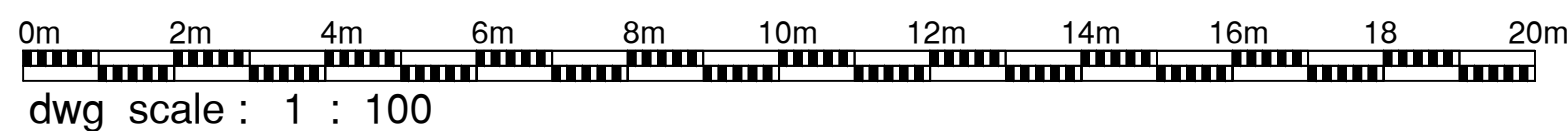
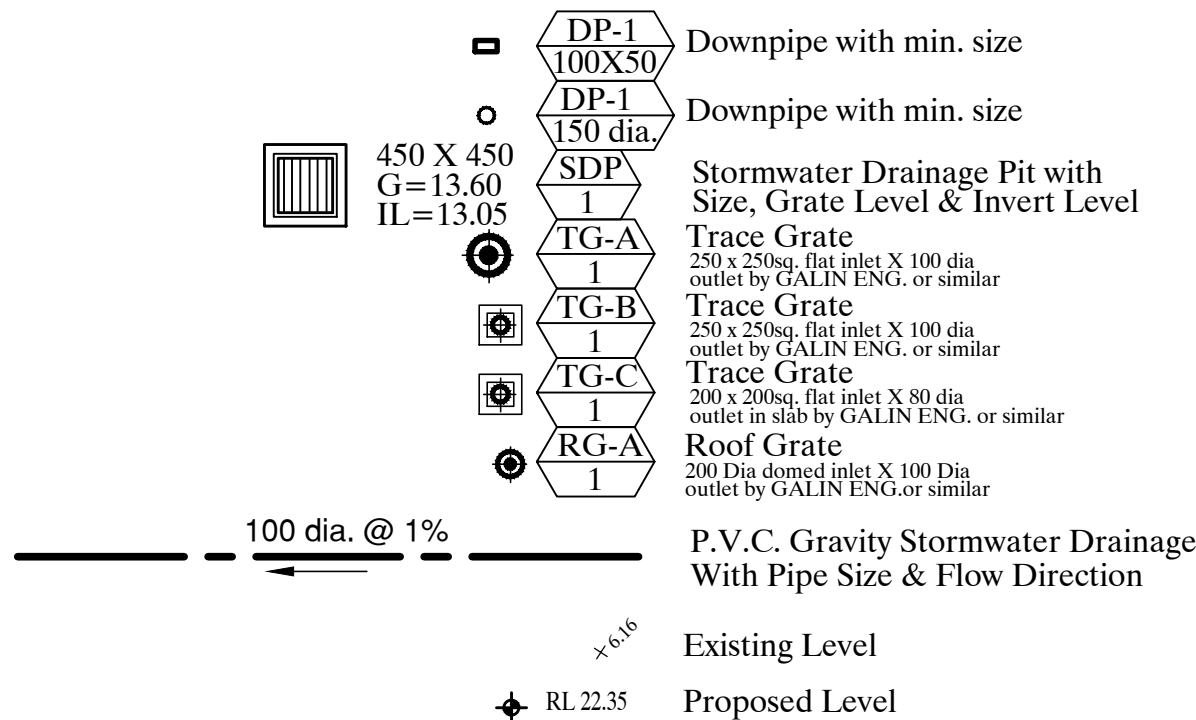


BASEMENT FLOOR PLAN

Scale 1 in 100
Scale 1 in 100 when printed on A1 sheet

LEGEND



GENERAL STORMWATER NOTES

- All pipes and stormwater structures shall be in strict accordance with relevant S.A.A. Codes for materials, workmanship and to rules and regulations of the local Council.
- The drawings are diagrammatic and setouts shall be checked with the Architectural drawings.
- All levels and dimensions shall be checked on site prior to start of construction. Do not continue or commit to any works until these details are approved.
- Pipe materials indicated may be altered provided they comply with the requirements of the relevant authorities.
- Gutters and downpipes shall be in strict accordance with AS 2179 & AS 2180. Gutters shall have a minimum effective cross sectional area of 6,050mm sq (115QUOD GUTTER or similar) with 1 in 500 min. grade with 100 x 50 downpipes unless otherwise noted on plans.
- Stormwater pipes up to and including 300 dia. shall be PVC pipes, sewer grade, conforming to AS 1260 and installed in accordance with AS 3500.3 and related reference documents.
- All existing services to be located prior to the commencement of construction. Any costs incurred for adjustments and/or relocation of services to be borne by the applicant.
- Provide unrestricted overland flowpaths from all pits and drain to detention tank inlet grates.
- On-site stormwater detention reduces flooding by providing temporary storage of stormwater during storms. After the storm, the stored water is slowly released, normally through a control orifice. Systems incorporating a High Early Discharge first fill the HED section, then overflow into the storage and later flow-back into HED through a one-way line. During light rain, no storage occurs. During extreme rainfall, the detention system will fill and could overflow. A typical storage system will quickly fill but take several hours to empty. Submersion during this period will not affect most grass, plants or trees.

- Councils require that on-site detention systems be inspected during construction to enable a final Hydraulic Certificate and Work as Executed details to be supplied upon completion. Councils require that concrete works (tank bases, lids, retaining walls etc.) are inspected before pouring and a Structural Engineers Certificate is issued on completion.
- These details are subject to approval by Council and possibly other authorities. Do not continue or commit to any works until these details are approved.
- Advise Design Engineer of any special conditions imposed or design variations made to the details. Any alterations (however minor) must be authorised by the Design Engineer.
- Conditions found during construction that conflict with these details shall be reported to the Design Engineer. If in doubt, ask. Design sizes, levels, heights and depths must not be varied without approval.
- All works are to be completed before the Final Certificate will be issued. Tanks are to be clear of all formwork, builder's rubbish and silt. The outline and sump drain is to be clear. All pits and grates are to be completed and shall be free of building material and spoil. All downpipes are to be connected. Landscape works including driveways, kerbs and drive trench grates shall be installed. Orifices, screens, step irons and tank grate locks are to be correctly fitted.
- Maintenance of the on-site stormwater detention system is the responsibility of the Owner. A complete set of these details shall be provided to the present owner. The details should be passed on to subsequent owners. It is important that these systems are not modified without approval. Do not enter any pit or tank where there is risk of inadequate ventilation or buildup of noxious odours, gases, or leakage of any volatile or toxic contaminations into the chamber. Obtain professional assistance if any of these conditions occur.

