

EK 23. TOPRAK İŞLERİ UYGULAMA PLANI (METHOD STATEMENT FOR EARTHWORKS) ÖRNEĞİ

METHOD STATEMENT for EARTHWORKS

1.0 SCOPE

This Method Statement defines requirements for Earthwork Works but it doesn't cover the earthwork activities related to underground piping, conduits and ducts. They will be covered under different Method Statements.

2.0 DEFINITIONS

- Earthwork** : Clearing, grubbing, stripping, cut and fill, excavation, and backfill and grading finish activities.
- Earthen Structures** : Permanent work items constructed as earthwork such as channels, ditches, dikes, embankments, etc.
- Fill** : All soil, soil-rock materials and treated or stabilized soils placed to raise the grade of the site or to backfill the excavated areas. Within this MS, fill and backfill materials are regarded as same.
- Borrow Material** : Suitable fill material obtained from excavations off the site, or from designated borrow areas.
- Stripping** : Activities consisting of excavation, removal and disposal of unsuitable soils.
- Stock Pile Area** : Designated area where borrow and additional material shall be piled.

3.0 REFERENCE DOCUMENTS

Such as applicable standards, specifications, regulations and Client's reference documents for the Project.

4.0 GENERAL REQUIREMENTS

All work shall be performed in compliance with the approved HSE Plan and Client's Earthwork Specification.

The Contractor shall employ a laboratory to perform all required tests. All documentation of the laboratory proving his competency shall be submitted to the Client's approval, prior to commencement of the Work.

During earthwork activities, all existing facilities, services, pipes, cables, instruments and survey monuments on, above, or under the surface of the area where earthwork operations are to be performed, shall be protected. Necessary inspection of existing facilities will be done by the use of proper equipment, before the work starts.

Trees, shrubs, and other landscape features specifically designated on the drawings for preservation shall be carefully protected during construction.

All cut and fill shall be safely sloped.

5.0 SURVEYING

The coordinates and elevations of the survey monuments shall be given to the Contractor by the Client. The Contractor shall verify the survey reference points.

The Contractor shall furnish these reference points on the Site and using these reference points, shall perform all surveying and staking required to complete the Work.

Existing Survey Monuments in the Work area shall be preserved and protected from damage or disturbance and shall not be removed unless necessary.

6.0 CLEARING AND GRUBBING

Areas to be excavated, filled, or graded shall be cleared and grubbed (cleaning the grass and roots).

Clearing and grubbing shall consist of the removal and disposal of trees, stumps, brush, roots, vegetation, logs, rubbish, and other objectionable materials. Stumps, roots, and other similar refuse shall be removed to a depth of not less than 150mm below the existing ground surface and to a distance of at least 600mm beyond the excavation limits. Holes remaining after removal of stumps, roots, and other similar refuse shall be backfilled with suitable material and compacted to at least the density of the adjacent undisturbed material.

Material cleared from the site shall be either burned or removed from the site. Disposal or burying of cleared materials shall comply with local laws, codes, regulations and the approved HSE Plan.

7.0 EXCAVATION

7.1 General

Excavation shall be done after clearing and grubbing has been completed.

Excavations shall preferably be performed in dry conditions. Proper drainage for excavated areas shall be maintained to prevent ponding of water. Excavated areas shall be kept dry by pumping or other suitable methods. Prior to completion of drainage facilities, sufficient temporary ditches and culverts to prevent ponding shall be installed. Well point systems may be applied where excavations go below the groundwater surface. Materials excavated for the permanent work shall be classified in accordance with the specification. Classified material designated for use in the permanent work shall be properly segregated and stockpiled. Material not allowed to be used in the permanent work shall be disposed of in accordance with the Client's directions.

Borrow material also shall be classified before placement in the permanent work.

Cut slopes shall have a maximum horizontal to vertical gradient of 1:1,5 unless otherwise indicated on the drawing or as controlled by stability considerations for specific soil conditions for each excavation location.

For personnel safety and work protection, excavation shoring shall be used when necessary. Excavation supports shall conform to the approved HSE Plan.

Extra care shall be taken during excavation work around the existing facilities.

7.2 Stripping

Stripping operations shall be performed prior to cut and fill, borrow material excavation, embankment construction, and backfill. Where fill material is to be placed over an existing paved surface, the pavement shall be removed and wasted, unless otherwise noted on the drawing.

Stripped material classified as topsoil, shall be stock piled for later use. Other stripping material including excess cut, unsuitable material, and excess topsoil shall be disposed of at designated general landscaping fill areas or spoil areas.

