BRIERLEY ASSOCIATES
Creating Space Underground

26 July 2023
File No. 322004-000

Kiewit Engineering (NY) Corporation
470 Chestnut Ridge Rd, 2nd Floor
Woodcliff Lake, NJ 07677

Attention: Monir Sarker, PE - Design Engineering Manager

Subject: HDD Inadvertent Release Contingency Plan
Crossings HDD 134 to HDD 135
Champlain Hudson Power Express – Design Package 8
Randall's Island, New York

Dear Mr. Sarker:

Brierley Associates Underground Engineers, PLLC (Brierley) is pleased to provide this HDD Inadvertent Release Contingency Plan for Package 8 of the Champlain Hudson Power Express Project. This work was conducted in general accordance our contract with Kiewit Engineering (NY) Corporation (Kiewit).

We thank you for this opportunity to be of service to you and your team on this project. Should you have any questions or require additional information, please do not hesitate to contact the undersigned at your convenience.

Sincerely,

Brierley Associates Underground Engineers, PLLC

Nick Strater, P.G.
Trenchless Design Manager

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1.0 Introduction

The Champlain Hudson Power Express (CHPE) project will install a pair of HVDC electrical transmission cables with an associated telecommunications line from Canada to New York City, NY. The portion of the work addressed herein is located in the upland portion of the route from the south end of Lake Champlain to New York City along the uplands of the Hudson River Valley. This work includes approximately 126 crossings under roads, railroads, wetlands water bodies, and obstructions to be installed using horizontal directional drilling (HDD) methods to minimize interference with use or impacts to the surface environment. This Inadvertent Release Contingency Plan addresses the design for the HDD crossings in Package 8 which extends from Harlem River Yard to Astoria. These crossings are designated HDD #134 and HDD #135.

This Inadvertent Release Contingency Plan (IRCP) is for Package 8 which includes HDD crossings HDD#134 and HDD #135.

A primary potential environmental concern associated with HDD involves the inadvertent release of drilling fluids during the drilling process. The purpose of this plan is to establish general procedures to prevent a fluid release (sometimes referred to as a frac-out) during HDD construction and to present steps to manage, control and minimize the impacts in the event that an inadvertent release of drilling fluid occurs. The objectives of this plan are to:

- Provide an overview of the HDD process with a specific focus on the composition, management and use of drilling fluids;
- Identify controls to be implemented during construction to minimize the potential of an inadvertent release;
- Identify the planned means of monitoring to permit early detection of inadvertent releases;
- Identify planned means to protect areas that are considered environmentally sensitive (rivers, wetlands, other biological resources or cultural resources);
- Establish site-specific environmental protection measures to be utilized prior to, during, and following drilling and pipe installation activities to minimize and control erosion and sediment releases to adjoining wetlands or watercourses;

- Have site specific preplanned general response programs in place at the start of construction that is understood and can be implemented immediately by all field crews in the event of an inadvertent release of drilling fluid occurs; and
- Establish a chain of command for reporting and notifying, in a timely manner, the construction management team, the Certificate Holders, and the proper authorities in the event of an inadvertent release of drilling fluid and of the preplanned actions that are to be implemented.

It is important to note that the plan in this document serves as the guiding framework for confirming that the HDD Subcontractor is adhering to the specifications and provisions to be protective of the environment. Since there are a variety of potential measures listed in this document available for preventing inadvertent releases and mitigating the effects of a release should one occur, the specifications require that each HDD Subcontractor submit to the project design team, for its review and acceptance, a supplemental site and Subcontractor specific means and methods plan for each HDD crossing reaffirming and detailing how the Subcontractor will conform with the requirements of this plan and the project specifications to prevent inadvertent releases and to mitigate any effects of a release should one occur. The supplemental plan by the Subcontractor shall be consistent with the site conditions and constraints, and the Subcontractor's selected means, methods, and equipment. The selected HDD Subcontractor will be responsible for incorporating specific permit conditions, applicable regulatory requirements, site specific environmental features and geotechnical information not available at this time into its submittal. The submittal shall be reviewed and approved by the design team and the Environmental Inspector prior to the start of construction of a specific HDD location, and shall be submitted as an EM&CP change.

2.0 Description of the HDD Process

The Horizontal Directional Drilling process begins by mechanically excavating shallow (approximately 5 feet wide by 10 feet long by 4 to 5 feet deep entry and exit pits at either end of the directional bore alignment. A small diameter (on the order of 5 to 9 inches in diameter) pilot bore is then drilled from the entry pit using directional boring methods. During the pilot bore, a drilling fluid (typically bentonite and water based with selected NSF 60 certified additives to improve and modify fluid stability, carrying capacity, and drilling properties to address site-specific ground characteristics and Subcontractor preferences) is pumped through nozzles in the drill head to support the hole and to hydraulically transport drill cuttings from the drill bit back to the entry pit. Environmentally acceptable NSF 60 certified additives are required by specification for use on this project and those planned for use by the Subcontractor will be checked for compliance by the design team prior to their use.

A guidance system is mounted immediately behind the drilling head to allow the crew to track and steer the path of the drilling so that it follows the preplanned alignment within the specification permitted tolerances. The drilling fluid holds the cuttings in suspension and carries the drill cuttings back through the annular space between the drill rods and the bore hole wall to the entry pit where it is collected and processed for re-use by a recycling system. The cuttings are separated from the bentonite, using screens, centrifuges, and desanding units which prepares the bentonite for re-use. Once the pilot bore reaches the exit pit, a larger diameter back-reaming head is then attached to the drill string and pulled back through the pilot hole to enlarge the hole. Depending on the size of the pipe to be installed and the ground conditions, several successively larger reaming passes may be needed. Again, a bentonite and water slurry is pumped into the bore hole during reaming to remove cuttings and to stabilize the bore hole. Lastly, the drill string is pulled back through the bore hole with the new, preassembled conduit attached to it in one continuous process until the lead end of the conduit emerges at the entry pit. Steps two and three may be combined, with the conduit being pulled back through the bore hole immediately behind the final reaming bit or swabbing pass.

Specific to this plan, it is important to have an awareness of the function and composition of the HDD drilling fluids. The drilling fluid composition and drilling fluid management are integral components of the HDD process with the following primary purposes:

- Support and stabilize the drill hole,
- Suspend and transport cuttings from drill bit through the drill hole annulus,
- Control fluid loss through the bore’s side walls by forming a filter cake on the bore hole walls,
- Managing and modifying the drilling fluid mix to improve its cutting carrying characteristics, its pumpability, and its hole stabilization and support characteristics,
- Power the downhole cutting tools (e.g., via mud motors if required); and
- Serve as a coolant and lubricant to the drill bit during the drilling process, and lubricant during the pipe insertion process.

