

1 General

1.1 GENERAL DESCRIPTION

- .1 Horizontal directional drilling (HDD) is the installation of a pipeline by drilling a pilot bore from the entry pit to a predetermined exit location. The drilling head is then replaced with a reamer and the borehole is enlarged to a predetermined size. Once completed the product pipeline is pulled into place.
- .2 This Specification outlines the minimum requirements for the installation of HDD crossings for pipeline systems. The Contractor shall ensure that the HDD requirements set out in this Specification are complied with by the Contractor to the extent they are applicable in the circumstance. Except as otherwise expressly provided herein; the Contractor is responsible for implementing this Specification. The Contractor shall be solely responsible for ensuring that the Work is performed in strict compliance with all Environmental, Health and Safety Laws.

2 Construction

2.1 PRE-COMMENCEMENT

- .1 All subsurface utilities within 25m of the proposed drill path must be identified and location marked on the surface. Subsurface utilities within 25m of the proposed bore path must be notified of the impending Work through the one-call program or directly if not a member of the service.
- .2 The Contractor shall prepare all construction sites, including removal of vegetation and topsoil to a base level grade, containment berms, excavation of entry/exit pits, temporary and permanent slurry containment pits, and installation of conductor barrels.
- .3 Drill sites shall be constructed to prevent fluids from leaving the site.
- .4 All utility crossings shall be exposed using hydro-excavation, hand excavation, or another approved method to confirm depth. Contractor must acquire appropriate permits to cross, expose, and backfill existing utilities.
- .5 The proposed drill path shall be surveyed and documented, including its horizontal and vertical alignments and the location of buried utilities and subsurface structures along the path.
- .6 Exit and entry areas should be delineated using traffic cones, barricades, construction taping, flagging, fencing/hoarding or by some combination of these. If necessary, warning signs should be placed to indicate open excavation.
- .7 All documents and plans as required in Clause 3.12 of this Section shall be submitted and approved by the Contract Administrator prior to commencement of any Work associated with the HDD, unless otherwise authorized by the Contract Administrator.
- .8 Exit area should be suitable size to accommodate activities related to reamer and product pipe connection.

2.2 PIPELINE SECTION

- .1 The Contractor shall provide all equipment, labour and materials to prepare the pipe sections and support all pullback activities:
 - .1 Complete all first call and ground disturbance activities to positively locate all foreign facilities and develop a plan to cross safely;
 - .2 Ensure all equipment is in good working order throughout the entire project so as not to affect the completion date;
 - .3 Shall schedule work to minimize interruption to existing services and local traffic;
 - .4 Shall obtain all necessary permits or authorizations to conduct construction activities and to disturb ground near or across all existing buried utilities, pipelines, services, and conduits;
 - .5 Pipe layout shall be prepared in the space required to layout the section in one piece. All City of Winnipeg by-laws and requirements shall be met;
 - .6 Depending on level of pedestrian and vehicular traffic, work area may have to be delineated (discretion of the Contract Administrator);
 - .7 Preparation of the layout section including loading, hauling, stringing, fusion, hydrostatic pre-testing prior to pull back and placement on rollers according to the pipeline specifications;
 - .8 All tests shall be completed with water – testing with air is strictly prohibited. Only potable water shall be used if the pipe is to transport potable water after its installation.

2.3 CLEAN-UP

- .1 Upon the successful completion of the HDD and subsequent tie-ins, all equipment and materials will be removed from the site and the area will be cleaned up. At a minimum, the Contractor shall:
 - .1 Fill in abandoned drill holes to completely seal and stabilize the borehole so as not to affect the new installation;
 - .2 Reclaim all drilling fluid/cuttings pits;
 - .3 Remove all equipment, materials and waste from the sites;
 - .4 Clean-up and restore access, entry/exit Work areas, HDD right of way, layout area, and water body access (except for seeding/fertilizing) to original condition;
- .2 All areas affected by Contractor use shall be restored, and free of contaminants, to the original state prior to construction.

