

# B2 Earthworks Construction



# Contents

## B2 EARTHWORKS CONSTRUCTION

|             |   |           |
|-------------|---|-----------|
| <b>2.1</b>  | <b>SCOPE</b>                                | <b>3</b>  |
| <b>2.2</b>  | <b>STANDARDS AND GUIDELINES</b>             | <b>3</b>  |
| <b>2.3</b>  | <b>PROTECTION OF THE EARTHWORKS</b>         | <b>4</b>  |
| <b>2.4</b>  | <b>EXCAVATION</b>                           | <b>4</b>  |
| 2.4.1       | GENERAL                                     | 4         |
| 2.4.2       | SAWCUTTING                                  | 5         |
| 2.4.3       | EXCAVATED MATERIALS                         | 5         |
| 2.4.4       | CONDITIONS BELOW GROUND                     | 5         |
| 2.4.5       | EXCAVATION IN ROCK                          | 5         |
| 2.4.6       | EXPLOSIVES                                  | 6         |
| 2.4.7       | UNSUITABLE MATERIAL                         | 6         |
| 2.4.8       | EXCAVATION FOR PAVEMENTS                    | 6         |
| 2.4.9       | EXCAVATION FOR TRENCHES                     | 6         |
| 2.4.10      | EXCAVATION FOR STRUCTURES                   | 6         |
| 2.4.11      | HAZARDOUS MATERIALS                         | 7         |
| 2.4.12      | EXCAVATION AROUND TREES                     | 7         |
| 2.4.13      | EXCAVATION AROUND SERVICES                  | 7         |
| 2.4.14      | SUPPORT OF EXCAVATIONS                      | 7         |
| 2.4.15      | VENTILATION OF EXCAVATIONS                  | 8         |
| <b>2.5</b>  | <b>SELECT MATERIAL FOR BACKFILLING</b>      | <b>8</b>  |
| 2.5.1       | MOISTURE CONDITIONING OF FILLING MATERIALS  | 8         |
| <b>2.6</b>  | <b>PLACING AND COMPACTING FILL</b>          | <b>9</b>  |
| 2.6.1       | PREPARATION OF SURFACES BEFORE PLACING FILL | 9         |
| 2.6.2       | PLACING AND COMPACTING FILL                 | 9         |
| 2.6.3       | PLACING AND COMPACTING STRUCTURE BACKFILL   | 9         |
| 2.6.4       | PLACING AND COMPACTING TRENCH BACKFILL      | 10        |
| 2.6.5       | PREPARATION OF SUBGRADES                    | 10        |
| <b>2.7</b>  | <b>TESTING</b>                              | <b>10</b> |
| 2.7.1       | TESTING FOR COMPACTION                      | 10        |
| 2.7.2       | FREQUENCY OF TESTING                        | 11        |
| <b>2.8</b>  | <b>FINISHED SURFACE OF EARTHWORKS</b>       | <b>12</b> |
| <b>2.9</b>  | <b>QUALITY</b>                              | <b>12</b> |
| 2.9.1       | INSPECTIONS                                 | 12        |
| 2.9.2       | HOLD AND WITNESS POINTS                     | 13        |
| 2.9.3       | TOLERANCES                                  | 14        |
| <b>2.10</b> | <b>REVISION REGISTER</b>                    | <b>14</b> |

## 2.1 SCOPE

This Technical Specification sets out the requirements for earthworks for various construction works including roads, pathways and concrete structures.

Earthworks include:

- Clearing the site
- Excavation as required for proposed elements such as pole and furniture footings, tree pits, retaining walls, stormwater works, kerb alignments and conduit paths and any excavations required to complete the Works
- Excavation of footpath and road pavement as required
- Disposal, and preferably recycling offsite, of surplus excavated material
- Placing and compaction of fill material
- Ground preparation necessary to bring the site to the correct shape and level
- Preparation of the subgrades.

## 2.2 STANDARDS AND GUIDELINES

Unless stated otherwise in this Technical Specification, the approved drawings or elsewhere in the construction documents, work shall comply with the current and relevant Australian Standards and/or TfNSW Standards.

