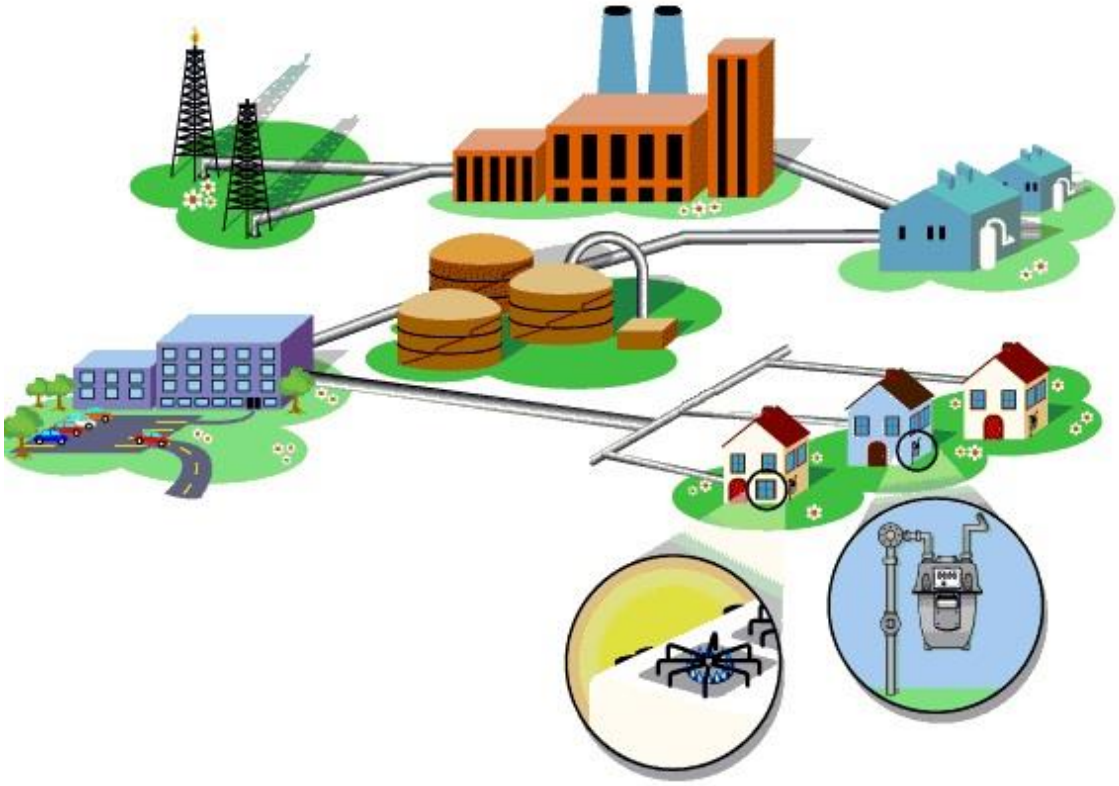
Georgian Oil & Gas Corporation

East-West Gas Pipeline Rehabilitation Project

Execute Phase

Scope of Work
(Construction Specification)
for the Construction Works at the 19 km Section of Pipeline TSITELIKHIDI-GARDABANI (Dn700)



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Project Code	Area Code	Function Code	Document Type	Sequence Number	Language	Revision
TIGA19	**GS07**	**CM**	**SOW**	**00001**	**ENG**	**A01**

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2016

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1. Introduction

”Karadg-Tbilisi first line” is the first main gas pipeline in Georgia built in 1959, which is still delivers gas from Azerbaijan to Georgian industrial, consumer and business facilities.

This section is the first part of the East-West Gas main Pipeline, that starts from the border Azerbaijan border.

Construction of this section will complete the whole reconstruction of the gas pipeline from the Azerbaijan border to Saguramo gas main hub, which is the main artery of natural gas transportation to all Georgia.

In fact, the gas pipeline has been under operation for more than 60 years and is practically entirely amortized.

Total length of the projected pipeline is around 19 km. In completion of construction Tsitelikhidi-Gardabani section of the pipeline will be connected to East-West main pipeline currently operational (newly constructed) sections of Gardabani-Saguramo, Gas supply to the design pipeline is envisaged from (State border) Karadag-Tbilisi Main Gas Pipelines.

The design was made based on norms and rules in effect in Georgia as well as internationally. Main technical decisions are based on the listed documents:

- ASME 31.8-2003 - Gas Transmission and Distribution Piping Systems;
- СНиП 2.05.06-85 – Main Gas Pipelines;
- СНиП III-42-80 - Main Gas Pipelines;
- СНиП 2.02.03-85 – Pillar Foundations;
- СНиП 3.02.01-87 – Earth Structures. Bases-Foundations;
- СНиП 3.03.01-87 – Foundations and Barrier Structures;
- СНиП 1.01.03-84 – Geodesic Works during Construction;
- СНиП 3.04.03-85 – Protection of Structures and Buildings from Corrosion;
- ВСН 004-88 – Construction of Main and Producer Pipelines. Technology and Organization;
- ВСН 006-89 - Construction of Main and Producer Pipelines. Welding;
- ВСН 008-88 - Construction of Main and Producer Pipelines. Corrosion and Thermal Protection of Pipelines;
- ВСН 009-88 - Construction of Main and Producer Pipelines. Electro Chemical Protection Measures and Devices;
- ВСН 011-88 - Construction of Main and Producer Pipelines. Cleaning and Testing;
- ВСН 012-88 - Construction of Main and Producer Pipelines. Quality Control of Works and Acceptance. Part 1 and Part II and other normative documents.
- API 1104 - Welding of Pipelines and Related Facilities

The pipeline is located on the territory of Gardabani and Marneuli municipalities and the coordinates of starting and finishing points are:

- Tsitelikhidi side: X=506234, Y=4577037;

- Gardabani side: X=506249; Y=4590850;

The construction corridor of the pipeline passes the well cultivated agricultural lands and is separated from high density points. The pipeline also crosses rivers Mtkvari (Kura) and Algeti, about 40 medium and small irrigation/drainage channel, about 15 agricultural natural soil and graveled roads connecting the nearby villages and also agricultural lands and several ravines.

Pipeline route mainly crosses well cultivated agricultural lands and is located away from tightly populated areas.

Given document discusses minimum technical requirements for the construction of 27 km section of Telavi-Akhmeta pipeline. This document is an addition to the other design procedures and standards.

Given documents does not realize the Construction Contractor from the responsibility to comply with the requirements of construction procedures and standards and also the norms foreseen by the Georgian legislation.

This specification describes and determines methods for each construction stage of the project (topsoil stripping, trenching, welding etc.) that the Contractor shall comply with in order to implement requirements foreseen by the legislation and construction/design documentation.

Given specification is for the construction stage and represents a part of GOGC's project management system and an important component of the bidding documents.

Given plan is developed based in the design, construction standards, Georgian legislation and specific conditions on the site.

The Contractor is required to have the given documents on site together with other design documentation and to make it available to the construction personnel that will be involved in the construction (supervisors, heads of construction teams etc.).

Given plan (including the conditions of the construction permit and the state ecological expertise), as the case may be, is included in the bidding documents, against which construction bids are received, evaluated and a contract awarded to a successful bidder. As the condition of the contract, before starting construction work, the construction Contractor is required to update and submit, for GOGC approval (upon request), the site-specific (for example for the river, road and other specific site/section crossings) detailed construction methodologies, that fulfills the requirements contained in the given documents, incorporating relevant information such as number of equipment, their type and labor resources. During construction, the Contractor will be responsible for implementing construction specification and permit conditions as well as for self-monitoring. Contractor's performance and compliance will be supervised by GOGC.

2. Design Documentation

All design documents are to be considered with the given specification.

Alignment Sheets

TIGA19-NSGP07-PL-ALS-00001
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Detailed Drawings

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TIGA19-NSGP07-PL-DTL-00017_1(2)
TIGA19-NSGP07-PL-DTL-00017_2(2)
TIGA19-NSGP07-PL-DTL-00018
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Schematic Drawings

TIGA19-NSGP-PL-SCM-00001

Standard Drawings

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TIGA19-NSGP07-PL-CPR-00013
TIGA19-NSGP07-PL-CPR-00014_1(2)
TIGA19-NSGP07-PL-CPR-00014_2(2)

3. Quality Control System

Quality Control System shall be in compliance with the Quality Control Specifications.

GOGC001-GA00-QC-SPE-00001 Specification for QA-QC Inspection

4. Health and Safety

The Contractor shall comply with all relevant health and safety requirements.

