

# Pipeline building a choreography of coordinated steps

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*(This update, provided by the Kenai Peninsula Borough mayor's office, is part of an ongoing effort to help keep the public informed about the Alaska LNG project.)*

The Alaska LNG project is a planning and coordinating effort of immense proportions. Not surprising when you consider that the pipeline construction alone requires piecing together about 115,000 40-foot-long sections in precise order, in rough terrain, in remote locations — and with 446 waterbody crossings.

That's 447 if you count the almost 30 miles across Cook Inlet to reach the proposed liquefaction plant at Nikiski.

The project teams are mapping out every detail of building 870 miles of pipeline to move natural gas from Point Thomson to Prudhoe Bay (about 63 miles of 32-inch-diameter pipe) and on to Nikiski (about 807 miles of 42-inch pipe). The right amount of pipe has to be at the right place at the right time with the right equipment for welding, digging and pipe laying during two years of construction, and that's after two years of prep work to build construction camp and compressor station pads, storage yards, clear rights of way, develop gravel sources and create access roads.

No easy task when you're moving and frequently relocating 9,000 pieces of equipment that would be used to build the mostly buried pipeline. Still more equipment would be used to build the North Slope gas treatment plant and the liquefied natural gas plant and marine terminal at Nikiski. An estimated 5,000 to 7,000 workers would be on the pipeline crews, with all of them living in work camps. Several thousand more are expected on the job at the gas treatment plant and the LNG plant, with the project estimating 15,000 workers total.

Pipe storage yards would be sited about every 18 miles along the route, with the project requiring about 18 million cubic yards of gravel for access roads, pipeline right of way and compressor station pads. The project would use existing pads wherever practical.

Think of it as a choreography of engineers, geologists, biologists, environmental specialists and logistics planners. Everyone has a role and everything has its place. And it's all synchronized for efficiency, cost savings and to limit environmental impact.

"Pipeline construction is a moving assembly line," an Alaska LNG team member said.

## **INFORMATION SHARING AT WORKSHOPS**

Almost two dozen Alaska LNG team members met with nearly three dozen federal and state regulatory agency personnel June 24-25, 2015, in Anchorage to share preliminary plans for pipeline construction and waterbody crossings and to listen to how and where the plans might be improved.

It's not only construction needs that dictate the planning work. There are operational issues to consider, too. For example, the gas will be cooled for transit through permafrost zones along the proposed route so that it doesn't melt the ground. That will require cooling units at the first six compressor stations whose job is to keep pushing gas through the line.

But the last two compressor stations on the route southward, including the one before the line enters Cook Inlet, will be built with heating units to warm up the gas in an effort to match the ground temperature in Southcentral Alaska and the water temperature in the inlet. Just as thawing frozen ground is bad, so too is freezing soil in the wrong places.

The gas temperature should mimic the terrain it moves through, not change it. As an Alaska LNG team member said, the idea is to work with Mother Nature, not against her.

If the project stays on schedule, if the marketplace cooperates, if the project sponsors and the state of Alaska successfully negotiate fiscal terms, and if investors sign up for the \$45 billion to \$65 billion project, site preparations for the pipeline work could occur in 2020-2021, with actual pipeline construction in 2022-2023 and first LNG production in 2024-2025. There are a lot of unknowns to get to that point, but the project teams are doing their part to get ready.

The teams are from project partners ExxonMobil, BP, ConocoPhillips and TransCanada. The state of Alaska is also an investor in the project.

## **WATERBODY CROSSINGS**

Of the 446 waterbody crossings, Alaska LNG's preliminary plan is to:

- Use open-cut trenching to install the pipe in a little more than half the locations.
- Temporarily restrict or divert the water flow for pipeline installation at fewer than half the crossings — called "flow isolation".
- Drill and pull the pipe under the river or bridge the waterway in a small number of locations, likely single digits.

While still preliminary, the plan is to dig trenches and lay pipe across approximately half the open-cut water crossings during the winter, when the flow is frozen or minimal. The others would be crossed during the summer, when crews would work fast and, in some small crossings, the pipe could be in place in a matter of hours.

