United Nation Development Program

UXOs and Solid Waste Management
PAL 10-71646

Technical Specification

The Excavation, Landfill and Leveling

Preface:
This section deals with the work of excavation including excavation of the landfill and the transfer of surplus soil off-site and supply the necessary soil valid for the purposes of landfill. It also deals with the conditions that must be provided to ensure the proper execution of these works and to ensure the public safety.

Remove the obstacles of the work:
The contractor must remove all the obstacles impeding the progress of the work, which arise during the process of excavation and removal of residues. This includes, but not limited to the sewer pipes and the unnecessary inspection chambers. He must also exude the smack and remove septic tanks and cesspits, and the water collection or the wells that are incompatible with the process of the excavation or the construction of the project. He should also separate sewer lines or turn then temporarily or permanently, wherever necessary, as well as the concrete rules, if any, in accordance with the instructions of an engineer, and transferred the contaminated dust to allowable places outside the site. If necessary to landfill these lines partially or totally, the contractor may fill them with dry sand and self-compact concrete well according to the specifications and instructions of Engineer.

General items
The works of the excavation including the excavation and the landfill are done according to the limits and levels shown on the drawings, and the contractor must set a number of levels and points along the street to make sure of the levels in the drawings.
If the output of all the excavations any part thereof is valid for use in the landfill (with the approval of the engineer), the contractor must preserve them in at an appropriate place and will not impede the movement or the mobility, and maintain them valid until being used. If none of them remained for reclamation, then he must remove them at his own expense to the allowed disposal locations outside the site.
The contractor must take all the precautions with the approval of the engineer, to prevent leakage or accumulation of water within the excavation, regardless of their source. And when the water appears in the excavations, the contractor must exude it using the most appropriate method. If their existence within or outside the excavation, then it is considered a source of danger on the safety or to the neighboring facilities, therefore the contractor must pump the water continuously. In the case of using the pumps for the former purpose, the contractor must assemble them on an enough distance from the excavations as determined by the Engineer, in order to prevent any movement or disturbance within the excavation or beneath the foundations of the establishment or the neighboring buildings and installations. However, the discharge of water is done according to the instructions of the engineer.
If the contractor, while engaged in excavation works, found the extensions of the electricity, or water or telephone and any other similar services, for known or unknown purposes, the engineer must be notified about it immediately and in writing, and they must coordinate together with both the employer and the competent authorities to take necessary measures regarding the transfer of the extensions or rehabilitate it, and estimate the malfunction that was caused for the contractor or the additional cost for doing the transfer or the related reform. If that is not possible to inform the engineer about these extensions to the engineer,

the contractor has damaged them during his practice of his work in the places of their existence, he must repair them as valid as it once, and as approved by the engineer and his instructions, at the private expense of the contractor.
Before beginning with the reclamation work for any purpose, the contractor must take the approval of the engineer about the selected materials for reclamation purposes, whether the results of the excavation or imported from outside the site.
The contractor shall not start putting the pipeline of the services and other works before the engineer conduct the inspection on the accomplished excavations, and tell him about the initiation of the works.
According to the Sub grade, the self-compact concrete is at least 98%, the difference in the levels + 2 cm as a maximum, in what considers the two case of excavation and the (CBR) for the (Sub Grade) should not be less than 15% at 98% self-compact concrete.
In the case of the landfill to a depth of 1.5 meters from the surface of the final paving, the landfill is and no less than done on layers that do not exceed 20 cm (Loose) ratio of self-impact concrete 98% below that depth, and the percentage of the self-impact concrete should not be less than 90%.
In the works of settlements, the price of the contractor must be comprehensive to the deluge of all the wells of the sewage or any other holes existing in the street, and it must be taken away be at the first place or filled with Road base layers of less than about 20 cm of self-compact concrete be treated well with the water.
In the works of the settlement, the price of the contractor must include the download of all the sewer lines as well as the water to the suitable depth in case of its objections to the levels as well as any replacement of pipes that may be damaged and according to the instructions of the supervising engineer.
The proportion of tests must be done with CBR% of the natural soil according to the instructions of the supervising engineer.

