



Exploration & Production

GENERAL SPECIFICATION

PIPELINES - RISERS

GS PLR 404

Installation of steel pipeline by Horizontal Directional Drilling
--

01	10/03	Change of Group name and logo
00	02/01	First issue
Rev.	Date	Notes



Contents

1. Scope	3
2. Reference documents.....	3
3. General.....	4
3.1 Definitions	4
3.2 Local Authorities	5
4. Performance of the Work.....	5
4.1 Management.....	5
4.2 Engineering.....	6
4.3 Survey.....	11
4.4 Site preparation.....	11
4.5 Drilling.....	12
4.6 Reaming	12
4.7 Pipe pulling	13
4.8 Pipe pre-commissioning.....	14
4.9 Reinstatement.....	14
4.10 As-built.....	14
5. Equipment/Material	15
6. Safety	16
6.1 Safety assessment.....	16
6.2 Implementation on site	16
7. QAI/QC	16
7.1 General.....	16
7.2 Inspection	17
8. Documentation	17
Appendix 1 Sketch of HDD	18
Appendix 2 Content of daily reports and logs	19



1. Scope

This specification covers the minimum requirements for the installation of pipelines by Horizontal Directional Drilling technique. This specification excludes the fabrication of the pipe string (covered by an other specification).

This general specification shall be considered as a framework stating the technical guidelines of the COMPANY and may be completed by a particular specification detailing specific aspects of the works.

While remaining within the requirements of the specification, alternative methods and drawings, other than those specified here, may be proposed. These alternatives must be properly justified (preferably based on previous experience) and will be subject to approval by the COMPANY.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Pipeline installed by HDD may be considered as submerged and consequently offshore code/specification may apply.

Detail design and construction work shall be carried out in accordance with one the following Standard, unless otherwise specified by COMPANY and in accordance with appropriate sections of the specifications and standards listed below.

Differences that could occur between this general specification and the references shall be brought to the COMPANY's notice for clarification.

Standards

Reference	Title
API RP 1111	Design, Construction, Operation, and Maintenance of Offshore Hydrocarbon Pipelines
API 5L	Specification for Line Pipe
API 5LW	Recommended Practice for Transportation of Line Pipe on Barges and Marine Vessels.
API 1104	Standard for Welding Pipelines and Related Facilities
BS 4515	Process of Welding of steel pipelines on land and offshore
ISO 9001	
ISO 9002	

Professional Documents

Reference	Title
DnV 81	Rules for Submarine Pipeline Systems, 1981



Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
ANSI B 31.8	Gas Transmission and Distribution Piping System (latest revision)
ANSI B 31.4	Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids (latest revision)

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS COR 220	Three layer polyethylene external coating for pipelines
GS COR 221	Three coat polypropylene external coating for pipelines
GS COR 560	Physical and chemical treatment of hydrostatic test water
GS PLR 101	Design of submarine pipelines DNV 81
GS PLR 102	Design of submarine pipelines API RP 1111, ANSI B 31.4 and B 31.8
GS PLR 501	Hydrostatic testing of submarine pipelines
GS PLR 502	Pre-commissioning of submarine gas pipelines

3. General

3.1 Definitions

For the purpose of this specification, the following are interpretations irrespective of any other meanings the words may have in other connections:

COMPANY Means Total or agents acting on its behalf.

HDD Means Horizontal Directional Drilling.

CONTRACTOR Means the COMPANY or its SUBCONTRACTOR performing the work.



Work Means HDD and associated works.

Site Means the locations where the work is to be performed and the vicinity thereof.

3.2 Local Authorities

The Work shall be executed in full compliance with the authorisations and permits from the local governing Authorities for activities.

4. Performance of the Work

The Work to be performed shall consist in all the works necessary to complete the installation of pipelines by HDD in accordance with the best and latest approved practices in oil and gas pipeline industry. The fabrication of the pipe string is not covered by this specification.

The Work to be performed includes, but is not limited to the following:

- Management
- Engineering
- Survey
- Site preparation
- Drilling
- Reaming
- Pulling
- Pre-commissioning
- Reinstatement
- As built.

4.1 Management

4.1.1 Personnel Organisation

CONTRACTOR shall provide experienced personnel familiar with the Work.

