

FERC 201 Workshop Series

Construction Challenges

The following notes from Workshop 3 reflect the discussions held during the workshop and may not cover all discussion questions identified in the pre-printed workshop slide handouts. Additional discussion questions identified during the workshop have also been added.

FERC INITIATIVES UPDATE

Best Practices for Industry Outreach Programs to Stakeholders

- The Federal Energy Regulatory Commission (FERC) will release this document the week of July 27 to FERC's email list.
- Key Elements to the Outreach Program:
 - < Needs high commitment from management to be a success.
 - < Outreach team needs to be involved from the beginning.
 - < All members of the team including survey team, CEO, project managers - need to carry the same message (general training).
 - < Outreach efforts should engage and educate by providing informational materials.
 - < Document outreach internally as well as on the FERC website (i.e., monthly status reports) to help keep the public informed.
 - < Outreach efforts should continue even after construction has been completed.
- Long-term Investment to the Stakeholders - FERC Chairman Quote:
 - < "As one gas pipeline CEO explained to me recently, while you certainly want to receive a certificate from FERC, you also want to earn a social license from the communities along the path of the pipeline. Your pipeline will provide service for decades to come. It is truly a long-term investment, and so is your relationship with the key stakeholders. It is in your interest to be a good neighbor from the start."
- Proactive Outreach to Public - FERC Chairman Quote:
 - < "These are boom times for many of the people in this room. But unfortunately, the siting of infrastructure, as you know, has become increasingly contentious. Here you can help yourselves, and FERC, by engaging in proactive outreach with stakeholders."

Updates to Guidance Manual on Environmental Report Preparation

- Updated document should be out for public comment in October.
- Final document should be issued by the end of the year 2015.
- Next FERC Seminar will be in Cincinnati, Ohio - October 6-8, 2015.
- FERC will be hiring 10 new staff (two LNG and eight environmental).

TOPIC 1 – CONSTRUCTION OVERVIEW

Typical Construction Sequence

Ideal Construction

- Typical schematic does not cover all the different types of construction (e.g., road borings, stream crossings, horizontal directional drill [HDD]).
- Construction challenges are different on hills vs. flat terrains.

Industry is constantly changing

- Safety and quality should be used interchangeably and the industry is starting to see environmental stipulations, like winter construction, adversely affecting safety and quality.

TOPIC 2 – CONSTRUCTION PERIOD CONSTRAINTS

Wildlife Restrictions

Background

- During permitting process there are best management practices (BMPs) in place to protect wildlife:
 - < Threatened & Endangered Species
 - < Migratory Birds
- BMPs can include:
 - < Route Modifications (to maximize distance from sensitive resources)
 - < Seasonal Construction Windows (to avoid breeding and rearing seasons, etc.)
 - < Workspace Limitations (reducing workspace near sensitive resources)
 - < Modified Tree Clearing (hand clearing to minimize impacts)

Challenges and Constraints

- Route Modifications:
 - < Potential impacts to other resources.
 - < Can also lead to greater overall land disturbance impacts.
 - < Changes late in the process (during construction) can lead to schedule impacts.
 - < Landowner input is another factor that can affect routing.
- Seasonal Construction Windows:
 - < Various species' windows can conflict with each other at times.
 - < Windows also narrow the time available for construction, especially when there are several.
 - < Wintertime construction - produces other challenges and potential delays due to wet or frozen conditions.
 - < Equipment move-arounds can be more challenging.
- Workspace Limitations – reducing workspace can lead to challenges
 - < Where to place or retain spoils in wetlands.
 - < Safety and access concerns due to the lack of travel lanes
- Tree Clearing:
 - < Compliance with the Migratory Bird Treaty Act has changed construction.
 - < Tree clearing performed by hand (i.e., use of chain saws) creates construction challenges.
 - < Mechanized clearing generally results in ground disturbance, which requires installation of erosion control devices (ECDs).
 - < Relative to hand clearing, mechanical clearing allows greater control of tree felling and increased worker and public safety, however mechanized clearing may have more impact on migratory birds.
- Landowners can introduce additional challenges:
 - < Public is more interested in the projects than ever.
 - < Landowners may also impose time of year restrictions on construction (hunting, farming, back yard weddings).

