



SABAL TRAIL TRANSMISSION PROJECT GULF INTERSTATE ENGINEERING COMPANY USA

2018 IPLOCA EXCELLENCE IN PROJECT EXECUTION AWARD

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Sabal Trail Transmission, LLC (“Sabal Trail”), a joint venture of Spectra Energy Partners, NextEra Energy, Inc. and Duke Energy, is a 515-mile interstate natural gas pipeline providing transportation services for power generation needs to Florida Power and Light and Duke Energy of Florida.

Gulf Interstate Engineering Company (Gulf) performed engineering, procurement and construction management (EPCM) services for the Sabal Trail project from 2013 through 2017, from FEED through commissioning and start-up. Gulf’s EPCM personnel peaked at 165 during the engineering phase and 393 during the construction phase.

Gulf believes the Sabal Trail project is a strong contender for the 2018 IPLOCA Excellence in Project Execution Award. Challenging in both scope and scale, the project was subject to exacting regulatory and jurisdictional requirements and was tested by varied and demanding environmental conditions, adverse weather conditions, problematic geology, constant organized protests and a tight construction timeline—construction was substantially completed in 8 months.

Client and EPCM contractor developed an integrated team to manage the project and fostered a collaborative partnership that

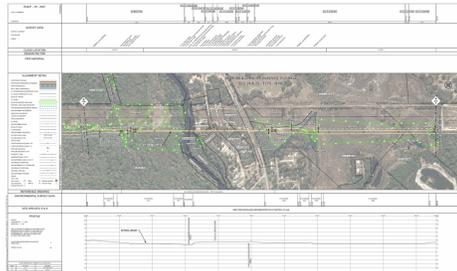
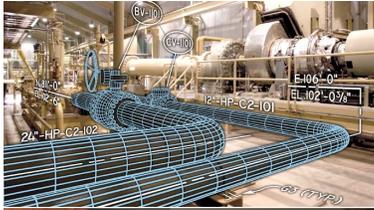
delivered a successful project to the satisfaction of all stakeholders. An EPCM approach for pipeline project execution is not customary in the U.S. and Sabal Trail is the only pipeline project undertaken with an EPCM strategy in the past five years. Gulf believes the success of Sabal Trail will encourage other client companies to employ this methodology.

The project was completed on schedule and on budget while setting an exemplary safety record and without receiving a single non-compliance citation from the Federal Energy Regulatory Commission, the Pipeline and Hazardous Materials Safety Administration nor any of the more than 100 other federal, state and local authorities with jurisdiction over the project.

Sabal Trail received the S&P Global Platts 2017 Construction Project of the Year award, which among other criteria, considers a project owner that recognized a critical need or opportunity, quickly moved to propose and finance new facilities, dealt with special or daunting political, regulatory, technological and/or landowner issues before and during construction and brought the project online with fiscal responsibility.

Gulf thanks the members of the Board of IPLOCA for the opportunity to present Sabal Trail and for their consideration for the award.

BUSINESS PROFILE



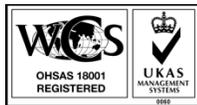
Formed by an intrepid group of businessmen and engineers who designed, constructed and operated an innovative natural gas pipeline system in the early 1950s, today Gulf Interstate Engineering Company is known throughout the worldwide oil and gas industry. Gulf is a company whose footprints cover some of the largest and most complex pipeline systems in the world: from the American Plains to the Andes Mountains and from the Middle East deserts to the frozen tundra of Siberia.

Based in Houston, Texas, with 1,300 personnel, Gulf Interstate Engineering Company provides project management, engineering and design, GIS, materials management and construction management services to the worldwide oil and gas industry. Since its formation in 1953, Gulf has achieved a reputation for producing practical, cost-effective, and sound solutions for complex projects, all with a proven commitment to safety, the environment, quality, cost and schedule.

Gulf specializes in pipeline systems, a focus that covers onshore pipelines, gathering systems, production facilities, pump and compressor stations, storage terminals and loading facilities. Gulf's experience and capabilities encompass all aspects of oil and gas production from the wellhead to the export terminal. Gulf has engineered more than 100,000 miles of pipeline systems; pumping and compression facilities totaling more than 6 million installed horsepower; and, over 100 million barrels of storage and offloading terminals.

Gulf's proactive and consultative approach ensures its clients are involved in the key decisions affecting their projects. Gulf's flexible structure means its proven methods are easily adaptable to the specific needs of the project. Broad experience gained from the execution of a multitude of projects for a variety of clients yields the best solutions. Gulf's focus sustains an unmatched understanding of pipeline systems: Gulf only does pipelines, and it does them better than anyone else.

Experience, technology and people; these strengths enable Gulf to exceed the expectations of its clients and ensure they have a positive impact in the communities they serve.





