

GUMNUT CONCRETE PRODUCTS

CONCRETE SLEEPER WALL

LANDSCAPE WALL < 1M HIGH

SCOPE

THIS DOCUMENT IS INTENDED TO PROVIDE GUIDANCE FOR THE DESIGN AND CONSTRUCTION OF CONCRETE SLEEPER RETAINING WALLS IN A RESIDENTIAL LANDSCAPING SETTING AND SHALL NOT BE USED WHERE DESIGN OR CONSTRUCTION EXCEEDS ANY OF THE FOLLOWING LIMITS OR EXCLUSIONS.

WHERE THERE IS ANY VARIATION TO THE LIMITATIONS STATED IN THESE DRAWINGS INCLUDING MATERIALS, SOIL CONDITIONS, DRAINAGE, SURCHARGE (ADDITIONAL LOADS) OR GEOMETRY OF THE RETAINING WALL, A STRUCTURAL/ GEOTECHNICAL ENGINEER SHOULD BE ENGAGED TO DESIGN THE WALL.

LOCAL AUTHORITIES SHALL BE CONSULTED TO DETERMINE IF ANY BUILDING APPROVAL OR APPLICATION IS REQUIRED TO ERECT A RETAINING WALL.

IN QUEENSLAND; BUILDING WORK FOR A RETAINING WALL IS PRESCRIBED/ALLOWED IF—

- (A) THERE IS NO SURCHARGE LOADING OVER THE ZONE OF INFLUENCE FOR THE WALL (IE; NO LOADING WITHIN 2.5 TIMES THE WALL HEIGHT HORIZONTALLY); AND
- (B) THE TOTAL HEIGHT OF THE WALL AND OF THE FILL OR CUT RETAINED BY THE WALL IS NO MORE THAN 1m ABOVE THE WALL'S NATURAL GROUND SURFACE; AND
- (C) THE WALL IS NO CLOSER THAN 1.5m TO A BUILDING OR ANOTHER RETAINING WALL.

DESPITE THE ITEMS ABOVE, THE BUILDING WORK IS NOT PRESCRIBED IF IT IS FOR A RETAINING WALL THAT FORMS PART OF THE FENCING FOR A REGULATED POOL AND A FORMAL BUILDING APPLICATION WITH THE LOCAL AUTHORITY WILL BE REQUIRED.

1. SLOPING GROUND

IF THE FINISHED SURFACE LEVEL IN FRONT OF THE WALL IS SLOPING, THEN FULL GROUND SUPPORT CANNOT BE RELIED UPON AND LARGER POSTS OR FOOTINGS WITH ADDITIONAL EMBEDMENT WILL HAVE TO BE USED.

IF THE SLOPE IS STEEPER THAN 10° (1 VERTICAL TO 6 HORIZONTAL) THEN A SPECIAL DESIGN IS REQUIRED, AND THE TABLES HEREIN SHALL NOT BE USED.

INCLINING THE GROUND BEHIND THE WALL (BACKFILL) INCREASES VERTICAL LOADS DUE TO THE WEIGHT OF THE BACKFILL. THIS RESULTS IN INCREASED HORIZONTAL LOADS (HORIZONTAL LOADS DERIVING FROM VERTICAL LOADS). IF THE GROUND BEHIND THE WALL (BACKFILL) HAS A SLOPE STEEPER THAN 14° (1 VERTICAL TO 4 HORIZONTAL) THE DESIGN TABLES ARE NOT APPLICABLE DUE TO RESULTING INCREASED GRAVITY AND LIVE LOADS THAT WILL EXCEED THE DESIGN LOADS ASSUMED FOR THE TABLES.

2. PERMANENT STRUCTURES (EXISTING OR FUTURE)

THE HORIZONTAL COMPONENT OF THE VERTICAL LOADS OF PERMANENT STRUCTURES CAN HAVE SIGNIFICANT IMPACT ON THE PERFORMANCE OF RETAINING STRUCTURES.

PERMANENT STRUCTURES INCLUDE (BUT ARE NOT LIMITED TO);

BUILDINGS, POOLS, ROADS, PARKING AREAS, WATER TANKS, GENERAL STORAGE AREAS.

IF ANY SUCH STRUCTURES WILL IMPACT WITHIN A HORIZONTAL DISTANCE OF THE MINIMUM OF 1.5m OR 2.5 TIMES THE HEIGHT OF THE WALL, THE RETAINING WALL DESIGN SHOULD BE REFERRED TO A STRUCTURAL/GEOTECHNICAL ENGINEER. FENCES OF LIGHTWEIGHT MATERIALS (TIMBER, METAL ETC) CONSTRUCTED ON OR ABOVE THE WALL DO NOT IMPACT ON THE DESIGN OF THE WALLS.

IF THE RETAINING WALL IS TO FORM PART OF A POOL FENCE, ENGINEERING DESIGN SHOULD BE SOUGHT.

