**SERIES 300**

**EXCAVATION**

Contents

## 301 Methods of Excavation

**1** The Contractor shall employ only Construction Equipment and working methods, which are suited to the materials to be handled and traversed, having due regard to BS.6031:2009 Code of Practice for Earthworks. In appropriate circumstances and subject to suitable local conditions and the prior agreement of the Engineer, the Contractor may use Specialist Excavation Construction Equipment such as mini excavators, top cutters, trenchers and the like.

**2** Mechanical excavators shall only be used in a manner which takes into account and fully satisfies the requirements of the Specification, including, but not limited to, the width of resulting trench compared with a manually excavated trench, the proximity of other undertakers plant and the requirements of NJUG publication 'Volume 4: NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees' when working in the area of trees.

**3** Blasting with explosives is not permissible under the Contract.

## 302 Marking Out

**1** Before commencing any permanent works the contractor shall accurately and clearly mark out the line of each trench, and the location and outline of each chamber and structure, the line and depth of all known other buried undertakers' apparatus and plant. Any paint markers shall be soluble, non-toxic and non-permanent. The Contractor will be responsible for the removal of marks associated with the excavation, made either by himself or other undertakers on his behalf, if requested by the Engineer.

## 303 Trench Support

**1** The sides of trenches, excavations for jointing chambers and cabinet foundations, and other excavations shall be vertical and shall be cleanly cut to a reasonable regular 'squared-off' shape. All bound edges must be essentially straight and parallel to the line of the trench, or edges of jointing chambers and cabinet foundations. If in the opinion of the Engineer the edges are inadequate, the surfacing shall be cut back to intact material.

**2** Where necessary and where ground conditions dictate, the sides shall be adequately supported; the support system may include close boarded timbering, trench sheeting, sheet piling or other suitable shoring products, and shall be so designed and installed to restrain lateral movement of the side walls and maintain the stability of the excavation. Supported excavations shall be inspected in strict accordance with Regulation 31 of The Construction (Design & Management) Regulations 2007

**3** Support systems placed in an excavation shall prevent loss of ground from beneath adjacent paved surfaces. In general supports shall be removed in staged lifts when back filling, to allow complete consolidation of the space occupied by the supports. No supports shall be left in the ground without the agreement of the Engineer.

## 304 Excavated Materials

**1** Arisings from excavations shall be treated in the following manner:-

| Location | Requirements | Action on Contractor |
|---|---|---|
| Trenches in Carriageways and Footways | All arisings from excavations to be disposed of at an approved tip, off Site. Imported Granular Sub-base Type 1 material to be used as backfill. | Notify Engineer of approved tip location. |
| Trenches in Verges | Arisings from excavations may be re-used as backfill (subject to the requirements of Clause 312 of the Specification). Otherwise, arisings from these excavations to be disposed of at an approved tip, off Site, and imported Granular Sub-base Type 1 material to be used as backfill. | Contractor to demonstrate acceptability of materials for re-use (to Appendix A1 of the Specification for the Reinstatement of Openings in Highways). Otherwise, notify Engineer of approved tip location. |
| Jointing Chambers and Cabinet Foundations | All arisings from excavations to be disposed of at an approved tip, off Site. Imported Granular Sub-base Type 1 material to be used as backfill. | Notify Engineer of approved tip location. |
| Other Excavations | All arisings from excavations to be disposed of at an approved tip, off Site. Imported Granular Sub-base Type 1 material to be used as backfill. | Notify Engineer of approved tip location. |

**Table 3/1: Requirements for Arisings from Excavations**

**2** Excavated material shall be deposited, whether prior to re-use in verges, or temporarily prior to disposal at an approved tip off Site, in a manner which does not:-

(i) affect the stability of the excavation;
(ii) affect the stability of adjacent property;
(iii) impair traffic flow of vehicles;
(iv) impair the passing of pedestrians;
(v) affect the free flowing drainage of surface water drainage of adjacent property or the street;
(vi) shed surface water contaminated by the excavated materials onto adjacent property or the street.

## 305 Water In Trenches

**1** The Contractor shall keep all excavations and earthworks free of water including:

(i) arranging for the rapid removal of water:

(a) shedding on to the excavations and earthworks;

(b) entering the excavations and earthworks from any source;

(ii) lowering and maintaining by appropriate measures, the water level in excavations, sufficiently to enable the Permanent Works to be constructed.

