## TECHNICAL NOTES AND SPECIFICATIONS FOR STRUCTURAL WORK

G1.1 General

G1.1.1 These notes serve as an addition to the specifications in the bill of quantities for this project. In those cases where the specifications in the bill of quantities differ from these notes, these notes shall take preference.

G1.1.2 These notes shall be read in conjunction with all relevant drawings of the Engineer and all applicable codes and standards mentioned below. In event of any discrepancies between these notes and the codes and standards, these notes shall take precedence and shall govern.

G1.1.3 The Contractor shall ensure that all subcontractors, relevant site personnel and supervisors are in possession of these notes and have familiarised themselves with the content.

G1.1.4 The Engineers' drawings shall be read in conjunction with all relevant Architects', Consultants' and Specialists' drawings. Any discrepancies shall immediately be referred to the Engineer, in writing.

G1.1.5 All codes and standards mentioned refer to the latest editions thereof.

G1,1,6 No scaling off drawings is allowed.

G1.1.7 The onus rests with the Contractor to produce work which conforms in quality and accuracy of detail to all the requirements of the specifications and drawings. The Contractor shall, at his own expense, institute a quality control system and provide experienced Engineers, Technicians, Foremen, Surveyors and other technical staff, together with all transport, instruments and equipment, to ensure adequate supervision and positive control of the works at all times.

G1.1.8 All work to be excecuted in accordance with the latest Occupational Health and Safety Act.

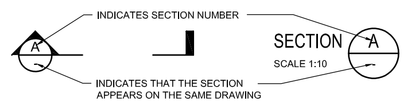
G1.1.9 Refer to Engineers' drawings for all superimposed design loads for suspended slabs, These design loads may not be exceeded at any stage during construction, unless adequate additional support for the slab is provides. The responsibility for the latter rests with the Contractor, who must obtain the Engineer's written consent for the proposed support methodology.

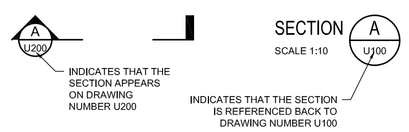
G1.2 General Drafting

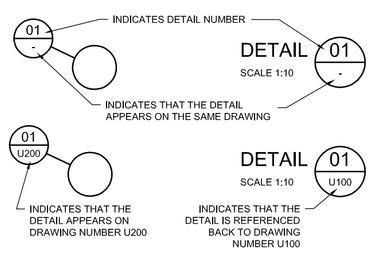
G1.2.1 All levels on drawings refer to top of concrete (unfinished) unless otherwise indicated.

G1.2.2 All dimensions of beams are shown as WIDTH x DEPTH

G1.2.3 Sections & Detail References:




## STRUCTURAL CONCRETE

C1 General Concrete

C1.1 Applicable Codes and Standards

| Execution of works | Code |
|---|---|
| General construction | SANS 2001 |
| National Building Regulations | SANS 10400 |
| Concrete construction | SANS 10100-2 |
| Tolerances | SANS 2001-CC1 - Clause 5.2 |

| Materials | Code |
|---|---|
| Cement | SANS 50197-1 |
| Aggregate | SANS 1083 |
| Ready-mixed concrete | SANS 878 |
| Compressive strength of concrete | SABS method 863 / SANS 5863 |
| Steel bars for concrete reinforcement | SANS 920 |
| Welded steel fabric reinforcement | SANS 1024 |

C1.2 Material Specifications

C1.2.1 Concrete Quality:

C1,2,1,1 All concrete mixes for structural work shall be designed by a competent concrete technologist in an approved laboratory. Proof of these mixes will be submitted to the Engineer for his records.

C1,2,1,2 Aggregates with a high modulus of elasticity shall be used. The type and origin of aggregate shall be submitted to the Engineer prior to construction.

C1.2.2 Concrete class:

| Type / Location | 28-day Fcu MPa | Stone mm |
|---|---|---|
| Blinding | 15 | 19 |
| Foundations | 30 | 19 |
| Columns | 30 | 19 |
| Suspended slabs | 30 | 19 |
| Surface beds - General | 25 | 19 |
| Surface beds - Industrial | 35 | 19 |
| Beams | 30 | 19 |
| Walls & retaining walls | 30 | 19 |

C1.3 Execution of Works

C1.3.1 No pumping of concrete shall be allowed without prior approval from the Engineer.

