HDD Large Diameter Pipeline Crossings of Highways Protecting Everyone's Assets



Chris Mills, PE Marc 9, 2018



General Stakeholders on HDD Highway Crossings

- Owners (DOTs & pipeline companies)
- Traveling public
- Engineer
- Various agencies
- Contractor



HDD Stakeholder Needs

- Pipeline companies
 - Transfer product from point "A" to point "B"
- DOTs
 - Keep highways operating safely for traveling public
- Engineers
 - Identify risks of installing HDD at proposed location
 - Design HDD to be feasible, reduce risk
 - Make recommendations on how to mitigate identified risks
- HDD Contractor
 - Follow best industry practices to complete HDD installation while mitigating risks







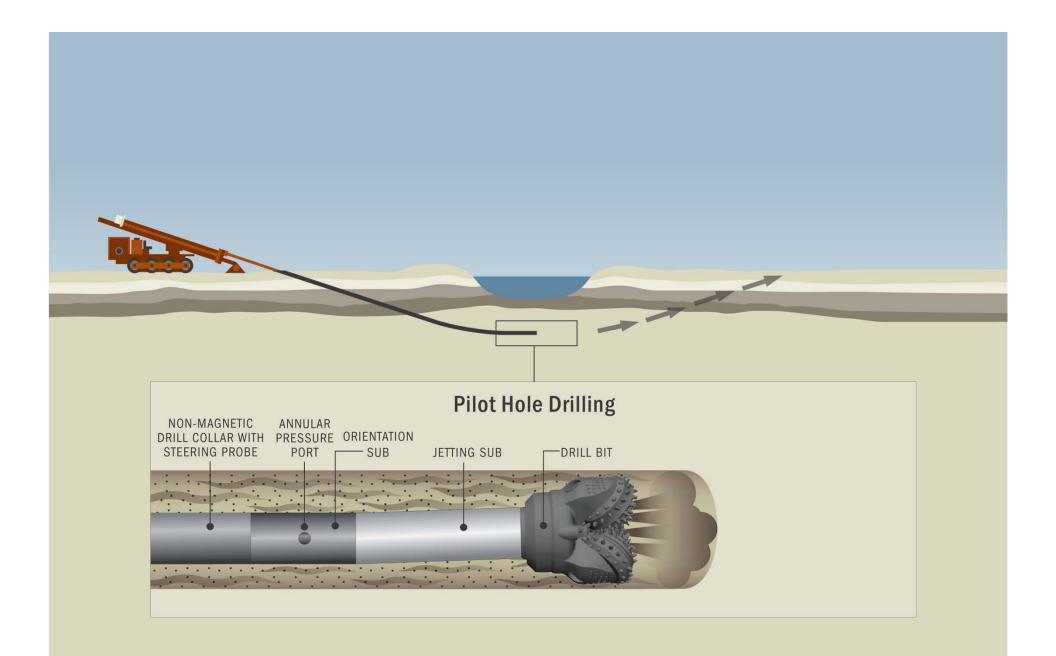










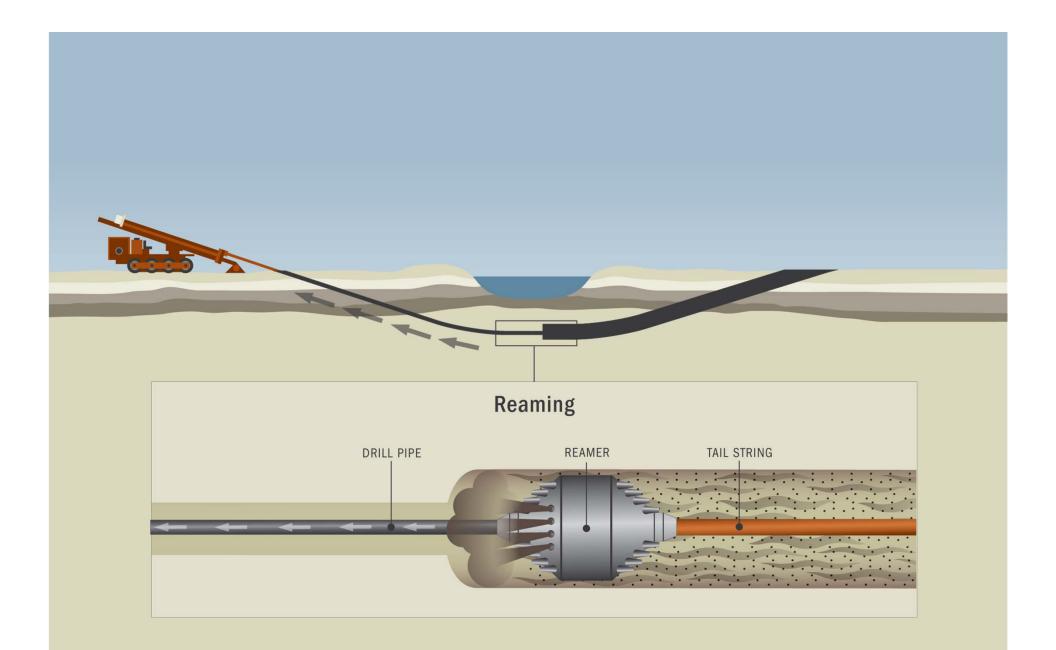






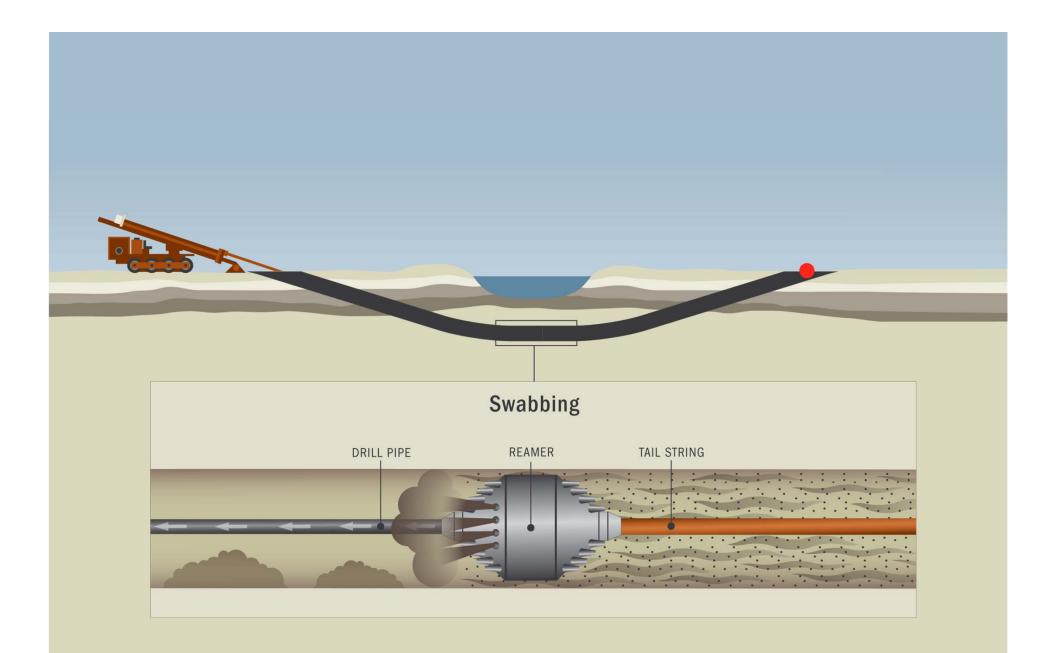