Any variations or ambiguity between the Technical Specification, other construction documents and Australian Standards shall be referred to the City's Representative for direction before proceeding with the work.

The following table indicates the Australian Standards, TfNSW Standards and other relevant standards applicable to this section. This table is not exhaustive and may not include all standards that apply to the work to be undertaken. It is the responsibility of the Service Provider to ensure that all relevant standards are met.

|   |
|---|
| AS 1152–1993 Specification for test sieves  |
| AS 1289 Methods of testing soils for engineering purposes (including supplements and amendments)  |
| AS 1348 Road and traffic engineering – Glossary of terms. Part 1 – Road design and construction   |
| AS 1726 Geotechnical site investigation code (including amendments)   |
| AS 2436 Guide to noise control on construction, maintenance and demolition sites  |
| AS 2601 Demolition of structures  |
| AS 3798 Guidelines on earthworks for commercial and residential development   |
| AS/NZS 2865 Safe working in a confined place  |
| City of Sydney Guidelines for Temporary Protective Structures – Hoarding, Scaffolding, Shoring and Façade Retention, April 2001   |
| Construction Safety Act   |
| Environmentally Hazardous Chemical Act 1985   |
| Landcom Publication (2004) Managing Urban Stormwater: Soils and Construction – Volume 1   |
| NSW Construction Safety Act and Regulations 84A–J: Construction Work Involving Asbestos or Asbestos Cement  |
| NSW Streets Opening Conference, 1997 – Information Bulletin on Codes and Practices  |
| Requirements from all authorities and services/utility providers such as Telstra, Powertel, Optus, Sydney Water, AGL, Agility, City of Sydney, Ausgrid and others as required |
| TfNSW QA Specification 3071 Selected Material for Formations  |
| Sydney Streets Technical Specifications – Chapter B12: Road Opening and Restoration   |



WorkCover Authority of NSW Code of Practice – Excavations

WorkCover Authority of NSW Code of Practice – Moving Plant on Construction Sites

WorkSafe Australia – Asbestos: Code of Practice and Guidance Notes.

## 2.3 PROTECTION OF THE EARTHWORKS

The Service Provider's responsibility for the Works shall include the protection of earthworks.

All excavations shall be appropriately managed to reduce water entering any excavation during construction. The following items shall be provided prior to, during and following earthworks operations:

- All materials and labour for the diversion of stormwater runoff from the Works
- Proper temporary drainage for conducting stormwater and any sub-soil ingress water across the site from adjacent properties or roads
- Controls for the uninterrupted flow at all times of stormwater runoff along existing gutters, water tables and conduits in the vicinity of the Works
- Controls for the temporary diversion of the stormwater runoff where the existing drainage is to be interrupted. No such interruption shall take place until this diversion is provided.
- An effective pumping plant as required for keeping all excavations free from water while construction is in hand
- Erosion and sediment controls to protect downstream and disturbed areas
- Works to be planned and constructed so that stormwater runoff is maintained away from the buildings and adjacent properties at all times. This may involve all temporary means to directly drain or to store and then discharge the water using pumps and the like.
- All diversions shall be of sufficient capacity to prevent flooding of the Works and adjacent properties, pavements and buildings to the satisfaction of the City's Representative
- Water shall not be pumped from excavations and discharged to either the public road or an existing drainage system unless specifically approved by the City's Representative
- Water from diversion works or pumped from excavations shall not be permitted to enter existing sewers unless specifically approved by the relevant authorities
- Dewatering of groundwater requires the relevant permits from the Department of Primary Industries and the Department of Water and Energy
- The Service Provider shall allow for the removal and appropriate disposal of all mud and debris, which may collect in the excavations
- If water enters excavations which are meant to receive concrete, the water shall be pumped out, any soft material unsuitable for receiving concrete taken out and replaced with either clean compacted sand or approved selected material as separately defined in this Specification.

Refer to the environmental protection requirements in Part B1: Preliminaries and General Construction

## 2.4 EXCAVATION

### 2.4.1 GENERAL

Any geotechnical information supplied by the City is for information purposes only. No guarantee is given for its accuracy. Description and classification of soils shall be in accordance with AS 1726:2017 Geotechnical site investigations.

