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Challenges of Planning a 40-Mile Regional Water Transmission Pipeline Within a Rural Setting Brazosport Water Authority

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Abstract

The City of Rosenberg, Texas, and the Brazosport Water Authority (BWA) came together to define a $52 million contracting and capital cost sharing scenario to design and construct a 40-mile large diameter water transmission pipeline and pump station facility to transmit potable surface water to the City of Rosenberg. The cost sharing scenario creates a win/win situation for member BWA cities as they will realize stabilization in their water rates with the City of Rosenberg becoming a contracting partner. The pipeline also accommodates other potential future growth in the region. Subsequent to construction, the City of Rosenberg will be in compliance with subsidence mandates through 2025 and have a sustainable and economical alternative water source that provides them with a unique economic development advantage relative to water rates of surrounding communities.

The water transmission line is in the preliminary engineering and design phase, and is anticipated to begin the bid phase early in 2017. This presentation will discuss the challenges faced when designing a regional pipeline within a rural setting spanning multiple cities and counties.

In order to begin field work, and even though Texas is a right-to-survey state, BWA made the decision to be a good neighbor and obtain Right of Entry to the private properties in which the potential easement(s) exist. In order to do this, GIS software utilized the Brazoria and Ft. Bend County appraisal districts' data to obtain property ownership information. Land agents had to coordinate right of entry with over 60 private land owners for access to complete easement survey, environmental survey (including wetland delineation and Phase 1 ESA), and geotechnical field work. The 60+ landowners have over 100 tracts of land, which does not include road crossings or public rights-of-way. Additionally, in order to finalize survey data and develop easement documents for initial offer letters, title agents had to obtain title commitments in rural areas that have not had land transfers in over 100+ years. This proved to be a challenge, especially when determining ownership along a previously abandoned railroad corridor that spans approximately 10 miles of the pipeline alignment. Additionally, in order to finalize the easement location, multiple meetings and an extensive coordination effort was necessary to appease various stakeholders. Multiple drainage districts, the Texas Department of Criminal Justice, TxDOT, large

land owners and numerous oil and gas companies had to be consulted to discuss and approve the exact location of the easement and pipeline within the easement.

Much of the coordination effort led to slight route adjustments, which led to additional field work and coordination efforts along the 40-mile stretch. Once all the coordination meetings were held, survey data was complete, and both historical and environmental impact studies were finalized, CDM Smith will finally be able to begin the design phase of the regional pipeline project. Parallel to design right-of-way agents will be negotiating easement terms with land owners. By December 2016 the various packages are anticipated to be under TCEQ review and ready for advertisement for bidding. This presentation will discuss the challenges faced between developing a plan to implement a regional pipeline system and turning that plan in to a final design reality for the BWA.

Background:

The Fort Bend Subsidence District's 2013 Regulatory Plan[1] requires the City of Rosenberg, Texas, meet surface water conversion goals by reducing groundwater withdrawals to no more than 70-percent of the total water demand by 2016, and no more than 40-percent of the total water demand by 2025. Additionally, projected population growth in Brazoria and Fort Bend Counties will increase the water demand of the City of Rosenberg and the surrounding communities, water authorities and water districts in the area.

In order to meet the conversion goal and growing water demand, the Brazosport Water Authority (BWA) entered into a partnership to convey treated drinking water from the existing BWA distribution system north of Angleton, Texas, to the take point for Rosenberg, Texas. The *Northern Regional Pipeline* routes approximately 40 miles from beginning to end, with booster pumps and a ground storage facility after the first five miles. In total BWA will provide 5.7 million gallons per day (MGD) of surface water to the City of Rosenberg to meet future water demand and surface water conversion requirements.

This paper will discuss the challenges faced when developing a regional water transmission pipeline, including coordination of multiple stake holders, land owners, and outside entities.

Challenge 1: Routing Options

In order to determine the physical location for the Northern Regional Pipeline and easement, CDM Smith was contracted to performed a routing study. An extensive combination of route alternatives were selected and studied based on cost, environmental impact, schedule, and future demands from BWA. As shown in Figure 1-1, the pipeline begins at Point A just north of Angleton, Texas, and ends at

[1] Fort Bend Subsidence District, 2013 Regulatory Plan, adopted August 28, 2013 by FBSD Resolution 13-332
http://www.fbsubsidence.org/docs_reports/2015/20130828_FBSD_Regulatory_Plan_ADOPTED_(FINAL).pdf

Point D in Rosenberg, Texas; however, BWA requested that the pipeline route through Point C in Sandy Point, Texas. Point C is necessary because BWA may service the TDCJ Darrington Unit as well as other communities north and northeast of Point C as future customers.

