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1. **SCOPE**

This Work Category Specification (WCS) documents the *Service* requirements for underground reinforced concrete or precast concrete pit construction.

1.1 **GENERAL**

- (a) As part of and in conjunction with this WCS, read WCS133 for the general standards and conditions that are relevant to, and are incorporated into this category of work.
- (b) For the avoidance of doubt, a breach of a general standard or condition contained in WCS133 is a breach of WCS61.2.

1.2 **APPLICATION**

The application of *Services* includes, but is not limited to, the following functions:

- (a) Cutting and removal of surfaces, concrete, asphalt and bitumen, for excavation.
- (b) Excavation, backfilling and surface reinstatement of excavations and trenches.
- (c) Removal of Conduit / Pipe sections for concrete pit construction.
- (d) Trial holes for identifying existing services in vicinity of concrete pit construction.
- (e) Construction or installation of in-situ concrete pits, reinforced concrete or precast concrete.
- (f) New construction, extension or modification of cast in-situ concrete pits, reinforced concrete or precast concrete that are underground chambers with access covers, for the principal use of cable jointing, on the underground electricity distribution and transmission network.

2. **AMENDMENT RECORD**

| Version | Change |
|---------|--|
| 9 | <ul style="list-style-type: none">▪ Removal of general standard and conditions clauses now published in WCS133.▪ Removal of Appendix A – Work Process Assessment▪ Removal of Appendix B – Sampling Plan▪ Removal of Appendix C - Final Product Assessment.▪ Reference to WCS133 added. |

3. **AIMS / OBJECTIVES**

The aim of this WCS is to ensure:

- (a) The overall aims and objectives detailed in WCS133, Section 3 - Aims and Objectives, are met by the application of procedures herein.
- (b) The additional category of work specific aims and objectives below are met:
 - (i) Underground reinforced concrete or precast concrete pits are constructed / installed consistent with *Construction Standards*.
 - (ii) Delivery of uninterrupted new construction, extension or modification of reinforced concrete or precast concrete pits for Energex distribution and transmission network.

Work Category Specification WCS61.2

Underground Reinforced Concrete Pits



4. COMPETENCIES, TRAINING AND QUALIFICATIONS

- (a) *Service Providers / Operators / subcontractors* performing *Services* are suitable licensed and trained in accordance with WCS133, Section 4 - Competencies, Training and Qualifications.
- (b) For competencies, training and qualification requirements specific to this category of work refer to the below included references and clauses.

4.1 ENERGEX COMPETENCIES

[Table 1](#) specifies the Energex Competencies / *Authorisations* (or combination thereof) that are Energex requirements to be held by *Operators*.

Table 1 – Operator Competencies

| CAMS Code | Competency Description | Operator Requirements |
|---|---|-----------------------|
| <i>Operators</i> hold the following competencies. | | |
| A OILS | Oil Spill Management (Note 1) | MO |
| A SOIL | Sediment Control Awareness (Note 1) | R |
| A VIRO | Gen. Environment Awareness (Note 1) | R |
| A WEED | Declared Plants Management Awareness (Note 1) | MO |
| U GCI | Generic Contractor Induction | R |
| U OHAW | Overhead Safety Awareness | R |
| U UGAW | Underground Awareness | R |
| | Authorised Person (as defined in Electricity Safety Regulation 2013) | R |
| <i>Operators</i> hold the following competencies when the relevant work activity is being undertaken. | | |
| A IWG | Individual Work Group | R |
| A RR | Restricted Recipient | MO |
| U EO | Electricity Officer | R |
| U SSAW | Substation Safety Awareness | R |
| | Excavation Plant (Note 2). | AR |
| | Construct Reinforced Concrete Suspended Slabs, Columns, Beams and Walls (Note 3). | R |
| | Install Pre-cast Access Chambers (Note 3). | AR |

Legend:

- R Required.
- AR As required.
- MO A minimum of one person on *Worksite* holds this competency.

Note 1: *Service Providers* with their own environmental training system equivalent as a minimum to the Energex environmental training system; may train and assess their own *Operators* as competent.

Note 2: *Operators* are to be trained and assessed as competent by a Registered Training Organisation (RTO) with appropriate scope for the plant being operated, and hold a current 'Statement of Attainment' or 'Nationally Recognised Qualification'. Provide *Energex Officer* with a copy of current 'Statement of Attainment' or 'Nationally Recognised Qualification' for all *Operators* of excavation plant.

Note 3: *Operators* are to be trained and assessed as competent by a RTO with appropriate scope for the construction of reinforced concrete suspended slabs, columns, beams and walls or the installation of

pre-cast access chambers and hold a current 'Nationally Recognised Qualification'. Provide *Energex Officer* with a copy of current 'Nationally Recognised Qualification' for all *Operators* responsible for constructing reinforced concrete suspended slabs, columns, beams and walls or the installation of pre-cast access chambers.