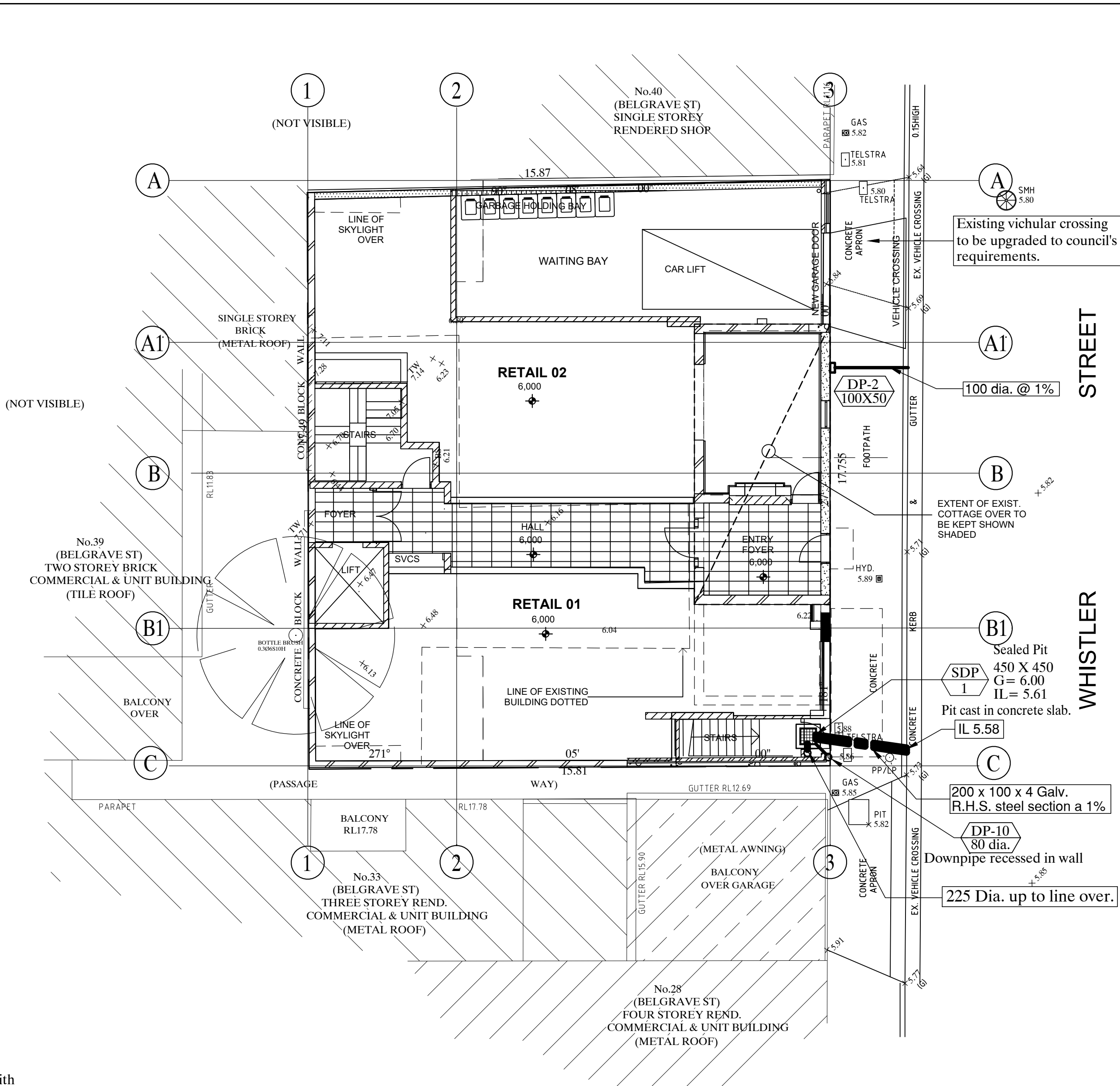
- Maintenance and cleaning is required as follows. Remove and flush clean the trash screen. Hose out the tank base and remove accumulated debris. Flush the discharge-line clear. This must be done to Council's time requirements and as all Council's vary it is the responsibility of the Owner to find out Council's requirements.
- Orifice plates shall be fabricated from 3mm thick stainless steel, with a circular hole machined to 12mm. Plates shall be fixed flush using four stainless steel expansion or chemical anchors. If required by Council, the orifice plate shall also be epoxy fixed. Unless otherwise detailed, plates shall be fixed on the centreline of the outlet.
- Screen mesh shall be Lysaght's expanded metal, type RH3030, and shall not be hot dipped galvanised after fabrication. The screen shall have elongated mesh openings set horizontal, and the projecting mesh lines pointing down and facing upstream. Screens shall be provided with a suitable handle located on the top upstream face of the screen (for removal and, for flat screens, to define the screen orientation). All screens shall be removable by hand without the use of tools. Fixing brackets shall be stainless or galvanised mild-steel type. Bracket anchors shall be stainless steel. When installed, the maximum edge gap shall be 3mm-5mm.
- One-way flaps shall be Rocla Floodgate type. Flaps shall be located clear of inlets, screens and step irons and must not prevent the screen from being removed.
- Concrete shall be 20 MPa for footings and tank bases, and 25 MPa for suspended tank lid slabs. Mesh reinforcement shall be lapped one square plus 25mm and bar reinforcement shall be lapped 500mm.
- Permanent (non-structural) formwork shall be Lysaght's Bondek, any grade, or equal.

- Tanks may be in-situ or precast. Note that falls, sumps and the position and depth to orifice plates or discharge control pipe is critical: both for hydraulic and health reasons. Overflow and access grates also provide light and ventilation requirements of various Authorities. Provide step irons to all tanks over 1200 depth.
- Tank risers should be in-situ concrete. Risers shall have the same clear internal size as the tank access opening. Provide step irons to risers as specified.
- Individual-rung step irons to tank, tank risers and deep pits shall be an approved type (galvanised steel or high impact plastic) complying with AS 1657. Fix rungs permanently and securely by drilling and epoxy grouting. Provide the specified number of step-irons, equally spaced vertically between 250mm and 350mm, with alternate rungs offset 200mm.
- Grates and frame units shall be hinged and childproof, using either a spring loaded bolt or a bolt and lug locking system (padlocks are not permitted). The frames shall be securely attached to the tank or riser, or built into an in-situ slab.
- Grates shall be class A (light duty) in paths and lawns; class B (medium duty) in residential vehicular areas; and class C (heavy duty) in public roadways.

GROUND FLOOR / SITE PLAN

Scale 1 in 100
Scale 1 in 100 when printed on A1 sheet

ALL STORMWATER DRAINAGE TO BE SEWER GRADE P.V.C.
ALL STORMWATER DRAINAGE TO 100 Dia. @ 1% MIN. GRADE
UNLESS OTHERWISE NOTED ON PLAN



Site area 279 m2

Pre-development impervouse 259.7 m2 impervouse = 93%

Post-development impervouse 279 m2 impervouse = 100%

Roof area 135.5 m2 (detention Pond) = 48.6%

Area by-passing detention 143.5 m2 impervious = 51.4%

C	Building redesigned. Drainage redesigned.	21-11-2019
B	Basement drainage removed and basement to be fully tanked. Drainage cal's added to plan.	10-10-2018
A	Floor plan Altered. Drainage altered to suit	10-10-2018
Revision	Details	Date

