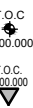


GENERAL STRUCTURAL

1. SANS 1020 Specifications will apply.
2. This drawing is to be read in conjunction with all relevant Engineer's drawings, schedules and details. The Contractor shall check all drawings and schedules to ensure that he has sufficient information prior to commencing with the works involved.
3. The Contractor must verify all dimensions on site before commencement of any work. Any discrepancies are to be referred to the Engineer immediately.
4. Structural levels are in metres and related to the bench mark.


5. All dimensions are in millimetres or meters, as indicated.
6. For setting out details refer to the relevant Engineer's drawings where applicable.
7. The Contractor is responsible for the design, detailing, erection, certification, maintaining and removal of all propping, shoring or other temporary works required by the construction and for the safe execution of all works during building construction. The Contractor shall provide all temporary supports and bracing necessary to maintain structural stability under any conditions that can be expected during construction. The Contractor shall, when requested, submit calculations and details of his proposed temporary works, for review, before the work begins. No concrete may be cast until the full compliance of the above.
8. The Contractor shall provide and maintain any necessary protection of the works.
9. Any item specified on the structural drawings is indicative of the required standard and qualities. Alternatives may be used provided that full technical details demonstrating equivalent properties of the item are submitted by the Contractor and approval is obtained from the Engineer, prior to execution.
10. No remedial work shall be undertaken without prior approval of the Engineer.
11. Where structural elements are designed by a specialist, the Contractor shall submit the choice of specialist to the Engineer for approval.
12. All proposed materials shall be proven to meet the specification prior to use. No inspection or approval of works shall be given where the materials incorporated therein have not previously been shown to meet the Specification. Refer to specific testing/approval requirements in other sections.
13. The contractor must confirm that the existing services and their location agree with the drawings, prior to construction. Any discrepancies must be indicated to the Engineer.
14. The contractor is responsible to ensure that all work is done accordingly to the latest OHS Act, and Construction Regulations.

1. The following design standards have been used:
SANS 82: Bending dimensions of bars for concrete reinforcement
SANS 1024: Welded steel fabric for reinforcement of concrete.
SANS 0100: "The Structural use of Concrete."
SANS 0162: "The Structural Use of Steelwork in Building"

1. Any existing structure or paving to be removed, as is any existing organic topsoil including roots.
2. Where rock is encountered during any of the operations the Engineer will instruct whether removal is necessary.
3. Backfilling to foundation excavations is to be done in 150mm thick layers as specified on the drawings.
4. Testing procedures for compaction and frequency of tests shall be approved by the Engineer. Frequency of tests shall not be less than the following: The last two layers shall each be tested for mod AASHTO density. Below these layers, every second layer shall be tested where applicable. The number of tests within a layer shall be agreed with the Engineer. It is the Contractors responsibility to ensure that all agreed tests are performed and results agreed at a layer before the next layer is placed.
5. For each proposed source of material for the building platforms, the Contractor shall submit test results for Atterberg Limits, sieve analysis, determination of mod AASHTO density and California Bearing Ratio for approval by Engineer prior to use.
6. Measurement of tolerances shall be in accordance with clause 9304 of the "Standard Specification for Road and Bridge Works", with the following parameters:

		Fill	Sel.Fill	Sub-base
Level	H90 Hmax	±20mm ±25mm	±15mm ±20mm	±10mm ±15mm
Thickness	D90 Dmax Dave	- - -	21mm 27mm 10mm	15mm 20mm 5mm

7. Provide termite proof to all ground bearing slabs

All concrete work has been designed based on the requirements of SANS 2100.

2. All structural concrete to be the following strengths:

a) 30MPa for all slabs & 35 MPa for surface beds.

b) 40MPa for all columns, concrete walls & exposed stairs unless otherwise indicated on the drawings.

c) 10MPa concrete for blinding.

d) 15MPa for mass concrete.

3. All concrete must be properly vibrated to specification using approved poker vibrators.

4. All materials used in the production of concrete shall comply with the relevant standards. Water shall be clean and free from harmful matter. All sources of materials shall be agreed with the Engineer prior to start on site. Prior to use initially and prior to any change in source of supply the Contractor is to submit test results to the Engineer for the following:

Cement - Certificate of compliance with SANS ENV 197-1:1992 Sand - Grading, dust content, fineness modulus, chloride content, and sand equivalent value to show compliance with SANS 1083. Stone - Grading, dust content, 10 % FACT Value or Aggregate Crushing Value, Flakiness Index and alkali reactivity. To show compliance to SANS 1083 The Contractor shall sample aggregate sources every month and forward test results to the Engineer for the following: Sand - Grading, dust content, fineness modulus and chloride content. Stone - Grading and dust content. The above is also required if ready mixed concrete will be used.