CONTRACTOR functional departments shall support its team at all stages of the Work.

CONTRACTOR shall inform COMPANY of the operations on a regular basis (daily on Site).

CONTRACTOR shall ensure that its personnel and equipment are working in accordance with the approved procedures.

4.1.2 Permits

CONTRACTOR shall get the following permit/authorisation from the relevant authorities:

- Working hours (extra work, night work, Sunday work, bank holiday work)
- Transport (equipment mobilisation and demobilisation, etc.)
- Water intake (from the open water or springs for the drill fluid mixing or ballasting)



- Groundwater table lowering
- Drill fluid (evacuation, disposal, etc.)
- Traffic Deviations (road obstruction, traffic lane deviations, speed limitations, etc.).

Should other permits have to be obtained via COMPANY, CONTRACTOR shall formally request COMPANY to obtain the required permits and provide all necessary information.

In most cases CONTRACTOR will work under a work permit system, and shall organise itself accordingly.

4.1.3 Management Manual - Deliverables

CONTRACTOR shall produce and submit to COMPANY a Management Manual in accordance with the time schedule included in Section 8. This Management Manual shall include as a minimum the following documents:

- Organisation Chart of the project team
- Health Safety and Environment Plan (as defined in 6.1)
- Emergency Procedure (as defined in 6.1)
- Inspection and test Plan (as defined in 7.2).

Similarly, CONTRACTOR shall issue on a regular basis the following documents:

- Master schedule
- Master Document Register
- Daily report and logs (see Appendix 2).

4.2 Engineering

CONTRACTOR shall prepare and submit to COMPANY an Engineering Dossier in accordance with the time schedule stated in Section 8. This dossier shall cover all aspects of the design of the line and include all drawings, calculation notes and procedures necessary to complete the work. This Engineering Dossier shall include as a minimum the following documents:

- Work Procedures Manual
- Design Manual
- Mobilisation Manual
- Drawings File.

4.2.1 Work Procedures Manual

The Work Procedures Manual shall include as a minimum the following procedures:

- Survey
- Site Preparation
- Drilling, Reaming and Pulling
- Coating Repair



- Pipe Pre-commissioning
- Contingency.

4.2.1.1 Survey procedure

This procedure shall include as a minimum, the equipment specifications, the calculation methods, the system of reference, the reference points, the formats, the accuracy of the survey, the true track description, the positioning technique, etc. This procedure shall cover all aspects of the survey works (survey of the river, positioning of the drilling tool, etc.).

4.2.1.2 Site Preparation procedure

This procedure shall detail all works to be carried out prior to the rig mobilisation. This shall include as a minimum the anchoring of rig, the water wining system, the storage of bentonite, the conveyor installation, and the platform design, etc.

4.2.1.3 Drilling, Reaming and Pulling procedure

This procedure shall include all details of the operations, the drill pipe sizes, the reamer characteristics, the offloading of equipment, the transfer of equipment from/to both sides, the access of equipment, the criteria of acceptance of borehole before pulling, the number of expected passes of reaming, the mud disposal, etc.

This procedure shall indicate the maximum pulling force that could be applied on the pipe and on the pulling arrangement. This shall be based on the calculation note results and the safe working load of the rigging arrangement for the pulling.

4.2.1.4 Coating repair procedure

This procedure shall be in agreement with COMPANY's anti-corrosion coating specification.

4.2.1.5 Pipe pre-commissioning procedure

This procedure shall cover a step-by-step description of proposed methods, equipment and requirements for the following operations:

- Pipeline flooding
- Pipeline gauging
- Pipeline hydrotesting
- Pipeline dewatering.

4.2.1.6 Contingency procedure

This procedure shall describe in detail that actions are to be taken in case of major equipment failures, accidents.

As a minimum, the following topics need to be addressed:

- Loss of drill pipe during reaming/drilling
- Pipe stuck during pulling
- Borehole deviation from corridor

- Presence of boulder
- Equipment breakdown.