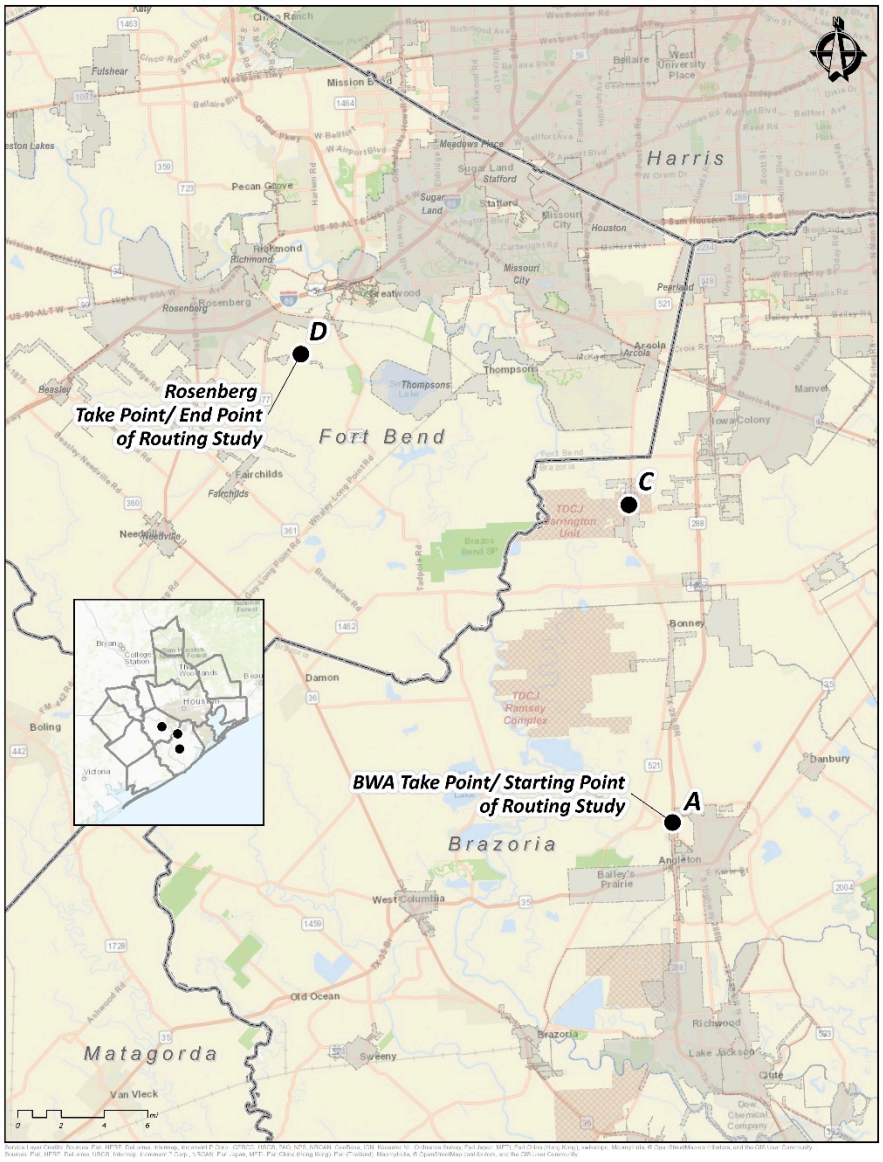

Figure 1-1: Critical Points for BWA Northern Regional Pipeline Route

Five route options were studied between Point A and Point C:

1. State Highway 288 (SH 288), within right of way;
2. Parallel to SH 288, within an established CenterPoint easement;
3. Farm-to-Market 521 (FM 521), within right of way;
4. Parallel to FM 521, but establish a new easement for BWA;
5. A hybrid of both FM 521 and SH 288.