Lake City, Florida pipe storage yard.

SABAL TRAIL TRANSMISSION PROJECT

Managed by an integrated team of Owner/Operator Spectra Energy Partners and EPCM contractor Gulf Interstate Engineering Company personnel, the \$3.2 billion Sabal Trail Transmission Project, a 515-mile interstate natural gas pipeline system, was engineered, procured and constructed in strict compliance with stringent U.S. Federal Energy Regulatory Commission (FERC) requirements. The project was delivered on schedule and on budget despite, among other challenges, continuous opposition activism during construction, a delayed construction start due to a later than expected receipt of the FERC construction

permit and adverse weather conditions including hurricanes. A demanding construction methodology was deployed to accommodate a geographically complex and environmentally sensitive route crossing many miles of wetlands, endangered plants and animal habitats, major rivers, and to attend to numerous workspace constraints, all of which required precise planning and interface coordination with over 100 federal, state and local regulatory agencies with jurisdiction and none of whom issued a non-compliance citation against the project.



Sabal Trail Transmission, LLC (“Sabal Trail”), a joint venture of Spectra Energy Partners, NextEra Energy, Inc. and Duke Energy, is a 515-mile interstate natural gas pipeline providing transportation services for power generation needs to Florida Power and Light and Duke Energy of Florida.

Sabal Trail is capable of transporting over 1 billion cubic feet per day or more of natural gas to serve local distribution companies, industrial users and natural gas-fired power generators in the Southeast markets.

The Sabal Trail pipeline route encompasses four counties in Alabama, nine counties in Georgia and 13 counties in Florida. Sabal Trail Phase I is comprised of 494 miles of 36-inch diameter and 21 miles of 24-inch diameter pipeline; three greenfield compressor stations with a total of 127,900 installed horsepower; and, six meter and regulating stations.

In 2020, Phase II will add two greenfield compressor stations and additional horsepower to the stations constructed in Phase I.

A CHALLENGING PROJECT

The construction of the pipeline and stations involved six mainline spreads, six mainline construction contracts and three station construction contracts. The construction contractors operated under both union and open shop labor agreements. To meet the schedule, simultaneous construction of all spreads and stations was required with coordination of daily activity along a 515-mile work front by the EPCM contractor. Over 10,000 project personnel received orientation and training for safety, environmental, community relations and project-specific construction management procedures.

The pipeline route paralleled a high voltage power transmission line for 180 miles and an existing pipeline for 130 miles. Mitigation of the effects of alternating currents from the power lines and the influence of the existing pipeline required active cathodic protection during pipeline construction. A multitude of foreign pipeline crossings affected progress along the 130-mile segment. Karst geology along much of the route, particularly in Florida, complicated the use of horizontal directional drilling (HDD), which was required in several locations to reduce adverse effects on the environment and communities located near the pipeline route as well as to accommodate restricted work space segments. The karst geology and subsiding soil conditions generated a design for 880 piles for foundation support at the Reunion Compressor Station in Florida.

Organized opposition groups constantly disrupted construction activity. Protestors were proficiently managed with a comprehensive and considerate Stakeholder Outreach program that included open house meetings and procedures to deal with polite inquiries as well as adversarial confrontations.



Many miles of timber matting was required to minimize damage to the right-of-way.

A Severe Weather Plan encompassing telephone and electronic messaging notification and action procedures guided project personnel during adverse weather events ranging from winter conditions in the northern section of the pipeline to tropical storms and hurricanes in the southern sections.

Personnel, equipment, activity and the right-of-way all suffered impacts from four named storms during the construction phase. The 2016 and 2017 hurricane seasons were two of the most active in recent U.S. history. Florida ranks first in the United States for lightning strikes and the project implemented an early warning notification system and sheltering procedures for lightning conditions.



Information Pipeline® portal

CMIS Dashboard

Date	Activity	Plan	Forecast	Actual	Delta
3/17/2017	Troy Construction	98.99	98.99	95.98	-3.01
3/17/2017	Bending - General			0.00	0
3/17/2017	Backfilling - General	13.75	13.75	0.00	-13.75
3/17/2017	Coating - Mainline	98.41	98.41	95.85	-2.56
3/17/2017	Ditching - General	98.99	98.99	94.94	-4.05
3/17/2017	Lowering - General	98.99	98.99	96.06	-2.93
3/17/2017	ROW Clearing - Grading	100.03	100.03	99.81	-0.22

Construction Progress

Spread	Starting Station	Finishing Station	Length
Spread 3 - FL	1372058	1416712	104604

Welding Operation	Type	Welds Today	Welds To Date
Fabrication	Manual	0	42
Final Tie-Ins	Manual	0	3
Fring Line	Manual	12	1158
HDD	Manual	0	46
Pipe Gang	Manual	14	1219
Temporary Welds	Manual	0	4
Tie-Ins	Manual	6	61
Transition	Manual	3	36
Totals No Crew defined:		21	1348

Welding Report

TECHNOLOGY ENHANCES PROJECT EXECUTION

Managing a pipeline construction project with multiple work fronts and activity along the entire 515-mile route demands effective communications and a responsive information management system capable of supporting daily requests for details, direction and data to address and resolve issues and sustain progress.