C1.3.2 All concrete shall be continuously cured for 7 days by a method approved by the Engineer.

C1.3.3 The position and method of forming of all construction joints shall be submitted to the Engineer for approval prior to construction.

C1.3.4 Concrete cover:

| Type / Location | Concrete cover |
|---|---|
| Foundations | 75 mm |
| Piles and pile caps | 75 mm |
| All concrete in contact with soil | 75 mm |
| External columns and beams | 40 mm to stirrups |
| Internal columns and beams | 30 mm to stirrups |
| External walls | 40 mm |
| Internal walls | 30 mm |
| External slab edges & cable anchors | 50 mm |
| All slab soffits | 30 mm |
| All parking slabs | 30 mm |
| All slabs to enclosed areas | 30 mm |

(Unless shown otherwise on reinforcement schedules and layouts)

C1.3.5 The necessary stools, clips and other means of supporting reinforcement are provided in order to achieve the specified cover. It remains however the Contractor's responsibility to ensure that the specified cover is achieved.

C1.3.6 Tolerances

| Type / Location | Degree of accuracy |
|---|---|
| Pad and strip foundations | III |
| Pile foundations | II |
| Reinforcement | II |
| Elements above foundation level | II |
| Cover to reinforcement | II |
| HD Bolts | II |
| Industrial surface beds | as per TR34 (see Section C.2 ) |

C1.3.7 All suspended concrete slabs to be adequately surveyed at intervals as agreed, before and after removal of support work. Results to be forwarded to the Engineer for his records.

C1.3.8 Back-Propping:

C1.3.8.1 Extent of back-propping and sequence to be discussed with the Engineer before commencement of works.

C1.3.8.2 For pre-stressed and post-tensioned slabs, the contractor must confirm the stripping sequance with the designer to ensure compliance prior to stripping of support work on.

C1.3.8.3 Back-propping requirements for multi-storey buildings, floor 1-6 (last floor), are in sequance; with floor 1 at the bottom and floor 6 on top:

| Floor Level | % of Back-propping at 28 days concrete strength for: | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | 100% | 75% | 50% | 25% | 0% | 0% |
| 2 | | 100% | 75% | 50% | 25% | 0% |
| 3 | | | 100% | 75% | 50% | 25% |
| 4 | | | | 100% | 75% | 50% |
| 5 | | | | | 100% | 75% |
| 6 | | | | | | 100% |

C1.3.9 The standard of concrete finish shall be as per the Architects' specification.

C1.3.10 One set of concrete test cubes shall be prepared per 50 m3 of concrete cast, or any part thereof. These shall be made daily for every cast.

General:
- one cube to be tested at 7 days
- three cubes to be tested at 28 days

Post-tensioned slabs:
- three cubes to be tested at 3 days *
- three cubes to be tested at 28 days

* These three cubes to be left on cast slab to simulate actual curing conditions on site. Sides of these cubes to be protected to prevent excessive drying out.

C1.3.11 Removal of formwork in normal to hot conditions:

| Type / Location | Age |
|---|---|
| Beam sides, walls, unloaded columns | 1 day |
| Slabs and quick-strip coffer slabs with props left under | 4 days |
| Beam soffits, coffer slab soffits, with props left under | 7 days |
| RC slab props | 10 days |
| Beam props, cantilever props | 14 days |
| Post-tensioned slab props (other than parking slabs) | after stressing |
| Post-tensioned parking slab props | 10 days |

C1.3.12 No kickers to be cast for columns and walls.

C1.3.13 For retaining walls laterally supported by concrete slabs, backfilling to be done not sooner than 7 days after casting of slab.

C1.3.14 Refer to Architects', Electrical- and Mechanical Engineers' drawings to verify positions of downpipes, duct penetrations, recesses, other services as required by them, prior to casting of concrete.

C1.3.15 Penetrations smaller & equal than 200mm in diameter are not indicated on the structural drawings. Any penetrations not shown on the drawings, in any part of the structure must be brought to the attention of the Engineer prior to casting of concrete.