Four route options were studied between Point C and Point D:

1. FM 1462;
2. TDCJ and Big Creek Diversion Channel;
3. Grand Parkway Route;
4. Rancho Pipeline Easement.

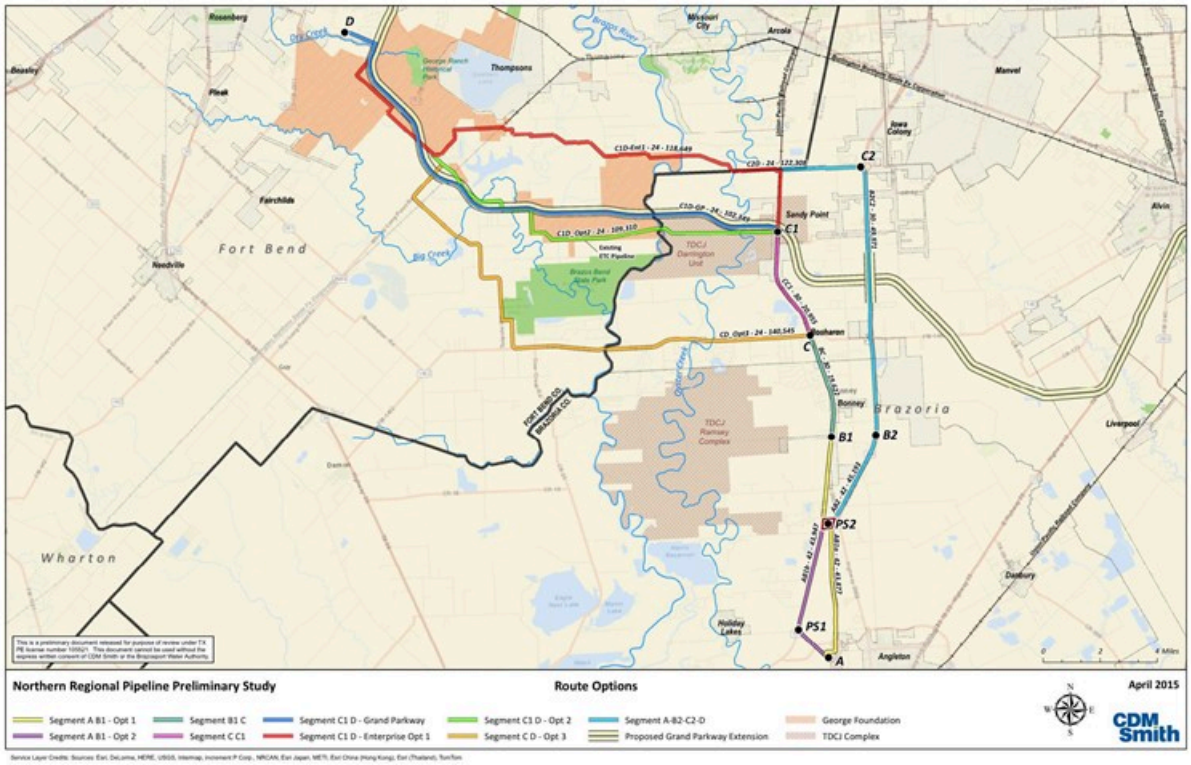

Figure 1-2: Alignment Alternatives Studied

The study reviewed route options between A and C, and C to D, including each combination of the routes between A and D.

Existing established corridors in the areas studied included various oil and gas easements (Enterprise Products' three pipeline easements referred to as "Rancho", "HSC Partnership (HSC)", and "Seaway"), electrical easements (CenterPoint corridor), existing Texas Department of Transportation (TxDOT) roads (SH 288, FM 521, FM 762, FM 1462), drainage channels (Ft. Bend County Drainage District's Big Creek Diversion Channel), and proposed future toll road alignments (Grand Parkway). During the routing study, a handful of alternative locations were reviewed for Point C. Additionally, BWA needed to acquire at least 5-acres of property to construct a storage and pumping facility to support the NRP. The final NRP alignment recommendation was made by studying and weighing criteria including capital costs (including construction and land acquisition), operating costs (pumping and maintenance), schedule risks, and opportunities for future benefits to BWA.