3 Directional Drilling Installation Specifications

3.1 WORK CONTENT

- .1 The Work shall include the complete installation of pipelines and conduits listed below by the directional drill method accordance to the Contract Documents:
 - One 150mm diameter DR x HDPE Firemain
 - One 100mm diameter DR x HDPE Firemain
 - One 100mm diameter DR x HDPE Sanitary Sewer
 - One 50mm diameter DR x HDPE Potable Water Service

- One 100mm diameter DR x HDRE Electrical Conduit
- Three 50mm diameter DR x HDPE Data/Voice/Fibre Conduits

3.2 CONSTRAINTS

- .1 All Horizontally Directionally Drilled (HDD) Crossings shall be performed in accordance with the following codes, regulations and requirements as applicable:
 - .1 Provincial Environmental Regulatory Bodies
 - .2 Fisheries and Oceans Canada (DFO)
 - .3 Navigable Waters Protection Act
 - .4 Crossing/Proximity agreements of foreign pipelines
 - .5 Access routes to the right-of-way (ROW), Work sites, staging areas, or to associated areas
 - .6 Landowner/Shareholder agreements
- .2 The Contractor shall review the Contract Documents and drawings to ensure Workspace, right-of-ways, drill design, layout areas, and all other items pertaining to the HDD are acceptable for their equipment and set-up procedures.
- .3 The Contractor shall base bid and work plan on geotechnical information provided.
- .4 The Contractor shall be responsible for the directional drilling methodology and equipment. The Contractor shall confirm that the drill rigs and mud mixing systems will be of sufficient capacity to successfully complete the installation considering the installation length, product type and diameter, and formation and ground water conditions that can be reasonably foreseen.
- .5 If there is a conflict between Acts, Regulations, Laws, Codes and Standards, the most stringent requirement shall be met by the Contractor at the sole cost to the Contractor.

3.3 CONTRACTOR SHALL SUPPLY

- .1 The Contractor shall supply:
 - .1 HDD materials, equipment, pipe, and personnel required to complete the Work. Specifically the Contractor shall supply the following (at a minimum);
 - .2 HDD equipment including a drilling rig with a minimum of 20,000 lbs. of push-pull force with suitable rotary torque to open boreholes to diameters specified within the Contract Drawings. This will also include all cold weather equipment as required and a complete water pumping and drilling fluid recycling system for the entry and/or exit sides (if required on exit);
 - .3 Equipment and personnel to supply transport, handle, weld, install, auger, and install/remove casing on entry and/or exit sides as required;
 - .4 All drill pipe, crossover subs, monels, heavy wall drill pipe, bits, hole openers, pipe pulling swivel, pipe pull head, and any other down-hole tools shall be supplied with current inspection certificates. All bits and cutters for reamers shall be new and in good condition prior to inserting in the borehole;
 - .5 Surface tracking systems and down-hole steering systems suitable for the type of crossing and the required accuracy for the bore path monitoring. The Contractor shall acquire all land use approvals or agreements for the installation of the coils

- necessary for tracking prior to commencement of the Work. Surface coils shall encompass 100% of the bore path, unless approved by the Contract Administrator;
- .6 A down-hole annular pressure monitoring tool;
 - .7 An approved anchoring system for the drill rig such that the installation can proceed in a safe and effective manner throughout the Work without failure;
 - .8 Fluid recycling equipment capable of isolating operating systems by redundancy, without down-time, for the purposes of cleaning or repairing;
 - .9 Flagging of the proposed pipeline between the proposed entry and exit location for reference;
 - .10 Barricades, warning signs, sack breakers and all materials for fluid containment on the worksite;
 - .11 A fence barrier around the entire worksite to prevent access by unauthorized personnel;
 - .12 Excavators and other lifting/excavation equipment with operators to support the HDD process on entry and exit throughout the Work;
 - .13 Sanitary facilities at appropriate locations;
 - .14 Fully equipped first aid facilities and personnel satisfying all applicable legislation (as required);
 - .15 An Electronic Drilling Recorder (EDR) and access inside the drill cab and to all instruments and their readings at all times. Contractor shall provide conversion factors to convert instrument read-outs of all EDR, Annual Pressure (AP), rotary motors, pressure, travel, and torque units to the manufacturer's specifications;
 - .16 Onsite Radios and frequency of Contractor radios prior to the commencement of drilling operations;
 - .17 Frac-out containment equipment as described in the Environmental Response Plan (ERP);
 - .18 Noise attenuating equipment or materials in conformity (to a minimum) with all Municipal by-laws and any additional special provisions of the Contract Documents. Contractor shall retain responsibility for moderating noise at the site and shall schedule the noisiest operations during the day.
 - .19 Pollution control measures in conformance with the applicable sections of the Provincial and Municipal Regulations with respect to air and water pollution control requirements and any necessary dust control measures;
 - .20 Adequate lighting systems to perform the Work.
- .2 The Contract Administrator, in its sole discursion, reserves the right to prohibit the use of any piece of equipment deemed to be unsuitable for the use in the performance of the Work.
 - .3 The Contract Administrator may request evidence of maintenance, inspection and testing programs relating to all equipment utilized on the crossing. Such evidence shall be provided at no additional expense to the City.
 - .4 The Contract Administrator shall have free and unrestricted access to all work and equipment. This shall include all forms of record keeping, inspection, and evidence.

