

TECHNICAL SPECIFICATIONS

CIVIL WORKS

CIC WASHER FOUNDATION

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300 CIVIL WORKS

300.1 GENERAL

The civil works include the construction of separate concrete block foundations for new CIC field washer equipment.

The works will include in general:

- Excavation and soil works:
 - Removal of vegetation
 - Soil excavations
 - Backfill and compaction

- Concrete works:
 - PCC workfloors
 - Reinforced concrete foundation blocks

Landscaping including site levelling after completion of the foundation works is not included in this scope.

300.2 SITE LOCATION

The site is located to the North of the main processing plant at Iamgold. The exact coordinates of the foundation will be determined on-site.





301 EXCAVATION AND SOIL WORKS

301.1 GENERAL

Excavation works include (but are not limited to):

- Removal of vegetation
- Soil excavations
- Backfill and compaction

Site preparation shall be carried out in accordance with the dimensions and elevations indicated on the specific drawings. Specific work items are:

- Field measurements
- Installation of permanent and/or temporary fencing.
- Site clearance.
- Topsoil stripping.
- Pre-earthworks drainage, e.g. ditches.
- Earthworks - cut, fill, grading and compaction.
- Stockpiling.

301.2 SITE CLEARANCE

All areas to be excavated, filled or constructed upon, shall be stripped entirely of top soil, including removal of vegetation, roots, debris, shrubs and other obstructions.

The stripped material shall not be used as fill and shall be removed from job site or stockpiled as directed.

After all unsuitable materials are removed, refill the excavation in layers to the required elevation with suitable fill material and compacted.

BUILDING CONTRACTOR shall inform CONSTRUCTION MANAGEMENT, in writing, concerning any existing obstacles, which are detected during top soil stripping and/or excavation work.

BUILDING CONTRACTOR's report shall include, but is not limited to location, description, dimensions, elevation and any other data determining the exact extent of the underground objects.

301.3 GRADING

Grading operations shall meet the requirements given in the specific drawings and shall be in accordance with the relevant sections of this specification.

Ensure that culverts, piping, conduits and other features under sub-grade have been installed.

Deposit and spread subgrade fill material for site preparation in uniform, nearly horizontal layers, to such loose depth (not exceeding 300 mm) that, when compacted, the required density will be achieved.

301.4 EXCAVATION

For selection of the equipment, the type of soil, presence of existing constructions and environmental matters shall be taken into account.

Equipment and work sequence are BUILDING CONTRACTOR's choice, but are subject to the approval by CONSTRUCTION MANAGEMENT.

BUILDING CONTRACTOR shall provide and maintain the necessary shoring and bracing to prevent excavation cave-ins and damage to existing and surrounding work caused by settlement, lateral movement, undermining, wash outs and/or other.

All necessary measures shall be taken to keep excavations free of water.

Excavation shall extend a sufficient distance from walls and footings faces to enable placing and removal of formwork, the installation of utilities and other works and to provide access for inspection. An exception would be where the concrete is to be cast directly against an excavated surface or shoring.

Where excavation is required for several closely spaced footings, the whole area may be excavated, subject to approval by CONSTRUCTION MANAGEMENT.

Where soft, unstable or otherwise unsuitable material is encountered at the bottom of a cut, excavation shall continue to a suitable level approved by CONSTRUCTION MANAGEMENT. The cut

shall then be refilled to the required elevation with concrete or other approved compactable material.

The undercutting of existing foundations shall only be carried out with CONSTRUCTION MANAGEMENT approval.

Excavated material to be reused as fill shall be placed at adequate distance from the edge of excavations or stockpiled at location indicated by CONSTRUCTION MANAGEMENT.

The bottoms of excavations for footings and foundations shall not be disturbed. Before the concrete is placed, the bottom of excavations shall be trimmed to final grade.

Pipe trench excavation should start at a low point, to enable the excavation to be kept dry.

The width of trench shall be sufficient to provide a minimum clearance between outside of pipe and the face of trench sheeting.

Trenches shall be graded and compacted to give uniform bearing along the bottom of the pipe. Where not shown otherwise on the specific drawings, and where pipe bedding material is not to be provided, the bed should be shaped for the first 10% of the diameter of the pipe or culvert.

Where silt or peat is encountered at the bottom of a cut, excavation shall continue a further 600 mm, subject to approval by CONSTRUCTION MANAGEMENT. This shall then be backfilled and compacted to the required elevation with sand. Where suitable conditions are not found, other methods shall be considered.

Excavations should only be kept open as long as reasonably required for the work. Minimum invert elevations and widths of excavations for cables and duct banks are indicated on the electrical and instrument drawings.

Changes in the direction of the excavation shall suit the allowable bending radius of the cables.

Excavations for piping and cables shall be free of projections, such as rocks.

301.5 STOCKPILING AND DISPOSAL OF MATERIALS

Excavated material shall be transported to a designated stockpile area on the Construction site. All excavated material shall be segregated and material suitable for backfill shall be stored separately. The composition and quality of excavated material to be used for backfill shall be subject to approval by CONSTRUCTION MANAGEMENT.