5. All proposed mix design proportions are to be submitted to the Engineer for approval prior to the work commencing. The contractor must include a statement of the proposed batching method, quality control procedures and details of the staff responsible for batching the concrete. The contractor is to include in his mix design submission details of the proposed concrete slump. If ready mixed concrete is to be used, no water may be added to the mix after the truck has left the ready mix suppliers premises. No pumping of concrete is permitted without the prior approval of the Engineer. Evidence of compliance for strength for the structural concrete will be shown by the following (According to SANS 1200 G) :

a) Three cubes shall be made from each batch or ready mix truck and shall be tested at 28 days. The average strength of the 28 day cubes shall exceed the specified characteristic strength by at least 2MPa. No individual cube shall give a strength less than the design strength.

6. The use of admixtures in the concrete is not permitted without the prior approval of the Engineer.

7. Testing procedures for the workability and quality control including the preparation and testing of cubes shall comply with the Specification and be agreed with the Engineer prior to commencing the work. The frequency of sampling is to be in accordance with the specification and agreed with the Engineer.

8. Method of striking of formwork to be agreed with the Engineer prior to concrete work commencing.

9. The positions of proposed construction joints, where not indicated on the drawings, are to be submitted to the Engineer for approval prior to construction.

10. Unless indicated otherwise on the drawings, formed concrete finishes shall be obtained by the use of properly designed formwork or moulds of timber, plywood, plastics, concrete or steel. The finished concrete surface should be free from voids, honeycombing or other blemishes. Exposed concrete beams and columns are to be formed using high quality concrete and steel shutters. Surfaces should be true with clean arises. Only minor surface blemishes should occur. These will be filled or rubbed down.

11. Unless indicated otherwise on the drawings, unformed finishes are to be uniformly levelled, tamped and subsequently power floated to produce a uniform surface. Power floating should start as late as possible, this is indicated by minimum indentation or when a footprint is barely perceptible. The maximum practical indentation is +5mm.

12. Any proposed penetrations to columns, beams, ribs, or holes greater than 200mm in slabs which are not shown on the structural drawings must be brought to the attention of the Engineer. All openings in structural members must have the Engineers approval.

13. All concrete elements shall be inspected and approved by the Engineer prior to casting. The Contractor shall have reviewed and approved all relevant details of the pour including setting-out, levels, reinforcement placement, formwork, built-in elements, reinforcement cover, joint preparation and cleanliness prior to calling for the Engineer's inspection. The Contractor's approval shall be noted on a Concrete Pour Approval Sheet. The Engineer shall be given 48 hours notice of when an inspection is required.

14. Tolerances for the concrete works are given in permitted deviations. These tolerances are not additive and relate to the structural grid.

15. Tolerances for formed surfaces are to be within the following:

	Permitted Deviation
a) General for concrete (unless modified by the following sections)	± 15mm
b) Cross-sectional dimensions of columns, walls, beams, openings etc.	<1m : ± 5mm >1m : + 15mm
c) Centroid in each storey height for vertical or raking elements	+ 10mm
d) Rotation of elements in plan	+ 2°
e) For exposed surfaces under a straight edge in contact with surface up to 0.3m	up to 0.3m + 3mm 0.3m to 3m + 5mm 3m to 5m + 10mm
f) Foundations	± 25mm
g) Cast-in bolts	± 3mm

16. All exposed external concrete corners to be chamfered 25x25mm where not in contact with brick work, or as directed by Engineer.

17. Concrete mix for all proposed concrete must be from the same batching plant and must be the same colour & design mix.

18. Tolerances for unformed surfaces to be within the following permitted deviations, which should be checked prior to despoor.

Permitted Deviation for specified finish	Wood Floated	Steel Floated
• At any point on the surface	± 20mm	±10mm
• Between any two points 6m apart	±15mm	± 10mm
• Under a 3m straight edge	± 10mm	± 5mm
• Abrupt change in level	± 5mm	± 5mm
• Slab thickness	± 10mm	± 10 mm

19. DURACURE WSC from ABE or similar approved, curing compound must be used on all concrete slabs, walls and stairs strictly to manufacturers specifications and must comply to ASTM C 309, all columns must be wrapped with plastic "Cling Wrap" for a min. of 21 days after casting.