No excavation shall be commenced until the Service Provider has undertaken a Before You Dig Australia (BYDA) search and obtained current underground location plans which provide an indication of the presence, location and depth of underground plant in the area of the Works. Refer to Part B1: Preliminaries and General Construction for existing services.

Excavation shall be carried out to the depths and dimensions shown on the approved plans and construction documents, or to such greater depths and dimensions as will ensure sound, permanent foundations. All excavation carried out shall be approved by the City's Representative before any materials or structures are placed on the excavated surfaces (hold point).

Excavations shall be conducted by machine and/or by hand as necessary to produce profiles to the accuracy required by this Specification, the approved drawings and the construction documents.

In carrying out excavation work, all reasonable precautions shall be taken against mishap or accident, whether arising from insufficient strength of supports, bad workmanship, breakage of machinery or plant, inefficient caulking or packing of open joints or spaces, flood, or any other cause whatsoever. The Service Provider shall be held solely responsible for all damage, injury or loss that may occur to buildings, structures, bridges, roadways, streets and other surfaces above and adjacent to the excavations; to all persons whether employed by the Service Provider, by the City or otherwise; and to their own and other works and plant, and the cost of all such damage, injury and loss and any compensation shall be met by the Service Provider.

### 2.4.2 SAWCUTTING

Should excavation be required in an area of concrete or asphalt, sawcuts of a nominal 50mm depth shall be made in the surface prior to excavation to ensure a smooth joint is maintained in the existing surface.

In the case of excavations for drainage works, sawcuts shall be provided on both sides of the trench. For kerb and/or gutter works, sawcuts shall be provided around the perimeter of the area of pavement to be reinstated. Medians shall be sawcut on the face of new median kerb alignment.

Note the need to control runoff from sawcut blade cooling water. This is because this is a source of fine sediment pollution which must be controlled when contractors are conducting ad hoc sawcutting.

### 2.4.3 EXCAVATED MATERIALS

All materials cleared and excavated shall be removed from the site and recycled appropriately or disposed of legally by adhering to the provisions of the *Protection of the Environment Operations Act 1997*.

If, in the opinion of the City's Representative, an appropriate area exists on the site, suitable material may be stockpiled and used for backfilling, provided that excess stockpiled material is disposed of when all backfilling is completed. Special care is to be taken to ensure that the proposed stockpile does not impact on any existing trees or structures.

### 2.4.4 CONDITIONS BELOW GROUND

If rock or artificial obstructions are encountered, the City's Representative may permit modifications to approved details to mitigate some of the additional cost of excavating in rock or removing obstructions. A request in writing must be made by the Service Provider to amend the excavation detail. These requests will be typically approved if the plan does not adversely affect the structural strength, stability or the usefulness of the Works.

If groundwater is encountered, such sections of the site shall be dewatered as necessary and as specified to permit work to proceed as required or such other measures as may be authorised by the City's Representative shall be undertaken.

### 2.4.5 EXCAVATION IN ROCK

Where the Service Provider is required to excavate in naturally lying rock, the City's Representative is to be advised immediately. Consideration of hammering sound and vibrations to adjacent buildings must be considered. The City's Representative may request that a dilapidation report of surrounding properties is undertaken by the Service Provider.

### 2.4.6 EXPLOSIVES

Explosives are not permitted.

### 2.4.7 UNSUITABLE MATERIAL

Unsuitable material for the Works includes any areas of the earthwork's foundation or any layer with the earthworks formation that rut excessively, yield or show signs of distress or instability, ground containing cavities, faults or fissures or ground contaminated by harmful substances including oil and chemicals.

Unsuitable material such as silt, mud, roots, organic matter, rubbish, areas of very soft clay or high moisture content and any other deleterious substances shall be disposed and replaced with select material as separately defined in this Specification.