3. DRIVEWAYS, ROADS AND RAILWAYS

DRIVEWAYS, ROADS AND RAILWAYS AND AREAS ADJACENT ARE REQUIRED TO BE DESIGNED FOR LOADS TO ACCOMMODATE THE INFRASTRUCTURE AND THE VEHICLES OVER (TRAINS, TRUCKS ETC). THESE LOADS ARE SIGNIFICANTLY LARGER THAN THOSE ALLOWED FOR IN THE DESIGN TABLES PRESENTED IN THESE DRAWINGS AND THEREFORE THE DESIGNS PRESENTED SHALL NOT BE USED IN THESE SITUATIONS.

4. MULTIPLE RETAINING (TERRACED) STRUCTURES

A RETAINING STRUCTURE CONSTRUCTED WITHIN THE ZONE OF INFLUENCE OF ANOTHER RETAINING STRUCTURE WILL APPLY ADDITIONAL LOADS TO THE LOWER WALL. THIS INCLUDES INSTALLING A NEW RETAINING WALL ABOVE OR BELOW AN EXISTING RETAINING STRUCTURE. THE ATTACHED TABLES SHOULD NOT BE USED FOR DESIGNING ANY RETAINING STRUCTURE WITH AN EXISTING OR FUTURE RETAINING STRUCTURE ABOVE OR BELOW SUCH THAT THE UPPER WALL IMPACTS WITHIN THE ZONE OF INFLUENCE OF THE LOWER.

5. SERVICES

RETAINING STRUCTURES CONSTRUCTED IN LOCATIONS NEAR SERVICES (EG. SEWER AND/OR STORMWATER PIPES) REQUIRE PARTICULAR ATTENTION. THE WALLS ARE REQUIRED TO BE DESIGNED TO IMPART NO LOAD ON THE SERVICES AND WILL REQUIRE SPECIFIC ENGINEERING DESIGN TO BE SITED BY A QUALIFIED SURVEYOR.

LOCAL AUTHORITIES (COUNCIL'S & STATE GOVERNMENTS) HAVE SPECIFIC REQUIREMENTS FOR DIFFERENT TYPES OF SERVICES, INCLUDING MINIMUM CLEARANCES. RETAINING WALLS TO BE CONSTRUCTED NEAR SERVICE LOCATIONS SHOULD BE REFERRED TO THE RELEVANT LOCAL AUTHORITY.

6. DRAINAGE

DRAINAGE OF BOTH THE LOCALIZED WALL AREA AND THE SURROUNDING TOPOGRAPHY SHOULD BE CONSIDERED DURING THE PLANNING PROCESS. DRAINAGE INVESTIGATIONS SHOULD ESTABLISH THE LOCAL GROUNDWATER LEVELS INCLUDING SOURCES, DIRECTIONS OF LATERAL FLOW AND SEASONAL OR TIDAL VARIATIONS. THE POSSIBILITY OF SEEPAGE OR SURFACE RUN OFF SHOULD ALSO BE EXAMINED. INADEQUATE DRAINAGE CAN RESULT IN OVERLOADING OF THE WALL OR

SCOURING OF THE FOOTINGS, EITHER OF WHICH MAY LEAD TO WALL FAILURE. WHERE DOUBT EXISTS, A STRUCTURAL/GEOTECHNICAL ENGINEER SHOULD BE CONSULTED.

7. POOR FOUNDATION MATERIAL

THE FOUNDATION MATERIAL ASSUMED IN DESIGN FOR THIS DATA SHEET AND ATTACHED TABLES IS STIFF CLAY. STIFF CLAY IS UNABLE TO BE MOLDED, IT IS ABLE TO BE INDENTED ONLY WITH STRONG DOWNWARD PRESSURE OF THUMB.

ACCEPTABLE ALTERNATIVE FOUNDATION MATERIALS ARE:

- WEATHERED ROCK (EG SHALE)
- DENSE SAND / GRAVEL

IF THE FOUNDATION MATERIAL IS NOT WITHIN THIS RANGE, THE TABLES IN THESE DRAWINGS SHALL NOT BE USED.

8. POOR BACKFILL MATERIAL

THE ATTACHED TABLES INCLUDE THREE OPTIONS FOR BACKFILL MATERIALS. THESE ARE: SAND, SANDY GRAVEL AND GRAVEL. ALTERNATIVE MATERIALS MAY RESULT IN WALL FAILURE DUE TO SWELLING OF BACKFILL OR LACK OF DRAINAGE. IF THE BACKFILL MATERIAL IS NOT WITHIN THE ABOVE RANGE, THE TABLES SHALL NOT BE USED. ALTERNATIVE BACKFILL MATERIAL SHOULD BE REFERRED TO A STRUCTURAL/GEOTECHNICAL ENGINEER.

9. STRUCTURAL CLASSIFICATION

THE DESIGNS CONTAINED IN THESE DRAWINGS ASSUME A STRUCTURAL CLASSIFICATION OF 3 AS PER AS 4678, THAT IS - 'WHERE FAILURE WOULD RESULT IN MINIMAL DAMAGE AND LOSS OF ACCESS AND WHERE THE WALL HEIGHT DOES NOT EXCEED 1.5M', FOR WALLS UNDER 1.5M. IF THE PROPOSED RETAINING WALL LOCATION HAS ADJACENT STRUCTURES OR FACILITIES WITH POST DISASTER FUNCTIONS OR FAILURE OF THE WALL MAY RESULT IN SIGNIFICANT DAMAGE OR RISK OF LIFE, A STRUCTURAL/GEOTECHNICAL ENGINEER SHOULD BE CONSULTED.