Excavation trenches for the extensions of the public services

- The excavations of the trenches are done for the sewer pipes, or for the purposes of extending the pipeline for the potable water, or any further extensions for the public services, according to the drawings and the instructions of the Engineer and in accordance with the levels and the necessary dimensions to ensure the proper execution of these works.
- If a soft, non-balanced layer appeared on the indicated level on the drawings or according to the instructions of the supervising, the contractor must remove that layer, and replace it by being re-filled with sand or soft soil, or a valid soil to the required level according to the approval of the engineer. In the case of using the soil, it must filled with self-compact concrete on layers with a thickness of no more (20 cm) for each one of them to give the maximum dry density of no less than (98) percent from the maximum dry density determined by the laboratory and tested with Proctor Modefide on the condition that such layers are put on a level less than (200) of the required level. The. The remaining sand will be replenished.
- The contractor must settle the bottom of the excavations, as the required inclination on the drawings and the instructions of the engineer, and do not leave any protrusions or rocky parts at the bottom of the excavations. He also has to clean the bottom of the excavation from any other exotic materials, such as the dirt and the grass and the falling tree branches and other harmful substances. He is not going to be paid any premium or additional rate in return.

- If the contractor dug too much from what is shown on the drawings and in the instructions of the engineer, he must re-fill the excavation location of whether by the extra soft gradual sand or the selected materials for the fill, which must be sprayed with water, and put self-compact concrete as needed, to get to the maximum dry density of no less than (98) percent from the maximum dry density determined by the laboratory, and examined at the test Procter Modefide. The contractor will not be paid an additional premium or extra rate in return.
- The reclamation works on the layers are done on no more thickness of 20 cm for each layer the settlement and spraying with the water and even the self-impact concrete to a maximum dry density of no less than 98%, according to Procter Modefide.

The Places of the disposal

- The contractor must adhere to the instructions of the official authorities on the authorized disposal places, if the work was within the limits of these authorities. However, if the work was outside its borders, the contractor must obtain the necessary licenses and permits at his own expense.

Reclamation for the trenches of public service extensions

- The fill works are not allowed to be done before the approval of the engineer, and to make sure that all the structures, filling and packaging are done according to what is shown in the drawings and the instructions of the engineer.
- The pipeline will be spread out over a bed of sand with a thickness of 20 cm and the pipelines will be packed with a layer of clean fine sand with a thickness of at least 30 cm and the trenches will be filled with sand all along its on layers with a thickness of no more than 20 cm per each one and with self-compact concrete with a percentage of 98%.
- The materials that are selected for the landfill must not contain any kind of stones or broken rocks or pebbles, or the diameter for each one is no more than (100) mm. the layers must be filled alternately with self-compact concrete on both sides of the pipeline and the layers must be of no more than the thickness of each of them (200) mm and sprayed with water then add self-compact concrete, taking into account that the method of self-compact concrete do not constitute a threat on the pipelines or its accessories.
- The connections of the trenches are not allowed to be left without fill, and the contractor must do the filling step by step with a complete in a complete compliance with the technical specifications and within the daily working hours in the project.
- The contractor must do what is required in order to do the self-compact concrete around the sinks on layers and, as appropriate, according to the specifications without ignoring the need to conduct tests on the sinks in all directions may not be sufficient to check only above the lines.

Prohibited material in the landfill

Taking into all the aforementioned considering the drawings and the instructions of the engineer, it is prohibited to use the following articles in the fill in any form and for any purpose:

- Soil excavated from the bottom of Swamps and Salinas.
- Peat and humus. (Peat)
- Trunks of trees, herbs and roots.

- Organic materials and decomposed.
- Spontaneous combustible materials spontaneous
- The material that contain stones or broken rock or gravel larger than later (100) mm, or the frozen materials that are in a state of Freeze.
- Soils with Plasticity Index more than (35) percent.
- The soil with a vulnerability to increase or contain excessive water, or extra vulnerability of swelling when increasing water content.
- The rubble of buildings.

Supporting the sides of the holes

- The contractor must on his own responsibility support the sides of the holes in order to prevent its collapse, in order to protect the workers and businesses equally inside it. The contractor shall be paid an additional premium or extra price for it. In the event of increasing the depth of the holes of more than 2.5 meters, a shutter is used to support aspects of excavation.
- The engineer has the right to make more tests, which it deems appropriate, on the soil or the materials and tools that are to be used to support the sides of the holes, in order to identify their properties. The contractor shall not be paid any raise for any additional work for that.
- If the contractor did not want to support the sides of the holes, and the engineer approved on that, then the contractor must make the necessary inclination to ensure that the non-collapse of the sides of the holes, so that the side inclinations will not be no less than (2) horizontal: (1) vertical, provided that the depth of the excavations is no more than (500) cm. He must then make the necessary Berms for the cuts and the appropriate inclination for the purpose. The contractor must make the necessary calculations to make sure that the sides of the holes will not slide in all conditions, and to submit those accounts to the Engineer for approval. This approval does not exempt the contractor from taking the full responsibility for the safety of the excavations, or extra work for the works mentioned in this item.

