

# NOTES:

## GENERAL

1. These documents shall be read in conjunction with all Architectural and other consultants drawings and specifications and with such other written instructions as may be issued during the course of the contract. Any discrepancy shall be referred to the Engineer or Architect before proceeding with work.
2. Materials and workmanship are to be in accordance with the relevant current SAA codes except where varied by the project specification.
3. All dimensions are to be obtained from Architects Drawings or from site. Do not scale Engineers drawings.
4. The approval of a substitution by the Engineer is not an authorisation for an extra. Any extra involved must be taken up with the Architect before any work commences.
5. During construction the Contractor shall be responsible for maintaining the structure in a stable condition and ensuring that no part shall be over stressed under construction activities.
6. Any cost associated with re-design of any part of the documents requested by the builder will be the responsibility of the builder.

## FOUNDATIONS

1. Foundation material to be approved before pouring concrete for a safe bearing capacity of 100 kPa.
2. The foundation material is **Natural Sand or Clay**.
3. Builder to commission a geotechnical engineer to confirm the parameters of the soil properties as shown in sheet S02.
4. All construction to comply with AS2870 - 2011.

## CONCRETE

1. All concrete workmanship shall be in accordance with the SAA Concrete Structures Code AS 3600-1994
2. All concrete shall be Grade: 20 MPa for footings
  - MPa for ground slabs
  - MPa for suspended slabs
  - MPa for wall panels
  - MPa for columns
3. Concrete sizes shown do not include finish and must not be reduced or members penetrated in any way without the Engineers approval.
4. Depths of beams are given last and include slab thickness. Slabs and beams are to be poured together.
5. Clear concrete cover to steel reinforcing, unless noted otherwise, to be: 50 mm for footings (protected by membrane)
  - mm for ground slabs (top)
  - mm for suspended slabs top
  - mm for suspended slabs bottom
  - mm for suspended stair slabs top
  - mm for suspended stair slabs bottom
  - mm for wall panels
  - mm for external balcony (top)
  - mm for beams
  - mm for columns

Concrete cover to be maintained by means of approved chairs and or concrete blocks spaced at approximately 750 cross centres, or to the approval of the Engineer.

## CONCRETE (Continued)

6. Camber to suspended slabs to be 3mm for every 1500 mm of span, unless noted otherwise.
7. Construction joints where not shown shall be properly formed and located to the approval of the Engineer.
8. Concrete to be kept free of supporting brickwork by two layers of a suitable membrane (malthoid etc.), or as directed by the Engineer. Vertical faces to be kept free by a 12 mm thickness of bituminous caneite. Check with Architect regarding V joints on rendered surfaces.
9. Brickwork must not be built on concrete slabs or beams until formwork supporting same has been removed.
10. Reinforcement is shown diagrammatically and not necessarily in true projection.
11. Splices in reinforcement shall be made only in positions shown. Welding of reinforcement will not be permitted unless shown on the structural drawings.
12. Reinforcement notation:
  - SL denotes welded wire fabric (square) to AS/NZS 4671
  - RL denotes welded wire fabric (rectangular) to AS/NZS 4671
  - R denotes plain bars to AS1302
  - N denotes deformed bars to AS/NZS 4671The number immediately following the bar grade symbol represents the nominal bar diameter in millimetres.
13. No holes, chases or embedment of pipes other than those shown on the structural drawings shall be made in concrete members without prior approval of the Engineer.
14. Reinforcing rods terminating at openings in floors or walls shall be hooked. At all openings in walls add 2Y16 bars on all sides projecting 600 past the corners unless noted otherwise on the structural drawing.
15. All temporary openings to be formed in walls or floors for construction purposes to be approved by the Engineer.
16. All reinforcement for any pour shall be completely placed and tied prior to inspection by the Engineer or Architect. No concrete shall be poured until it has been inspected and approved.
17. All beam stirrups shall have 180 degree bends at the free ends of the bars
18. The Builders attention is specially directed to the top steel on this project. Reinforcement is to be securely tied and supported in its correct position so as not to be displaced during concreting.