CONCRETE NOTES:

- C.1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE RELEVANT CURRENT AUSTRALIAN STANDARD CODES (AS 3600, AS 2870 & AS 1379), BUILDING BY-LAWS AND THE ORDINANCES OF THE RELEVANT LOCAL AUTHORITY
- C.2. CONCRETE SPECIFICATION

ELEMENT	GRADE	MAX. SLUMP (mm)	MAX. AGGREGATE SIZE (mm)	MIN. COVER (mm)
CONCRETE SLEEPERS	N50	80 (+20/-10)	20	35
PIERS	N25	100 (+20/-10)	20	50

- C.3. ALL CONCRETE TESTING IS TO BE CARRIED OUT BY A NATA REGISTERED LABORATORY, IN STRICT ACCORDANCE WITH THE REQUIREMENTS OF AS 1012. THE FOLLOWING TESTING SCHEDULE IS TO BE ADOPTED IN ADDITION TO THE REQUIREMENTS OF THE MANUFACTURERS QUALITY ASSURANCE PROGRAM. A MINIMUM OF ONE TEST (3 CYLINDERS) TO BE TAKEN FROM EACH 50m³ OR PART THEREOF CAST ON ANY GIVEN DAY FOR EACH STRENGTH GRADE.
- C.4. NO CONCRETE TO BE POURED WHEN SITE TEMPERATURE EXCEEDS 35° C OR FALLS BELOW 5° C

STEELWORK NOTES:

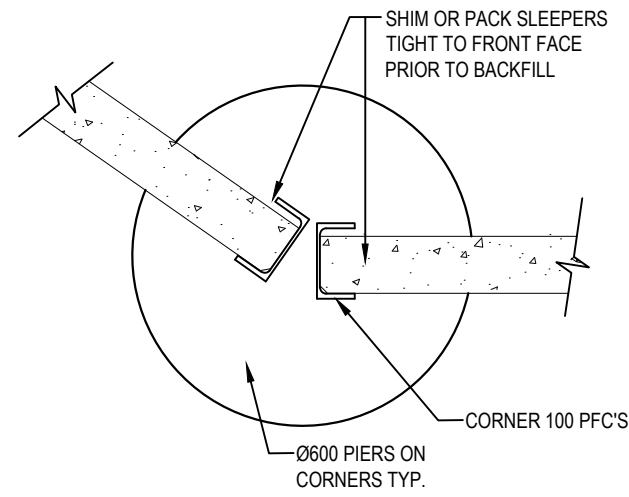
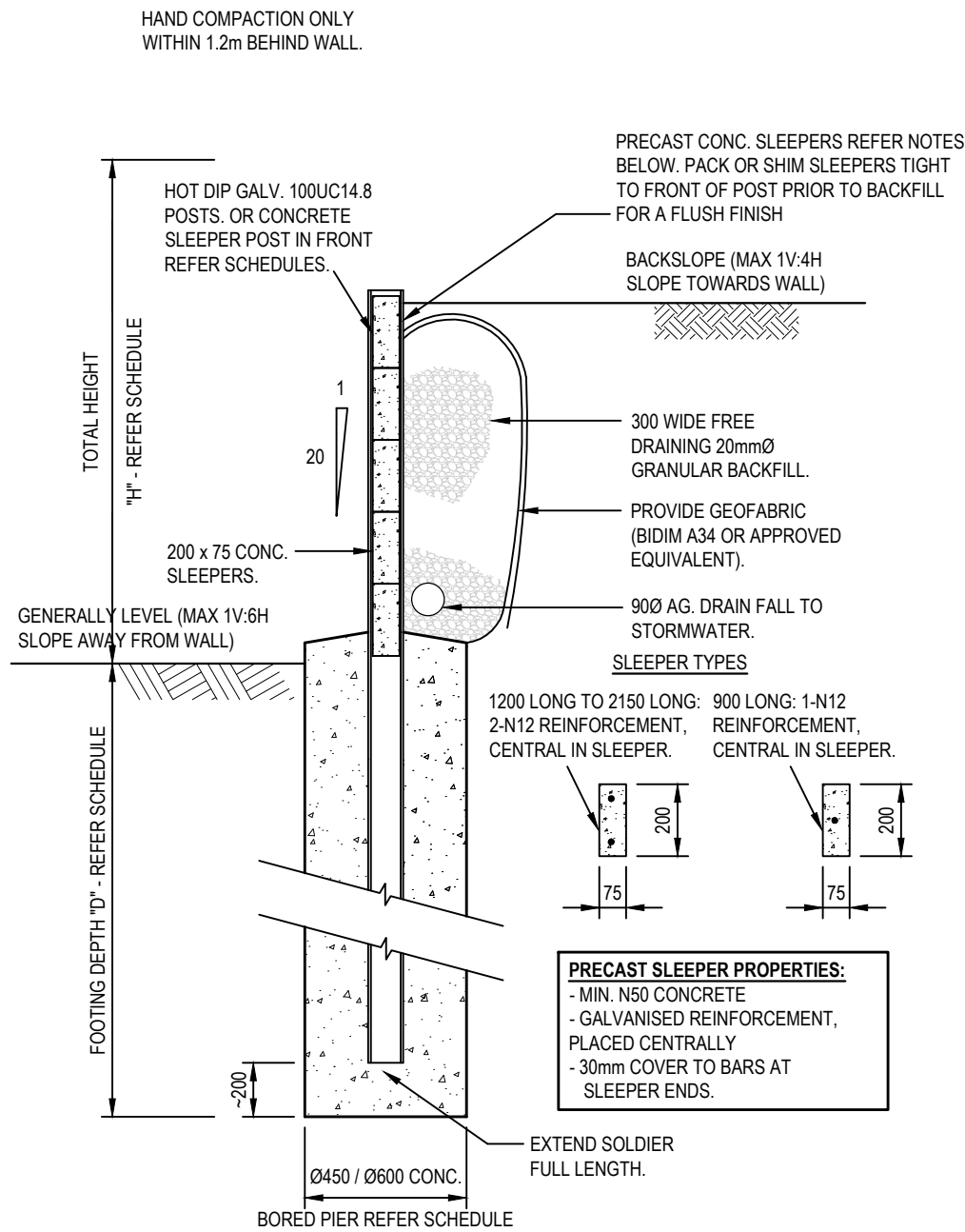
- S.1. ALL STEELWORK SHALL COMPLY WITH THE REQUIREMENTS OF:- AS 4100 - STEEL STRUCTURES AS 2312 - GUIDE TO THE PROTECTION OF IRON AND STEEL. AS 1214 - HOT DIP GALVANISING OF THREADED FASTENERS
- S.2. PLATES, CLEATS, BRACES AND ALL OTHER HOT ROLLED SECTIONS SHALL BE GRADE 300 MATERIAL U.N.O. AND POWER BRUSHED TO ST2 AND PRIMED WITH AN APPROVED METAL PROTECTIVE COATING.
- S.3. ALL STEEL POSTS TO BE HOT DIPPED GALVANISED - GRADE 350. ALL PENETRATIONS IN POST TO BE SELF TAPPING SCREWS ONLY. ANY RE-DRILLED HOLES TO BE COATED WITH ZINC OR COPPER BASED PRIMER FOR CORROSION PROTECTION AND COLD GAL SPRAYED.
- S.4. BOLTS NOMINATED BY DIAMETER, ULTIMATE STRENGTH AND METHOD OF TIGHTENING (EG M12 4.6/S = 12mmØ, COMMERCIAL BOLT, SNUG TIGHT).
- S.5. ALL BOLTS TO BE INSTALLED WITH ONE HARDENED WASHER UNDER THE TURNED PART. (SEE AS 1720.1 SECTION 4)
- S.6. ALL EXTERNAL STEEL MEMBERS AND COMPONENTS INCLUDING BOLTS AND WASHERS TO BE HOT DIPPED GALVANISED OR S/S 316 AS NOMINATED. DIS-SIMILAR METALS TO BE SEPARATED.