Stockpiles of the topsoil and fill materials shall be shaped in such a way that surface water will freely drain.

Contaminated soil shall be disposed of as directed by CONSTRUCTION MANAGEMENT.

The stockpile shall be safeguarded against scattering and mixing with undesirable materials, pending its use for finish grading of the construction site.

301.6 BACKFILL

Backfill the excavated areas to elevations given on the specific drawings as promptly as the work permits with clean, organics free, locally available **saprolite** or **granite gravel**, but not until completion of following:

- Removal of concrete formwork, shoring and bracing.
- Approval by CONSTRUCTION MANAGEMENT or its representative of any underground construction work.
- Inspection by CONSTRUCTION MANAGEMENT or its representative of excavated area.

Before backfilling around newly installed foundations, the excavation shall be cleared of debris, waste, etc. Backfill against foundations shall not be started for at least three (3) days after placing concrete.

Backfill shall be placed symmetrically to prevent eccentric loading on structures. It shall be placed in horizontal layers not exceeding 250 mm or as specified on the drawings and shall have the proper moisture content for the required degree of compaction.

Large fills may be compacted with tractor drawn compactors in maximum 250 mm thick layers or as specified on the specific drawings.

Backfilling shall be to the grade levels shown on the specific drawings.

Any areas improperly backfilled, such as where settlement occurs shall be reopened to the depth required for proper compaction, refilled and recompacted.

Backfill around culverts and pipes should be symmetrically placed to prevent side loading, and should be tamped to provide firm support. Backfill should be placed in horizontal layers not exceeding 150 mm loose thickness to the tops of all piping, culverts and electrical cables.

Above this level fill should be placed in layers not exceeding 200 mm loose thickness.

While backfilling pipes and/or cable trenches, the following shall be adhered to:

- Pipe joints should be left exposed until the necessary tests have been performed, and in the case of concrete pipes for at least twenty-four hours after joints have been made.
- Pipes, cables and protective coatings shall not be damaged during backfilling operations.

During the course of work, it should be ensured that fill is protected from any damage and also take suitable measures to ensure that fill will not be washed away.

When sub grades are likely to sustain damage due to shrinkage cracks, they should be kept moist until protected by sub-base or surfacing material.

Earth embankments shall be constructed with such increased height and width as to compensate for trimming to final cross section and to ensure that the final exposed surface has the compaction.

Excavated areas which are improperly backfilled to the depth required or where settlement occurs. Refill, compact and restore the surface to the required grade and compaction.

301.7 COMPACTION

The degree of compaction should be measured against modified Proctor values being the maximum density obtained in the laboratory at optimum moisture content using ASTM D1557.

Each layer of fill shall be compacted to at least the following percentages of the maximum density obtained in the laboratory at optimum moisture content by test specification ASTM D1557:

- 95% of the test values for fills under foundations, floor slabs, paving and roads.
- 90% of the test values for fills elsewhere.

The optimum moisture content shall be within 2%, if not otherwise noted elsewhere.

Each layer shall be tested by the BUILDING CONTRACTOR. The BUILDING CONTRACTOR shall receive written approval by CONSTRUCTION MANAGEMENT before starting the next layer.

Equipment to be used for compaction is CONTRACTOR's choice, but will be subject to the approval by CONSTRUCTION MANAGEMENT.

301.8 EROSION PROTECTION

Special care shall be placed at construction stage to avoid all situations where concentrated flows may take place over unprotected slopes.

301.9 DRAINAGE AND DEWATERING OF EXCAVATIONS

BUILDING CONTRACTOR shall prevent surface or subsurface water from flowing into excavations or from flooding the site and the surrounding area.

Fills shall be built up evenly over the full width of the area, maintaining slopes to allow efficient area drainage and prevent ponding.

Provide and maintain temporary earthen drainage ditches to minimize the ponding of water and adequately drain all areas to the satisfaction of CONSTRUCTION MANAGEMENT.

301.10 SHORING AND PROTECTION

BUILDING CONTRACTOR shall assume full responsibility for maintaining the stability of all excavated faces until final acceptance of the work by CONSTRUCTION MANAGEMENT.

The slope of embankments and various methods of shoring, bracing and underpinning to ensure safe working conditions, shall be determined by the CONTRACTOR unless specifically detailed on the specific drawings.

The various methods of shoring, bracing and underpinning shall be approved by CONSTRUCTION MANAGEMENT.

CONTRACTOR shall place and maintain all temporary fences, guard rails, barricades, light and other protective measures required for the safety of the premises.

For pipe trench excavation, adequate planking and strutting shall be provided to ensure the safety of the workmen employed on the work and to prevent damage to roads, buildings, etc.