7.3 Stockpiles and Borrow Areas

Stockpiled topsoil and fill material shall be mounded and shaped to avoid rainwater to cause deep erosion. The stockpile area shall be graded to drain surface water away from topsoil and fill stockpiles. Water shall not be allowed to pond near the base of stockpiles. Stockpiles shall be shaped to be able to calculate the volume easily.

Fill or stockpile areas, and onsite borrow areas and their types shall be designated by the Contractor. No material shall be supplied or placed prior to Client's approval.

All borrow areas shall be left in a neat and safe condition, and shall be provided with adequate drainage to prevent ponding.

7.4 Structural Excavation

Structural excavation includes excavations of footings, mats, pits, foundations, grade beams, retaining walls, manholes, catch basing, and other similar constructions. If the quantity of footings are much and their excavation depth is similar, instead of single and

separate excavation, mass excavation (bath tube excavation) can be preferred. This application will make the excavation, backfilling and concrete works much easier and safer, although increases the excavation and backfill volumes.

Tests of the subgrade conditions shall be clearly reported in accordance with the approved Inspection and Test Plan. When soft or unsuitable soils are encountered at designated footing grades, such soils shall be removed, and replaced with suitable backfill material and compacted or filled with seal slab lean concrete.

Excavation depths shall include provision for seal slabs if required. 75 mm minimum seal slabs (blinding) shall be provided in structural excavations to preserve the integrity of the foundation soil until the permanent work is placed.

7.5 Earthen Structures

Drainage ditches, culverts, and banks shall be constructed to the slopes, sections and inverts shown on the drawings.

Unstable soil in the slopes or excavation bottom shall be removed and replaced with suitable material. The bottom of ditches shall be graded such that ponding will not occur. If material is soft and not acceptable, it shall be removed and replaced with acceptable material and compacted to 95 % of the maximum dry density determined according to ASTM.

Over excavations shall be backfilled with suitable material and compacted to at least 95 % of the maximum dry density determined according to ASTM.

8.0 FILL MATERIAL

Fill material shall be obtained from excavation areas, borrow pits or other approved sources. These materials shall be essentially free of topsoil, organics, roots, debris and other deleterious substances. Fill material shall be classified by the Laboratory, prior to use in the permanent Work. The material source shall be monitored by the Laboratory to verify suitability of the fill for its intended use.

9.0 PLACING AND COMPACTING FILL MATERIAL

9.1 General

Fill operations shall be performed after areas are cleaned and made ready for backfill. Only approved material by the Client shall be used for fill operations.

9.2 Subgrade Preparation

Before placing classified fill material, the soil surface shall be graded, wetted or dried to produce the required moisture content, and compacted again to the specified percent of maximum density. Subgrade preparation shall include soil or soil cement mixture treatment as specified on the drawing or specifications.

Before placing classified fill in area where structural excavations have been made, all formwork, sheeting, shoring and other temporary facilities shall be removed.

9.3 Fill placement

Areas to receive fill shall be essentially free of soft or loose soils, roots, trash, and other foreign matter. Only classified fill material approved by the Client shall be placed in the permanent work.

Special care shall be taken when backfilling adjacent to manholes, catch basins, and other drainage structures to prevent settlement of pipes entering or leaving structure.

Fill material shall not be deposited on frozen ground and no frozen material shall be placed as fill.

Backfill shall be placed around foundations as soon as progress of the work permits and after all forms have been removed. Backfill shall not be placed against basement or retaining walls until the concrete has developed a strength of not less than 85 % of the design strength.

After areas to receive fill have been properly prepared, material shall be placed on spreads of thickness depending on compacting requirements to achieve specified compacted density. Large continuous areas shall be uniformly filled starting from the lowest point. Horizontal layers may be constructed in placement of a width to suit the compaction equipment. Fill adjacent to structures where hand operated equipment is used shall be placed in 150 mm loose layers or lesser thickness if necessary to develop required density.

Dikes constructed of fill shall be overfilled as required for ease of compaction, and then cut back and trimmed to the required line and grade to form of a smooth uniformly compacted surface. Dikes shall be fully constructed with cohesive material as shown on the drawing. Temporary access ramps or openings in the dike can be constructed as approved by the Client.

Fill slopes shall be protected as necessary to prevent washouts, gullying and other degradation during the construction period.