The drilling fluids are composed primarily of potable water, which will likely be obtained from nearby sources selected and permitted by the Subcontractor. As mentioned above, the drilling fluid also contains bentonite clay as a viscosifier. Bentonite is a naturally occurring, nontoxic, inert substance that meets NSF/ANSI 60 NSF Drinking Water Additives Standards and is frequently used for drilling potable water wells. While bentonite is non-toxic and commonly used in farming practices, it has the potential to impact plants, fish and their eggs if discharged to waterways in significant quantities. Frequently, additives are used to: amend the drilling fluid, improve its compatibility with the ground and groundwater chemical characteristics, improve its cutting suspension and carrying characteristics, improve its hole stabilization ability, and reduce seepage loss through the ground characteristics. Environmentally acceptable additives are required by specification for this project and before the start of work at a specific HDD, the HDD Subcontractor is required to submit crossing, environmental, and toxicity data regarding any additives for review and acceptance by the design team.

During the HDD process and subsequent conduit insertion, the drilling fluid pumped downhole will tend to flow along the path of least resistance. Generally, this will be though the annulus between the drill string and the drill hole side wall. However, the bore alignment may encounter ground conditions where the path of least resistance is an existing fracture, fissure or hole of anthropogenic origin, areas with low overburden confinement, areas of hole collapse, or coarse gravel zones in the soil or rock substrate. When this occurs, circulation can be lost or reduced. This is a common occurrence in the HDD process but does not necessarily prevent completion of the bore or result in a release to the surface or adjacent environment. However, the environment may be impacted if the fluid inadvertently releases to the surface at a location on a waterway's banks or within a waterway or wetland. Again, additives to amend the properties of the drilling fluid may be used as necessary to prevent and limit releases and losses through such paths of lower flow resistance.

3.0 Organization and Staffing Responsibilities

The organizational chart shown below list the contact information of the principal organizations involved in this project. The remainder of Section 3 discusses the roles and responsibilities of these principal organizations.

Organizational Chart

Entity	Contact Information
Certificate Holders	Name, Title Phone Email
Construction Manager	TBD

HDD Construction Subcontractor	TBD
Environmental Inspector	TBD
U.S. Army Corps of Engineers, New York District Office	USACE New York District Upstate Regulatory Field Office ATTN; CENAN-OP-UR, Bldg. 10, 3rd Floor North 1 Buffington Street Watervliet, NY 12189-4000 518-266-6350 cenan.rfo@usace.army.mil
New York State Department of Public Service	Matthew Smith Department of Public Service Empire State Plz 3 Albany, NY 12223 (518) 402-5141 matthew.smith@dps.ny.gov
New York State Department of Environmental Conservation	Regional Office(s) Information NYSDEC Region 2 Field Office 1 Hunter's Point Plaza, 47-40 21st Street, Long Island City, NY 11101-5401 dep.r5@dec.ny.gov
New York State Department of Environmental Conservation (Spills)	NYS Spill Hotline: 1-800-457-7362

3.1 Responsibilities of Various Organizations

The principal organizations involved in this project include the Regulatory Agencies, Certificate Holders, Design Engineer, HDD Construction Subcontractor, Construction Manager, and Environmental Inspector. The roles and responsibilities of the principal organizations are discussed in the following subsections and are shown in the organizational chart included above.

3.2 Regulatory Agencies

The Certificate of Conditions issued by the NY Public Service Commission is the primary regulatory agency for the requirements associated with the project. The Champlain Hudson Power Express (CHPE) Route Project also has permits from the Department of Energy, and the US Army Corps of Engineers, and the New York Water Quality Certification. Various HDDs within this package take place within or adjacent to wetlands, underneath or adjacent to bodies of water, and underneath or adjacent to railroad tracks. Measures are discussed throughout this report to control/mitigate any potential releases before environmentally sensitive boundaries are reached or impacted.

3.3 Certificate Holders

The project Certificate Holders are TDI. TDI's Project Manager will have the overall responsibility to coordinate this project for TDI. The Project Manager, will be responsible for correspondence and coordination among all parties and will have the authority to stop work as necessary.

3.4 Design Engineer

The Design Engineer for the HDD Design is Brierley Associates and Kiewit in collaboration with KC Engineering and Land Surveying. During construction, the Design Engineer will be responsible for reviewing and approving required Subcontractor submittals, shop drawings, and material certificates. Power Engineers will also take responsibility for review and acceptance of submittals, and documenting the materials and methods used in performance of the construction work to document that the construction complies with the contract documents.

3.5 Third Party Engineer

The Third-Party Engineer for the HDD inadvertent return analysis is Brierley Associates and Kiewit in collaboration with BCE. During construction, Brierley/Kiewit/KCE will be assisting Power Engineers with the review of the Subcontractors Inadvertent Release Plan and providing technical assistance as needed with the HDD installation.

3.6 Construction Manager

The Construction Manager for this project has yet to be selected. The Construction Manager will be responsible for on-site management of the project for the Certificate Holders to ensure overall Subcontractor compliance with the EM&CP documents, environmental permits, and local and federal regulations.

3.7 HDD Construction Subcontractor

The HDD Construction Subcontractors (Subcontractors) for the various HDD crossing of this project have yet to be selected. The Subcontractor will be responsible for completion of the conduit casing installation by HDD methods in accordance with the design criteria, contract documents, environmental compliance permits and federal regulations. The Subcontractor will be expected to use the appropriate construction procedures and techniques to complete the project, including supplemental site specific and means and methods specific Inadvertent Release Prevention and Contingency Plans reviewed and accepted by the design team for each crossing in accordance with the contract documents.

The HDD Drill Operator (Drill Operator) will be responsible for operating the HDD drill rig, and observing and managing changes in annular fluid pressure or loss of circulation. The Drill Operator will communicate with other members of the drill crew as needed when issues arise. The Subcontractor will be responsible for developing the specific lines of communication within their organization and shall dedicate a responsible person for communicating inadvertent releases to the Construction Management team and Environmental Inspector.

3.8 Environmental Inspector

The Environmental Inspector for this project has not yet been determined. In general, the Environmental Inspector will perform full-time observation and documentation during the HDD activities at a specific site. The Environmental Inspector will be responsible for coordination with all county, state and federal resource agencies, compliance with and changes to any environmental permits.

The Environmental Inspector shall have the authority to stop work when the environmental permit conditions are not being followed or when appropriate environmental precautions are being disregarded by the Subcontractor.

3.9 Lines of Communication and Authority

Formal lines of communication will generally follow the established lines of authority. However, open communications between all parties will be encouraged to facilitate more efficient communication and coordination.

3.10 Training

The Subcontractor will verify and document that all construction personnel have appropriate environmental training before they begin work. The Environmental Inspector will also conduct a project orientation meeting for staff assigned with specific roles during the HDD installation and will review the site-specific environmental concerns and permit conditions. The Certificate Holders and Design Engineer will also attend the orientation meeting to review the procedures that will be used to document inadvertent releases in accordance with the HDD specifications.