C1.3.16 Concentration of a large number of sleeves or services to be cast into a concrete element shall not be allowed. Grouping shall be in small bundles of three, should the diameter allow this, and spaced at minimum 100mm c/c, all as discussed and agreed with the Engineer before concreting.

C1.3.17 No chasing of services in the concrete structure is allowed.

C1.3.18 No cores will be allowed without prior approval from the Structural Engineer.

C1.3.19 Any item (electrical- and water-sleeves, conduits, pipes, et cetera ) cast into the concrete structure must be durable and able to withstand the hydration energy of the concrete as well as construction loads and actions during casting that could possibly cause damage.

C1.3.20 All columns placed centrally about gridlines or centrelines, unless shown otherwise.

C1.3.21 All exposed corners of concrete elements to have 20x20 chamfer, unless noted otherwise or as per Architects' specifications

C1.3.22 All structural movement joints (joints between slabs at soffit, split columns and walls etc.) to have a 20x20 chamfer.

C1.3.23 Unless otherwise noted or indicated on drawings, all waterproofing shall be in accordance with the Architects' details and specifications.

C1.3.24 The Contractor shall be responsible for the design and maintenance of all temporary structures, including formwork and support work.

C1.3.25 Where indicated on layout drawings, beams and slabs shall be constructed with the following upward camber:

Cantilever = Span devided by 200 (SPAN/200)
All other spans = Span devided by 500 (SPAN/500)

C1.4 Reinforcement

C1.4.1 Applicable Codes and Standards:

| Description | Code |
|---|---|
| Bending dimensions and scheduling of steel reinforcement for concrete | SANS 282 |
| Detailing of steel reinforcement for concrete | SANS 10144 |

C1.4.2 R denotes plain round mild steel bars of strength 250 MPa.
Y denotes high yield deformed steel bars of strength 450 MPa.
Z denotes types of steel not covered by R and Y. This may include cold drawn wire, high yield bars cold-reduced to increase yield stress, mild steel bars (plain or deformed) cold-worked to increase yield stress, etc.

C1.4.3 Cold-reduced steel bars shall have a proof stress of 500 MPa minimum and tensile strength of 550 MPa.

C1.4.4 All reinforcement must be inspected by the Engineer before concrete is cast. The Engineer shall be given 24 hours advance notice of such an inspection.

Inspection will only be carried out if:
- all steel is properly fixed as per the layout drawings,
- spacer blocks are positioned,
- shuttering is cleaned out,
- reinforcement has been checked by the responsible contractor, and
- the inspection sheet has been completed by the contractor.

C1.4.5 Reinforcing bars shall be stacked off the ground so as to prevent distortion and shall be protected from aggressive environments and contamination.

C1.4.6 Reinforcing bars shall be clear of all foreign material and loose rust when fixed in position. Rust shall be removed by wire brush to ensure a sound surface to which the concrete may bond.

C1.4.7 Welding of high-yield (Y) reinforcement is not allowed. Mild steel (R) reinforcement may be welded only if instructed or expressly agreed to in writing by the Engineer.

C1.4.8 Example of notation on drawings:

20Y25-01-150 T1

20 : Number of bars
Y : High yield steel
25 : Bar diameter
01 : Bar mark
150 : Bar spacing c/c, mm
T1 : Location

Refer to Section C5 for other abbreviations that may be used as part of this notation.

C1.4.9 Typical reinforcing layers in horizontal elements:



Stools stand on B1, supporting T2

C2 Surface Beds

These notes are supplementary and should be read in conjunction with Section C1

C2.1 Applicable Codes and Standards

| Description | Code |
|---|---|
| Execution of works | Technical Report No. 34 (TR34) |
| Materials | SANS 10109-1 |

C2.2 Material Specifications

Refer to Section C1.2

C2.3 Execution of Works

C2.3.1 Floor construction:

C2,3,1,1 The preparation, construction and finishing of industrial concrete surface beds shall be undertaken by a specialist flooring contractor only. The Contractor shall forward all relevant project data to the Engineer.

C2.3.1.2 Where no damp-proof membrane is specified, the supporting layer works must be dampened before placing of concrete.