- Seasonal Restrictions
 - < Developing construction schedules and charts that depict the seasonal restrictions are useful resources to open the dialogue between agencies and owner/operator.
 - < Agencies are responsible for protecting the resources. Owner/operators are responsible to protecting the resources, maintain commitment to their customers, and ensuring the safety of the pipeline asset, the public, and the construction and operation workforce.

	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Required Activity	FERC Order	Federal Permits Received	FERC NTP	Tree Clearing	Access Road and Mainline Construction		Stream Crossing Construction and Mainline Construction				Mainline Construction		
Migratory Bird and Bat Tree Clearing Window													
Trout Stream Crossing Window													
Red: Activities Prohibited Green: Activities Authorized													

- Winter Construction
 - < Snow event requires/creates:
 - o Snow removal of right-of-way (ROW).
 - o Preheating of pipe after snow event.
 - o Additional safety risks, especially in hilly terrain.
 - o Additional maintenance in spring (following soil settling).
- Time of Day Restrictions
 - < Local ordinances may restrict construction activities between certain hours.
 - < Local ordinances may restrict noise levels during construction.
 - < Local ordinances may be in place to maintain safety (e.g., narrow roads in northeast have time restrictions to avoid pipeline construction traffic being on the road at the same time as local school buses).

Lessons Learned and Possible Solutions

- Mitigation Solutions from Agencies
 - < Working with local agencies seem to be more of a challenge because they may not be as accustomed to working with pipelines, or as knowledgeable of pipeline construction practices, as many of the federal agencies.
 - < Construction variances are possible. Increased environmental survey corridor widths and increased construction contractor involvement during the planning process should help account for and identify potential variance requests during construction. The pre-filing process also allows for discussion with agencies and owner/operator early in the planning process.
 - < Owner/operators find that agencies are not always on the same page. Wintertime clearing is not always a safe option.

- < The project construction stage is not the time to work out issues. The planning stage is where mitigation measures should be decided.
- < Industry should also be working with agencies on their regional planning and land use management plans.
- < Regional approaches could be a solution.
- < Programmatic planning and consultations could be a solution.
- Acquisition of Incidental Take Permits
 - < Currently no mechanism for migratory birds, but the United States Fish and Wildlife Service (USFWS) is actively reviewing a process to provide for incidental take authorization.
 - < Programmatic approaches (e.g., habitat conservation plans, programmatic biological opinions, etc.) may be an option to avoid lengthy permit acquisition time under the Endangered Species Act (ESA).
- Owner/Operator Habitat Conservation Plans
 - < Alternative to a programmatic approach
 - < Covers entire existing system
 - < Provides initial take permits for covered species
 - < Commits operator to avoidance and mitigation plans
 - < Long and expensive process
 - < Owner/operators could start with one of their systems to approach the USFWS.
- Conservation banking
 - < In-lieu mitigation banking
- Using information from USFWS
 - < Look for survey data from USFWS that may not be published or readily accessible.
 - < Graduate students are a great resource for data research and surveys.
- HDD
 - < While the use of HDD is very useful to avoid impacts to environmental resources, there are some situations where it cannot be employed.

TOPIC 3 – CHALLENGES OF VARYING SITE CONDITIONS

Ideal Construction ROW Widths

- 75-foot ROW is sufficient for ideal construction conditions, but does not provide much room for slash piles, segregated soil storage, pipeline trench, equipment and personnel in problematic areas.
- 50-foot ROW has even less room.
- Refer to the INGAA Foundation’s “Building Interstate Natural Gas Transmission Pipelines: A Primer”.

Hilly/Steep Terrain

Challenges and Constraints

- Safety Considerations:
 - < Morning Job Safety Analysis (JSA) meetings should take place to discuss potential hazards for the day.