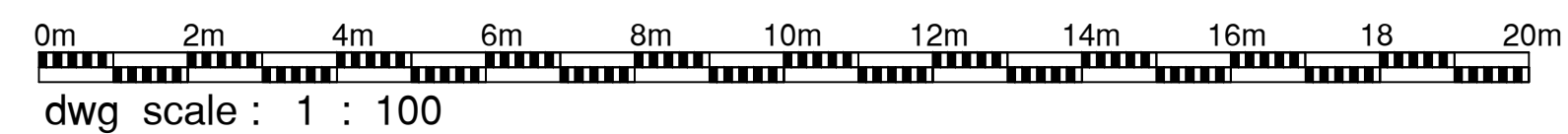
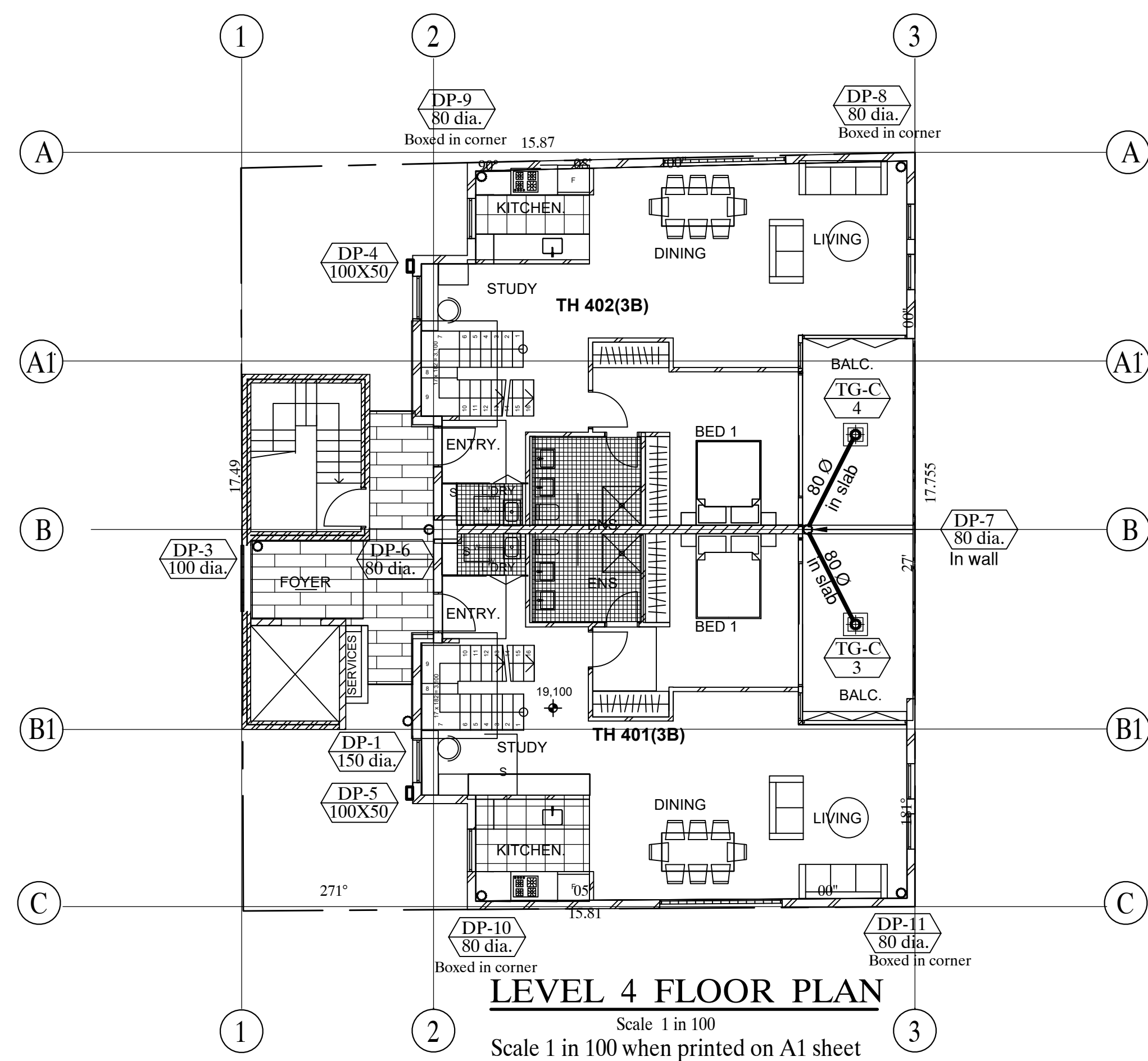
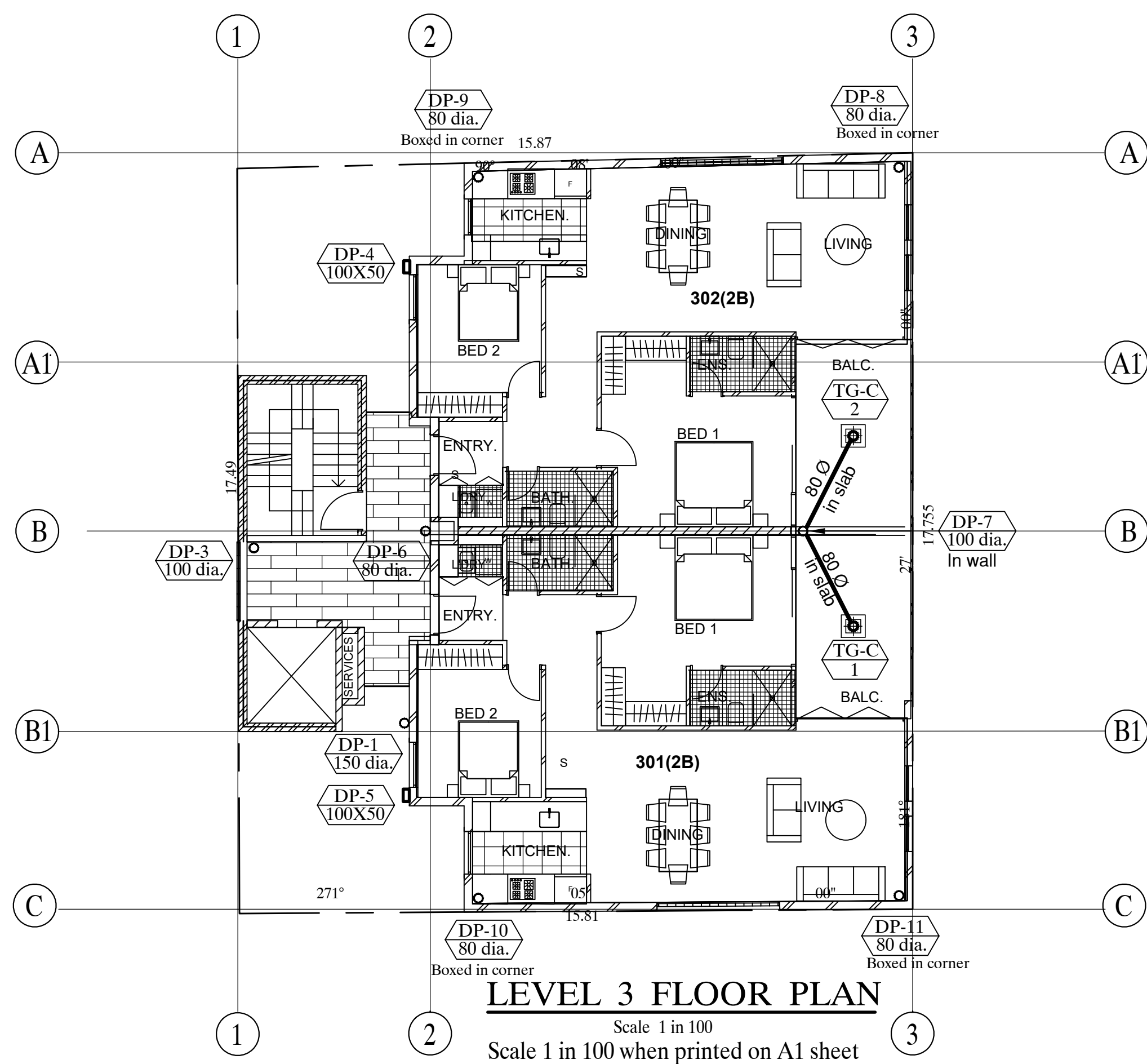
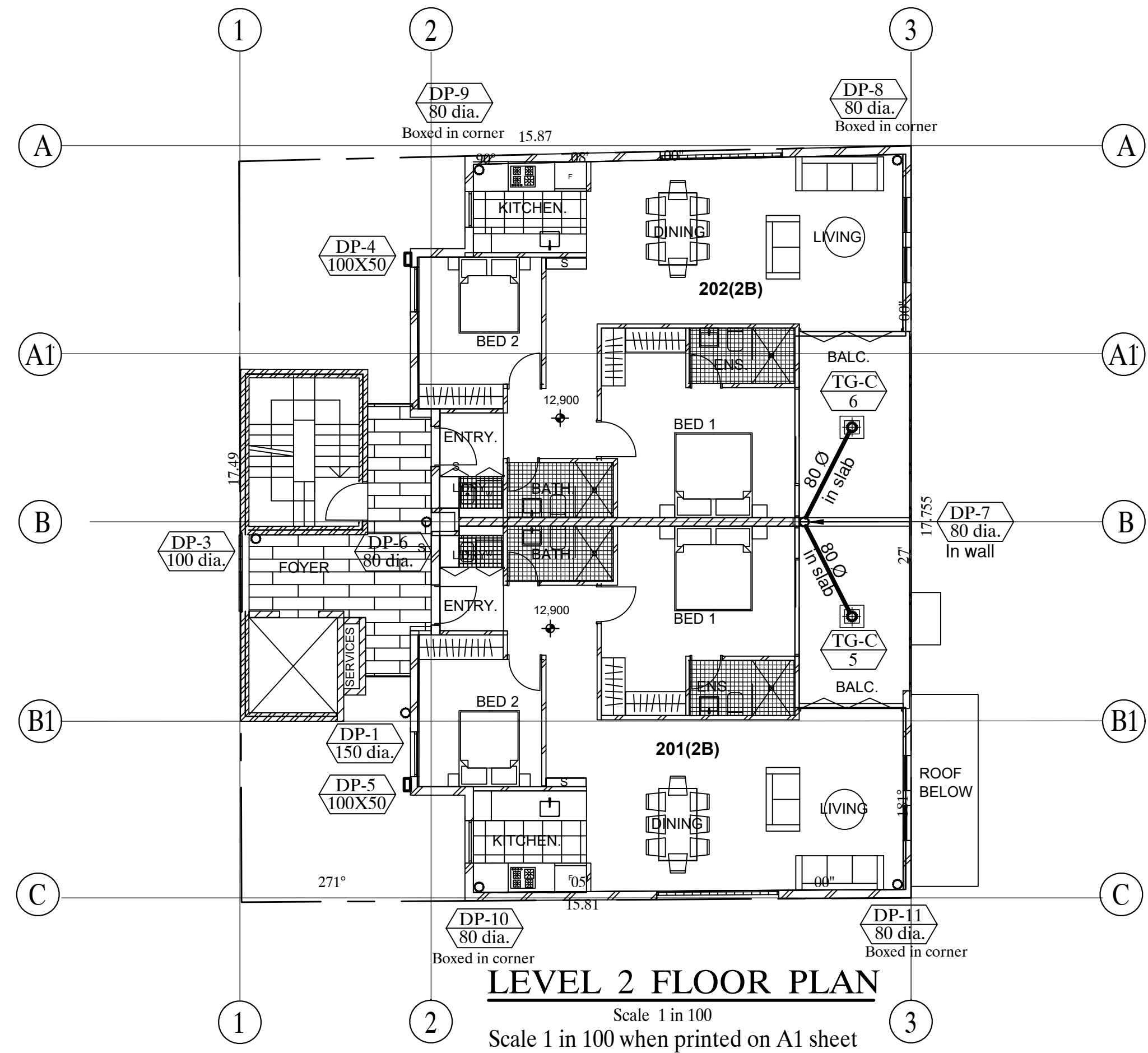
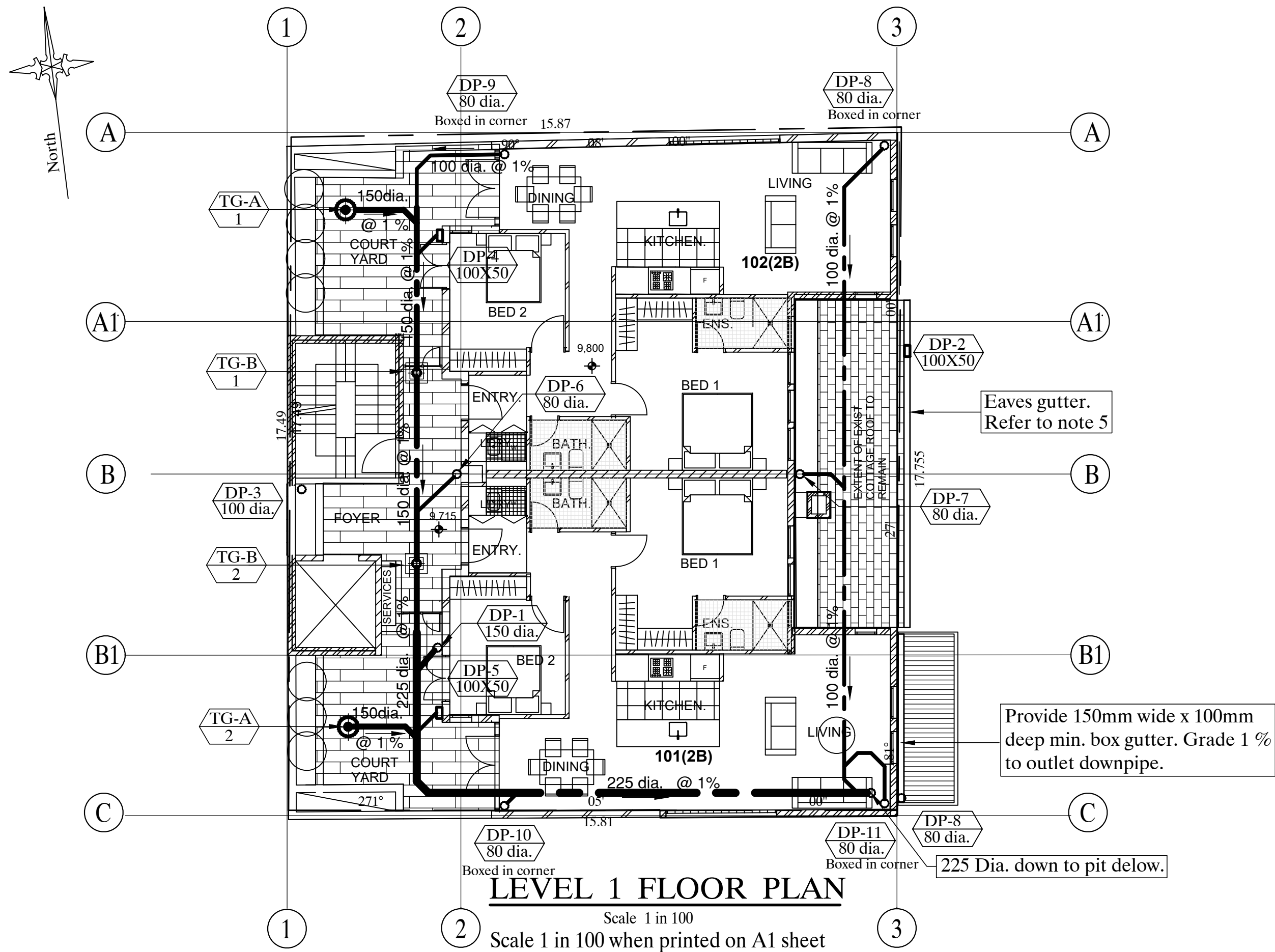
Project
RESIDENTIAL DEVELOPMENT
21 WHISTLER ST MANLY