4.0 Fluid Release Minimization Measures

4.1 Geotechnical Investigation

The first steps taken to characterize and minimize the potential risk of an inadvertent release includes conducting a geotechnical investigation at the site to develop an understanding of the surficial soils. Test borings were conducted near the proposed cable alignment within or immediately adjacent to the HDD sites. We understand that each boring has been backfilled and sealed with a cement/bentonite grout to limit the risk of a release through an abandoned bore hole during the HDD construction. In addition, a marine geophysical survey was completed for submarine potions of the HDD alignments.

4.2 HDD Design

The HDD crossings are being designed to reduce the potential risk of an inadvertent fluid release during construction. General design considerations for HDD include:

- Depth of cover during profile design (based on test borings and bathymetric survey) to limit the potential inadvertent release to the water body, road, wetlands, or ground surface.
- Typically, potential exists for releases near the entry and exit pits of an HDD bore. The distance where there is a potential for releases at the ends depends on the soil conditions, the slope of the ground surface and the length of the bore. Generally, the

longer and deeper the bore the greater the slurry pressures required to hold the borehole open and to carry the cuttings back to the entry or exit pit.

- Specific provisions regarding exit pit design for underwater cable installation (i.e. via the use of temporary dredged cofferdams or steel casing conductor pipes).
- Generally, for the formation of inadvertent releases, the more critical stage of the HDD process tends to be during the initial pilot hole drilling when the annular space between the bore sidewall and the drill string is the smallest and therefore requires large slurry pressures to overcome flow resistance to carry cuttings back to the entry pit.
- Adjusting the drill alignment to avoid existing infrastructure including existing utilities, and other obstacles,
- Establishing a drill alignment line that allows for gradual angular changes to minimize pressure build-up and limit pull back stresses and bending stresses in the conduit, as well as being compatible with the bending capacity of the drill steel.
- Requiring drilling fluid composition and drilling procedures that minimize drilling fluid pressures,
- Requiring drilling fluids that adequately address site-specific drilling concerns while posing the least threat to the environment, and
- Requiring that, during the performance of any HDD waterbody crossing, contractors monitor the use of inert biodegradable drilling solution and, in the event of a detected release of fluid, implement the procedures specified in the approved EM&CP. For any release occurring in a waterbody, the Certificate Holders shall immediately notify DPS Staff and NYSDEC of details of the release and the course of action they recommend taking.
- Requiring monitoring and controlling drilling fluid pressures with down-the-hole sensors during pilot hole drilling.

4.3 Contingency Plan

As mentioned above, prior to construction the selected Subcontractor will be required to submit a supplemental site-and Subcontractor-Specific Inadvertent Release Contingency Plan for review and approval by design team. The project specifications require that the following major elements be addressed in detail in the Subcontractor's Plan:

- Work plan and detailed description of the drilling program (details for executing pilot hole, reaming, pull-back operations, and schedule), this plan shall include necessary procedures for addressing problems that are typically encountered during HDD installations through the anticipated subsurface for each drill location;
- Drilling fluid composition design and on-hand amendments to alter fluid properties to reduce pressures, potential for plugging, and seepage losses;
- Description of the planned drilling equipment and drill site layout;
- Safety Data Sheet (SDS) information for all drilling fluid products proposed for use;
- Procedures for drilling fluid pressure control, and fluid and pressure loss monitoring and management to aid in the detection of an inadvertent release (i.e., metering of makeup water, recording of drilling fluid product quantities utilized, fluid return volumes, fluid and cuttings disposal quantities, turbidity of river water, etc.);
- Contingency plans for addressing inadvertent releases into wetlands, or other sensitive areas, which includes the specific procedures used to halt the release and then contain, clean-up, and remove materials from the release site;
- Notification procedures and chain-of-command in the event of a release;
- Criteria for evaluating the need for a drill hole abandonment and the associated plan for sealing the drill hole if abandoned;
- Drilling fluid management and disposal procedures;
- The work plan and detailed drilling program description should include documentation regarding site restoration, vegetation management, sedimentation and erosion control, and hazardous material usage (if applicable). Intended approach shall be in compliance with those measures presented in the Project EM & CP.
- Notice shall be provided to residents, businesses, and building, structure, and facility (including underground, aboveground and underwater facilities) owners and operators within one hundred (100) feet of any HDD staging area or trenching activity with an offer to inspect foundations

before, during, and after construction. Additional detail regarding this notice, associated inspections, intended benefits, proof of notice, cost reimbursements and associated construction initiation schedule is included in General Condition 154.

In addition to providing a site-specific Inadvertent Release Contingency Plan, the specifications require that the Subcontractor implement the additional necessary safeguards to minimize the likelihood of a fluid release and management/control should a release occur. This includes having a readily available supply of spill response devices (containment booms, pumps, straw bales, silt fence, sediment logs, sandbags, vacuum trucks, and storage tanks) and any other materials or equipment necessary to contain and clean up inadvertent releases. To maximize protection to sensitive environmental areas these measures shall be pre-positioned at the site, readily available and operational prior to the start of any drilling. If needed, additional spill response measures shall be employed immediately, as secondary measures, in the event of a fluid release.

The workspace layout for HDD materials and equipment will be configured to reduce the likelihood of a release. Example configurations are shown in Figures 1a and 1b, final dimensions to be adjusted based on actual space available and shown on the drawings for each HDD crossing.

4.4 Drill Fluids Management

As described in the Project EM&CP document, drilling fluid (typically bentonite and water based with selected inert biodegradable additives) will be National Sanitation Foundation (NSF) certified and all recycling and reuse regulations will be followed where applicable. The drilling fluid management system and subsequent disposal is the responsibility of the subcontractor performing HDD subcontractor. However, the drilling fluid management system and subsequent disposal will adhere to the following requirements:

- Drilling fluid will be processed through an initial clearing that separates the solid materials from the fluid;
- Solids will be sifted out by a screening apparatus/system and the solids deposited into a dump truck and periodically transported off-site and disposed of at an approved disposal facility determined by the HDD construction subcontractor;
- Drilling fluid that is deemed unacceptable to be reused during construction or left over at the end of drilling will be collected and transferred into a tanker truck for disposal at an approved disposal facility determined by the HDD construction subcontractor;

- Drilling fluid accidentally spilled during construction and operation of drilling rigs will be contained following the mitigation measures described in the SPCC (Appendix K of the EM&CP) and disposed of at an approved disposal facility as determined by the HDD construction subcontractor;
- Supply of spill containment equipment and measures shall be maintained and readily available around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system, if used, to prevent spills into the surrounding environment. Pumps, vacuum trucks, and/or storage of sufficient size will be in place to contain excess drilling fluid; and,

An overview of the drilling fluid system will be submitted to the Environmental Inspector for approval once determined and prior to any HDD installation activities. The role of the Environmental Inspector is discussed in Chapter 3 of the EM&CP.