**2** In carrying out the requirements of Sub-Clause 1 of this Clause, the Contractor shall:

(i) provide where necessary temporary drainage systems such as drains, pumping and the like;

(ii) discharge accumulated water and groundwater in accordance with Clause 107 of the Specification, but strictly providing adequate means for trapping silts and the like, on such temporary systems discharging into permanent systems.

(iii) any temporary works, such as drainage sumps, shall be suitably trimmed and backfilled in accordance with Clause 306 of the Specification.

## 306 Trench Preparation

### General

**1** Excavations requiring backfilling shall remain open only for the minimum period necessary

### Soft Spots and other Over-Excavations

**2** Treatment of soft spots and other over-excavations shall comply with the following:

(i) soft spots existing below the bottom of an excavation shall be removed as directed by the Engineer and the resulting voids backfilled with well compacted Granular Sub-base Type 1 material, well compacted duct bedding material, or C7.5/10 concrete;

(ii) any additional excavation below the bottom of an excavation that is required because the Contractor has allowed the bottom to become soft or otherwise unacceptable for the construction of the ductline, chambers or cabinet foundations shall be made good at the Contractor's expense, as described in sub-Clause item (i) of this Clause;

(iii) any excavation greater than the net volume required for the Permanent Works below the level of any duct surround shall be made good as described in sub-Clause (i) of this Clause.

**3** In excavations containing rock, hard-core and the like, the formation shall be tested at frequent intervals and any hard spots removed, as agreed with the Engineer. Any additional excavation shall be replaced by well compacted Class A, Class B, duct bedding or Granular Sub-base Type 1 materials.

### Verges and Grass Areas

4 Excavations in normal verges and grassed areas shall require the removal, replacement of the turf and reinstatement to a reasonable condition, including the removal of stones and surplus excavated material. In all such cases, the reinstatement may have to be seeded, with 100mm of soft earth being provided on top of the trench. Turves shall only be reused if replaced within one week during the period 1 April to 31 August or two weeks during the remainder of the year.

**Turfed Grass Areas**

5 Excavations in high class and/or turfed grass areas (defined as being mown at least 3 times per year) shall require careful removal and reinstating of the turves, which may include mechanical turf cutting. Any damaged turf shall be renewed with new turf.

**Cultivated or Landscaped Areas**

6 Excavations in amenity or landscaped areas shall require careful removal and reinstating of any plants, shrubs and the like. Any damaged plants, shrubs and the like, shall be replaced by the Contractor. The Employer may require the Contractor to appoint specialist landscape contractors to undertake such works.

## 307 Weathering Action

1 When excavating in chalk, the excavation shall be protected from weather action. In addition, the Contractor should take all measures to protect existing surfaces from staining.

2 The Contractor's attention is drawn to the fact that water or frost may make the excavation dangerous.

## 308 Support to Other Undertakers Apparatus and Plant

1 Existing other undertakers' apparatus and plant, other structures and street furniture exposed by the excavation or likely to have their supports weakened by the close proximity of any excavation shall be adequately supported and protected to the satisfaction of the relevant street authority, other undertaker, or owner concerned.

## 309 Trenches - General

1 Excavation methods should allow ducts to be laid in accordance with the provisions of Series 400 of the Specification.

2 Immediately prior to the laying of duct bedding material under duct laying operations, the trench bottom should be free from stones angular protrusions and loose material which may damage ducting.

3 In addition to the requirements of Clauses 202 and 203 of the Specification, trenches to receive duct runs shall be laid where practicable in straight lines. To accommodate local obstructions, slow and even horizontal or vertical curves shall be adopted by springing/flexing the duct through its natural curvature, without kinking, crimping, or local collapse occurring in the duct. For curves with radii less than 25 metres but greater than 3 metres preformed bends may be used with the Engineer's approval, in accordance with the requirements of Clause 404 of the Specification. In all cases, all ducts and preformed bends shall be sufficiently large to permit the testing mandrel to pass through.

## 310 Trenches - Dimensions local to Ducts

**1** The trench shall be no wider than is reasonably necessary for the execution of the work, but shall be not less than the minimum dimensions shown on the Drawings, which should be considered as the payment line.

