help in decision-making, a geodesign map/dashboard was developed to support the alternatives analysis of various nature-based infrastructure strategies comparing business as usual on the left with nature-based strategy on the right. The nature-based strategy compared to a turf-based strategy maximized the number of positive impacts including improvements to air quality, carbon sequestration, runoff reduction, energy savings, heat island reduction, and a huge reduction in landscape maintenance costs.

To foster partner collaboration, the GIS team created a Tyndall AFB Coastal Resilience Partner Portal where local, state, and federal government organizations, non-profit groups, and academic institutions could collaborate on projects, access tools and data, and leverage each other's work to fund raise.

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Jacobs

TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

VISUAL MEDIA SERVICES

Client
U.S. Air Force (via KBR)

Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

Services
Capital Improvement Planning
Flood Mitigation
Sea Level Rise Adaptation Plan
Resiliency

Points of Contact
John Mogge, Jacobs Program Director
Jim Kessler, Visual Media Director
Camilo Vargas, Interactive Media Director
Gary Allison, 3D Visualization Director
Varsha Makwana, Interactive Media Developer
David Crawford, Interactive Media Developer
Adam New, Videographer/3D Artist
Babak Aliabadi, Lead 3D Artist
Oksana Casey, 3D Artist
Drew Fletcher, Real-time Developer
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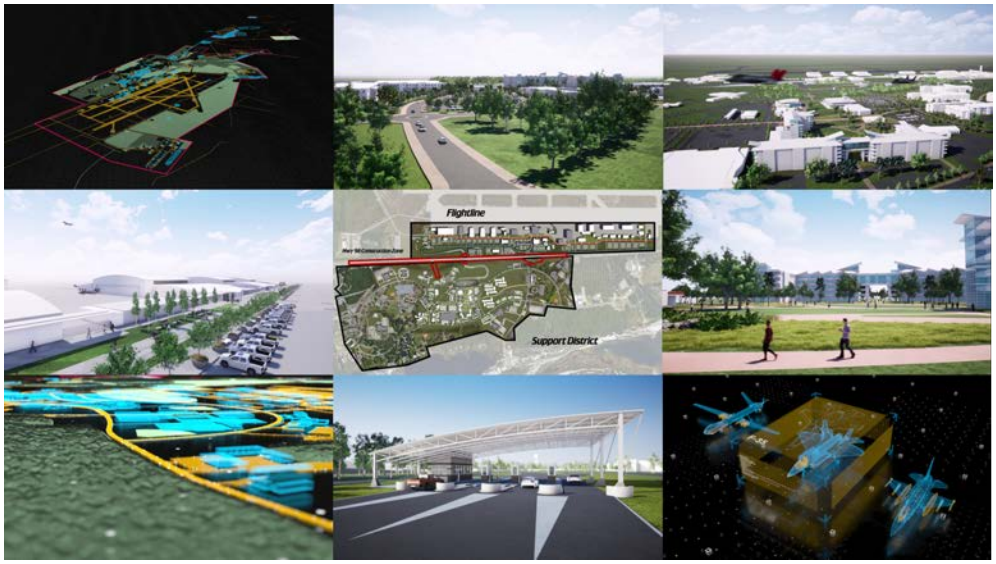

Project Description/Services Provided:

Jacobs Visual Media Group (VMG) assisted many of the multi-faceted initiatives and projects from the rebuild program services to the U.S. Army Corps of Engineers (USACE) for the redevelopment of Tyndall AFB in the Florida panhandle of. This effort was to help create a resilient, sustainable and smart installation of the future with campus-like, pedestrian- and bike-friendly environment for all base members and guests.

The project covered 30,000 acres and 129 miles of coastline. The effort required condition and vulnerability assessment, demolition and construction phasing, nature-based infrastructure design, landscape master planning, infrastructure planning and design, and coastal resilience planning.

The Jacobs VMG team supported all other teams including stormwater, water, wastewater, electric, communications, transportation, buildings, environmental, landscaping, lighting, furnishings, sustainability, and coastal resilience in communicating key outcomes and project deliverables through a wide range visual media aids; 3D renderings, videos, animations, graphic elements, interactive media, and simulations.