Implemented at the initiation of the project, Gulf's web-based Information Pipeline® portal provided all project participants with ready access, anytime and anywhere, to all engineering, procurement, logistics, materials management, construction management and construction documents including, among other data, drawings, specifications, schedules, plans, procedures and permits.

Gulf deployed its Construction Management Information System, CMISSM, which provides an on-line, digital solution for construction management reporting. Activity progress, status and other information such as crew and equipment make-up, weather conditions, and safety incidents are entered directly into the system or imported from electronic templates. Data integrity was ensured with a combination of program and user quality assurance procedures.



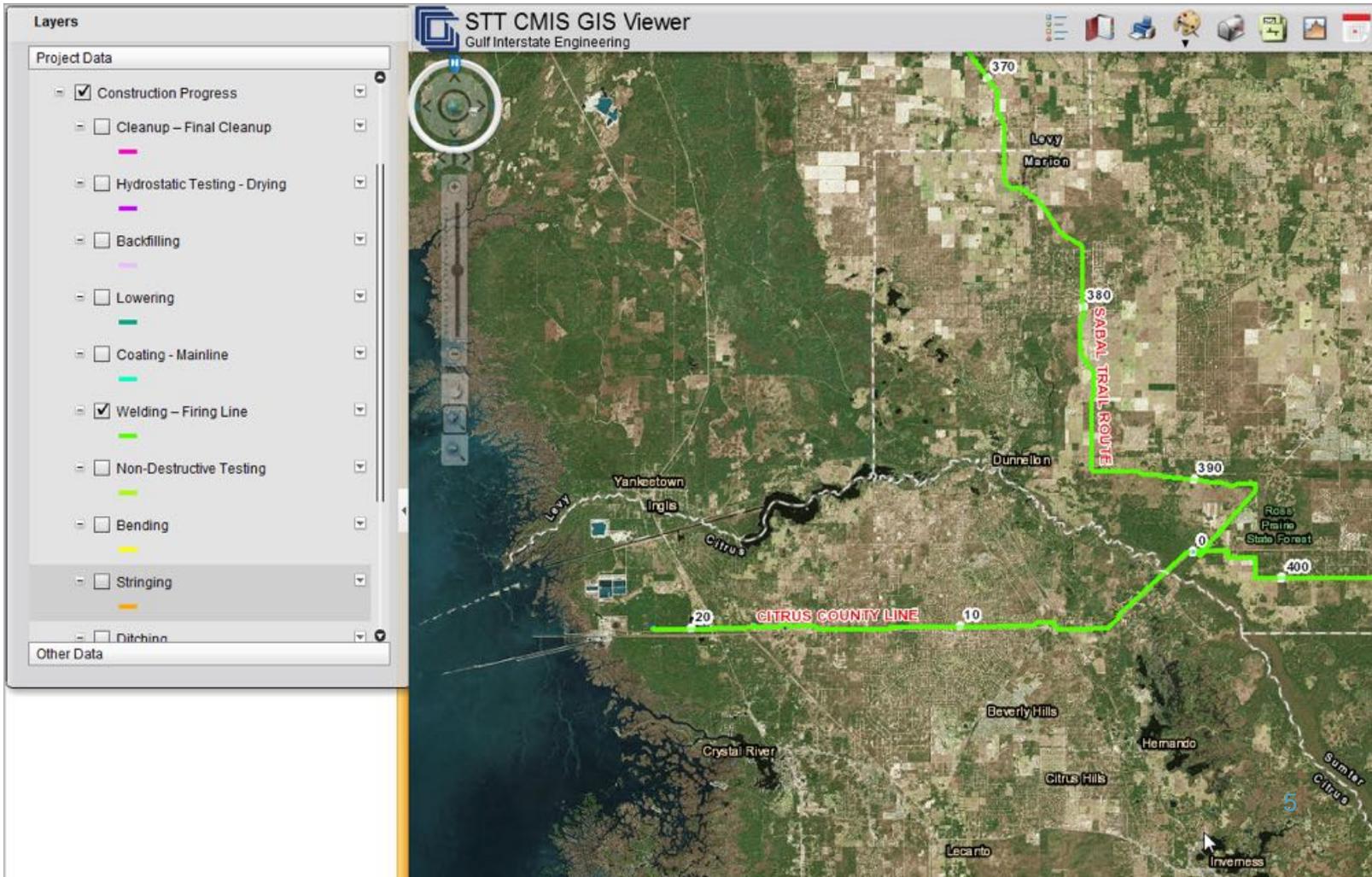
CMIS provided a suite of reports, viewable on-line and printable. The program is an archive of all construction activity, by day, which can be filtered to present information by spread or station, by contract or contractor and by activity, providing current and historical data to support trending and management of change. All project participants had controlled access to CMIS with complete information concerning activity through the previous day available before the start of the next day.



