1. Purpose

1.1 To detail the method for handling ready mix concrete and mixing concrete on site when constructing BT joint boxes and manholes.

1.2 Ready mix concrete is the preferred option for joint boxes, however site mixed concrete can be used for footway and carriageway joint boxes provided BT TAA has approved a certificate of compliance.

1.3 For manholes (jointing chambers) only ready mixed wet concrete delivered to site in a rotating drum can be used. The mixed concrete shall be as a minimum RC 40.

2. Responsibilities

2.1 The **Gang Foreman** shall ensure staff involved in the handling and mixing of concrete on site, adhere to this method and are licensed under the BT scheme for the disciplines they are in charge of.

2.2 The **Site Supervisor** shall periodically monitor the compliance to this method statement.

2.3 The **Quality Manager** will ensure that the process is monitored periodically.

2.4 If this method cannot be adhered to, contact your supervisor for advice before proceeding.

3. References & Definitions

3.1 References

- BT Specification LN 550- Underground Duct Laying and Associated Works.
- BS 5328 Pt 1 – Guide to specifying concrete mixes
- BS 5328 Pt 2 – Methods for specifying concrete mixes
- BS 5328 Pt 3 - Specification for the procedures to be used in producing and transporting concrete
- BS 5328 Pt 4 – Specification for the procedures to be used in sampling, testing and assessing compliance in concrete
- BS 12 Specification for ordinary and rapid hardening Portland cement.

3.2 Definitions

- **Manhole –** is an underground chamber with a roof, in the footway or the carriageway.
- **Jointbox –** is an underground chamber, placed either in footway or carriageway, with a maximum depth of 1650mm and has access cover/s covering the majority or entire top surface.
- **Chapter 8** is the section of the New Roads and Street Works Act, which details the requirements of the road works guarding.

4. Safety considerations

4.1 Hazards

Traffic	√	Fumes/Gas		Falls of material		Mobile Plant & Vehicles	√
Buried Services		Dust	√	Demolition		Noise & Vibration	√
Overhead Services		Deep Excavations		Collapse of Structure		Lifting Operations	√
Fire/Explosions		Confined Spaces		Soft Ground		Manual Handling	√
Flying		Lighting Levels		Falls on Level		Working near Water	
Particles/Objects							
Heat		Falls from Height		Defective Materials		Adverse Weather	

4.2 Precautions

- **ASSESS THE RISK** - Ensure that prior to starting work a **SITE SPECIFIC RISK ASSESSMENT** is conducted and recorded on to identify specific risks that may be present, if in doubt contact your site supervisor.

- **ROAD WORKS GUARDING**
  - To be in accordance with Chapter 8.
  - Signs and barriers to be secured with sand bags if necessary.
  - Maintain a safe route for pedestrians to by pass by the works.
  - Guard pedestrians from vehicles when directed into carriageway.
  - Where required lights to be attached to signing and guarding.
- **PLANT, VEHICLES & WORK TOOLS**
  - To be kept inside the work area.
  - To be in good working order and properly maintained.
  - To have mufflers and silencers fitted where practicable.
  - Vehicles to be fitted with, and use amber rotating beacon/s.
  - Plant operators to be trained and competent in the use of the plant they are using.
  - Switch plant off when not in use.
  - Ensure that all guards are properly secured and unauthorised persons do not use the plant/vehicle.
  - Rotate operators to reduce individual exposure.
  - Keep plant & vehicles away from the edge of the excavation.
  - Air hoses to be maintained in good order with joints correctly coupled.
  - Hose check arrestors to be fitted and used on all compressed air lines.
  - Dust suppression is to be used when saw cutting or using equipment that can cause airborne dust, i.e. water.
  - Fuel oil to be stored and handled safely to prevent spillage or contact with skin or clothing.
  - Ensure the correct PPE is used for the type of equipment.
  - Ensure fumes do not enter confined space.
- **SAFE LIFTING TECHNIQUES**
  - When lifting materials and tools from/to the excavation or onto/off the truck ensure that items are not too heavy. Either reduce them into lighter pieces or/and seek assistance to spread the load or use suitable lift equipment. If in doubt seek advice.
  - When lifting manhole or box covers ensure that the proper lifting keys are used and that safe lifting techniques are employed. For carriageway covers lifting aids shall be used for lifting the covers wherever practicable, i.e. a suitable manhole lifter.

4.3 Personal Protective Equipment

- Ensure the following is worn at all times during the works:
  - Hard Hat
  - Safety boots or wellingtons
  - High visibility jacket or jerkin
  - Coveralls
- Ensure the following is worn as required during the works:
  - Eye protection – grinding, sawing and cutting
  - Ear protection – grinding, sawing, cutting, using jackhammers.
  - Dust masks – grinding, sawing, cutting or conducting activities that involve airborne dust.
  - Gloves – when using power equipment or manual handling.
  - Waterproofs – in wet weather.

5. Method

5.1 Site care

- Ensure that a protective covering is placed on the floor (plywood, polythene or similar) prior to

placing concrete on the ground. Ensure the mix is not splashed over non-protected areas or runs off the protective covering.

- All concrete staining shall be removed prior to leaving site, even if it means removing the affected surface and reinstating with new materials.