4.5 Early Fluid Release Detection

The HDD method has the potential for seepage or fluid loss into pervious geologic formations that the bore path crosses. This may occur due to the presence of fractures in the rock, low overburden confinement, or from seepage through porous soils such as coarse gravels or via prior exploratory boreholes. It is important to note that inadvertent releases of drilling fluid can occur even if the down-hole pressures are minimal. Subsurface conditions that could be conducive and lead to inadvertent releases or drill difficulties include:

- Highly permeable soil such as cobbles and gravel;
- Presence of rock fractures, solution features, or other subsurface fractures, including faults and shears;
- Considerable differences in the elevations of HDD entry and exit points (typically greater than 20 feet);
- Disturbed soil, such unconsolidated fill.
- Soft soils with low confining capacity.
- Presence of archeological resources,
- Existing deep foundations, and,

- Existing below-grade utilities.

Our opinions regarding the risks associated with the above conditions at specific crossings are discussed in Section 9 of this report.

An experienced drill crew is the most effective approach to detect drilling fluid seepage prior to a surface release and promptly stop the drilling and they can modify the drilling fluid composition, properties, and pressures to address indications of loss of drill fluid. The HDD Subcontractor is required to utilize experienced drill crews particularly in and adjacent to environmentally sensitive areas. The following factors can be used for identifying the potential for drill fluid release:

- The loss of pressure within the drill hole utilizing a downhole pressure monitoring system
- A substantial reduction in the volume of return fluid (loss of circulation)

In addition to an experienced drill crew, the HDD Subcontractor will be required to perform periodic (at least twice a day) visual inspection and monitoring of the stream or river channel and wetlands in the vicinity of the drill bit or reaming bit for signs of an inadvertent release. Per Article VII Condition 114(n), monitoring of the status of each HDD waterbody crossing while construction activities are underway until the crossing has been completed and the stream and stream banks have been restored. In the event of any potential or actual failure of the crossing, the Certificate Holders shall have adequate staff and equipment available to take necessary steps to prevent or avoid adverse environmental impacts. If visual monitoring indicates a potential release, additional measures such as turbidity measurements and bentonite accumulation measurements both upstream and downstream of the current active location of the drill bit may be required, depending on site conditions and access.

5.0 Inadvertent Release Monitoring and Notifications

The HDD Subcontractor is responsible for monitoring of the drilling operation to detect a potential inadvertent release by observing and documenting the flow characteristics of drilling fluid returns to the HDD entry/exit pits and by visual inspection along the drill path. If drilling fluid to the HDD entry/exit pits are lost, the Subcontractor shall implement the following steps:

- The Drill Operator will monitor and document pertinent drilling parameters conditions and observe and monitor the drill path for evidence of an inadvertent release, if there is evidence (typically visual) of a release, the Subcontractor will be required to stop the drilling immediately.

- The Subcontractor shall notify the lead Environmental Inspector of any significant loss of drilling fluid returns at the drill rig; and, in the event of a detected release of drilling fluid during the performance of any HDD waterbody crossing, implement the procedures specified in the approved EM&CP. The Certificate Holders shall immediately notify New York State Department of Public Service (NYSDPS) Staff and New York State Department of Environmental Conservation of details of the release and the course of action they recommend taking.
- The subcontractor will take steps to modify the drill fluid properties and pressures to reduce the potential of drill fluid loss or release.
- The Drill Operator will take steps to restore drilling fluid circulation in accordance with the requirements of the HDD technical specifications.

If a fluid release is identified, an immediate response is necessary and the Subcontractor is required to take proper corrective actions to minimize impacts, particularly to environmentally sensitive resources (e.g. watercourse, waterbodies, and wetlands).

6.0 Inadvertent Release Response (Upland and Road areas)

A common reason for upward movement and release of drill fluid is from borehole collapse or blockage and a resulting increase in the pressure exerted by drill pumps. Lowering drill fluid pressure is a first step to limiting extent of a release and can be accomplished by stopping drill rig pumps and allowing pressure to bleed off. With no pumping pressure in the hole, surface seepage will generally stop, then the Subcontractor can trip the drill steel back a selected distance and attempt to clear cuttings from the annulus to re-establish circulation.

The Subcontractor will be required to contain/isolate and remove any fluid that has emanated from the surface. On land this can be done through use of berms, straw bales, shovels as needed, or silt fence to contain the release in conjunction with excavating a small sump pit and/or use of vacuum collection equipment, if needed. Sufficient spill-absorbent material will also be required on-site.

If a release is identified in an upland area, the Subcontractor will be required to immediately respond as described above to limit the extents of the release. After containment is established, cleanup and removal can be conducted by hand, with vacuum trucks, or other equipment. The Environmental Inspector will be present during clean up and removal activities, as they may need to be conducted outside of the pre-authorized temporary workspace areas. The Environmental Inspector, Construction Manager, and the

Subcontractor will work closely to determine the best course of action for inadvertent releases occurring within upland areas.

Upon containment of the release, the Subcontractor will be required to evaluate the cause of the seepage and develop mitigation strategies to limit the likelihood of recurrence. The location of the seepage and the area around the seep will be monitored upon the re-start of the HDD operations for changes in conditions. The segments of borehole nearest the entry and exit points and other areas of low overburden cover tend to be the most susceptible to surface seepage as they have the least amount of soil confinement. These locations will generally be in areas of dry land where seepage detection is easily identified and contained. If areas of high risk for inadvertent releases are identified during the HDD design phase, they can be protected from an uncontrolled release through use of strategically placed confinement/filter beds, straw bales, silt fence, or earth berms place prior to the start of drilling or the use of conductor casings if at entry and exit areas.

7.0 Inadvertent Release Response (Wetland, railroad, and open water body areas)

For any release occurring in a waterbody, the Certificate Holders shall immediately notify DPS Staff and NYSDEC of details of the release and the course of action they recommend taking. During the performance of any HDD waterbody crossing, contractors monitor the use of inert biodegradable drilling solution and, in the event of a detected release of fluid, implement the procedures specified in the approved EM&CP. If an inadvertent release occurs when working beneath the waterway, wetland, or railroad the Subcontractor will be required to cease drilling operations and reduce pressures in borehole immediately, and notify the Environmental Inspector, the construction management team and the Certificate Holders. The Environmental Inspector, with input from the Drill Operator, will evaluate the potential impact of the release on a site-specific basis and will determine the appropriate course of action. The Subcontractor is required to develop general in-stream or in-rail response methods and pre-place necessary materials and equipment at the site prior to construction. Specific response actions will be determined in consultation with the Environmental Inspector and Subcontractor and could include the following:

- Shutting down or slowing the drill fluid pumps;
- Modifying the drill fluid properties, add agents to reduce drilling fluid pressures and/or to plug/seal release path;
- Tripping the drill steel back a selected distance and attempt to clear cuttings from the annulus

to re-establish circulation

- Stopping drilling activities for 24 hours to allow the bentonite in the subsurface pathways to gel and seal the pathways;
- Evaluate the current drill methods to identify site specific improvements to lower the risk of additional inadvertent releases and,
- Implementation of proper in-wetlands and in upland, road and railroad, hand-placed sedimentation control measures including, but not limited to hay bales, vacuum trucks, silt curtains, containment cells, turbidity curtains, or if suitable, sand bags and confinement/filter beds. These activities will require that qualified construction personnel and other support equipment, and supplies be prepositioned and readily available at or near the site.
- Use of a relief well installed at the location of the release. A well or pit equipped with a subsurface pump to control slurry pressures and future releases at that location by evacuating drilling fluid as it accumulates can also be used. The relief well can be utilized to immediately lower the borehole pressures in the event of an inadvertent release and later to control and manage the release as the drilling continues.