CMIS links to Gulf's GIS Management Portal and using this geospatial information system, construction activity and progress was overlaid on an aerial view of the pipeline route, providing a visual, at-a-glance and color-coded display of progress by location and activity. Geo-referenced photographs of construction activity, areas of concern and other points of interest were accessible with a mouse-click on the GIS viewer screen.

The U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA) diligently monitors all new pipeline construction projects and requires constant information regarding all aspects of the project, from engineering through construction. Gulf developed a web-based solution to provide PHMSA with anytime, anywhere access to project information, viewable on-line and downloadable, which was a new and well-received approach that earned PHMSA's compliments.

PHMSA Solution

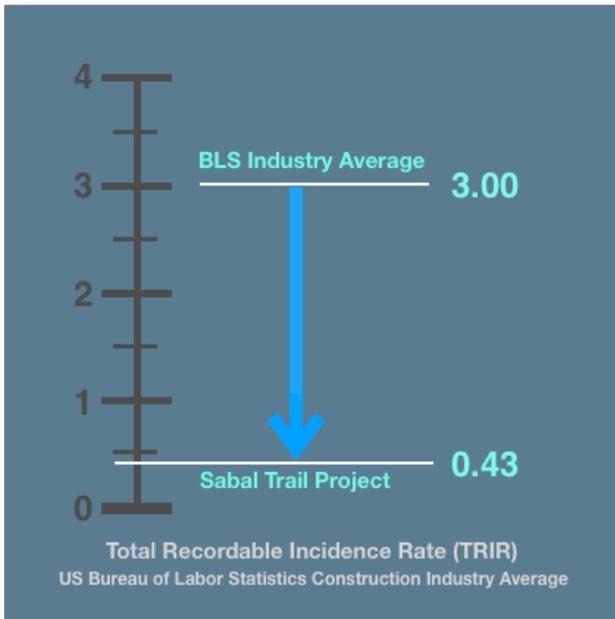


Gulf's GIS program incorporates an alignment sheet module that generates alignment sheets using a pre-designed template to which engineering data and other information are added to complete the drawings for construction.



The engineering methods and technology applications employed for Sabal Trail combined to control and reduce costs, effectively manage environmental impacts, address community concerns and support the exceptional safety record achieved by the project.

- The GIS platform served from inception to completion of the project, facilitating efficient engineering of the pipeline alignment: workspace management during the design and ROW acquisition phase; analysis and selection of re-routes; automatic generation of alignment sheet drawings; and, ready access for reviewers in various locations to comment on the development of the alignment. During construction the GIS platform provided on-line viewing and retrieval of all engineering information and other documentation relevant to the construction of the pipeline as well as providing visual display of construction progress.
- The EPCM contractor made extensive geophysical analyses to select the best locations for geotechnical investigations in karst locations to support the detailed engineering for HDD installations in these geologically difficult areas. The HDD approach was selected during the engineering phase as the best method to minimize environmental impacts and the EPCM contractor prepared detailed designs for each HDD location.
- Light imaging, detection and ranging (LIDAR) surveys coupled with boundary surveys, both performed during the engineering phase, supported field re-routing during construction and reduced the need for additional ground surveys to verify the re-routes.
- The Stakeholder Outreach program identified community concerns with the siting of the Albany Compressor Station and provided the feedback to enable a strategic relocation of the station to an acceptable location during the engineering phase.
- Preliminary design of two future compressor stations yielded a solution for minimal tie-ins to the existing pipeline system to control costs and facilitate eventual construction of the future stations.