5. VEHICLES AND PLANT

For vehicles and plant requirements, refer to WCS133, Section 5 – Vehicles and Plant.

6. MATERIALS, TOOLS AND EQUIPMENT

- (a) For materials, tools, equipment requirements, refer to WCS133, Section 6 – Materials Tools and Equipment.
- (b) For materials, tools, equipment requirements specific to this category of work refer to the below included references and clauses.

6.1 NOMINATED TOOLS AND EQUIPMENT

[Table 2](#) specifies the nominated materials, tools and equipment required when providing *Services* for this category of work.

Table 2 – Materials, Tools and Equipment

| Description | Supplier |
|--|-------------------------|
| Cable / Pipe locator | <i>Service Provider</i> |
| Sound barriers / fence | <i>Service Provider</i> |
| Road / surface cutting and rock breaking equipment | <i>Service Provider</i> |
| Sediment barriers / fence | <i>Service Provider</i> |
| <i>Shoring</i> systems | <i>Service Provider</i> |
| Backfill compaction equipment | <i>Service Provider</i> |
| Motor fuels, lubricants, etc. as required | <i>Service Provider</i> |
| Tools and equipment and materials specific to reinforced concrete pit construction, e.g. concrete vibrators, concreting tools (e.g. screeds, trowels, floats) formwork, props. | <i>Service Provider</i> |
| Conduit sealing equipment. | <i>Service Provider</i> |
| Pit access cover lifting devices | <i>Service Provider</i> |

7. SAFETY

- (a) For safety requirements, refer to WCS133, Section 7 – Safety.
- (b) For safety requirements specific to this category of work refer to the below included references and clauses.
- (c) Implement control measures to eliminate and / or reduce the following (but not limited to) risk exposures:
 - (i) Surfaces near edges of excavations with insufficient compaction of backfilling could be unsuitable for operation of heavy plant (e.g. backhoes).
 - (ii) Construction and modification of in-situ concrete pits surrounding energised electrical cables and plant or in the vicinity of existing assets connected to the network.

8. ENVIRONMENT

For environmental requirements, refer to WCS133, Section 8 - Environment.

9. EXTENT OF WORK

9.1 GENERAL

- (a) For the general extent of work requirements, refer to WCS133, Section 9 – Extent of Work.
- (b) For extent of work requirements specific to this category of work refer to the below included references and clauses.
- (c) Provide *Services* in accordance with (but not limited to):
 - (i) Work Category Specification WCS2 – Underground Construction.
 - (ii) Work Category Specification WCS61 – Underground Civil Construction.
 - (iii) Work Category Specification WCS61.2 – Underground Reinforced Concrete Pits.
 - (iv) Work Category Specification WCS133 – General Standards and Conditions.
 - (v) Energex Manual 00305 – Underground Distribution Construction Manual.
 - (vi) Energex Form 0099 - Return of Energex Property – Contractor Use Only.
 - (vii) Energex Form 2121 – Safedig for Improved Power Supply We Upgrade Underground.
 - (viii) Australian Standard AS 1289.0:2014 - Methods of testing soils for engineering purposes - Definitions and general requirements.
 - (ix) Australian Standard AS 1657-2013 - Fixed platforms, walkways, stairways and ladders - Design, construction and installation.
 - (x) Australian Standard AS 3600-2009 - Concrete structures.
 - (xi) Australian Standard AS 3610-1995 - Formwork for concrete.
 - (xii) Australian Standard AS 3996-2006 - Access covers and grates.
 - (xiii) Australian Standard AS 4373-2007 - Pruning of amenity trees.
 - (xiv) Australian Standard AS/NZS 4671:2001 - Steel reinforcing materials.
 - (xv) The requirements of the Energex approved *Work Plan* and associated drawings.
 - (xvi) Energex approved *Work Plan*, construction drawings and associated drawings and instructions. (*Worksite* specific and current amendment may be provided as part of the *Work Order*).
 - (xvii) Current plans detailing existing underground essential services infrastructure in the immediate area and surrounding the *Worksite*.
 - (xviii) *Service Provider's* safe system of work.

9.2 RPEQ CERTIFICATION

- (a) Where the *Services* being provided for construction, extension and modification of concrete pits is not being managed by Energex or certified by a *Service Provider* with a Service Agreement with Energex, the concrete pits are to be certified by the Principal Contractor's or *Developer's* supervising Registered Professional Engineer Queensland (RPEQ) – Civil / Structural Engineer.
- (b) The RPEQ – Civil / Structural Engineer certifies that all concrete pit construction *Services* have been provided in strict accordance with:
 - (i) Energex's construction specification as a minimum.
 - (ii) Construction Drawings for the project.
 - (iii) Manual 00305.