REINFORCEMENT NOTES:

- R.1. ALL STEEL REINFORCEMENT SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE RELEVANT CURRENT AUSTRALIAN STANDARD CODES (AS 3600 & AS 4671).
 - R.2. REINFORCEMENT IS PRESENTED DIAGRAMMATICALLY. IT IS NOT NECESSARILY SHOWN IN TRUE PROJECTION.
 - R.3. SPACEMENT OF SUFFICIENT "STOOLS" UNDER MAIN REINFORCEMENT BAR(S) AND TOP CROSS BAR IN SLABS TO ALLOW ADEQUATE SUPPORT IN CORRECT POSITION DURING CONCRETING (BUT NOT GENERALLY GREATER THAN 900mm SPACINGS).
- REINFORCEMENT SYMBOLS:
 N GRADE 500 MPa DEFORMED BAR
 SL GRADE 500 MPa DEFORMED SLAB MESH
 Y GRADE 410 MPa DEFORMED BAR
 S GRADE 250 MPa DEFORMED BAR - POOLS CONSTRUCTION
 R GRADE 250 MPa PLAIN BAR

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REV	DATE	DESCRIPTION	BY	CHKD	DRAWING DETAILS	SCALE	APPROVED	<p>Barlow Shelley CONSULTING ENGINEERS</p> <p>p 07 5443 8285 e office@barlowshelley.com.au W www.barlowshelley.com.au a PO Box 899 Maroochydore 4558 ABN 89 215 591 077</p>	PROJECT: CONCRETE SLEEPER WALL LANDSCAPE WALL < 1M HIGH GUMNUT CONCRETE PRODUCTS		JOB NUMBER 2052		
1	01-07-20	PRELIMINARY FOR COMMENT	DK	DK	DATUM	 DANIEL KENNA (RPEQ 15522) DRAWING STATUS CONSTRUCTION					SHEET: 1 OF 4	
2	06-08-20	CONSTRUCTION	DK	DK									
3	13-08-20	ADDED 900mm SLEEPER SPECIFICATION	DK	DK	DESIGN DK								
					DRAWN DK								
					DESIGN CHECK DK						DRAWING NUMBER S01	REV 3	
					DATE 01-07-20				DRAWING TITLE: GENERAL CONSTRUCTION NOTES				

