

## SOAKWELL SOLUTION

Stormwater Calculations in accordance with Geotechnical Advice

Site Area = xx,xxx m<sup>2</sup>  
 Development Impervious Area = 15,545 m<sup>2</sup>  
 Runoff Coefficient = 0.90  
 Equivalent Impervious Area = 13,990 m<sup>2</sup>

Permeability rate recommended by the geotechnical consultant = 5m/day  
 Intensity at 5% AEP of 24 hour duration = 4.3mm/hr

### Required Storage

Q = CIA/3600  
 = 0.90 x 4.3 x 15,545 / 3600  
 = 16.71 l/s x 24 hours  
 = 1,443.82 m<sup>3</sup>

### Provided Storage

Ground Level = RL 34.0 AHD  
 Soakwell Depth = 1.80m  
 Base of Soakwell = RL 32.0 AHD  
 Groundwater Level = RL 10.0 AHD  
 Clearance to Groundwater = 22.0m

Volume of a dia 1800mm x 1800mm deep soakwell = 4.58m<sup>3</sup>  
 Infiltration of a dia 1800mm x 1800mm deep soakwell  
 = πr<sup>2</sup> + 2πrh@25%  
 = πx0.9x0.9 + 2πx0.9x1.8x0.25  
 = 2.54+2.54  
 = 5.08m<sup>3</sup> of permeability area  
 Infiltration achieved for one soakwell  
 = 5.08m<sup>3</sup> @ 5m/day  
 = 25.40m<sup>3</sup>/day of infiltration

Soakwell capacity over 24 hours = volume + infiltration = 29.98m<sup>3</sup> per day

No. of Soakwells Required  
 = 1,443.82 / 29.98  
 = 48.16  
 = 49 soakwells of dia 1800 x 1800 depth required.

Volume Provided = 224.42 m<sup>3</sup>

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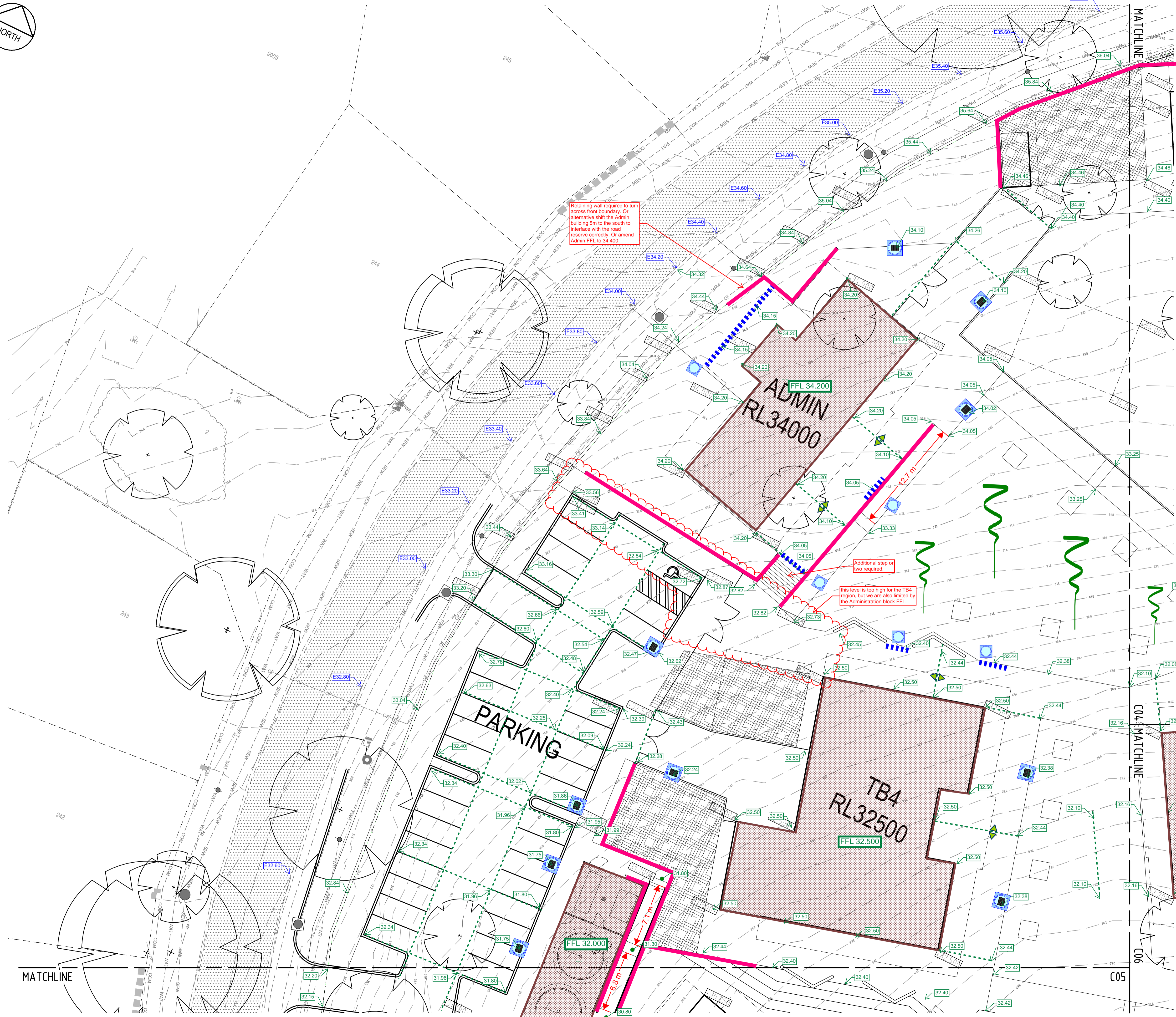
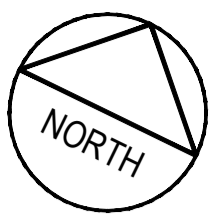
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Retaining wall required to turn across front boundary. Or alternative shift the Admin building 5m to the south to interface with the road reserve correctly. Or amend Admin FFL to 34.400.

Additional step or two required.

This level is too high for the TB4 region, but we are also limited by the Administration block FFL.

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FFL 32.200  
engineering consultants

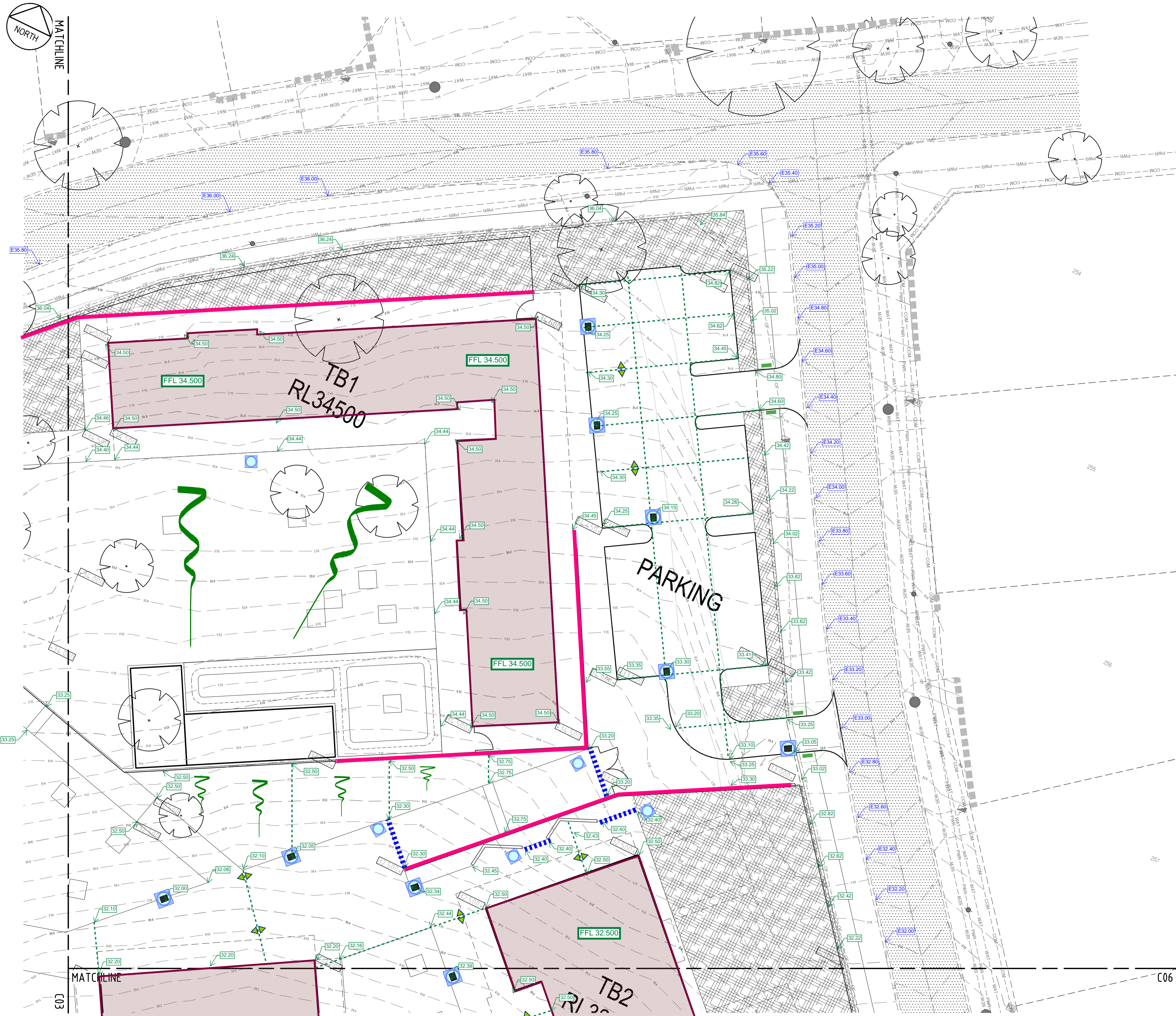
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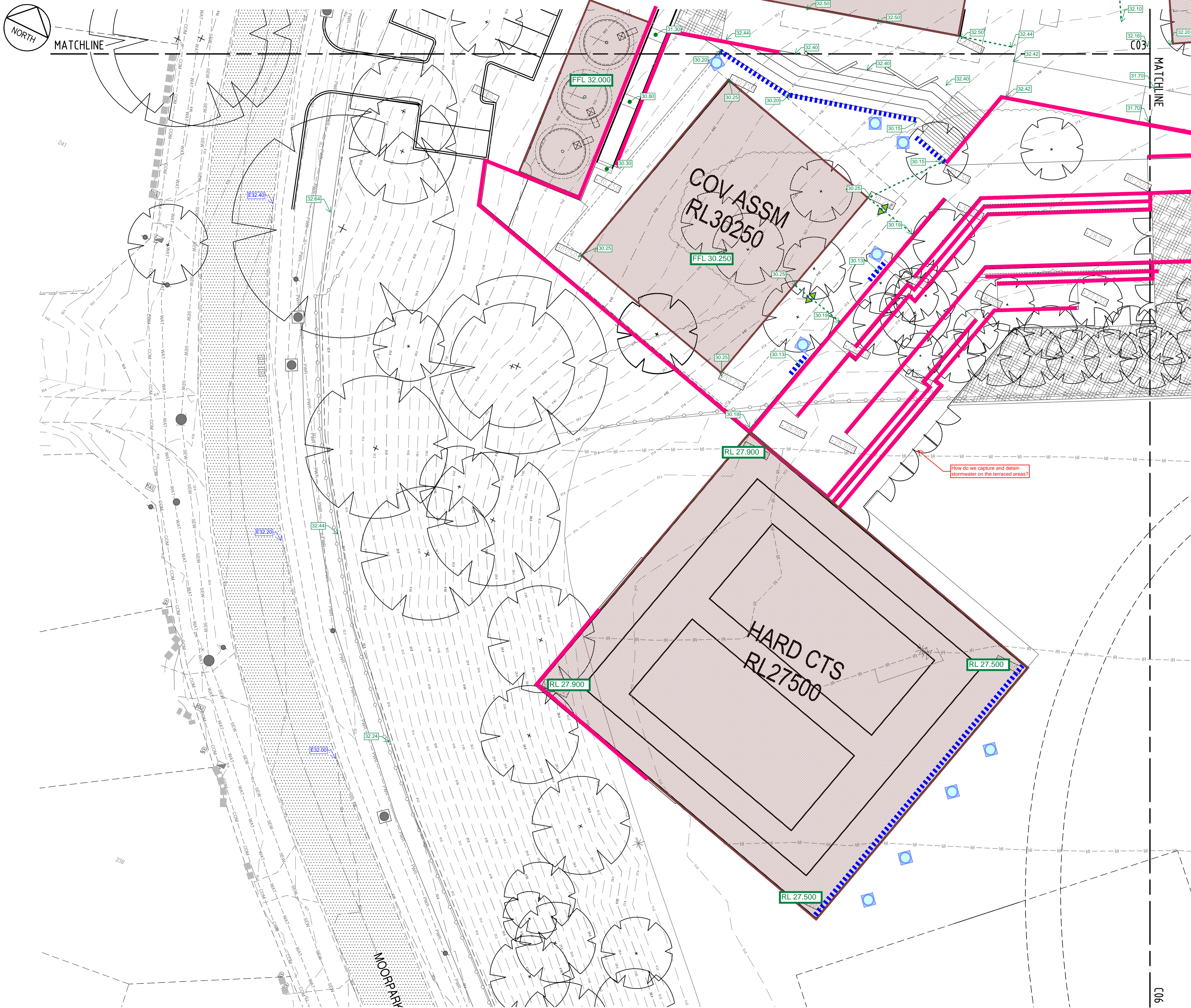


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NORTH

MATCHLINE

241

238

MOORPARK

FFL 32.000

FFL 30.250

RL 27.900

RL 27.500

COV ASSM  
RL30250

HARD CTS  
RL27500

How do we capture and detain stormwater on the terraced areas?