- (c) Issue the REPQ – Civil / Structural Engineer certification to the *Energex Officer* at hand over or before completion of civil / structural works and *Commissioning* of the network whichever comes first.

9.3 DETAILS OF WORK

- (a) The extent of the construction work is incorporated in the *Work Plans*. The *Work Plans* are to indicate the full scope of the required construction work. *Work Plans* are issued to the *Service Provider* with amendments from time to time.
- (b) Confirm with *Energex Officer* any alternate locations, alignments and depths to overcome *Site* difficulties before proceeding with concrete pit installation if nominated depth from the finished surface levels and vertical or horizontal separation from other essential services or obstructions is likely to be reduced.

9.4 PREPARATION FOR CIVIL WORKS

9.4.1 Locating Existing Underground Services

- (a) Prior to commencement of any concrete pit construction *Services*, for example ground penetration and / or mechanical excavation, the *Service Provider* is to ensure all underground services have been located and positively identified at the *Worksite*. Dial Before You Dig (DBYD), can be utilised for obtaining below ground essential service locations.
- (b) In Bulk, Zone and Commercial and Industrial (C & I) substation, there will normally be a higher concentration of underground electrical cables and other electrical infrastructure, for example earth grids, in a confined area.

9.4.2 Photograph of Work Site

The use of photographic records of *Site* conditions prior to excavation is recommended. In this way the *Work Group* may defend themselves against unfounded accusations of causing damage.

9.4.3 Undisturbed Survey Marks

Exercise care so that no survey pegs or Permanent Survey Marks (PSMs) are disrupted during the course of providing *Services*. Should survey pegs or PSMs be disrupted, the *Service Provider* is responsible for reinstatement. The reinstatement of survey pegs or PSMs is only to be performed by a Registered Surveyor.

9.4.4 Non-daylight Hours Lighting

During non-daylight hours utilising flood lighting; prevent excessive glare from flood lighting impacting on nearby vehicular and marine vessel traffic and or nearby residents and *Premises*.

9.4.5 Entering Public Sealed Roads

Remove excess dirt, mud and / or sand from plant and vehicles before leave the *Site* and entering onto public sealed roads. No significant deposits of dirt, mud and / or sand left are to be left on sealed roadways.

9.4.6 Proving Site Conditions

- (a) Excavate trial holes along proposed route at critical locations to confirm practicality of constructing concrete pits on proposed *Site* or obstruction at various Locations of Interest and report to *Energex Officer* any required changes to facilitate concrete pit construction, extension or modification.
- (b) Excavate trial holes by hand only, assisted by mechanical plant and have typical dimensions of 500 mm x 500 mm x 300 -1000 mm deep.

- (c) Provide a record of existing essential services to assist with determination of the practicality of proposed construction, including consideration for relocation of existing essential services.
- (d) Final location is to be agreed with the *Worksite Supervisor* and the concrete pit setting out marked on surface prior to start of excavations.

9.4.7 Breaking of Surface

- (a) Break bitumen, asphalt, concrete, paved or tiled surfaces (cut cleanly / neatly so edges not jagged) of footpaths and roadways in accordance with *Authority's* requirements.
- (b) During the removal of surface finishes (e.g. concrete, asphalt or bitumen), segregate, collect, treat (if necessary) and removed from *Worksite* in an approved manner the slurry formed by saw cutting operations.
- (c) *Worksite Supervisor* determines the most suitable method of concrete pit installation in decorative driveways, for example stencilled, stamped, pavers and exposed aggregate, which are in good or near new conditions, for example relocating concrete pit clear of decorative driveways.

9.4.8 Public Notification

- (a) Consult Energex Corporate Communications Group over *Services* being provided:
 - (i) To determine the most appropriate strategy for communicating with impacted community.
 - (ii) Advising distribution date of notification to local residents of impending works.
 - (iii) Ensuring affected local residents concerns are addressed.
- (b) Inform local residents of proposed *Services* being provided in their neighbourhood at least *7 Business Days* before scheduled work commences and not more than *28 Business Days* before work commences, using Form 2121, via letter drop method and assist Energex as required to advise the wider community by notification in the local press.
- (c) Where work requires the removal and reinstatement of a section of driveway to a property and an agreement is not initially provided, the *Service Provider* is to:
 - (i) Contact the owner to discuss proposed works.
 - (ii) Obtain a written agreement of approval to remove a section of driveway and reinstate it after construction; prior to commencement of work.
 - (iii) Resolve all objects received prior to *Services* being provided.
- (d) *Operators* are to briefly explain the nature of work being undertaken when approached by members of public while providing *Services* at *Site*.