GOGC-GE07-HS-PLN Emergency Response Plan
GOGC-GA-HS-PLN-00001 HS Management Plan
GOGC-GA-HS-PRO Personal Protective Equipment

5. Environment

The Contractor shall comply with all legislation and normative acts currently in effect in the field of environment protection.

Environmental Emergency Response Plan
Waste Management Plan
Site-Specific Environmental Management Plan

6. Construction Specification and Project Management

This section provides, first in the form of the plain text, the main conditions of the project management for the site, and then compiles into the procedural description of each important construction stage that will be implemented to ensure correspondence of the site construction and operation to Georgia legislation and design/contract conditions. Key parties responsible for the implementation, supervision and regulation, as well as the timing of the application of monitoring actions are defined. Appendices also include supervision instruments (as-build reports, acceptance certificates and other construction forms).

The contractor shall have a complete set of the project design documentation and construction norms and standards available in hard copy on site and make the documentation accessible for the personnel.

6.1 Project Management System

Personnel
The construction Contractor is obliged to bring representatives on site for implementing Project requirements.

The minimum amount of representatives key personnel to be provided by the Construction Contractor shall include, but is not limited to, the following 5 persons:

- Project Manager;
- Construction Manager;
- Quality Control Manager;
- Health, Safety and Environmental Manager;
- Procurement and Logistics Manager.

Above listed key personnel shall have adequate work experience and their appointment shall be agreed with GOGC. Their substitution shall also be agreed in writing with GOGC.

Qualified field supervision team consists of:

- Site supervisors *(exact number shall be determined by the Contractor depending on the scale of construction works, but shall be no less than 1 person);*
- Heads of construction teams *(all teams working on site shall be controlled by the relevant specialist, their number depends on the number of working teams);*
- Quality control specialists (*exact number shall be determined by the Contractor depending on the scale of construction works, but shall be no less than 3 persons)*
- Health, safety and environmental specialists *(exact number shall be determined by the Contractor depending on the scale of construction works, but shall be no less than 3 persons).*

Prior training of entire personnel and continuous toolbox talks to ensure that all workers are aware of the methodology of works and have appropriate skills. Untrained and unskilled personnel are not allowed to participate in the works!

Daily toolbox talks shall be conducted with the appropriate site personnel, site supervisors and/or health, safety and environmental specialist.

A special folder shall be created for all supervisors working on the site that contains all necessary design documentation, typical as well as specific procedures and methodologies.

Duties and Responsibilities

The duties and responsibilities of the Project Management Team includes (but are not limited to):

- Preparing construction procedures, methodologies and other documents considered by the agreement;
- Monitoring of field supervision team;
- Identification of the required permits and communication of necessary information to construction teams and liaising with external Regulatory Authorities as necessary;
- Central coordination of quality control, health, safety and environmental reporting activities with the team members including weekly reports, monthly reports, CAR/PAR, incident reports, waste numeric & waste transfer notes and submitting to GOGC;
- Implementing permitting (Extra Land, Access Roads & etc.), monitoring and GOGC reporting requirements;
- Assisting pipeline construction teams with planning to ensure that requirements are considered at the earliest stages;
- Planning and carrying out training, meetings and inspections for construction activities (including Sub-Contractors activities and personnel);
- Coordination of construction activities with GOGC and local authorities.

The duties Responsibilities of the Site Supervision Team include (but are not limited to):

- Supervises construction progress and checks correspondence with the requirements of the design;
- Undertakes field based training (toolbox), and complies daily as-build reports, including subcontractors/suppliers as applicable;
- Reporting of all compliant and non-compliant situations observed to the corresponding field manager on a daily basis including GOGC;
- Carries out and implements CAR/PAR measures;
- Undertakes tasks as assigned by the relevant Manager as necessary;
- Makes sure that each completed construction stage complies with the design parameters;
- Completes daily construction reports and fills in different design forms/questionnaires;
- In case on accidents acts in accordance with the Emergency Response Plan.
- Liaise closely with Local Communities in order to avoid delay of construction process on social reasons;
- Communicate with project manager regarding complaints to find out ways response in timely manner;
- Liaise with the local government representatives.

The Contractor shall provide CVs of the project key personnel. People nominated as key personnel shall have at least 5 (five) years of applicable work experience.

Communication
The construction Contractor must commit to maintaining a sufficient number of personnel on-site to supervise the work. Most members of field teams will report to the site manager for their day-to-day task work allocation. They will also coordinate with the Construction Manager in the office to ensure a consistency of approach and quality and to provide feedback on the progress of the works. The manager will, in turn, ensure that the field teams are consistent in their approach, check the quality of their work, and report to the GOGC on progress.

Related letters and documents will be transmitted to GOGC using this process and include the following:

- Daily construction documentation
  - ✓ Geodesic reports;
  - ✓ Earth work reports (topsoil stripping, trenching etc.);
  - ✓ Stringing report;
  - ✓ Bending pipe register;
  - ✓ Welding reports;
  - ✓ Radiography reports;
  - ✓ Lowering and backfilling reports;
  - ✓ Reinstatement reports;
  - ✓ Concrete works reports and other construction stage completion reports;
  - ✓ Midterm agreements on geodesic measurement results *(upon completion of the project as build drawings shall be submitted to GOGC).*
- If requested by GOGC, Construction Contractor will provide to GOGC as-build documentation status and make available as-build records for review in advance of completion of the project;
- Monthly and/or weekly reports, as requested by GOGC;
- Incident reports;
- CAR/PAR reports;
- Audit reports;
- Correspondences (letters and transmittals) etc.

Contractor shall ensure compliance with environmental and safety aspects of construction through continues monitoring and reporting.

CAR/PAR
A Corrective Action Request (CAR) relates to a situation/circumstance that is a nonconformance and that requires corrective actions to eliminate the cause of the detected nonconformance, or other undesirable situation. (CAR/PAR form is included in Annex E)

A Preventive Action Request (PAR) relates to a situation/circumstance that is a potential nonconformance and that requires preventive actions to eliminate the cause of the potential nonconformance or other undesirable potential situation. (CAR/PAR form is included in Appendix E)

For environmental CAR/PAR, a level of severity will be determined depending on the environmental impact degree of the non-conformance:

- Level 1 (low severity) CAR/PAR - presents no immediate threat or limited harm to environment, requiring minor corrective action.

- Level 2 (medium severity) CAR/PAR - presents limited harm to the environment, but could result in damage to an important resource. Requires urgent corrective and general resources for correction, but is reversible.
- Level 3 (high severity) CAR/PAR - a critical non-compliant situation typically including material damage to an important resource or a reasonable expectation of impending damage.

For the construction stage (topsoil stripping, trenching, welding etc.) that the CAR is issued on and that is not corrected within the indicated timeframe, GOGC retains the right to stop progress of the given works altogether and to also suspend payment for the total volume of completed works of this stage until the correction is fully completed.

6.2 Pre-construction Survey

The Contractor will carry out pre-construction surveys to ensure all irrigation channels are well documented so that they can be effectively re-instated following the completion of construction. This will include primary, secondary and tertiary channels, formally recorded channels and those used informally by land users. Flow will be maintained for all irrigation that cross the ROW e.g. via flume pipe or over pumping, so that crops on land outside the ROW are not damaged as a result of construction activities.

6.3 Access Roads

Access to the ROW shall normally be from public roads which intersect the ROW, or other suitable access points, providing prior consent has been obtained from GOGC, and all necessary permits have been obtained.

The Contractor shall exercise care when using both public and private roads for travelling to and from the ROW and shall upgrade and maintain during the works as necessary for safe operations, and reinstate them to their existing condition or better following completion of construction activities.

Appropriate signage shall be placed at access roads to the ROW, at access to storage yards, and along the ROW, for location identification purposes, as well as to restrict access from non-authorized personnel, including vehicles and pedestrians.

The Contractor will install culverts or flume pipes at all ditches and water crossings to prevent any siltation downstream. Materials, number of pipes and diameter to be defined specifically for each stream during preconstruction survey.

Temporary bridges (Structures made from pipes (concrete or steel pipes) designed to maintain continuous flow during construction at watercourses sites) shall be constructed. Flumes will be sized to accommodate the flow volume expected at the time of construction. These temporary bridges shall be removed as soon as possible after pipeline construction activities have been completed in order to return the flow of water within the watercourse channel to normal.

Topsoil should be removed form recoverable access roads and fully reinstated after completion of the works.

Utilization of non-authorized access roads is not allowable. In order for the contractor to use such access roads, consent of local self-governance officials or land owner is essential on the additional land plot. Those roads should be reinstated upon project completion.

In case of necessity regularly spray water on access roads to control blowing dust in vicinity of local villages and farms.