4.2.2 Design manual

4.2.2.1 Design

CONTRACTOR shall design the pipe route in accordance with COMPANY's specific requirements (that may appear in a particular specification) and with the following guidelines (see also Appendix 1):

- Entry angle shall be $12^{\circ} (\pm 4^{\circ})$ from horizontal reference
- Exit angle shall be $10^{\circ} (\pm 4^{\circ})$ from horizontal reference
- Radius of curvature shall be such that the longitudinal stress is less than:
 - 60% of the SMYS when pipe is at its maximum design pressure and temperature
 - 80% of the SMYS when pipe is pulled
 - 90% of the SMYS when pipe is hydrotested.
- Radius of curvature shall be such that the combined stress is always less than 90% of SMYS
- Radius of curvature shall always be greater than $1000 \times OD$
- The cover on top of pipe shall be minimum 5 m below obstacle being crossed and shall ensure a mud breakout does not occur
- The distance between entry point and exit point and the first obstacle (road, river, ditch, etc.) shall be at least 50 m
- The length of straight pipe at entry and exit points shall be 10 m minimum.

4.2.2.2 Stress verification

CONTRACTOR shall perform and include in the Design Manual, all calculations and verifications relating to the anticipated stress conditions in the pipeline during the installation of the line up to its operation in service. The following situations must be taken into account:

- Stress in the product pipe at the beginning of the pull (friction, weight)
- Stress in the product pipe upon finish of the pull-in (friction, floatation, bending)
- Stress in the product pipe because of the over bend (exit angle)
- Stress in the product pipe upon pull-in (inside pressure, temperature, bending, overburden).

4.2.2.3 Other calculations

Based on the designed profile CONTRACTOR shall assess the expected pulling force. This shall be properly engineered, taking into account all the parameters (i.e. not only the buoyancy and the critical friction factor) and CONTRACTOR's experience.

CONTRACTOR shall perform calculation to ensure that there will be no damage to existing facilities during the operations (heavy load crossing existing line, etc.), that the main

equipment/accessories are suitably designed (pulling head, etc.), that the rig is suitably anchored (vertical and horizontal), etc.

All calculations shall be detailed and calculation methods shall be provided.

4.2.3 Mobilisation Manual

The Mobilisation Manual shall include:

- Detailed specifications of all major equipment
- Equipment certificates of conformity, performance tests
- Calibration certificates
- Bentonite data sheet
- Spare part list
- Surveys and test procedures for each main piece of equipment of the spread.

4.2.4 Drawings file

CONTRACTOR shall provide as a minimum the following drawings:

- Profile of the line
- Plan view of the line
- Preparation of work area on rig side
- Preparation of work area on pipe side
- Conveyor/trench line
- Pipe break-over entering into the hole
- Pipe pulling rigging arrangement
- Anchor pattern (if use).

4.2.4.1 Profile

The drawing of the profile shall contain at least the following information:

- Elevation of fields
- Entry angle
- Exit angle
- Horizontal length of drilling
- Effective length of drilling
- Absolute (or relative) elevations of drill profile
- Cover
- Minimum (vertical) radius of curvature
- Buildings and other pipelines in the area of the trace

- Obstacles
- Pipe data.

4.2.4.2 Plan view

The drawing of the plan view shall contain at least the following information:

- Property situation from the COMPANY submitted area map
- Drill axis
- Co-ordinates of the entry and exit point
- North arrow
- Existing buildings and other pipelines close to the drilled hole
- Obstacles
- Shortest distance between drill axis and obstacles
- Minimum (horizontal) radius of curvature
- Planned work area for rig site and string site.

4.2.4.3 Preparation of the work

The drawing of the work area plan shall contain at least the following information:

- Location of the separate components (rig, cabin, pumps, etc.)
- Method of anchoring of the rig
- Build up of the drill fluid preparation unit
- Location and size of the drill fluid storage basin
- Access roads.

4.2.4.4 Conveyor/Trench line

The drawing defining conveyor line shall contain at least the following information:

- Number of conveyors, supports respectively
- Position of the conveyors
- Location of the conveyors in plan view
- Detail drawing of the conveyor.

4.2.4.5 Tying pipes into a bundle

The drawing showing the pipe bundle shall contain at least the following information:

- Cross-section of the bundle
- Diameters of the individual pipes
- Method of tying into a bundle
- Trench characteristics (if applicable).

4.3 Survey

4.3.1 Pre-survey

Prior to the final issue of the Engineering Manual, CONTRACTOR shall survey the Site and identify all existing lines, cables, obstacles, etc. For safety reason, this may require to hand dig existing facilities.