9.5 EXCAVATION

Undertake all provided open cut excavation for the provision of concrete pit construction in accordance with requirements set out below:

- (a) All open cut excavation activities are controlled as part of the Construction Safety Plan and comply with the *Laws*.
- (b) Take into account the proposed changes to existing finished surface levels when deciding depth of excavations to ensure correct finished surface level of concrete pit access covers is maintained after completion of surface reinstatement.
- (c) Dispose of surplus spoil on the same day as excavation occurs. Where disposal of spoil is required, the *Service Provider* complies with the directions from *Authorities* on the location and manner of transport to an approved disposal *Site*.

- (d) Spoil removed from *Site*, is only disposed of at an approved facility or *Site* accepting the class of material being removed.
- (e) Vegetation obstructing access to *Site* is to be pruned in accordance with AS 4373. Trees (including palms) that are removed from *Site* during excavation are to have their stumps removed from *Site*.
- (f) Keep disturbance of existing Energex cables and joints to a minimum.
- (g) Place suitable mechanical protection around Energex cables to prevent damage during excavation.
- (h) In some instances careful excavation of trial holes are necessary to determine in advance the alignment and depth of existing Energex cables and essential services and infrastructure to facilitate the installation of protective materials prior to excavating with machinery.
- (i) Limit the use of excavation by mechanical plant, for example backhoe in open excavations when there is evidence of debris and rubble in the ground near existing underground Energex cables and essential services.
- (j) Typically over excavate for precast concrete component / module installation (e.g. precast concrete pit components / modules) to allow 200 mm clearance around the precast concrete component / module when placed in excavation.
- (k) Floor of excavations are true to grade and smooth.
- (l) Excavations contain no loose clumps of soil or deleterious material.
- (m) Change in excavations gradient is gradual.

9.5.1 Excavation in Rock

- (a) Excavations in rock are works that require material to be first broken up by pneumatic tools or explosives, before it can be removed.
- (b) It is not considered excavation in rock when material can be reasonably removed by:
 - (i) A 7 tonne, 55 kW (74 HP), mechanical excavator (in good working condition).
 - (ii) Moderate use of a jackhammer.
- (c) Notify the *Energex Officer* by submitting initial details of pending variation claim for excavation in rock before proceeding with further excavation.

9.5.2 Shoring, Battering or Benching Excavations

- (a) Ensure *Shoring*, battering or benching established to prevent the collapse of excavation walls complies with *Laws* and relevant Australian Standards.
- (b) *Shoring* systems are designed and certified by a competent person, for example structural engineer and or geotechnical engineer.
- (c) Construction and removal of certified *Shoring*, battering or benching of excavations undertaken by a minimum of two competent *Operators* who are qualified and trained to carry out this work.
- (d) An *Operator*, who is qualified to construct and remove *Shoring*, benching or battering, is to remain on *Site* containing open excavations, during works to ensure the following:
 - (i) Daily examinations of excavation, for example *Shoring*, battering or benching, installed:
 - Before works commence.
 - Regularly during the progression of works to ensure no change in sides and surrounding conditions of excavation.
 - Where changes are detected, ensure control measures to prevent collapse are adequate.
 - (ii) All work ceases immediately when deficiencies to the excavation or collapse prevention control measures are detected. *Operators* are not to enter the excavation until rectification works have been completed.

9.5.3 De-Watering

- (a) In saturated ground, keep the water level below the construction level within the excavation.
- (b) Maintain excavations clear of water while work is in progress through the use of a submersible sump pump or similar.
- (c) Use pumps as the first choice to drain large volumes of water or mud from open excavation. When utilising the 'sump hole' technique and the bucket of the backhoe to drain out water, ensure the size of the 'sump hole' is significantly larger than the size of the bucket.

9.6 FOUNDATION

- (a) The floor of the excavation to be a graded surface and reasonably smooth across the width of the excavation, and where practicable, also along its length.
- (b) After excavation, check the subgrade which will support the concrete pits (reinforced concrete or precast concrete) floor slabs to be constructed and if the subgrade is suspected as being inadequate (unstable) refer the matter to the Civil Construction Engineer for direction.
- (c) As a guide foundation subgrade details are as follows:
 - (i) Unstable soils are soft clay to sandy gravel with soil strength 50 – 150 kPa. These soil types may REQUIRE a foundation base (slab) of additional area to decrease the bearing pressure on the soil under the infrastructure. (Refer to Civil Construction Engineer before proceeding with construction).
 - (ii) Stable soils are very stiff clay to shale / rock with a soil strength of 150 kPa or higher. These soil types generally DO NOT REQUIRE a foundation base (slab) of additional area to decrease the bearing pressure on the soil under the infrastructure.