BURGESS, ARNOTT & GRAVA PTY. LTD.
CONSULTING STRUCTURAL, CIVIL & HYDRAULIC ENGINEERS

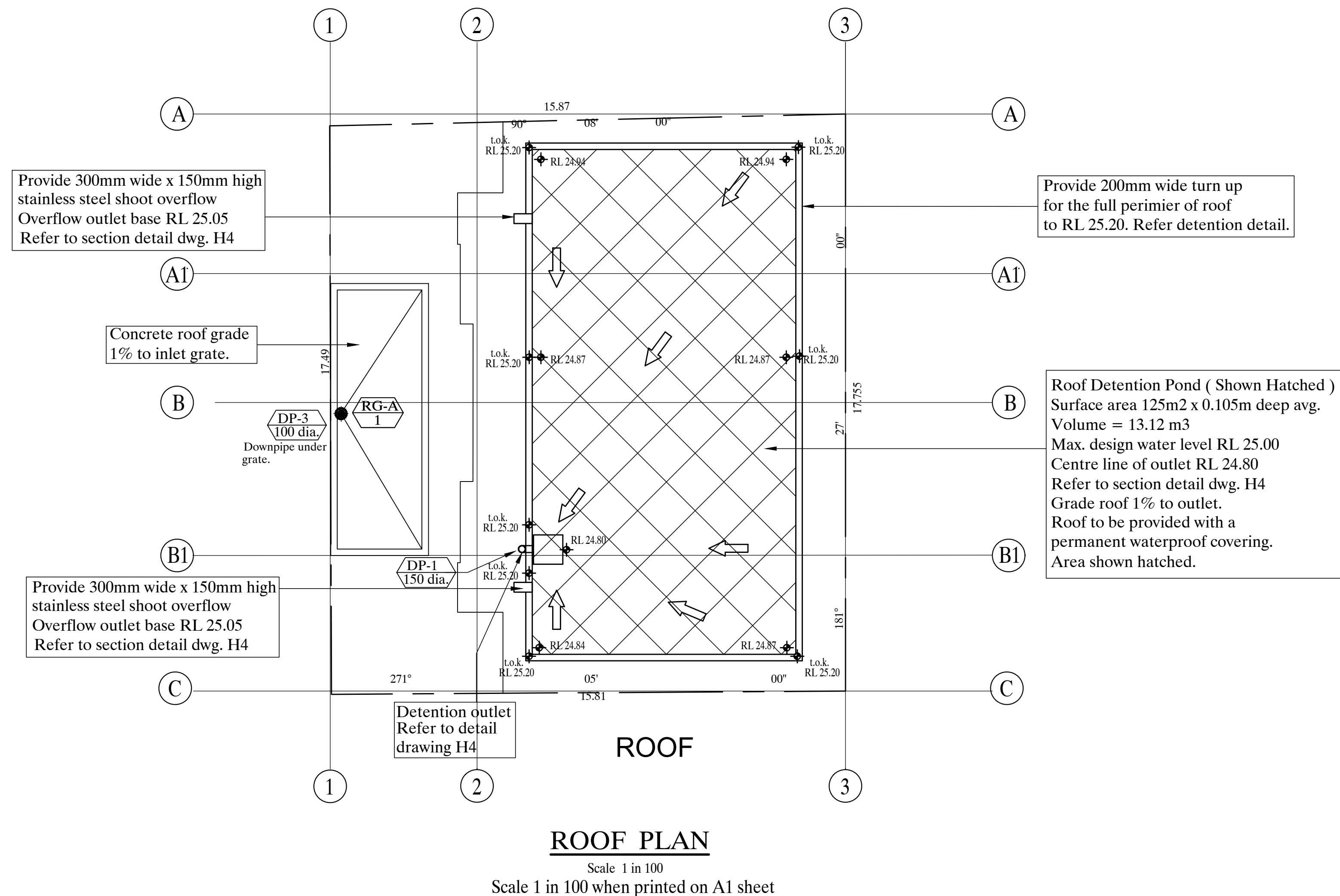
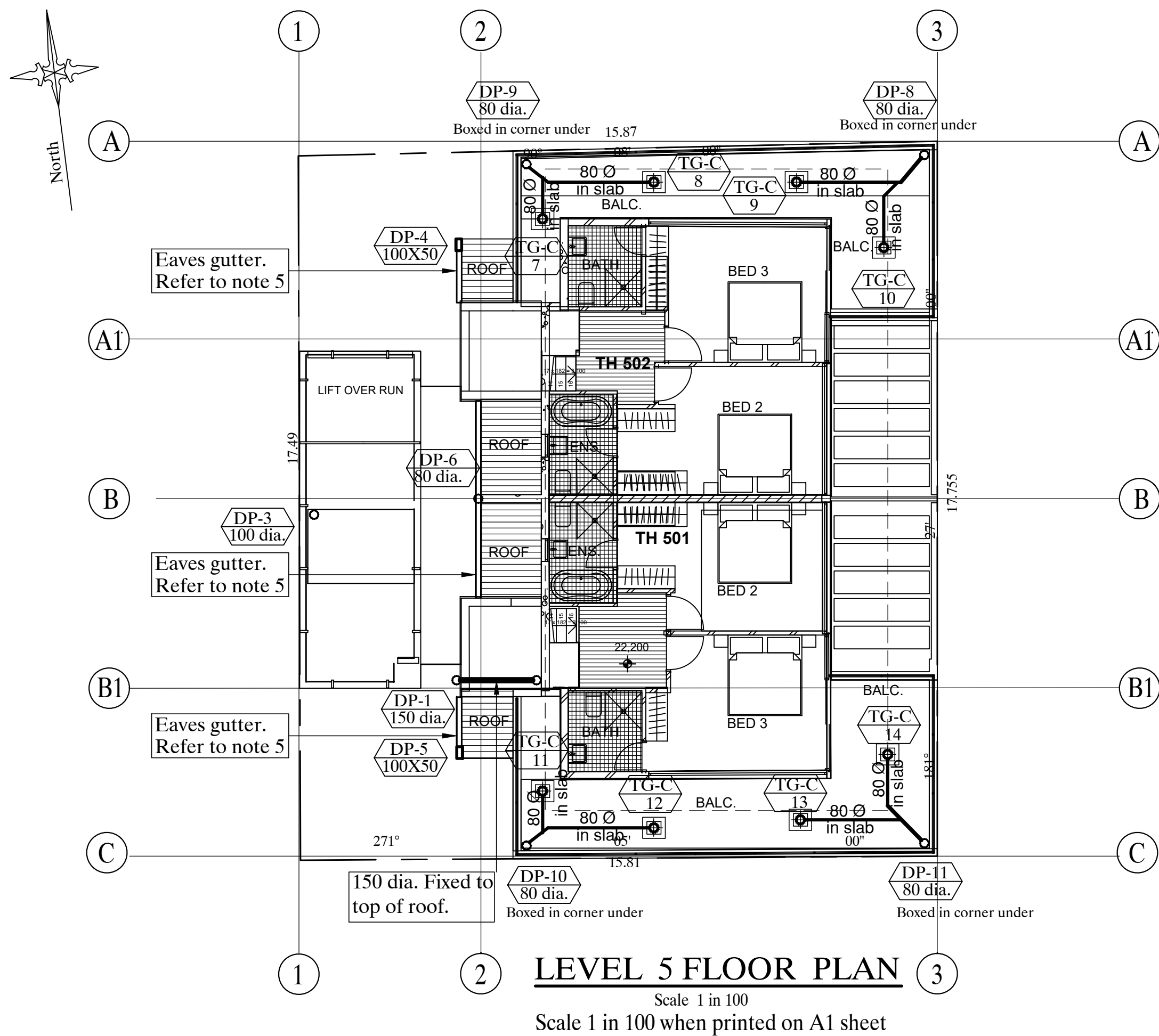
61A THE CENTRE FORESTVILLE P.O. BOX 69 FORESTVILLE 2087
Ph. 9451 4411 Fax. 9975 2274
email rob@gravaconsulting.com.au