The Service Provider shall rework or replace any material that has become unsuitable because of inappropriate construction activities. Inappropriate construction activities include poor surface drainage, restricted or inoperative subsurface drains, contamination, excessive-sized plant where the imposed local load exceeds the material strength, poorly maintained plant allowing leakage of oils and water onto the formation, and leaving the surface open to wet weather allowing moisture ingress.

### 2.4.8 EXCAVATION FOR PAVEMENTS

Excavation for pavements shall be carried out to form the boxing in which the pavement is to be constructed.

Any excavation in existing pavements shall have neat sawcut edges, in accordance with the sawcutting requirements as separately defined in this Specification, before excavating commences. Boxing shall extend over a sufficient width to allow construction of the pavement below and behind kerbing and edging.

If unsuitable material is found at subgrade level, the Service Provider must provide notice to, and receive an instruction from the City's Representative before commencing excavation and removal of such material.

### 2.4.9 EXCAVATION FOR TRENCHES

Unless otherwise specified and/or approved by the City's Representative, trenches for pipelines shall be excavated so as to provide adequate cover clearance between the outside of the pipe and the trench wall or sheeting in accordance with *AS/NZS 3725-2007 Design for installation of buried concrete pipes*. Trenches for utility service conduits shall conform to the Utility Authority's specifications.

Trench excavations shall be carried out below the pipe invert grade to accommodate bedding as specified and/or shown. All loose unexcavated material and projections of hard materials or rock protruding above plan grade shall be removed prior to the placement of bedding.

Additional excavation shall be provided under sockets or flanges of pipes and ducts to allow for jointing and to give the pipe or duct uniform bearing.

### 2.4.10 EXCAVATION FOR STRUCTURES

Excavation for structures shall extend a sufficient distance from the structure so as to permit placing and removing forms, installing drainage facilities where required, cleaning and inspection.

If foundation materials exposed at the approved/specified levels are considered by an independent geotechnical engineer (engaged by the Service Provider) not to be suitable, the Service Provider should seek the direction of the City's Representative and may be directed to excavate to the depth necessary to obtain a suitable foundation material and/or modify the foundation dimensions so as to achieve the allowable foundation bearing pressure.

Except where approved, specified or authorised by the City's Representative, excavations for footings shall not be over excavated to allow for back forming and backfilling.

Excavations for footings, which have been carried beyond the lines and levels authorised, shall be backfilled with concrete or stabilised sand or as directed by the City's Representative at the Service Provider's expense.

The shape of under-cut sections of excavations for footings may be varied to suit the Service Provider's method of excavation or equipment provided that the effective slope of the under-cut section is not decreased and the

proposed methodology is agreed beforehand by the City's Representative.

All rock above the levels specified and/or shown and all rock shattered, disturbed or loosened by the process of excavation shall be removed and the foundation surface shall be cleaned by air or water jets and by brooming and swabbing until it is as clean as the natural undisturbed condition of the rock permits.

All cracks, fissures, holes and soft spots in rock foundations shall be cleaned out and filled with concrete, grout or mortar, as directed by the City's Representative.

#### **2.4.11 HAZARDOUS MATERIALS**

The Service Provider shall give notice immediately to the City's Representative of any hazardous materials or conditions found, including but not limited to the following:

- Asbestos or material containing asbestos
- Flammable or explosive liquids/gases
- Toxic, infective or contaminated materials
- Radiation or radio-active materials
- Noxious or explosive chemicals
- Tanks or containers that have been used for storage of explosive, toxic, infective or contaminated substances.

Refer to Section 1.5 Work, Health and Safety of Part B1: Preliminaries and General Construction regarding the removal of hazardous materials and remediation of the site.

#### **2.4.12 EXCAVATION AROUND TREES**

The Service Provider must dig using hand tools whenever digging in the vicinity of tree roots. Care must be taken to ensure that no tree roots are damaged during all excavation activities.

Roots that are greater than 50mm in diameter measured at a distance of 3 metres from the tree trunk, must not be cut without prior approval from the City's Representative. Refer to Subsection 1.4.7: Protection of Trees in Part B1: Preliminaries and General Construction

#### **2.4.13 EXCAVATION AROUND SERVICES**

The Service Provider must dig using hand tools whenever within 0.3 metres of a service pipe. Typically, there are more service pipes than listed on the BYDA drawings. These abandoned service lines may not be removed without approval of the managing Service Authority. Further investigation around the conduit may be required to determine the owner of the service line.