8.0 Drill Hole Abandonment Plan

In the event the Subcontractor must abandon the drilled hole, a plan to fill the abandoned hole will be implemented as detailed in the Subcontractor's supplemental Inadvertent Release Contingency Plan and an alternative plan/alignment for crossing shall be evaluated. If it becomes necessary to abandon a partially completed hole, the abandoned hole will be filled with a mixture of high-yield bentonite, water, and drill spoil. The first ten feet of the bore path will be compacted and filled with soil or a cement-bentonite mix to prevent future settlement. The Subcontractor submitted site-specific abandonment plan shall be approved by the Design Engineer and the Construction Manager prior to being performed in the field.

After the abandoned hole has been filled, an alternative entry and exit hole and bore path alignment will be evaluated by the Subcontractor, Construction Manager, and the Design Engineer. The new alignment shall be offset from the abandoned hole by at least 10 feet (except at the ends where a 5- foot offset may be used) to help limit the risk steering difficulties due to the presence of or hydraulic connection causing drill fluid loss to the abandoned hole.

9.0 Crossing Specific Discussion

9.1 HDD Crossing #134

HDD #134 consists of two, straight (in plan view) HDD bores, each approximately 2,039 feet long and crossing the Bronx Kill Channel and active recreational ballfields operated by the New York City Department of Parks and Recreation. The HDD bores will pass approximately 26 feet below the mudline of the Bronx Kill Channel. Surface grades in the crossing vicinity are relatively flat and range from about El. 8 to El. 10 (reference datum NAVD 1988). Bronx Kill Channel is approximately 200 feet wide, 2 to 4-ft deep (below Mean Low Water, MLW) and tidally influenced.

The HDD#134 bores will have no horizontal curves. The proposed work at this location must be construction in accordance with the Article VII Certificate and associated EM&CP.

Subsurface conditions at HDD#134 - Soil conditions in the vicinity of HDD#134 include a layer of surficial fill placed during previous site development. Highly variable in gradation, the fill includes Sand (SP, SW), silty Sand (SM), clayey Silt (ML) and silty Clay (CL). Although not encountered by the test borings, the fill is expected to contain cobbles and boulders, debris and possibly abandoned utilities. The thickness of the fill in this area is expected to range from about 15 to 25 feet.

Bedrock on the northwest and southeast end of the alignment is relative shallow, ranging in depth from about 15 to 27 feet below grade. Bedrock was not encountered in the central portion of the alignment. In this vicinity test boring BR-2 encountered a thick deposit of Glacial Till below the fill, consisting of silty Sand (SM) and sandy Silt (ML) with cobbles and boulders. Bedrock was not encountered by BR-2.

Bedrock material in the vicinity of HDD#134 is expected to consist of gneiss and schist of the Fordham Gneiss, with lesser marble of the Inwood Marble/ Dolomite.

The geologic profiles used for annular pressure analyses of the HDDs in this segment are shown in Appendix A.

Specific design considerations for HDD #134 include:

- General depth of soil/bedrock cover above the HDD alignment.
- It appears that there is a potential of inadvertent release at the start and ends of the bore (as is common). These should be relatively easy to control through the use of conductive casings, haybales, silt fences, erosion control measures and vacuum trucks.
- Maintaining a borepath in the bedrock mass to the extent possible.
- Adjusting the drill alignment to miss existing infrastructure including existing

utilities, and other obstacles,

- Establishing a drill alignment line that allows for gradual angular changes to minimize pressure build-up,
- Requiring drilling fluid composition and drilling procedures that minimize drilling fluid pressures,
- Requiring drilling fluids that adequately address site-specific drilling concerns while posing the least threat to the environment,
- Requiring monitoring and controlling drilling fluid pressures with down-the-hole sensors during pilot hole drilling.

In our opinion the conditions conducive to inadvertent releases that may exist this at this site may include:

- Highly permeable soil such as cobbles and gravel in the surficial fill.
- Reduced soil cover in the vicinity of the Bronx Kill Channel.
- Existing below-grade utilities near the HDD exit.
- Potential abandoned channel retention structures adjacent to the Bronx Kill Channel.
- Bedrock and very dense soils which will require use of a mud motor and elevated pump rates during pilot hole advance.
- Existing the bedrock into the glacial till with a mud motor near the center of the alignment.
- Existing utilities near the HDD exit.
- Obstructions such as cobbles and boulders within the overburden soils.

9.2 HDD Crossing #135

HDD #135 consists of two, straight (in plan view) HDD bores, each approximately 5,230-ft long (plan length) and extending from the northeastern edge of Randall's Island, below the East River, to the northwest corner of Astoria. The HDD bores will pass approximately 40 feet below the mudline of the East River at its deepest point. The anticipated HDD entry is located at the northwest end of the alignment

(Randall's Island) within and adjacent to ballfields operated by the Parks Dept. Surface grades in this area slope downward gently toward the river, from about El. 10 to El. 0. Wetlands are present between the ballfields and water's edge.

The anticipated HDD exit is located at the southeast end of the alignment at Astoria, within an existing industrial facility operated by NY ConEdison. Surface grades in this area are relatively flat and range from about El. to 4 to El. 6.

The East River is approximately 1,500 to 4,000 feet wide at the crossing vicinity, flows to the south and is tidally influenced. The center of the river is used as a shipping channel, and commercial, industrial and recreational boat traffic are common. Within the shipping channel, water depths range from about 60 to 90 feet below MLW. On the northwest and southeast ends of the alignment water depths range from about 10 to 25 feet below MLW. In general, the banks of the East River are covered by stone rip rap.

The bores will have both horizontal and vertical curves, but no segments of the bore path are designed with compound curves (segments with compound curves would have both horizontal and vertical curves).

The certificate holders have received permits for the project including a modified Section 404 permit from the USACE.

<u>Subsurface conditions at HDD#135</u> - On the banks of the East River, at both ends of HDD#135, the test borings encountered approximately 35 feet of fill consisting of Sand (SP, SW), silty Sand (SM), sandy Silt (ML) and silty Gravel (SM) which overlies native organic soil and silty Clay (Estuarine/Marsh Deposits). Bedrock is expected at depths of about 40 to 50 feet on both ends of the HDD#135 alignment.

Within the East River, the subsurface conditions are expected to consist of 5 to 25 feet of granular glacial soils (possible Glacial Till) overlying bedrock. The approximate bedrock surface below the river is shown in the marine geophysical survey included in the Brierley Randall's Island GDR. Bedrock in the vicinity of HDD#135 is expected to consist of gneiss and schist of the Fordham Gneiss, with lesser marble of the Inwood Marble/Dolomite. Note that test borings were not completed within the deepest portions (shipping channel) of the East River due to strong currents and barge access limitations. Observations made during mining of the Astoria Gas Tunnel suggest that poor quality highly weathered bedrock may be present in this area, possibly associated with a fault or shear zone.