Title
STORMWATER DRAINAGE CONCEPT PLAN
BASEMENT FLOOR PLAN
GROUND FLOOR / SITE PLAN

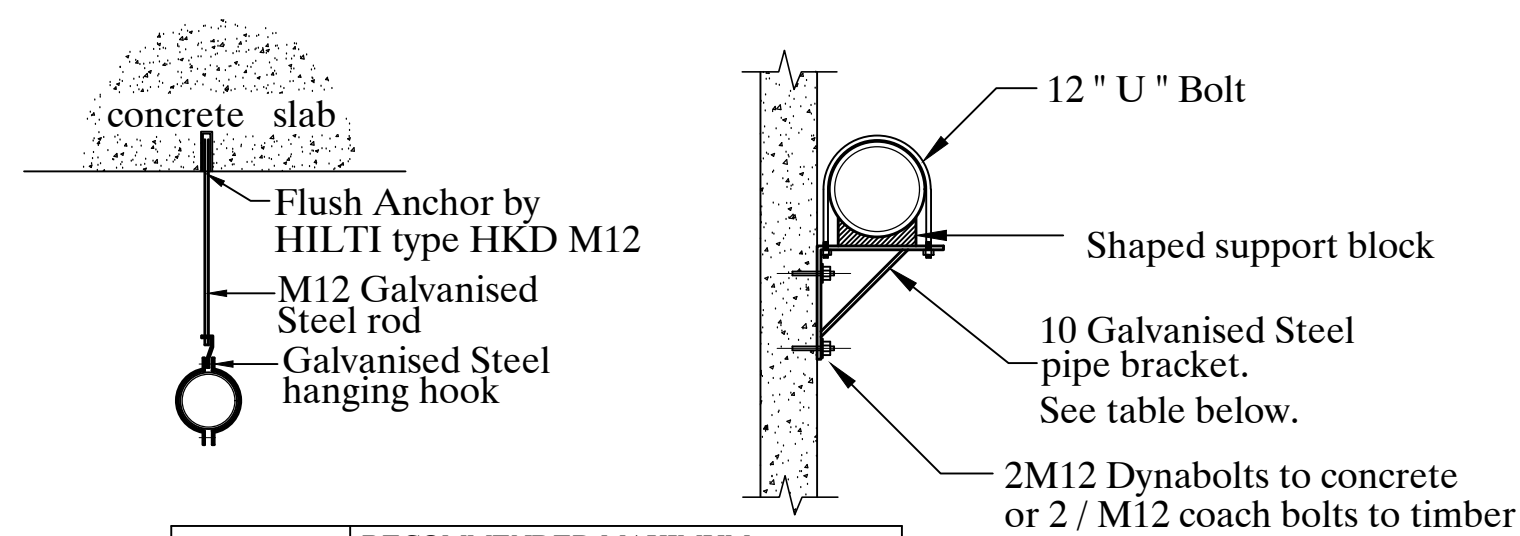
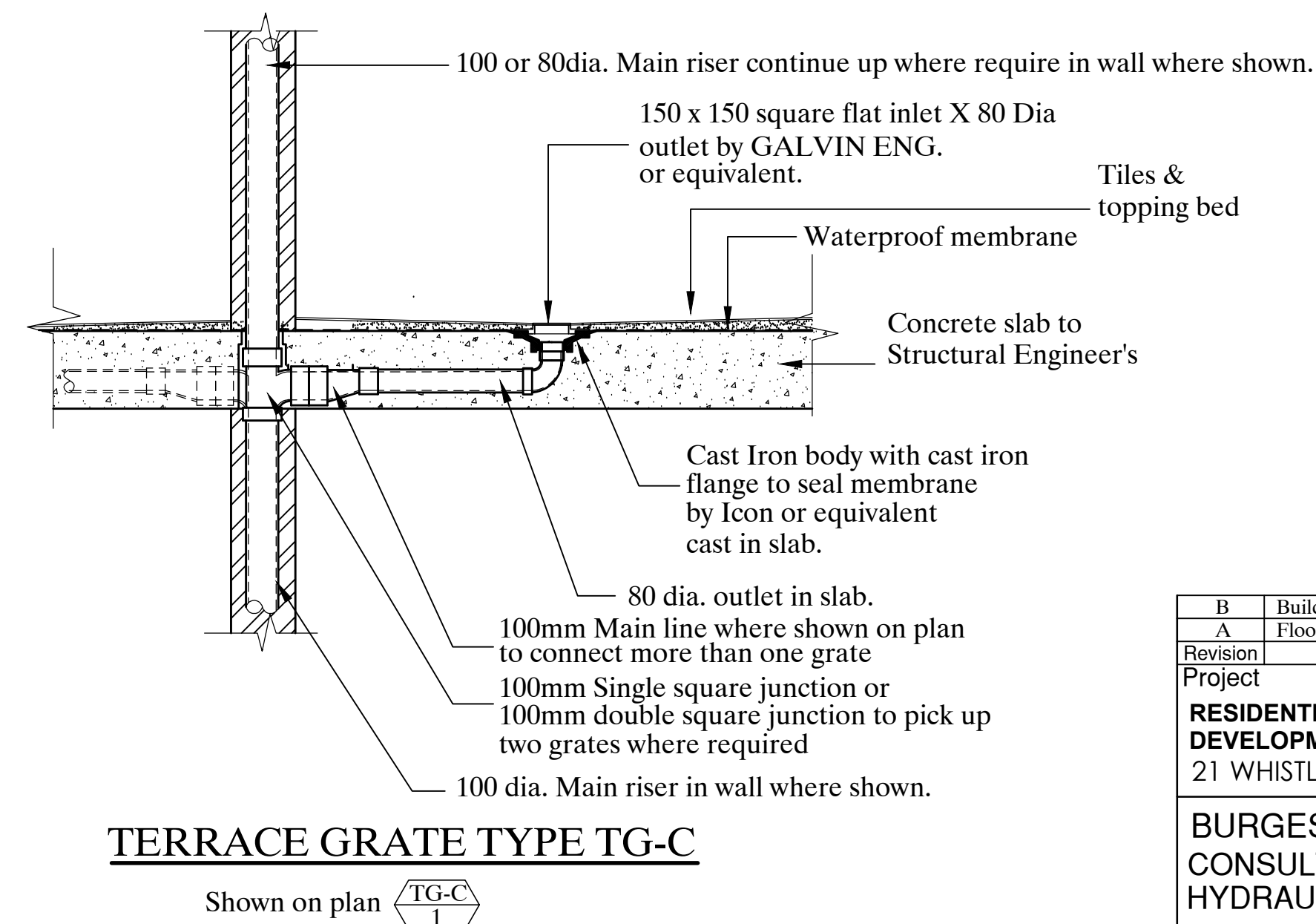
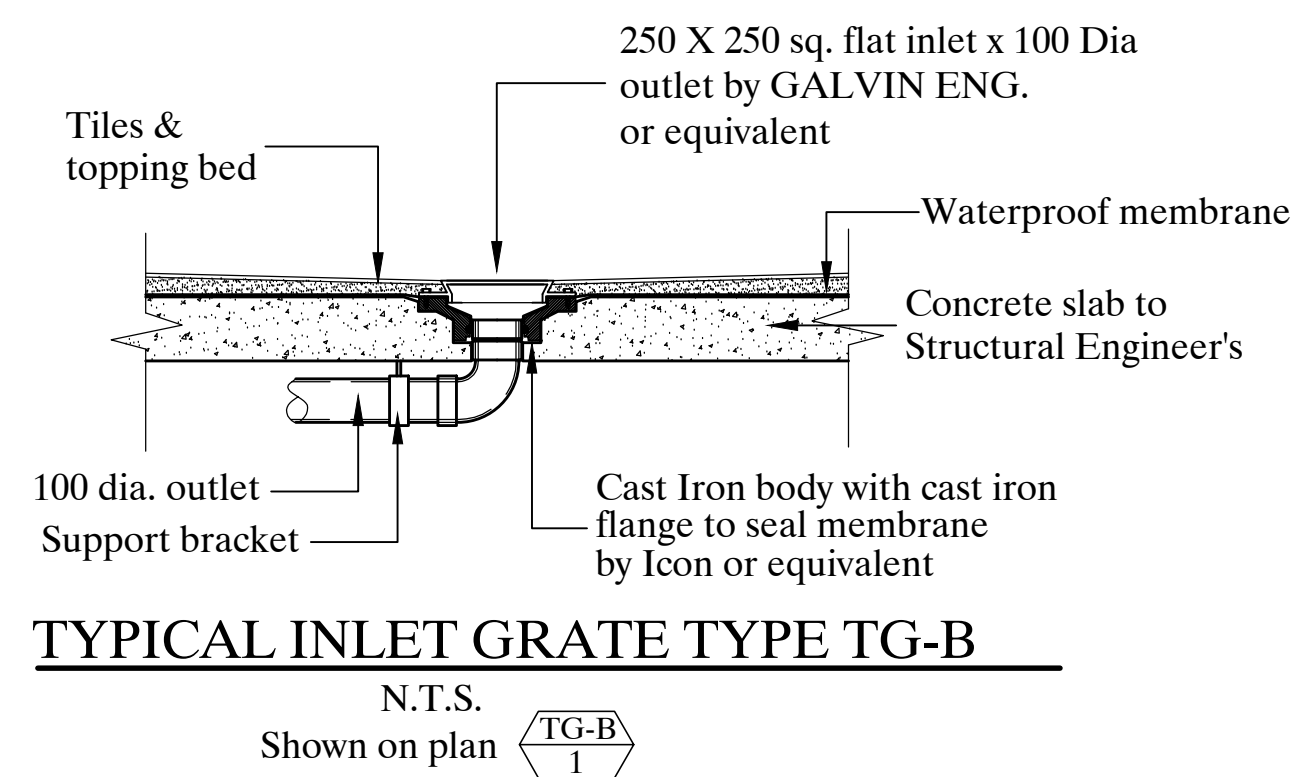