**2** Spacings relative to ducts shall be as follows:-

(i) outermost edge of duct(s) to side wall of trench - 25mm;

(ii) horizontal interspacing between outside of ducts - 25mm;

(iii) vertical interspacing between outside of ducts - 25mm;

(iv) trench bottom to underside of lowest duct(s) - 50mm;

(v) topside of uppermost duct(s) to top of surround material - 50mm.

**3** In grass verges the excavation may be made wider, where the Contractor elects to use different Construction Equipment and working methods, provided that the extra width will not cause detriment to property or carriageway haunches. Such a deviation must be strictly in agreement the Engineer, prior to commencement of the Permanent Works and shall be taken to be at the Contractor's expense.

## 311 Trenches - Depth of Cover to Ducts

**1** All trenches shall be to the depth necessary to achieve the specified depth of cover over the ducts. The base of the trench excavation should be flat and free from stones and rock.

**2** Depth of cover is generally defined as the measurement from the finished paving surface to the top of the uppermost duct. However, the depth of cover should be in accordance with Table 3/2, which conforms to the minimum requirements of NJUG Publication 'Volume 1: NJUG Guidelines on the Positioning and Colour Coding of Underground Utilities Apparatus'.

| Surface Type | Category of Road | Type of Construction | Minimum Depth of Cover | Comments |
|---|---|---|---|---|
| Carriageway | 0, 1 and 2 | All Construction | 600 | All UK Areas |
| | 3 and 4 | Local Build: All Works | 450 | All UK Areas |
| | 3 and 4 | National Build: Trunk/Super Trunk Works | 600 | All UK Areas |
| Commercial Vehicle Crossings in All Footways and Verges | All Categories | All Construction | 450 | All UK Areas |
| Footway: Urban | All Categories | Local Build: Nodal Works | 250 | 260mm in Scotland |
| | All Categories | Local Build: Trunk/Super Trunk Works | 250 | 260mm in Scotland |
| | All Categories | National Build: Trunk/Super Trunk Works | 350 | |
| Footway: Rural | All Categories | Local Build: Nodal Works | 250 | 260mm in Scotland |
| | All Categories | Local Build/National Build: Trunk/Super Trunk Works | 500 | Measured relative to adjoining carriageway level |
| Verge: Urban | All Categories | Local Build: Nodal Works | 250 | 450mm in Scotland |
| | All Categories | Local Build: Trunk/Super Trunk Works | 250 | 450mm in Scotland |
| | All Categories | National Build: Trunk/Super Trunk Works | 350 | Measured relative to adjoining carriageway level |
| Verge: Rural | All Categories | Local Build: Nodal Works | 250 | 450mm in Scotland |
| | All Categories | Local Build/National Build: Trunk/Super Trunk Works | 500 | Measured relative to adjoining carriageway level |
| Agricultural Land | All Areas | All Construction | 1200 | Engineer to confirm requirements |

**Table 3/2: Depth of Cover in Trenches**

## 312 Trenches - Requirements for the Re-Use of Acceptable Excavated Materials in Verges

### General

**1** Arisings from excavations may be re-used as acceptable backfill, strictly in accordance with Table 3/1 of this Specification, subject to the Contractor demonstrating such acceptability of the materials for re-use, in accordance with the requirements of Appendix A1 of the Specification for the Reinstatement of Openings in Highways.

**2** Arisings from excavations in chalk materials to be used as backfill shall comply with the following requirements:

a) The saturation moisture content of the chalk shall be determined prior to its use.

b) The chalk shall be laid and compacted to an approved compaction procedure developed in accordance with Section NG1.6 3) of the Specification for the Reinstatement of Openings in Highways. The compaction procedure shall be proven with chalk materials of similar saturation moisture content.

**3** Excavated chalk to be re-used as backfill shall comply with the following requirements:

a) Excavated chalk shall be stockpiled for re-use and shall not be subjected to multiple handling.

b) During wet weather, excavated chalk shall be protected against water ingress at all times.