20. All expansion joints must be as detailed on drawings.

21. Min. time for removal of formwork = 7 days.

22. Temporary props under slabs to be kept in position for a min. of 21 days.

23. Concrete slabs may not be used for storage of building material during construction.

24. All brickwork below slabs to be load bearing and must be done as detailed.

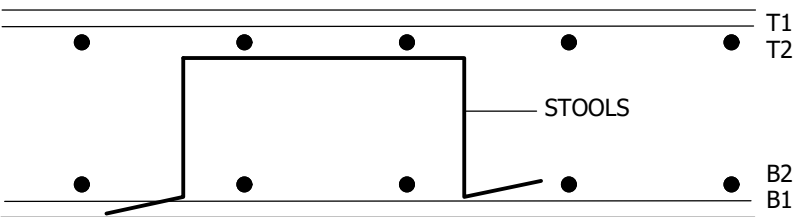
25. All concrete work including materials, concrete, formwork, reinforcement, tolerances and tests must comply with SANS 1200 G. Concrete (Structural)

26. All sand/cement screeds according to concrete institute specifications on screed paper.

- Mild ($F_y = 250 \text{ MPa}$) and high strength ($F_y = 450 \text{ MPa}$) reinforcing bars shall be in accordance with SANS 920. All bars shall be new billet steel, clean and free from loose rust and loose mill scale. Contractor shall submit mill certificates to Engineer for approval prior to use.
- Reinforcement must not be cut or bent, except as shown in the bending schedules, without approval. Bending shall be in accordance with SANS 82.
- Each bundle of bars shall be clearly tagged with their schedule and mark numbers.
- Minimum cover to reinforcing generally to be as follows, unless noted otherwise:

	INLAND	COAST
Bottom of footing/ground beam, sides and top of footing/ground beam and columns below ground	= 50mm	= 50mm
Slabs: on ground, bottom suspended	= 50mm	= 50mm
	= 30mm	= 50mm
Beams: to main bars	= 35mm	= 50mm
to links	= 30mm	= 50mm
Columns: to main bars	= 50mm	= 50mm
to links	= 30mm	= 50mm
Walls: to all bars	= 30mm	= 50mm
Basement walls: earth face	= 50mm	= 50mm
other face	= 30mm	= 50mm
- Concrete or plastic spacers must be used for bottom and vertical reinforcement.
- The Engineer shall be given 48 hours notice prior to ordering any concrete.
- For placement of reinforcing, B1, B2, T1 & T2 see Reinforcing layer detail.
- Min. lap length for reinforcing is 40 dia.

1. The Contractor shall coordinate and submit for approval to the Engineer/Client shop drawings showing all builders work requirements involving structural elements, prior to commencement of the works involved. These shop drawings shall be of sufficient detail as to layout, building-in requirements, connection to structural elements, etc. to progress the works in a coordinated, workmanlike manner. Refer to other specifications for other builders work shop drawing requirements.
2. The Contractor shall make allowance in his program for all approvals above any builders work is incorporated into the works.
3. Except as detailed on the Structural Drawings, no structural element shall be sleeved or otherwise penetrated for any reason unless prior approval is obtained from the Engineer.