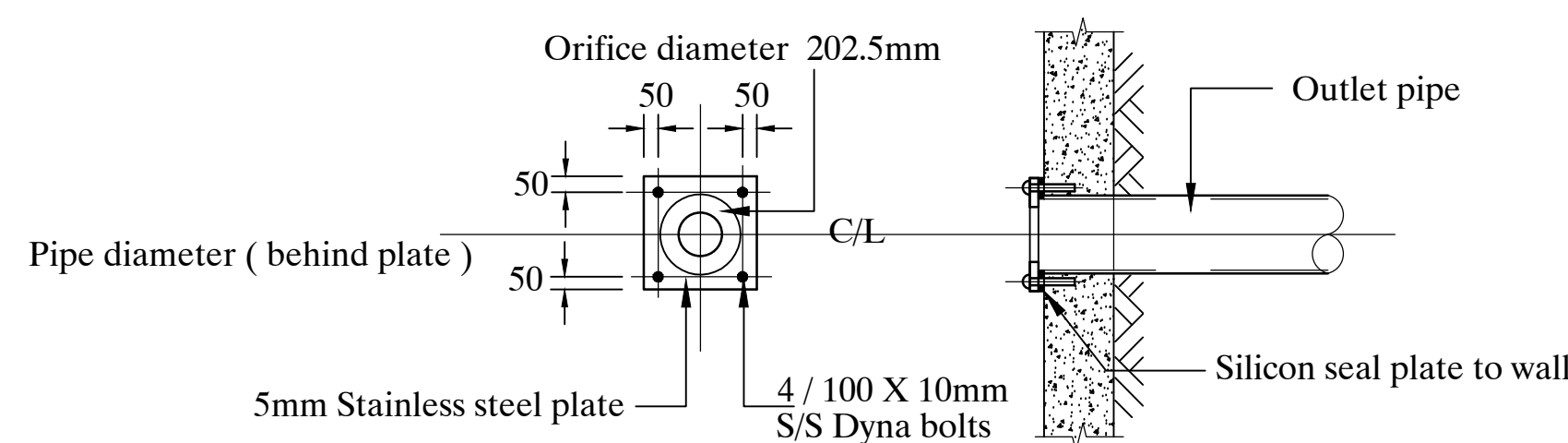
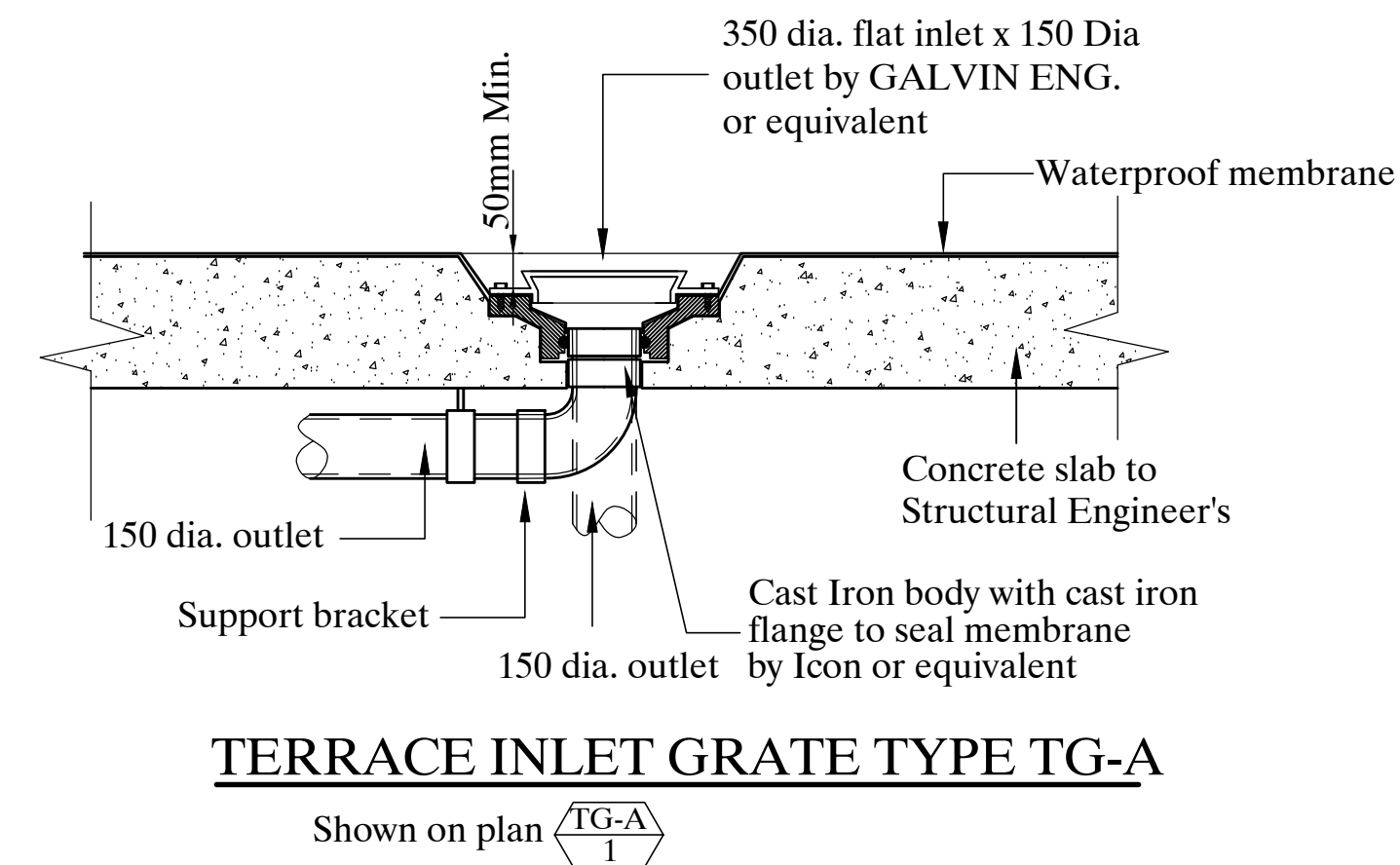
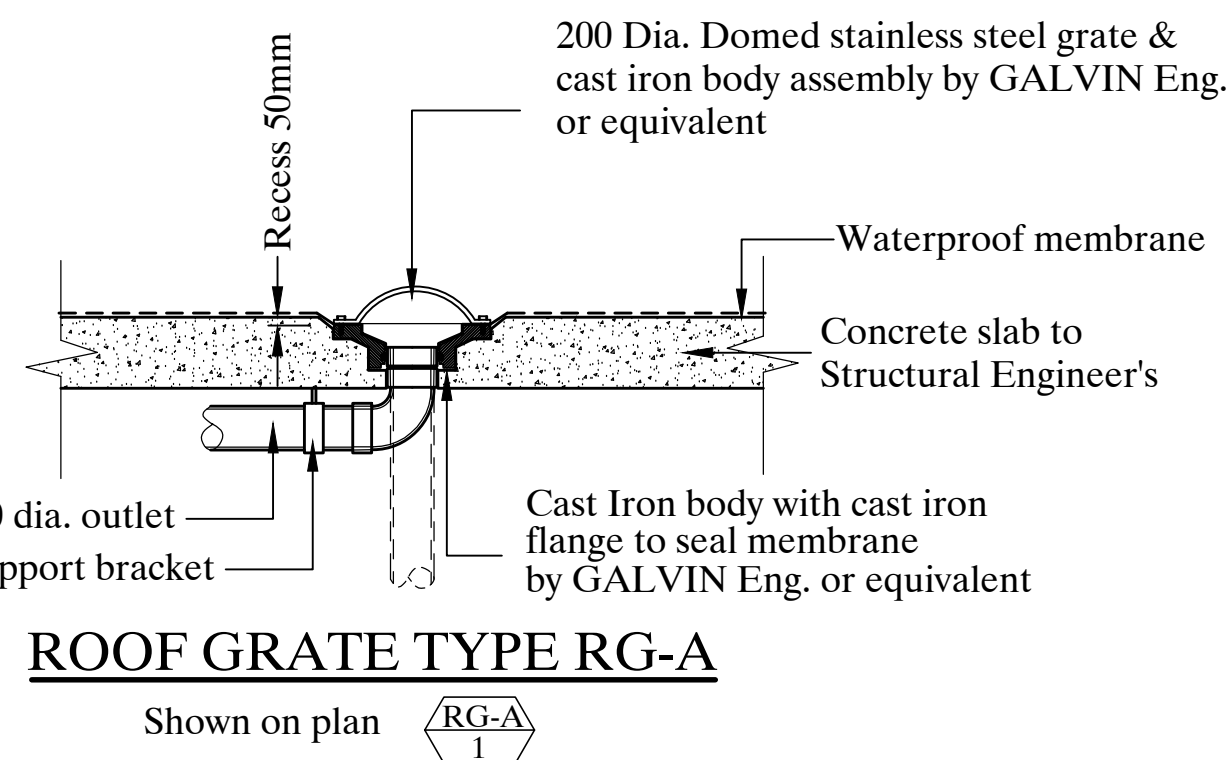
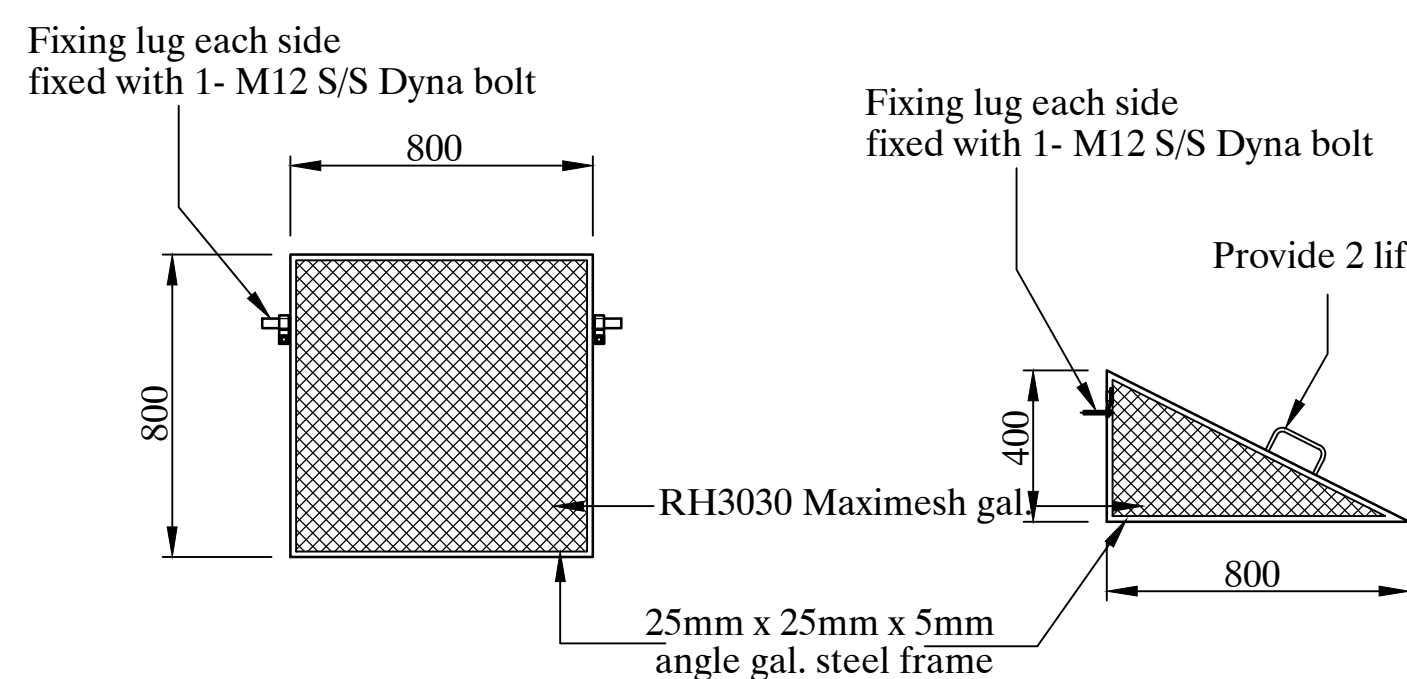