6.4 Location and Protection of Existing Services

GOGC shall provide the Contractor with a list of all statutory authorities, companies, agencies or other known organizations who are given in the design and who may own and/or be responsible for the operation and maintenance of the services and/or equipment that cross or are within close proximity to the pipeline ROW. The Contractor shall contact and co-ordinate with all relevant owners and/or operators prior to locating and identifying the existing services who crosses or are at close proximity to the pipeline ROW or those which might be affected by the work.

The Contractor shall confirm the separation distance to be applied in excavating or operating from existing services and shall comply with the requirements of technical approval issued by the the owners/operators. All works specified by the owners/operators shall be carried out under direct supervision (if required) by the pipeline/utility owner.

Following approval from the owners and/or operators, the Contractor shall locate and identify all existing buried and above ground services such as cables, power transmission lines, pipelines, water mains and sewers etc., including those not identified on the drawings, that cross or are at close proximity to the pipeline. In such cases, any construction activities are only allowed following the official approval of the owners and/or operators.

Buried services shall be located using the most effective and latest underground detection equipment and the location shall be confirmed by means of hand excavated trial holes carried out in advance of any construction operation that could cause damage.

All buried pipeline and service crossings within the ROW shall be clearly marked with warning signs and fenced as required. The warning signs shall indicate the type, size and depth of the buried service. The location and details etc shall be recorded on drawings (plans and sections) to be prepared by the Contractor if not mentioned in GOGC drawings.

If the Contractor uncovers an unidentified service, all work shall stop adjacent to the service. The Contractor shall make sure the works are safe before locating the owner and establishing the necessary steps to negotiate the crossing.

The Contractor is responsible for the relocation of all services (power transmission pillars, water supply systems, sewage collectors, communication systems etc.) with own resources to the safe distance from the centerline to avoid delay or disruption of the construction. The Contractor is also responsible to obtain all necessary permits from the relevant organizations and to comply with the requirements of technical conditions issued for those activities.

The Contractor shall be responsible for any damage caused to existing services, equipment, overhead lines or structures when confirming their position or at any time during execution of the work.

If the Contractor uncovers archaeological remains or relics the Contractor shall stop work immediately and report the findings to the GOGC. All archaeology or other such relics discovered prior to and during construction activities shall be treated in accordance with the archaeological contract.

6.5 Setting of Pipeline Route

Prior to commencement of any clearing activities, the Contractor shall delineate the pipeline route using durable pegs to identify the pipeline centerline and the ROW boundaries. The pegs shall be driven firmly into the ground and shall be of sufficient height to ensure adequate visibility.

The Contractor shall peg the pipeline centerline and ROW in accordance with the Contract Drawings. The pegs shall be placed at maximum intervals of 100 meters and at all crossings, changes in direction (IP's), fences, existing pipelines, above or below ground facilities. In areas where it is difficult to follow the centerline when pegged at 100m intervals, the pegs shall be set at 50m intervals or less to ensure unobstructed visibility.

The Contractor shall establish KP reference points every 100 meters along the pipeline route during ROW preparation. The reference points shall be positioned at the edge of the ROW.

When setting the pipeline ROW, the contractor shall pay special attention to the section where the width of the ROW is reduced.

6.6 Preparation of Pipeline ROW

The nominal ROW width for construction shall be as detailed in the drawings. The width can be extended locally only after the Contractor obtains written permission in advance from GOGC and land owner. The maximum ROW width through environmentally sensitive areas (forested areas, wind breakers) shall be reduced according to GOGC's instructions.

The Contractor shall co-ordinate with all local authorities and utility owners to obtain clearance and approval prior to commencing preparation and clearing of the ROW.

Prior to any clearing operations, the Contractor shall be fully aware with all conditions and provisions. The Contractor shall comply fully with all such provisions and avoid damage to property, other pipelines and utility services on or adjacent to the ROW.

The Contractor shall clear the ROW of all hedges, fences, walls, brush, vegetation, non-saleable wood, stumps, tree roots, boulders, debris and other obstructions, including derelict buildings.

The Contractor shall avoid causing damage to irrigation systems crossing the ROW and shall provide temporary arrangements to maintain these services for the duration of the work.

The Contractor shall install temporary drainage culverts or flume pipes at all ditches and watercourse crossings that could be obstructed during the construction period. This shall also be done to avoid water supply terminations to neighboring settlements and territories (including irrigation water).

ROW Grading
After the ROW has been cleared, the Contractor shall grade the ROW to provide an adequate surface for pipeline construction and safe access to the pipeline during construction.

The Contractor shall grade the ROW to remove sharp, high points, to minimize cold bending. Elastic bending shall be used if stress limit of the pipe is not exceeded.

Where the construction ROW intersects with roads, tracks, channels, rivers or any other improved or confined areas, the Contractor shall grade only the width of the ROW necessary for excavation of the pipeline trench. In areas where construction activities require greater width, the Contractor shall obtain landowner approval before commencing any clearing operations.

6.7 Tree Felling

Contractor and GOGC Representative and local authority shall select and mark trees which are to be removed and which are to be protected.

Remove all shrubs and bushes. (All shrubs and bushes < 150 mm in diameter shall be removed using machetes or small chainsaws).

Stump removal will occur during ROW grading activities.

Tree felling must be completed in one continuous operation. The tree felling operation is completed when the tree is lying on the ground. The tree shall not be left leaning against standing tree(s) or partially cut. The contractor is responsible for clearing the RoW from bushes and trees with own recources.

The surveyor will set out wooden stakes with warning tape attached (between boundaries pegs). These shall be placed on the pipeline center line and on the both sides of the easement boundaries.

Cutting of trees and vegetation in the ROW corridor shell be managed with due consideration of Georgian regulations (Georgian Law on Forest, N 2124, 22.06.1999, Georgian Law on Management of Forest Funds N 3345, 06.07.2010, Decree of the Government of Georgia on Approval of the Rules of Forest Use N 242, 20.08.2010) for wood cutting and relevant methodologies.

Contractor is required to conduct inventory on forest parcels as defined by the relevant legislation. Based on this, specialized tree cutting will be carried out later on in cooperation with local representatives of Legal Entity of Public Law Agency of Natural Resources.

Contractor is required to adhere to all requirements defined by the agreement between GOGC and Legal Entity of Public Law Agency of Natural Resources.

Contractor is obliged immediate transportation of cut trees with own resources to the dedicated area (location will be provided by local representatives of Legal Entity of Public Law Agency of Natural Resources). Prior to transportation representatives of Legal Entity of Public Law Agency of Natural Resources shall be notified in order for them to issue documents confirming the origin of trees and to carry out special marking.

Unauthorized disposal of cut trees is not allowed. Trees designated for cutting shall be fully transferred to the representatives of the Legal Entity of Public Law Agency of Natural Resources and corresponding acceptance acts shall be singed. Any difference between the volumes of trees designated for cutting and transferred to the Agency shall be reimbursed by the Contractor.

Trees will be assessed and where possible either avoided or uprooted and re-planted as required.

Stumps shall only be removed from the area of 2 m from pipeline centerline.

Felling activities will take the following into consideration:
- Removal of individuals of protected tree species including rare (Red Book) species, as far as practicable, will be minimized and avoided through consultation with the site environmentalists.
- Individual trees to be conserved during ROW clearance, will be identified during the Pre-construction Survey and marked with a different color tape (or similar) to denote them from trees marked to be felled; and
- No felling of trees or cutting of vegetation shall be permitted other than that strictly necessary within the ROW and at other construction facilities.

In case of violation of the tree cutting requirements, any losses incurred shall be compensated by the Contractor. It is also the responsibility of the Contractor to protect cut timber from looting or loss.

6.8 Topsoil Management

The Contractor's approach to topsoil removal and storage to facilitate appropriate reinstatement of the pipeline and facilities is outlined within this section. It is understood that the success of reinstatement is dependent upon the ability of CONTRACTOR to successfully manage topsoil throughout construction. Protection of the topsoil will be ensured through its separation from subsoil, and storage in a manner that retains its structure and seed bank whilst minimizing the potential for topsoil loss.

Topsoil Stripping
Boundaries of RoW topsoil stripping shall be identified by RoW pegging at limits and specified topsoil storage areas.

Topsoil shall be stripped using hydraulic excavators fitted with wide ditching buckets and dozers pushing the topsoil. Stockpiles are limited to 2m high, side slopes <45 degrees, drained by open ditches as necessary.

Subsoil piles or banks will not be greater in height than 3m, side slopes <60 degrees, drained by open ditches as necessary.

Topsoil shall be stripped to the subsoil level throughout the length of the pipeline route in accordance with the working width, with a minimum distance of two meters from watercourses, ditches and hedges.