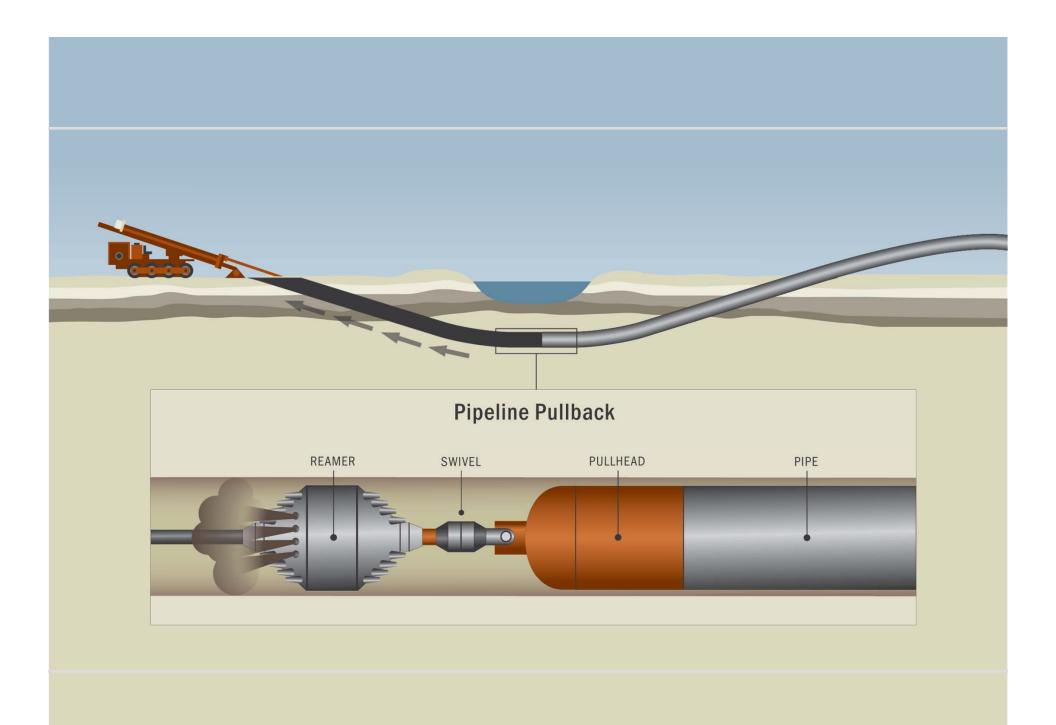












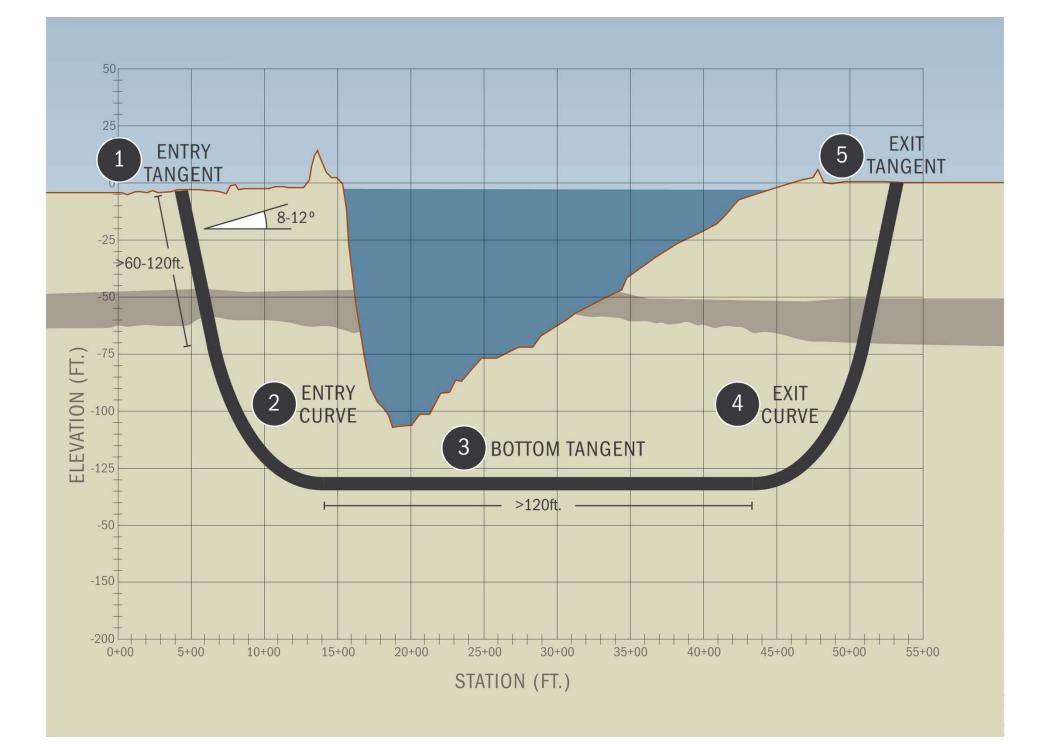




Engineering Considerations

- Is proposed HDD alignment feasible?
- What type subsurfaces will be encountered during drill?
 - Complete geotechnical exploration with soil borings and laboratory testing
- Does site location allow for proper layout of workspaces and are they accessible?