Measures and the comprehensiveness of the prices

- The contractor must under the supervision of an engineer, check the drawing of the area and topography included in the documents of the tender, indicating the levels of the site in detail, prior to the initiation of the works in the site. And must be adopted and signed by both the engineer and the contractor to become a reference for the measures.
- The individual prices of the excavations set out in the table of the quantities are comprehensive to all the requirements of the work according to these specifications. If there is no explicit item in the table of quantities concerning the clean up of the site and the removal of the dirt rubble, plants, trees and other obstacles, then the individual prices of the previous excavation works are comprehensive of all that work. If there are no items in connection with the types of the excavation, the individual prices of the excavations provided in the tables of the quantities are comprehensive to all types of soil, rocks and old foundations.
- The individual prices of the excavation works are comprehensive to all the required works to ensure the safety, including the support for the sides of the hole and establish the necessary inclination to prevent the collapse of the soil, water seepage, and other procedures set forth in the special specifications and these specifications.

- The individual prices for the excavation works are considered comprehensive in the way of dealing with the outcome of the excavations wherever needed within the work and, according to the specifications of refill around the foundations, settling the supporting walls of the building and the walls of the support, the settlement of the site and fill the agricultural soil in the allocated areas to them and transfer the surplus to the outside of the site.
- The excavations are measured according to the engineering measures in the unit set forth in the table of the quantities according to the dimensions and formats shown on the drawings and the depths to be dig, according to the instructions of the engineer.
- If there was a special item on the agenda concerning the fill by materials selected from outside the site, the measures is done according to the engineering measures in cubic meter for the self-compact concrete volume that was filled from those materials to the level determined by the Engineer.
- The CBR test and Proctor Modefide modified under the layer of the base course will be at the expense of the contractor and scheduled on the items of the works with its numbers according to the Professional standards and the instructions of the supervising engineer.

The works of the soil of (the Base Course)

1. After identifying the areas that need the soil of "the Base Course", the base course will be supplied to those areas with the acknowledgment of the supervising Engineer and his approval. The supply must be from a quarantine approved by the municipality, after doing the laboratory tests needed on the sample brought by the contractor.
2. The owner has the right to refuse any sample with a test with the naked eyes which he finds not identical to the required type before doing any laboratory tests. And the contractor must remove them from the site as immediately upon request from the owner or his representative in this regard. Further tests must be conducted to confirm that the base course of does not contain any traces of mud or mixed with base course.
3. The base course is spread on layers with a thickness of no more of 15 cm. the spread, the mixing, the settlement, the spraying, flatten and rolling for each layer in order to reach the maximum limit of compression and the required laboratory tests must be done at the expense of the contractor.
4. After the spread, mixing and settling, flatten the base course, they must verify the validity of levels and they must not be different from the required level in each layer which is (5) mm. all the elevations and declines that exceed the allowed differences by removing the unwanted work or by adding new materials according to the instructions of the supervising engineer.
5. After preparing the layer of the base course layer, it must be preserved and maintained by spraying water all the time and flatten until it is covered with asphalt or the interlocking tiles. If it is dried or instable because of the movement of pedestrians and vehicles or otherwise, it must be reprocessed and prepared again.
6. The General specifications of the Base Course are as follows:
   A. The maximum dry density must not be less than 2.1g/cm^3.
   B. That there will be no stone size greater than 3".
   C. The Materials that pass through a sieve 4-3, "ranging from 60 to 90%.
   D. The limit of the liquidity does not exceed 25% (L.L).
   E. The plasticity index ranging from 0% - 6% (P.I).
   F. Spraying, flatten, and self-compact concrete up to the maximum intensity of 100% Modefide Procter.

G. C.B.R value must not be less than 80% after 4 days of soaking.
H. The calculation in this item is done square meter box and according to a model cross-sectional of the road. The area under the front stone or the belts is not calculated. The base course under the stone or the belt shall be 10 cm and to be loaded on the unit price for the linear meters of the front stone or the belt.
I. The proportion of the waste in a Los Angeles device is no more than 40% according to the test of measurement.
J. Soundness in sodium sulfate solution is no more than 12% and no more than 18% when using magnesium sulfate.
K. The longitudinal contraction shall not exceed 3%.
L. (SAND EQUIVALENT) must not be less than 40%.
M. (ELONGATION & FLAKINESS) must not be more than 35% for each one.
N. The excess in the progression of the used materials passing through a sieve must not be more than 7% pf the percentage of the adopted sample.
O. Progression is done on five samples taken from the site after being mixed to be compared with the original progression.
P. All the tests are done on the supplied materials when changing the source or at every supply of 1000meter cubic.
Q. The progression of the base course is as the following:

Number of sieve	**1.5"**	**1"**	**3/4"**	**1/2"**	**3/8"**	**4**	**10**	**40**	**200**
The percentage of the passing	**100**	**100-75**	**90-60**	**80-45**	**70-40**	**65-30**	**40-20**	**20-80**	**10-5**

R. When examining the test of self-compact concrete for every layer, there samples at least must be taken from every street in 1000 square meter of the area of the layer or 200 meters of the road.

