

## General

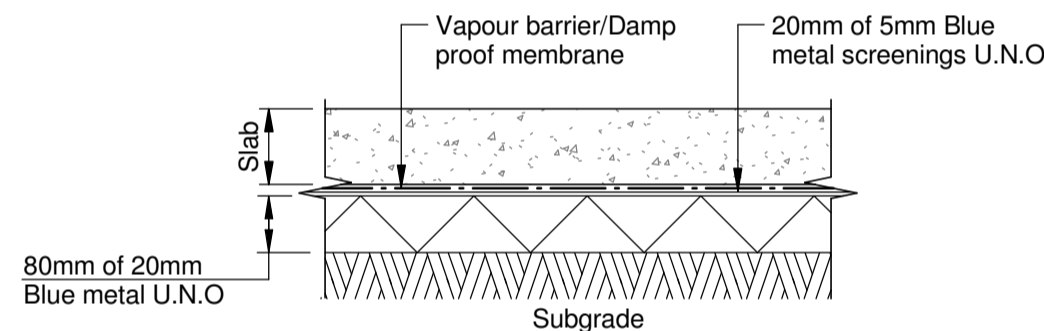
- G1. Structural drawings shall be read in conjunction with all architectural and other consultants drawings and specifications.
- G2. Any discrepancies shall be referred to the architect for a decision before proceeding with the work.
- G3. For setting out dimensions refer to architectural drawings. No dimensions shall be obtained by scaling from drawings. If in doubt, ask.
- G4. Unless otherwise noted, all levels are given in metres and all dimensions are in millimetres.
- G5. All materials and workmanship shall be in accordance with Australian standards and codes of practice except where varied by the specification and/or drawings. The applicable Standards shall be the referenced Standards current at commencement of construction. These Standards for this project shall be determined by reference to the document history on the Standards Australia website. This determination of applicable Standards shall be carried out during the Tender period and any queries relating to the appropriate Standard shall be raised with Arup during this period.
- G6. The builder shall be responsible for maintaining the stability of the structure until its completion and shall ensure that no part of the structure is overstressed by excessive construction loading or contains "Locked-in" stresses from temporary conditions.
- G7. Each aspect of structural work shall be checked by the engineer after the builder has satisfied himself that it is correct, and before it is concealed. The engineer shall be given 48 hours' notice of inspection being required.
- G8. Unless shown otherwise, members shall be detailed to intersect at the centroid lines of sections used.
- G9. Refer to Architects drawings for details of all grooves, fillets, hobs drip grooves & the like.

### G10. Abbreviations:

c/c - centres	
col - column	NSOP - not shown on plan
cts - centres	NSOE - not shown on elevation
FFL - finished floor level	SSL - structural slab level
gal - hot dip galvanised	typ. - typical
EF - each face	UNO - unless noted otherwise
NF - near face	EW - each way
	FF - far face
NTS - Not to scale	
PT - Pile cap top	
PB - Pile cap bottom	

## Subgrade

- F10.1 Natural subgrades shall be proof-rolled with a roller of 70kN minimum static weight, unless otherwise stated in the geotechnical investigation report, detect soft or loose areas. Such areas should be treated in accordance with the Geotechnical Engineer's recommendations.
- F10.2 Unless otherwise specified the subgrade below base courses for slabs shall be suitable material compacted to 100% std as determined by test AS 1289.5.1.1. or 70% minimum density index for cohesionless soils.
- F11. Base shall be approved well graded natural gravel or crushed rock (max. size 40mm) spread and compacted to 98% mod as determined by test AS 1289.5.2.1. or 80% minimum density index for cohesion less soils.