## STRUCTURAL STEEL

1. All steelwork shall be carried out in accordance with the Steel Structures Code AS 4100-1990.
2. Two copies of shop drawings are to be submitted to the Engineer for approval and no construction shall be commenced without that approval. Approval will not cover dimensions or layout.
3. Connections shall be provided to carry the reactions as shown on the drawings. Where there is no information shown use the minimum requirements as specified below.
4. Welds to be 6 mm continuous fillet laid down with approved covered electrode in accordance with AS 1554 Welding Code.  
Bolts 16 mm diameter, black in 2 mm clearance holes.  
Gusset plates 10 mm thick unless noted otherwise.

## STRUCTURAL STEEL (Continued)

5. All cleats and drilling for fixing of timber members, etc., to be provided by the fabricator.
6. Camber to structural steel roof members, etc., to be NIL mm for every meter of span unless noted otherwise.
7. Concrete encased structural steel to be enclosed by one layer of SL41 placed clear of steel. Encasing to provide 65 mm of cover, where exposed to the earth. All other steelwork to be given one shop coat of approved primer after vigorous wire brushing.
8. All exposed steelwork to be hot dip galvanized in accordance with AS 2312.
9. Masonry walls to be tied to structural steel members with approved metal ties spaced at 450mm horizontally and 600mm vertically. Ties to be rigidly attached to members.
10. High strength bolts are denoted as 8.8/s and are to be snug tightened only unless noted otherwise.
11. All structural steel members to be BHP-300 PLUS Steel U.N.O.
12. All steel purlins to be BHP- Lysaght U.N.O.
13. All structural steel hollow sections to be BHP C350 U.N.O.
14. All structural steel plate to be BHP C250 U.N.O.

PROJECT:

PROPOSED CONCRETE SLEEPER RETAINING WALL

CLIENT:

ICON WALLS PTY LTD



**DAVID NOVAK & ASSOCIATES** PTY. LTD.  
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scale

NIL

drawn

BY

date

15/01/2014

checked

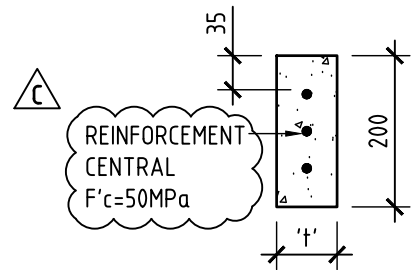
DN

job no.

14-006

drawing no.