9.7 CONDUIT / PIPE ENTRY

- (a) Determine content of existing in-situ *Conduit / Pipes*, by establishing an inspection window prior to any additional construction work being performed.
- (b) Inspection windows are not to be cut using reciprocating and / or cut off saws.

9.8 PVC OR POLYETHYLENE CONDUIT / PIPE APERTURES

- (a) Cut inspection window edges to sufficient depth to allow final removal by lightly tapping out.
- (b) Use a depth control device to regulate the depth of any cut, ensuring the cutting tool / blade does not penetrate through *Conduit* wall.
- (c) Prior to using any cutting device to form an inspection window, *Operators* are to fully expose the *Conduit / Pipe* to determine the wall thickness, and set of cable, as:
 - (i) Cables may have a set in them, and may not be laying in bottom of the *Conduit*.
 - (ii) Markings on *Conduit* may be illegible due to discolouration caused by leachate from surrounding soil.

9.9 EXCAVATION BACKFILL

- (a) The *Service Provider* is to backfill all excavations in accordance with the *Authority* or owner specifications approved by the *Energex Officer*.
- (b) Carry out the backfilling of excavations as soon as practicable after concrete pit construction, extension or modification and location recording is complete but not before installed concrete pit infrastructure to be covered has been accepted by *Energex Officer*.
- (c) Additionally it may be necessary to install drainage material that is plumbed into local *Authority* storm water drains.

- (d) Ensure that no damage is caused to other existing *Services* while using mechanical rammers in locations where existing *Services* are adjacent to or within the areas to be backfilled.

9.10 BACKFILL MATERIALS

- (a) Backfill excavations with well graded fine sand free of particles exceeding 5 mm and sharp edge particles or substitute material as agreed by *Authority* or owner and approved by the *Energex Officer*.
- (b) Where required by the relevant *Authority* or owner, the *Service Provider* undertakes compaction tests in accordance with their requirement.
- (c) Where backfill composition requirements of the relevant *Authority* or road owner differ from this instruction, obtain approval from the *Energex Officer* prior to agreeing to these requirements.
- (d) Backfilled excavations nominated for soil testing to achieve in-situ dry density not less than 95% of maximum dry density as determined by the modified compaction test to AS 1289, unless specified otherwise.

9.11 TEMPORARY REINSTATEMENT COVER BOARD

For the temporary reinstatement of excavations and open underground infrastructure, for example pits using cover boards. Apply the following on all Energex authorised works as a minimum:

- (a) Cover boards and timber support beams of a suitable cross section and stress grade to support any applied loads from the resumption of normal pedestrian and / or vehicle flow over the covered opening.
- (b) On *Sites* that are not barricaded, cover boards installation are not to present a trip hazard for normal pedestrian use.
- (c) Cover board used not less than structural plywood of stress grade 'F14' unless approved by a Civil Engineer for use on a *Worksite*.
- (d) Overlap on multiple cover boards placed together is to be a minimum of 100 mm unless otherwise specified.
- (e) Cover board is to extend a minimum of 500 mm past the edge of the opening (aperture) onto the surrounding surface unless otherwise specified.

9.12 WASTE DISPOSAL – CIVIL CONSTRUCTION

- (a) Dispose of all waste material in accordance with *Authority* requirements and restore the *Site* to a clean and safe condition in accordance with the *Laws*.
- (b) The *Service Provider* ensures that liquid residue is identified / tested to determine the level of contamination prior to disposal, ensuring the subcontractor engaged to perform the disposal can safely retrieve and transport contaminated waste.

9.13 FORMWORK

- (a) Construct formwork in accordance with AS 3610, including current amendments.
- (b) All formwork to be rigidly constructed and true to the shape and dimensions shown on the construction drawings. Joints to be sufficiently tight to prevent the leakage of concrete. Formwork to be rigidly braced and strutted to prevent deformation under the weight and pressure of wet concrete, constructional loads, earth pressure and surcharge.
- (c) All concrete forms to be thoroughly wetted or oiled to facilitate stripping.
- (d) Remove formwork as soon as concrete has hardened sufficiently to resist damage from removal operations but in no case less than 24 hours after pouring.
- (e) In the case of early stripping of walls, re-strut the walls.
- (f) Do not strip soffits or roof slabs, less than 7 days after pouring.

- (g) Do not load any walls or roof slabs, before 21 days unless approved otherwise by the Civil Construction Engineer in charge of the infrastructure being constructed.