Subsoil shall not be placed on topsoil it's to be separated and kept isolated from subsoil and in a manner to retain the soil structure and seed base. Except where the soils will be separated by geotextile material.

All preventive erosion control works defined burring activities shall be in place prior to the removal of top soil.

Contractor shall ensure that plant and vehicles don't traverse undistributed topsoil areas.

The contractor shall ensure that the site is left in a tidy condition in order to reduce the Environmental impact of operations.

Due to the width limitation of the ROW in the areas under the ownership of Forestry Department, topsoil should be transported outside this territory and stored on a wider section of the ROW.

Topsoil and subsoil operations are carried out in a way which minimizes the risk of soil loss down into watercourses;

At no time will CONTRACTOR use topsoil for trench fill or bedding/padding.

Topsoil Storage
Topsoil shall be stripped and stacked in a manner to avoid contamination with sub-soil and / or other foreign materials. Also, where there is no danger of it falling into watercourses or onto hedges. To prevent this, erosion control works will have been defined and constructed, e.g. silt fences, straw bale barriers, timber fences. Where topsoil is identified as having a significant content of silt/sand, storage heaps shall be covered with a suitable erosion mat.

Gaps shall be left in the topsoil stacks meaning that top layer of the stacked topsoil shall be open in some locations to avoid surface water accumulations in dents and not to obstruct access to the ROW.

Trenches shall be dug alongside of the ROW to prevent erosion and to keep the ROW as dry as possible during times of heavy rainfall.

Contractor shall ensure an adequate buffer zone is maintained between the toe of the topsoil stack and the toe of the excavated trench material, alternatively a physical barrier should be installed to prevent topsoil and subsoil mixing (see typcl drw).

Topsoil stockpiles will be monitored. Should any adverse conditions be identified corrective actions will include:
- Erosion - temporary protective silt fencing will be erected;
- Waterlogging - a drainage channel will be cut through the stockpile.

6.9 Handover/Purchase of Pipes and other Materials

Materials provided by GOGC
GOGC hands over the main materials (pipes, bends, valves etc.) to the contractor following the written notification. Their list and location is predefined and is provided in a relevant annex.

Upon handover of materials acceptance act is signed between GOGC and the Contractor that indicated the name, quantity, technical parameters and condition of the materials handed. The Contractor is responsible for the transportation of the materials from the GOGC storage area to the Construction site, its loading, offloading, processing, storage and security.

All risks related to security of the materials handed over to the Contractor, their storage and usage is transferred to the Contractor upon singing of the acceptance act.

The Contractor is responsible in front of GOGC for the materials handed over and shall present GOGC with adequate documents concerning the use of materials as directed as well as concerning their location. If inconsistency is identified in quantity and quality of materials handed over by GOGC and the ones being under the actual possession of the Contractor as confirmed by the corresponding act, the Contractor is responsible for elimination of any faults and/or inconsistencies with own resources by materials having same quality as the one handed over by GOGC or through reimbursement of costs as agreed by both parties.

Remains of materials handed over by GOGC and material not used during the construction shall be fully returned to GOGC.

The Contractor is responsible for returning unused materials and remains of material to GOGC at their own cost.

Materials to be procured by the Contactor
The Contractor shall procure all the material that are not handed over by GOGC and that are required for the implementation of works per design.

The Contractor shall agree the specifications of all materials that are needed for the implementation of works and that are not handed over by GOGC and upon receiving GOGC"s approval ensure their purchase, transportation and installation under own risk.

All materials, equipment and resources supplied by the Contractor shall correspond to the requirements and technical conditions of GOGC. Materials and equipment that are regarded unsatisfactory by GOGC shall be substituted with acceptable materials/equipment by the Contractor.

On material supplied by the Contractor Quality Certificate and other corresponding documents shall be presented. Any supplied material that are not accompanies by given documents will not be used during work before the submission of adequate documentation.

6.10 Pipe Transportation and Stringing

The Contractor ensures all cranes and mechanisms needed for adequate transportation of pipes without damaging bevels and coating.

Falling of pipes, rolling, hitting against hard and sharp objects shall be avoided to reduce to minimum risk of pipe damage.

Hook ends shall be manufactured from corresponding materials to avoid damage of pipe and bevels. They shall be smooth and fit to the inner diameter of pipe. During lifting operations pipe shall be secured using rope. If pipe has protective caps, they shall be removed prior to lifting. Under no circumstances one side of the pipe shall be lifted.

The use of tongs, bare pinch bars, chain slings, pipe hooks without proper padding, ropes, chains or wire cables or any such other handling equipment shall not be permitted.

Coated pipe shall not be placed directly on to the ground but shall be placed on sand bags or padded skids. Wooden wedges shall be installed at each side to ensure the pipe is safely chocked on to the skids.

Gaps shall be left between pipes at intervals to permit the passage of stock and agricultural equipment across the ROW, and where necessary, to permit the use of public rights of way.

Any damage to pipe or coating caused during handling, transportation, stacking, storage or stringing, shall be repaired or the pipe rejected if so directed by the GOGC.

Where rock is encountered along the ROW, pipe shall not be strung until cleared all loose rock.

6.11 Cold Bending of Pipes

All bends shall be made cold and with GOGC approved bending equipment. A cold, smooth bending machine shall be used having a full-circle bending shoe and an internal mandrel. GOGC reserves the right to reject the use of any bending machine if its operation is not considered to be satisfactory. Spot heating or wrinkle bends are not allowed.

In accordance with GOGC's instructions, the Contractor prepares all required cold bended pipes that are needed for the construction. Pipe bending is carried out due to changes in direction and grade changes due to terrain conditions and not only in correspondence with the initially deified quantities on the drawings.

All bends shall have a smooth contour and be free of mechanical damage, cracks, wrinkles or buckles. If pipe has a longitudinal seam, the seam shall be located near the neutral axis. Longitudinal seams in adjacent joints shall be offset by at least 250 mm at the pipe circumference. The difference between the maximum and minimum diameters of the bent pipe due to ovality shall not exceed 2.5% of the nominal diameter. All bends shall have a tangential straight no less than 1 metre on each end.

Each bend shall be inspected and approved by the GOGC. All field bends shall have a gauge plate of 95% of the nominal internal diameter pulled through after completion of the bend, to

ensure the pipe inside diameter is still within specification. Any bend damaged from any cause or bend that does not fit the ditch as specified, shall be cut out and replaced at the Contractor's expense.

Where bends have been formed from coated pipe, the coating shall be inspected after bending. Wherever damage has occurred, the coating shall be repaired or replaced in accordance with the project Coating Specification.

The Contractor shall be required to maintain a bend register which shall indicate the following types of information: the date that the cold bend was pulled; the bend angle; pipe number; KP location etc.

6.12 Cutting and Beveling of Pipes

All pipe cutting shall be performed by either an approved pipe cutter or by a thermal cutting and beveling machine.

The Contractor shall string and layout the pipeline to ensure that wastage due to short cut-off pipe sections is kept to a minimum.

Prior to cutting, all pieces of pipe to be cut off shall have the unique pipe identification number that shall be reflected in relevant pipe cutting report with an indication of its length and wall thickness.

The Contractor shall layout and measure the pipe to minimize the number of cut pipes less than 2 meters in length. All cut pipes 2 meters and longer shall be moved ahead daily to the front end for inclusion into the main pipeline.

The minimum distance between any two circumferential welds shall be 1OD (pipe nominal diameter) not less than 300mm unless previously agreed in writing by the GOGC.

6.13 Welding and Weld Inspection

The contractor shall carry out welding per API STANDARD 1104 Welding of Pipelines and Related Facilities da ASME Code for Pressure Piping B31.8.

Pipes, fittings and valves shall be connected using arc welding.

Pipe section shall be assembled using internal centrators.

When welding same wall thickness pipes, shift of 20% of the wall thickness is allowable providing it does not exceed 3 mm.

When welding same diameter, but different wall thickness pipes (7,1 mm and higher) or pipes and fittings (tee, adaptor, bend, end cap), shift shall not be higher than 2,5 mm (considering the pipe wall thickness does not exceed 12 mm).

Only competent, skilled, and qualified welders using qualified procedures shall be used for welding the pipeline. The Contractor shall immediately release any worker from the Contract if their work is not to the satisfaction of GOGC.

The Contractor is responsible to mobilize experienced welders with the relevant valid certificates. Prior to start of welding activities the Contractor ensures testing of all welders and based on that gives each welder a special identification number. Testing of welders shall be witnessed by the representatives of GOGC.

Prior to start of welding, the Contractor shall present GOGC all relevant documentation and welder's certificates.