Temporary diversions would be used for the flow-isolation crossings, which could include water-filled "aqua dams," sand bags, concrete blocks, steel flumes or pipes — it just depends on the water flow, soil and site conditions, team members explained.

Alaska LNG will decide on the most appropriate water-crossing methods in consultation with the Alaska Department of Fish and Game, U.S. Army Corps of Engineers and other state and federal agencies. Pipe specifications will be under the jurisdiction of the U.S. Pipeline and Hazardous Materials Safety Administration.

The “trenchless” crossings will use horizontal directional drilling to run pipe under the river bottom. The process involves drilling an initial pilot hole beneath the river, about 5¼ inches in diameter, then using successively larger drill heads to ream out the hole, making it bigger until it is maybe a foot larger in diameter than the 42-inch steel pipe, team leaders told federal and state regulators. The full length of the pipeline, all welded together and laid out in a large staging area at the entrance to the hole, is then pulled through to the other side.

An Alaska LNG pipeline team member said the process is so accurate that crews can drill the pilot hole and hit a stake on the other side of a river.

But sometimes the river is too deep, the ground too full of boulders or the geology just not right to go through or under the waterway. In those cases, the Alaska LNG teams are looking at building pipeline bridges, especially in areas of steep terrain.

A particularly steep area along the route is in the Nenana Canyon, just south of the community of Healy and east of Denali National Park, in a tight area of the Parks Highway, Nenana River and Alaska Railroad. Project teams are working to find the best way through that congestion.

The bridge proposals are still preliminary, as are all of the water crossings, team members told state and federal regulators. The teams and their consultants have a lot of work to do this summer to firm up their plans, with more information and a lot of details to come in the next round of environmental reports the project expects to file in February 2016 with the Federal Energy Regulatory Commission.

In addition to consulting with state and federal wildlife, lands and water managers, Alaska LNG will be working with a visual-impact consultant regarding the bridges, which likely would be within eyesight of travelers on the Parks Highway, a National Scenic Byway.

## **PIPELINE CONSTRUCTION PLANS**

Much of this summer’s field work and office analysis is aimed at better identifying soil conditions, terrain, hillsides, vegetation, geology, safety and environmental concerns as Alaska LNG continues to make decisions not only on waterbody crossings but also pipeline specifications to match different ground conditions such as discontinuous permafrost that would put additional stress on sections of pipe.

Highway and road crossings will be underground, generally at least four feet below the road base, the teams reported, with heavier steel pipe for additional protection.

Current plans, subject to change, show about 45 percent of the Prudhoe-to-Nikiski pipeline built in the winter season and 55 percent in the summer, over two years. Depending on the weather — freeze-up, break-up, road restrictions and terrain — some of the pipe laying could be done in shoulder months, the teams said.

All 63 miles of the Point Thomson line would be built above ground and during the winter.

The mainline would likely be divided into four “spreads” of about equal mileage, with four contractors all working at the same time on their spread. Crews would move around, laying pipe in areas best suited for the season. Frost heaves, permafrost, thaw settlement, steep terrain and fish and wildlife would be among the considerations in deciding summer and winter work.

Some areas will be more easily accessible to work crews than others. Reaching the pipeline work on the West Side of Cook Inlet will be challenging, the teams reported. Contractors would move some equipment and pipe by barge from Anchorage, and the current proposal is to move much of the equipment across the frozen Yenta River in the winter, then park it there until construction work resumes with warmer weather for the final southerly push toward tidewater.

For those last miles on the West Side of Cook Inlet, the pipeline route would be in the uplands, away from the wetlands and the ENSTAR gas line and behind the Beluga power plant before turning toward the inlet.

The Cook Inlet crossing would be a separate contract; that work will be covered in an Alaska LNG workshop for state and federal regulators in August.

Pipe laying on the Kenai Peninsula, for the last miles to the LNG plant site, would be scheduled for the second construction summer, 2023, according to preliminary schedules.