CONTRACTOR shall be equipped with complete/accurate survey equipment and have access to plotting facilities in order to issue drawing in one day to COMPANY after any survey activities.

CONTRACTOR shall perform soil investigations, to ascertain different soil strata and individual physical properties, if specified by COMPANY or if required by CONTRACTOR (at its responsibility) to select/configure its equipment, the pipe route, etc.

Typical of the following investigation could be performed:

- Conepenetrometer Test every 100 m, 10 m from centreline, 5 m deeper than drill planned trace
- Core drilling every 200 m, 10 m from centreline, 5 m deeper than drill planned trace
- Measure of granulometry, compressive strength of the rock, etc.
- Seismic.

The above information shall be used to adjust the profile of the line and the method of work (reaming passes, etc.).

As part of the survey work, CONTRACTOR shall collect and analyse, hydrographical data (currents, tidal movement), existing pipeline and cable, topographical maps, detailed information for the access road (weight limitation for bridge and roads, maximum heights in tunnel or bridge, etc.).

CONTRACTOR shall survey the rig side and also the pipeline string fabrication side, and make sure that the pipe string can be installed/welded in a way, which is acceptable for the pipe pulling.

4.3.2 Survey during drilling

During the drilling of the pilot hole, the real position of the drill tool shall be continuously recorded.

In case of congested area or long drill, a wire system shall be laid on the ground parallel to the drill axis to ascertain the drill tool position (thru-track grid).

The survey tool shall be calibrated, before the start of the drill and the possible magnetic interference shall be checked prior to drilling.

Accuracy of the drilling/survey shall be established and included in the Engineering Dossier.

4.3.3 As built survey

CONTRACTOR shall re-survey the line after the line is accepted and issued a final as built drawings that will re-incorporated in the as built dossier as described in section 4.10.

4.4 Site preparation

Prior to the site preparation, the entry point, the exit point and the pipe centreline shall have been pegged by a qualified surveyor.

CONTRACTOR shall prepare safe access to the site (for the equipment and personnel).

CONTRACTOR shall prepare the rig and pipe side in order to protect existing facilities, equipment, and provide good anchorage to the rig.

CONTRACTOR shall install additional conveyors at the pipe entry side if necessary to avoid any overstress or damage to the pipe coating.

If required (bad mechanical characteristic of the soil, etc.) CONTRACTOR shall prepare the subsoil for the operations (injection of concrete, etc.)

4.5 Drilling

CONTRACTOR shall drill along the predetermined profile. Unless otherwise agreed by COMPANY, the drilling tool shall always be in a corridor defined as follows:

	Lateral	Vertical
First 100 m from entry point Last 100 m from exit point	± 2 m from theoretical centreline*	± 0.5 m from theoretical centreline
Rest of the line	± 3 m from theoretical centreline*	+ 1 m, -0 m from theoretical centreline

During the operation, CONTRACTOR shall record all relevant parameters as shown in Appendix 2.

Mud characteristics shall require COMPANY Safety Department approval. Thus, a clear data sheet of the mud chemical composition and general parameters shall be provided by CONTRACTOR at an early stage of the project and included in the Engineering Dossier.

CONTRACTOR shall take all measure to avoid mud spillage near the Site. Mud disposal shall be addressed in the Drilling, Reaming and Pulling procedure.

In case of difference of elevation between rig and pipe side CONTRACTOR shall study and demonstrate that the mud can be maintained in order to have the borehole duly conditioned.

4.6 Reaming

CONTRACTOR shall analyse the parameters recorded during the drilling of the pilot hole associated to the existing soil data and select adequate size of fly cutter and reamer to ensure a good condition of the hole prior to pipe pulling.

The final reamer size shall be as a minimum:

	Minimum value
For pipe OD ≤ 600 mm	OD x 1.5
For pipe OD > 600 mm	OD + 300 mm

The reaming operations shall start only after approval of profile by COMPANY.

* In any case, the lateral accuracy shall not exceed ± 0.5% of the drilled line.



During the reaming operation CONTRACTOR shall monitor the parameters and adjust the number of reaming passes accordingly.