C2.3.1.3 The flooring contractor shall confirm all levels and tolerances of the surface bed layer works before commencement of works. Allowable finished surface tolerances for sub-base to be +0mm and -25mm. Positive tolerances above zero are not permitted. Any areas not conforming to these tolerances shall be reported to the Engineer by the flooring contractor prior to casting of floor. (Note: Layer works to Civil Engineers' specifications)

C2.3.2 Floor type: free movement

C2.3.3 Surface regularity:

| Description | Requirement |
|---|---|
| Permissible limits - as per Table 4.2 , TR34 | FM3 |

Floor contractor to provide the Engineer with a detail survey by an independent surveyor, within two weeks of casting the floor.

C2.3.4 Surface requirements:

| Description | Requirement |
|---|---|
| Abrasive resistance - as per Table 5.1 , TR34 | AR2 |
| Abrasive tests | to be carried out at 28-day concrete strength |
| Surface finish | Smooth power float |
| Surface hardener | No |

C2.3.5 Joints:

C2.3.5.1 Movement- and construction-joints to be constructed as per layout and details provided, and as discussed and agreed upon with the flooring contractor ahead of any concrete being cast.

C2.3.5.2 Sawn joints in surface beds shall be cut as soon as the concrete has reached sufficient strength or within 4 to 48 hours of casting, whichever is first.

C2.3.5.3 Joint sealants as specified, installed in accordance with the manufacturers' specifications.

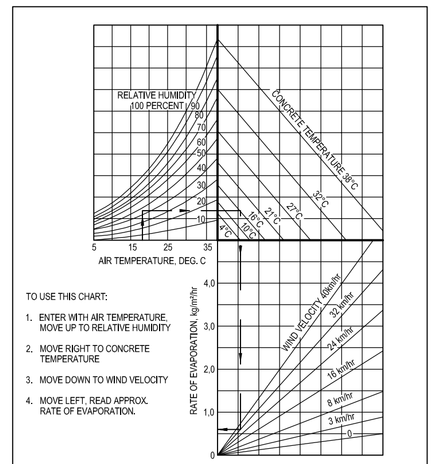
C2.3.6 Curing:

C2.3.6.1 Apply approved liquid membrane-forming curing compound (Duracure SBW or similar) strictly in accordance with the manufacturers specifications.

C2.3.6.2 Where architectural concrete finishes are required or adhesives for tiles, the suitability of the curing compound must be confirmed with the supplier before use.

C2.3.7 Factors Affecting Concrete Shrinkage Cracks:

C2.3.7.1 If the rate of water evaporation from concrete exceeds 1.0kg/m2 per hour, precuations should be taken to reduce evaporation (see figure below)




(FIGURE 7.7) EFFECT OF CONCRETE AND AIR TEMPERATURES, RELATIVE HUMIDITY AND WIND VELOCITY ON THE RATE OF EVAPORATION OF SURFACE MOISTURE FROM CONCRETE

IF THE RATE OF WATER EVAPORATION FROM THE CONCRETE EXCEEDS 1.0 kg/m² PER HOUR, PRECAUTIONS SHOULD BE TAKEN TO REDUCE EVAPORATION (SEE FIGURE 7.7)

**L.R. MARAIS, B.D. PERRIE (2009). *CONCRETE INDUSTRIAL FLOORS ON THE GROUND.* C&CI PUBLICATION. FIG. 7.7. PP 121.**

C3 Foundations

These notes are supplementary and should be read in conjunction with Section C1

C3.1 Applicable Codes and Standards

| Description | Code |
|---|---|
| Piling | SANS 1200 F |
| Earthworks | SANS 1200 D & DA |

C3.2 Material Specifications

Refer to Section C1.2

C3.3 Execution of Works

C3.3.1 All foundations shall be positioned centrally under columns or walls, unless shown otherwise.

C3.3.2 All foundation excavations, design bearing pressure and founding levels must be approved by the Geotechnical Engineer before commencement of any foundation blinding or concrete work.

C3.3.3 Foundation levels shown on the Structural Engineer's drawings are preliminary, and may vary depending on the Geotechnical Engineer's findings on site.