S01



## TYPICAL CONCRETE SLEEPER DETAIL

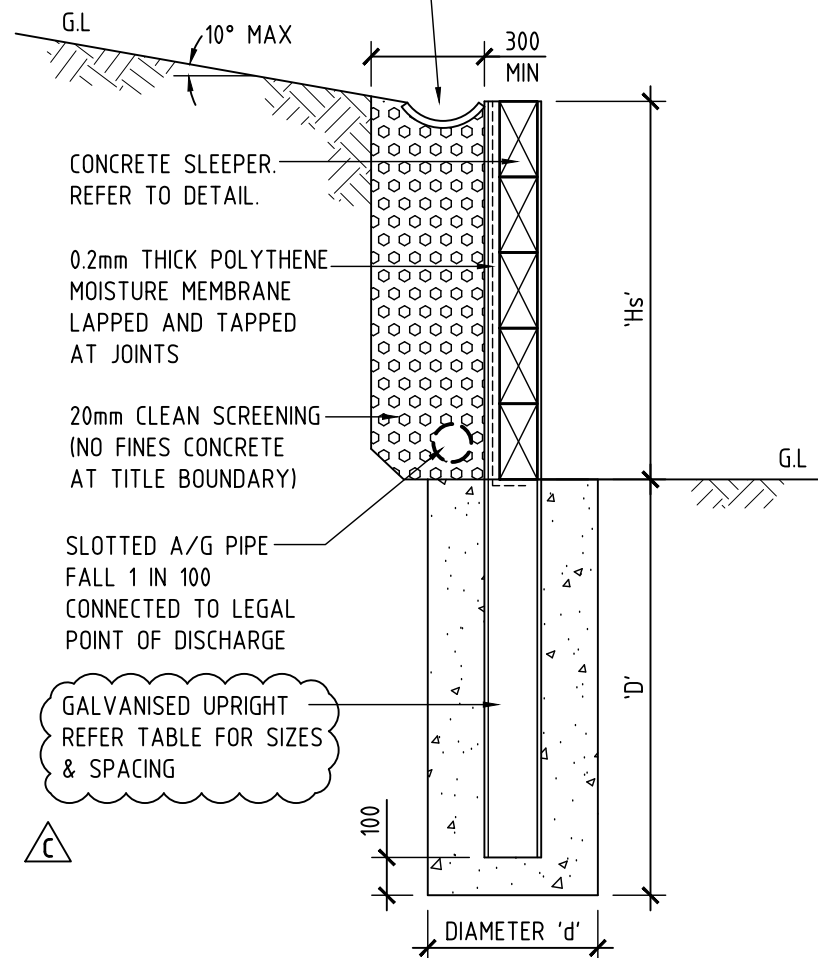
SCALE 1:10

MAXIMUM ALLOWABLE SURCHARGE, Q	
HEIGHT, 'Hs' (mm)	'Q' (kPa)
< 1500	2.5
≥ 1500	5.0

ASSUMED SOIL PROPERTIES		
	SAND	CLAY
SOIL DENSITY, $\gamma$ (kN/m <sup>3</sup> )	18	19
ANGLE OF FRICTION, $\phi$ (°)	30	28
COHESION, c (kPa)	0	5

**NOTE:**  
THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION. A STRUCTURAL ENGINEER FAMILIAR WITH SLEEPER RETAINING WALL TO CERTIFY AND APPROVE ALL OF THE DESIGN ON AN INDIVIDUAL SITE BASIS.

CONCRETE SPOON DRAIN BY OTHERS WHERE REQUIRED FOR SITE SPECIFIC REQUIREMENTS TO BE DETERMINED BY CONSULTING ENGINEER FALL 1 IN 100 AND CONNECTED TO LEGAL POINT OF DISCHARGE



## TYPICAL SLEEPER RETAINING WALL DETAIL

SCALE 1:20

## SPECIFICATIONS:

- SLEEPER CONCRETE GRADE TO BE 50MPa. RIGID FORMWORK & INTENSE CONCRETE COMPACTION IN ACCORDANCE WITH AS3600 IS REQUIRED FOR CASTING EACH SLEEPER. THE MIX CONCRETE SHALL HAVE A MAXIMUM AGGREGATE OF 14mm.  
**NOTE:** 80mm THICK CONCRETE SLEEPERS SHALL NOT BE USED WITHIN 1km FROM THE COASTLINE.
- HAND COMPACTING EQUIPMENT ONLY IS PERMITTED TO BE USED ADJACENT SLEEPERS (WITHIN DISTANCE=0.75Hs)
- SLEEPERS SHALL BE HANDLED WITH DUE CARE DURING TRANSPORTATION & ERECTION. CRACKED OR DAMAGED SLEEPER WILL NOT BE USED.
- SLEEPER MINIMUM END BEARING LENGTH SHALL NOT BE LESS THAN 25mm EACH END.
- FOR DETERMINATION OF THE APPROPRIATE SLEEPER TYPE, THE HEIGHT IS MEASURED FROM THE TOP OF THE WALL TO THE APPLICABLE SLEEPER. A WALL FACE CROSS SECTION MAY CONSIST OF VARIOUS SLEEPER TYPES.