MATCHLINE

C03

C06

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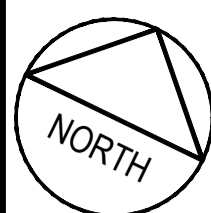


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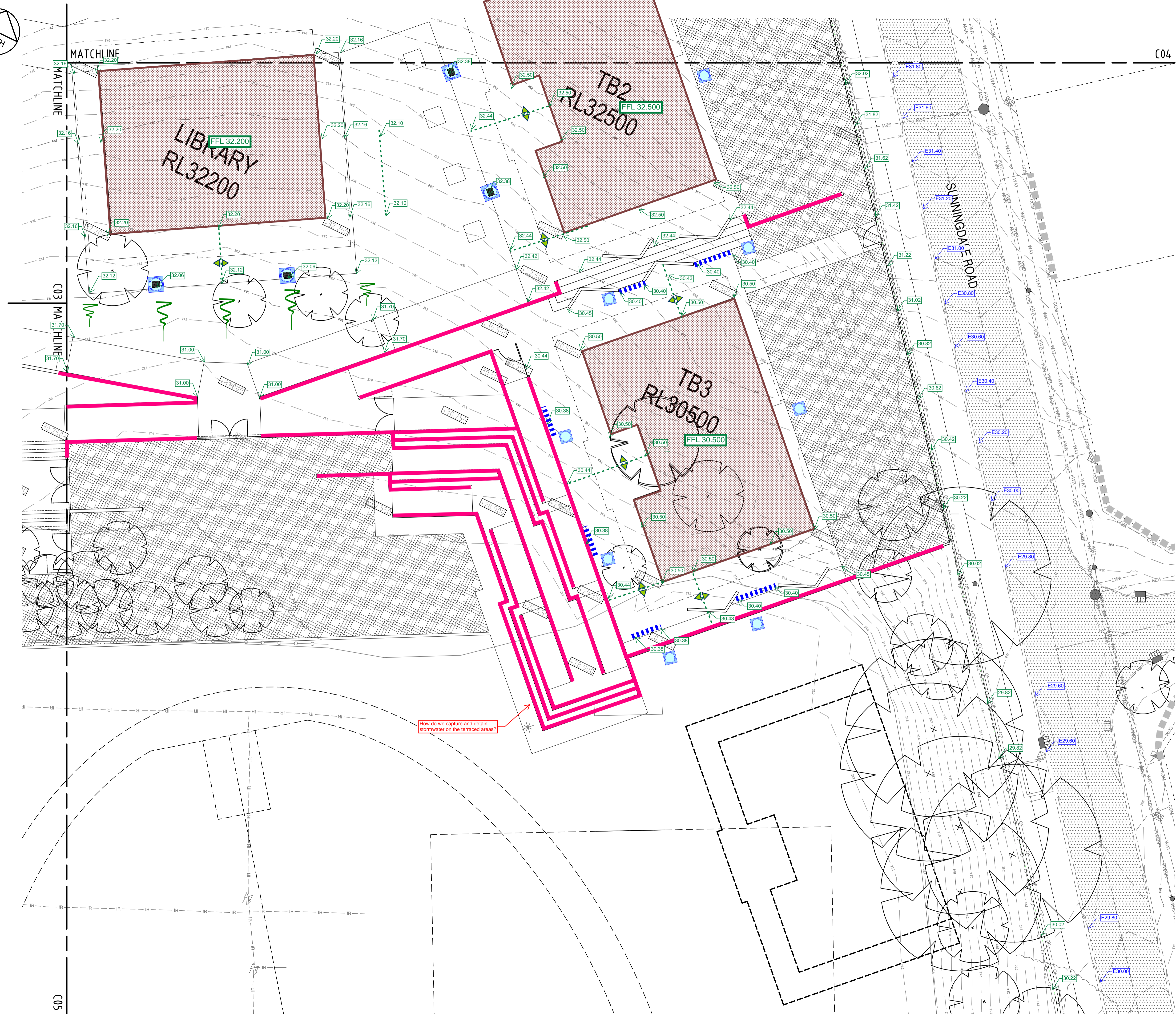
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C04



How do we capture and detain stormwater on the terraced areas?

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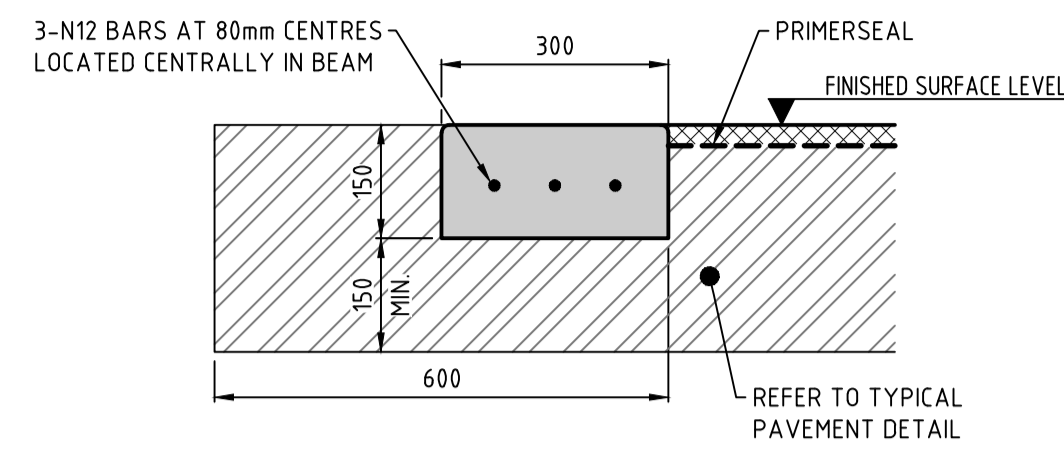
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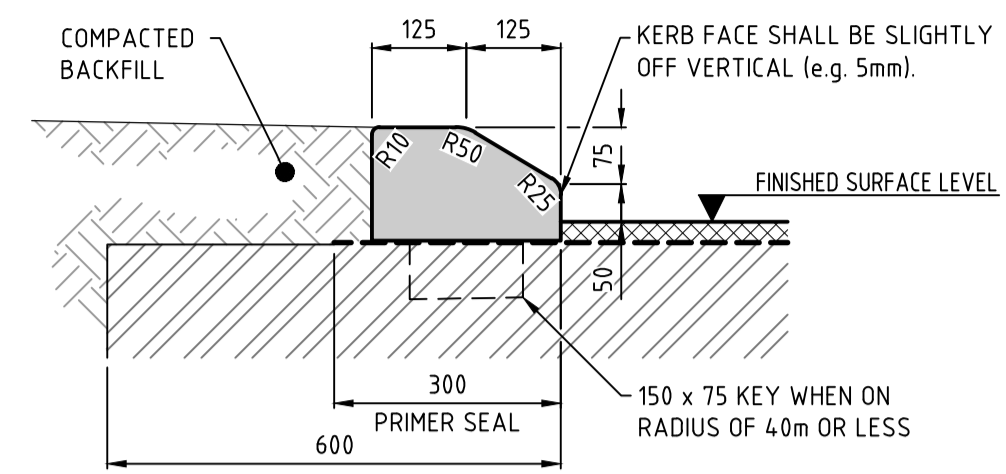






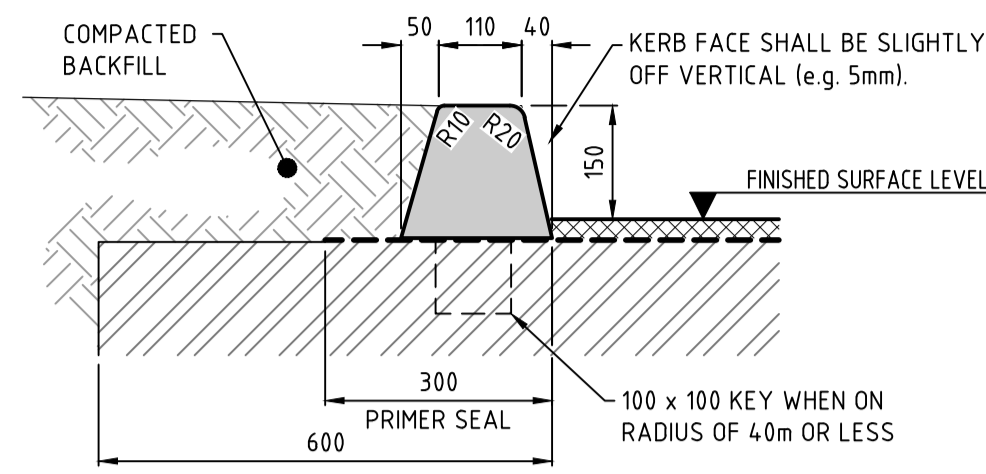
**TYPICAL FLUSH KERB DETAIL**

SCALE 1:10 0m 200mm 400mm  
NOTE: ALL RADII ARE 10mm U.S.O.



