GENERAL CONCRETE SUPPLY & INSTALLATION SPECIFICATION

Document Control Statement –This Standard is maintained by the City of Karratha Engineering Services team. Any printed copy may not be up to date, and you are advised to check the electronic copy at the City of Karratha Website to ensure that you have the current version. Alternatively, you may contact Customer Service on (08) 9186 8555.

1. SCOPE

The following specification outlines the requirements for the manufacture, supply, delivery and installation of concrete for works completed for the City of Karratha. This specification also includes general installation means and methods of reinforced concrete.

The Contractor shall supply concrete to meet the performance criteria and comply with the specific requirements in this Specification. It is the responsibility of the Contractor to dispose of and resupply concrete that fails to meet the requirements in this Specification.

This specification excludes design of concrete infrastructure for strength, serviceability, and fitness for purpose. For these requirements, refer to the relevant design standards, project-specific drawings and documentation.

1.1 Applicable Standards

The installation, materials and workmanship shall comply with all relevant current Australian Standards, Codes and Regulations and all reference codes and Standards listed in the prefaces to those standards and codes.

Where Australian Standards and Codes do not exist the appropriate International Standard or Codes shall apply. Request an instruction from the City for amendments to Standards, Codes or Regulations that come into effect during the works and affect the works of the contract.

Document	Title
AS 1012 Suite	Methods of Testing Concrete
AS 1379	Specification and Supply of Concrete
AS 1478.1	Chemical Admixtures for Concrete
AS/NZS 1554.3	Structural Steel Welding – Welding of Reinforcing Steel
AS/NZS 2425	Bar Chairs in reinforced concrete
AS 2758.1	Aggregates and rock for engineering purposes – Concrete aggregates
AS 3600	Concrete Structures
AS 3610.1	Concrete Formwork Specifications
AS 3799	Liquid Membrane – Forming Curing Compounds for Concrete
AS 3972	General Purpose and Blended Cements
AS 2350	Methods of testing Portland, blended and masonry cements

AS/NZS 4671	Steel for the reinforcement of concrete
AS/NZS 1554	Structural Steel Welding

The Contractor is solely responsible for the performance of the concrete and shall rectify any non-compliance in accordance with *AS 1379* which shall be used as a normative reference to this Specification.

1.2 Definitions

Term	Description
Contractor	shall mean the party constructing the works or/and supplying the materials.
Principal	shall mean the City of Karratha or the nominated representative.

2. SPECIFICATION

Concrete shall, in general, be constituted of a mixture of cement, water, coarse/fine aggregate and admixtures. The strength of concrete is defined as the average 28-day compressive strength of a minimum of two standard 100mm diameter by 200mm long cylinders taken from the same sample, made, cured and tested in accordance with Formwork and falsework are used as a temporary structure to contain freshly poured concrete to its desired shape. Reinforcement is added to provide tensile strength to concrete to resist bending and cracking.

2.1 Cement

Cement used in the preparation of concrete must comply with *AS 3972*. At the Principal's discretion, the contractor must provide the Principal with test certificates demonstrating the cement supplied to the batching plant conforms with the testing requirements in *AS/NZS 2350*.

2.2 Aggregate

Aggregates must comply with *AS 2758.1*.

Fine aggregates must be selected such that the material finer than 75µm does not exceed the limits in *AS 2758.1.* Fine aggregates for concrete shall consist of natural sand or a combination of natural and manufactured sand.

Coarse aggregates for concrete shall be crushed igneous rock or crushed or screened river gravel or crushed concrete returns conforming to the requirements of AS 2758.1. The maximum amount of water absorption for coarse aggregates shall not exceed 2.5 percent. The maximum coarse aggregate size shall be either 14mm or 20mm; unless otherwise specified, the default aggregate size shall be 20mm as per AS 1379.

2.3 Water

Water used in mixing concrete must be of an acceptable quality, complying with the requirements of *AS 1379 Clause 2.4, Table 2.2, and Table 2.3.*

2.4 Admixtures

Admixtures are added to concrete to improve its workability and must comply with *AS 1478* and be used in accordance with *AS 1379*. Admixtures shall not be used to reduce cement content, as strength and durability may be compromised. The admixture shall have no harmful effect on the quality of the concrete or upon any reinforcement or other fixture embedded therein.

Calcium chloride and other chloride-bearing admixtures shall not be used in concrete containing any type of steelwork or steel reinforcement.

Where two or more admixtures are proposed for incorporation into a concrete mix, their compatibility shall be certified by the manufacturers and the certificates shall be provided to the Superintendent before use of the

admixtures.

2.5 Formwork

The design and construction of formwork must be in accordance with *AS3610.1*. The Contractor is responsible for the design of the formwork and falsework. Formwork tolerances must be in accordance with *AS 3600* and *AS 3610.1*.

2.6 Off Form Concrete Finish (Class 2)

Concrete with finish of uniform quality and texture, in accordance with AS 3610.