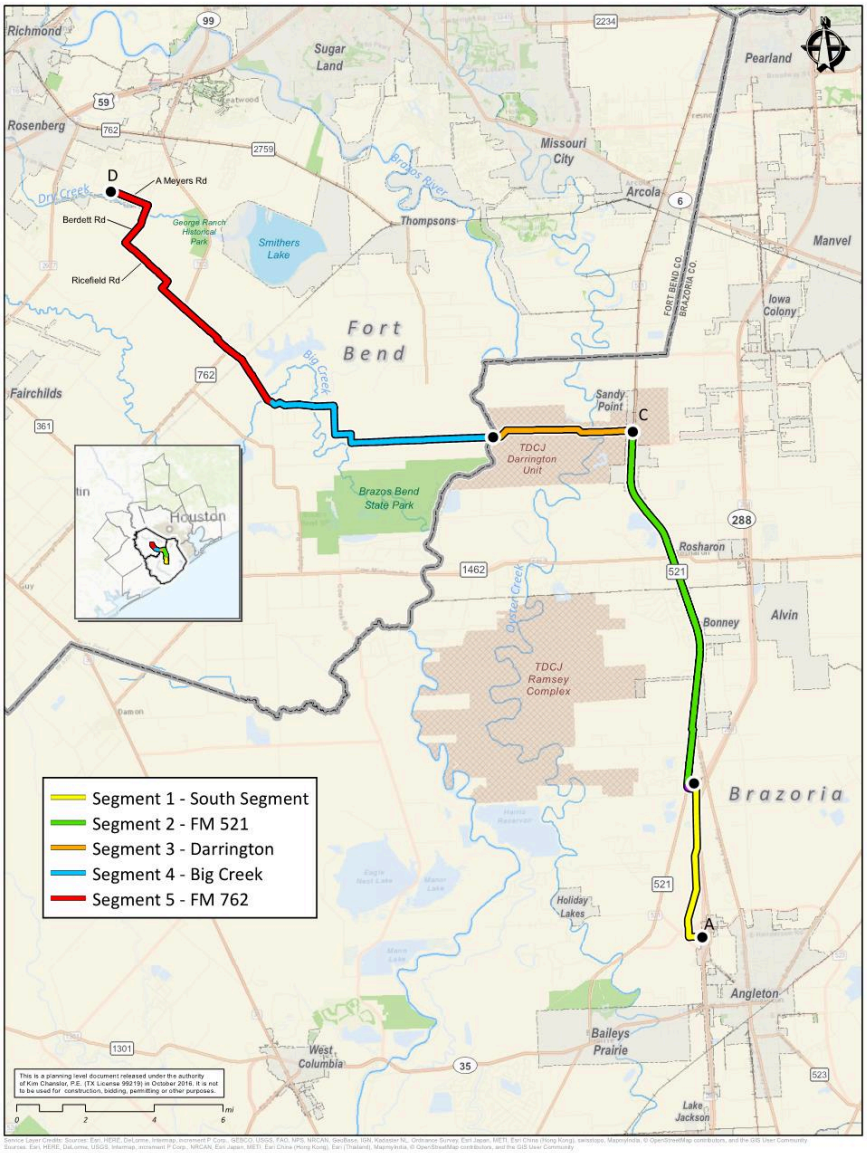

Figure 1-3: BWA Northern Regional Pipeline Final Route

Figure 1-3 illustrates the final route selected for the Northern Regional Pipeline. The NRP begins at Point A, just west of SH 288 north of Angleton, Texas, and runs parallel to Enterprise Products' "Seaway" pipeline easement to the North Regional Storage and Pumping Station (NRSPS). Upon exiting the NRSPS to the west, the NRP parallels FM 521 in an easement acquired by BWA along the eastern boundary of the road right-of-way until it crosses the road (approximately 4 miles north of the NRSPS) to parallel the western boundary of FM 521 within an easement acquired by BWA, to Point C in front of the TDCJ Darrington Unit. Within the TDCJ property, the pipeline turns west and parallels Enterprise Product's "HSC" pipeline easement and Fort Bend County Drainage District's "Big Creek Diversion Channel" right of way for approximately 11 miles. The line borders property lines for another few miles until finally reaching FM 762. From FM 762, the NRP shares an easement with

Enterprise Product's "Rancho" pipeline until just before reaching the final take point facility in Rosenberg, Texas.

Challenge 2: Determining Property Ownership

One of the largest challenges faced during preliminary engineering and design of the Northern Regional Pipeline related to identifying the correct property owners along the route of the BWA easement. Due to the rural setting of the pipeline, the majority of properties are large sprawling ranches. Defining property boundaries and current owners was a challenge for both the title agents and the surveyors.