3.4 CASING INSTALLATION

- .1 The Contractor shall install casing to stabilize near surface formations from collapse and drilling fluid loss. The Contractor (at a minimum) shall:

- .1 Independently assess the requirement for casing. If casing is required, casing shall be sized and by the Contractor as required to isolate any unsuitable formations near surface with Contract Administrator's approval;
- .2 Transport, handle, install driving shoe, weld (with an approved welding procedure), install into competent material, and remove casing pipe upon completion of the Work;
- .3 Install casing (with an approved procedure provided by the Contractor) and seal into competent material. Once the casing is augured out, a leak down test shall be completed to ensure the casing can contain the hydrostatic pressure of the drilling fluid prior to the start of the pilot hole;
- .4 Supply and install centralizer pipe throughout the project and replace/rotate as required to ensure wear on the casing is minimal;
- .5 All casing pipe shall be removed after pipe pullback or prior to demobilization (at a minimum).

3.5 PILOT HOLE

- .1 Unless specifically waived by the Contract Administrator, the Contractor will install the pilot hole along the design drill path shown on the Bid Opportunity and Construction drawings. The Contractor may suggest an alternate drill path plan prior to the close of the Bid Opportunity subject to the Contract Administrator for approval in accordance with B7.
- .2 The Contractor shall:
 - .1 Clearly identify the expected drill path for quick reference in the event of a potential fracture;
 - .2 Be responsible for the protection of all existing utilities and structures in the area of work which will include (at a minimum) determining location, protection, avoidance and plan and execute the crossing safely;
 - .3 Supply all steering/intersect tools to complete the work with appropriate accuracy for an as-built. Contractor shall present a steering plan, along with proposed equipment for the Contract Administrator Acceptance;
 - .4 Indicate the X, Y, and Z positions every 10m (minimum);
 - .5 Inform the Contract Administrator of any deviation from design path and present a plan for mitigation or re-drill for Contract Administrator acceptance. In all cases, the Contractor shall be responsible for the drilling of the pilot hole;
 - .1 The Contractor shall be responsible for correcting any deficiencies in the pilot hole installation at own cost.
 - .6 Provide the Contract Administrator a copy of the steering report upon request.

3.6 REAMING

- .1 The Contractor will complete all reaming passes to open the borehole to a final diameter that will allow for the safe installation of the product pipeline. The minimum final diameter for the pipe shall be:
- .2 The Contractor shall:

PRODUCT Ø	REAMED DIAMETER
<200mm	Diameter of Product + 100mm
200-600mm	Diameter of Product x 1.5

>600mm	Diameter of Product + 300mm
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- .1 Determine the number of passes required to open the borehole to the size required for the existing geotechnical conditions;
- .2 Select and supply reamers with new cutters as required for the geotechnical conditions;
- .3 Supply adequate devices on exit side to safely make and break drill pipe as required and ensure that the torque being applied is completed to manufacturer's specifications;
- .4 Supply adequate equipment on exit side to recycle drilling fluid and pump down the drill string to support the drilling operations, if required;
- .5 Shall complete all reaming operations according to their approved procedure, execution plan, specifications, and the Bid Opportunity and Constructions drawings;
- .6 Any tools or other metal object lost or lodged down hole shall be reported to the Contract Administrator. Metal objects shall be fully recovered prior to pipe pullback operation unless specifically approved otherwise by Contract Administrator. Failure to recover metal objects lost or lodged down hole within a reasonable time period constitutes just cause for rejection of the drill borehole.