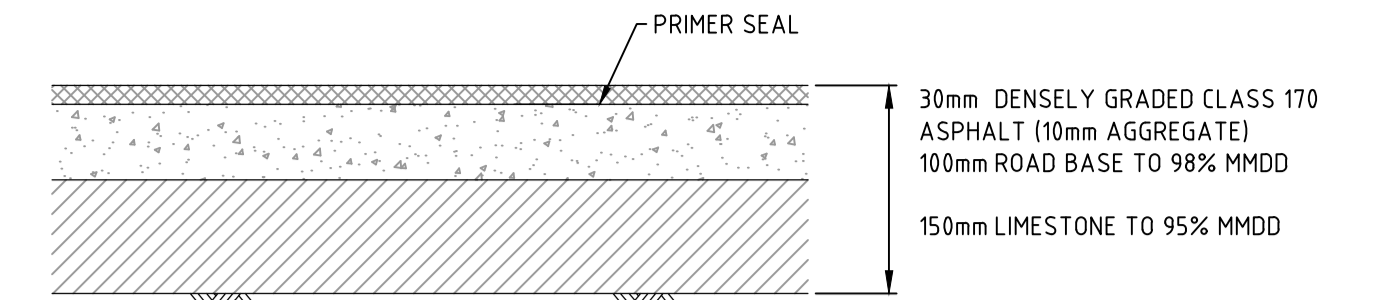
**TYPICAL SEMI-MOUNTABLE KERB DETAIL**

SCALE 1:10 0m 200mm 400mm



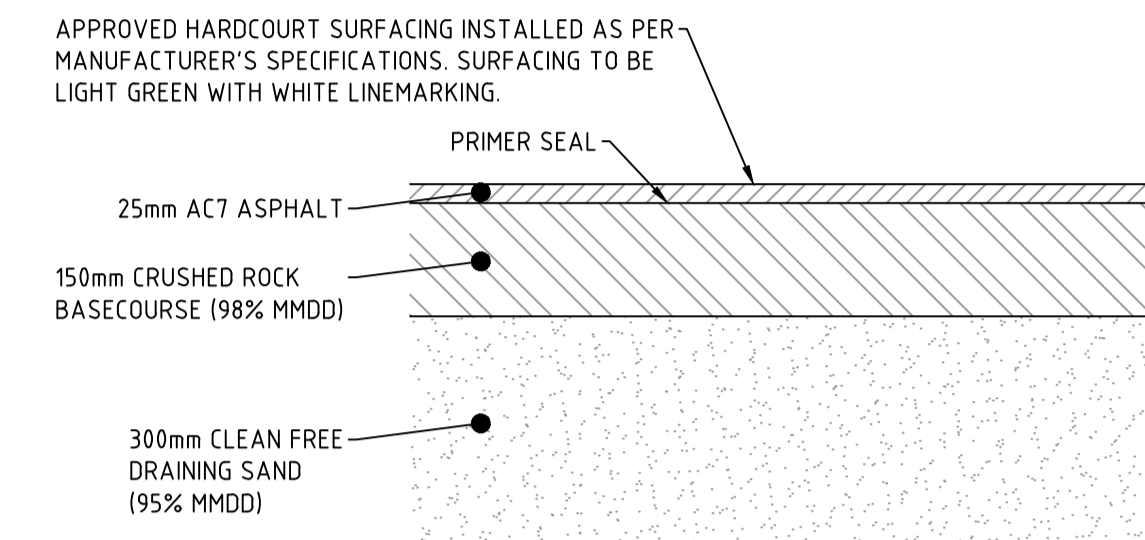
**TYPICAL BARRIER KERB DETAIL**

SCALE 1:10 0m 200mm 400mm



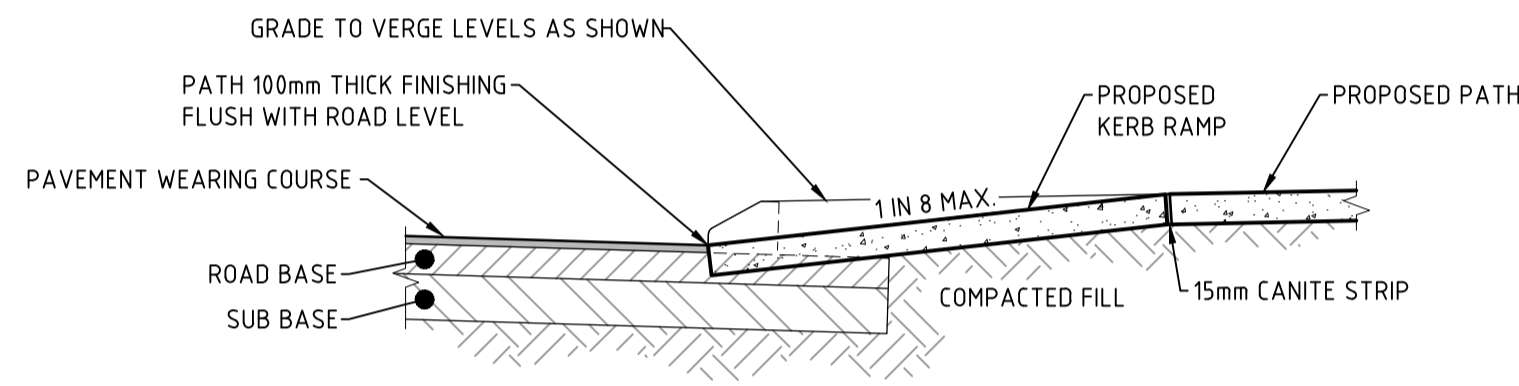
**TYPICAL ASPHALT PAVEMENT DETAIL**

SCALE 1:10 0m 200mm 400mm



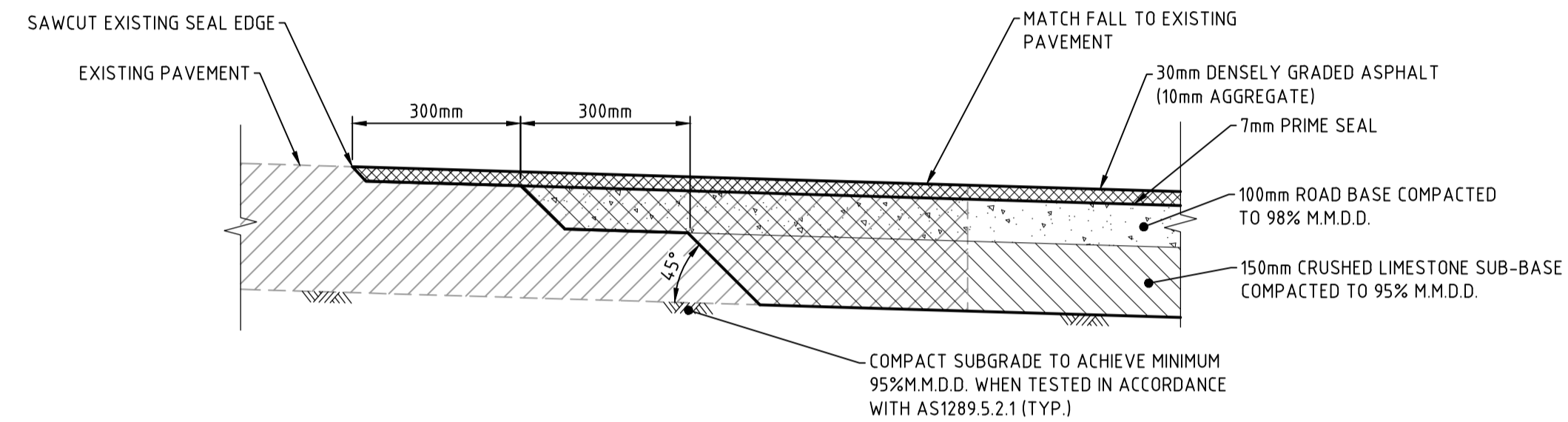
**TYPICAL SPORT COURT PAVEMENT DETAIL**

SCALE 1:10 0m 200mm 400mm



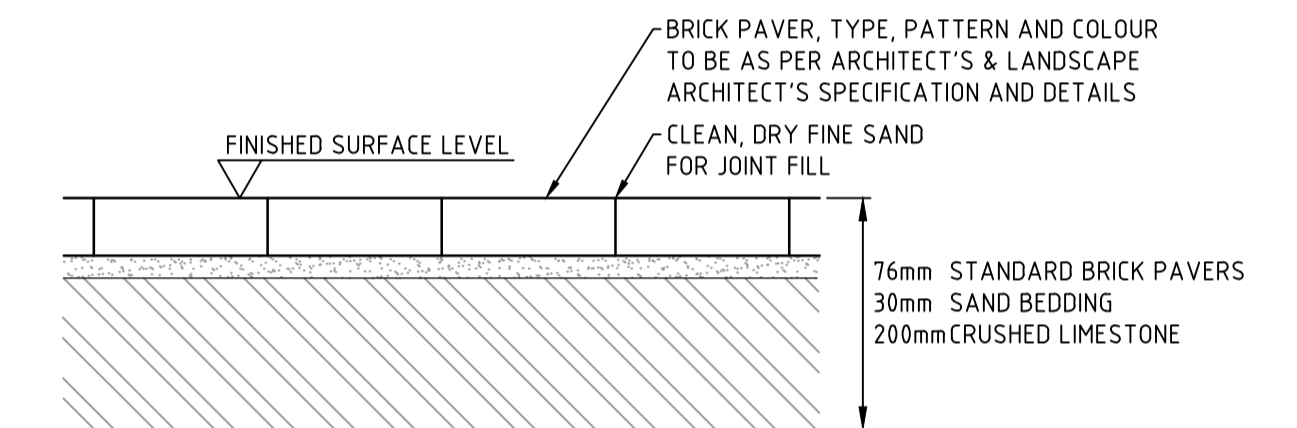
**SECTION A**

SCALE 1:25 0m 250mm 500mm



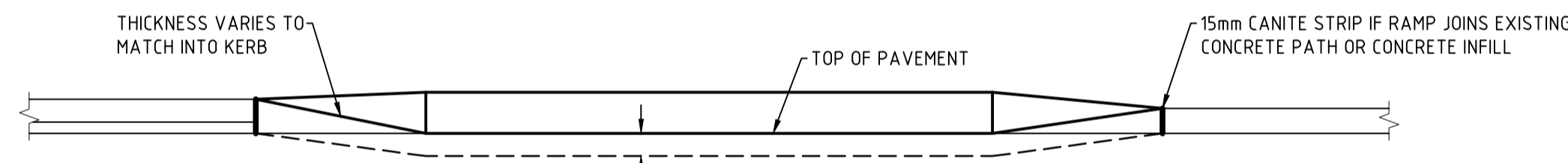
**TYPICAL SAW CUT DETAIL**

SCALE 1:10 0m 200mm 400mm



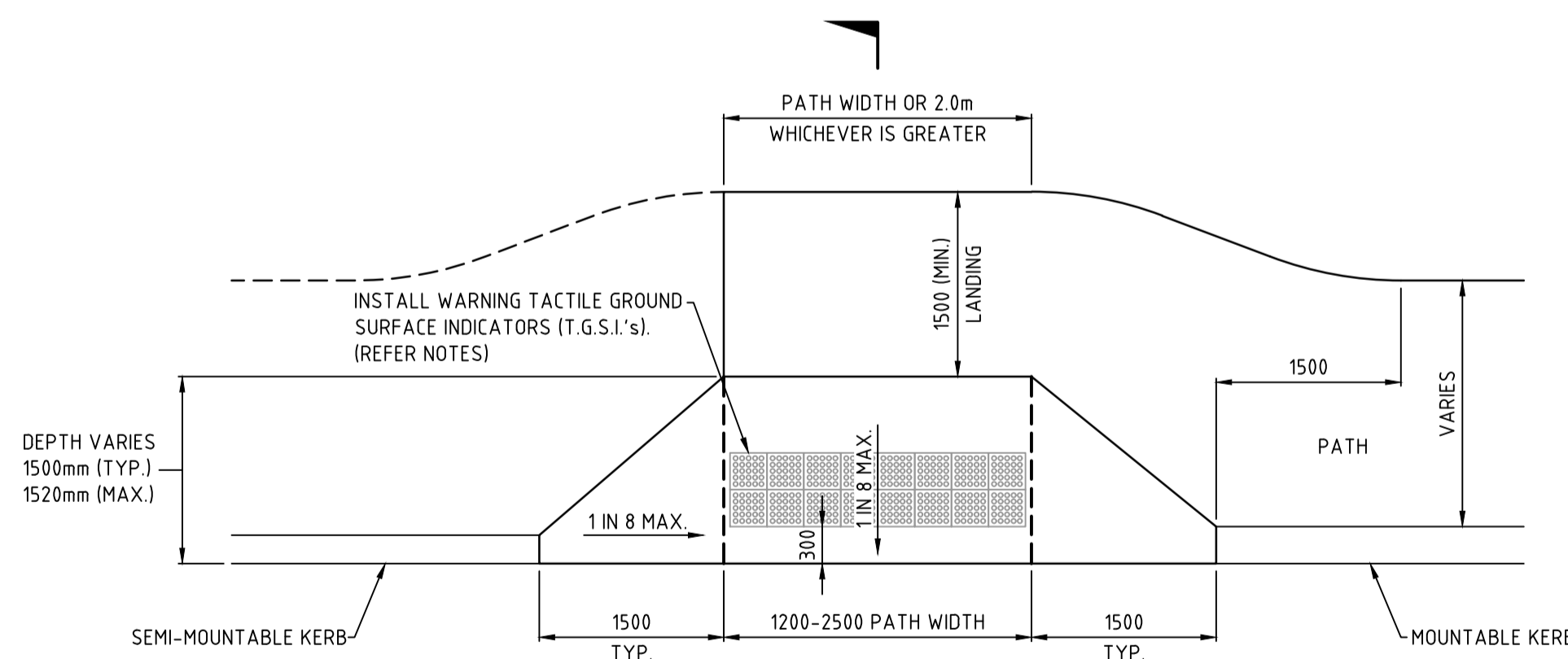
**TYPICAL BRICK PAVING DETAIL**

SCALE 1:10 0m 200mm 400mm



**FRONT ELEVATION**

SCALE 1:25 0m 0.5m 1.0m

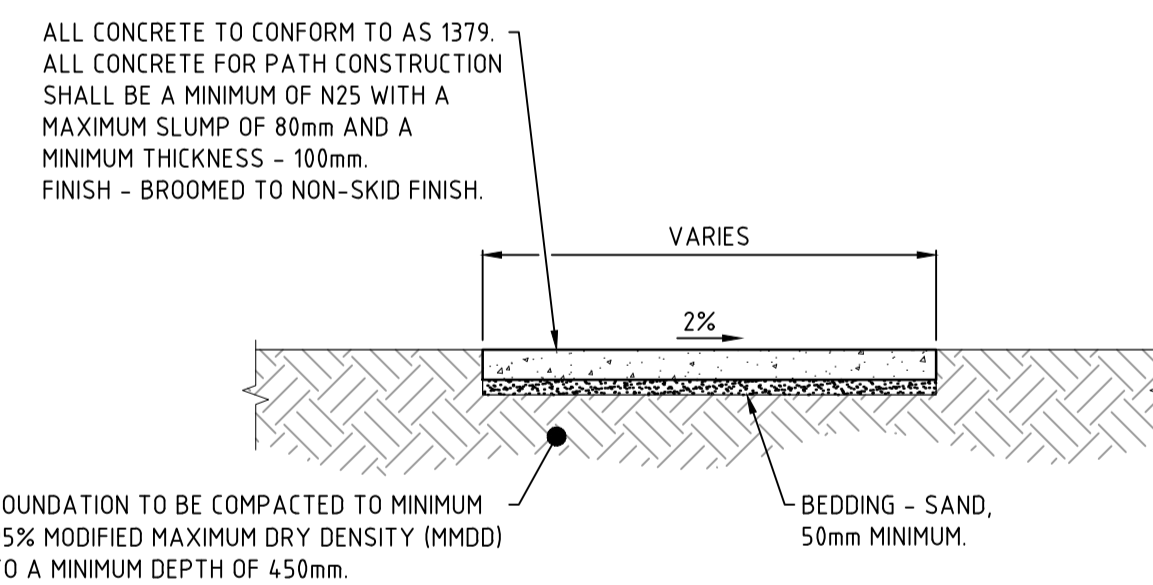


**PLAN**

**TYPICAL INTERNAL "TYPE A" KERB RAMP DETAIL**

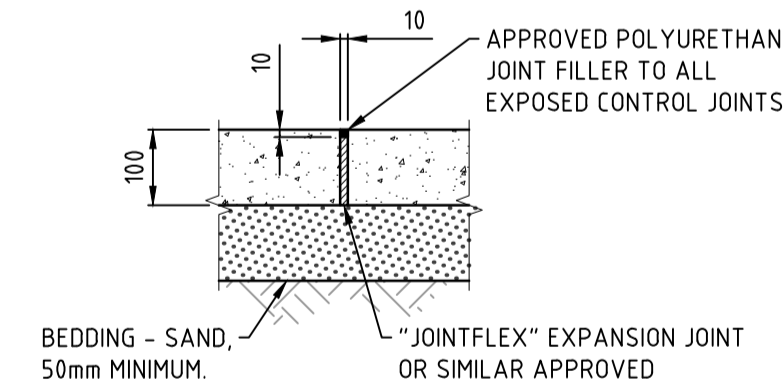
SCALE 1:50 0m 1m 2m

- NOTES**
- TACTILE GROUND SURFACE INDICATORS (T.G.S.I.'s) SHALL BE IN ACCORDANCE WITH AS1428.1 AND AS1428.4.
  - CONTRACTOR TO INSTALL 24 ROWS OF TERRACOTTA WARNING T.G.S.I.'s (ADHESIVE TYPE) FOR FULL WIDTH OF CONCRETE KERB RAMP.
  - WARNING T.G.S.I.'s ARE NOT TO BE CUT. CONTRACTOR SHALL SELECT SUITABLE SIZE TO EXTEND ACROSS FULL WIDTH OF KERB RAMP (EXCLUDING SPLAYS).
  - WHERE THE KERB RAMP IS CONSTRUCTED USING BLOCK PAVERS, THE CONTRACTOR SHALL INSTALL T.G.S.I. PAVERS IN A CONTRASTING COLOUR CONFORMING WITH AS1428.4 LUMINANCE REQUIREMENTS.