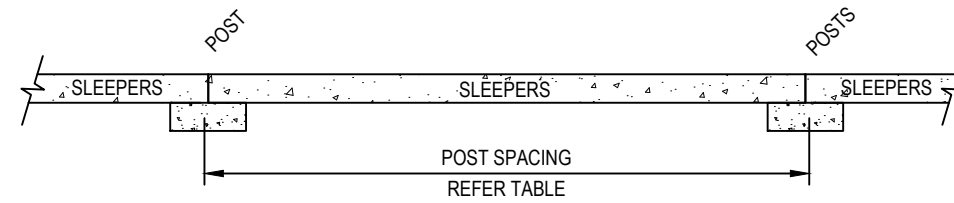
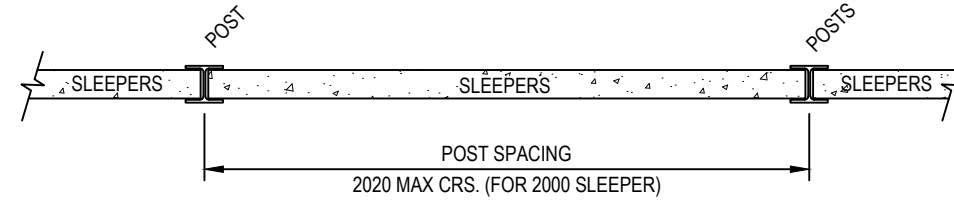


Ø450mm BORED PIER FOOTING DEPTH - D (m) WITH LEVEL BACKSLOPE

WALL HEIGHT-H (m)	POST SPACING (m)			
	2.0	1.5	1.2	0.9
1.0	1.6	1.4	1.3	1.2
0.8	1.4	1.2	1.1	1.0
0.7	1.2	1.1	1.0	0.9
0.2-0.6	1.1	0.9	0.8	0.7

Ø450mm BORED PIER FOOTING DEPTH - D (m) WITH 1V:4H BACKSLOPE

WALL HEIGHT-H (m)	POST SPACING (m)			
	2.0	1.5	1.2	0.9
1.0	1.6	1.5	1.4	1.4
0.8	1.5	1.4	1.2	1.1
0.7	1.4	1.2	1.1	1.0
0.2-0.6	1.2	1.1	1.0	0.9

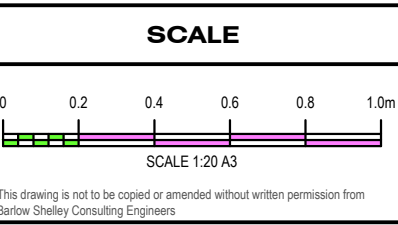


CONCRETE POST MAXIMUM SPACING

WALL HEIGHT-H (m)	POST SPACING (m)	BACKSLOPE
0.8	0.9	1V:4H
0.7	1.2	1V:4H
0.6	1.5	1V:4H
0.2 - 0.5	2	1V:4H
1.0	0.9	FLAT
0.8	1.2	FLAT
0.7	1.5	FLAT
0.2-0.6	2.0	FLAT

TABLE ABOVE BASED ON 200x75 N50 CONCRETE POST WITH 2/N12 CENTRAL REINFORCING. CAST POST 600mm MIN. INTO FOOTING TYPICAL.

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					DRAWN
					DESIGN CHECK
					DATE



APPROVED

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DANIEL KENNA
(RPEQ 15522)

DRAWING STATUS
CONSTRUCTION

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PROJECT:
CONCRETE SLEEPER WALL LANDSCAPE WALL < 1M HIGH
GUMNUT CONCRETE PRODUCTS