3.7 CLEANING PASS

- .1 The Contractor shall complete a cleaning pass to prepare the borehole for product pipe installation. The Contractor shall:
 - .1 Complete a minimum of one cleaning pass as per the approved Contractor procedure prior to pullback. A second pass may be required to ensure the pipe section is installed safely without coating damage. In all cases, the Contractor shall ensure the borehole is clean and free of obstructions prior to pullback;
 - .2 Monitor and record pull force and rotary torque every joint during the cleaning pass and provide this information to the Contract Administrator prior to pull pipe.

3.8 PRODUCT PIPE INSTALLATION

- .1 Contractor shall control the pipe installation process to ensure a safe and quality installation. At a minimum the Contractor shall:
 - .1 Begin the installation of the product pipe in daylight hours;
 - .2 Monitor the pullback of the pipe section and record the pull forces vs. time and joint. A conversion chart will be provided where necessary;
 - .3 Have sufficient equipment and storage on-site to manage excess fluid displaced by the pullback section;
 - .4 Provide the Contract Administrator with sufficient notice for start of the pullback to ensure support operations from the City are in place (road closure, etc.). The Contractor shall be fully responsible for managing the pullback operations to ensure the pipeline is installed properly and safely;
 - .5 Support equipment during pipeline pullback operation to safely install the pipe section without over-stressing the product pipe. Contractor shall be responsible for coordinating and managing all aspects of the pullback section;

- .6 Anchor installed section, if required on the upper section, to sufficiently restrict the pipelines movement in the hole. The Contractor shall submit a plan of this anchor for approval by the Contract Administrator;
- .7 Traffic control measures for any public or private venues that may require restricted access or closure pursuant to the Contract Drawings. Traffic control devices and personnel must conform to the City of Winnipeg by-laws and be approved for use by the City prior to execution;
- .8 Pull as much as practicable into the entry pit to inspect the pipe. If pipe is damaged, the Contractor will pull additional lengths of pipe until the damage is either reduced or eliminated and is acceptable to the Contract Administrator. If damage to the pipe is unacceptable to the Contract Administrator, the Contractor will remove the section, replace if damaged, re-ream the borehole and re-install the product section.

3.9 DRILLING FLUID

- .1 The Contractor shall make every effort to maintain circulation and recycle the drilling fluid throughout the drilling process. The drilling fluid recycling system shall be configured and sized to maximize the re-circulation of the drilling fluid throughout the drilling process.
- .2 The Contractor shall be proactive about the management of the drilling fluid and specifically (at a minimum);
 - .1 Measure and document drilling fluid parameters (density, viscosity and sand content at a minimum) every four (4) hours, and compare with the Drilling Fluid Plan and adjust as required. Contractor shall provide professional oversight on their Drilling Fluid Plan to ensure formation issues are controlled and fluid is managed appropriately;
 - .2 Measure and document the volume of fluid in the borehole, fluid return pit, shaker tank and the amount of make-up fluid added to the mixing tanks and throughout the system to ensure any losses are noticed and reported. When a loss is noticed, the Contractor will investigate the drill path for the fracture point and enact the Environmental Response Plan (ERP) as required;
 - .3 Provide an independent Mud Engineering Report, supplied by the Contractor, outlining the specific compliant products, rheology, and testing for the Work proposed. The Mud Engineer shall be present during baseline setup activities and mitigation measures. An API Compliant Drilling Mud Report shall be displayed on the rig at all times representing the current base setup.
- .3 The Contractor shall ensure that all proposed drilling fluids and/or additives are compliant with all municipal landfill reclamation criteria's.
- .4 Supply at least three (3) types of loss control material. This material shall be specifically suited for plugging fractures in the formations being drilled and shall be available on site in suitable amounts for three (3) applications of each. The Contractor shall also supply pill tanks and associated pumps and hoses to effectively apply the plugging agent as specified by the manufacturer. Provide adequate and qualified personnel to supervise all aspects of the directional drilling process.

- .5 Control drilling fluid on exit side as required. This may include exit side recycling system, tanks, pumping equipment or other methods to control fluid onsite. Trucking will only be allowed with Contract Administrator approval subject to a review of the impact on landowners, public, and/or surrounding infrastructure.
- .6 Water supply for drilling use shall be supplied by the City. City will supply Contractor a single point of supply (Valve Chamber) in close proximity to the entry side; and supply meter with backflow preventers. All costs for transfer and storage of water are the responsibility of the Contractor. The Contractor shall confirm the status of all permits and shall garner any additional applications/renewals necessary from the City.