The monitoring and adherence to the technical parameters such as viscosity and saturation with cuttings during the drilling, is of outmost importance. During the reaming process, the returns shall be analysed. At the end of the reaming operations, the cuttings in the returned drill fluid should always be less than 30%. Only then, it can be sure that the hole is not plugged with sediment.

4.7 Pipe pulling

Prior to pipe, pulling CONTRACTOR shall weld the pulling head to the pipe string.

Prior to pulling, the string of wash-over pipes should be rotated to ensure that the swivel is working. During the pulling the product pipe shall remain free from rotation.

Prior to, during and after the pulling, CONTRACTOR shall take all necessary precautions to keep the inside of the pipes free from dirt, waste and other foreign matters.

During the pull in CONTRACTOR shall check the pipe coating with a holiday detector before the pipe enters the hole. CONTRACTOR shall repair coating damages immediately and in such way that the pulling is not stopped. Any coating material applied onto the pipeline must be done only as per a procedure approved by COMPANY

CONTRACTOR shall control the minimum allowable bend radius and the conveyor spacing to ensure that the pipeline stays below the specified minimum yield stress.

For larger diameter pipes, CONTRACTOR shall provide buoyancy control to reduce the pull force to an acceptable level.

During pullback CONTRACTOR shall monitor and records all relevant data, such as, pull-force, torque, pull velocity, and drill fluid volumes. The rig shall be equipped with an automatic and continuous system to record the pull force (including the peak values).

CONTRACTOR shall always ensure that the maximum allowable pull-force for the pipeline is not exceeded.

CONTRACTOR shall always try to reduce the abrasive action to the coating and the load applied during the operations.

The pulling shall stop when COMPANY agrees on the final location of the pipeline and when the pipe next to the pulling head does not show unacceptable damage.

If the coating on the pipe is damaged, CONTRACTOR shall pull extra length of pipe in order to remove the damage part from the line (this is feasible if there is extra length on the pipe side).

CONTRACTOR shall perform an insulation test after the pulling of the pipe, to assess the damage to the coating.

After pulling CONTRACTOR shall cut the pulling head, and seal the pipe on both sides to prevent water/dust ingress.

Unless otherwise agreed, between COMPANY and CONTRACTOR, CONTRACTOR can demobilise its equipment if the visual inspection of end of pipe, insulation test, gauging and hydrotest are acceptable to COMPANY.



4.8 Pipe pre-commissioning

After the pulling, CONTRACTOR shall perform the cleaning, flooding, gauging, testing and dewatering of the pipeline.

4.8.1 Flooding

CONTRACTOR shall perform water analysis prior to filling and if the water is acceptable CONTRACTOR shall clean and fill the line with filtered water.

If necessary, CONTRACTOR shall treat the water in accordance with **GS COR 560**. Details on the water/inhibitors mixing and pipeline filling systems shall be submitted to COMPANY for approval prior to the pipeline filling operation.

4.8.2 Gauging

Physical check of the bore pipeline integrity shall be performed with a pig equipped with a gauging plate -or with a calliper pig. The gauging plate shall have a diameter of 95% of the nominal diameter.

Prior to running a gauging pig, the line shall be cleaned.

4.8.3 Hydrotest

CONTRACTOR shall perform the testing operation in accordance with **GS PLR 502** COMPANY general specification during 24 hours.

4.8.4 Dewatering

After the test CONTRACTOR shall dewater the line, remove the test heads and seal both ends of the pulled line in order to prevent water and dust ingress.

4.9 Reinstatement

Upon the completion of pullback and the subsequent tests (hydrostatic test, sizing pig, and insulation test) CONTRACTOR shall reinstate both pipe and rig sites. Included in this work are the removal of drilling fluid from the entry and exit pits and the filling in of these excavations.

4.10 As-built

CONTRACTOR shall submit as a minimum the following As Built information and documentation.

4.10.1 Drawings

- Plan View (1:500)
- Cross profile, plan view, cross-section (1:100-500).

4.10.2 Logs/Reports

- Daily reports and logs compilation
- Area clean up report
- Completion report.



4.10.3 Photo documentation

- Area before commencement of work
- All stages of the operations
- Main equipment/configuration
- Area upon clean-up.