- < Weather and wind can affect the safety of workers (e.g., welders, machine operators on slope, workers at base of hill).
- < Side hill slippage can occur from underground water seepage. (The potential seepage can go unnoticed during winter since the water is frozen until spring).
- Refer to INGAA Foundation’s “Land Movement Mitigation Study” report written with Williams.
- Workspace Considerations:
 - < Despite all the planning, there are still situations that arise in the field that need extra consideration.
- Space is always an issue.
- Schedule seems to be the constant driver.

Lessons Learned and Possible Solutions

- Be sure to identify the need for extra workspace as early as possible in the planning process.
- Develop a well thought out access road plan during the planning process, do not make it an afterthought.
- Extra workspace and access roads need to be approved not only by agency, but by the landowner as well. This can be challenging.
- Benefits to HDD – may not require a permit (e.g., crossing under a Section 404 Clean Water Act regulated stream). Agencies need to know if an HDD is not feasible due to ground conditions (unsuitable geotechnical conditions like cobble rock), elevation (valley of two hills), or workspace, so that they can work with the owner/operator to come up with additional solutions.
- Agencies historically encourage new pipelines to parallel existing transmission lines or pipelines. However, this practice could actually result in greater ground disturbance than a greenfield route in some instances (e.g., , due to the original transmission line or pipeline being on the top of the ridge, therefore forcing the new pipeline route to be on the less desirable side sill of the slope).

Road and Railroad Crossings

Background

- Considerations
 - < Permit requirements for depth of cover.
 - < Unknown utilities and foreign lines in the ROW that parallel the road.
 - < Other anticipated obstructions.
 - < Ground conditions may require special techniques to maintain the integrity of the excavation.
- Ideal Workspace for Typical Road Crossing (90° angle)
 - < No underground obstructions.

Challenges and Constraints

- Safety Considerations
- Workspace Considerations

Lessons Learned and Possible Solutions

- Plan for soil conditions and trench slope requirements.
- Typical 25-foot by 50-foot workspace on each side of the road crossing may not be sufficient depending on the location and terrain.
- Construction contractors would like all known utilities located within the ROW (above and below ground) prior to construction to avoid their discovery during construction, which can impact safety,

result in greater ground disturbance, and may require schedule delays. Drills and bores need to be redesigned too often in the field during construction.

- Confirm whether the road or railroad you want to cross is a historic structure. If it is, it may require additional agency review and approval.
- Depth will affect how much extra workspace needs to be permitted.
- Technology has been changing and some owner/operators have spoken with Railroad Commissions about not requiring crossings to be cased.
- Make sure to request workspace all the way up to the actual road (not just the road easement). Past projects have required a variance to get from the road to the workspace.

Wetland Crossings

Challenges and Constraints

- BMPs are standard and consistent; the wetlands are not.
 - < Sizes, lengths
 - < Soil conditions and saturation levels
- Workspace limitations
- Additional considerations:
 - < Depth of cover
 - < Access to wetlands
 - < Topsoiling requirements
 - < Crossing techniques
 - < Pipe buoyancy requirements
 - < Stream crossing within a wetland
 - < Utility crossing in a wetland
 - < Equipment refueling in remote areas
- Mats
 - < Life of a mat is typically two uses or job/projects.
 - < There are two types of mats typically used during pipeline construction: 1) 3-ply / laminated mats for access of rubber tired vehicles/trucks and drill sites, and 2) Hardwood digging mats for the heavy equipment used to install the pipeline.
 - < Mats that sit too long between jobs tend to deteriorate quickly.
 - < 10 - 75 mile pipelines typically require between 10,000 and 60,000 mats (initial investment cost of approximately \$5 million for 10,000 mats, mats only, not the transportation, placement, or removal).
 - < How many hardwood digging mats can be manufactured from a single hardwood (i.e., oak) tree).
 - < Synthetic mats tend to be too slick and don't hold up to heavy tracked equipment during the pipeline construction.
 - < Purchasing local saves the costs of transportation.