3.10 ENVIRONMENTAL RESPONSE PLAN (ERP)

- .1 The Contractor will supply and implement and Environmental Response Plan to monitor the surface of the drill path, respond to a release to the environment, and cleanup and restore the area. The ERP shall contain the following, (at a minimum):
 - .1 Communication of all personnel onsite to ensure there is an understanding of the roles and responsibilities in the event of a drilling fluid loss;
 - .2 Designation of a representative onsite at all times during the drilling, reaming, and pipe installation procedures. This representative will be responsible for coordinating the ERP and supply the appropriate information to the Contract Administrator;
 - .3 Surface monitoring of the drill path for 100m on either side of the drill path a minimum of every four (4) hours and report;
 - .4 If a fluid loss is detected, at a minimum the Contractor will:
 - .1 Halt all operations immediately;
 - .2 Inform the Contract Administrator as soon as possible so appropriate regulatory agencies can be notified if appropriate;
 - .3 Isolate the migration site and recover fluids (on land);
 - .4 Contain the drilling fluid and prevent further migration downstream (if in the watercourse or floodplain);
 - .5 If fluid migration does not appear on the surface or water body, the Contractor will increase the frequency of surface monitoring to ensure drilling fluid has not migrated to surface;
 - .5 Attempt to restore circulation by extracting the drill pipe and cleaning the hole, plugging or re-drill the pilot hole;
 - .6 Continue with loss of circulation while ensuring no effect to the environment, this must be approved by the Contract Administrator prior to implementing;
 - .7 The supply of the following equipment and supplies at a minimum:
 - .1 0.5m³ - Absorbent material for hydrocarbon product spills;
 - .2 One pallet of sand bags;
 - .3 2 - 4" trash pumps with 200m of hose and associated fittings;
 - .4 20 – T-posts;
 - .5 Light towers suitable for personnel Working on entry and exit sides safely;
 - .6 2 Rolls – Silt fence;

- .7 1 - Post pounders;
 - .8 50m – Geo-textile/plastic sheeting;
 - .9 100m – Plastic snow fence;
- .8 This is recommended for emergency response only. If further equipment or materials are required for continuance, the Contractor shall provide it;
- .2 Plugging/bridging agents shall be supplied to be pumped down the borehole and set per the manufacturer's recommendations. If positive circulation is restored, drilling can be continued. If positive circulation is not established, pumps will be halted and a re-application shall be made. This process may be repeated until plugging occurs. All plugging agents will be specifically designed for the formations being drilled and supplied onsite as specified in this specification. If plugging cannot be achieved, the following continuance options may be utilized, upon approval by the Contract Administrator and all applicable regulatory bodies:
- .1 Installation of casing or extension of existing casing where possible to eliminate the point of fracture;
 - .2 Partial recovery of circulation where fracture to the surface can be managed by pumping fluid back to either the entry or exit point and may be allowed. This may be sufficient if a diligent monitoring program is undertaken to ensure fluid is not being released to the environment. This must be approved by the Contract Administrator;
 - .3 Pilot hole re-drill along a different drill path designed to avoid the area where loss circulation occurred.

3.11 RECORD OF CONSTRUCTION TO BE PROVIDED

- .1 Daily Reports:
 - .1 Tower Sheets showing equipment, manpower, and activities on an hourly basis;
 - .2 Drilling fluid volume (fluid loss/gain) and parameter (weight, viscosity, and sand content) reports;
 - .3 Steering survey data;
 - .4 Surface monitoring report;
 - .5 Water use;
 - .6 Safety tailgate meetings and investigations as required;
- .2 Submissions with seven (7) days of completion:
 - .1 As-built information including pipe centerline in plain view and tabulation of coordinates referenced to the drill entry point and to the global survey systems;
 - .2 Pipe Pullback Report showing pull force per joint vs. time;
 - .3 Drilling Fluid Disposal Report (location, permits, volumes, approvals, testing);
- .3 Submission with 10 Working days of receiving Notice of Award:
 - .1 HDD Execution Plan;
 - .2 Construction Schedule;

- .3 Environmental Response Plan (ERP)/Frac Response Plan that meets all requirements of Department of Fisheries and Oceans and Manitoba Conservation;
- .4 Drilling Fluid Disposal Plan;
- .4 A project schedule shall be updated weekly during drilling operations with progress reports showing site-specific and project-wide progression on a percent complete basis. Contractor's schedule shall address continuity of supervision, quality management, and communication between shifts.
- .5 The drilling fluid properties shall be tested at least every four (4) hours during drilling operations and reported daily unless operating conditions change. The Contract Administrator may require more frequent testing as warranted.