Behavior-Based Safety Plan	Document No.: 1657-002-GN-0009 Revision: 2 Date: May 22, 2016
1.0 PURPOSE	We at Sabal Trail Transmission (STT) intend to take a proactive approach to injury prevention that focuses on at-risk behaviors that can lead to an injury and also on safe behaviors that can contribute to injury prevention. This is the meaning of behavior based safety. Instead of being responsible for accidents, our company encourages managers to be responsible for creating an accident prevention process and culture. This Behavior Based Safety Program provides both guidance and flexible procedures by which we prevent or mitigate all-risk behaviors and promote safe behaviors.
2.0 ADMINISTRATIVE DUTIES	The EPCM Health and Safety Manager is responsible for developing, training and maintaining the written Behavior Based Safety program. This program will become a part of the Project Execution Plan.
3.0 PERFORMANCE GOALS	In our proactive approach to injury prevention, the following safety related goals and objectives have been developed. <ul style="list-style-type: none"> EPCM and STT Employees will be required to document and submit one (1) Safety Observation (ESO) per quarter Encourage employee participation in the behavioral safety process Provide ESO training and mentoring to employees Track, trend, and analyze all ESOs to identify at-risk behaviors
4.0 SAFE WORKING ENVIRONMENT	STT is responsible for maintaining a safe and healthy work place. The Behavior Based safety program will help us focus our efforts in improving our work environment. STT believes the discipline that goes into a Behavior Based safety program will spill over into the production and quality of the project. Employees will become more aware of how to do their jobs safely. STT recognizes that employee behavior alone cannot guarantee a safe working environment. We strive to provide a workplace free from recognized hazards, both physical and behavioral.
5.0 OBSERVATION AND FEEDBACK	Observations of behaviors are necessary to give corrective or positive feedback to an employee. Employees are encouraged to document all observations. It is required that when observations are made that employees provide instant feedback to the employee observed, regardless if the observation is documented or not.
<small>Document No.: 1657-002-GN-0009 - Behavior-Based Safety Plan Page 4 of 6</small>	

Behavior-based Safety Plan

AN OUTSTANDING SAFETY RECORD

The behavior-based safety culture jointly established by the Client and the EPCM contractor and incorporating all project personnel through on-boarding training produced exceptional results, significantly better than the U.S. Construction Industry average.

11,475,000 HOURS WORKED
ZERO LOST TIME INJURIES
ZERO FATALITIES
TRIR 0.43

TAILGATE SAFETY MEETINGS. EVERY SPREAD. EVERY WORK FRONT. EVERY DAY.



CONSTRUCTION MANAGEMENT INFORMATION SYSTEM

Project: Sabal Trail Transmission Project Number: 1657 Project Role: Executive

Reports

Spread(s) Spread 1a, Spread 1b, Spread 2 View Report

GULF INTERSTATE ENGINEERING **CONSTRUCTION MANAGEMENT INFORMATION SYSTEM** **Sabal Trail TRANSMISSION**

Safety Incident Report

Project Name: Sabal Trail Transmission Spread(s) Selected: Spread 1a, Spread 1b, Spread 2, Spread 3 - GA, Spread 3 - FL, Spread 4, Spread 5, Spread 6, Hunters Creek Lateral, Citrus County Lateral
 Project Number: 1657 Project Description: Interstate gas pipeline system intended to provide natural gas transportation services for Florida Power & Light Company (FPL).
 Client Name: Spectra Energy

Spread	Date	Inspector	Safety Notes
Spread 6	9/17/2016	Monty Bell	Contractor digging GTs neat utilities. Slow down and watch spotter.
Hunters Creek Lateral	9/10/2016	Monty Bell	Contractor held the Tailgate meeting and covered the subjects of Traffic control and Responsibilities of everyone involved in getting equipment across the road safely.
Spread 2	9/12/2016	Frank Bagwell	At 3:20pm, the foreman was stung on the chest by something. MPG medic was on the site and took care of it. I reported it to Greg Swann, Safety Inspector.
Hunters Creek Lateral	9/17/2016	Cevin Loftin	Side boom backed into welding rig, front bumper damaged. No personnel injured, Safety (Jesse Garza) was notified by inspection staff and arrived at location along with Rockford safety. Incident will be noted as property damage, counseled with contractor about spotters and being aware of surroundings.
Hunters Creek Lateral	9/12/2016	Monty Bell	Contractor held the Tailgate meeting and cover the subjects of Traffic control. Responsibilities of all to watch traffic when backing in tump trucks with gravel for the approach. Spotter to watch hoe operator when working near power lines.
Spread 6	9/18/2016	Monty Bell	Reminded crews to watch equipment moving mats down the ROW and to stay a safe distance away at all times.
Spread 6	9/12/2016	Keith Wiltz	Contractor had safety incident, notified all necessary persons. Please see Safety Report for details of incident.
Hunters Creek Lateral	9/18/2016	Cevin Loftin	No safety concerns
Hunters Creek Lateral	9/12/2016	Cevin Loftin	Welder and helper were counseled by welding inspector Daniel Faulk regarding proper PPE for the task being performed.
Spread 3 - GA	9/19/2016	Charles Starr	Some of the skids being used to string this pipe are rotten and breaking and all the skids are not of adequate quality to string 36" heavy wall pipe on I have already contacted safety and assist chief about the situation and it is being addressed.

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Gulf’s CMIS provided effective capture and communication of safety incidents to all project participants. Every safety incident was recorded in CMIS and this archive of safety incidents cataloged a wealth of lessons learned information that benefited the ongoing operations and for application on future projects.