Before You Dig Australia plans note transmission cables such as high voltage gas or water mains that may need a Service Authority representative present when excavating near their service. The Service Provider is responsible for coordinating any Service Authority supervision.

#### **2.4.14 SUPPORT OF EXCAVATIONS**

The Service Provider shall provide all shoring, planking, propping, progressive backfilling and strutting necessary to retain the sides of the excavations, and to ensure safe working conditions, including safety covers over holes. The Service Provider has the sole responsibility for the sufficient support of the excavations on site (including any design and approvals required for such support).

Any collapse of the sides of excavations due to the Service Provider's failure to shore, brace and/or sheet such excavations shall be rectified and any materials, equipment, structures, services and the like damaged by such collapses shall be repaired or replaced as directed by the City's Representative, and at the Service Provider's expense.

Such shoring, bracing and/or sheeting shall be satisfactorily maintained during the whole of the excavation and construction operations and shall be removed in a manner to prevent caving as the excavations are concreted and/or backfilled.

Where temporary supports are to be left in place, they shall be appropriately de-stressed and all cavities behind

the supports shall be located and backfilled and compacted as specified elsewhere herein.

Where temporary supports are required as permanent structures, they are to be designed by the Service Provider's Engineer and approved by the City's Representative.

The Service Provider shall guard against the formation of voids outside sheeting, sheet piling, shoring and the like; however, should any voids form they are to be filled and compacted to the approval of the City's Representative.

The Service Provider shall remove shoring and timbering progressively as the work proceeds unless otherwise instructed.

#### 2.4.15 VENTILATION OF EXCAVATIONS

Excavations shall be aired or ventilated as required by statutory authorities (e.g. WorkCover Authority of NSW) codes of practice for confined spaces and AS2865-2009 Confined spaces. Equipment shall be made available throughout the Works for continuous monitoring of the pits, including respirators, and for the rescue and resuscitation persons who may become affected by gases while working in the pits.

### 2.5 SELECT MATERIAL FOR BACKFILLING

Backfilling or filling in this section refers to all filling required to the subgrade level. Refer to Subsection 10.4.2: Fill and Pipe Support Material in B10: Stormwater Drainage for the requirements for fill material for stormwater trenches.

All materials used for temporary backfilling shall be in accordance with Stormwater Drainage Construction B12: Road Opening and Restoration.

Select material for backfilling shall be granular material which is naturally occurring, recycled or manufactured having a particle size distribution, determined in accordance with AS 1289.3.6.1-2009: Methods of testing soils for engineering purposes – Soil classification tests – Determination of the particle size distribution of a soil – Standard method of analysis by sieving.

Select material can be crushed rock, natural soil, gravel and sand, or other approved granular material consisting of clean, sound, durable fragments, free from organic matter from an approved source.

Grading limits for select fill shall be in accordance with AS/NZS 3725:2007 Design for installation of buried concrete pipes as tabulated below:

**Table 1 - GRADING LIMITS FOR SELECT FILL**

| Sieve Size (mm) | Weight Passing (%) |
|-----------------|--------------------|
| 75.0            | 100                |
| 9.5             | 100-50             |
| 2.36            | 100-30             |
| 0.60            | 50-15              |
| 0.075           | 25-0               |

The Service Provider shall obtain a copy of the Supplier's grading tests that is indicative of the material supplied. A copy of this test certificate shall be provided to the City's Representative upon request.

The City encourages use of recycled materials where possible. Recycled material shall comply with TfNSW QA Specification 3071 – Selected Material in Formation Layers when used as select material and the grade limits above.

#### 2.5.1 MOISTURE CONDITIONING OF FILLING MATERIALS

Fill is to be compacted at a moisture content of approximately +/- 2% of Standard Optimum Moisture Content. Strict adherence to this range is required.