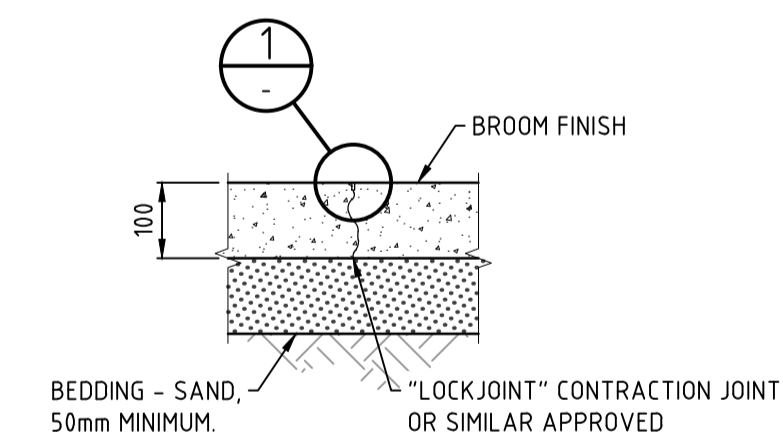
**CONCRETE PATH SECTION**

SCALE 1:25 0m 0.5m 1.0m



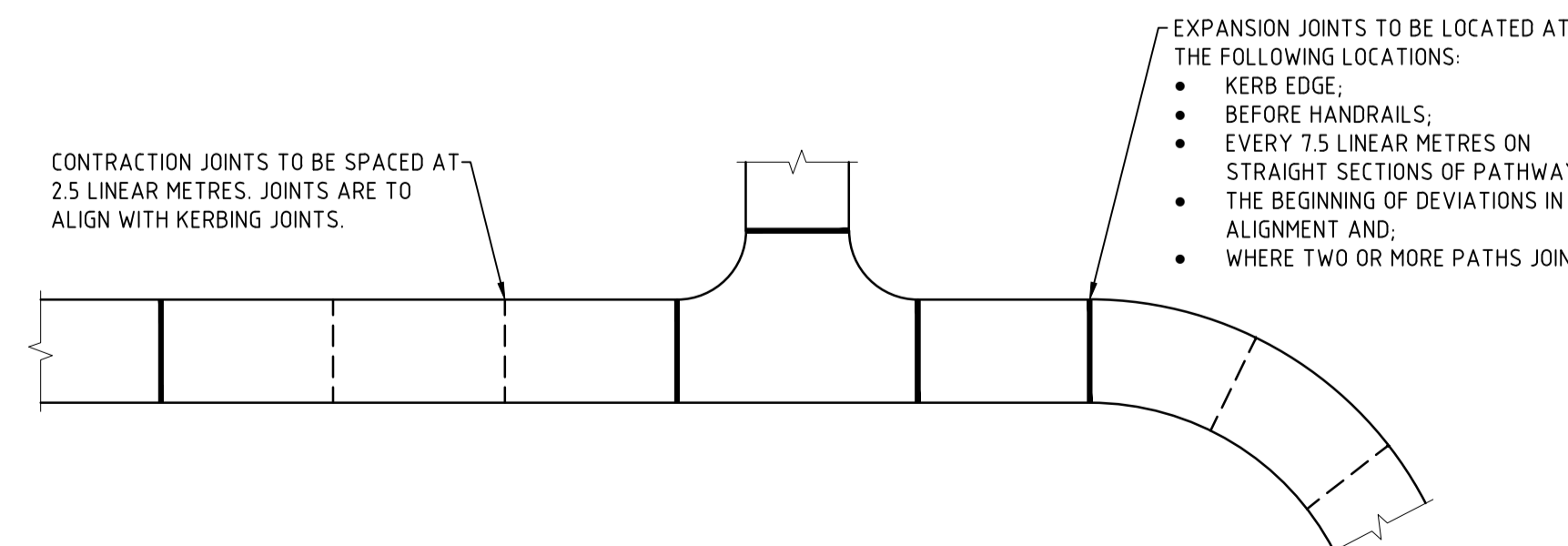
**EXPANSION JOINT**

SCALE 1:10 0m 200mm 400mm



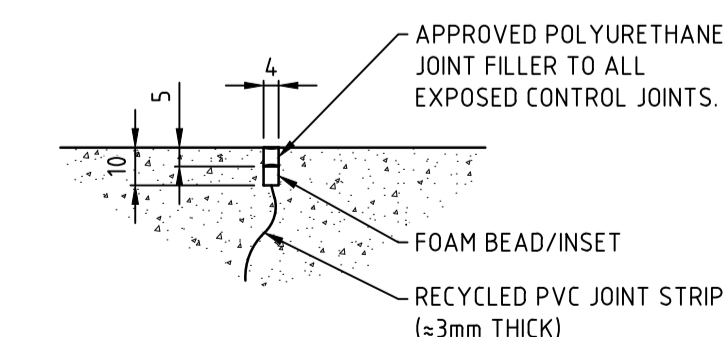
**CONTRACTION JOINT**

SCALE 1:10 0m 200mm 400mm



**TYPICAL CONCRETE PATH PLAN**

SCALE 1:100 0m 2m 5m



**DETAIL 1**

SCALE 1:2 0m 20mm 40mm

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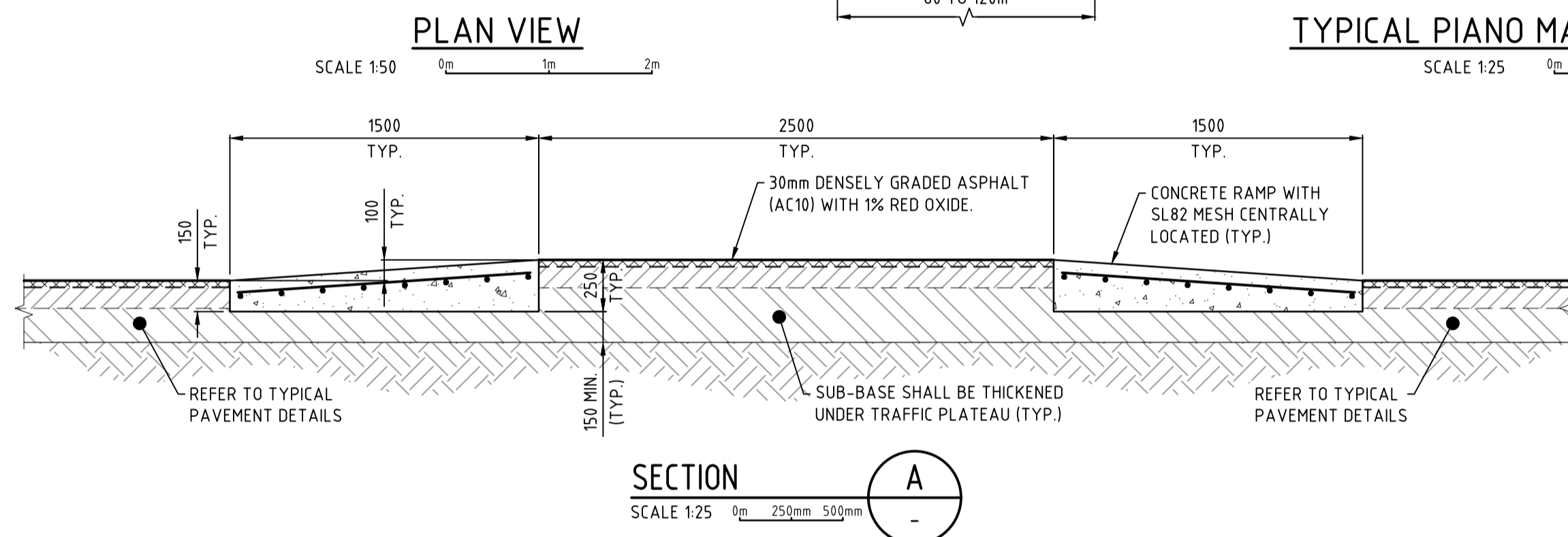
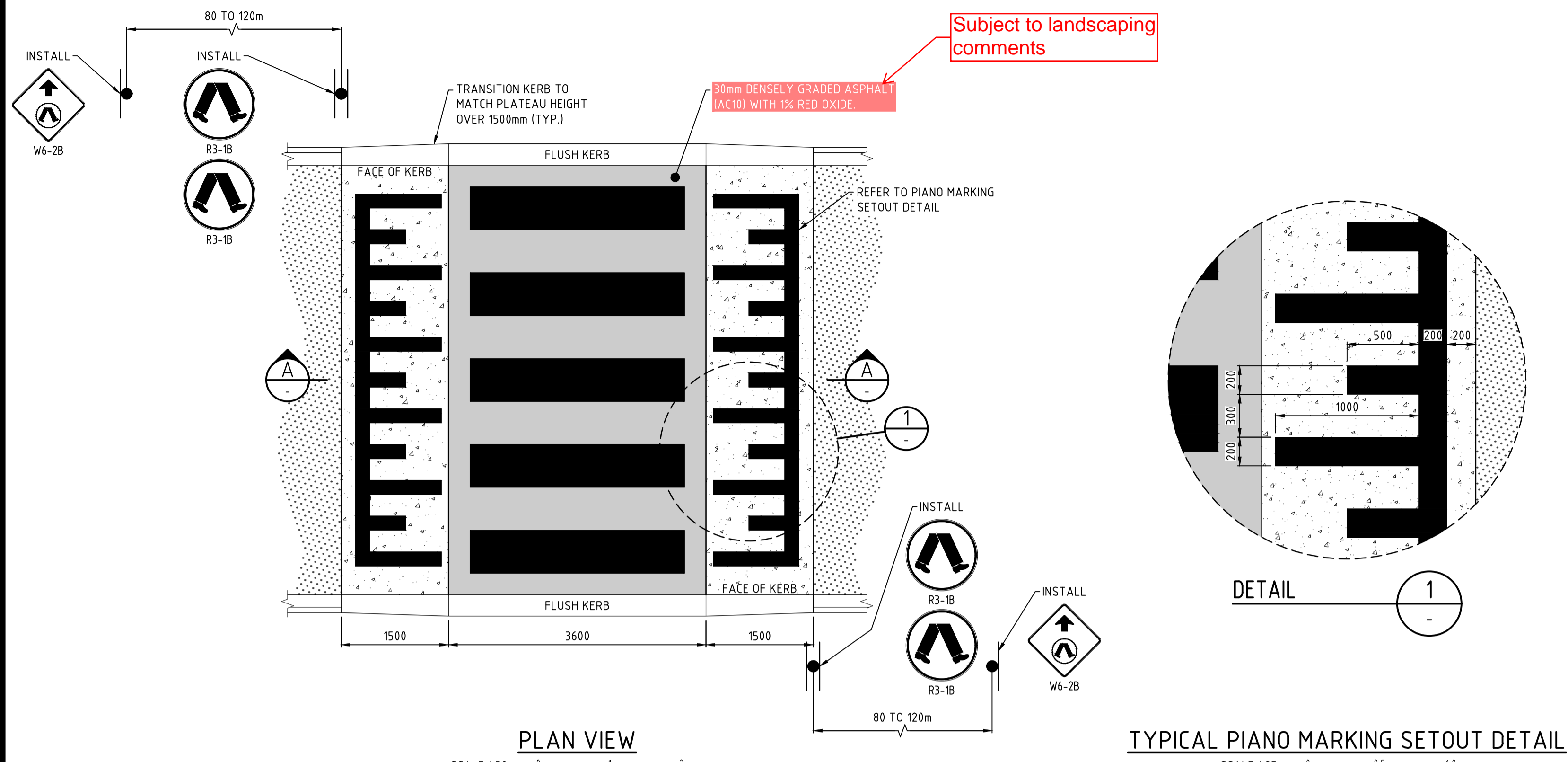
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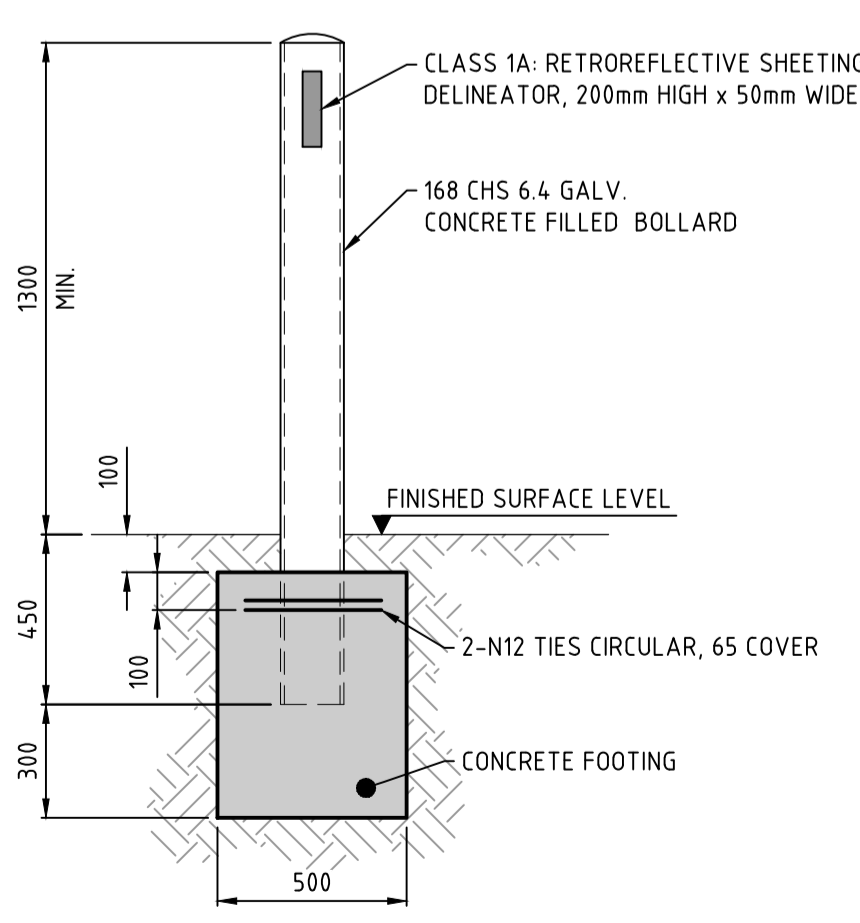
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**WOMBAT CROSSING SPEED HUMP**

- NOTES**
1. THE PIANO PAVEMENT MARKING SHALL BE INSTALLED IN ACCORDANCE WITH AS1742.13
  2. IF A CONTRASTING PAVEMENT MATERIAL IS USED SUCH THAT THE HUMP IS CLEARLY VISIBLE UNDER ALL CONDITIONS, THE PIANO PAVEMENT MARKING MAY BE OMITTED
  3. THE WARNING SIGNS SHALL BE MANUFACTURED AND INSTALLED IN ACCORDANCE WITH AS1742 AND MAINROADS W.A. DRG: 200331-129
  4. THE PLATEAU SPEED HUMP SHOWN IS NOT SUITABLE FOR USE ON BUS ROUTES. IF A PLATEAU SPEED HUMP IS REQUIRED TO BE INSTALLED ON A BUS ROUTE, THE FOLLOWING SPECIFICATIONS SHALL BE ADHERED TO:
    - 4.1. RAMP GRADE = 1:20 (MAX.)
    - 4.2. PLATEAU LENGTH = 7.0m - RIGID BUSES, 10.0m - ARTICULATED BUSES
    - 4.3. PLATEAU HEIGHT = 65 - 75mm (MAX.)