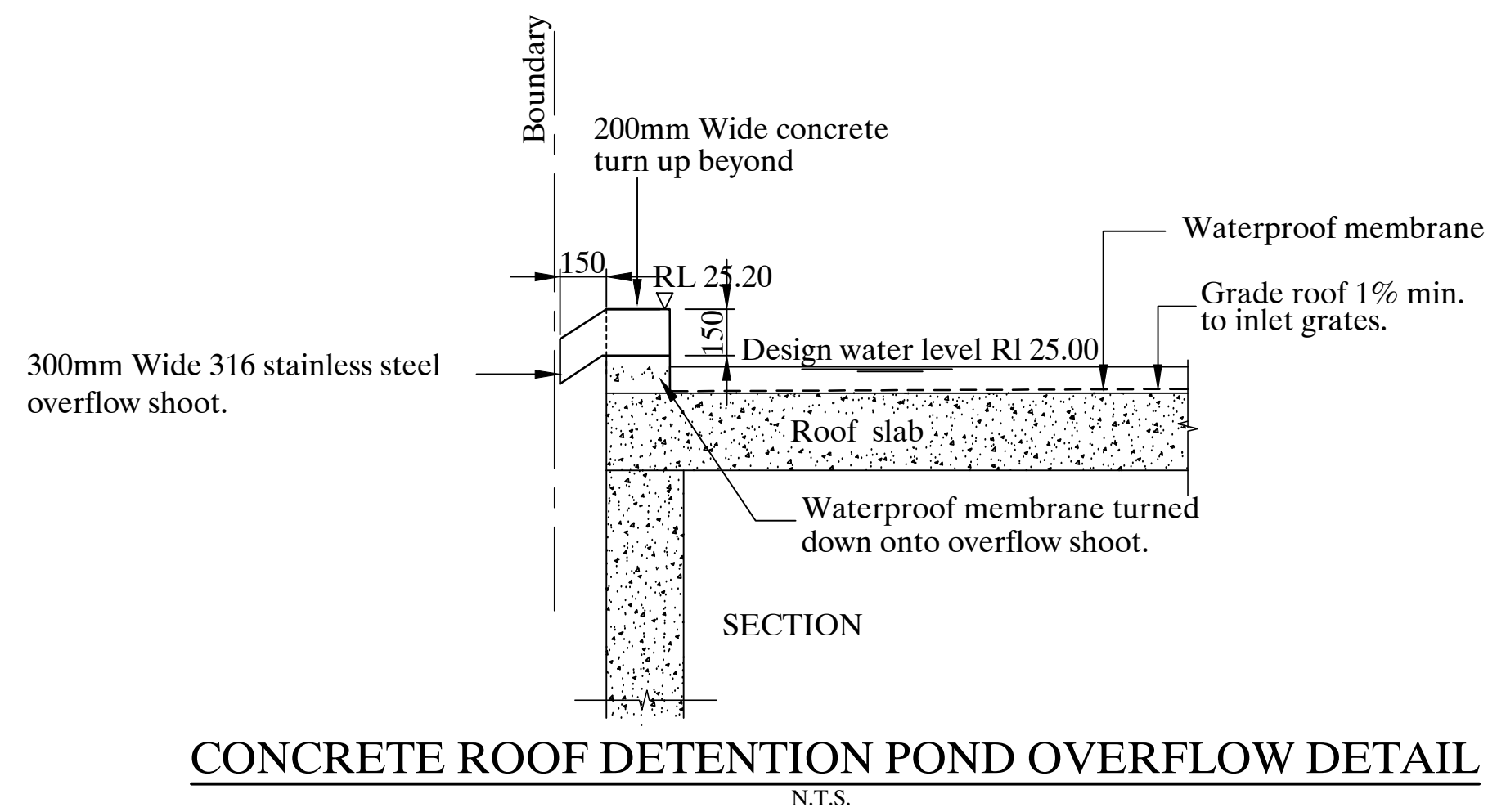
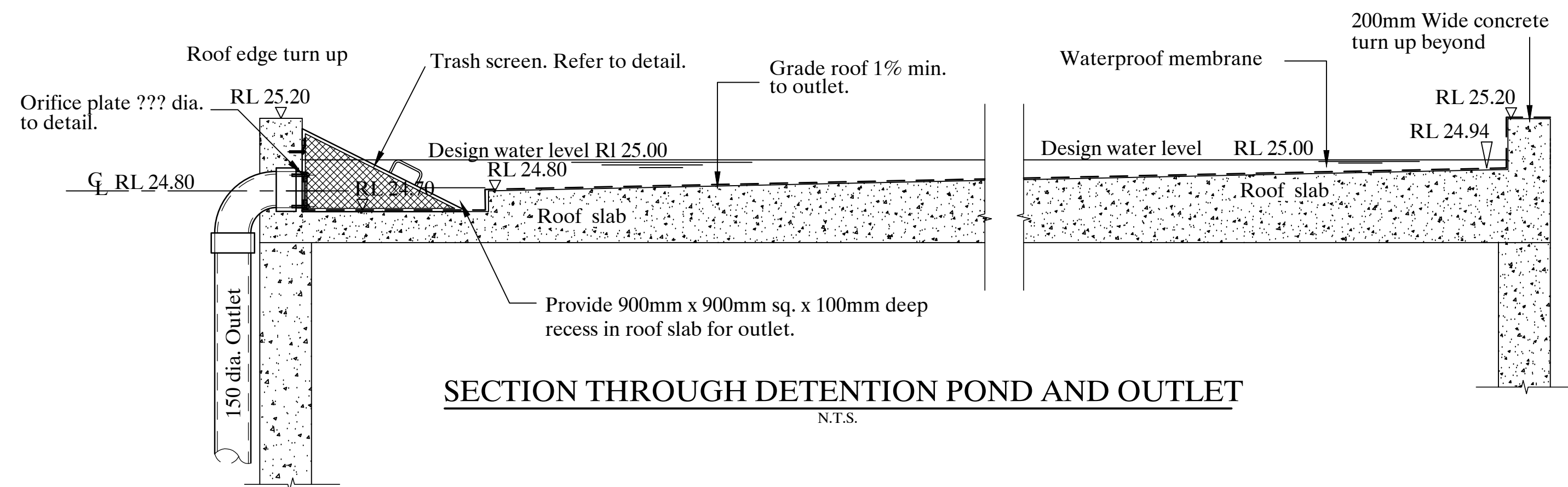
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Approved by			Drawing 1 in set of 4	
Chartered Engineer			Drawing size A1	