Specific design considerations for HDD #135 include:

- Depth of cover during profile design (based on test borings and geophysical survey) to limit the potential inadvertent release to adjacent wetlands and East River.

- Maintaining a borepath in the bedrock mass to the extent possible, and avoiding the soil-fill valleys that appear to be present below the East River (based on geophysical survey).
- It appears that there is a potential of inadvertent release at the start and ends of the bore (as is common). These should be controlled through the use of conductive casings, haybales, silt fences, erosion control measures and vacuum trucks.
- Generally, for the formation of inadvertent releases, the more critical stage of the HDD process tends to be during the initial pilot hole drilling when the annular space between the bore sidewall and the drill string is the smallest.
- Adjusting the drill alignment to miss existing infrastructure including existing utilities, and other obstacles,
- Establishing a drill alignment line that allows for gradual angular changes to minimize pressure build-up,
- Requiring drilling fluid composition and drilling procedures that minimize drilling fluid pressures,
- Requiring drilling fluids that adequately address site-specific drilling concerns while posing the least threat to the environment,
- Requiring monitoring and controlling drilling fluid pressures with down-the-hole sensors during pilot hole drilling.

In our opinion the conditions conducive to inadvertent releases that may exist this at this site may include:

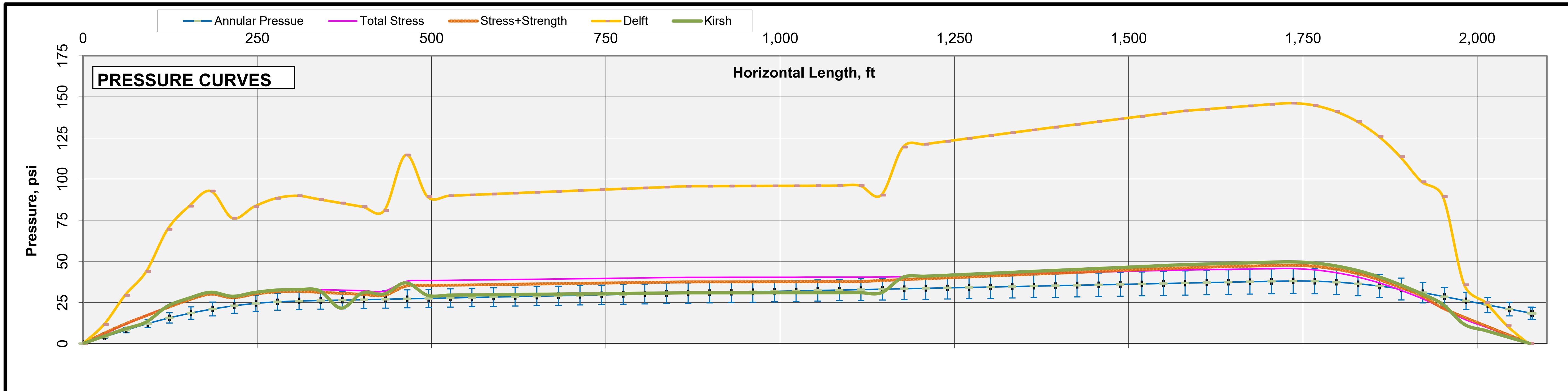
- Elevated drill fluid pressures associated with the depth and length of the bores.
- Highly permeable soil such as cobbles and gravel in the surficial soils.
- Reduced soil and bedrock cover below the East River.
- The potential for highly fractured bedrock or faults within the rock mass below the East River.
- Existing below-grade utilities near the HDD entry.
- Potential abandoned channel retention and/or dock structures adjacent to or within the East River.
- Bedrock and very dense soils which will require use of a mud motor and elevated pump rates

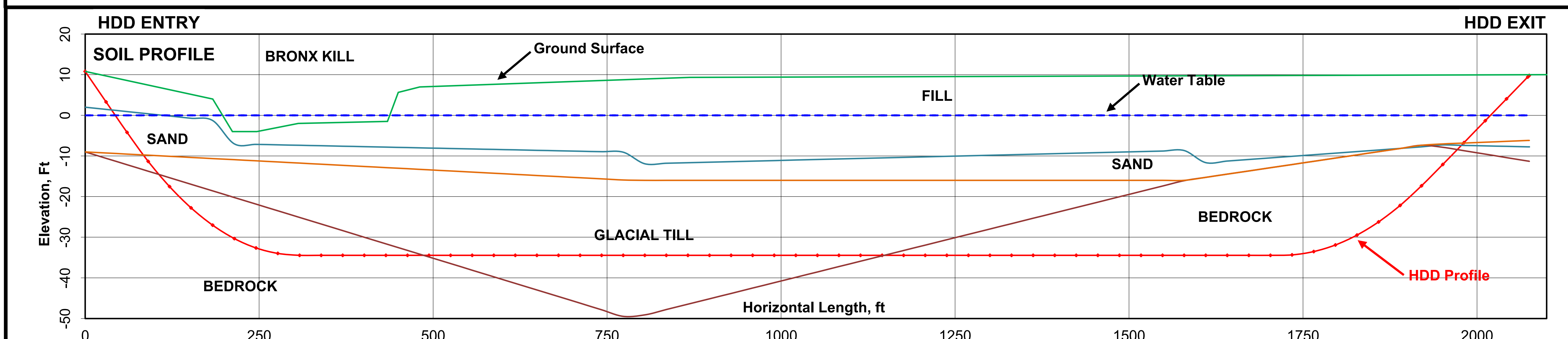
during pilot hole advance.

- Obstructions such as cobbles and boulders within the overburden soils.

APPENDIX A
ANNULAR PRESSURE ANALYSES

APPENDIX A
ANNULAR PRESSURE ANALYSES





ISSUED: Final Design

Notes:

1. Geology is interpreted from project data.
2. The error bars represent a 20% variance in slurry density.
3. Ground surface data obtained from project survey data.
4. Subsurface data from Geotechnical Reports. Properties are interpreted from field and laboratory data.
5. Pump rate, pilot hole diameter, fluid density are estimated: actual values may vary depending on Contractor field operations.
6. See Table 1, *'Submittal Notes'* for detailed references on geotechnical and surveying data.