Gumnut Concrete Products
Building Unique Landscapes

JOB NUMBER
2052

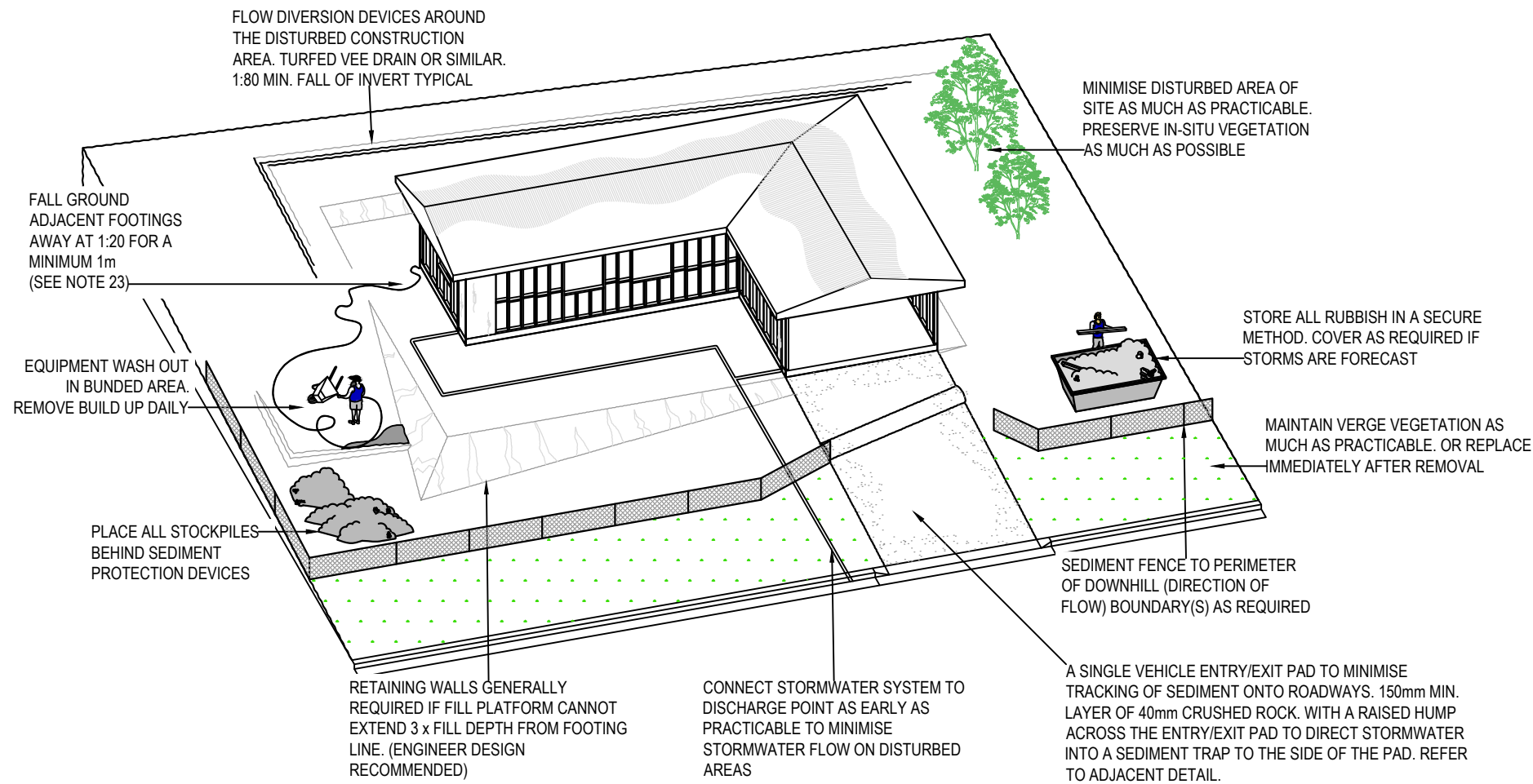
SHEET: 2 OF 4

DRAWING TITLE:
FOOTINGS & SLABS LAYOUT PLAN

DRAWING NUMBER
S02

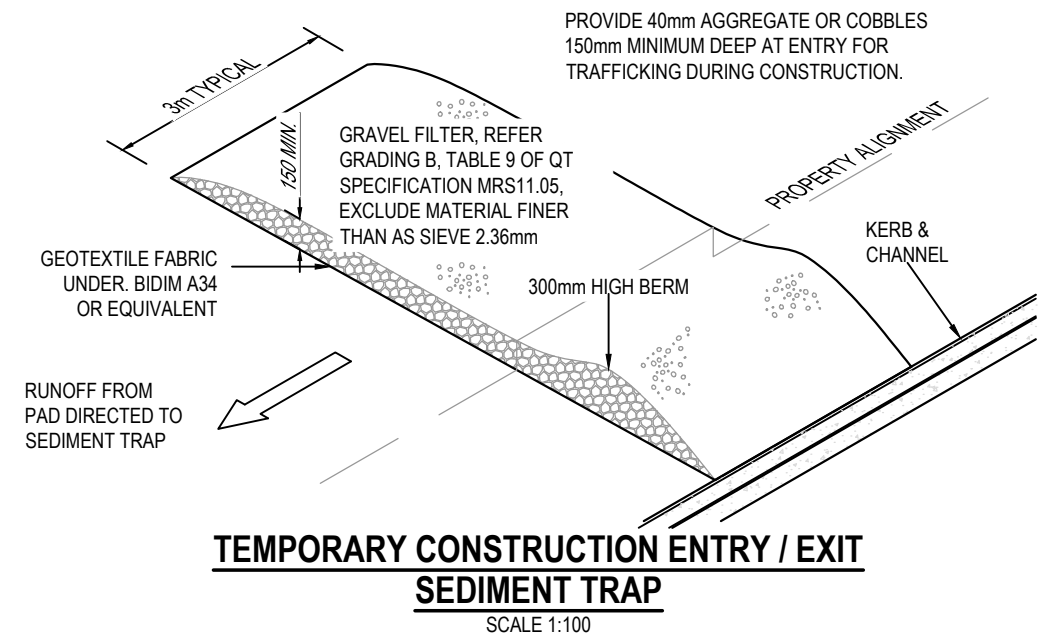