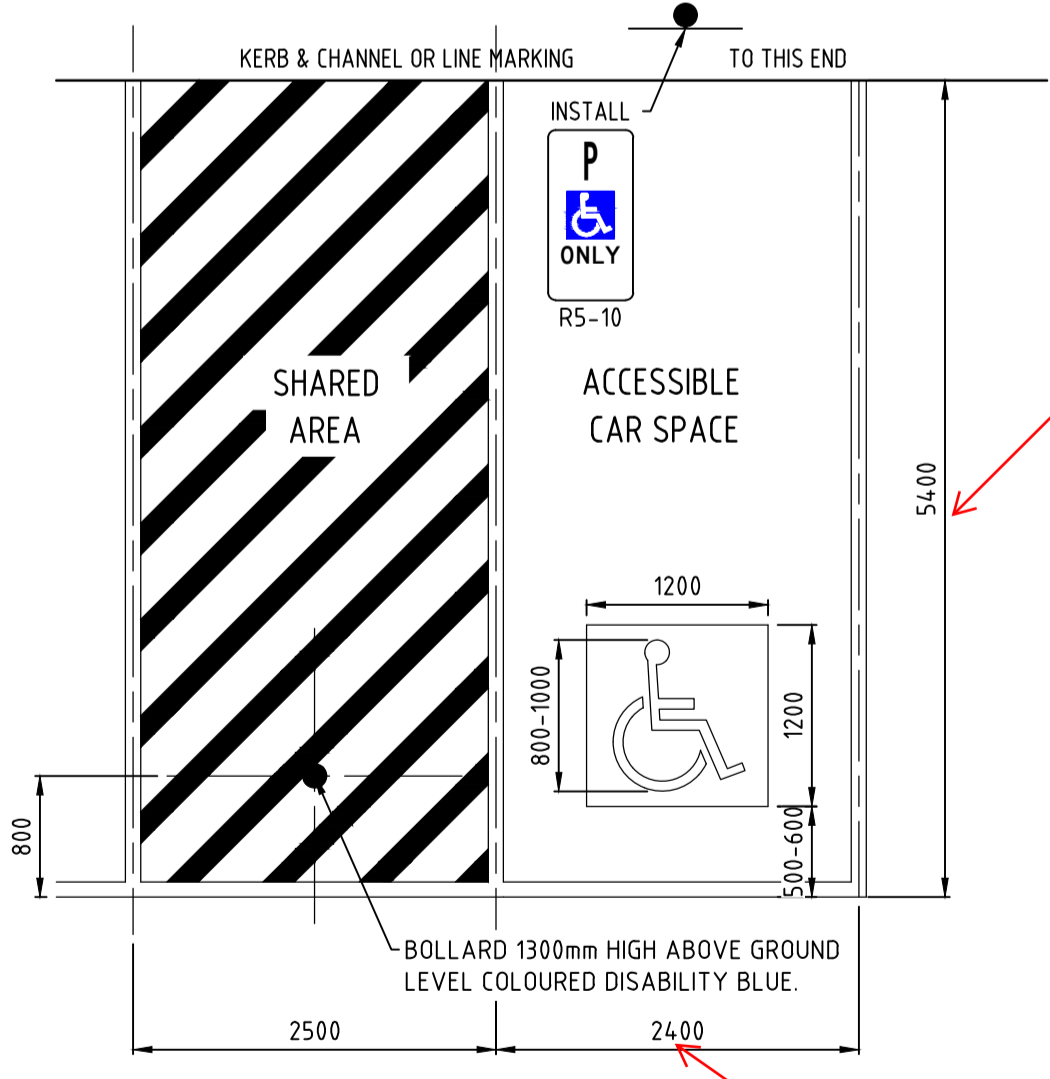
**TYPICAL BOLLARD DETAIL**

SCALE 1:20 0m 400mm 800mm  
NOTE: THE BOLLARD SHALL COMPLY WITH AS3845

**SPACE IDENTIFICATION**  
EACH DEDICATED SPACE SHALL BE IDENTIFIED BY MEANS OF A WHITE SYMBOL OF ACCESS IN ACCORDANCE WITH AS 1428.1 BETWEEN 800mm AND 1000mm HIGH PLACED ON A BLUE RECTANGLE WITH NO SIDE MORE THAN 1200mm, PLACED AS A PAVEMENT MARKING IN THE CENTRE OF THE SPACE BETWEEN 500mm AND 600mm FROM ITS ENTRY POINT AS ILLUSTRATED.

**SPACE DELINEATION**  
PAVEMENT MARKINGS SPECIFIED IN ITEMS (A) AND (B) OF THIS CLAUSE SHALL BE YELLOW AND SHALL HAVE A SLIP RESISTANT SURFACE. RAISED PAVEMENT MARKERS SHALL NOT BE USED FOR SPACE DELINEATION.

- PAVEMENT MARKINGS SHALL BE PROVIDED AS FOLLOWS:
1. LINEMARKING:
    - 1.1. DEDICATED PARKING SPACES SHALL BE OUTLINED WITH UNBROKEN LINES 80 TO 100mm WIDE ON ALL SIDES EXCEPTING ANY SIDE DELINEATED BY A KERB, BARRIER OR WALL.
  2. SHARED AREAS SHALL BE MARKED AS FOLLOWS:
    - 2.1. WALKWAYS WITHIN OR PARTLY WITHIN A SHARED AREA SHALL BE MARKED WITH UNBROKEN LONGITUDINAL LINES ON BOTH SIDES OF THE WALKWAY EXCEPTING ANY SIDE DELINEATED BY A KERB, BARRIER OR WALL.
    - 2.2. OTHER VACANT NON-TRAFFICKED AREAS, WHICH MAY BE INTENTIONALLY OR UNINTENTIONALLY OBSTRUCTED (E.G. BY UNINTENDED PARKING), SHALL BE OUTLINED WITH UNBROKEN LINES 80mm TO 100mm WIDE ON ALL SIDES EXCEPTING ANY SIDE DELINEATED BY A KERB, BARRIER OR WALL, AND MARKED WITH DIAGONAL STRIPES 150mm WIDE WITH SPACES 300mm BETWEEN STRIPES. THE STRIPES SHALL BE AT AN ANGLE OF 45° TO THE SIDE OF THE SPACE.
    - 2.3. NO SHARED AREA MARKINGS SHALL BE PLACED IN TRAFFICKED AREAS.
    - 2.4. ALL LINEMARKING MUST BE NON SLIP.
  3. BOLLARDS:
    - 3.1. MINIMUM HEIGHT 1300mm.
    - 3.2. RECOMMENDED COLOUR BLUE TO CONTRAST AGAINST YELLOW LINE MARKING.
    - 3.3. RECOMMEND FLEXIBLE BOLLARDS TO REDUCE MOTOR VEHICLE DAMAGE.



**ACCESSIBLE CAR PARKING SPACES IN ACCORDANCE WITH AS2890.6**

SCALE 1:50 0m 1m 2m

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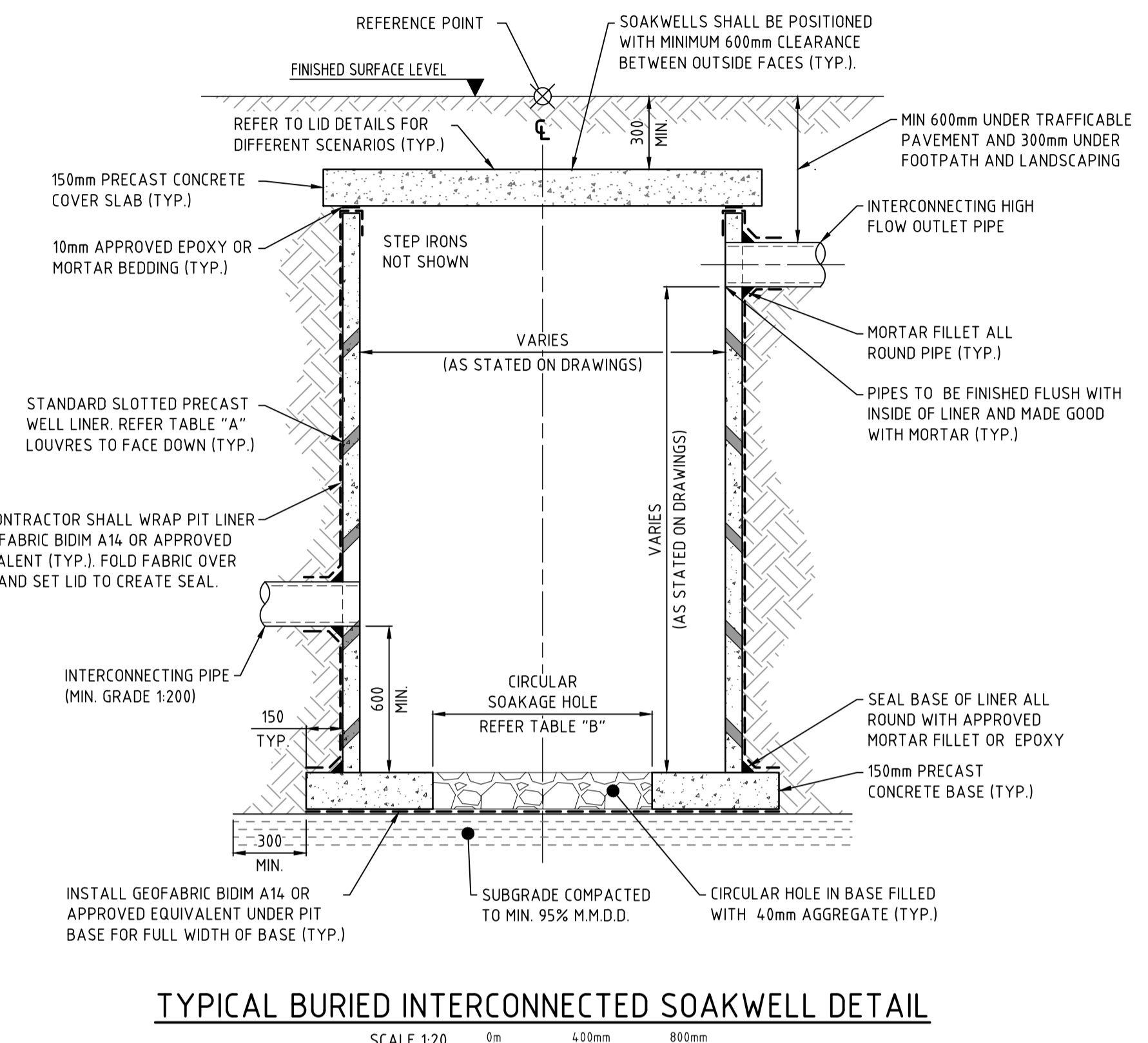
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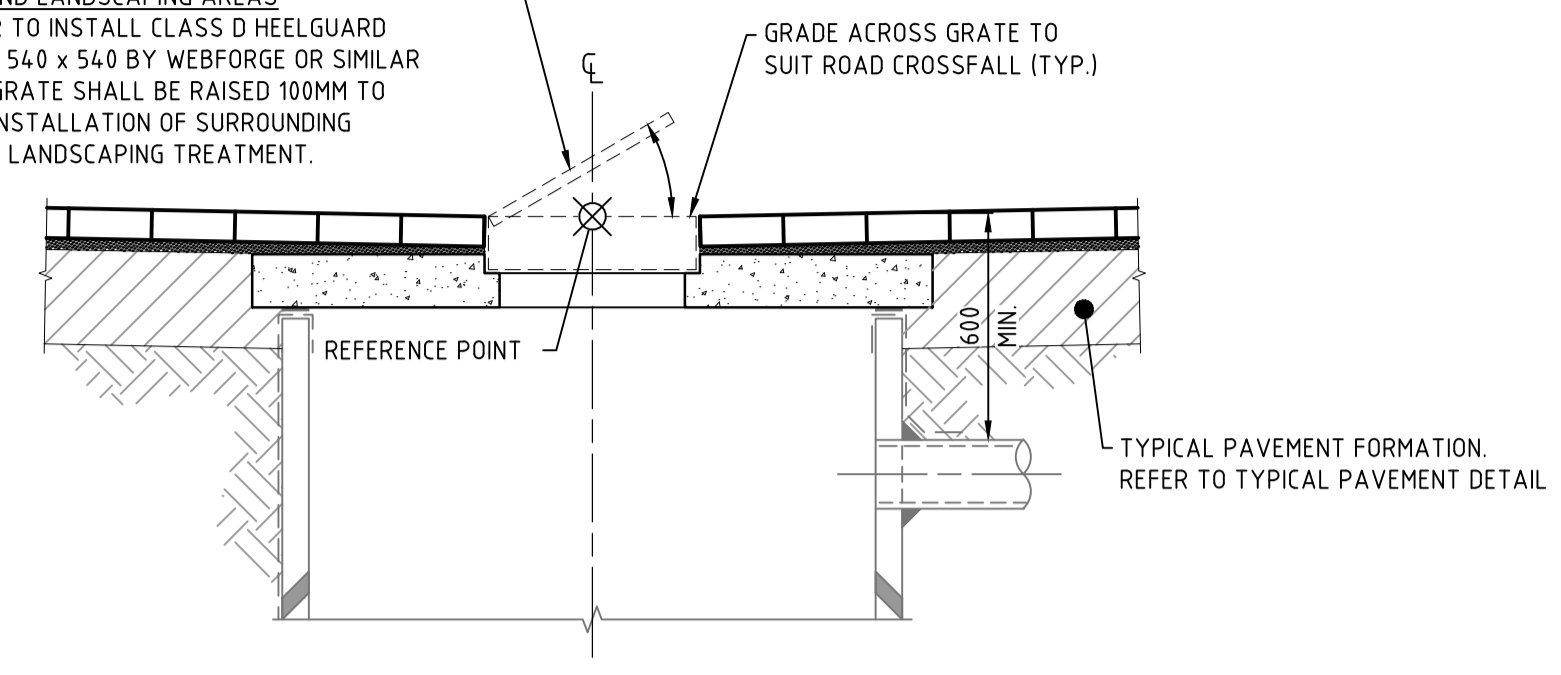