9.14 REINFORCING STEEL

- (a) Reinforcement to be plain round bar or tempcore grade γ -bar complying with AS/NZS 4671 or hard drawn steel wire fabric complying with AS/NZS 4671.
- (b) Reinforcing material used to be free of loose rust scale, grease, paint or any other contamination that may reduce the strength of the steel-concrete bond.
- (c) Reinforcing to be placed, tied and supported to ensure that it is fully covered by the concrete to the required distance. Place all reinforcement on bar chair supports when in horizontal plane; and against nylon bar chairs when in the vertical plane to ensure correct cover of concrete.
- (d) Cover to reinforcement, 50 mm minimum externally and 30 mm minimum internally, unless specified otherwise.
- (e) Position embedded items carefully to ensure that they are correctly located and fixed to reinforcing steel.
- (f) Bell mouth aperture steel reinforcement for reinforced concrete pit construction is to be identical to that of the concrete pit chamber (floor, walls, and roof).

9.15 CONCRETE

- (a) All concrete work to be in accordance with AS 3600.
- (b) Concrete is nominal Grade 32 (for non-aggressive soil and aggressive soil in dry conditions) with maximum aggregate of 20 mm and slump of 75 mm unless specified otherwise on construction drawings (*Works Plans*).
- (c) For grade of concrete in aggressive soil in extremely wet soil conditions please consult Civil Construction Engineer.
- (d) Use ready-mixed concrete:
 - (i) The location of the mixing plant is such that the concrete is poured within 1.5 hours from the time of batching.
 - (ii) Use no admixture in the concrete that adversely affect its strength, cause corrosion of the reinforcing or adversely affect the strength of the steel-concrete bond.
- (e) Placing of concrete is to proceed in a continuous operation until completion of the part of the work between construction joints:
 - (i) If stopping of concrete placement elsewhere is unavoidable, then make a construction joint where the concrete pour stopped.
 - (ii) Use a minimum of joints in the construction.
- (f) Thoroughly compact the concrete during the placing operation, so that no voids remain within the concrete:
 - (i) Using a mechanical immersion vibrator wherever possible.
 - (ii) Elsewhere by rodding or tamping.
- (g) The concrete is to have a smooth, hard surface finish, free of burrs or irregularities with straight edges (within tolerance) and free of burrs.

9.16 CONCRETE FINISH

- (a) Floors and top of roof to have wood-float finish.
- (b) Walls to have smooth off form finish.
- (c) All external angle corners to be radiused smooth.
- (d) Remove any projections and dags evident after formwork is stripped.
- (e) Make good any honeycombing by grouting solid with a structural non-shrink grout.

- (f) Should reinforcement steel be visible after stripping formwork, carry out no corrective work without approval from the Civil Construction Engineer.

9.17 IN-SITU CONCRETE PIT CONSTRUCTION – REINFORCED OR PRECAST

9.17.1 General

- (a) If any concrete pit to be constructed is found to be located in a roadway or driveway, consult the Civil Construction Engineer before any construction is authorised or commenced.
- (b) Keep the disturbance of existing Energex electrical cables and joints to a minimum. Place suitable mechanical protection around electrical cables and joints to prevent damage.
- (c) Use an appropriate method of support to prevent the collapse of the walls of the concrete pit construction excavation. *Shoring* system used by *Service Providers* to construct concrete pit (suitable for use in areas with a high density of existing underground essential services and fitting around these services) complies with the *Laws* and to have a Structural Design Certificate from an independent RPEQ Structural Engineer and a Work, Health and Safety Certificate (as required) prior to commencement of construction utilising certified *Shoring* system.
- (d) Maintain excavations for concrete pit construction clear of water while work is in progress.
- (e) After excavation, check the subgrade which will support the concrete pit and if the subgrade is suspected as being inadequate (weak) refer the matter to the Civil Construction Engineer for direction.
- (f) Backfill all excavation surrounding in-situ reinforced concrete pit or precast concrete pit infrastructure with well graded fine sand free of particles exceeding 5 mm and sharp edge particles.
- (g) At completion of concrete pit construction, remove debris from inside of concrete pit, if necessary pump dry and leave in a clean and tidy condition.
- (h) The *Service Provider* provides Energex with a minimum of 2 *Business Days'* notice prior to completion of work to arrange for final product acceptance of concrete pit construction.

9.17.2 Reinforced Concrete Pit

- (a) Pit floor slab, walls and roof slab to each be single pours.
- (b) Compact pit floor slab, walls and roof slab by means of mechanical immersion vibration.
- (c) Bell mouth aperture reinforcement for reinforced concrete pit construction to be identical to that of the concrete pit chamber (floor, walls, and roof).