The Contractor shall check the welds visually prior to NTS testing and for the given purpose mobilize experienced and qualified welding specialists to the site following the agreement with GOGC.

Welding and NDT inspection shall be the responsibility of the Contractor.

All welds shall be subjected to inspection by radiography 100%.

NDT of welded joints shall be conducted as per API 1104 chapter 11 *Procedures for Nondestructive Testing*.

Distance between the pipes during welding shall be 2-2.5 mm. 2.55 mm diameter E6010 type of electrode shall be used for root welding, whereas 3.0 mm or 3.5 mm diameter E7018 type is used for fill welding.

Only highly qualified welders with corresponding permits are allowed to site. Welding procedure is agreed beforehand.

Welding permits are issued only to highly qualified welders who have passed qualification tests. Welding procedures shall be agreed in advance.

Due consideration shall also be given to ambient temperature changes throughout the day and the resultant pipe length changes/stresses. Where necessary temperature controlled tie-ins shall be carried out.

All inspected weld reports shall be in writing. Based on the results the decision will be made whether or not the quality of welds is acceptable. If faults are detected the areas shall either be repaired or cut out and re-welded. Repaired welds shall be checked by radiography once again. No works shall proceed before the results of radiography are received. What is extremely important is not changing the position of the pipe.

The Contractor shall have all devices needed for welding on the site such as oven for drying electrodes, bevel cutters, centrators and other needed inventory.

All radiographs and other NDT records shall be presented for GOGC approval. In dispute GOGC decision is final.

The Contractor shall provide all necessary weather protection shelters, wind breaks etc. to ensure optimum welding conditions. Should the Contractor fail to utilize this equipment (welding cabins), then welding operations will be suspended by GOGC should adverse weather conditions prevail. GOGC may authorize the resumption of such operations when the correct equipment is mobilized to the field. All such stoppages shall be the Contractor's responsibility.

The contractor shall prepare and clear with GOGC detailed welding procedure WPS (welding procedure specification) per project requirements and applicable pipeline construction standards.

After receiving an approval on welding procedure (specification), qualification testing can start. GOGC representative shall attend the testing. Destructive testing shall be recorded and submitted to GOGC for approval. Welded test joints shall be tested in the lab and results submitted to GOGC.

6.14 Filed Joint Coating

Line pipe will be coated with strap (Wrap-around heat-shrinkable sleeve) three layer polyethylene coating.

Before applying wrap-around heat-shrinkable sleeve on joint, Contractor obliged to put two component epoxy primer on metal surface.

The Contractor shall supply all permanent material and consumables for the coating of field welds following GOGC acceptance of NDT. All welds and any damaged areas of pipeline coating shall be field coated.

Before starting of coating the Contractor should clean uncoated sections of pipe by sand blasting. Method and used materials shall be agreed with GOGC.

The Contractor shall follow the manufacturer's recommendations with respect to handling, shelf life, storage and application requirements of the field joint coating materials.

6.15 Trenching

Excavation
The pipe trench shall be carefully excavated and the trench bottom graded so that the pipeline is evenly supported throughout its length. The trench bottom profile shall be such as to obtain a smooth profile for the pipeline and to minimize field bending.

The pipe trench shall be excavated along the pegged alignment but where there is a change in direction, the trench shall be cut so as to accommodate the specified radius of the pipe bend.

Where the use of mechanical excavation equipment is either unsuitable or hazardous due to the poor ground conditions, or may cause damage to other property or existing facilities, GOGC may require the pipe trench to be dug by hand.

The finished trench shall be free from roots, stones, rocks or other hard objects which could cause damage to the pipe and its coating. De-watering shall be carried out where necessary and prior to lowering-in.

Trench dimensions and pipe cover
The minimum depth of cover shall be in accordance with the typical and detailed drawings, the pipe trench shall be excavated to a sufficient depth to provide the specified cover, allowing extra depth for any soft padding which may be required beneath the pipe. The trench width shall be at least 400mm greater than the outside diameter of the coated pipe. At locations where further work on the installed line may be necessary, such as at tie-ins, the trench shall be widened and supported by timbers or battered so that welding and other work may be performed safely around the pipe in the trench. Due consideration shall be given to ground/soil conditions in determining the appropriate trench profile.

Extra depth
Extra depth cover shall be provided as required to provide mechanical protection from third party intervention at specified locations. These shall include but not be limited to road, rail, water and foreign service crossings as shown on the drawings.

Where there is extra depth all additional HSE precautions shall be taken to ensure safe access and egress and the trench shall be supported with close supports or battered back to a safe angle.

Timbering and support
When ground conditions are such that the trench sides are liable to become unstable between trenching and pipe lowering, the Contractor shall take all necessary safety and construction precautions such as stabilizing the trench walls or battering the side of the trench to a safe angle or covering trench sides with slabs or other corresponding means.

As needed, animal barriers shall be installed around the trenches to reduce risk of falling to minimum. Prior to starting of the construction, construction team in cooperation with GOGC agrees location of barriers with the relevant communities and owners of the domestic animals.

Barriers will be located close to populated areas or other sensitive locations and they represent most needed measures for securing people, animals and property. Given implies installation of barriers at the above mentioned crossings.

Excavation in running sand and areas of high water table
The Contractor shall submit to the GOGC his proposed method of excavation in running sand and in areas of high water table with details of ground de-watering equipment to be used. Inlet filters shall be fitted and used on all pumps used for dewatering.

Existing services
All underground services shall be located using hand dug trial holes, operating to agreed procedures, Permits to Work and supervision as required by the owners/operators of the apparatus.

Excavation around existing services shall be carried out by hand with such care as is necessary to avoid damage to the services.

The pipe trench shall be excavated so that the clearance between a buried pipeline and any other underground service or structure is not less than specified on the drawings.

Communication cables within the ROW shall be placed in protective casing as per drawing.

Padding material
Suitable fine soft material free from sharp stones, flints, organic matter or other materials which may cause damage to the pipe coating shall be selected from the excavated material other than top soil or delivered from the borrow pit previously agreed with GOGC. Using of topsoil for padding and/or backfilling is not allowed.

Prior to lowering-in the trench shall be cleared from stones and other solid materials. If on the crossing section concreted pipe is used it is permissible to lower it in existing soil. If pipe is lowered without the concrete cover it will be necessary to apply 20 cm thick sand or soft soil padding in order to avoid damaging the pipe.

Where excavated material is unsuitable for processing into padding and intimate backfill, the Contractor shall import sand or other suitable material from the borrow pit previously agreed with GOGC.

6.16 Lowering In

Holiday detection
Prior to commencing lowering-in operations, the Contractor shall undertake an electric holiday detector inspection in the presence of the GOGC over the entire coated pipe at a speed not exceeding 300mm per second. The invert area of the pipe shall be thoroughly checked by both visual and holiday detection, and all coating repairs shall be satisfactorily made and cured before the pipe is lowered into the trench following satisfactory holiday detection.

The setting of the DC. Voltage of the holiday detector shall be as specified by the coating manufacturer for the respective coating thickness used.

After the coating has been inspected and deemed satisfactory in the presence of GOGC, the pipeline section shall be ready for lowering-in. Before lowering-in, the trench bottom shall be inspected to ensure that it is clean and free from boulders, stumps, debris or any organic material.

At the lowering point, coating repair crews shall be mobilized to ensure repairs of local damages using special melt sticks and cuffs.

Lowering in
The Contractor shall furnish sufficient equipment to lift the pipe from its skids in a vertical movement and install the pipe into the ditch without allowing the pipe to touch the ditch walls.

All over bends shall be made and installed in such a manner that the pipe is continuously supported on the padding so that no point of the bend has excessive stress placed upon it.

Should the coating be damaged at a frequency unacceptable to GOGC during lowering-in due to equipment, handling methods, or related work methods the Contractor shall be responsible and GOGC has the right to halt construction, until the Contractor has corrected the problem.

At wetland areas GOGC may require the use of concrete coated pipe in accordance with the contract typical drawings.

Lowering of pipes into the trench without the presence of GOGC representatives is not allowed.

Pipe Concreting
At natural barrier crossings (rivers, channels etc.), to ensure stability of pipe (protection from floating), the contractor shall concrete the pipes with 12 cm thick concrete layer. Concreted pipe shall be lowered in the trench free from bending.

Concreting shall be done using class B25 hydro technical concrete (ГОСТ 26633-91), frost resistivity F25 and water penetration resistivity W6.

Net (ГОСТ 8478-81) is placed in the concrete 3 cm from the pipe wall. Pipe welded joints are covered with cuffs HTLP 60 and concreted.