Lessons Learned and Possible Solutions

- No two projects are the same; each project is unique.
- Work with the Environmental Monitors to anticipate needs and get variance approvals if conditions warrant.
- Safety considerations, environmental considerations, safety of workers, permitting considerations.
- Owner/operator should work with construction contractors as soon as possible to help determine how much extra workspace will be needed in wetlands.

- United States Army Corps of Engineers (USACE) recommends applying for maximum amount of workspace needed in a wetland without pushing the thresholds of the permit, however before completing the work; it is good to verify the reduction of impacts so that the permits and mitigation requirements can be modified.
- The definition of what constitutes a wetland has not changed under the recent Waters of the U.S. rule. The change set forth in the new rule is involves the extent of wetlands that the USACE may assert jurisdiction over.
- FERC requires owner/operators to reduce work areas in ALL wetlands regardless of their being jurisdictional by USACE.
- Topsoil segregation - in some areas, topsoil is a premium and limited to 10-12 inches, other places, topsoil is over 5 feet thick.
- Push-pull can be done through a wetland, where the water table allows.
- Concrete pipe vs. saddle bags vs. anchor cost differential can be in the millions of dollars, site / ground conditions dictate the best system.
- When paralleling a line, concerns include the depth of the existing line and limited workspace (cannot work on top of the existing line).
- In wetlands, the construction process is modified. Digging of the trench comes last. You dig only what you are installing that day or the next because the trench may collapse if it is left open for a longer period.
- FERC Wetland and Waterbody Construction and Mitigation Procedures now require pipe to be assembled and ready for lowering into place prior to trenching in wetlands.
- Overestimating wetland mitigation: Is it possible to get a refund, for the amount that is overestimated? The answer varies by district.

Stream Crossings

Challenges and Constraints

- Additional workspace consideration:
 - < Depth of cover
- Bridges:
 - < Putting something in the middle of the bridge (in the water) helps to stabilize it; if bridge were to collapse, unintentional consequences could affect species in the waterbody and local and downstream water quality.
- Unconsolidated soils can lead to expanding trench widths and additional workspace needs.

Lessons Learned and Possible Solutions

- All streams are not the same, be as familiar as you can with the local conditions.
- Minimum work spaces shown in typical schematics work best for flat terrain.
- Landowners may be a good resource for what type of work has been done successfully in the past.
- Allow placement of in-stream supports for equipment bridges.
 - < Better for safety
 - < Doesn't impede flow of creek
- In the Northeast, streams can have rock bottoms but the use of blasting has been restricted. The use of rock hammers in streams is dangerous and increases the amount of time the stream is disturbed.

Horizontal Directional Drills

Background

- Recommended to avoid direct impacts to sensitive environmental resources during construction.
 - < Wetlands
 - < Streams
 - < Protected species habitat
 - < Cultural resources
- When would an HDD not make sense?
 - < It would depend on the size of pipe, length of drill, and other considerations (e.g., soils, geology, terrain).

Challenges and Constraints

- Soil conditions, geology, and terrain may prohibit its use.
- Some agencies may not consider HDD an avoidance measure (e.g., some SHPO offices no longer consider HDD of a cultural resource to result in “no effect”).
- Limitations to drill lengths and angles.
- Workspace considerations:
 - < Construction access requires equipment move-arounds (which cost time and money).
 - < Staging areas and false ROW for pull back string.
 - < Access to water for drilling mud and hydrostatic testing.
- Karst topography is a challenge. If the void is small, the drill will go through. If not, the mud will continue to pump... Having a complete geotechnical investigation can help to develop a successful HDD plan.
- Disposal of drilling mud - on jobsite, release to a landowner. Some states require it to go to a disposal site.
- Beneficial reuse - FERC allows for beneficial reuse (i.e., land application) of HDD drilling mud as long as sensitive resources are not impacted. Owner/operator has had to claim the application area as a workspace in the past.
- Presence of utility lines not identified in the original design takes additional time and money. Costs are associated with extending drills, re-permitting, redesign of the drill, and schedule delays.
- Less expensive to open cut vs. HDD in most cases.
- Good idea to have contingency workspace near a resource if you are close to completing the HDD and the drill sticks.