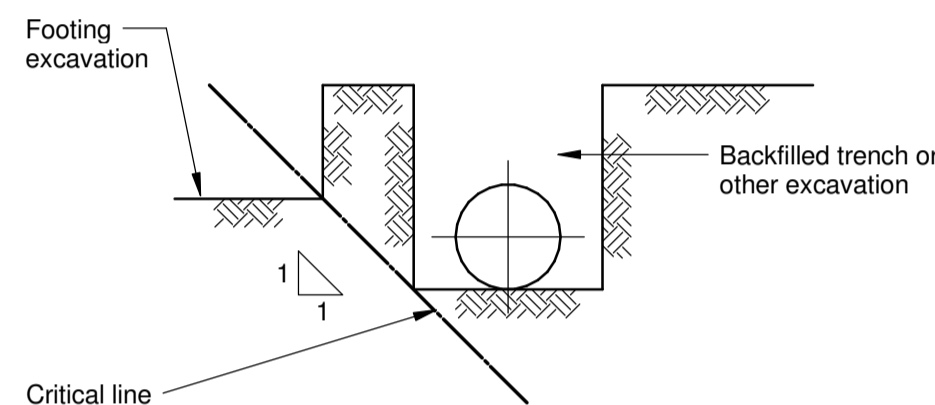
Typical Slab on Grade

## Foundations - cohesive (loamy and clayey) soils

- FC1. Foundation material shall be approved by the engineer for allowable bearing capacity before construction of footings.
- FC2. Underside of footings in loamy and clayey soils shall be a minimum of 600mm below natural ground level.
- FC3. Excavate to firm, dry ground and maintain the excavation in a dry condition. Remove any soft ground as directed by the engineer.
- FC4. Where over-excavation in soft ground is required, filling to the correct level shall be with concrete of  $f_c = 20$  MPa U.N.O.
- FC5. Footings have been designed for an allowable working load bearing pressure of Noted on the drawings for a 20mm settlement, but not less than 150kPa
- FC6. All walls and columns shall be concentric with supporting foundations unless otherwise shown.
- FC7. Blinding of 50mm concrete ( $f_c = 15$  MPa) shall be placed as soon as the footing excavations have been inspected by the engineer.
- FC8. Unless otherwise approved by the engineer, no excavation shall be carried out closer to footings than a line extending down from their edge at 45° as per note F9.

## Foundations - Non Cohesive (sandy) Soils

- F1. Refer to the Geotechnical Site Investigation prepared by Arup Geotechnics.
- F2. Foundation material shall be approved by the Geotechnical engineer for allowable bearing capacity before construction of footings. This shall be based on the results of tests carried out under item.
- F3. Compaction shall be measured using a penetrometer in accordance with AS1289 3.3.
- F4. Penetrometer compaction results required:
- Under Footings: 8 blows per 300mm measured from 150mm to 750mm deep;
  - Under slabs: 8 blows per 300mm measured from 150mm to 750mm deep.
- F5. The contractor shall arrange for all penetrometer testing to be carried out by an approved testing laboratory with all costs being borne by the contractor. The tests shall be carried out in accordance with the following schedule:
- Under pad footings: one test/10m<sup>2</sup> with min. 1 test/pad
  - Under strip footings: one test/5m length
  - Under slabs: one test/20m<sup>2</sup>
- F6. Footings have been designed for an allowable working load bearing pressure noted on drawings but no less than 150kPa
- F7. All walls and columns shall be concentric with supporting foundations unless otherwise shown.
- F8. Unless otherwise approved by the engineer, no excavation shall be carried out closer to footings than a line extending down from their edge at 45°
- F9. All free draining granular fill material behind retaining walls shall be of strong durable particles conforming to the following gradings:
- |                 |
|-----------------|
| A.S. Sieve size |
| 26.50mm         |
| 9.50mm          |
| 2.36mm          |
| 600 microns     |
| 75 microns      |
- F10. Refer Civil works specification & drawings for general fill & compaction requirements if not listed.