All off-form concrete that is visible in the finished work, unless specified otherwise, shall achieve a minimum class 2 formwork level of finish.

Produce a smooth, even finish with an impervious sheet material (eg high quality resin film faced plywood) arranged in an accepted regular pattern as a feature of the surface. This will coincide with the features as indicated on the Design Drawings. Do not replace parts of the formwork panels where this may cause a change in colour in the concrete.

Abrupt irregularities shall be not greater than 1mm. Gradual irregularities, expressed as maximum permissible deviation from a 1m straight edge, shall be not greater than 3mm.

The surface shall be free from discoloration caused by contamination from a release agent, grout leakage or other source.

No spacers shall be visible or rust marks evident.

Generally, surfaces shall be free from voids, honeycombing, segregation, and other defects.

Voids shall be kept to an absolute minimum while ensuring compliance with other requirements of the Specification.

Ensure that the following criteria shall be observed:

- No blowholes larger than 20mm² shall be acceptable. There will be no more than three such holes in any 1m² of surface area. Refer to the photo examples as defined in AS 3610.
- The concrete shall have a consistent, uniform, matt, light coloured face.
- The concrete shall be free from surface blemishes visible to the eye at 3m.
- No repairs are permitted to the formwork, unless acceptance has been given by the Principal.
- Damaged panels shall be replaced with material of the same performance and shall be grout washed to blend in with the existing panels.
- No water or grout loss shall be permitted. Marks no larger than 50mm in any dimension shall be acceptable.

Apart from the making good allowed for in the Structural Engineer's Specification, making good shall be minimal and consistent to an accepted sample. As far as possible, the finished surface shall be achieved without making good.

The improvement of the surface finish by the Subcontractor (e.g. filling noticeable surface blemishes) shall be agreed with the Principal prior to any work being carried out. Continuity of personnel for making good, where required, shall be provided by the Subcontractor, to the satisfaction of the Principal.

Formwork tie-rod holes shall be at uniform centres and in-line, horizontally and vertically, and in-filled with matching prepared cement/ fine aggregate paste, to an accepted sample as specified.

Where rebates or features are shown, these will also be the panel joints. No other joints are permitted. The design of panel joints, rebates, striking pieces and other elements are the responsibility of the Subcontractor but shall be subject to acceptance by the Principal. Features shall be bedded on mastic, but no mastic shall be

permitted on the finished facework.

2.7 Off Form Concrete Finish - Class 3

Concrete with good visual quality in accordance with AS 3610.

All off-form concrete beams, soffits and columns that are concealed in the finished work shall achieve a class 3 level of finish.

2.8 Colour Consistency

The consistency of the concrete colour is of great importance. Select all suppliers, materials, and all methods to ensure the specified finish and consistency.

This shall include but not limited to the following:

- The main plant shall have a consistent supply to achieve the specified finish.
- The back-up plant shall be selected to achieve an equivalent supply.
- Cement, fines, and other aggregates shall be from one region/ source to achieve consistent concrete colour.

Colour shall be within the relevant tonal scale range as defined in AS 3610 for the specific class of finish or as agreed with the D&C Subcontractor (BPJV) based on the benchmarks or samples which shall then become the colour standard for the project.

Colour consistency problems, for example inherent colour variation, aggregate transparency or loss or movement of water, shall be avoided and appropriate measures taken.

This shall include but not limited to the following:

- Ensuring the continuity of supply from one source for the duration of the work under the
- Contract. Any back-up plant shall have an equivalent supply.
- Batching the concrete precisely and mixing thoroughly.
- Bracing or stiffening the formwork to reduce flexibility.
- Ensuring that the formwork face material has a uniform absorbency.

2.9 Reinforcement

Steel reinforcement must comply with *AS/NZS 4671*. The City's preferred mesh is SL82. Acceptable manufacturers and processors of steel reinforcement must hold a valid certificate of approval issued by the Australasian Certification Authority for Reinforcing and Structural Steels.

All reinforcement must be free from scale, loose rust, oil, paint, grease, or other matter that could impair the bond between concrete and reinforcement.

Reinforcement must not be welded except as indicated on the drawings or with the approval of the Principal; welding must comply with *AS/NZS 1554.3*.

All reinforcement must be securely fixed during the placement and compaction of concrete using appropriate bar chairs, spacers, and tie-wires complying with *AS 3600* and *AS/NZS 2425*. All reinforcement covers shall be in accordance with the project drawings, or if not noted, the cover shall comply with Table 1.

Table 1: Reinforcement Cover Required

Location	Minimum Cover (mm)

General	50
Cast against ground	50
Internal (indoors)	30

3. TESTING

3.1 Concrete Strength

Concrete strength shall be a minimum 28-day characteristic compressive strength of 32 MPa and shall be verified using two (2) standard *AS1012.8.1 Clause 5*, cylinder samples (100mm diameter by 200mm long) and tested in accordance with *AS 1012.9*. Concrete strengths other than 32MPa require the approval of the Principal.