C3.3.4 The Contractor shall be responsible for the control of storm water and the dewatering of the site to prevent damage to the structure, excavations or any other works for the duration of the contract.

C3.3.5 No excavations shall undermine any existing foundations.

C3,3,6 Blinding with a minimum thickness of 50mm shall be cast under all reinforced foundations and pile caps unless shown otherwise.

C3.3.7 As-built levels of all foundations will be forwarded to the Engineer for his records.

C4 Summary of information to be submitted to Engineer

The following important information shall be submitted to the Engineer, for his records.

C4.1 Concrete mix design
A concrete mix design together with the required aggregate tests (in accordance with SANS 1083) shall be forwarded to the Engineer, 14 days ahead of any casting of concrete.

C4.2 Concrete test cubes
- Results at 7, 14 and 28 days strength.
- Cube results to be clearly linked to element type, position, cast date, et cetera .

C4.3 Casting dates and construction sequence
Contractor to provide detail programme and information flow, to be agreed upon with the Engineer 14 days ahead of any construction commencing.

C4.4 General

C4.4.1 Method statement for back-propping.

C4.4.2 Construction joint locations and details to be clearly indicated on a set of Engineers' drawings.

C4.4.3 Mill certificates for rebar.

C4.4.4 Post-tension stress results:
Results and stress sequence to be summarised (cables to be clearly marked on the cable layout

C4.4.5 Method for curing of concrete elements.

C4.4.6 Survey results of all ground bearing and suspended slabs.

C4.4.7 Survey results of as-built pile foundations.

C4.4.8 As-built bearing levels of foundations.

C5 Abbreviations

Concrete:

| | |
|---|---|
| TOF | Top of footing |
| TOC | Top of columns |
| SL | Soffit level |
| SSL | Structural slab level |
| PCL | Pile cut-off level |

Reinforcement:

| | |
|---|---|
| ABR | Alternate bars reversed |
| ALT | Alternately |
| B | Bottom |
| B1 | Lowest of the bottom layers |
| B2 | Second lowest of the bottom layers |
| CTS | Cut to suit |
| EF | Each Face |
| EW / BW | Each way / Both Ways |
| FF | Far face |
| NF | Near Face |
| HOR | Horizontal |
| STG | Staggered |
| T | Top |
| T1 | Highest of the top layers |
| T2 | Second highest of the top layers |
| TOG | Together |
| VER | Vertical |

## NOTES:

1. DRAWINGS MUST NOT BE SCALED. ALL MEASUREMENTS TO BE CONFIRMED ON SITE.
2. DRAWINGS TO BE READ WITH THE GENERAL NOTES DRAWING AND ALL TYPICAL DETAIL DRAWINGS WHERE APPLICABLE.
3. DRAWINGS TO BE READ WITH THE ARCHITECTS DRAWINGS AND ALL DISCREPANCIES TO BE REPORTED TO THE RESPONSIBLE ENGINEER IMMEDIATELY.
4. DRAWINGS TO BE READ WITH THE PROJECT SPECIFICATIONS AND APPLICABLE SANS 1200 CODES.

## AS-BUILT RECORD

| CONTRACT No. | DESCRIPTION | CERTIFIED BY | DATE |
|---|---|---|---|
| | | | |
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CERTIFIED AS-BUILT FOR CONTRACT :
ECSA Reg. No:

ENGINEER DATE

## VERSION/AMENDMENTS

| No. | DATE | DESCRIPTION | AUTHORISED BY |
|---|---|---|---|
| 1.0 | 2021/03/17 | ISSUED FOR TENDER | F. DE KOCK |
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PROJECT TITLE:

LERATO PARK
REPAIR OF 491 RDP HOUSES

DRAWING TITLE:

STANDARD NOTES AND DETAILS
SHEET 1

DATE: NOVEMBER 2018

CO-ORDINATE SYSTEM:

ORIGINAL DRAWING SCALE: 1:100

ORIGINAL DRAWING SHEET SIZE: A1

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100mm ON ORIGINAL DRAWING


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DRAWING No: 2334.50.02.SUA.14.A001

VERSION: 1.0

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2334.50.02.SUA.14.A001