Soils with moisture content greater than the specified compaction range shall be removed and replaced with complying material.

Soils with moisture content less than the specified compaction range must have water added from a watertanker prior to and during the compaction process.

## 2.6 PLACING AND COMPACTING FILL

### 2.6.1 PREPARATION OF SURFACES BEFORE PLACING FILL

After the site has been cleared, the natural ground surfaces on which fill or pavements are to be placed shall be scarified and compacted as specified in this Specification.

Heavy steel drum rollers (minimum applied load intensity of 4t/m width of drum) shall not be used within 1.5 metres of an existing buried service unless permitted by the relevant Service Authority. The use of vibrating rollers shall not be permitted. Any material which is soft, visibly deformed, unstable or deemed unsuitable by the Service Provider shall be excavated and replaced with fill in accordance with the requirements of this Specification.

### 2.6.2 PLACING AND COMPACTING FILL

Fill material shall be placed and compacted in successive horizontal layers for the full width of the cross-section. The loose depth of the material in each layer shall be such that when compacted the layer thickness shall be not more than 150mm.

At the time of compaction of each layer, the moisture content of the material shall be +/-2 per cent of Standard Optimum Moisture Content.

Equipment shall be properly weighted and sufficient passes shall be made to attain the compaction specified. In areas which are not suitable for rolling with power equipment, the Service Provider shall use mechanical hand tampers/plate compactors.

No compaction shall be accomplished by inundation or flooding.

If, at any time during the progress of the work, tests performed by the Service Provider show that the specified degree of compaction is not being obtained, the Service Provider's equipment and/or methods shall be replaced or modified, as required, to obtain the specified results.

The Service Provider may vary the scarifying and compacting methods adopted provided that it can be established to the satisfaction of the City's Representative that the material can still be compacted to the specified requirements.

At the completion of each day's work and at any time during a shift when a delay to work appears imminent on account of rain, all fill deposited shall be spread, graded and lightly rolled to form a surface sufficiently dense and shaped to shed the rain to drains. Upon resumption of work, those areas which have not been fully compacted shall be ripped for their full depth, cut to shape and processed as newly deposited fill.

Material which has been moisture softened following rainfall should be removed to the satisfaction of the City's Representative prior to placing additional fill over.

Acceptance of each layer is conditional upon the application of uniform and sufficient compaction effort by appropriate equipment over the whole of the layer.

### 2.6.3 PLACING AND COMPACTING STRUCTURE BACKFILL

Placing of backfill must be undertaken in layers so that any adjacent structures are not overloaded or damaged during compaction.

The placing of fill and backfill against brickwork or concrete work shall only be done where shown on approved construction documents or when otherwise approved by the City's Representative.

The placing of fill and backfill on both sides of foundation walls shall be equalised as far as possible and the difference in elevation between the two surfaces shall not exceed 600mm.

Fill and backfill shall be placed in layers not exceeding 200mm in compacted thickness allowing due care to avoid damage to any structures within the fill area and shall be compacted by rolling, tamping, vibration or other approved means.

#### 2.6.4 PLACING AND COMPACTING TRENCH BACKFILL

Trench backfill shall be placed and compacted in accordance with *AS/NZS 3725:2007 Design for installation of buried concrete pipes* and/or the relevant Service Authority's specifications.

Backfilling shall proceed as rapidly as construction. Backfill shall be placed in layers not exceeding 150mm in compacted thickness allowing due care to avoid damage to any services within the trench area and shall be compacted as specified.

For drainage trench backfill, refer to B10: Stormwater Drainage Construction.

#### 2.6.5 PREPARATION OF SUBGRADES

The Service Supplier shall notify the City's Representative when earthworks have progressed to a stage where the nature of subgrade material can be assessed. The City's Representative may order the removal of unsuitable material or other treatments including variations in pavement thickness to allow for the subgrade materials actually encountered.