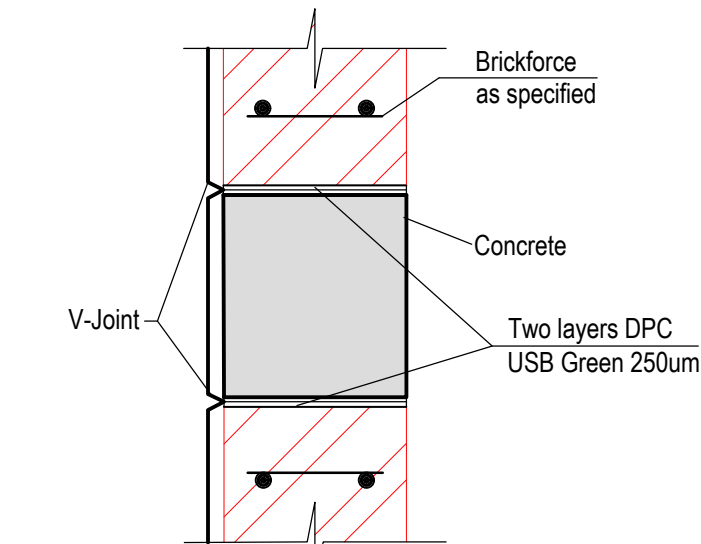


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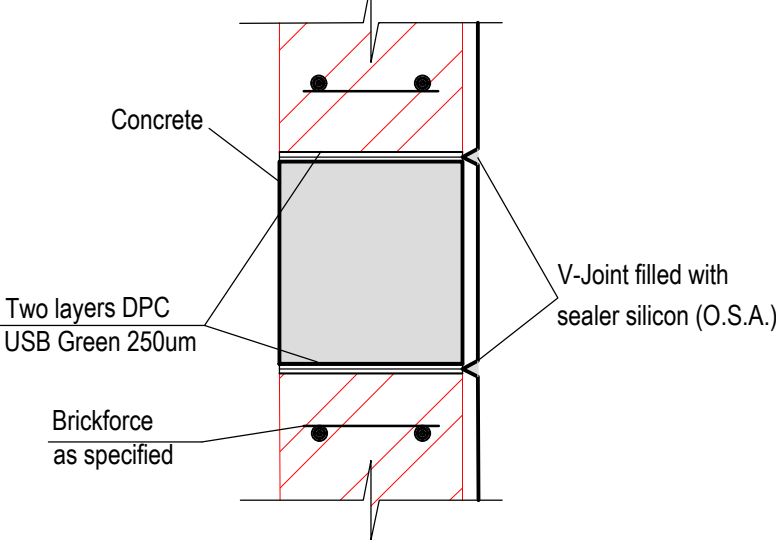
1. The specification for the requirements for concrete paving blocks is SANS 1058:2009 Concrete paving blocks which is referred to in SANS 1200 MJ:1984 Standard specification for civil engineering construction: segmented paving. Compressive strength of 25 MPa, for lightly trafficked situations, or 35 MPa, for a wheel load greater than 30 kN. The latest standard specifies a tensile splitting strength of 2,2 MPa for light traffic and 2,8 MPa for heavy traffic. Also an abrasion resistance test is required.

REINFORCING

- 1.1 Mesh reinforcing will be welded steel fabric, refer to surface bed drawings for Mesh Ref.
- 1.2 Dowel bars across construction joints will be Octo Dowel at 250mm spacing (where indicated). Ends of dowels must be grinded smooth and round.
- 1.3 The layout and position of the reinforcing must be inspected by the Engineer or his representative prior to casting of any concrete. Special care must be taken to ensure that the reinforcement remain on the correct position and level during the casting process.
2. CASTING OF CONCRETE SLABS.
 - 2.1 The Contractor must issue to the Engineer a complete work method statement for approval prior to construction.
 - 2.2 Sub base will be adequately wet before casting can commence, no mud or puddles to form.
 - 2.3 Due care shall be taken by the Contractor to ensure that the correct depth of the reinforcing is maintained during the casting process.
 - 2.4 Concrete shall be 35MPa readymix from approved supplier, such as Meler (Glen Talmage: (031) 714 2130) o.s.a. The typical mix design to be submitted for approval to consist of: CEM I 52.5 Water:Cement Ratio = 0.64 - 0.55 Coarse dolomitic aggregate: 26.5mm + 19mm Concrete strength required at 28 days: 35MPa No pump mix allowed.
 - 2.5 Flat ended shovels will be used to move concrete. (Rakes and Poker vibrators are unsuitable for moving concrete and can cause segregation).
 - 2.6 Floor hardener: Moisture Barrier Floor Topping (MBFT) from Samson Technologies or similar approved must be applied strictly in accordance with supplier's specifications.
3. CURING
 - 3.1 The new concrete will be kept wet continuously for 7 days. This can be achieved by using a wet sand layer on plastic sheeting to trap the moisture in..
4. JOINTS AND SEALING
 - 4.1 All joint cutting and sealing shall be done by an approved sub-contractor.
 - 4.2 Saw cut joints will be cut by a specialist between 24 to 36 hours of casting.
 - 4.3 Joints must not be beamed before concrete is at least 7 days old.
 - 4.4 Joints should be cleaned with a strong water jet to remove all clippings and debris from the cut.
 - 4.5 When the saw cut is dry, the joint will be cleaned with oil free compressed air to ensure a dust free environment.
 - 4.6 Joint Filler to be used is Sikaflex Pro 3I-Cure or similar approved, unless otherwise specified, strictly to their specifications, at the end of the contract.
5. EARTHWORKS
 - 5.1 The layer works as indicated on the relevant drawings will be imported and the minimum compaction specifications adhered to at all times.
 - 5.2 The number of compaction tests per layer must be prescribed in the SANS codes. The results should be approved by the Engineer prior to construction of the subsequent layer.



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