## NOTE:

- MAXIMUM WALL HEIGHT MUST NOT BE EXCEEDED.
- BUILDER TO MAINTAIN STABILITY OF THE RETAINING WALL DURING BACKFILL.
- BUILDER TO LOCATE EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS.
- DO NOT EXCAVATE IN FRONT OF THE WALL FOR SERVICES WITHIN THE HEIGHT OF THE RETAINING WALL.
- GEOTECHNICAL ENGINEER TO APPROVE FOUNDING MATERIAL FOR ALL FOOTINGS.
- FOUNDING MATERIAL TO BE APPROVED FOR A SAFE BEARING CAPACITY OF 100KPa PRIOR TO COMMENCEMENT.
- NO FENCE/GUARD RAIL TO BE BUILT ON RETAINING WALL. IF IN DOUBT CONTACT THIS OFFICE.
- NO PART OF THE STRUCTURE TO PROJECT BEYOND TITLE BOUNDARY.
- EXISTING FOOTINGS OF STRUCTURES MUST NOT BE UNDERMINED BY ANY EXCAVATION.
- ADJOINING OWNERS PROTECTION WORKS ARE OUTSIDE THE SCOPE OF THESE DOCUMENTS.
- BUILDER TO MAKE SURE THE RETAINED SOIL PROPERTIES TO BE CONFIRMED BY GEOTECHNICAL CONSULTANT PRIOR TO COMMENCEMENT OF WORKS. IF IN DOUBT CONTACT THIS OFFICE.
- BUILDER TO OBTAIN ALL RELEVANT AUTHORITY PERMITS AND ENSURE ALL RELEVANT INSPECTIONS ARE CARRIED OUT.
- A GEOTECHNICAL INVESTIGATION TO BE CARRIED OUT TO CONFIRM NO ROCK IS ENCOUNTERED WITHIN THE FOOTING DEPTH PRIOR TO COMMENCEMENT OF WORKS. IF IN DOUBT CONTACT THIS OFFICE.

## CONSTRUCTION SEQUENCE:

- DETERMINE LOCATION OF ALL SERVICES AND FOOTINGS TO BUILDINGS ABOVE AND BELOW THE WALL.
- CLEAR THE SITE AND PREPARE THE PATH FOR THE ACCESS OF DRILLING MACHINERY.
- MARK OUT THE LOCATION OF THE EACH HOLE THAT IS TO BE EXCAVATED.
- EXCAVATE THE HOLES TO THE REQUIRED DEEP AND DIAMETER. ENSURE NO LOOSE MATERIAL FALLS INTO THE HOLES.
- INSTALL AND BRACE THE UPRIGHTS TO MAKE SURE THE UPRIGHTS ARE IN POSITION AT ALL TIME. PROVIDE CONCRETE SEAT BLOCK AT THE BOTTOM OF HOLE AS REQUIRED.
- POUR THE CONCRETE INTO THE HOLES. DO NOT OVERFILL THE HOLES.
- INSTALL THE FIRST TWO SLEEPERS AFTER MINIMUM 24 HOURS OF CONCRETE POUR. PLACE A PLASTIC MEMBRANE BEHIND THE WALL.
- INSTALL A SLOTTED A/G PIPE ALONG THE BOTTOM BACK OF THE WALL AND CONNECT TO LEGAL POINT OF DISCHARGE.
- INSTALL THE REST OF SLEEPERS.
- COVER THE A/G PIPE WITH 20mm CLEAN SCREENING FOR DRAINAGE AND BACKFILL THE WALL AFTER MINIMUM 7 DAYS OF CONCRETE POUR.

PROJECT:  
PROPOSED CONCRETE SLEEPER RETAINING WALL

CLIENT:  
ICON WALLS PTY LTD



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scale 1:20	date 29/10/2019	job no. 14-006	drawing no. S02
drawn BY	checked DN		REV C

**SLEEPER LENGTH (l) = 1200mm**

HEIGHT 'Hs' (mm)	THICKNESS 't' (mm)	REINFORCEMENT	UPRIGHT @1200 CTRS MAX	UPRIGHT AT END	DEPTH 'D' (mm)	DIAMETER 'd' (mm)
UP TO 1800	80	2-N10 CENTRAL	100 UC 14.8	100 PFC	2100	450
1801 - 2200	80	2-N10 CENTRAL	150 UC 23.4	150 PFC	2500	450
2201 - 3600	100	3-N10 CENTRAL	200 UC 46.2	250 PFC	3800	600
3601 - 4200	100	3-N10 CENTRAL	250 UC 72.9	380 PFC	4400	600
4201 - 5500	120	3-N10 CENTRAL	310 UC 96.8	250 UC 72.9	5700	750
5501 - 6000	120	3-N10 CENTRAL	310 UC 137	250 UC 89.5	6300	750