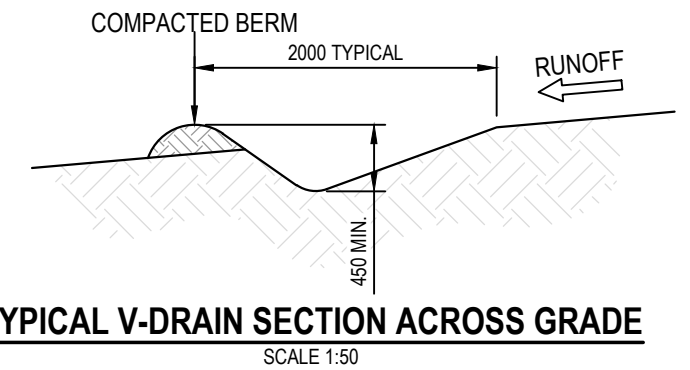
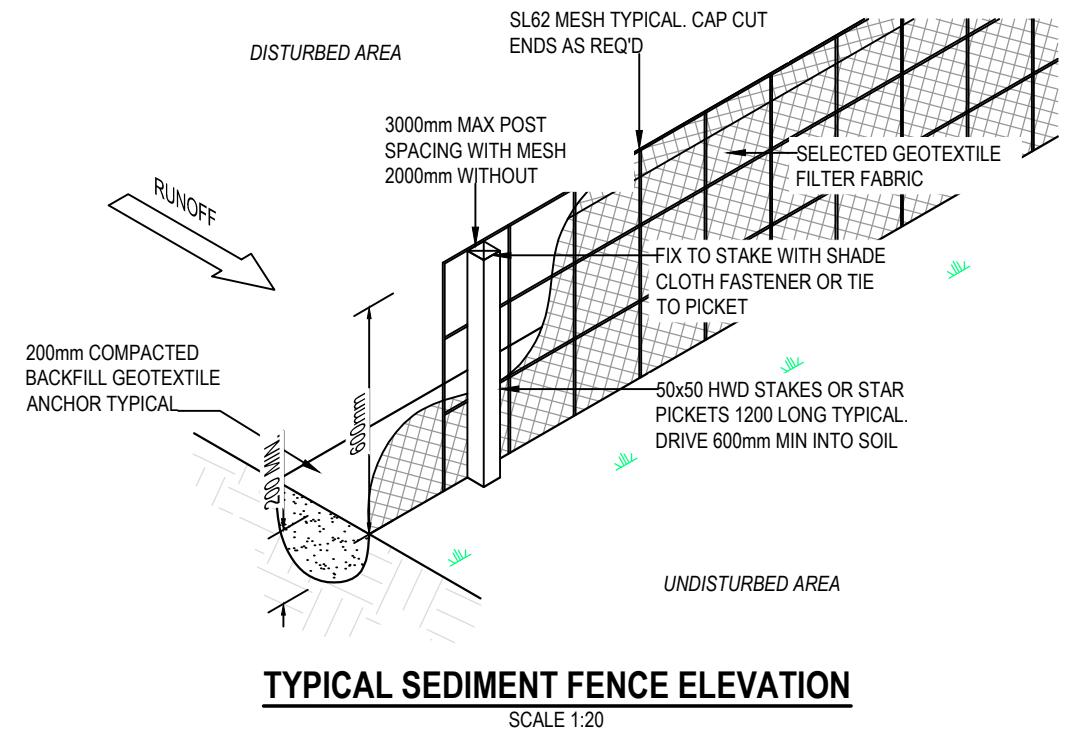
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RESIDENTIAL SITE DRAINAGE, EROSION & SEDIMENT CONTROL BEST PRACTICES

