Pre-Planning Project/Drills

This presentation covers what is needed from the Drill Contractor in order to successfully complete large projects and drills. This presentation will include documents to submitted to assist in permitting, Contingency Plans and procedures used during operations. The goal is to better inform drill contractors with what is needed and the cost that is to be considered during the bid process and during the drill itself. We will begin by explaining the steps that take place from conception to completion of one of a crossing. Next, we will describe in detail how to best accomplish each step to ensure the crossing is successful for the contractor and the owner. The details will include permitting, design, drill plan, actual operations and a debrief at the completion of the drill. We believe this presentation can help our industry become stronger as each contractor learns to apply the same procedures.

Ever since the beginning of HDD, drill contractors have had challenges on every drill. We hope to inform the contractor and the owner with better methods of accomplishing crossings. By sharing these ideas and methods, we hope to help the industry have more constructible projects with less down time and more efficient completion times. We believe by improving in these areas, the improvement will help increase the demand for HDD, not only on water body crossings, but on any environmentally sensitive crossings.

The first steps to any project or drill is permitting. To get this started, we need a few things: Geo Tech, design and a drill plan.

- **Geo Tech**- This is one of the most important steps to an HDD because it becomes our road map to success. There needs to be as many core samples completed as possible parallel to drill path but 50' off set. We will learn from these Geo's which is the best layer that will allow efficient Rate of Penetration and hold up the best (???) for whichever size hole we are cutting. We can also consider the best formation to help prevent any Inadvertent Returns, which is the unintended transfer of drilling mud to the surface during operations.
- **Design**- We will take the information we learned from the Geo Tech and begin to apply to the design. We need to consider any obstacles that may be present throughout the crossing. These obstacles include pipelines, seawalls or bridge pilings. With this information, we can determine our entry and exit angles to start the design. We recommend keeping these to approximately 10 degrees when possible. We use the Geo Tech to dictate where our bottom tangent will run so that we are in the most HDD friendly formation.
- **Drill Plan**- This stage is where we do our best to describe exactly how we will accomplish this crossing. Your drill plan should include the following.
    - Equipment you plan to use
        - Size of rig
        - Reclaimer
        - Pump
        - Drill Rod
    - Steering tools you plan on using
        - Walk Over
        - Tensor
        - Para Trac
        - Gyro
    - Drilling Fluid Plan
    - Pilot hole procedures
    - Reaming procedures
        - Number of ream passes
        - Flow rates
    - Swabbing procedures
    - Puling procedures
        - Lift and break over plan
    - Inadvertent Return Plan
    - Contingency plan

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Once we have received the permits, we can further work on design and develop a more precise drill plan. This would an additional review to ensure construction starts with no issues.

- **Design**- Make sure all parameters are met.
    - Radius set with an acceptable Minimum radius
    - Pull Calculations are completed to ensure product and rig size are sufficient.
    - Drill path tolerances are set
- **Drill Plan**- We want to go back and review the plan for accuracy
    - Make sure equipment selected meets pull calculation requirements
    - Selecting the correct steering tool for the crossing
    - Double check the fluid plan is appropriate for each layer
    - Contingency plan: you want to make sure you have thought of all that could go wrong and how you will fix it.
- **Mud Disposal**- Mud disposal needs to be calculated early on. The number of loads that are estimated to be disposed and the cost associated with this amount. This could be up to 30% of your bid.

Now we are ready to start the construction which means mobilizing the rig and support equipment. Hopefully if we planned correctly and followed our plan, there will be very few problems. If a problem arises, we want to feel secure that we have it covered in our contingency plan. Once the crossing is complete, I always encourage everyone to complete a de-brief. What I mean by this is ask the 3 questions below.

- What went right?
- What went wrong?
- What can we do different?

The main take away from this discussion is you must be prepared and there is a cost to being prepared. If we spend the time and money to pre-plan before large crossings like we have discussed here, the chance of success increases. When looking at projects like these, you must ensure to realize what it takes to complete them. With the proper prep work and strategy, there is no crossing that cannot be completed successfully.