The on-boarding training that every participant in the project received provided the foundation for a strong safety awareness approach. The EPCM contractor developed the syllabus and training materials and conducted all on-boarding training. A complete register of all project participants was maintained indicating the training modules completed by an individual and any outstanding modules to be completed as well as additional modules required if the individual’s responsibilities on the project changed. The feature of the project Safety Management Program that proved to be the most expeditious and informative was the development of a central clearinghouse for safety incident reporting. All project personnel were instructed to immediately send a text message to a dedicated address to report any safety, environmental or opposition incident. The clearinghouse administrator routed the message to the appropriate project personnel and within minutes of receiving a message, action could be taken to address the incident. This safety incident reporting system was a notable factor supporting the exemplary safety and environmental record achieved by the project and a valuable aspect of the project’s community relations approach.

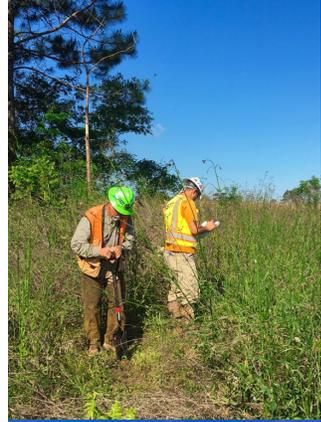
RESPONSIBLE ENVIRONMENTAL MANAGEMENT

Environmental aspects of the construction project are regulated by the Federal Energy Regulatory Commission, which conducted its own environmental impact study of the project in addition to the studies carried out by the project proponents. The studies identified the environmental impacts to be addressed. The FERC reviewed all project plans for mitigation of environmental impacts and continuously monitored construction activity to assess compliance.

Numerous federal, state and local regulatory requirements were addressed by the Sabal Trail project including the stipulations of the U.S. Clean Water and Clean Air Act, the U.S. Fish and Wildlife Service and the U.S. Army Corp of Engineers, which regulates waterbody crossings.

Water was a particular concern along the entire pipeline route. Damage to rivers, wetlands and civic water supplies during and after construction is a regulatory and community concern and a recurring claim made by pipeline opposition groups. Wetlands boundary surveys were made before an after construction to maintain encroachment restrictions and ensure conformed restoration. HDD construction methods were employed for major river crossings and certain wetland areas. The HDD crossing of the Suwannee River was lengthened to include an adjacent recreational park; an overall drill or more than 4,000 feet. Water used for hydrotest was subject to volume limits and timing of use constraints that demanded attentive planning. Disposal of hydrotest water required the construction of special retention structures to control dispersion and filter the water for removal of silt and other particulates.

100+ FEDERAL, STATE AND LOCAL AGENCIES ZERO NON-COMPLIANCE CITATIONS





Hundreds of participants gather to protest the Sabal Trail Transmission pipeline at a construction site near Suwannee River State Park.

RESPONSIVE COMMUNITY RELATIONS

Sabal Trail’s Stakeholder Outreach program coupled with a determined On-boarding and Training program proved an invaluable method to foster positive community relations and address opposition activism prior to and during pipeline construction.

During the engineering and FERC application filing phases of the project, open houses hosted by Sabal Trail provided stakeholders with the opportunity to learn more about the project and to ask questions on specific issues or concerns with the EPCM contractor and other subject matter experts. It was also the occasion for Sabal Trail to listen and understand the issues and concerns stakeholders may have on the project, including the proposed project route. The open house format allowed for one-on-one engagement that ensured a wide variety of questions specific to a particular landowner could be answered, in a comfortable setting and in a casual manner.

During construction, the programs provided guidance enabling all project participants to deal with protests and disruptions in a respectful and professional manner.