Factory coated pipe (Dn711) with the concrete layer of 12 cm is provided on the drawing.

6.17 Backfilling

After lowering in has been completed, but before backfilling, the ditch shall again be inspected to ensure that skids, brush, stumps, trees, boulders or debris are not in the trench.

The Contractor shall ensure that no cinders, scrap metal, welding rods, vegetable matter or any other materials potentially harmful to the pipe and coating are contained in the backfill material.

After inspection of the ditch, pipe shall be immediately backfilled, after being lowered in. The intimate backfill material shall be firmly compacted under and around the pipe to a level at least 20 cm above the pipeline. Where the pipeline is supported above the bottom of the ditch the Contractor is to ensure that intimate backfill flows under the pipe and fully supports it along its length. Further layers of final backfill material shall be added not exceeding 30 cm in depth and shall be compacted Under no circumstances shall topsoil be used as padding material.

Backfilling shall be undertaken as closely behind the lowering in operation as is practicable. Should GOGC feel that any section of installed pipeline may have received coating damage due to a failure by the Contractor to place the intimate backfill over and around the pipeline in a reasonable period of time, the the Contractor shall either re-holiday detect the suspect section in the ditch and make remedial coating repairs as necessary or alternatively lift the section from the ditch and re-holiday detect and repair the coating outside the ditch.

The Contractor shall be responsible for any damage to the pipe or pipe coating.

All ditching and backfilling across drainage ditches, irrigation ditches, terraces, private drives, trails or roads, rivers and other streams shall be undertaken by the Contractor in accordance with the drawings, or as directed by GOGC.

Intimate backfill
Intimate backfill is the backfill surrounding the pipe from the bottom of the trench and including any necessary bedding to a level of 20 cm above the crown of the pipe, and shall be used to maintain coating integrity (except in locations where the pipeline is encased in concrete weight coating).

Selected excavated materials other than topsoil shall be returned to the trench, at the sides of pipes and over the pipeline. This shall be firmly compacted to a compacted depth of 20 cm above the crown of the pipe by hand rammers or mechanical vibrators/rammers. In selecting the intimate backfill from excavated materials, the Contractor shall treat excavated subsoils by rotovating, sieving, shredding or similar methods to ensure that sufficient quantities of fine grained material are available and/or ensure delivery of additional soft material from the borrow pit previously agreed with GOGC.

After GOGC has approved the placing of the intimate backfill, the remaining excavated material shall be returned to the trench in 30 cm layers and thoroughly compacted by whacker plate or other GOGC approved mechanical means to prevent subsequent settlement of the top of backfill below original ground level. The original soil sequence shall be preserved. Backfilling shall not be considered complete until such time as all drains and services crossed by the pipeline have been repaired to the satisfaction of the relevant parties.

6.18 Crossings (Road, Channel, River etc.)

The Contractor shall take all responsibilities and risks in crossing third party pipelines and services and shall be responsible for protecting all such existing pipelines, power lines, sewers, cables, or other facilities from being damaged during execution of the work and in accordance with the requirements of the owner.

Road crossings
Minor roads shall generally be open trenched, except where Authorities or GOGC specify other.

Major road crossing shall have pre-tested before pipe installed throughout the crossing.

In the open trench across a road, all backfilling of such open trenching on the ROW shall be accomplished by placing suitable material in layers. Each layer shall be mechanically compacted with a pneumatic tamping device (or equal) to 95 percent as indicated on the proctor scale. In the event that the material removed from the open trench is not suitable for backfill and tamping due to water saturation or nature of material, the Contractor, at his expense, shall obtain suitable material from other sources.

After backfilling, the surface of the road shall be reinstated in previous or better condition at the Contractor’s expense with material of quality in a manner satisfactory to authority having jurisdiction.

Should the crossing authority or managers concerned make any charge for repairs before completion of works and in the opinion of GOGC, such repairs are made necessary by insufficient consolidation of the backfilling, such repairs shall be the responsibility of the Contractor.

Where steel casings are specified they shall be coated from the carrier pipe by means of sturdy pipeline centralisers. Gap between the casing and the carrier pipe at the ends shall be closed with standard industry casing seals, before back filling.

When making roadway, crossings, care shall be taken not to block traffic while such crossings are being installed. The Contractor shall provide, bypass (if necessary) and maintain all necessary barricades, suitable and sufficient lights, danger signals, signs and other traffic control devices as required, and shall take all necessary precautions for the protection of the work and safety of the public and workforce. It is necessary to notify patrol police and other relevant authorities before starting given activity. Instruction of those entities shall be strictly adhered to.

In all cases where it is necessary for a pipe to cross a public road, track, the Contractor shall, immediately backfill that portion of the ditch and shall restore the crossing so that the inconvenience to the public is minimized.

The pipeline section crossed up to tens of local ground and graveled roads connecting neighboring villages and agricultural lands.

The pipeline route crosses roads at three locations: “Tbilisi-Tsitelikhidi” road at KP7+500 and at KP10+000 (road kps are 34+429 and 41+892), crossings should be don e by drilling and casing method. Route also crosses “Tsereteli-Mirzoevka-Mughanlo-Kesalo” road at KP19+768.

Water crossings
It is necessary! to cross streams and rivers during low water or dry periods of the year.

Aerial crossing of River Mtkvari (Kura)
For crossing will be used existing pillars constructed for existing DN500 gas pipeline.

Around 10 existing pillars should be dismantled during installation of new Dn700 pipline.

Pipeline Crossings
The pipeline also crosses the existing gas pipelines - operated by Georgian Gas Transportation Company. Before starting works, the contractor shall inform the representatives of Georgian Gas Transportation Company about the planned activities. Working within the safety zone and excavating the existing line without the presence of the Georgian Gas Transportation Company representatives is strictly prohibited.

6.19 Block Valves

Location of valve stations is indicated in profiles and detailed drawings.

The Contractor shall implement coating works on valves and relevant devices as indicated by GOGC.

Aboveground sections of valves are cleaned (using sand blasting), primer is applied and then painted by the Contractor in accordance with specifications.

Accesses shall be arranged to valves and they shall be fenced in accordance with the parameters indicated in design documentation.

Together with the installation of main components of valve units, the Contractor is also responsible for carrying out installation of gas receiver impulse devices as per design documentation.

6.20 Pressure Instrument Gauge (PIG) Launcher and Receiver

The Contractor shall install PIG launcher station at start point of Tsitelikhidi-Gardabani gas pipeline, which includes installation of one PIG launcher with one Dn700 and one Dn200 aboveground valves.

The Contractor shall also take appropriate actions to ensure that aboveground sections of valves are cleaned (using sand blasting), primer is applied and then painted by the Contractor in accordance with specifications and preparation of bases/foundations, area leveling/graveling, fencing and etc.

6.21 Cathodic Protection System

The completed pipeline shall be cathodically protected by a combination of impressed current and sacrificial anode systems.

The Contractor shall install cathodic protection test stations at locations shown on the drawings and at steel foreign services/pipeline crossings which may be encountered but not shown on the drawings at the time of pipeline installation.

Connection of any type of cathodic protection to the pipeline shall be carried out using pin brazing method. Coating of the connection points and used material shall be agreed with GOGC in advance.

Isolation joints and their installation shall be in accordance with specifications.

The Contractor shall install electrical isolation joints and protection at locations specified on the Alignment Sheets.

The Contactor shall submit a plan for construction and commissioning of the permanent system. Where this is not carried out immediately the pipe is laid then it will be necessary for temporary sacrificial anodes to be installed on certain pipeline sections until such time as the permanent impressed current system is fully operational. The Contractor shall issue a specification to GOGC for approval and the location of these anodes (if applicable) shall be indicated on the construction drawings.

The Contractor shall ensure connection of cathodic protection system to the local grid prior to full completion of the construction. The Contractor is also responsible for acquisition of relevant permit from the authorized entity.

Installation of one cathodic protection devices is envisaged on Tsitelikhidi-Gardabani section.

Electricity supply to the stations will be carried out from transmission lines located close to the pipeline.

6.21 Pipeline Pigging and Hydrotesting

All cleaning and hydrostatic testing shall be under the supervision of approved experienced specialists employed by the Contractor or by an approved testing Sub-Contractor.

Contractor will furnish supplies and materials, including squeegees, spheres, test manifolds, valves, fittings, temporary launcher and receivers and other supplies and materials, also monitoring equipment normally used as part of pressure testing work.

GOGC and their designated representatives shall observe all Pressure and Leak Testing.

Contractor shall furnish all water for hydrostatic testing. Water shall be disposed of according to the Environmental Management Plan. The Contractor shall obtain all related permits.