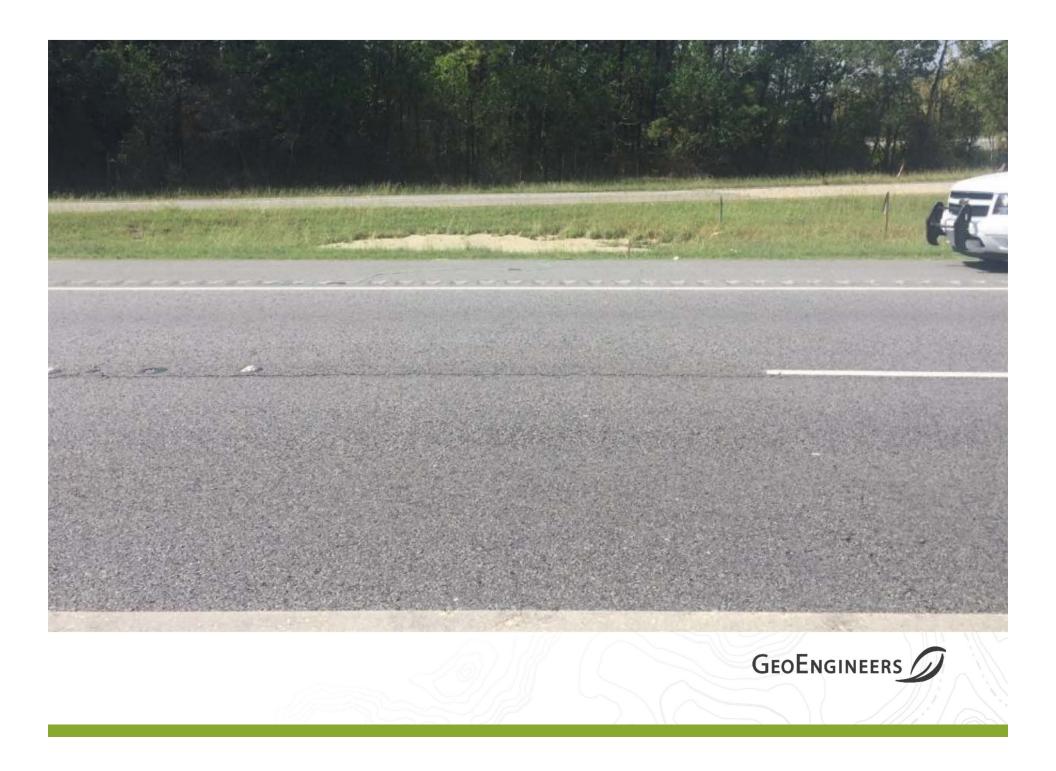
| GEOENGINEERS | | | | | | | |
|------------------|--------|----------|---------|-------|---------|--------|--|
| MINIMUM CROSSING | | | 10°/8° | | 12°/10° | | |
| OD | RADIUS | MIN W.T. | HML | MD | HML | MD | |
| 8" | 800 | 0.173" | 507 ft | 23 ft | 558 ft | 30 ft | |
| 12" | 1200 | 0.240" | 647 ft | 30 ft | 726 ft | 39 ft | |
| 16" | 1600 | 0.320" | 790 ft | 35 ft | 893 ft | 48 ft | |
| 20" | 2000 | 0.400" | 930 ft | 41 ft | 1061 ft | 57 ft | |
| 24" | 2400 | 0.480" | 1070 ft | 47 ft | 1229 ft | 65 ft | |
| 30" | 3000 | 0.600" | 1280 ft | 56 ft | 1480 ft | 78 ft | |
| 36" | 3600 | 0.720" | 1491 ft | 65 ft | 1732 ft | 91 ft | |
| 42" | 4200 | 0.840" | 1702 ft | 74 ft | 1984 ft | 105 ft | |
| 48" | 4800 | 0.960" | 1913 ft | 84 ft | 2235 ft | 118 ft | |

GEOENGINEERS

Engineering

- Identify risks and design HDD to reduce risks
- Inadvertent drilling fluid returns surfacing
- "Dry hole" from entry and exit point elevation differential and cause hole stability issues