To begin, Geographical Information Systems (GIS) mapping software was utilized to store, retrieve, manage, display, and analyze all types of geographic and spatial data, and specifically to provide county appraisal property information. Utilizing GIS, map books were created showing the easement alignment, property boundaries, and ownership information based on appraisal records. However, the team quickly learned that the accuracy of appraisal information ranges between counties. One county provided maps online, free of charge, and another required purchasing the data and downloading from their server. The data purchased quickly revealed itself to be more up-to-date and accurately represented then the data was accessible online to anyone who wanted to see it, and the team had to spend extensive resources confirming the accuracy of the one county's data.

Title work and surveying verified ownership information for most of the parcels; however, for approximately 7 miles of the NRP the easement fell within an abandoned Union Pacific railroad company corridor. Although the tracks had been removed, and in most places the right-of-way deeded to another owner, there were locations where the title work could not find documentation that the property had been deeded to anyone but UPRR did not have records of owning the property. Hiring title agents (who were familiar with easement acquisition rather than property purchases for small single- family homes) to provide certified title commitments (further than 35 years) proved necessary because some of the properties had not changed hands in over 75 years.

Two properties took over a year to determine ownership and eventually were acquired via notification by publication. One property is an asset of an out-of-business company of which agents were unable to track down heirs to assets. Another, title work was unable to prove ownership of the 12-acre parcel the easement runs through, although, title pulled showed ownership on each border of the 12-acre parcel. Having title and survey agents who are familiar with the area and have experience with nearby properties enabled the project to move forward and not hit a road block. One of the surveyors stated that if they had realized how difficult the title work for the rural area would be to obtain, they probably would not have taken on the job. However, with patience and communication, the property owners were finally

identified in order for BWA to negotiate easement and property purchase offers and ultimately install the water transmission line.

Challenge 3: Survey, Geotechnical Work and Easement Negotiations with Property Owners

Once the route determined and the landowners identified, the BWA NRP's next challenge is from the property owners. The pipeline is primarily rural; therefore, a majority of the landowners are in a short run of the corridor (approximately 7 miles). A majority of the NRP easement lies within two properties: Texas Department of Criminal Justice (TDCJ) Darrington Unit and The George Foundation's Ranch.

TDCJ Darrington requires background clearance for any visitors to the property. Every agent for BWA had to submit personal information for a criminal background check, which took approximately 30 days once submitted. This became challenging when companies had staff turnover or wanted to send additional personnel to the site. Additionally, TDCJ Darrington has an established easement with Enterprise Products for the HSC pipeline. After numerous meetings with TDCJ representatives, the final alignment of the BWA NRP could be set. The TDCJ preferred the BWA NRP parallel the HSC easement on the Northern end of the easement; however, title had to be pulled and survey confirmed to determine the exact coordinates of the easement. The survey confirmed that the HSC easement had a shift in alignment (eventually determined to be from avoiding historical artifacts) and initial documentation from the TDCJ showed otherwise. The change affected the crossing of the Brazos River and delayed design and permitting for the HDD river crossing.

The George Foundation owns property for approximately 14 miles of the entire route. Being a large, mostly undeveloped ranch, the property is difficult to access and prone to flooding. Once access routes were determined, the surveyors could begin their work; however, 2016 brought rainy weather conditions. During Memorial Day weekend 2016, the Brazos River flooded due to heavy rainfalls upstream in the river. Governor Greg Abott declared disaster areas for both Brazoria and Ft. Bend counties. In Rosharon, a neighboring community of the BWA NRP, the Brazos Rier rose to 52.54 feet, shattering its previous 1994 record (the gauged area is considered flooded at 45 feet)[2]. USGS river gauges recorded flood waters passing through Rosharon 49.3 million gallons per minute (110,000cfs) when it crested. The flooded river affected the surrounding area, which meant field crews could not access property for survey, and if they could have accessed the area they would have been under water. The water finally receded enough for field crews to remobilize by July.

In addition to weather and security obstacles, a handful of property owners had to be threatened with temporary restraining order (TRO) filings, in order to be allowed access to their property for field work. The disgruntled land owners in Brazoria

[2] USGS 08116650 Brazos Rv nr Rosharon, TX
https://nwis.waterdata.usgs.gov/tx/nwis/uv?cb_00035=on&cb_00036=on&cb_00055=on&cb_00055=on&cb_00060=on&cb_00065=on&format=html&site_no=08116650&period=&begin_date=2016-05-30&end_date=2016-06-05

County required condemnation attorneys and temporary restraining orders to complete the work, which also meant that field work had to be completed expeditiously once allowed.