The Contractor shall hydrostatically test the pipeline to the pressure indicated on the Drawings or Project Scope, for the specified period; however, the Company reserves the right to require the Contractor to maintain pressure beyond the specified period, if the pressure has not stabilized due to temperature or it cannot be determined if there is a leak within the test section. Contractor shall locate and repair any leaks or failures which occur and the pressure test shall be restarted.

The Contractor can, with GOGC prior approval, subcontract the pipeline pigging and hydrotesting to a qualified testing company acceptable to GOGC.

The test equipment and personnel shall be positioned to minimize potential hazards. Typical positioning shall include a barrier between the test equipment and test manifold and/or placement of test equipment a minimum distance of 25 meter from the test manifold. Personnel performing the test should approach the pressured line only in the performance of their duties.

At no time shall personnel attempt to tighten flanges or screwed fittings during testing. The test pressure must be bled off prior to tightening.

Adequate support, bracing and location of pumping equipment and pressure piping shall be used in connecting to the facility to be tested.

Adequate lighting shall be available to testing operations performed at night.

All connections regardless of size, which can be practically installed, shall be made prior to pressure testing. The pipeline and components shall be completely filled with clean water approved by the Corporation, free of silt, trash or any substance that might be injurious to the system. The Contractor shall furnish a filter that shall be rated at sufficient capacity to accommodate the output of the fill pump.

Before commencing hydrotest, PIG-s equipped with brush, magnet and gauge plate shall be run with air blowing force.

For hydrotesting of pipeline fresh water shall be delivered to the site. Abstraction of water shall be made from nearest water courses.

Test is carried out simultaneously on the entire section for a continuous period of 36 hours and consists of two stages.

- During the first stage pressure in the pipe shall equal to 125% of maximum operating pressure 6.75 mega Pascal and this pressure shall be maintained for 24 hours.
- On the second stage the pipe is tested on the maximum operating pressure – 5.4mega Pascal for another 12 hours.

A continuous record of test pressure shall be obtained by the use of a pressure recorder. The range of the pressure recorder shall be compatible with the test. Prior to use on the work, the Contractor shall provide the Corporation with written proof of pressure recorder equipment calibration and certification from a qualified metrological laboratory acceptable to GOGC within a period of one (1) year.

Accurate manometers (min 2 for section) shall be used to measure test pressures. Contractor shall provide the Corporation with written proof of manometer equipment calibration and certification from a qualified metrological laboratory acceptable to GOGC within a period of one (1) year.

A continuous record of the ambient, ground at the pipe temperature (where applicable), and of the test medium shall be obtained by use of temperature recorders. The range of the temperature recorder shall be compatible with the test. Prior to use on the work, the Contractor shall provide the Corporation with written proof of temperature recorder equipment calibration and certification from a qualified metrological laboratory acceptable to GOGC within a period of one (1) year.

For an acceptable strength test, the test pressure shall not exceed the maximum test pressure of the pipeline or any component of the pipeline.

The stabilization period shall begin after the fill operation is complete. Sufficient time shall be allowed for the temperature of the pipe, test medium and backfill (if any) to become stable.

After the thermal stabilization period, the test section shall be pressurized to the required test pressure using caution, recognizing the possibility of failure of the pipe or equipment or the possibility of over-pressurization of the pipe.

Once the test pressure has been reached and the pressure stabilizes, deadweight readings shall be recorded every 10 minutes during the first hour and every 15 minutes thereafter until the test has been completed. Pressure, time and volume of water shall be recorded for ,,bleeding-off" or repressuring.

The Contractor's Representative and the Corporation's Representative shall sign and date all original charts, immediately upon completion and acceptance of the test. The original charts shall remain with the Corporation.

On completion of testing the pipe is de-watered, additional pigging runs will be carried out using of swabbing/foam pig to remove as much free water as possible from the pipeline. It is possible to use two or more different types of pigs.

If the gague plate run in the pipeline has defects indicating geometric damage, the Contractor shall furnish and run a caliper/geometry inspection tool (intelligent PIG) with instrumentation having defect location capabilities that will provide information necessary to find any indication of ID reduction in the pipe in order that the pipe may be uncovered, inspected and possibly removed, in the area of the indication of the ID reduction.

The Contractor shall uncover and remove all indications detrimental to the safety of the pipeline as determined by the Corporation.

The contractor shall pig the pipeline with paralon pig driven by compressed air pressure in two stages:
Initial – main volume of water is removed from the pipeline by one pig;
Control – water is completely removed from the pipeline using one pig.

The results of the water removal will be regarded acceptable if control pig does not bring out water and if it comes out without damages. If this is not the case, control pig is run again before acceptable result is received.

It is considered that at dew points -20°C no corrosion will occur. Contractor shall dry up pipeline using special air dryer (heaters) compressors to achieve dew point minimum -20°C.

All the temporary equipment needed for the hydrostatic testing operation will be fully certified for the test pressure concerned and copies of the certificates will be available onsite for inspection prior to the start of the test.

It shall be considered that pre-tests are required for certain sections of the pipeline. During pre-tests pressure in the pipes shall be 150% of the design pressure (8.1 Mpa) for road crossings and 125% (6.75Mpa) for the River crossings and shall be maintained for 6 hours.

Waste water from hydro test will be discharged into the specially arranged settling pond.

To avoid scouring of mineral soil, kinetic energy of water coming from the pipes should be decreased by diverting the current to specially arranged water barriers in the trench.

For the removal of iron, rust and sediments settling pond arranged for the construction will be used (with the approximate dimensions of 5mX5mX1m). Bottom of the pond will be covered with a waterproof membrane to avoid infiltration. Water will go through several layers of hay bales before getting into the pond and then also after leaving the pond.

6.22 Reinstatement

Reinstatement of project areas disturbed by pipeline construction activities (e.g. ROW, camps, pipe yards, temporary access roads etc) to the original landscape character is a specific objective aimed at achieving the ultimate goal of no harm to the environment. This requirement will need

to be balanced with other Project goals of improvements to community infrastructures as a socio-economic benefit, as well as site-specific landowner requirements.

Pipeline reinstatement will be undertaken in all project affected locations. Final reinstatement of all areas will be to the standard of the prevailing site conditions to the extent practical, or better, as documented in the Pre-construction Survey records. This will include the removal of all surface contamination, whether pre-existing or not, in accordance with the advice of GOGC per Waste Management Plan.

The objective of this section will be to help the natural reestablishment of the vegetative cover (re-contouring the topography back to its natural state, special attention to spherical topography of land plots. Decompressing the compacted soil and redistributing the topsoil) during the restoration and re-vegetation period.

The objectives of the Reinstatement activities are to ensure that:

- Landscape is restored, as far as reasonably practicable, in areas where there would be a significant visual impact;
- Any third party property or services damaged as a result of construction activities are repaired and reinstated;
- Areas disturbed by pipeline construction activities are restored to preconstruction conditions to the greatest possible extent;
- Topsoil is handled and stored to retain soil structure, viability of its natural seed bank, and its fertility;
- Bio-restoration strategy is based on supplementing the seed bank of local species, where necessary, with suitable treatment of rare/endangered floral species to ensure their conservation.

Landscaping work shall take place to ensure that the impacted habitat is returned as close as practical to its natural condition.

Trees will be assessed and where possible either avoided or uprooted and re-planted as required.

Final grading, clean up and restoration / re-vegetation activities will be completed as soon as practically possible after construction has been completed.

Third party property

The reinstatement of third party property, land and crossings will be undertaken in accordance with pre-entry agreements. Pre-Construction Survey records that detail the site conditions will supplement these agreements. Third party property, land and crossings include, but are not limited to, the following:

- Pipelines;
- Irrigation systems;
- Utilities;
- Roads.

Any damage, or loss, to third party property, land or crossings resulting from pipeline construction activities will be immediately reinstated / replaced to the original condition, or better by the Contractor unless provided for in the pre-entry agreement. Such requirements will be subject to negotiations between the Contractor and the affected third party(s), with prior approval of GOGC.

The specific reinstatement measures required on private land will be agreed with the landowner prior to construction work commencing on the site in accordance with the Land Entry agreement; the details will vary on a case-by-case basis. As a minimum it is expected that the land will be returned to its pre-project condition, subject to the requirements of the landowner.

The original condition of a specific site (KP) will be considered to be that of the Pre-construction Survey records and photographs. Photographs and other data will be taken of the site prior to construction activities taking place and the boundaries and other features of the land will be recorded (GPS locations) to assist in reinstatement.