5.2 Concrete requirements

- Whether the concrete is ready mixed or site mixed, it shall have a minimum compressive strength after 28 days of 35 N/mm².
- Where the compressive strength of the concrete falls below 35 N/mm², the joint box and/or manhole shall be demolished and re-built with concrete of the correct strength.
- The slump of the concrete shall be 50mm +/- 25mm.
- All concrete shall be placed and then compacted using a vibrating poker to ensure that there is no air entrapped in the mix.
- Where the visible surface of the concrete displays voids due to poor compaction the affected item will be demolished and rebuilt ensuring that adequate compaction is achieved in the concrete of the re-built item.

5.2 Product care

- The concrete mix can easily be degraded by poor handling therefore the following precautions shall be taken:
  - **DO NOT ADD ADDITIONAL WATER TO READY MIXED WET CONCRETE AT SITE** (it will invalidate the guarantee by the supplier and reduce the compressive strength).
  - **DO NOT ADD ADDITIONAL WATER TO SITE MIXED CONCRETE AFTER THE ORIGINAL MIXING** (it will dramatically reduce the compressive strength of the concrete).
  - **ENSURE DRY CEMENT IS PROTECTED FROM INCLEMENT WEATHER OR ANY DAMPNESS** (exposure to moisture prior to mixing will dramatically reduce the compressive strength of the mixed concrete).
  - **PROTECT MIXED CONCRETE FROM BEING EXPOSED TO RAIN OR GROUND WATER** (this may also reduce the compressive strength of the mixed concrete).
  - **DO NOT USE CONCRETE THAT HAS STARTED TO CURE** (once the concrete starts to cure prior to placement the strength will be dramatically reduced if placed in this state)
  - **DO NOT PRE-MIX THE INGREDIENTS OF THE CONCRETE PRIOR TO PLACING IN THE MIXER** (this can cause the compressive strength of the concrete to be severely reduced if the aggregate and or sand is wet or even slightly damp).

5.3 Ready mixed wet C 35 concrete delivered to site

- Ready mixed concrete must be delivered to site in a rotating drum to ensure that the fines have not settled in the mix during transportation.
- The ready mixed concrete shall be placed within 2 hours of the mixing at the batch plant and must be placed within 1 hour of arriving on site.
- The concrete shall be ordered with the desired slump, water shall not be added on site, as this will invalidate the compressive strength guarantee.
- A delivery ticket shall be obtained from the driver on delivery and placed into the job pack for future reference.

5.4 Ready mixed dry concrete collected from a recognised concrete batching plant

- A dry ready mixed concrete can be used on joint boxes provided the following precautions are taken:
  - The ready mix dry concrete shall be a C40 mix.
  - The ready mix dry concrete shall be placed on a dry surface and protected from inclement weather during transportation and on arrival at site.
  - The ready mixed dry concrete shall have a suitable amount of water added and be mixed in a cement mixer within 4 hours of leaving the batching plant and placed within 25 minutes of mixing.
  - The water used for mixing the concrete shall be of a quality suitable for drinking.
  - The concrete shall be mixed in a powered cement mixer on site.
  - Only sufficient water shall be added to provide a slump reading in the region of 50mm ±25mm.

5.5 Site mixed concrete

- The cement shall be stored in dry conditions free from moisture.
- Bags of cement shall not be left on the back of a truck for longer than one day and shall be protected against rain and other forms of moisture.
- Bags of cement shall not be stored on wet ground.
- The cement, sand and aggregates shall be stored separately. The ingredients shall not be added together until the actual mixing is taking place in a concrete mixer.
- All site mixed concrete shall be mixed in a suitably sized cement/concrete mixer.
- The water used for mixing the concrete shall be suitable for drinking.
- Site mixed concrete shall be placed within one hour of mixing.
- Clean dry vessels shall be used for measuring out the materials for the concrete and adding the water. The ratios shall be strictly adhered to and as follows:
- **Mix design for 40 N/mm2 coarse concrete: Per M3 approx.**

- **10/20 gravel: 800 kg**
- **4/10 gravel: 410 kg**
- **0/4 MP sand: 580 kg**
- **CEM 1 52.5 N: 405 kg**

- **Strength grade: C40**
- **Nominal size of aggregate: 20mm**
- **Type of aggregate: Coarse (BS EN 12620)**
- **Fine (BS EN 12620)**
- **Sulphate class: 1**
- **Cement type: PC (EN 197-1)**
- **Minimum cement content: 360 kg/m3**
- **Max chloride content: 0.4%**
- **1 cubic meter = 2.2 approximately 2.2 tones**
- **Water cement ratio should be approximately 0.55 to achieve a consistence of 50 - 90mm slump, i.e. 2.3 – 2.6 litres per 25 kg bag.**
- **The above concrete is designed to give the strength specified when produced to recommended workability and cube tested in accordance with BS1881.**

5.6 Specially designed ready mixed concrete for non-standard applications

- Where specially designed mixes are required to assist in the construction of BT joint boxes and/or manholes the following criteria shall be supplied by the concrete manufacturer:
  - A certificate of compressive strength

- The ingredients of the design mix, including additives.

- The handling instructions and product limitations

- A competent person will assess the suitability of the design mix for the proposed application.
- Once the design mix has been found suitable for use then a copy of the proposed mix will be sent to BT TAA for approval.
- The mix will not be used until approved by BT TAA.