The paving works with asphalt

1- After the completion of the works of spreading and settling the layer of the base course, and before the contractor begin in the spraying of liquid asphalt, he must sweep and clean the surface to be sprayed by using the pressurized air machine and it must be dry before starting the process of spraying, and after taking the written approval of the supervising engineer the contractor shall spray the material called (MCO) or its equivalent on the layer of the Base Course with a rate of 1 kg/ m^2. Spraying must be done immediately and without any delay, after examining and accepting the top layer of the Base Course and the area should be closed to traffic until the end of the pavement. They must work to prevent the filler from flying, and to retain the Base Course humid.

After a period of at least 24 hours of the spraying of (MCO), the contractor can supply and spread the ready hot asphalt layer from an approved factory of progression 4/3" "and the proportion of the Bitomin according to the asphalt mixture design and the allowed differences in the specifications ±30.0% .
If the case of using (Emulsion) for Prime coat or Tack coat, the contractor must then show a certificate from the laboratory that confirms the validity of used material before the supply. They must also adhere to the instructions for the product for the rates of spraying, as well as

the processing time (curing time). The supply of the Prime coat and the Tack coat to the site must be in closed packages and take a sample for testing to ensure their conformity with the specifications prior to the commencement of the work of spraying.

1. After the completion of the preceding item, the cleaning of the existing asphalt by using the mechanical broom or pressurized air, and after taking the approval of the supervising engineer, the Tack coat (RC2) is sprayed or its equivalent in accordance with the instructions on the of the product and the report of the laboratory.
2. After the completion of the previous item and the approval of the Supervising Engineer, an asphalt layer will be supplied progression 2/1".
3. The asphalt mixture is from the hot type and from a mechanical mixer from an accredited factory.
4. The thickness of the hot asphalt layer is 6 cm (or according to the table of quantities) and is less than 3 mm of the required thickness. When the shortage in the thickness of the asphalt layer is more than 3 mm and up to 15% of the required, the layer is accepted with 15% discount of the price of the item for the failed areas but the shortfall is more than that, then these areas must be removed and replaced with a new class rather than identical to the specifications and at the expense of the contractor.
5. The Ministry has the right to conduct the necessary laboratory tests, at the expense of the contractor.
6. A new spreading machine must be used for the spreading of the asphalt layer and the use of the appropriate number of entries for the self-compact concrete.
7. In the case of cutting the asphalt in any area, especially around sinks , the asphalt is returned back around sinks and it is not permitted to use concrete instead of asphalt.
8. The contractor is being paid in this item and square meter sand the required thickness after flatting.
9. The progression of the gracels in the hot asphalt layer include 4-3" (per Bitomin 60/70 according to the design of the asphalt mixture, and the permitted differences in the specifications +0.3%).

Number of sieve	**3/4"**	**1/2"**	**3/8"**	**4**	**10**	**40**	**80**	**200**
The percentage of the passing	**100**	**80- 100**	**87-70**	**50-65**	**50-35**	**30-16**	**20-10**	**9-4**

9. The progression in the asphalt mixture is the progression ½" (the percentage of Bitomin according to the asphalt mixture design, as the permitted differences in specifications + 0.3%) were as follows:

10.

Number of sieve	**1/2"**	**3/8"**	**4**	**10**	**40**	**200**
The percentage of the passing	**100**	**70-100**	**70-50**	**52-32**	**20-10**	**9-4**

- The maximum density of the mixture after the self-compact concrete is not less than 97% of the intensity of the approved Marshall Mix design - on the basis of the attached specifications and not according to the daily Marshal as appropriate with no less than 2300 kg/ m^3.

13.5% min = V.M.A. (binder course)
V.M.A. 14.5 % min (W.C.)
V.F.B. - Voids filled with bitumen = 60-75%
V.T.M. - Voids in total mix = 3 - 7% (binder coarse)
V.T.M. - Voids in total mix = 3-5% (wearing coarse)

- Marshall stability of at least 900 kg.