Basis of Calculations

6.53 in	Pilot Hole Diameter	
3.50 in	Drill Rod Diameter	9.89 ppg
6.5	Pilot Bit Diameter	
74.0 pcf	Unit Weight Drill Fluid	
400 gal/min	Pump Rate	
2079.21 ft	Plan Length	
2086.98 ft	Path Length	

Bore Logs

BR-1
BR-2
BR-3
BA-103
BA-104

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BRIERLEY ASSOCIATES
Creating Space Underground
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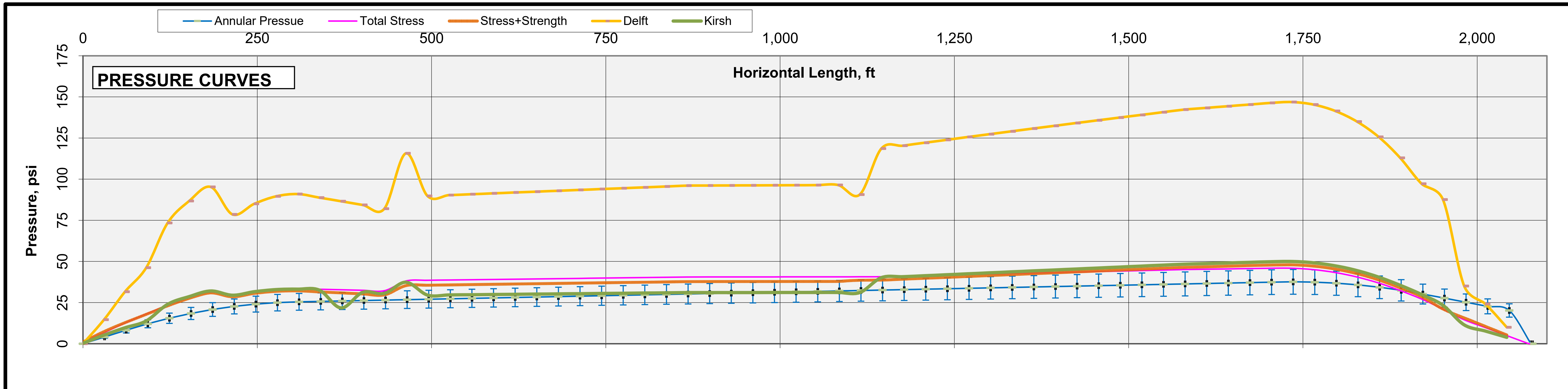
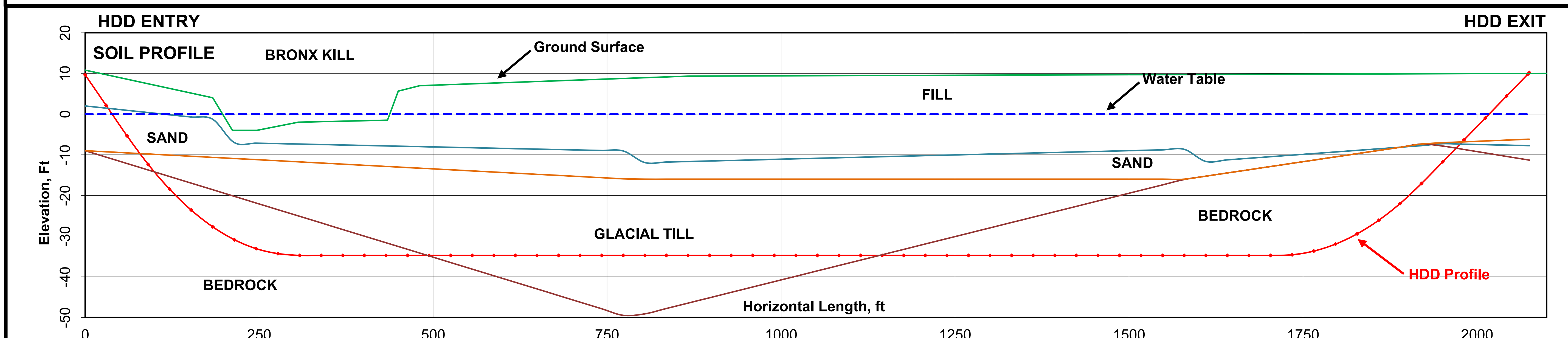
Champlain Hudson Power Express Package 8
Transition Vault 5 to Astoria Converter Station
HDD #134 Conduit 2

ANNULAR PRESSURE AND FORMATION PRESSURE CURVES
Champlain Hudson Power Express Package 8
HDD #134 Conduit 2
Cable Duct

Revision 1





ISSUED: Final Design

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6.5	Pilot Bit Diameter
74.0 pcf	Unit Weight Drill Fluid
400 gal/min	Pump Rate
2079.27 ft	Plan Length
2086.97 ft	Path Length

9.89 ppg

Bore Logs

BR-1
BR-2
BR-3
BA-103
BA-104

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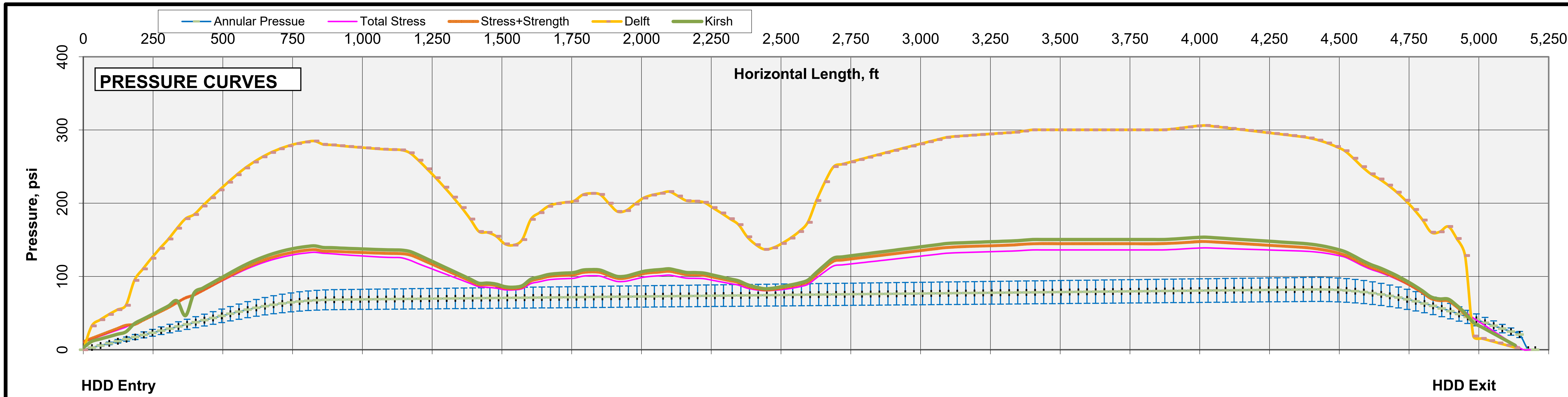
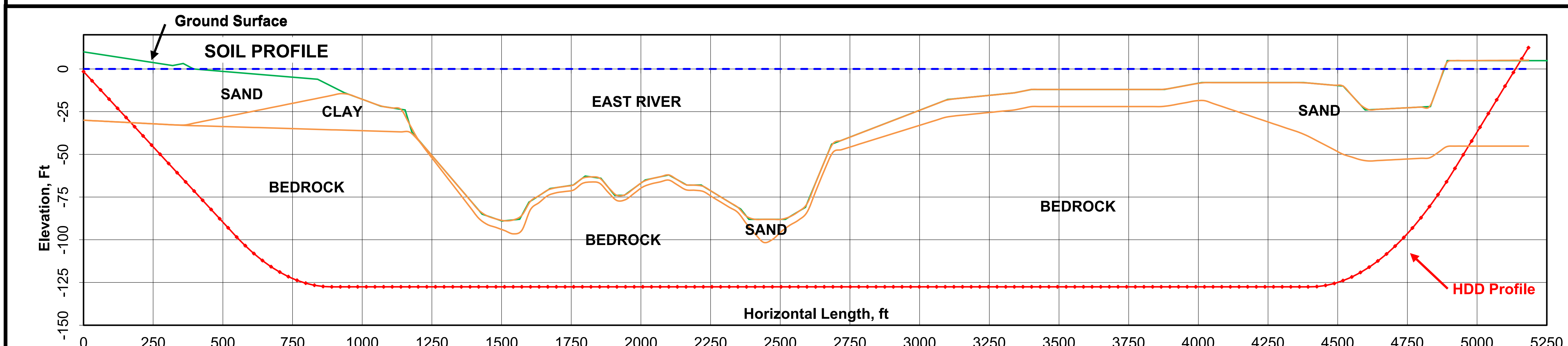
Champlain Hudson Power Express Package 8
Transition Vault 5 to Astoria Converter Station
HDD #134 Conduit 1