**SLEEPER LENGTH (l) = 1500mm**

HEIGHT 'Hs' (mm)	THICKNESS 't' (mm)	REINFORCEMENT	UPRIGHT @1500 CTRS MAX	UPRIGHT AT END	DEPTH 'D' (mm)	DIAMETER 'd' (mm)
UP TO 1200	80	2-N10 CENTRAL	100 UC 14.8	100 PFC	1400	450
1201 - 2200	100	3-N10 CENTRAL	150 UC 23.4	150 PFC	2500	600
2201 - 3400	120	3-N10 CENTRAL	200 UC 46.2	250 PFC	3800	600
3401 - 3700	120	3-N10 CENTRAL	200 UC 59.5	250 PFC	4100	600
3701 - 4300	150	3-N12 CENTRAL	250 UC 72.9	380 PFC	4500	750
4301 - 5100	150	3-N12 CENTRAL	310 UC 96.8	250 UC 72.9	5300	750
5101 - 6000	150	3-N12 CENTRAL	310 UC 158	310 UC 96.8	6300	750

**SLEEPER LENGTH (l) = 1800mm**

HEIGHT 'Hs' (mm)	THICKNESS 't' (mm)	REINFORCEMENT	UPRIGHT @1800 CTRS MAX	UPRIGHT AT END	DEPTH 'D' (mm)	DIAMETER 'd' (mm)
UP TO 800	80	2-N10 CENTRAL	100 UC 14.8	100 PFC	1000	450
801 - 1400	100	3-N10 CENTRAL	150 UC 23.4	125 PFC	1800	450
1401 - 2200	120	3-N10 CENTRAL	150 UC 23.4	150 PFC	2700	600
2201 - 3200	150	3-N12 CENTRAL	200 UC 46.2	250 PFC	3900	600
3201 - 4100	150	3-N12 CENTRAL	250 UC 72.9	380 PFC	4400	750

**NOTE:**

TOP TWO SLEEPERS TO BE BOLTED TO THE END UPRIGHT (PFC ONLY) AND FIRST INTERMEDIATE UPRIGHT WITH 10 THICK CLEAT PLATES, 6 CFW BOTH SIDES TO UPRIGHTS AND M12 GALVANISED ANKASCREW PER CONNECTION (50 EMBEDMENT, 50 MIN. EDGE DISTANCE).

CONCRETE SLEEPER REINFORCEMENT IS NOT TO BE INTERFERED WITH GALVANISED ANKASCREW INSTALLATION.

**NOTE:**

CONCRETE SLEEPERS HAVE BEEN DESIGNED FOR 60 YEARS DURABILITY AND LOCATED MORE THAN 1km FROM THE COASTLINE. FOR CONCRETE SLEEPER MORE THAN 60 YEARS DURABILITY AND/OR WITHIN 1km FROM THE COASTLINE, CONTACT THIS OFFICE FOR FURTHER ADVICE.



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scale AS SHOWN	date 29/10/2019	job no. 14-006	drawing no. S03
drawn BY	checked DN		REV F

**SLEEPER LENGTH (l) = 2000mm**

HEIGHT 'Hs' (mm)	THICKNESS 't' (mm)	REINFORCEMENT	UPRIGHT @2000 CTRS MAX	UPRIGHT AT END	DEPTH 'D' (mm)	DIAMETER 'd' (mm)
UP TO 1500	80	2-N10 CENTRAL	100 UC 14.8	100 PFC	2300	450
1501 - 2100	100	3-N10 CENTRAL	150 UC 23.4	150 PFC	2700	600
2101 - 3000	100	3-N10 CENTRAL	200 UC 46.2	250 PFC	3800	600
3001 - 3900	120	3-N10 CENTRAL	250 UC 72.9	380 PFC	4400	750
3901 - 4600	120	3-N10 CENTRAL	310 UC 96.8	250 UC 72.9	5200	750
4601 - 5200	150	3-N12 CENTRAL	310 UC 137	310 UC 96.8	5900	750