9.17.3 Precast Concrete Pit Construction

- (a) Install precast concrete pits at correct levels and alignment and with floors level (within tolerance) unless otherwise specified.
- (b) Place precast concrete pit component base slab on 50 mm minimum of compacted bedding material (subgrade) that has been levelled to ensure correct overall installation and prevent uneven settlement of precast concrete components.
- (c) If deep excavation is required under or near to edge of precast concrete components / modules; prop the underside of slab / edge of components / modules while deep excavation remains open in accordance with Civil Construction Engineer's directions.
- (d) Precast concrete components that come assembled are to have a layer of preformed sealant between the mating surfaces of assembled precast concrete components.
- (e) Only remove minimum preformed concrete knockout aperture (area) required to pass *Conduits* / cables through.

- (f) Seal between *Conduits* / cables and concrete knockout aperture interface by grouting with high strength sand and cement grout after *Conduit* installation to prevent entry of vermin and backfill ingress to precast concrete module chamber / void.
- (g) Typically over excavate for precast concrete pit installation to allow minimum of 200 mm clearance around the precast concrete components / modules.
- (h) Ensure careful compaction of excavation during backfilling, so as to not put undue pressure on the walls. Under no circumstances impose on precast concrete pit wheel loadings as part of the back filling operation.

9.17.3.1. Lifting / Handling Precast Components

- (a) Lift, handle and install precast concrete components / modules on a construction *Site* in strict accordance with the *Laws* and the requirements of the relevant Australian Standards and Work Health and Safety Regulations.
- (b) Should '*Reid Swiftlift*' or equivalent proprietary concrete lifting system be fitted for lifting precast concrete components / modules, *Operators* are to use only nominated lifting system components to lift precast component / modules by lifting from system anchors cast in concrete.
- (c) Lifting components / modules from all anchors provided. The load will always be shared between two diagonal points and enclosed ANGLE OF SLING / CHAINS IS NOT TO EXCEED 60°.
- (d) Items that are specially manufactured, for example slings or lifting brackets; tested and certified by a company using N.A.T.A. approved testing facilities, tagged with a current test label and maintained in good order.
- (e) Where a particular lifting eye or fitting is required; obtain and use that fitting to lift and place components / modules.
- (f) Where lifting points are marked on the precast concrete components / modules; only use these points to lift and place components / modules.
- (g) Test certificates are available for all lifting equipment used.

9.17.3.2. Identification Precast Components at Site

Clearly stencil precast concrete pits, components, modules or assembled combinations thereof delivered to *Site* with the following information:

- (a) Individual precast components net weight (tonnes to three significant figures).
- (b) Assembled precast concrete pit gross weight (tonnes to three significant figures).
- (c) Method for lifting all precast components and assemblies.
- (d) Identification of lifting anchor points.
- (e) Component type and date of manufacture (internal face only).

Note All alpha and numeric characters stencilled on precast components are to be a minimum of 30 mm high, paint of high visibility colour and placed on components at two locations typically top and side face of components.

9.17.4 Sealing Conduit Ends

Immediately seal *Conduits* / *Pipe*, after removing a section for concrete pit construction. Seal all *Conduit* ends to prevent entry of spoil using orange PVC end caps.

9.17.5 Conduit Apertures

- (a) Determine aperture(s) actual size and position from the construction layout drawings (*Site* specific).
- (b) When *Conduits* are installed through walls during concrete pit construction:

- (i) Grout the *Conduit* aperture to prevent the ingress of soil and foreign material.
 - (ii) Cut *Conduits* off flush with inside face of concrete pit wall.
- (c) When concrete pit is constructed prior to *Conduit* installation; seal apertures by placing form-ply sheeting or similar on outside face of concrete pit wall to cover aperture and hold in position with sand bags.

9.17.6 Hardware Fittings Installation for Concrete Pits

9.17.6.1. Stop Rungs

- (a) Install step rungs in accordance with AS 1657 for all design, construction and installation.
- (b) The edge of the clear opening directly over the step rungs is a maximum of 75 mm off the internal face to which the step rungs are fitted. (In wide bodied concrete pits, offset the access cover towards the wall with the step rungs fitted).

9.17.6.2. Access Covers

- (a) Supplied access covers, comply with AS 3996.
- (b) Cast access covers in concrete, in accordance with access cover supplier's specifications for installation.
- (c) Access covers and frames; square and parallel to the real property alignment; where practical.
- (d) Access covers and frames, fitted flush with the finished surface level and conform to the general contour of the surrounding surface.
- (e) In pavements with permanent finishes, set the frame of access cover in concrete so that the access cover will be flush with finished surface level and conform to the contour of the permanent pavement surface.
- (f) In unmade footpaths (turfed areas), set the access cover as close to the proposed permanent surface level as practicable.

9.17.6.3. Access Covers Tools and Fittings

Access cover keys have been designed for lifting access covers off concrete pit(s). The keys are fitted with a safety lug that is designed to prevent the key slipping out the keyhole when the cover is being lifted. (Do not use unapproved tools, e.g. wrecking bars, large screwdrivers or crowbars to enter concrete pits).