**4** Chalk materials shall be assessed by breaking up excavated fragments by hand, or by driving a steel pin into unexcavated deposits, and classified in accordance with Table S5.1. If the classification falls between two densities, then the chalk shall be assumed to be at the lower of the two densities.

| **Chalk Density** | **Physical Assessment** | **Backfill Suitability** |
|---|---|---|
| High | Very difficult/impossible to break up by hand<br>Difficult to hammer in steel pin | Carriageways, footways & verges |
| Medium | Some difficulty in breaking up by hand<br>Some effort needed to hammer in steel pin | Footways & verges only |
| Low | Easy to break up or crush by hand<br>Steel pin can be pushed in by hand | Unsuitable for use in any reinstatement |
| **Notes to Table S5.1:**<br>1) Chalk often contains flint inclusions and care should be taken to ensure that:<br>a) the steel pin does not strike a flint<br>b) the hand crushing sample does not contain any flints. | | |

**Table 3/3 - Suitability of Chalk Materials for Use as Backfill**

**5** Where the line of trench in rural verge is within 1.8m of the edge of carriageway, or where the Engineer considers there to be a significant risk of vehicle run over, arisings from excavations shall not be re-used, irrespective of acceptability. NOTE: this obligation exceeds the requirements of clause S9.2 of the Specification for the Reinstatement of Openings in Highways (version 3 England only) See also Table 3/1 of the Specification.

**6** The Contractor shall be responsible for maintaining the nature of excavated material acceptable for re-use as backfill material, so that when it is placed and compacted it remains acceptable under the Contract. Such excavated material shall be protected from weathering action and wetting and drying actions described in accordance with this Clause of the Specification, which would otherwise alter the natural moisture content of the material leading to lack of compaction, voids or settlement after back filling.

**7** Where the Engineer directs that excavated material is acceptable for re-use as backfill material, but the Contractor elects to remove such excavated material from the Site, to suit his own operations, then he shall make good any consequent shortfall of such material arising out of his actions, or alternatively provide imported Granular Sub-base Type 1 material in lieu of the shortfall, at his own expense.

**8** Where the excavation reveals a combination of material acceptable for use as backfill material and unacceptable material, the Contractor shall carry out the excavation in such a manner that the material acceptable for use as backfill material is excavated separately for use in the Permanent Works, without contamination by the unacceptable materials.

**9** Where the Contractor elects to re-use excavated materials as acceptable backfill, such material shall only be left on Site overnight where agreed with the Engineer, and shall be kept to an absolute minimum. Adequate storage space must be available, and the requirements of Clause 304 of the Specification observed. Such material left on site shall be securely signed and guarded to meet the requirements of the NRSWA 1991.

**10** Imported surround material to all ducts shall still be required when reinstating in accordance with this Clause of the Specification.

**Wet Weather**

**11** Excavated material shall be stacked in a heaped ridge and protected by waterproof sheeting to prevent water uptake.

**12** Excavated materials must not block water channels. Boards, ducting or other means shall be used underneath the excavated material to maintain the normal water channel. Water must be diverted away from open excavations.

**Dry Weather**

**13** Excavated material that is to be replaced as backfill in the same day needs no special protection.

**14** Material that is left above ground overnight, or for longer periods, shall be protected by the use of waterproof sheeting to maintain its water content.

## 313 Jointing Chambers and Cabinet Foundations

**1** Excavation methods should allow sufficient working space for jointing chambers and cabinet foundations to be constructed in accordance with the provisions of Series 500 of the Specification.

**2** Chambers shall be founded on a firm formation. Excavations in soft fine ground soils such as silts, clays and fine sands, shall be blinded to formation level in concrete immediately upon completion of the excavation.

**3** Immediately prior to the placing of any structural concrete as bases to jointing chambers and cabinet foundations, the excavation bottom, whether blinded or not, should be free from stones angular protrusions and loose material which may contaminate structural concrete.

## 314 Security of Live Virgin Media Apparatus and Cables

**1** The security of live Virgin Media apparatus and plant is paramount during all excavation work. In particular under no circumstances will an excavation containing such live apparatus and cable(s), in any stage of construction, be left exposed following completion of work for the day such that it is could be vandalised. This requirement is particularly relevant for alterations to the network, tie-ins to and diversions of the network, together with overbuilding to the network.

**2** Where the Engineer considers the Contractor to have not provided adequate protection measures, the Engineer may specify additional requirements.