ANNULAR PRESSURE AND FORMATION PRESSURE CURVES
Champlain Hudson Power Express Package 8
HDD #134 Conduit 1
Cable Duct

Revision 1





ISSUED: Draft Design

Notes:

1. Geology is interpreted from project data
2. The error bars represent possible range of slurry density
3. Ground surface data obtained from project survey data
4. Subsurface data from Geotechnical Report, Properties are interpreted from field and laboratory data as presented in Table 4.
5. Pump rate, pilot hole diameter, fluid density are estimated actual values may vary depending on Contractor field operations. The error bars provide an estimate of the full range of possible fluid properties for a given pump rate.

Basis of annulur pressure calculations

9.92 in	Pilot Hole Diameter	
74.0 pcf	Unit Weight Drill Fluid	9.89 ppg
400 gal/min	Pump Rate	
5.00 in	Drill Rod Diameter	
20%	for APC curve	

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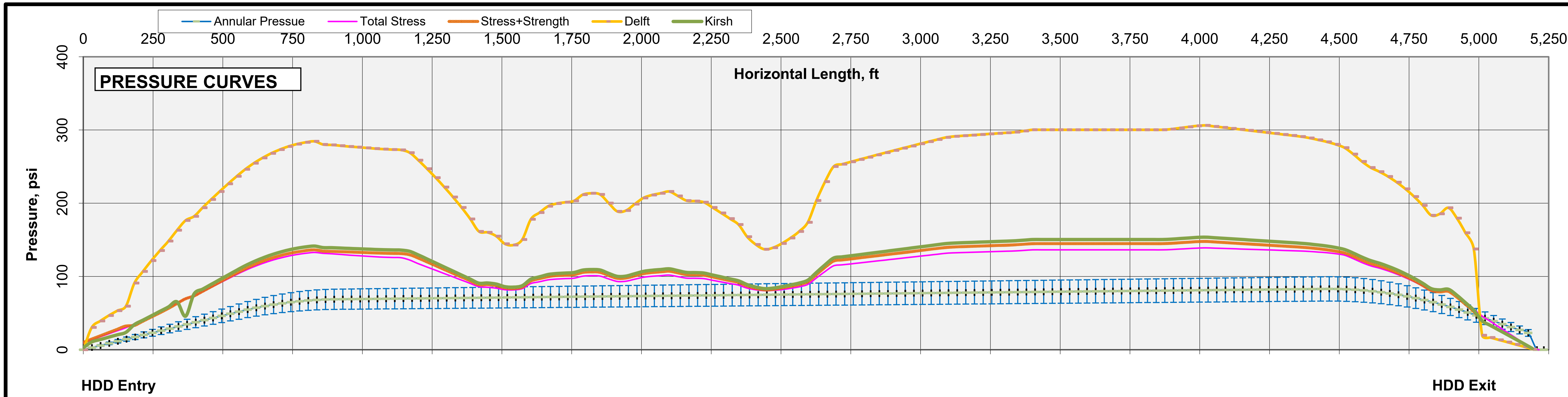
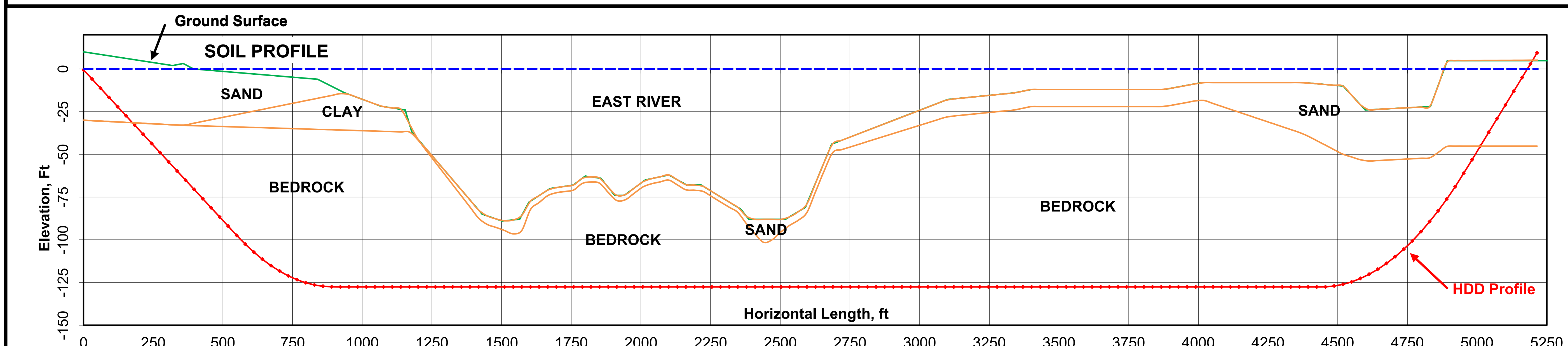
CHPE Package 8
HDD #135
NYC, NY

ANNULAR PRESSURE AND FORMATION PRESSURE CURVES
HDD #135
Circuit #1

Revision 1





ISSUED: Draft Design

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3. Ground surface data obtained from project survey data
4. Subsurface data from Geotechnical Report, Properties are interpreted from field and laboratory data as presented in Table 4.
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Basis of annulur pressure calculations

9.92 in	Pilot Hole Diameter	
74.0 pcf	Unit Weight Drill Fluid	9.89 ppg
400 gal/min	Pump Rate	
5.00 in	Drill Rod Diameter	
20%	for APC curve	

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CHPE Package 8
HDD #135
NYC, NY

ANNULAR PRESSURE AND FORMATION PRESSURE CURVES HDD #135 Circuit #2

Revision 1