TYPICAL BURIED INTERCONNECTED SOAKWELL DETAIL

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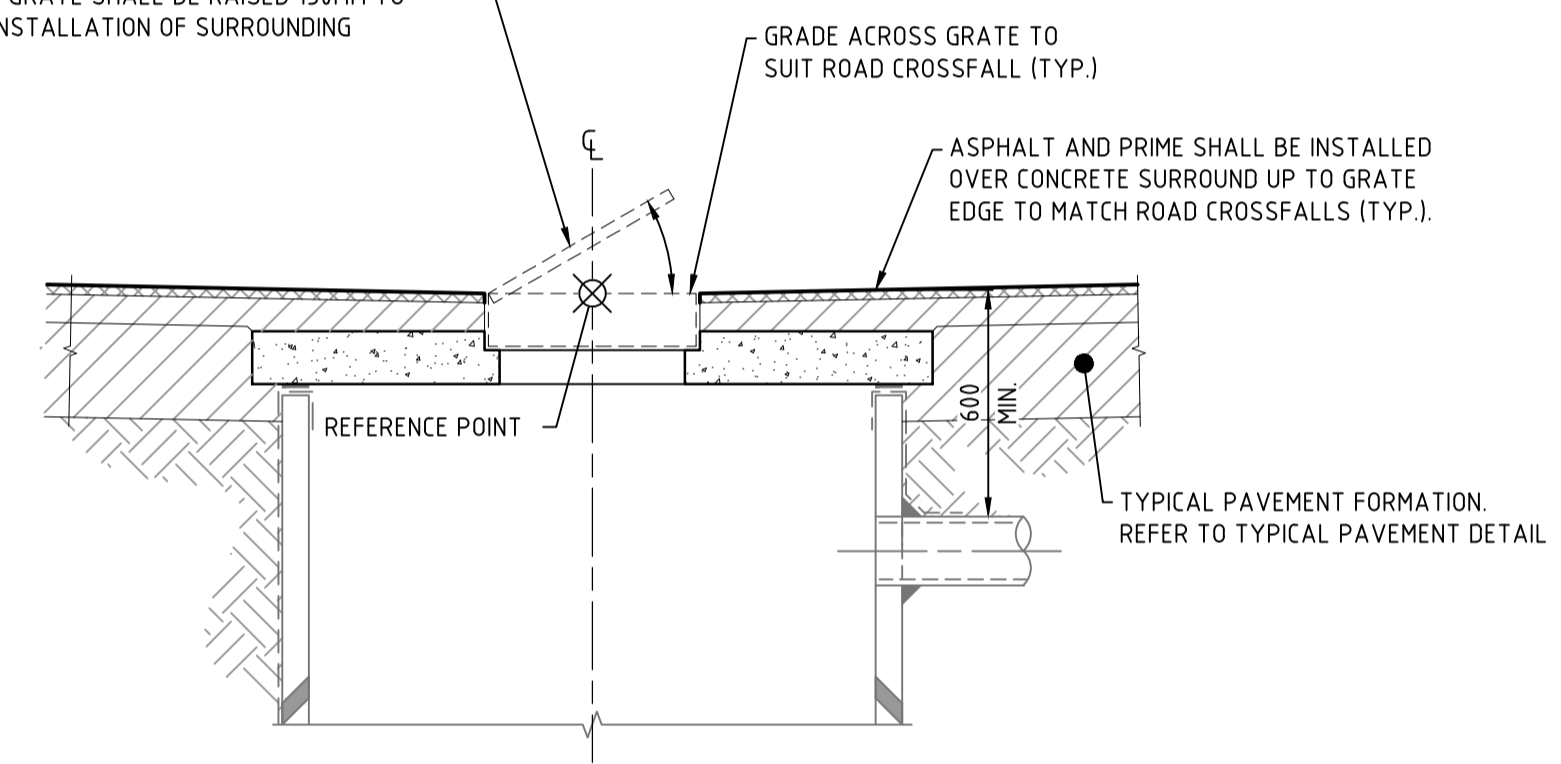
**CARPARK AREAS**  
HINGED GRATE FRAME AND CONCRETE SURROUND 750 X 550 GRATE TO BE CYCLESAFE SET FLUSH WITH SURROUNDING PAVEMENT, OR APPROVED EQUIVALENT. GRATE SHALL BE RAISED 150MM TO FACILITATE INSTALLATION OF SURROUNDING PAVEMENT.  
**FOOTPATH AND LANDSCAPING AREAS**  
CONTRACTOR TO INSTALL CLASS D HELPGUARD SUMP GRATE 540 x 540 BY WEBFORGE OR SIMILAR APPROVED. GRATE SHALL BE RAISED 100MM TO FACILITATE INSTALLATION OF SURROUNDING PAVERS AND LANDSCAPING TREATMENT.



TYPICAL INVERTED GULLY GRATE LID DETAIL WITH BRICK PAVING

SCALE 1:20 0m 400mm 800mm

HINGED GRATE FRAME AND CONCRETE SURROUND 750 X 550 GRATE TO BE CYCLESAFE SET FLUSH WITH SURROUNDING PAVEMENT, OR APPROVED EQUIVALENT. GRATE SHALL BE RAISED 150MM TO FACILITATE INSTALLATION OF SURROUNDING PAVEMENT.



TYPICAL INVERTED GULLY GRATE LID DETAIL WITH ASPHALT PAVEMENT

SCALE 1:20 0m 400mm 800mm

- NOTES**
- ALL INSITU CONCRETE SHALL BE CLASS N32 IN ACCORDANCE WITH A1379.
  - ALL INSITU CONCRETE CORNERS SHALL HAVE A 20 CHAMFER UNLESS OTHERWISE NOTED.
  - CEMENT MORTAR SHALL CONSIST OF ONE PART CEMENT AND THREE PARTS SAND.
  - SL81 REINFORCEMENT SHALL CONFORM WITH HARD DRAWN FABRIC TO AS4671.
  - MINIMUM CLEAR COVER TO REINFORCEMENT SHALL BE 50.
  - THE LINER SHALL BE REINFORCED CONCRETE MANUFACTURED TO AS4058.
  - THE MAXIMUM INLET/OUTLET PIPE OUTSIDE DIAMETER SHALL BE LESS THAN 60% OF THE LINER INTERNAL DIAMETER.
  - MINIMUM OF 0.0% OF LINER SHALL REMAIN IN ANY HORIZONTAL PLANE.
  - MINIMUM INTERNAL LINER SPACE OF 200mm BETWEEN PUNCHED/CUT HOLES.
  - HOLES TO BE CUT/PUNCHED ON ACCORDANCE WITH MANUFACTURER'S SPECIFICATION.
  - THE LINER SHALL HAVE EQUIVALENT PROPERTIES AND REINFORCEMENT OF CLASS 2 R.C.P. EXCEPT THAT THE REINFORCEMENT SHALL BE CIRCULAR.
  - FOR STRUCTURES DEEPER THAN 1200, STEP IRONS OR PREFABRICATED GALVANISED STEEL LADDER SHALL BE FITTED. THE LADDER SHALL BE FIXED WITH STAINLESS STEEL MASONRY ANCHORS IN ACCORDANCE WITH AS1657.
  - ORIENTATE STEP IRONS OR LADDER TO ENABLE EASY ACCESS AND TO FACE ONCOMING TRAFFIC.
  - COVERS SHALL BE CLASS D TO AS3996.
  - SIDE ENTRY PIT APRON SHALL BE A COMBINATION OF PROPRIETARY MATCHING FRAME (UNIVERSAL SIDE ENTRY FRAME OR APPROVED EQUIVALENT) AND AN APPROVED APRON DEFLECTOR SLAB.
  - SIDE ENTRY PIT COVER AND APRON SHALL SATISFY THE FOLLOWING CRITERIA:  
VERTICAL OPENING: 120 MIN. 150 MAX.  
HORIZONTAL OPENING: 880 MIN.  
APRON GRADE: 3% WITH VERTICAL DEFLECTORS

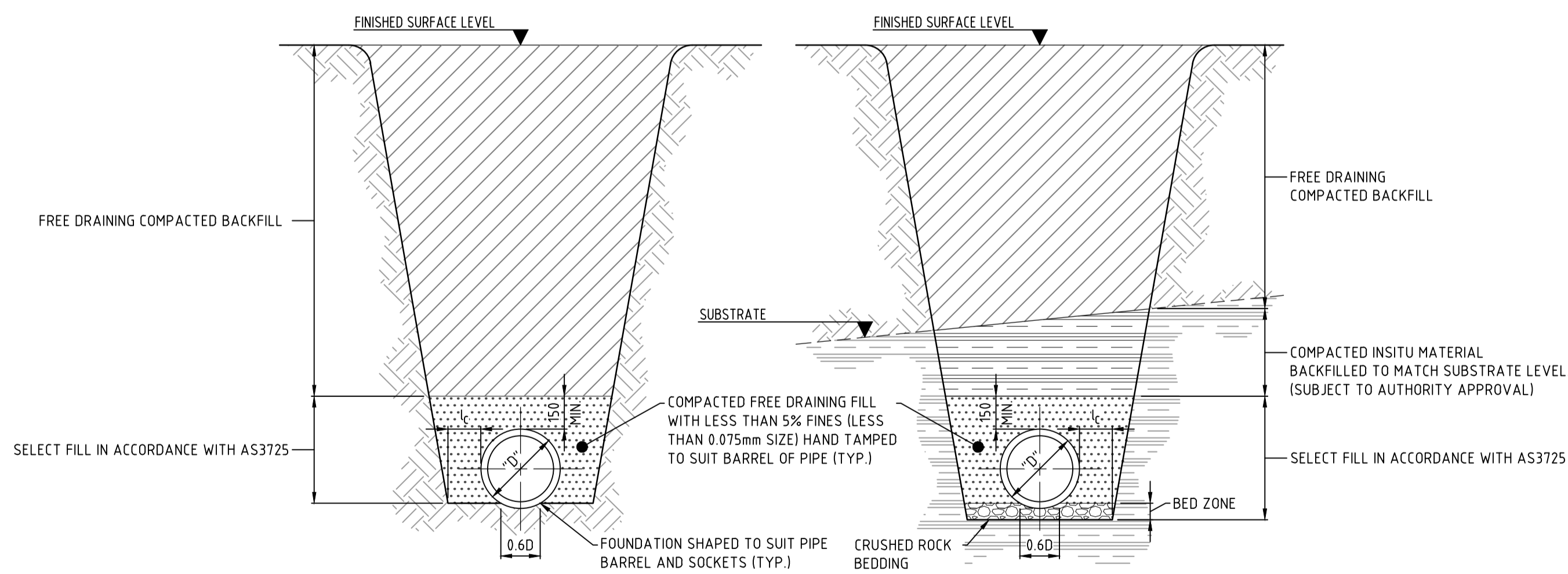
**TABLE A**  
DRAINAGE PIT LINER SIZE

NOM. LINER SIZE (mm)	PIPE SIZE MAX. (mm)	LINER TYPE
φ1050	φ450	CONCRETE
φ1200	φ600	CONCRETE
N/A	N/A	CUSTOM

FOR PIPES φ1200 AND LARGER INSTALL A CUSTOM CHAMBER TO SUIT.

**TABLE B**  
DRAINAGE PIT BASE SOAKHOLE HOLE SIZE

LINER SIZE MIN. (mm)	SOAKHOLE DIAMETER (mm)
1050	600
1200	600
1500	900
1800	1200



DRY CONDITIONS ROCK CONDITIONS

TYPICAL CONCRETE PIPE TRENCH DETAILS (SUPPORT TYPE "U")

SCALE 1:20 0m 400mm 800mm

**TRENCH DETAIL NOTES**

- ALL PIPE TRENCHES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AS3725 - DESIGN FOR INSTALLATION OF BURIED CONCRETE PIPES. SHOULD DISCREPANCIES EXIST, AS3725 TAKES PRECEDENCE.
- DRY CONDITIONS SHALL BE SAND SOIL WHERE THE MAXIMUM PREDICTED G.W.L IS A MINIMUM 300mm BELOW PIPE INVERT.
- BEDDING CONDITION SHALL BE CARRIED PAST ALL MANHOLES, GULLIES & OTHER DRAINAGE STRUCTURES DOWNSTREAM.
- WHERE PIPES HAVE PROTRUDING SOCKETS, SUITABLE RECESSES SHALL BE PROVIDED IN THE SUPPORTING MATERIALS TO ENSURE THAT THE PIPES DO NOT BEAR ON THE SOCKETS (TYP.)