The subgrade shall be excavated, trimmed and consolidated to levels ready to receive the first pavement course over the entire area to be surfaced. Low areas shall be filled with approved selected material and compacted to the following densities when tested in accordance with *AS 1289.0:2014 Methods of testing soils for engineering purposes – Definitions and general requirements*. Areas shall be retrimmed if necessary after compaction to the following requirements:

- 95 per cent of standard maximum dry density – All subgrades except under roads, and kerbs and gutters
- 98 per cent of standard maximum dry density – Under roads, kerbs and gutters, and building platforms.

### 2.7 TESTING

Testing may be carried out to determine whether the fill has the strength to hold loads placed on City footpaths and roads.

All testing must be performed by a NATA-registered laboratory.

The cost of all testing shall be paid by the Service Provider and the original of all laboratory reports shall be retained by the Service Provider and made available for inspection by the City's Representative. A certified copy of the test's reports must be provided to the City's Representative.

Work shall not proceed on any stage of the construction until the City's Representative has indicated that the test results on the previous stage are satisfactory.

#### 2.7.1 TESTING FOR COMPACTION

Compaction shall be checked by a standard maximum dry density test and a field density test for materials other than sand or by the density index and field density tests for sands when directed by the City's Representative.

Tests shall be carried out in groups of at least three and compaction of the layer concerned will be considered to be satisfactory if no single result falls outside the specified density range. Should the results not reach this standard, the Service Provider shall again roll the area, if necessary after scarifying, adding water, blading to reduce the moisture content and/or removing and replacing excessively moist fill as may be required.

Should the City's Representative consider that the depth of insufficiently compacted material is greater than can be effectively compacted from the surface, material shall be removed to a depth at which compaction is satisfactory and replaced and compacted in layers.

The standard maximum dry density referred to in this Technical Specification for materials other than sand shall be the maximum standard dry density as determined in accordance with *AS 1289 – Test 5.1.1. Methods*

*of testing soils for engineering purposes*

The modified maximum dry density referred to in this Technical Specification for materials other than sand shall be the maximum modified dry density as determined in accordance with *AS 1289 – Test 5.2.1. Methods of testing soils for engineering purposes*

The field density referred to in this Technical Specification for all materials shall be the dry density of the material in place as determined in accordance with *AS 1289 – Test 5.3.1. Methods of testing soils for engineering purposes*

The percentage of the standard maximum dry density (Dry Density Ratio) for materials other than sand shall be calculated from the formula given in *AS 1289 – Test 5.4.1. Methods of testing soils for engineering purposes*

The maximum and minimum densities of cohesionless materials shall be determined in accordance with *AS 1289 – Test 5.5.1. Methods of testing soils for engineering purposes*

The density index specified for sand (cohesionless materials) shall be calculated from the formula given in *AS 1289 – Test 5.6.1. Methods of testing soils for engineering purposes*

## 2.7.2 FREQUENCY OF TESTING

The following testing frequencies relate to acceptance on a 'not one to fail' basis.

The testing should be carried out in randomly chosen locations by the City's Representative and at the frequencies as given below; however, it may be appropriate to undertake testing in specific locations based on visual appearance or past experience (e.g. compaction may be more difficult to achieve adjacent to manholes, kerbs or over backfilled service trenches).

Where a test, or group of tests, is carried out on an area that has been subjected to essentially the same preparation and compaction procedures, and where the area is free from items that would affect compaction results (see examples in the above paragraph), the whole of this area is considered to be represented by this test or group of tests. The uniform area is generally known as a work lot.

On this basis, if one or more tests indicate that compliance with the specification has not been achieved, the whole of the area which has been submitted for testing is deemed not to comply, unless it can be demonstrated that the area in which the non-complying test result(s) can reasonably be separated from the whole. It should not be assumed a test result applies only to the area immediately surrounding it.

The required frequency of testing is not less than:

- 1 test per 50m<sup>2</sup> distributed reasonably evenly throughout the full depth and area; or
- 1 test per layer of 150mm thickness per material type per 200m<sup>2</sup> of surface area (but per 100m<sup>2</sup> for roads), whichever requires the most tests.

The testing frequency may be reassessed to the approval of the City's Representative, if a high degree of uniformity becomes evident during construction.

For trench filling, 1 test per maximum 50 linear metres per layer of 150mm thickness per material type is required.