3.12 HDD EXECUTION PLAN AND SCHEDULE

- .1 The Contractor shall supply a site specific HDD Execution Plan that is used to complete the specific Work. Any operational deviation from the submitted HDD Execution Plan shall be presented to the Contract Administrator in written form. This may include a change in any process, borehole condition, equipment, or pipe installation technique. Contract Administrator shall review and approve any deviations of the Drilling Execution Plan prior to implementation by the Contractor. The HDD Execution Plan shall consist of:
 - .1 A description of steps required to complete all aspects of the project including casing install, pilot hole (steering/tracking procedures, and equipment proposed), reaming (number of passes, sizes, types), cleaning pass (reamer size, orientation) and pullback operation (configuration of pull assembly);
 - .2 Complete description of all equipment to be supplied on both the entry and exit sides to complete the Work including, but not limited to, the drill rig(s) (pull force/rotary torque), pumps (type, capacity, number), anchor system, recycling equipment (number, type, and description of tanks, shakers, de-silters, de-sanders, centrifuges, etc.), drill pipe (size and type), mud motors (size and type), drill bits (size and type), steering tools (type, accuracy, etc.), reaming equipment (type, size, number) and noise mitigation equipment (if required);
 - .3 Description and drawings of the preparation of the Work pads, access and layout and confirmation of suitability for Contractor's equipment. Drawings showing the intended drill path in plan and profile, depth of cover, entry and exit angles, and depth/size of surface casings;
 - .4 Description of all auxiliary equipment such as light plants, auxiliary pumps, generators, rig mats, and all other equipment to complete the Work;
 - .5 Provide a description of its down hole survey instruments and surface location equipment;
 - .6 A description of drill pipe maintenance during construction that will include inspection as required and how the Contractor will minimize stress in the drill pipe during the drilling operations;
 - .7 Water usage estimate per day and onsite storage requirements;
 - .8 Fracture mitigation strategy that shall be implemented by the Contractor and at a minimum shall pertain specifically to three (3) parts of the drilling process:
Drilling Fluid Parameters Control, Pressure and Volume monitoring;

- .1 The Contractor shall specify the parameters of drilling fluid planned for this project. The Drilling Fluid Program (DFP) will be provided for the specific formation for each crossing and maintain the program throughout the crossing including providing a Mud Engineer. The DFP specifically will provide guidelines that control drilling fluid parameters to ensure cuttings removal, borehole stabilization and production concerns are addressed and optimized. The DFP shall also address the placement of pills or select products to address borehole stability, frac-outs, or other anticipated drilling concerns. The DFP shall be supplied with resumes of personnel to be responsible for the DFP and the frequency of site overview by a properly trained Mud Engineer;
- .2 The Contractor shall monitor the annular pressure throughout the pilot hole and compare with an approved model. The Contractor will be responsible for maintain pressure below the approved model;
- .3 The Contractor shall develop a procedure to balance the drilling fluid losses into the formation with make-up water, tank volumes and borehole production;

- .9 Sample of daily drilling report format including Tower Sheets, Drilling Fluid Parameters, Steering, and Surface Monitoring Reports;
- .10 Resumes of personnel (with related experience) that will be onsite on these projects;
- .11 Provide a description of all safety and medical equipment and personnel to meet the regulatory requirements for the Work;
- .12 The Contractor shall provide a list of standard drilling procedures that address the processes that are typically undertaken on an HDD project. At a minimum, this document shall be a quality control document that identifies the Contractor's standard procedures for casing installation, pilot hole drilling procedure (Jet/Motor), reaming procedures, cleaning pass procedure, pullback procedure, continuance plan in the event of a partial loss of drilling fluid, and plugging procedures to be undertaken in the event of higher than expected annular pressure, loss of drilling fluid volume, and conditions of high rotary torque. Also these procedures shall describe the required make-up torque for drill string proposed and the rotary torque and RPM for the reamers proposed;
- .13 Emergency procedures for inadvertent utility strikes, including: power, natural gas, water, sewer, or telecommunication lines, Procedures must comply with regulations;
- .14 Independently assess the requirement for casing. If casing is required, provide a Casing Plan and drawings including installation/removal methodology, equipment, and testing;
- .15 A detailed Noise Control Plan that conforms to all municipal by-laws with respect to noise, hours of Work, night Work, and holiday Work;
- .16 A detailed Rehabilitation Plan of the effected construction sites, including returning the sites to their original state;
- .17 A detailed Drag Section Handling Plan that includes timing, equipment, safety, and applicable road closures;
- .18 Traffic Management Plan, in accordance with the Contract Document provisions and Contractor's Drag Section Handling Plan;
- .19 Schedule of Work including installation sequence for the project including:

- .1 Work pad, layout and access preparation;
 - .2 Mobilization;
 - .3 Topographical survey;
 - .4 Casing installation (if required);
 - .5 Pilot hole;
 - .6 All Reaming Passes;
 - .7 Cleaning Pass;
 - .8 Pipe Pullback;
 - .9 Demobilization;
 - .10 Area cleanup;
- .20 The Construction Schedule shall also include working hours/days per week:
- .21 A detailed plan for the disposal of drilling fluid; with the identification of suitable disposal locations.
- .2 Approval of the HDD Execution Plan by the Contract Administrator does not relieve Contractor of any responsibility or liability for safety, damages, compliance with permits and Engineering Inspection Certifications of drill pipe, drilling tools, steering tools, pull heads and swivels to be used on the project;
 - .3 This plan shall be part of the technical evaluation of the Bid Opportunity and are all subject to the Contract Administrator's approval.

3.13 DRILLING FLUID STORAGE AND DISPOSAL PRACTICES

- .1 The Contractor will manage all drill fluids (fluids and solids) from the site.
- .2 The Contractor shall be responsible for permanent disposal of all waste drilling fluids (liquids and solids) in conformance to all environmental regulations. Drilling fluids shall not be permitted to become contaminated with any substance that would prevent the use of landspreading.
- .3 Disposal cuttings and fluids shall be disposed of in strict compliance with the Local Authorities having jurisdiction. Disposal of drilling cuttings and fluids shall be conducted in compliance with all relevant environmental regulations, landowner agreement, Workspace agreements, and permit requirements.
- .4 Prior to disposal, testing of drilling fluids and cuttings shall be performed by a third party at the Contractor's expense with the results provided thereafter to the Contract Administrator (if required based on disposal location).
- .5 All drilling fluids and cuttings shall be removed from the site during City and permit approved daylight hours. The frequency of the transportation shall occur at a rate that ensures that the site is operated efficiently and safely while reducing public impact.
- .6 All costs associated with the management and disposal of drilling fluid and returns are the sole responsibility of the Contractor.
- .7 Contractor shall ensure:
 - .1 That all transportation permits are in conformance to environmental regulations;

- .2 That transportation of fluids (solids and liquids) to the disposal site shall be at a frequency and time as determined by the Contractor and must meet with the City of Winnipeg by-laws;
- .3 Precautions shall be taken to keep drilling fluids out of streets, manholes, sanitary and storm sewers, and other drainage systems including streams and rivers;
- .4 Transportation of wastes shall adhere to applicable Manitoba Infrastructure and Transportation guidelines;
- .5 If working in an area of contaminated ground, the circulated drilling fluid shall be tested for contamination and disposed of in a manner that meets government requirements;
- .6 The Contractor shall make a diligent effort to minimize the amount of drilling fluids and cutting spilled during the drilling operation and shall clean up all drilling mud overflows and spills;
- .7 After product pipe is installed; entry and exit pits shall be cleaned of drilling fluids and cuttings, and backfilled with native material or select backfill in accordance with the Contract Documents;

3.14 ACCEPTANCE

- .1 Pipeline product shall be installed along the pre-specified alignment tolerance as shown on the drawings and provided in the project specifications.
- .2 Once installed pipe shall meet the requirements of the specifications including, but not limited to:
 - .1 Results of the drill profile survey information;
 - .2 Results of any pull force/stress data;
 - .3 Hydrostatic test data;
 - .4 Any material inspection data.

END OF SECTION