9.4 Compaction

Compaction shall begin only after the fill has been properly placed and the material to be compacted is at the proper moisture content. Each layer of fill shall be compacted to the required density before proceeding with the next layer. Compaction shall be performed with equipment compatible with the soil type.

Fill should be compacted in horizontal layers with uniform density and moisture conditions. The compacted thickness of each layer should be appropriate for the type and size of roller and specifications. But generally, should not exceed the following values;

- a. Max 200mm for Class I (Structural Clay Fill)
- b. Max 300mm for Class II (Structural Sand Fill)
- c. Max 300mm for Class III (Structural Crushed Rock or Gravel Fill)

Fill materials shall be compacted as per related specifications.

Fill for general site grading and sidewalks shall be compacted to a minimum of 95 % of the maximum dry density.

Road and parking areas to be compacted as per road construction documents.

The proper type and size equipment to be used to obtain the required compaction for each type of soil shall be determined in the field considering the results of proof test. Proposed equipment and compaction procedures will be decided based on field tests and their approval by Client, prior to the operation.

Impact type equipment shall be used to compact cohesive soils. This equipment may be motor driven rammers or pneumatic tampers in confined spaces, self-propelled rammers in trenches, or sheep foot rollers or pneumatic rollers in open areas. Vibratory rollers or plates without impact action shall not be used to compact cohesive material.

Vibratory equipment such as vibratory plates, vibrating smooth drum rollers, and vibrating sheep foot rollers shall be used to compact granular backfill, except in very confined places.

If the material to be compacted contains excessive moisture, the material shall be processed to reduce the moisture content to the specified limits. If the soil has less than the specified moisture content, or is likely to lose enough moisture during compaction, water shall be added and the soil lift thoroughly mixed before compaction, to bring the moisture content of the soil before the completion of the compaction to the specified below limit as minimum.

To provide a blending interlocking of adjoining surfaces in fill placed for dikes, the upper surface of compacted layers that have been rolled smooth shall be lightly scarified to a minimum depth of 25mm and moistened prior to placing the next lift.

After compaction of the fill, field density tests shall be made. If the material fails to meet the specified density, the entire placement area shall be reworked as necessary to obtain the specified density. The compaction method or equipment may be altered as required to obtain the specified density.

Fill adjacent to the structures such as ring foundations, spread footings, grade beams, trenches, retaining walls, pit walls and basement walls to a minimum distance of from 1.2m from the sides of the structure, shall be compacted with hand-operated equipment only.

9.5 Finishing

Final surface of compacted fills shall be graded as indicated on the drawing. All finished fill surfaces shall be maintained against erosion or other deterioration until the work has been completed and accepted by the Client.

10.0 EXAMINATIONS, TESTS AND REPORTING

10.1 General

All earthworks shall be inspected/tested in accordance with the approved Inspection & Test Plan. Inspection / Test Reports shall be issued, distributed, and filed.

10.2 Classification Testing

The laboratory shall visually classify all soil to be tested and shall verify that the density test results are representative of the entire placement area being tested for acceptance. Classification testing including gradation and plasticity characteristics shall be performed when changes in material type are noted. One set of test for every 3800m³ of the same type material placed shall be performed as minimum.

10.3 Moisture Density / Maximum – Minimum Density Tests

At least three laboratory tests for compaction control, either moisture – density relationships or maximum – minimum density determinations, as applicable, shall be performed initially for each fill and subgrade type to be compacted. Additional tests shall be run if changes in material type become evident, as determined either by visual observation or as indicated in test results (i.e. tests exceeds maximum laboratory dry density by more than 2 %.)

10.4 Field Density Tests

Either sand-cone method or nuclear methods may be used. Tests shall be performed in accordance with the Standards addressed in the Reference Documents.

The frequency of field density tests of compacted fill and backfill shall be as defined below:

- a) At least one test shall be performed for every 465m² of each lift placed in unrestricted areas for roads, parking areas, embankments, fills, earthen structures, and other similar constructions.
- b) At least one test shall be performed for every 38m³ of compacted backfill in restricted areas.
- c) Each lift of fill placed in an unrestricted area shall be tested. Tests shall be taken at various depths throughout a lift thickness.
- d) Subgrade areas shall be tested at the same frequency as fill placements. At least three tests shall be performed within each subgrade area of limited extent.
- e) All testing instruments shall be furnished by the laboratory with current calibration certificates.
- f) The number of field density tests shall be increased if inspection reveals that the moisture content is not uniform or if the compaction effort is variable and not considered sufficient to attain the specified uniform density.