To the extent practical, all areas will be reinstated to their original condition, or better, to the satisfaction of the owner or authority, notwithstanding approval from GOGC. All pre-entry agreements are to be signed-off (Acceptance certificate See Annex. H) by the Contractor and the owner or authority, in the presence of GOGC representatives, prior to demobilization from site. Photographs of the condition of the area prior to and after reinstatement will be used for reference.

During the Defects Liability period the Contractor is responsible for maintaining the standard of topsoil reinstatement including erosion control, soil stabilization and plant growth.

Reinstatement of topsoil
Topsoil will be reinstated separately from subsoil, with care taken to avoid mixing of the materials. The depth of topsoil replacement will be a direct reflection of that excavated.

When replacing the topsoil the Contractor will program the works such that areas furthest away from the stockpiles are reinstated first with reinstatement getting progressively closer to the stockpiles, thus reducing the number of vehicle movements over the reinstated topsoil.

The reinstated topsoil will then be harrowed, to protect the stability and promote vegetative growth.

Where topsoil is reinstated to agricultural land the surface will be prepared for planting. The Contractor should arrange relevant lined channels to avoid flooding of private land plots (surface should be reinstated in dry conditions). As a minimum the soil will be graded and tined to remove compaction.

In the event that a shortfall of topsoil occurs, alternative methods of reinstatement (to address a lack of topsoil) will be considered. These may include:
- Importation of topsoil from sites where topsoil is in excess (if appropriate);
- Selection of biorestoration methods suitable for these conditions. (Contractor is required to recruit engineer soil specialist/agronomy with relevant qualification during the process of biorestoration).

Unless otherwise deemed appropriate, the Contractor will use only the topsoil excavated in a specific location for reinstatement operations in that location.

To promote fertility in the topsoil thin layers of ‘equivalent material’ may be added. These materials will include, but not be limited to, the following:
- Compost;

- Windrowed vegetation; and
- Mulch.

The Contractor follows:
- The Working Width will be re-graded to reflect the original profile
- Topsoil will not be replaced when it, or the subsoil, is soaked or waterlogged
- The subsoil will be ripped to remove soil compaction prior to topsoil replacement.
- After replacement, the topsoil will be stone picked, ripped and cultivated as necessary

Watercourse reinstatement
The following features of water crossings will be reinstated to pre-construction conditions as far as is practicable with deviations subject to approval by GOGC:
- Bed contours;
- Bed scour resistance along the line; and

Stabilization of all watercourses will be undertaken immediately, to the extent practical, upon completion of backfilling. Watercourse banks shall be stabilized within 2 days of backfilling.

The Contractor will introduce erosion control measures as necessary to minimize the potential for sediment release into watercourses until re-vegetation is established. The measures will also serve to stabilize the banks, helping to re-establish vegetation.
- seeding of grass;
- planting of bushes;

Special attention shall be paid to the cutting and reinstatement of the artificial dams on the river crossings. Mixing of dam material with other soil is not allowed. Excavated soil shall also be correspondingly separated and special compactor shall be used during reinstatement that will separately compact 300mm layers. Grass and different types of bushes shall also be planted on the final surface.

Ant Erosion Measures
Gabion boxes shall be manufactures per ГОСТ Р 52132-2003 and ОСТ 10323-2003 and wire shall be selected per ГОСТ Р 51285-99.

Marker posts and signs
The Contractor shall install signs and pipeline markers at all station sites, cathodic protection test stations, road, track, rail crossings, water crossings, casing vents, facility fences, field boundaries, as identified on the drawings and anywhere else deemed necessary to identify the pipeline. Where CP marker posts have been installed, these will act as pipeline markers.

Signs and markers shall be assembled and installed in accordance with the construction drawings. Pipeline aerial markers shall be installed along the pipeline corridor at each significant change in direction and every 1000m along the route.

6.23 As-Build Drawings and Record of Installation

During the construction the Contractor shall survey, record and produce as-built information and documentation. The Contractor shall provide all as built information both as hard copy and

electronically on CDs. All electronic data shall be in an AUTOCAD format, and suitable for input into GIS based on ArcGis ArcMap system.

The Contractor shall ensure mobilization of 2 experienced surveyors on the site separately equipped with corresponding devices, electronic tachometer and/or high precision stationary GPS (parameters of the equipment and calibration certificates shall be agreed with GOGC in advance). Each team shall also have individual vehicle and support personnel. Surveyors hall have experience with AUTOCAD.

As-Build Survey
The Contractor shall liase closely with the GOGC during all phases of the survey, and shall provide the GOGC with adequate opportunity to verify all measurements and details the GOGC considers necessary prior to backfilling.

Whilst conducting the as-built survey, the Contractor shall immediately notify the GOGC of any discrepancies between the design and as-built installation. This shall include, but not be limited to, such items as insufficient cover, misalignment, insufficient separation between pipe and foreign lines, drains, etc, that may have been installed by the Contractor. The Contractor shall be responsible for any re-work.

The Contractor shall maintain pipe records. These records shall show, as a minimum, each pipe joint, bend and fitting installed in sequence of installation, with unique pipe identification number, weld number, diameter, length and wall thickness, weld radiographs.

As-Build Pipeline Details
The Contractor shall survey the entire pipeline route and provide the GOGC with information, which shall include but not be limited to the following:

- Alignment sheet number.
- Position and extent of all over bends, sag bends and side bends.
- Depth of Cover.
- KP.
- X,Y,Z co ordinates for each weld along the whole pipeline.
- CP connections and test points.
- All boundaries, road, track, river, ditch crossings etc.
- Position of cathodic protection cable connections to pipe, cable routing and ground bed locations.
- Valves, tees, fittings and pipeline appurtenances.
- All underground services within the ROW.
- All overhead services within the ROW.
- All existing natural and manmade surface features within the ROW
- KP to marker posts.
- Protection slabs at crossings.

- etc.

Underground utilities and land drains
The position, direction, depth and nature (i.e. pipe/cable, size, material, product and owner, etc) of all the land drains and utilities exposed along the route shall be surveyed by the Contractor. The position and elevation above ordnance datum shall be determined whilst the pipeline trench is open.

Overhead services
The position, route and voltage of overhead power lines and position and route of telephone cables and posts shall be marked on the alignment sheets. If the pipeline route is changed during construction for any reason, the ground clearance to the overhead wires shall be re-surveyed and the alignment sheets plans updated as appropriate.

Survey data listings
The following survey data shall also be kept and be made available to the GOGC:

- Surveyor's field notes, including instrument calibration sheets.
- Formatted (field book style) output from the field data loggers.
- Calculation sheets, including all formulae, constants, observations and computed values used in computations.

As-build Drawings
The Contractor shall adopt GOGC prepared Alignment sheets, revise to represent the As-Built Survey Data and then submit to GOGC As-Built drawings as follows:

- 1:2,500 scale plans of the pipeline route indicating the exact depth of the pipeline and the position at which the depth changes. The pipeline shall be able to be located from as many fixed, permanent features as possible so that its position can immediately be established in the field. The location of all cathodic protection and pipeline marker posts and existing services (with their depths, diameters, material and indication of provisions for their protection) shall also be shown.

- A longitudinal section along the pipeline route at 1:2,500 with a vertical scale of 1:500.

- Ground levels shall be shown at maximum of 30 metre intervals unless significant changes in ground level require closer intervals.

- All vertical deflections and bends shall be noted on the drawings with an indication of the chainage at which any bend or deflection starts and finishes. Any services or physical phenomena necessitating the vertical deflection of the pipeline(s) shall be shown and large scale details (not less than 1:500 scale) shall be produced to indicate the actual installation of the pipeline in relation to all of the services or physical phenomena encountered along the pipeline route.

- At all identified crossings including all water crossings, ditch and road crossings the Contractor shall produce a plan and profile at 1:200 scale showing the exact location of the pipeline. A cross-section of the crossing at a horizontal and vertical scale equal to the plan showing the level of the pipeline and sleeves (if any) and their respective diameters.

These sets of drawings shall also show the position and location of all adjacent services and of any cathodic protection, pipeline marker posts and aerial markers and any other engineering data.

- 1:2,500 plans showing the location of all cables laid under the contract, cathodic protection equipment and anodes in relation to the pipeline and other fixed, permanent and temporary items.

Geodesic control
Major Survey Control: 1/25,000
Minor Survey Control: 1/20,000

Leveling
A line of level is to be run through the minor survey control to third order standards, where closures shall be within $12\sqrt{}$ K. mm, where K is the distance levelled in Kilometres. The levelling shall be tied to the Baltic (Khronstadt) Datum.

Accuracy
The accuracy of the points surveyed in the field shall be to the following tolerances:-

Horizontal: plus or minus 20 cms
Vertical: plus or minus 5 cms