Lessons Learned and Possible Solutions

- Careful planning is needed, have good geotechnical data to support planning.
- Requires HDD feasibility and contingency planning, have the extra workspace permitted and approved so it is there if you need it.
- Conventional installation is sometimes preferable.
 - < Faster
 - < Less construction risk
 - < Typically lower cost

Other Construction Challenges

- Foreign line crossings increase workspace needs and safety risks as well as potential environmental consequences (i.e., hitting an oil line or a natural gas line).

Lessons Learned and Possible Solutions

- Unknowns are always going to come up. Owner/operator tries to include unit costs for the “unknowns.”
- Never enough time to plan - but always enough time to “fix” the problem.
- Contaminated soils - hire people with the expertise knowledge and have a plan for hauling, testing, disposing, etc.
- Unanticipated discoveries need to be handled with care.

The remaining topics, Integrity and Maintenance Work and The People Factor, will be added to future workshops.

ACTION ITEMS

Following are action items agreed to by attendees of the workshop.

Action Item	Responsible Entity
Sponsor or develop agency training toolbox materials (i.e., pipeline construction 101 video, resource-specific construction topics)	INGAA Foundation

ADDITIONAL RESOURCES

General

Building Interstate Natural Gas Transmission Pipelines: A Primer
<http://www.ingaa.org/Foundation/Foundation-Reports/ConstructionPrimer.aspx>

INGAA Foundation Pipeline Construction Video
<https://www.youtube.com/watch?v=Ih2aG4ybOIA>

FERC Chairman Quotes
<http://www.naturalgasintel.com/articles/103059-fercs-bay-urges-improved-gas-electric-coordination-get-tough-on-cybersecurity>

INGAA Foundation Reports and Resources: Construction

Guiding Principles
<http://www.ingaa.org/File.aspx?id=8612>

Building Interstate Natural Gas Transmission Pipelines: A Primer
<http://www.ingaa.org/Foundation/Foundation-Reports/ConstructionPrimer.aspx>

Guidelines for Practical Implementation of a Construction Quality Management System
<http://www.ingaa.org/Foundation/Foundation-Reports/constructionqualityreport.aspx>

Lessons Learned Repository (The repository is only accessible by INGAA Foundation members)
<http://www.ingaafoundationsafety.org/Login.aspx>

Safety Every Step of the Way
<http://www.ingaa.org/File.aspx?id=12282>

Quality Control in Construction of Natural Gas Pipelines
<http://www.ingaa.org/File.aspx?id=23570#page=41>

INGAA Foundation Reports and Resources: Construction Safety and Quality Management Systems

Overview of Construction Quality Management Systems
<http://www.ingaa.org/File.aspx?id=18464>

Specification and Purchase of Segmentable Induction Bends and Elbows
<http://www.ingaa.org/File.aspx?id=18182>

Guidelines for Parallel Construction of Pipelines
<http://www.ingaa.org/File.aspx?id=18180>

Guidelines for Natural Gas Pipeline Crossings
<http://www.ingaa.org/File.aspx?id=20405>

Best Practices in Applying API 1104, Appendix A
<http://www.ingaa.org/File.aspx?id=21692>

Training Guidance for Welding & Coating Construction Workers and Inspectors
<http://www.ingaa.org/File.aspx?id=19350>

Field Applied Coatings Best Practices
<http://www.ingaa.org/File.aspx?id=18215>

Land Movement Mitigation Study (to be published by end of 2015)

Criteria for Pipelines Co-Existing with Electric Power Lines (to be published by end of 2015)

Guidance Document for Onshore Pipeline Route Selection and Data (jointly completed by PRCI; to be published by end of 2015)