B	Building redesigned. Drainage redesigned.	21-11-2019
A	Floor plan Altered. Drainage altered to suit	10-10-2018
Revision	Details	Date
Project		
RESIDENTIAL DEVELOPMENT		
21 WHISTLER ST MANLY		
BURGESS, ARNOTT & GRAVA PTY. LTD.		
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email rob@gravaconsulting.com.au		
Title		
STORMWATER DRAINAGE CONCEPT PLAN		
LEVELS 1, 2, 3, & 4 FLOOR PLANS		
Checked	Scale	Date
R. Grava	As shown	Sep.2018
Approved by		Drawing 2 in set of 4
Chartered Engineer		Drawing size A1
Drawing No.	2018-116-H2	Rev. A



B	Building redesigned. Drainage redesigned.	21-11-2019
A	Floor plan Altered. Drainage altered to suit	10-10-2018
Revision	Details	Date
Project		
RESIDENTIAL DEVELOPMENT		
21 WHISTLER ST MANLY		
BURGESS, ARNOTT & GRAVA PTY. LTD.		
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email rob@gravaconsulting.com.au		
Title		
STORMWATER DRAINAGE		
CONCEPT PLAN		
LEVELS 5 FLOOR PLAN		
ROOF PLAN		
Checked	Scale	Date
R. Grava	As shown	Sep.2018
Approved by	Drawing 3 in set of 4	
Chartered Engineer	Drawing size A1	



NOMINAL SIZE OF PIPE	RECOMMENDED MAXIMUM SPACING OF SUPPORTS in M	VERTICAL PIPES
80	1.35	2.70
100	1.50	3.00
125	1.70	3.00
150	2.00	3.00
225	2.00	3.00

B	Building redesigned. Drainage redesigned.	21-11-2019
A	Floor plan Altered. Drainage altered to suit	10-10-2018
Revision	Details	Date

Project
RESIDENTIAL DEVELOPMENT
21 WHISTLER ST MANLY

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Title
STORMWATER DRAINAGE CONCEPT DETAILS

Checked	Scale	Date	Drawing No.	Rev.
R. Grava	As shown	Sep.2018	2018-116-H4	B
Approved by	Drawing 4 in set of 4			
Chartered Engineer	Drawing size A1			