<small>Stakeholder Outreach/Government Relations Plan GE Document No. 100-200-00-0000 S1T Document No. GE-200-00-00-00 August 15, 2014</small>	<ol style="list-style-type: none"> 7. Key risks and execution strategy around those risks <ol style="list-style-type: none"> a. Risks and strategies attached 8. Key stakeholders and relationship strategy <ol style="list-style-type: none"> a. Tier 1 stakeholders documented by SO, GR & BD 3.0 Stakeholder Engagement (Phase II) <ol style="list-style-type: none"> 1. Purpose – SO is strategically focused on due-diligence and execution of projects to ensure they are on-time, within budget, and with few surprises. Stakeholders are the main variable in a project. SO will work with PM’s, GR, ROW, and Environmental to identify stakeholder issues, design effective communications / engagement for external benefit, and assist PM with effective communications / engagement for internal team. 2. Strategy/Plan of Action <ol style="list-style-type: none"> a. Seek and identify Tier 2 & 3 stakeholders for project outreach b. Continue building relationships through educating and updating key stakeholders/ policymakers c. Develop (or review) messaging and tools for the variety of team members’ use (GR/ BD/ SO/ Media/ ROW/ Environmental/ Regulatory/ etc) d. Ensure close coordination with partner companies e. Gain understanding of local policies and issues, possible coalition interest, partner company lessons learned f. Provide training to ROW, Survey, Env. Survey, etc around community interaction while in the field g. Educate and communicate with local communities to establish positive relationships with the public, policymakers, agencies, and financial community. h. Track major stakeholder issues that will potentially impact the project. <ol style="list-style-type: none"> i. Provide feedback to team re: impacts of project considerations to determine best outcomes and practices i. Create, review and produce internal communications – reports, presentations, communications, etc. to be used with project team members, company management, customers, and partners. 3. Organizational Structure <ol style="list-style-type: none"> a. Same as Phase I b. Additionally, Outreach will provide communications guidance to ROW, Environmental, Regulatory, PM’s, etc. 4. Outside Resource Requirements/Consultants utilized <ol style="list-style-type: none"> a. Hire local Public Affairs groups to assist with Sabal Trail project work in each state b. Use to assist with strategy development, issue resolution, media and social media messaging and monitoring, relationship building, and general community understanding and engagement c. Consult with higher education institution or consulting firm to prepare an economic benefits study (most likely will need a separate group to perform each state)
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CONSTRUCTION SOLUTIONS WORTHY OF ATTENTION

Certain conditions can accelerate corrosion damage to the pipeline, namely power transmission line alternating current and the electrical influence of a parallel existing pipeline. Prudent engineering and construction practice determined the **cathodic protection system** should be energized during construction, despite the regulatory proscription that allows a one-year period after the pipeline is in service to activate cathodic protection. The EPCM contractor coordinated with the welding and tie-in activities to confirm a continuous section of pipeline, five miles in both directions from the CP rectifier, and the CP system was activated as soon as the pipeline was backfilled. Once the CP system was energized, readings were taken on a regular basis to ensure the pipeline was protected. Florida has the highest number of lightning strikes in the USA. Damage to the pipeline from lightning strikes was another consideration for activating the CP system during construction. A lightning strike cause pipeline damage due to a grounding current coming off the pipe at an anomaly, which would not have occurred if the pipeline segment had been shielded with active cathodic protection.

A **six-hundred foot bore** under a hotel parking lot and an adjacent highway was accomplished using a pilot drill to guide the bore. Boring was used extensively along the 130-mile segment that paralleled an existing pipeline. This pipeline was installed in the 1950s and permit restrictions allowed no excavation within 10 feet of the existing pipeline. **Fifty seven bored crossings** of this pipeline were required, most of which crossed at a 45 degree angle.

Various locations along the right-of-way, particularly in Florida, featured soil conditions subject to hydro-compaction, which manifests as sinkholes. **Compaction grouting** is a technique that displaces and densifies loose granular soils, reinforces soils and stabilizes subsurface voids or sinkholes, by the staged injection of low-slump, low mobility aggregate grout. This technique was implemented at a number of HDD crossings to address subsidence that occurred as a result of HDD activities.

Soil conditions at the Reunion Compressor Station in Florida lead to a design solution calling for **pile supports** for all foundations. The 880 piles were included in the construction contractor's scope of supply. Manufacturing and delivery concerns and equipment



availability gave rise to an alternative suggested by the construction contractor, who proposed a 12" pile versus the 14" pile specified. The EPCM contractor made the necessary calculations and confirmed that 12" piles could be used for all foundations except the compressor foundation. This solution resulted in a notable cost savings and was a certain example of the collaborative approach between the EPCM contractor and the construction contractors.

The requirement for piling presented the opportunity to utilize "Ufer Grounds" versus customary grounding grid systems. Ufer Grounds utilize the steel in the piles, which are enclosed in concrete. The concrete enclosure increases the surface area of the connection between the grounding conductor (the pile) and the surrounding soil, which helps to reduce the overall impedance of the connection. This method presents meaningful savings for grounding installations.

The gas heater for the Hunters Creek metering and regulating station was one of the **largest piece of plant equipment** required for the project. At 15 feet in height and weighing 102,000 pounds, the gas heater presented a

logistical challenge with a time-critical delivery window. Several alternatives were evaluated including truck, barge and rail. Truck and barge delivery would each require special permits and a minimum of two months to deliver. The rail alternative was selected and the gas heater was delivered within three weeks, well ahead of the field need date.

A delay in the issue of the FERC construction permit had a consequent impact on the **delivery logistics for the compressor station components**, which could not be stored at the manufacturer's facility beyond a date certain. Enclosed storage near the construction site was not available in a large enough space to accommodate the volume and size of the components—over 120 crates, 8' X 8' X 20'. The EPCM contractor secured a temporary marshaling yard with a combination of paved and gravel surfaces. Timber mats were used for the heavier crates. Each crate was tightly wrapped with heavy gauge plastic and covered with canvas tarps. The components stayed dry and the yard survived a tornado strike without damage to the equipment.