9.17.6.4. Fibreglass Bell Mouths

Fibreglass bell mouth apertures utilised for concrete pit; only used as lost formwork and to have reinforced concrete constructed around all external faces in accordance with reinforced concrete construction requirements for concrete pit chamber proper.

9.18 DRILLING CONCRETE COMPONENTS

Do not use explosive powdered tools for example Ramset or HILTI guns to penetrate reinforced concrete or precast concrete components.

10. RECORDS

- (a) For records requirements, refer to WCS133, Section 10 - Records.
- (b) For records requirements specific to this category of work refer to the below included references and clauses.

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10.1 AS CONSTRUCTED DRAWINGS

'As Constructed' drawings for the in-situ concrete pits constructed, provide details of actual final levels, depths, internal dimensions and levels of the concrete pits and their position relative to lot frontages, boundaries and other topographic features.

11. WORK VERIFICATION

- (a) For work verification requirements, refer to WCS133, Section 11 – Work Verification.
- (b) For additional work verification requirements specific to this category of work refer to the below included references and clauses.
- (c) Provide Energex with the option of attending *Site* to witness setting out of reinforcing steel and hardware fittings, and pouring of concrete.

12. GLOSSARY

- (a) For standard definition of words, acronyms and abbreviations used in this WCS, refer to WCS133, Section 12 - Glossary.
- (b) For addition definition of words, acronyms and abbreviations specific to this category of work, refer below.

| Term | Definition |
|------------------|--|
| Developer | Any person, organisation or company, which enters into an agreement with Energex for the supply of electricity to development project under the terms and conditions of the agreement. |
| Shoring | A system of temporary supports and sheeting material, to maintain the stability of the sides of an excavation (including trenches) to prevent collapse. |

13. REFERENCES

- (a) For reference requirements, refer to WCS133, Section 13 - References.
- (b) For additional reference requirements specific to this category of work refer to Section 13 references and clauses below.

13.1 AVAILABLE DOCUMENTS

Make available (at all times) to Infield *Operators*, the relevant documents / forms listed in [Table 3](#) below for verifying *Service* requirements.

Table 3 – Available Documents

| Document Reference | Detail / Description |
|-------------------------------------|---|
| Work Category Specification WCS61 | Underground Civil Construction. |
| Work Category Specification WCS61.2 | Underground Reinforced Concrete Pits. |
| Work Category Specification WCS133 | General Standards and Conditions. |
| Energex Manual 00305 | Underground Distribution Construction Manual. |
| Energex Form 0099 | Return of Energex Property – Contractor Use Only. |

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Underground Reinforced Concrete Pits



| Document Reference | Detail / Description |
|--------------------|--|
| Energex Form 2121 | Safedig for Improved Power Supply We Upgrade Underground Installations (or <i>Service Provider</i> equivalent). |
| | <i>Work Orders</i> detailing the <i>Services</i> to be performed. |
| | Energex approved <i>Work Plan</i> , construction drawings and associated drawings and instructions. (<i>Worksite</i> specific and current amendment may be provided as part of the <i>Work Order</i>). |
| | Current plans detailing existing underground essential services infrastructure in the immediate area and surrounding the <i>Worksite</i> . |
| | <i>Service Provider's</i> safe system of work. |

13.2 RECOMMENDED DOCUMENTS

Refer below for the recommended documents that are of relevance.

13.2.1 Energex Documents

Table 4 – Energex Document

| Document Reference | Detail / Description |
|--------------------------------------|--|
| Work Category Specification WCS2 | Underground Construction. |
| Work Category Specification WCS61.1 | Underground Trenchless Technology. |
| Work Category Specification WCS61.2A | Assessment – Underground Reinforced Concrete Pits. |
| Energex Document No. 4920-A4 | Energex Overhead Construction Manual. |

13.2.2 Queensland Acts and Regulations

For Queensland Acts and Regulation requirements, refer to WCS133, Section 13.2.2 – Queensland Acts and Regulations.

13.2.3 Australian Standards and Other Documents

- Australian Standard AS 1289.0:2014 - Methods of testing soils for engineering purposes - Definitions and general requirements.
- Australian Standard AS 1657-2013 - Fixed platforms, walkways, stairways and ladders - Design, construction and installation.
- Australian Standard AS 3600-2009 - Concrete structures.
- Australian Standard AS 3610-1995 - Formwork for concrete.
- Australian Standard AS 3996-2006 - Access covers and grates.
- Australian Standard AS 4373-2007 - Pruning of amenity trees.
- Australian Standard AS/NZS 4671:2001 - Steel reinforcing materials.
- Other relevant Australian Standards.

14. APPENDICES

There are no appendices included with this WCS providing additional instruction.

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