Challenge 4: Permits from numerous entities

Coordination with TxDOT once the SH 288 option was selected for the southern segment of the NRP was not an easy task. The highway, in the specific area of the pipeline, varies between controlled and non-controlled access and does not have a frontage (or "feeder") road. This meant that a plan would be necessary for accessing and maintaining the pipeline; however, this is prohibited from the main travel lanes of SH 288. Therefore, the pipeline would need to be accessed from the western-bordering properties, or further north and south. Because BWA would have to negotiate with land owners for access, and because the typical TxDOT review and approval would take an estimated 9 months (per the district engineer), it was determined that realigning this portion of the pipeline was in BWA's best interest. Rather than being installed within the TxDOT right-of-way, the line was rerouted west to be adjacent and parallel to the Seaway pipeline easement.

The BWA NRP routes parallel and adjacent to or within three major pipeline easements belonging to Enterprise Products. Encroachment letters of no objection (LONO) for each easement had to be provided, which meant extensive coordination with Enterprise's encroachments group. Google earth files (.kmz) were provided to Enterprise for their review and approval. Strict encroachment requirements were enforced during design (90-deg crossing where possible, 24" minimum separation distance, minimum 18' clearance, etc), and construction requirements for the contractors were incorporated into the contract documents (such as one-call requirements and zones of influence requiring hand-digging).

The US Army Corp of Engineers is reviewing the project in order to provide a 2012 Nationwide Permit for Wetlands and HDD crossing under Brazos River. However, the 2012 permit process expires March 17, 2017, and requires design of the segments to be complete and construction contracts awarded. If the deadline were to be missed, the BWA NRP would fall under the non-finalized 2017 Nationwide Permit requirements and may potentially delay necessary approvals in order to being constructing. Pre-application meetings were necessary to ensure that the deliverable for permitting is correct for the first submission, in order to minimize potential delays to the entire project. With cooperation from the USACE to assist in providing expedited reviews, the USACE Nationwide 12 Permit was granted to BWA on March 15, 2017.

In addition to the entities stated above, numerous encroachment reviews by other oil and gas companies, CenterPoint electric / telephone, and drainage districts were required for the pipeline easement. This requires excessive resources and staying organized to keep track of the status of approvals.

Challenge 5: Managing numerous sub-consultants and design teams

Because the BWA NRP project is complex in scope, numerous sub-consultants were tasked with specific portions of the preliminary engineering and design work. In order to accommodate the decision to break the NRP into five segments, for bidding and construction purposes, two segments of the five were designed by sub-consulted engineering firms. Two (2) geotechnical firms were brought on board, and areas of responsibility were based on county (one for Ft. Bend and one for Brazoria). Additionally, survey was performed in each county by separate firms who were contracted to provide the field survey, easements, and topographic data.

CDM Smith also hired sub-consultants to manage specific tasks for the entire NRP. For example, one acquisition firm was hired to assist with obtaining the easements on behalf of BWA; however, they had three title companies working simultaneously in order to provide certified title commitments for the entire route. Furthermore, two environmental firms were necessary for specific tasks for the entire route: one for environmental wetland permitting and USACE permitting and one for the Phase 1 environmental site assessment. In order to meet the expedited design and construction schedule, a separate design team was assigned to the Pump Station and GST project. In addition to the CDM Smith team, BWA contracted legal counsel for both general purposes and condemnation purposes.

Many challenges arose due to having as many as ten (10) sub-consultants working on one project. CDM Smith found that communication, documentation, and status tracking is key to keeping the process moving forward and keeping the pieces in sync. For example, the surveyors required title information in order to finalize the survey; however, the title agents requested field survey notes in order to finalize the title commitments. It takes teamwork and communication to make sure that all information is distributed in a timely matter, and to ensure the information transmitted is adequate for its intended purpose.

Communication is the biggest challenge with working with a large number of personnel on a project. A centralized, simple web-based project management system (eRoom) was utilized as the solution for dispersal of information to all parties involved in the project. The site sends a daily email with a list of all added documentation, so everyone has a morning snapshot of data provided in the previous 24-hours. This site was also necessary due to the various security measures each firm has for information technology. This decision allowed everyone to access the information, as long as they have a working internet connection. The team learned early on that if there is one central location where all data can be found, it eliminates questions such as “Which iteration is the latest and greatest?” or “Where are we on the status of a specific permit?” and enables the team to work off the latest available information.