Streamlining: 2-4 mm.

- The proportion of waste of gravels in Los Angeles device is no more than 40% of the surface layer and 50% of the association layer.

The gravels must not contain any Clay Lumps.

- Soundness in sodium sulfate solution is not more than 12% and than 18% when using magnesium sulfate.

The degree of absorption of not more than 2%

- The mixture must be handed over at the work site at temperatures between (139 to 163) Celsius

There should be an extraction Test at the beginning of the working day or when noticing any change in the shape or the color of the components of the mixture and the sample must be taken from the factory or after Finisher and before flatting, they should not spread after having the results of the extraction Test and to verify the safety of the mixture and its identification or making the necessary corrections.

- In the case of failure in the examination of a sample of self compact concrete, the test is done again after the self compact concrete in the next day directly at noon by a PTR for two hours. The new test should be done by taking two samples before and after the failed sample in a distance that does not exceed ten meters in every direction and the sample that succeeds represents half of the distance only and in the case of failure the same standards shall be applied.

In the case of the failure of the examination of a sample thickness of the asphalt, the examination is repeated by taking core samples within ten meters in every direction, and each sample will represent half of the distance.

- All the tests of thickness and density including the repetition tests if found must be held within a week of spreading the asphalt layer and in the case of failure in obtaining the required proportion of self-compact the following procedures must be taken for the failed areas:

Even if the excess is up to 1% the layer shall be accepted with a discount of 10% from the price of the item.

- Even if the excess is up to 2% the layer shall be accepted with a discount of 20% from the price of the item.

Even if the excess is up to 3% the layer shall be accepted with a discount of 35% from the price of the item.

- If the excess is more than 3%, the asphalt layer is removed and replaced with a new one at the expense of the contractor.

A sample is taken for examination every 500 m^2 of the area of the layer or every 200 linear meters of single lane traffic, whichever is less, and the test is done according to Ashto test.

- In the use of a slat with a length of 4 meters, the allowed excess in the flatness of the surface must be as follows:
    II. In the longitudinal direction, no more than 6 mm.
    III. In the cross direction, no more than 3 mm.

The difference between the alleged design of the road and the performed on the ground must not exceed 5 mm.

The way of spreading and flatting

- The asphalt mixtures can not be put unless the air temperature is ten degrees Celsius or more and when the weather is not foggy or rainy and when the current surface is free of humidity

The load is unloaded from the vehicle specialized in this work and unloading it directly to the spreading machine which must be a mechanical one.

- Iron rolling compactor weighing 8 tons must be used and rubber flatting weighing 12 tons. They must use 3 iron roller machines and one rubber rolling compactor for each spreading operation. The flatting starts when the temperature of the mixture is adequate to support the weighs of the rolling compactors to withstand without adverse effects, the rolling is done in the following manner:
    1. First the rolling compactor weighing 8 tons, with an appropriate number of times and the rolling must be from the bottom to the up through the cross direction of the road and in coordination with the supervising engineer.
    2. Then the rubber rolling compactor then passes many times and the direction must be from the beginning of the road to the inside, and from the bottom to the top and by cooling the wheels of the rolling compactor by using cold water to prevent the adhesion of the asphalt with the wheels.
    3. What shows the degree of access to the final self-compact concrete is the disappearance of the signs of the rolling compactor wheels on the surface of the road.
    4. The contractor must ensure the adequate protection of all newly self-compact concrete from the traffic until it is harden to the required degree.

The Tests required for all the materials used in the project

This paragraph includes a summary of *some* of the required tests for *some* of the materials used in this project and for the required samples

Number	Statement	Required tests	Number of samples
1	Land Fill works with base course	- Proctor Modifide test the density - CBR test - self-compact concrete tests	**- Once at least/ or whenever the type of the supplied soil is changed** - A sample for every 250 square meter
2	The Base Course	- Proctor Modifide the density - CBR test - the granular progression tests - the liquidity test - the plasticity Index - The self-compact concrete tests - Los Angelos Test - The sand Equivalent - and any other tests according to what is required by the supervising engineer	- A sample for every 250 square meter
3	The Front Rock	- The fracture test (pressure resistance) - The theoretical test	The number of dimensions for every 1000 meter and with a minimum limit of three stones for every project.
4	Interlocking tiles	the fracture test (pressure resistance) the land test the absorption test the dimensions of the rock	Two tiles for every 1000 pieces
5	Remicon Hardened Concrete	slump test the fracture test (pressure resistance)	one sample for each quantity less than 20 meters cubic two samples for each pouring more than 20 meters cubic three pairs at least of samples for each concrete pouring