3.2 Slump

Slump testing shall be completed and recorded in the field prior to pouring of concrete. Concrete slump shall be a maximum of 100mm for all general works. Slump is to be sampled and tested in accordance with *AS 1012.3.1*.

The Contractor shall confirm the strength of the concrete and slump supplied by forwarding production assessment documentation of the last reporting period upon request by the Principal.

- The Contractor shall provide the following information with each sample:
- Date and time of taking the sample
- Location of the batch of concrete after placement
- Name of Supplier and location of plant
- Delivery docket number and transport vehicle number
- Slump of sample
- Method of identifying test cylinders
- Ambient temperature at the time of sampling.

Testing of concrete cylinder samples is to be conducted by a laboratory accredited by the National Association of Testing Authorities (NATA), and the results of the testing are to be forwarded to the Principal.

4. DELIVERY

Concrete shall be supplied and delivered to the Site in rotating agitator trucks in accordance with *AS 1379*.

The Principal may, at their discretion, direct the Contractor to obtain material from an alternate source of supply, depending on cost and timing requirements. The Contractor shall agree on the difference in any costs with the Principal compared to the original Contract prior to obtaining alternate material.

5. TRACEABILITY

The Contractor shall deliver materials in the time and manner according to the Specification and the Principal's Request document, subject to the Principal giving sufficient notice of the required delivery date.

Materials shall be accompanied by a docket at the point of delivery bearing all relevant information relating to the delivery and be signed by the Contractor. All records are to be supplied to the Principal upon request. This shall form the basis for payment.

Each truckload of concrete shall be accompanied by a docket with the following information.

- Batch number
- Truck number
- Name of Contractor to whom mix is to be supplied
- Date
- Time of batching
- Concrete delivery location
- Class of concrete
- Quantity (cubic metres)
- Admixture Dosage (litres).

6. CONSTRUCTION

6.1 Pouring / Pumping

The total elapsed time between the mixing of cement and aggregates must not exceed 90 minutes in accordance with *AS 1379 Clause 4.2.5*. Provision for extending the time between wetting and discharge must be submitted and approved by the Principal prior to implementation.

No additional water shall be added to the mix onsite.

Concrete is recommended to be poured at a free fall no greater than 1.5m vertically to prevent segregation.

6.2 Temperature

Concrete placement will only be permitted subject to the following conditions:

- The concrete mix temperature during placement shall at no time exceed 32°C; and either
- The ambient shade temperature is less than 38°C and falling; or
- The ambient shade temperature is less than 38°C and rising, but placement can be completed before the ambient temperature exceeds 38°C.

The temperature of delivered concrete shall not be greater than 35ºC as per *AS 1379 Clause 4.4.2*.

The Contractor shall submit to the Principal details of the method proposed for making and pouring hot weather concrete, including use of any additives and additional measures.

Special precautions to be taken by the contractor may include but are not limited to:

- Upon approval by the Principal, reschedule concrete pouring at times and dates with lower ambient temperatures. Pouring concrete outside of approved construction hours is subject to approval by the Principal.
- Incorporate ice into the mix to replace some of the water to reduce temperatures.
- Thoroughly moisten the subgrade the concrete is being poured onto, the reinforcement and formwork. The subgrade is to be damp during the pour, not a slurry.
- Shade concrete from direct sunlight where possible.
- Use wet coverings until final finishing is applied or spray with a moisture-sealing compound. Areas requiring flat finishes to be uncovered only prior to finishers completing the surface and to be covered after.

6.3 Finishing

In its finished state, the concrete shall be a dense and uniform mass, free from voids, segregation, and honeycombing. The concrete shall have a uniform face as specified by the project drawings when formwork has been removed.

Water may be sprinkled on the surface of the concrete to assist in workability in finishing but shall not be added to the concrete batch mix.

6.4 Curing

Fresh concrete shall be protected from sun, wind and rain exposure. Concrete shall be prevented from drying out too rapidly in accordance with *AS 3799:1998*.

Concrete must be cured for a minimum of 7 days for normal-strength concrete (less than 40MPa), or 14 days for high-strength concrete.

The temperature of concrete shall not be less than 5ºC nor greater than 35ºC during the curing period. If temperatures exceed 35°C, additional steps such as shading, spraying with water, or using cooling methods may be required to prevent rapid drying and cracking.

6.5 Protection

Protection of work:

- Provide full and adequate protection against the effect of weather for the in situ concrete works.
- Provide full and adequate protection for the concrete, against damage, until Practical Completion.
- The protective measures used shall not in any way permanently mark or damage the concrete finishes.

Standard Number:	**CKS-100**
Previous Standard/ Number:	**N/A**
Last Reviewed:	**January 2025**
Next Reviewed:	**January 2026**
Responsible Officer:	**Principal Engineer Coordinator**