Challenges:

In the fast-paced delivery timeframes for most of the tasks, Visual Media team was instrumental in assisting each of the teams in strategizing, developing and delivering the most effective and impactful visual communication solutions. In many cases these visual media solutions became the central means to engaging with key staff and decision makers as well as the broader base and communities. The team was also assisted Tyndall in significant innovation in terms of online facility standards and virtual engagement solutions.

Solutions and Outcomes:

The team worked in the following areas to produce the desired outcomes: 1) Interactive Media, 2) Visualization, and 3) Videography.

Jacobs

TYNDALL AIR FORCE BASE

HURRICANE MICHAEL RECOVERY PROGRAM

Panama City Beach, Florida

Client
U.S. Air Force (via KBR)

Dates
April 2019 - September 2020

Size
$5B Construction
$17M Professional Fees
300 Jacobs Team Members

Services
Capital Improvement Planning
Flood Mitigation
Sea Level Rise Adaptation Plan
Resiliency

Points of Contact
John Mogge, Jacobs Program Director
Jim Kessler, Visual Media Director
Camilo Vargas, Interactive Media Director
Gary Allison, 3D Visualization Director
Varsha Makwana, Interactive Media Developer
David Crawford, Interactive Media Developer
Adam New, Videographer/3D Artist
Babak Aliabadi, Lead 3D Artist
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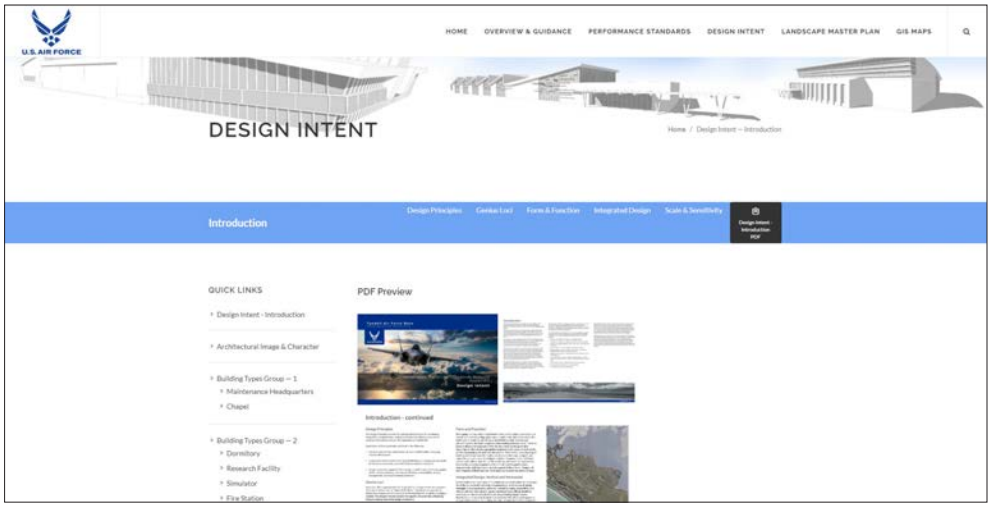
INTERACTIVE MEDIA

Web-based IFS (Installation Facilities Standards)

Jacobs provided the Tyndall AFB Program Management Team with an innovative web-based tool to augment the Tyndall AFB Installation Facilities Standards (IFS). Historically delivered as a static paper document or PDF, the web-based Tyndall IFS provides easy and immediate access to the specific standards relative to the Tyndall Rebuild projects under their scope of work in an up-to-date, searchable environment available via computer or mobile device. This strategy was widely praised as it will most effectively integrate individual facility standards with the overall Air Force Facilities Standards available online.