**NOTE:**  
 THE VALUES IN THE TABLES ARE BASED ON THE STRENGTH OF THE CONCRETE SLEEPER. THE DEFLECTION OF CONCRETE SLEEPER MAY BE UP TO APPROXIMATELY 50mm. IF THIS IS NOT SATISFACTORY, WE RECOMMEND THE MAXIMUM HEIGHT OF THE RETAINING WALL TO BE REDUCED TO:

- 500mm FOR 80mm THICK x 2000mm LONG CONCRETE SLEEPER
- 1000mm FOR 100mm THICK x 2000mm LONG CONCRETE SLEEPER
- 1700mm FOR 120mm THICK x 2000mm LONG CONCRETE SLEEPER
- 3200mm FOR 150mm THICK x 2000mm LONG CONCRETE SLEEPER

**SLEEPER LENGTH (l) = 2400mm**

HEIGHT 'Hs' (mm)	THICKNESS 't' (mm)	REINFORCEMENT	UPRIGHT @2400 CTRS MAX	UPRIGHT AT END	DEPTH 'D' (mm)	DIAMETER 'd' (mm)
UP TO 1400	100	3-N10 CENTRAL	150 UC 23.4	125 PFC	2100	450
1401 - 2000	100	3-N10 CENTRAL	150 UC 23.4	150 PFC	2800	600
2001 - 2800	120	3-N10 CENTRAL	200 UC 46.2	250 PFC	3900	600
2801 - 3700	120	3-N10 CENTRAL	250 UC 72.9	380 PFC	4600	750
3701 - 4300	150	3-N12 CENTRAL	310 UC 96.8	250 UC 72.9	5300	750
4301 - 4900	150	3-N12 CENTRAL	310 UC 137	250 UC 89.5	6000	750

**NOTE:**  
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- 700mm FOR 100mm THICK x 2400mm LONG CONCRETE SLEEPER
- 1100mm FOR 120mm THICK x 2400mm LONG CONCRETE SLEEPER
- 2000mm FOR 150mm THICK x 2400mm LONG CONCRETE SLEEPER

**NOTE:**  
 TOP TWO SLEEPERS TO BE BOLTED TO THE END UPRIGHT (PFC ONLY) AND FIRST INTERMEDIATE UPRIGHT WITH 10 THICK CLEAT PLATES, 6 CFW BOTH SIDES TO UPRIGHTS AND M12 GALVANISED ANKASCREW PER CONNECTION (50 EMBEDMENT, 50 MIN. EDGE DISTANCE).

CONCRETE SLEEPER REINFORCEMENT IS NOT TO BE INTERFERED WITH GALVANISED ANKASCREW INSTALLATION.

**NOTE:**  
 CONCRETE SLEEPERS HAVE BEEN DESIGNED FOR 60 YEARS DURABILITY AND LOCATED MORE THAN 1km FROM THE COASTLINE. FOR CONCRETE SLEEPER MORE THAN 60 YEARS DURABILITY AND/OR WITHIN 1km FROM THE COASTLINE, CONTACT THIS OFFICE FOR FURTHER ADVICE.



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scale AS SHOWN	date 29/10/2019	job no. 14-006	drawing no. S04
drawn BY	checked DN		REV A

**SLEEPER LENGTH (l) = 3000mm**

HEIGHT 'Hs' (mm)	THICKNESS 't' (mm)	REINFORCEMENT	UPRIGHT @3000 CTRS MAX	UPRIGHT AT END	DEPTH 'D' (mm)	DIAMETER 'd' (mm)
UP TO 1400	100	3-N10 CENTRAL	150 UC 23.4	125 PFC	2100	600
1401 - 1800	120	3-N10 CENTRAL	150 UC 23.4	150 PFC	2800	600
1801 - 2600	150	3-N12 CENTRAL	200 UC 46.2	250 PFC	3600	750
2601 - 3400	150	3-N12 CENTRAL	250 UC 72.9	380 PFC	4700	750

**NOTE:**

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- 400mm FOR 100mm THICK x 3000mm LONG CONCRETE SLEEPER
- 600mm FOR 120mm THICK x 3000mm LONG CONCRETE SLEEPER
- 1200mm FOR 150mm THICK x 3000mm LONG CONCRETE SLEEPER

**NOTE:**

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