MINIMUM BED ZONE DEPTHS

SUPPORT TYPE	DEPTH (mm)
U	75
H / HS ≤ φ1500	100
H / HS > φ1500	150

MINIMUM SIDE CLEARANCE "Lc" (D/6 or Lc, WHICHEVER IS GREATER)

PIPE DIAMETER	Lc
≤600	150
>600 - ≤1200	200
>1200	D/6

NOTE: THE MINIMUM Lc VALUES SHALL ONLY BE USED WHERE NECESSARY COMPACTION VALUES CAN BE ASSURED.

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SCALE	AS SHOWN	DATE	MAY 2019	DRAWING No.
BHW PROJ No.	----	BHW FILE No.	2019/----	CO.-- A

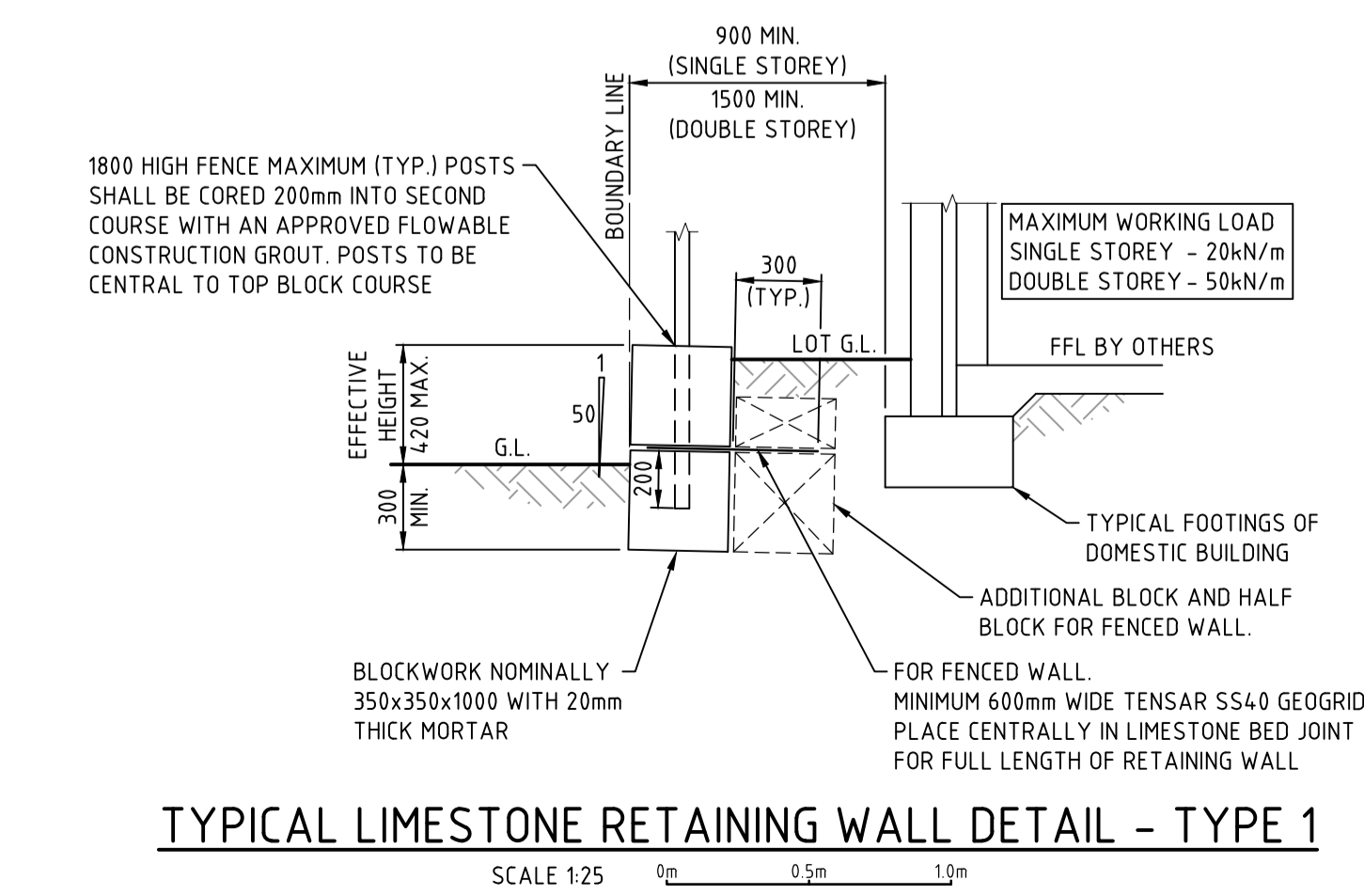
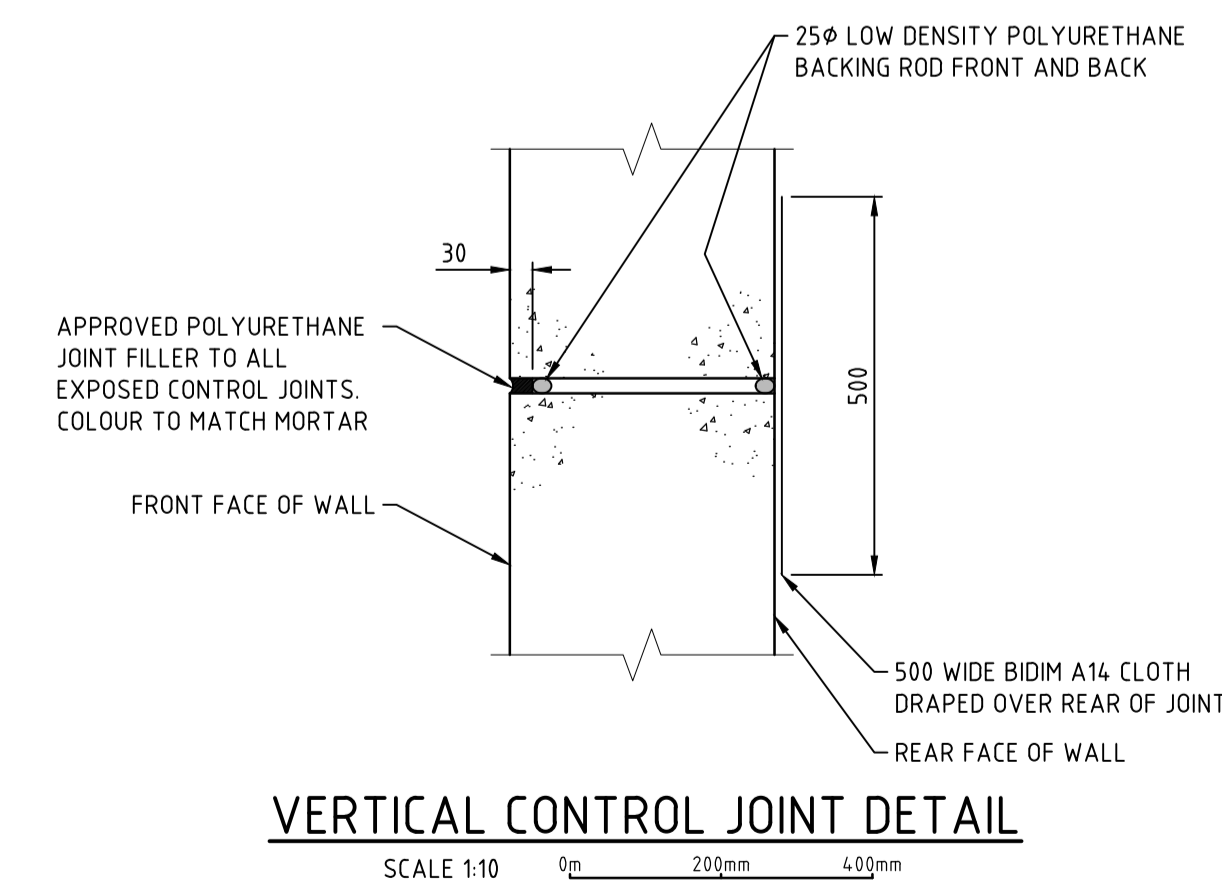
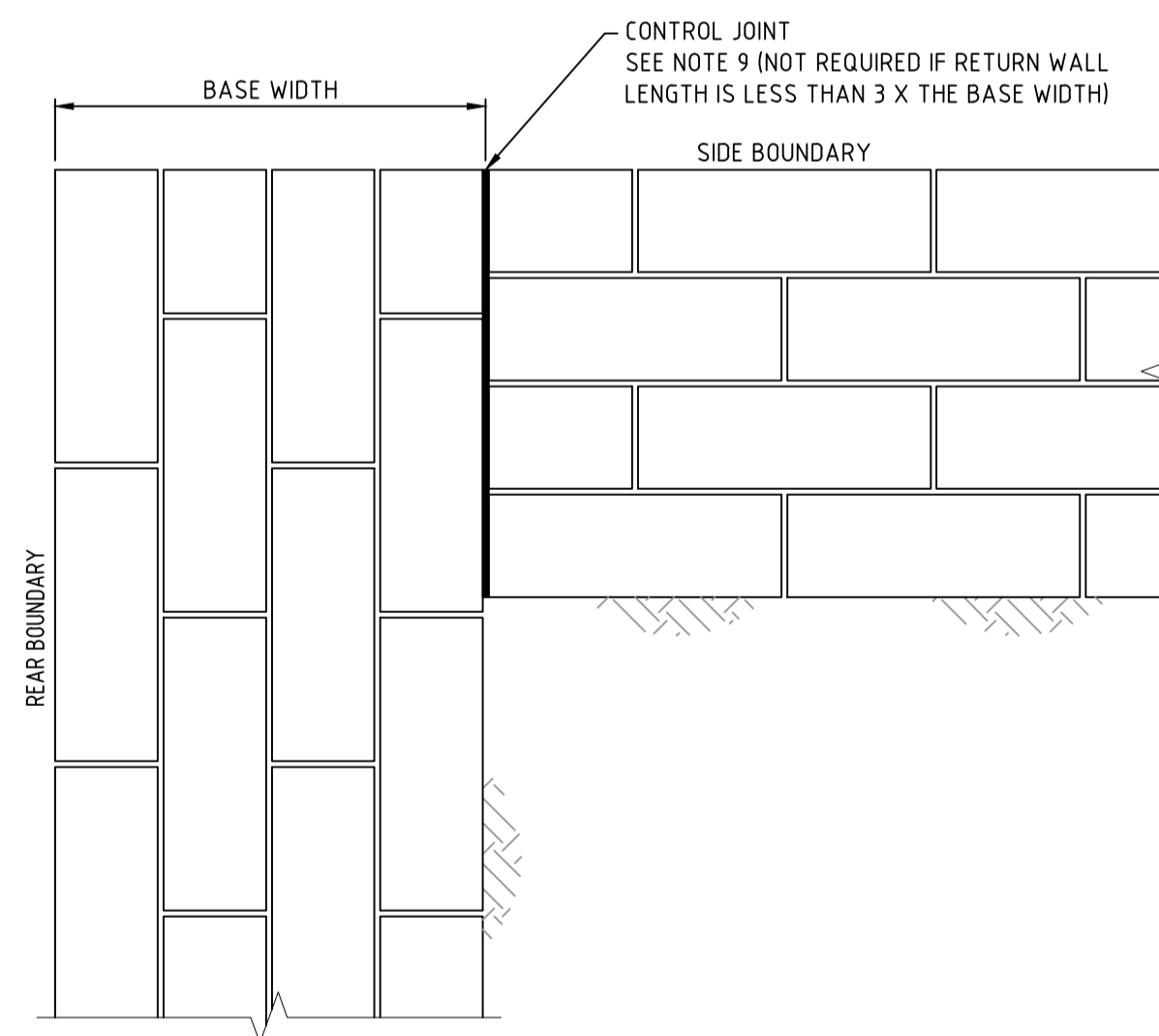
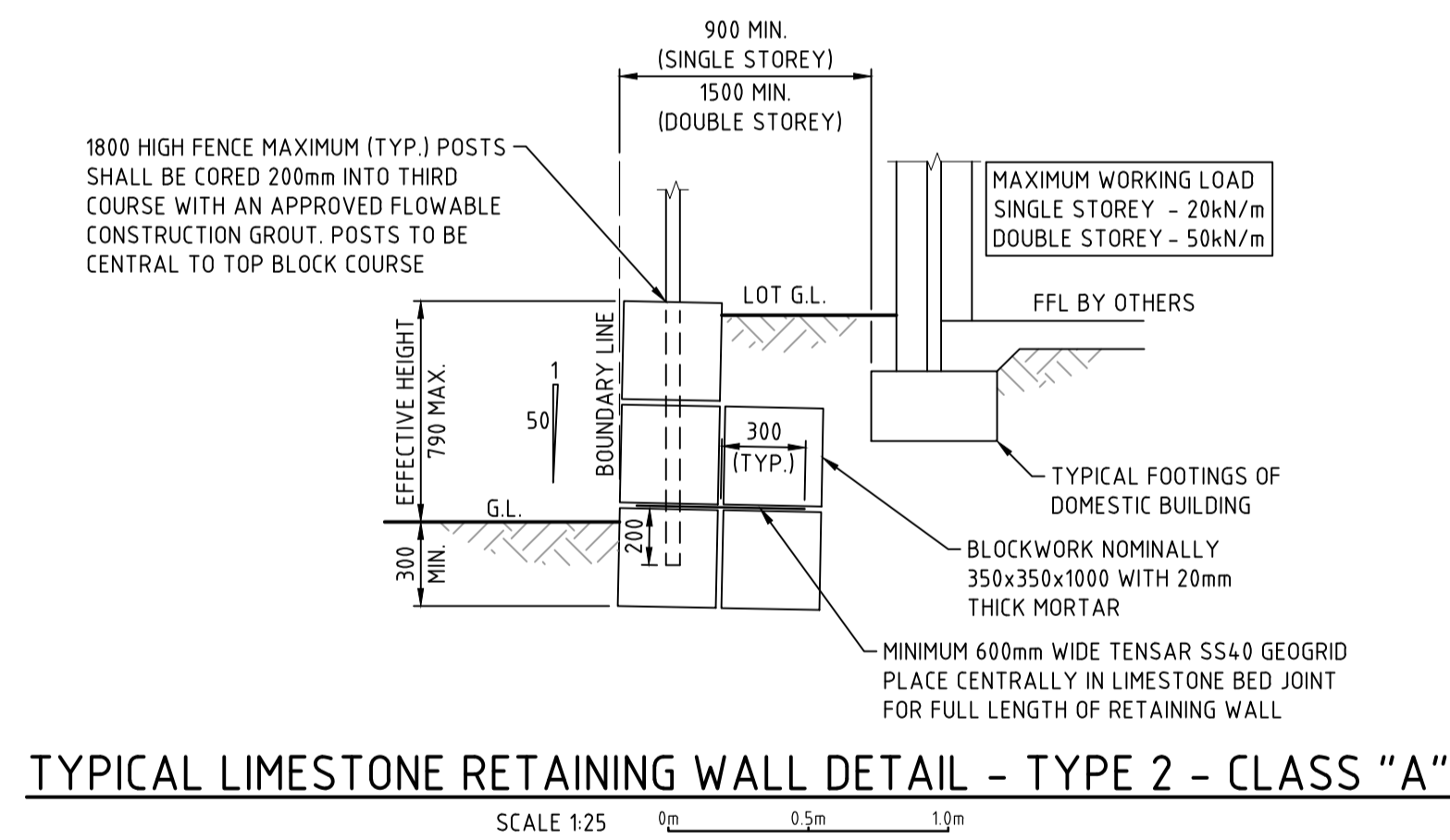
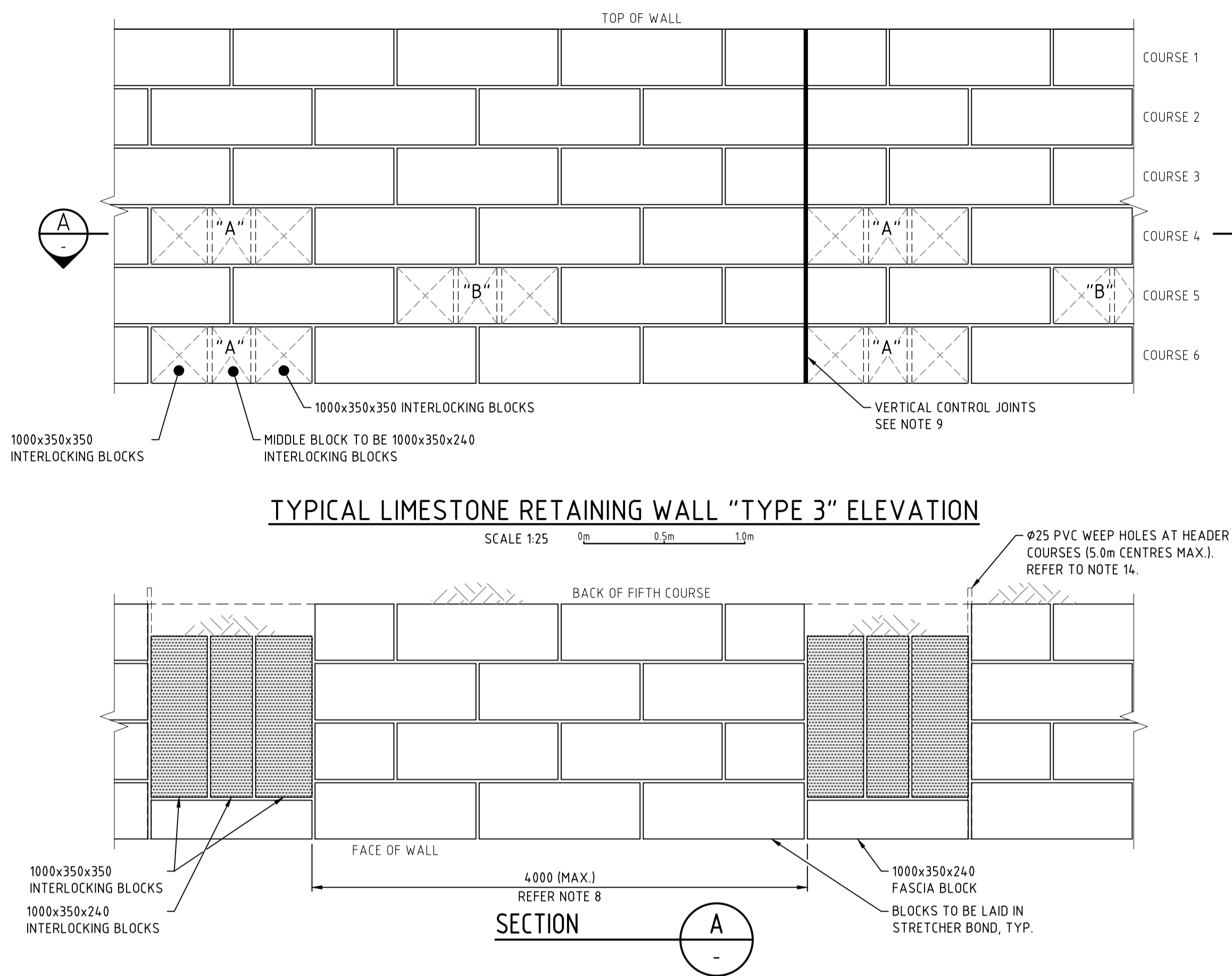
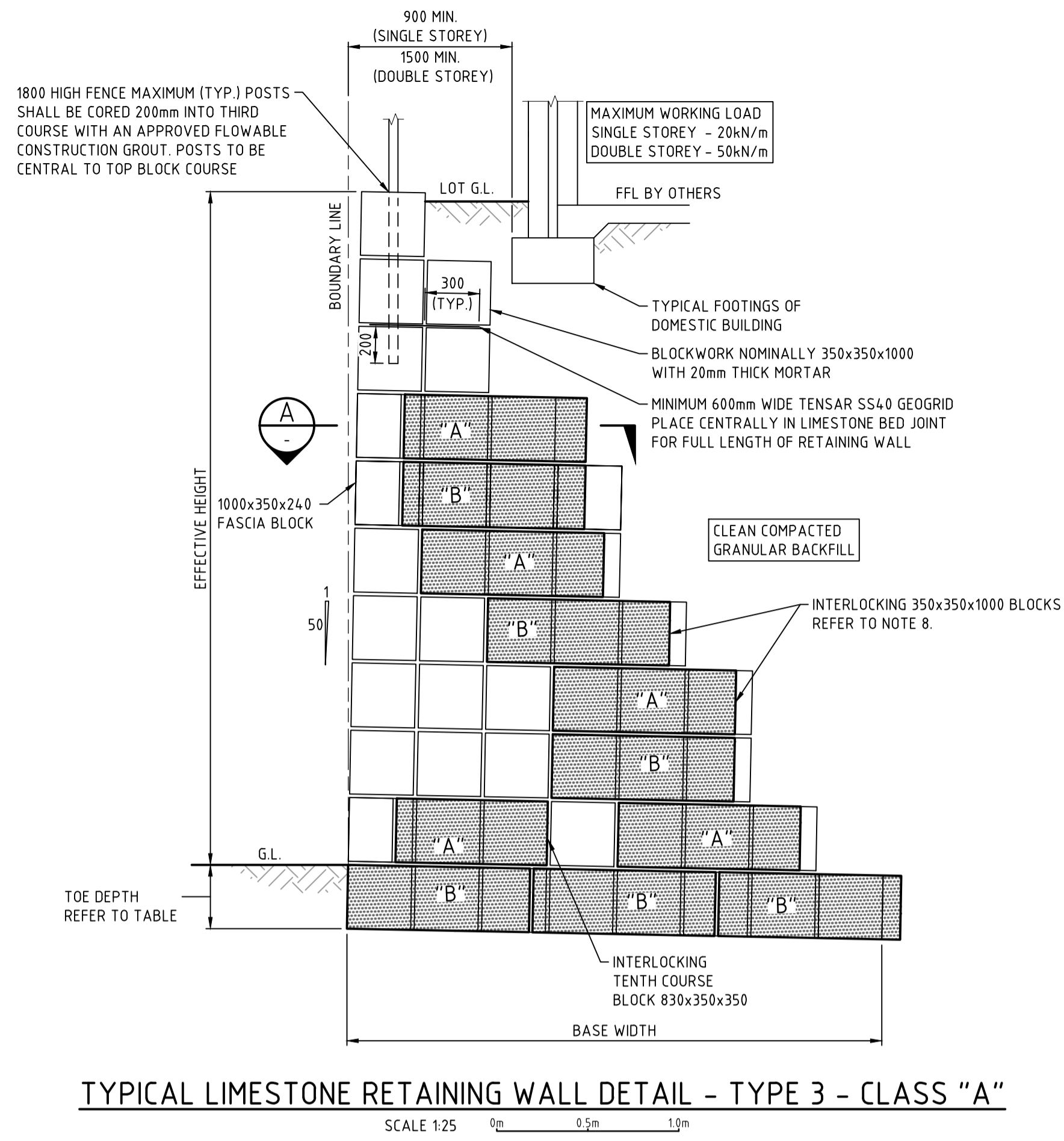


