

GENERAL SPECIFICATION

CIVIL WORKS

GS EP CIV 101

Earthworks

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1. Scope

This General Specification defines the minimum requirements for Site Preparation, Excavation, and Backfilling.

2. Reference documents

This document is the TOTAL E&P transposition of the TOTAL S.A. Harmonized GS GR CIV 100.

The reference documents listed below form an integral part of this General Specification.

Where there are national regulations, their particular requirements, and those of the standards or codes to which they refer, shall be applied, supplementing or amending the provisions of this document.

If there are no mandatory national regulations, international regulations, standards and codes shall be applied.

If there are no applicable international standards and codes, the national standards and codes shall meet all the following rules:

- Be chosen from the External Documents listed below, according to the projects in hand
- Be defined in the job specification.

In the absence of a specific exemption, duly justified by the Contractor and agreed by the owner, codes and standards of different origins may not be used in whole or in part.

If certain points in the regulations need to be clarified, the Contractor shall deal with the changes and/or additions to be made according to all the following requirements:

- Changes and/or additions to be described and justified
- Changes and/or additions to be adapted to the nature and environment of the structure
- Changes and/or additions to be considered acceptable only when they have been examined and approved by the Company
- A definitive list of regulations, standards and codes, be proposed, taken from the reference documents defined in this specification and the project's job specification
- As only the main standards are mentioned, Contractor be responsible for compliance with any secondary standards.

The list provided in this document should not be regarded as exhaustive.

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published at the effective date of this document.

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External Documents

Reference	Title
ASTM C117	Standard Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2,700 kN-m/m ³))
ASTM D1883	Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D4253	Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D4254	Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D6758	Standard Test Method for Measuring Stiffness and Apparent Modulus of Soil and Soil-Aggregate In-Place by Electro-Mechanical Method
ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
EN 933 (All Parts)	Tests for geometrical properties of aggregates (All Parts)
EN 13286-2	Unbound and hydraulically bound mixtures - Part 2: Test methods for laboratory reference density and water content - Proctor compaction
EN 16907-2	Earthworks - Classification of materials
EN 17892-2	Geotechnical investigation and testing - Laboratory testing of soil - Part 2: Determination of bulk density

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Reference	Title
NF P94-041	Soil: investigation and testing. Granulometric description. Wet sieving method
NF P94-051	Soil: investigation and testing. Determination of Atterberg's limits. Liquid limit test using cassagrande apparatus. Plastic limit test on rolled thread
NF P94-052-1	Soil: investigation and testing. Atterberg limit determination. Part 1: liquid limit. Cone penetrometer
NF P94-056	Soil: investigation and testing. Granulometric analysis. Dry sieving method after washing
NF P94-057	Soils investigation and testing. Granulometric analysis. Hydrometer method
NF P94-061 (Parts 1; 2; 3)	Soils: investigation and testing. Determination of density of materials on site - Parts 1; 2; 3
NF P94-062	Soils: investigation and testing. Measurement of density on site. Gamma-gamma ray log
NF P94-093	Soils: investigation and testing - Determination of the compaction reference values of a soil type - Standard proctor test - Modified proctor test
NF P94-105	Soils: investigation and testing - Inspection of compaction quality - Method using a variable energy dynamic penetrometer - Principle and method for calibrating the penetrometer - Exploitation of results - Interpretation

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Reference	Title
GS EP CIV 201	Design and construction of roads and stabilized areas
GS EP GEO 102	Onshore Geotechnical Investigations

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3. Applicability

This specification is within the scope of the following engineering & construction tasks:

- Preliminary and basic design
- Development of Project Particular Specifications (PPS)
- Detailed design when PPS do not exist
- Construction
- Expertise.

This specification is applicable to onshore facilities.

4. Definitions of terms

For the purpose of this document, the following terms and definitions apply:

California bearing ratio (CBR): Penetration test for evaluation of the mechanical strength of a soil.

Company: Any entity of the TOTAL Group mentioned in the contract or the order.

Contractor: Individual or company assigned the work contract. The Contractor may be responsible for carrying out the execution studies.

Engineering company: Individual or company providing, according to this specification, the following services:

- Basic studies and possibly detailed studies
- Potential procurement of material
- Placement of work orders
- EV2:

Modulus of deformation of the soil, determined with the plate load test, applying the formula:

$$EV2 = \pi \cdot (1 - \nu^2) \cdot Q \cdot B / 4S$$

with:

- S: settlement under the plate
- B: plate diameter
- Q: stress applied under the plate
- ν : Poisson's coefficient.

Maximum dry density (MDD): Highest density obtainable when the compaction is carried out on the material at varied moisture contents.

Maximum Index Density: Reference dry density of a soil in the densest state of compactness that can be attained using a standard laboratory procedure.

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Minimum Index Density: Reference dry density of a soil in the loosest state of compactness at which it can be placed using a standard laboratory procedure

Optimum moisture content: Moisture content at which the maximum density is obtained.

PPS: Project Particular Specification.

Relative density (Dd): Ratio of void indexes, used as a criterion of the quality of the compaction.

$$Dd = (e_{max} - e) / (e_{max} - e_{min})$$

with:

- e_{min} : void ratio for the loosest state of compactness
- e_{max} : void ratio for the densest state of compactness
- e : In place or target void ratio.

5. Scope of supply

The scope of supply is described in the order. It comprises all the constraints due to the application of the regulations and those due to the proximity of the existing works or units, operating or otherwise.

The utilities required for the site, for the inspections and for the tests, are the responsibility of the Contractor (unless otherwise stipulated in the contract).

Waste management – including earth and rubble - is under the responsibility of the Contractor.

6. Safety

The Contractor shall establish its quotation and its own safety plan.

All necessary permits shall be obtained from Company prior to performing any earthwork.

Unless otherwise specified in Company Site Specific Instructions, the following applies.

The Contractor shall place and maintain in good condition all the following features:

- Temporary fences
- Guardrails
- Barricades
- Lights
- Shoring
- Bracing
- And other protection measures required for the safety of personnel and the premises.



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Any work which restricts the full use of a pedestrian or vehicular roadway shall comply with Company Site Specific Instructions.

A clear space of at least 1 m shall be maintained on all sides of an excavation or trench.

When any excavation or trench reaches a depth of 1.3 m or when soil banks are greater than 1.3 m, all the following safety procedures shall be applied:

- Shoring be installed
- Sides be sloped or benched
- Trench treated as a confined space.

A safe means of entry and exit shall be provided for all excavations and trenches every 7.5 m.

When there is a risk of gas accumulation (for example in the case of works performed in or near a running unit), and whatever the depth, the following safety procedures shall be applied to the trench:

- Trench to be treated as a confined space
- Specific measures for gas detection be carried out.

Excavations shall be inspected by the Contractor according to all the following requirements:

- Daily inspection
- Inspection after rains and blasting
- With the objectives of possible cave-ins, failures of protective systems and equipment, hazardous atmospheres or other hazardous conditions.

When personnel enter any excavation, the following measures shall apply:

- Adequate safety measures be installed and maintained
- If there is an unsafe condition, workers will not be allowed to enter the excavation.

All rock blasting shall follow the Company Site Specific Instructions.

If rock blasting is required and authorized, the Contractor shall develop a written rock blasting safety plan for Company approval.

Concerning permits, Contractor shall abide by all the following requirements:

- Obtain and pay for required permits from authorities having jurisdiction
- Submit copies of permits to Company
- Obtain written permission from Company before explosives are brought to the site or before drilling is started.