To best manage the contractual interfaces, Gulf embedded its Contracts Administrators and Project Controls personnel at the spread level. This proximity to the construction contractors and the construction activity stimulated daily contact between EPCM contractor and construction contractor personnel, resulting in early identification of issues with the potential to impact the cost and schedule of the project. The EPCM contractor's Engineering Clarification Reports were a quick means to communicate upcoming design changes to the construction

The original construction schedule called for a 12-month construction period based on the planned date for receipt of the FERC Notice to Proceed with construction certificate. The FERC NTP was delayed by four months, during which time Sabal Trail, the EPCM contractor and the construction contractors agreed an adjusted construction schedule, reducing the overall time frame to 10 months. Sabal Trail requested that all efforts be made to further reduce the schedule to achieve substantial completion that would allow an early, partial volume gas flow on



contractors and allow time for alternative work plans to minimize or mitigate cost increases and schedule delays. The regular association of these personnel developed relationships that enabled frank and meaningful discussions and an informed understanding of the issues, leading to equitable and mutually acceptable settlements which maintained the project schedule and reduced the initial change request amounts by some \$100 million.

A prime example of the cooperative working relationship that Gulf cultivated with the construction contractors is represented by the schedule improvement necessary to meet the challenge for an accelerated completion requested by Sabal Trail.

the original in-service date, reducing the time for substantial completion of construction to 8 months. To achieve this would require the entire pipeline system to be completed along with the metering and regulating stations, and at least one compressor unit operating at each of the compressor stations. Gulf and the construction contractors worked together to optimize schedules and work plans. This was particularly challenging for the compressor stations as the entire construction approach had to be revised to accommodate isolation of the early flow unit, and introduced a hot work permit requirement to complete the remaining units. The early flow date was achieved within the project budget.



THE KEY TO SUCCESS

From the beginning moment of negotiations between Spectra Energy Partners and Gulf Interstate Engineering Company for the award of the EPCM contract, both parties sensed an opportunity to form a relationship grounded in mutual respect with a compact to deliver a successful project. This disposition soon led the senior management of both entities to nurture a culture of cooperation, communication and consultation that culminated in an integrated team approach that recognized and relied upon the separate talents and capabilities of both companies and in coalition to handle the challenges of the Sabal Trail project. Spectra Energy set the strategic expectations and Gulf developed the tactical plans and procedures and deployed its personnel to fulfill the requirements.

A representative example of this partnership collaboration is demonstrated with the approach employed for engaging the construction contractors for the project. The contractual agreements rested with Spectra Energy, who focused on an owner's concerns, while the technical contract formulation, bid packages, evaluation, selection and negotiation with the successful construction contractors was led by Gulf, relying upon the EPCM contractor's experience, its relationships with and knowledge of the pipeline construction contractors and its understanding of the needs of both the owner and the constructors.

Establishing the route of the pipeline is the most critical aspect of the project and is an interface intensive effort that demands the coordination of multiple participants—owner, engineer, regulatory agencies, surveyors, environmental assessors, landowners, land acquisition personnel and legal representatives. The management process to attend to re-routes must be proactive, decisive and informative and issues must be communicated expeditiously and effectively to all concerned parties.

The permit to construct the pipeline issued by the FERC is predicated upon the route set forth on the approved for construction alignment sheets. Deviations during construction are subject to strict controls and further approvals and failure to adhere to the requirements can place the construction permit in jeopardy. Gulf and Spectra Energy developed an integrated pipeline alignment management process which melded the distinct responsibilities of the owner and the EPCM contractor into a comprehensive procedure that successfully administered all re-routes, before and during construction. **No non-compliance notices were issued to the Sabal Trail project by the FERC.**

Because of the communication technology employed for the project (web-based portals) the need for client representatives to be present in the EPCM contractor's office during the engineering and procurement phase was reduced and often minimal when compared to other projects of a similar size and scope. The minimal presence was not only because of the communication technology, but also a measure of the mutual trust between client and contractor.

The topics discussed in preceding pages provide additional illustration of a rare, but welcome phenomenon, a successful and satisfying client-contractor relationship. A contractor's best evidence of a contented client is to receive additional work from that customer. Spectra Energy awarded Gulf the engineering assignment for the future compressor stations to be installed on the Sabal Trail project in 2020.

Perhaps the best testimony for the success of the Sabal Trail project is the recognition it received from industry peers with the S&P Platts Global 2017 Construction Project of the Year Award. Gulf Interstate Engineering Company is truly proud to have played a part in this pace-setting pipeline project.



PHOTO GALLERY



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Sabal Trail

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