## Reinforcement

- R1. All reinforcement shall be as follows:

Symbol	Type	Designation to AS/ NZS 4671
R	Normal ductility plain bars	R250N
N	Normal ductility deformed bars	D500N
SN/ RN	Normal ductility welded mesh square or rectangular	D500SN/ D500RN
SL/ RL	Low ductility welded mesh square or rectangular	D500SL/ D500RL
T	"Tempcore" bars or equivalent	D500SL/ D500RL

Note 1: The number following R, N or T is the bar diameter in mm  
 Note 2: T bars shall be used for all rebend of pull-out applications

- Steel reinforcement for concrete MUST comply with AS/NZS 4671 or AS/NZS 4672. It MUST be cut and bent in accordance with AS 3600, AS 5100 or AS 2870.
- R2. Clear cover to reinforcement (including filaments) shall be as noted on the drawings. Where cover is not specifically designated, an RFI is to be raised with the engineer.
- R3. Where top and bottom reinforcement is shown on the same plan, Top reinforcement is shown thus: Bottom reinforcement is shown thus:
- R4. Distribution bars to main reinforcement in slabs shall be: N12 @ 300 c/c U.N.O. for slabs upto 200 thick N16 @ 300 c/c U.N.O. for slabs upto 300 thick Contact engineer for thicker slabs.
- R5. No Reinforcement splices shall be made, other than those shown on the structural drawings, without the prior approval of the engineer. Minimum lap for fabric shall be one mesh plus 25mm.
- R6. Welding of reinforcement is not permitted unless shown on the drawings or approved by the engineer.
- R7. Top and bottom reinforcement in slabs shall be supported in both directions at maximum centres of 1000mm.
- R8. Reinforcement to be checked by the engineer prior to pouring. Give engineer 48 hours notice of check being required and allow sufficient time for any remedial work required after checking prior to concrete pour.
- R9. The minimum clear spacing between conduits, cables, pipes and bars to be as required by AS 3600 but not less than three diameters. Conduits in slabs to be placed above bottom reinforcement and below top reinforcement.
- R10. All re-entrant corners and service holes are to have trimmer bars placed diagonally at corners using two bars (1600 long), one tied to the underside of top reinforcement and the other tied to the top of the bottom reinforcement. Trimmer bars to be N12 for slab not thicker than 120, N16 for slabs not thicker than 180, N20 otherwise. U.N.O.
- R11. All hooks, laps and bends shall be in accordance with AS 3600 unless shown otherwise. Laps in mesh shall be made so that the overlap measured between the outermost transverse wires of each sheet is not less than the spacing of the wires plus 25mm.
- R12. Abbreviations used for reinforcement location.

BB - Bottom Bottom	B - Bottom
TT - Top Top	T - Top
EF - Each Face	EW - Each Way
NF - Near Face	FF - Far Face
LV - Bar Length Varies	AS - Alternately Staggered
AP - Alternately Placed	