**LIMESTONE RETAINING WALL AND FENCE NOTES**

1. COMPACT GROUND UNDER FOOTING TO RESIST 8 BLOWS PER 300mm OF A STANDARD 16mm DIA PENETROMETER OVER A DEPTH OF 600mm
2. LIMESTONE BLOCKS TO BE A MINIMUM DENSITY OF 1500kg/m<sup>3</sup> (DRY). RECONSTITUTED LIMESTONE BLOCKS TO BE A MINIMUM DENSITY OF 1800kg/m<sup>3</sup> (DRY).
3. MORTAR MIX SHALL COMPRISE 1 PART WHITE CEMENT, 1 PART LIME PUTTY, AND 6 PARTS CLEAN YELLOW SAND OR 1 PART WHITE CEMENT, 0.5 PART LIME PUTTY AND 4.5 PARTS YELLOW SAND IF LESS THAN 1km FROM THE COAST. ALL BLOCK WORK SHALL BE FULLY MORTARED TO ADJACENT BLOCKS.
4. THESE WALLS ARE APPLICABLE FOR CLASS 'A' CONDITIONS ONLY TO AS 2870. ALL OTHER CONDITIONS TO BE REFERRED TO ENGINEER.
5. ALL RETAINING WALLS HAVE BEEN CALCULATED WITH A HORIZONTAL BACKFILL. ANY OTHER CIRCUMSTANCES TO BE ASSESSED INDIVIDUALLY.
6. THE RETAINING WALL HAS BEEN DESIGNED TO SUPPORT A 5kPa SURCHARGE.
7. INTERLOCKING BLOCK COURSE TO BE STAGGERED AS PER TYPICAL DETAIL.
8. WALL TO HAVE INTERLOCKING BLOCKS COMMENCING AT 4th COURSE FROM TOP, PERPENDICULAR TO FACING AT MAXIMUM 4m SPACING TO ACHIEVE INTERLOCK OF STRUCTURE.
9. WALLS SHALL HAVE VERTICAL CONTROL JOINTS AT INTERVALS OF NO MORE THAN 10 METRES FOR TYPE 1 WALLS, 15 METRES FOR TYPE 2 AND 3 WALLS, PREFERABLY LOCATED AT PROPERTY BOUNDARIES. JOINTS REQUIRED ALSO ON CORNERS AS PER ATTACHED DETAIL. JOINTS SHALL BE 20mm WIDE, BE FILLED WITH A 25mm CLOSED CELL FOAM AND SEALED WITH AN APPROVED POLYURETHANE JOINT FILLER.
10. NO BACKFILLING UNTIL 7 DAYS AFTER WALLS HAVE BEEN BUILT. COMPACT USING LIGHT EQUIPMENT TO DISTANCE BACK FROM THE FACE OF WALL EQUAL TO THE EFFECTIVE HEIGHT.
11. FENCE TO BE PROPRIETARY SYSTEM BY OTHERS - WALL DESIGNED FOR WIND REGION A ONLY.
12. FENCE POSTS SHALL BE AT 2400mm MAXIMUM CENTRES.
13. A NON SACRIFICIAL ANTI GRAFFITI COATING IS TO BE APPLIED TO WALLS FACING A ROAD, P.A.W. OR P.O.S.

**WALL TYPE "3"**

COURSES	TOTAL HEIGHT	EFFECTIVE HEIGHT RANGE	BASE WIDTH	MIN. TOE DEPTH
4	1460	790 - 1110	1090	350
5	1830	1111 - 1480	1460	350
6	2200	1481 - 1850	1460	350
7	2570	1851 - 2170	1830	400
8	2940	2171 - 2540	2200	400
9	3310	2541 - 2810	2200	500
10	3680	2811 - 3180	2570	500
11	4050	3181 - 3550	2940	500



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**Government of Western Australia**  
Department of Finance  
Building Management and Works

**SUNNINGDALE PRIMARY SCHOOL**  
CIVIL WORKS  
STANDARD RETAINING WALL DETAILS

DRAWN	NS	DESIGNED	RT	REDUCTION
CHECKED	JDP	PRINCIPAL		0 25
APPROVED	JDP	SIGNATURE		
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