- ALL SEDIMENT FENCES ARE TO BE INSTALLED PRIOR TO COMMENCEMENT OF EARTHWORKS IF RAIN IS POSSIBLE WHILE EARTHWORKS ARE OCCURRING.
- PRIOR TO COMMENCING EXCAVATIONS, TOPSOIL MUST BE STRIPPED FROM THE DESIGNATED AREA AND STOCKPILED ON SITE FOR LATER USE.
- IMMEDIATELY FOLLOWING THE COMPLETION OF BULK EARTHWORKS, ALL DISTURBED AREAS OUTSIDE THE FOOTPRINT OF THE BASE SLAB (IF A BASE SLAB IS USED, OTHERWISE ALL DISTURBED AREAS) TO BE MULCHED (MINIMUM 50mm) OR OTHERWISE STABILISED AGAINST SOIL EROSION.
- DESIGNATED EARTH BATTERS ARE TO BE STABILISED, AS DIRECTED ON THE PLANS, IMMEDIATELY AFTER BULK EARTHWORKS HAVE BEEN COMPLETED ON THE SITE.
- APPROPRIATE BUILDING WASTE RECEPTORS MUST BE LOCATED ON THE SITE AND SUITABLY MAINTAINED DURING THE BUILDING PHASE.
- ALL GROUND-COVER VEGETATION OUTSIDE THE IMMEDIATE BUILDING AREA SHALL BE PRESERVED DURING THE BUILDING PHASE.
- DAMAGE TO THE ROAD RESERVE (I.E. FOOTPATH) VEGETATION IS TO BE MINIMISED AND REPAIRED AS SOON AS PRACTICABLE AT THE BUILDER'S EXPENSE.
- NO MATERIALS ARE TO BE STOCKPILED OUTSIDE THE PROPERTY BOUNDARIES BEYOND THE END OF A WORKING DAY.
- SOIL AND SAND STOCKPILES ARE TO BE COVERED IF STRONG WINDS ARE FORECAST THAT COULD DISPLACE THE MATERIAL FROM THE SITE.
- STOCKPILES OF EARTH ARE TO BE COVERED WITH AN IMPERVIOUS COVER IF RAIN IS FORECAST.
- THE SITE'S UNDERGROUND STORMWATER DRAINAGE SYSTEM IS TO BE INSTALLED AND OPERATIONAL PRIOR TO THE ROOF BEING LAID.
- ROOF WATER DOWNPIPES (TEMPORARY OR PERMANENT) ARE TO BE CONNECTED TO THE STORMWATER DRAINAGE SYSTEM IMMEDIATELY AFTER THE ROOF AND GUTTERING ARE LAID.
- ALL TEMPORARY DRAINAGE AND SEDIMENT CONTROL MEASURES ARE TO REMAIN FUNCTIONAL DURING THE BUILDING PHASE.
- ALL EROSION AND SEDIMENT CONTROL STRUCTURES ARE TO BE INSPECTED EACH WORKING DAY AND MAINTAINED IN PROPER WORKING ORDER AT ALL TIMES.
- SEDIMENT IS TO BE REMOVED FROM UP-SLOPE OF EACH SEDIMENT TRAP (E.G. SEDIMENT FENCE) IMMEDIATELY AFTER RAINFALL IF THE DEPTH OF SEDIMENT EXCEEDS 200mm.
- EXCESSIVE SEDIMENT DEPOSITION ON THE ROCK ENTRY/EXIT PAD IS TO BE REMOVED.
- ADDITIONAL ROCK SHALL BE APPLIED TO THE ROCK ENTRY/EXIT PAD AS NECESSARY TO MAINTAIN ITS FUNCTIONALITY.
- ALL SEDIMENT DEPOSITED OFF THE SITE AS A RESULT OF WORK-RELATED ACTIVITIES IS TO BE COLLECTED AND DISPOSED OF IN A MANNER THAT WILL PREVENT ANY SAFETY OR EROSION HAZARD.
- BRICK, TILE AND MASONRY CUTTING MUST BE CARRIED OUT ON A PVIOUS SURFACE, SUCH AS GRASS, OR OPEN SOIL, OR IN SUCH A MANNER THAT ALL SEDIMENT-LADEN RUN-OFF IS PREVENTED FROM DISCHARGING INTO A GUTTER, DRAIN, OR WATER BODY.
- WASHING/FLUSHING OF SEALED ROADWAYS MUST ONLY OCCUR WHERE SWEEPING HAS FAILED TO REMOVE SUFFICIENT SEDIMENT AND THERE IS A COMPELLING NEED TO REMOVE THE REMAINING SEDIMENT (E.G. FOR SAFETY REASONS). IN SUCH CIRCUMSTANCES, EXERCISE ALL REASONABLE AND PRACTICABLE SEDIMENT CONTROL.
- MEASURES MUST BE USED TO PREVENT, OR AT LEAST MINIMISE, THE RELEASE OF SEDIMENT INTO RECEIVING WATERS. ONLY THOSE MEASURES THAT WILL NOT CAUSE SAFETY AND PROPERTY FLOODING ISSUES SHALL BE EMPLOYED. SEDIMENT REMOVED FROM ROADWAYS MUST BE DISPOSED OF IN A LAWFUL MANNER THAT DOES NOT CAUSE ONGOING SOIL EROSION OR ENVIRONMENTAL HARM.
- IF GROUNDWATER IS ENCOUNTERED OR THE SITE IS KNOWN TO HAVE A HISTORY OF GROUNDWATER PROBLEMS, A SUB-SURFACE RUBBLE DRAIN WITH SLOTTED AGRICULTURAL PIPE WILL BE REQUIRED. THE DRAIN IS TO HAVE A MINIMUM DEPTH OF 1200mm OR TO THE MAXIMUM DEPTH OF FILL.
- BUILDING PLATFORM TO FALL AWAY FROM HOUSE AT 1 IN 20 MINIMUM. IF FALL IS TO BE ACHIEVED BY PLACING TOPSOIL AFTER THE FOOTINGS ARE CONSTRUCTED, OVER EXCAVATE THESE AREAS AS REQUIRED TO COMPLY WITH LOCAL AUTHORITY REQUIREMENTS REGARDING DIFFERENCE BETWEEN SLAB HEIGHT AND FINISHED GROUND LEVEL (GENERALLY 225mm MINIMUM).



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1	01-07-20	PRELIMINARY FOR COMMENT	DK	DK	DATUM	AS NOTED	DANIEL KENNA (RPEQ 15522)
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PROJECT: CONCRETE SLEEPER WALL LANDSCAPE WALL < 1M HIGH GUMNUT CONCRETE PRODUCTS

DRAWING TITLE: RESIDENTIAL EROSION & SEDIMENT CONTROL GUIDELINES

Gumnut Concrete Products Building Unique Landscapes

JOB NUMBER: 2052

SHEET: 3 OF 4

DRAWING NUMBER: S03

REV: 3

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