## Piling

- P1. All piling shall comply with AS2159 & the specification. The Piling specification shall take precedence where conflict exists.
- P2. The contractor shall obtain all the necessary approvals from the relevant authorities, and adjacent property owners prior to commencement of work.
- P3. Unless shown otherwise, bored piles / barrettes shall have a minimum socket length of 2 x pile diameter in rock.
- P4. The plan set-out dimensions are at pile trim level. If piling and driving of piles takes place from a different level, appropriate adjustments to the set-out of raking piles, if any, must be made.
- P5. If any pile needs to be trimmed by the piling or excavation contractor for reasons of access etc. such trimming shall be at a level not less than 100mm above the final trimmed level. No such trimming shall take place without the prior agreement of the engineer.
- P6. Top section of bored pier / barrette to be lined if necessary to retain loose material and ground water, and sealed into rock to prevent significant inflow of ground water.
- P7. Unless noted otherwise, centreline of bored pier / barrette shall coincide with centreline of column/wall above. Refer architect's drawings.
- P8. Bored piers / barrettes shall be designed for a maximum eccentricity of 50mm. All bored pier / barrette centrelines shall be checked prior to concrete being poured. If eccentricity greater than 50mm is measured, the engineer shall be notified immediately.
- P9. The contractor is responsible for interpretation of the geotechnical information and for designing a piling system to suit the site.
- P10. Pile groups shall be designed to carry the working loads given in the pile group schedule and to account for negative skin friction due to settlement of the ground. Pile joints shall have structural properties not less than those of the balance of the pile section.
- P11. All piles shall be designed and constructed in accordance with AS2159. Steel piles are not acceptable. Pile durability shall be in accordance with AS2159, section 6 non aggressive conditions. The design of the pile alternatives shall be carried out by a chartered engineer and independently checked by another chartered engineer. A statement signed by both engineers, shall be provided to certify that the design of the piles meets all the requirements of this specification.
- P12. The tender shall include full details of the types of alternative pile proposed. This information shall include, but is not limited to:
- the geotechnical design criteria used in the pile design
  - the structural design criteria used in the pile design.
- P13. Concrete for the piles shall be tested by project control testing as specified in AS3600 with a minimum rate of testing of one sample per batch of concrete.
- P14. The maximum permissible deviation at cut off level of the center of each completed pile from the correct centre point is 50mm in any direction. The maximum permissible deviation from the vertical at any level of a finished pile is 1 in 75. Allowable tolerance in cut off level is 20mm.
- P15. Pile shall be driven in an order and in such manner that no damage is sustained by previously driven piles or structure.
- P16. The contractor shall record in a manner approved by the engineer, details of the construction of each pile and submit all details to the engineer within 48 hours of the pile being constructed.
- P17. The pile set out positions will be available prior to the commencement of the site work.
- P18. The contractor shall engage the services of a licensed surveyor to setout the piles from the building grid lines setout by the proprietor's surveyors. The contractor shall engage the services of a licensed surveyor to check setout of completed piles. A schedule of survey results shall be forwarded to the engineer on a progressive basis. Any existing setout reference and/or datum which are lost or disturbed during the course of the work shall be established by the contractor at his own cost.
- P19. The contractor shall ensure that the pile driving technique employed does not cause the propagation of damage inducing waves.
- P20. The contractor shall produce a report to demonstrate that the piles have been installed in accordance with these notes and the design requirements.

## Pin Notes

- PN1. All materials for pin plates, clevis plates rods & rod connectors is to be AS1204 grade 350. Proposed identification procedure & material certificates for this material shall be submitted to the engineer for approval prior to fabrication.
- PN2. Pins to be grade 4140 or equivalent with a minimum yield strength of 640MPa. Before fabrication provide for approval material certificates for pin material. Tolerance on pin to be such that resulting clearance between pin & hole is between 0.2mm & 0.5mm making due allowance for surface treatment.
- PN3. Screw threads to be as AS1275.
- PN4. Length of threaded portion of rod to be:-
- |              |    |     |     |     |     |     |     |
|--------------|----|-----|-----|-----|-----|-----|-----|
| Rod diameter | 16 | 24  | 30  | 36  | 42  | 50  | 65  |
| Rod diameter | 80 | 100 | 120 | 125 | 150 | 150 | 175 |
- PN5. Rods to have a minimum of rod dia. +6mm engagement in connectors.
- PN6. All edges of plates and rods that will be galvanised are to be smoothly rounded prior to galvanising.
- PN7. Holes in pin & clevis plates to be drilled not punched.
- PN8. Stiffeners where shown are to be provided on both sides of the member unless noted otherwise.
- PN9. Stiffeners where shown are to be provided on both sides of the member unless noted otherwise.
- PN10. Member centrelines at nodes are to coincide unless noted otherwise.
- PN11. All member splices are to be subjected to non-destructive weld testing as specified. Any variations in member splices from those shown on the drawings are to be submitted to the engineer for approval.
- PN12. The engineers written approval shall be obtained for any penetrations in structural members not shown on structural drawings.
- PN13. After galvanising, items with internal threads shall be tapped & oiled for corrosion protection. Those with external threads shall be wiped or the coating otherwise controlled to enable hand assembly all this work to be in accordance with AS1214. Prior to assembly galvanised threads shall be lubricated with an appropriate material.

P1	28/10/14	ML	XN	AJ
Preliminary Concept				
Issue	Date	By	Chkd	Appd



General Notes  
Sheet 1

Scale at A1 As indicated	
Discipline Structural	
Job No <b>234008</b>	Drawing Status <b>Preliminary Concept</b>
Drawing No <b>S-301</b>	Issue <b>P1</b>