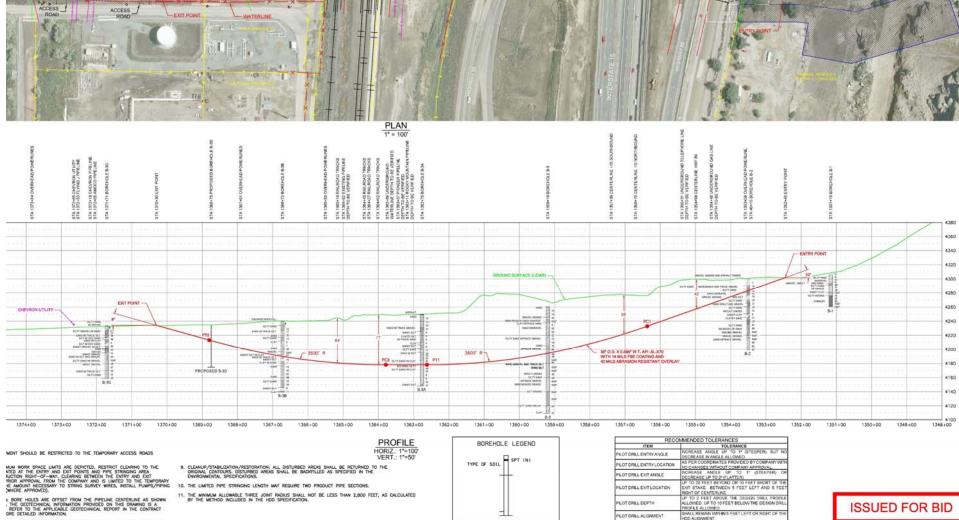












NUM WORK SPACE LIMITS ARE DEPICTED. RESTRICT CLEARING TO THE KIED AT THE DITTY AND DET FORTS AND PPE STRIKING AREA LICTOR REGI-O-WARK, CLEARING ENTERN THE LIMITY AND EXTOPORATY 42 MOUNT INCESSARY TO STRIKG SURVEY WRIES, INSTALL PLAPS/PPING WHERE APPROXED).

U BORE HOLES ARE OFFSET FROM THE PIPELINE CENTERLINE AS SHOWN THE OCCITCINICAL, INTORMATION PROVIDED ON THIS DRAWING IS A REFERE TO THE APPLICABLE COTECHNICAL REPORT IN THE CONTRACT ORE DETAILED INFORMATION.

PORTRAY ALL EXISTING UNDERGROUND FACILITIES AND CONTRACTOR IS

- CLEANUP/STABILIZATION/RESTORATION: ALL DISTURBED AREAS SHALL BE RETURNED TO THE ORIGNAL CONTOLRS: DISTURBED AREAS SHALL BE BACKFILLED AS SPECIFIED IN THE ENVROMENTIAL SPECIFICITIONS.
- 10. THE LIMITED PIPE STRINGING LENGTH MAY REQUIRE TWO PRODUCT PIPE SECTIONS.

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- 11. THE MINIMUM ALLOWABLE THREE JOINT RADIUS SHALL NOT BE LESS THAN 2,000 FEET, AS CALCULATED BY THE METHOD INCLUDED IN THE HOD SPECIFICATION.
- TYPE OF SOIL

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| RECOMMENDED TOLERANCES | | | | | | |
|-------------------------|--|--|--|--|--|--|
| ITEM | TOLERANCE | | | | | |
| OT DRILL ENTRY ANGLE | NCREASE ANGLE UP TO 1* (STEEPER), BUT NO DECREASE IN ANGLE ALLOWED. | | | | | |
| OT DRILL ENTRY LOCATION | AS PER COORDINATES PROVIDED BY COMPANY WITH NO CHANGES WITHOUT COMPANY APPROVAL | | | | | |
| OT DRILL EXIT ANGLE | NCREASE ANGLE UP 10 1" (STEEPER) OR DECREASE UP TO 2" (FLATTER). | | | | | |
| OT DRLL EXITLOCATION | UP TO 20 FEET BEYOND OR 10 FEET SHORT OF THE EXIT STAKE. BETWEEN 5 FEET LEFT AND 5 FEET RIGHT OF CENTERLINE. | | | | | |
| OT DRILL DEPTH | UP TO 2 FEET ABOVE THE DESIGN DRLL PROFILE ALLOWED, UP TO 10 FEET BELOW THE DESIGN DRLL PROFILE ALLOWED. | | | | | |
| OT DRILL ALIGNMENT | SHALL REMAIN WITHIN'S FEET LEFT OR RIGHT OF THE | | | | | |

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ACCESS ROAD

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Questions?

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