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## 2.8 FINISHED SURFACE OF EARTHWORKS

The area within the limit of the Works shall be graded, within the limits specified, to the required elevation and cross-section.

The finished surfaces shall be smooth, compacted as specified, and free from irregular surface changes.

Allowance for the effects of consolidation including the settlement of fill shall be made by placing extra material at the time of construction, or additional material shall be placed after consolidation has taken place.

The finished surface of the subgrade shall not vary more than -20mm, +0mm from the approved design grade or approved cross-section.

Grading shall include connections or entrances to drainage facilities or natural drainage, as shown, and shall not create pockets in which water will stand.

Deviations in the finished surfaces in excess of these limits, when tested with a three (3) metre straight-edge or profile template as applicable, applied parallel with and/or at right angles to the centre line of the area, shall be corrected by loosening to a minimum depth of 100mm, adding or removing material, reshaping, adjusting moisture content and re-compacting. This testing shall be repeated until the surface conforms to the limits specified.

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## 2.9 QUALITY

### 2.9.1 INSPECTIONS

At least two working days' notice shall be given for all inspections.



## 2.9.2 HOLD AND WITNESS POINTS

|                           |  |
|---------------------------|--|
| 1. Process Held:          | Excavation (Section 2.4)   |
| Submission Details:       | At least two (2) working days before starting the excavation on site.  |
| Release of Hold Point:    | The City's Representative will inspect the final excavated levels, prior to authorising the release of the Hold Point.                         |
| 2. Process Held:          | Compaction of Subgrade (Section 2.6.5)   |
| Submission Details:       | At least two (2) working days prior compaction of subgrade.  |
| Release of Witness Point: | The City's Representative will inspect the compacted subgrade, prior to authorising the release of the Witness Point unless advised otherwise. |
| 3. Process Held:          | Backfilling (Section 2.6.3)  |
| Submission Details:       | At least two (2) working days before starting the backfilling on site.   |
| Release of Hold Point:    | The City's Representative will inspect the final finished backfill levels, prior to authorising the release of the Hold Point.                 |
| 4. Process Held:          | Compaction Testing (Section 2.7)   |
| Submission Details:       | Submit the compaction testing results at least two (2) working days before final levels are achieved.  |
| Release of Hold Point:    | The City's Representative will inspect the compaction results, prior to authorising the release of the Hold Point.                             |
| 5. Process Held:          | Location of Services (Section 2.4.1)   |
| Submission Details:       | At least two (2) working days prior to any earthworks being carried out.   |
| Release of Hold Point:    | The City's Representative will inspect the Before You Dig Australia details prior to authorising the release of the Hold Point.                |

### 2.9.3 TOLERANCES

On completion of cutting, filling and all incidental operations and before the placement of covering materials, finished surfaces shall conform to the tolerances in level and shape as outlined below.

| Item | Activity              | Tolerances      |   |
|------|-----------------------|-----------------|---|
| 1.   | Cut subgrade in earth | • Level:        | +0mm<br>- 20mm                                |
|      |                       | • Straightness: | 20mm departure from 3m straightedge both ways |
| 2    | Cut subgrade in rock  | Level:          | +0mm<br>- 20mm                                |
|      |                       | Straightness:   | Unspecified                                   |
| 3    | Fill subgrade         | Level:          | +0mm<br>- 20mm                                |
|      |                       | Straightness:   | 20mm departure from 3m straightedge both ways |

## 2.10 REVISION REGISTER

| Revision | Clause  | Description of Revision  | Authorised By | Date   |
|----------|---------|--|---------------|--------|
| Rev. 6   | 2.6.5   | 100 per cent of standard maximum dry density – Under roads, kerbs and gutters, and building platforms, Changed to 98 per cent  | SA            | Aug-23 |
|          | Overall | References to "Roads and Maritime Services" or "RMS" changed to "Transport for NSW" or "TfNSW" respectively.<br>References to "Dig Before you Dig" or "DBYD" changed to "Before you Dig Australia" or "BYDA" respectively. |               |        |