5. Equipment/Material

The drilling rig shall be of sufficient reserve of capacity in pull force, torque, pump volume, pump pressure, etc. to cope with any unforeseen increase of loads (due to ground conditions or other reason).

If used, any construction vessel using anchors to maintain position shall do so in accordance with a pre-determined anchor pattern. The anchor pattern shall be shown on a chart included in the Drawing File. This chart shall have an appropriate scale and contain the following information:

- Position of each anchor and cable touch down point
- Location of existing pipelines and installations
- Vertical clearance between anchor cables and pipelines.

CONTRACTOR shall ensure that communication on site is efficient between pipe side and rig side and between the site and COMPANY offices/facilities.

The equipment measuring the pulling force shall be calibrated prior to the Work.

All lifting, pulling equipment shall be certified with certificate available on Site. This includes slings, shackles, swivels, cranes, etc.

All drilling fluid shall be environmentally safe.

CONTRACTOR shall have spare parts on Site for the main equipment.

CONTRACTOR shall provide a desk in its office for COMPANY representative on Site.

All equipment shall be listed in the Mobilisation Manual and may be subject to COMPANY inspection.

CONTRACTOR shall provide safety equipment to all personnel on Site and adequate lighting for night operations.

CONTRACTOR shall provide and operate all other safety equipment required by the operations, such as gas detectors if shallow gas is expected, etc.

All safety and life saving equipment shall bear a valid certificate of inspection less than 12 months old.



6. Safety

6.1 Safety assessment

As part of its safety work CONTRACTOR shall prepare and submit to COMPANY the following documents for approval:

- HSE Plan
- Emergency Procedure.

CONTRACTOR shall perform a risk assessment in which the following risk shall be reviewed as a minimum:

- Presence of shallow gas
- Drilling in existing facilities
- Mud breakthrough and disposal.

Similarly CONTRACTOR shall hold a Hazid meeting with the relevant parties involved in the Work. That includes COMPANY, operators of the crossed obstacles or facilities, operators of existing facilities in the vicinities (pipeline, valve, cable, etc.).

The Working and Safety procedures shall be revised to include all comments, prevention and remedial actions agreed upon during the Hazid meeting.

6.2 Implementation on site

CONTRACTOR shall take all necessary safety measures.

CONTRACTOR shall ensure that its personnel, SUBCONTRACTORS and other parties working on Site or close to the site are fully aware of the activities and the associated risks and emergency procedures.

CONTRACTOR shall hold as a minimum a safety meeting with all personnel working on the site at mobilisation prior to the start of the drilling and on a weekly basis.

CONTRACTOR shall obtain from COMPANY all relevant work permits prior to the performance of any Site work. CONTRACTOR shall mobilise safety personnel and equipment as required by safety procedures and shall designate an experienced safety engineer in charge of safety matters.

7. QA/QC

7.1 General

CONTRACTOR shall operate a quality management system in compliance with [ISO 9001](#) and [9002](#) or other equal or approved quality management system, covering all aspects of the work. The systems shall ensure that quality management of the Work as a whole is applied from inception to completion of the work.

CONTRACTOR shall enable the Third Party Inspector to perform, in an independent manner, any inspection on CONTRACTOR QA/QC program and operations.

CONTRACTOR shall provide information and access to the Third Party Inspector and shall process QA/QC related matters in a manner that will enable the Third Party Inspector to perform inspections of Work and witness tests in a timely manner.



7.2 Inspection

CONTRACTOR shall submit an Inspection and Test Plan detailing all activities of the Work.

CONTRACTOR shall ensure that this Inspection and Test Plan is implemented and followed on Site.

Inspection performed by COMPANY and/or Certifying Authority shall not be construed as releasing the Third Party Inspector from performing its inspection programme.