Live Web link> https://www.tyndallifs.com/index.php



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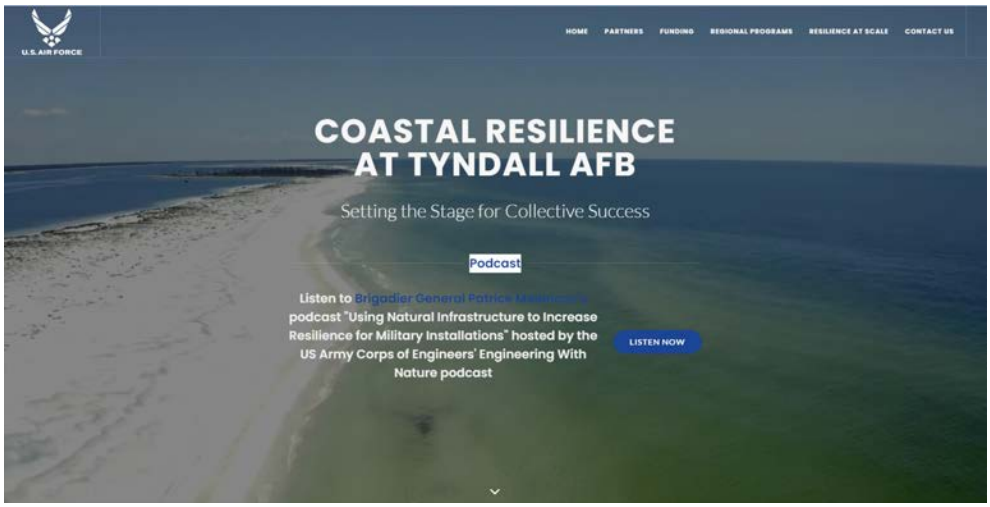
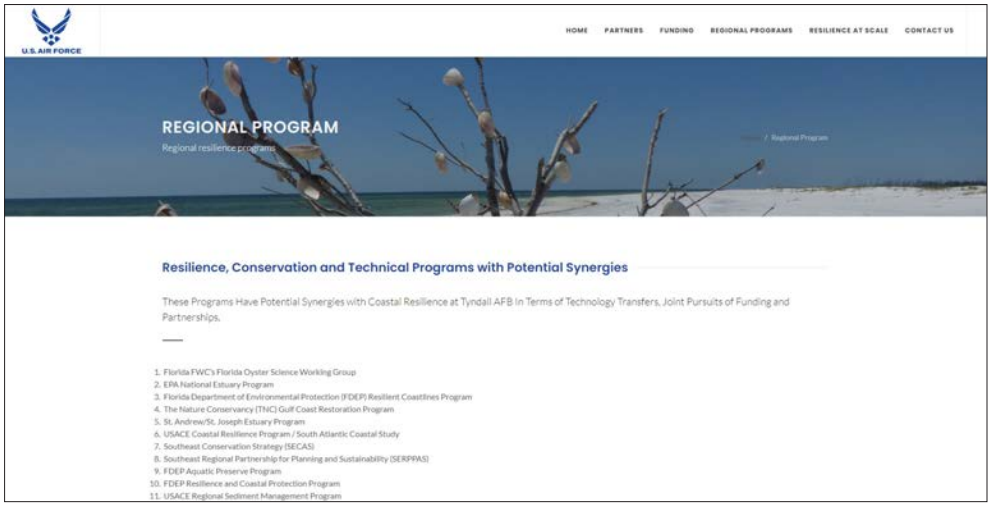


Coastal Resiliency Website

In support of the of the sustainable and resilient planning efforts VMG provided a responsive, interactive web-based solution for all the study documentation; results, strategies, data and outcomes. All of the web technologies and connected data: GIS, graphics, navigation framework was developed and delivered by VMG.

Live Web link> http://www.tyndallcoastalresilience.com/index.php



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VISUALIZATION

Tyndall Rebuild Overall Animation

At completion of the planning period a consolidated campus 3D model was developed, and several visualization outputs were provided including a 3-minute animation showing the impact and integration of all of the future facilities and infrastructure.

Private video link> https://vimeo.com/385049613/24af6163cd

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VIDEOGRAPHY

Videography

Jacobs Visual Media Group developed and produced several videos to help project teams communicate various Rebuild program processes, outcomes, and responses. Audiences included key staff, project managers, Air Force staff, and community members. The videos provided an enhanced platform for engaging viewers and communicating key messages.

List of a few of the key video efforts:

- Architectural Image & Character IFS intro video
- Site and Land Management IFS intro video
- Presentation videos for the Tyndall AFB Coastal Resiliency website
- Interview videos for the Tyndall AFB CDC website