Where the completed subgrade has been disturbed by construction operations or adverse weather, recondition as follows:

- Scarify the surface, add material where required, reshape and compact to the required density.
- Proof roll the prepared surfaces of all subgrades to check for unstable areas and the need for additional compaction. Proof roll when the soil surface appears dry.
- If unsatisfactory conditions are observed, notify CONSTRUCTION MANAGEMENT.

301.11 TOLERANCES

All excavations shall be within ± 25 mm of the elevations or dimensions indicated on the specific drawings.

The longitudinal slopes of drainage ditches shall have a tolerance of ± 20 mm from a straight slope between points of given elevations.

Uniformly grade the surface of all areas to the plant rough grade elevations shown on the design specific drawings.

The slopes of embankments and excavations shall be of uniform inclination between points where elevations are shown.

All grading shall be within ± 25 mm of the elevations for grade or slope as indicated on the design specific drawings.

The completed surface shall not show any deviation in elevation in excess of 20 mm when tested with a 3 m straight edge. The completed elevation of the surface shall be within ± 20 mm of the elevation indicated and the average elevation shall not be less than the design elevation.

302 CONCRETE WORKS

302.1 CONCRETE

Structural concrete shall be minimum grade C30/37 with characteristic compression strength of 37 N/mm² after 28 days, in accordance to EN 206-1;

302.2 REINFORCED STEEL

Reinforcing steel shall be FeB400 with a characteristic yield stress equal to 400 N/mm².

Immediately before concrete is placed, all reinforcing steel shall be free from loose mill scale, loose rust, oil, grease, paint or any harmful matter that may decrease the bond between the steel and the concrete.

The clear distance between individual bars shall not be less than:

- 1.3 times the maximum size of the coarse aggregate
- Twice the diameter of the bar or the diameter of the immersion vibrator
- 50 mm for bars in walls

The center-to-center distance of individual bars shall not be more than:
150 mm - For main bars in beams where bending moments are maximum.

250 mm - For bars in slabs.

- For bars in walls.
- For mild steel stirrups in beams.

300 mm - For longitudinal bars in columns.

- For horizontal side bars in beams.
- For high yield stirrups in beams.

400 mm - For any other bars not mentioned above, provided the cross bars are spaced at not more than 250 mm.

302.3 FORMWORK

The formwork must be thus strong and rigid that pouring deformations shall be smaller than 3mm measured over a straightedge of 2m in length. The formwork may not be removed without the approval of the site management. Imperfections in the concrete may only be repaired in accordance with the instructions and in the presence of the site management.

302.4 PREPARATION AND PROCESSING OF CONCRETE

The contractor shall thereof inform the site management in advance so that the quality of this cement may be examined. The cement shall be stored, protected against leak water, wind-driven rain and damp rising from the ground. Torn bags must be removed.

The contractor shall take samples at regular intervals to ensure that there are no lumps in the cement. The storage shall be such, that the batches will be used in sequence of arrival. The aggregates shall be stored in such a manner as to prevent pollution that may affect the quality of the concrete.

Water that has been pre-approved by the site management shall be used for the concrete. The contractor must be able to proof that the water used for the concrete is clean and does not contain pollutants.

The contractor shall take the necessary precautions against the consequences of rainfall on poured concrete. The contractor shall keep available personnel and auxiliary materials for repairs, if any, to the formwork during pouring. In pouring, no work interruptions shall occur that cause a time difference of over one hour between the concrete to be freshly placed and that which has already been placed.

Pouring joints shall be determined in consultation with the site management.

Openings and parts to be embedded, which have not been set in the right spot, as well as gravel pockets and other defects, shall be repaired without compensation, in the presence of the site management.

302.5 QUALITY CHECK

In advance, by means of a suitability test, it must be demonstrated that the concrete composition to be applied has the required concrete strength.

Test cubes will be made on site from each batch supplied and shall be tested no fewer than 28 days later.

Of the first batch, and subsequently on instructions of the site management, the slump of the concrete mixture supplied shall be determined in place by means of the Abrams test.

302.6 CURING

The contractor shall keep the concrete surfaces moist at all times for 3 day after pouring, also on Sundays and holidays.

The next 4 days, it will suffice to wet the concrete once per day. Clean potable water shall be used to keep the concrete moist. The use of a preparation against drying out is permitted, however, following prior consultation with and approval of the site management.

The use of curing compound is allowed. In the event of screed or other top layers to be installed afterward, the contractor must take sufficient measures (chemical cleaning, grit blasting or grinding) to guarantee bonding strength between concrete base and top layers.

302.7 LEAN CONCRETE

Lean concrete grade shall be C12/15 with a minimum characteristic compressive strength of 15N/mm² after 28 days.

All concrete foundations shall be placed on a 50 mm thick layer of lean concrete except otherwise noted on drawings.

302.8 PREFABRICATION

Prefabrication of concrete block foundations is allowed if CONTRACTOR can guarantee safe transport to site and installation of blocks within tolerances.

CONSTRUCTION MANAGEMENT may request additional information regarding lifting and transporting plans and others.