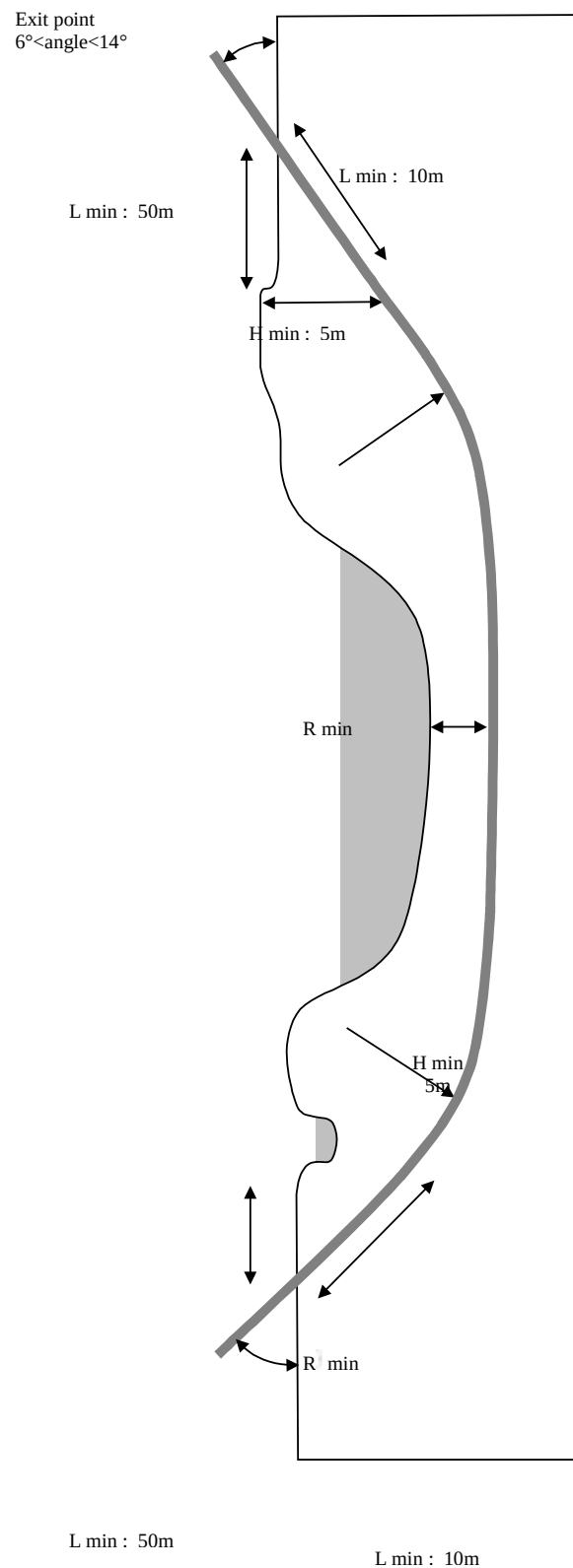
8. Documentation

CONTRACTOR shall deliver all documents (except daily report/log), in four hard copies and one under electronic format to COMPANY. All documents shall be made under Word 7, Autocad or Excel.

CONTRACTOR shall work only when the complete documentation is approved and available on Site.

	Reference	Latest date of submission
Preliminary Engineering Dossier	4.2	1 month prior to rig mobilisation
Final Engineering Dossier	4.2	15 days prior to rig mobilization
Preliminary drawings of drilled pilot hole	4.2.4	Continuously during pilot hole drilling
Final drawings of drilled pilot hole	4.2.4	Prior to reaming
Management Manual	4.1.3	15 days prior to rig mobilisation
As Built Dossier	4.10	15 days after completion of the pulling
Schedule	-	Weekly issue
Master Document Register	-	Weekly issue
Daily Report/Logs	Appendix 2	Daily issue

Appendix 1 Sketch of HDD





Appendix 2 Content of daily reports and logs

Daily Report

- CONTRACTOR name
- COMPANY name
- Project name
- Pipeline diameter and wall thickness
- Site location
- CONTRACTOR representative name and signature
- COMPANY representative name and signature
- Personnel list on site
- Equipment list on site working/stand-by
- Bentonite in storage (today/received)
- Bentonite used (today/cumul.)
- Executed work (CONTRACTOR/SUBCONTRACTOR)
- Extraordinary event
- Next day programme
- Next week programme.

Logs

- CONTRACTOR Name
- COMPANY name
- Project name
- Pipeline diameter and wall thickness
- CONTRACTOR foreman name and signature
- Date
- Site location
- Info to be recorded at least each drill/wash over pipe
- Pull/push force
- Torque
- Pump rate
- Pump pressure
- Mud characteristic (analyses of the returns, etc.).