

## **STORMWATER DESIGN CERTIFICATE**

**PROJECT:** PROPOSED CONSTRUCTION OF A GRANNY FLAT

**ADDRESS:** 27 PHILIP ROAD, MONA VALE 2103

**CLIENT:** HEATHER & PETER CAVE

**DRAWINGS NUMBER:** STW192-2022, REV.A

We confirm that Modular Engineers has reviewed the drawings and design for the above-mentioned address by practice and qualified stormwater engineer, the review has been performed in accordance with:

- BCA (2019)-Building Code of Australia Clause A2.2;
- AS/NZS 3500.3(2015)-Building Code of Australia;
- And Council DCP and SEPP

I, Ali Al-Obaidi from Modular Engineers Pty Ltd, I am a chartered professional engineer in both civil and structural colleges. I am a competent person in structural and civil design, being listed in the National Professional Engineering Register (NPER-5358554) and as such can certify that I am responsible for the stormwater design verification of the above elements described herein, and that the design was carried out in accordance with the provisions of the Building Code of Australia and the relevant Australian Standards.



**Ali Al-Obaidi | Director**

MSc, BSc, MIEAust, CPEng,  
NER (No: 5358554), NPER

# STORMWATER MANAGEMENT PLAN

## EROSION CONTROL

BEFORE EARTHWORKS CAN COMMENCE THE EROSION & SEDIMENT CONTROL MEASURES MUST BE IN PLACE.

DURING THE CONSTRUCTION PERIOD, THESE CONTROL MEASURES WILL NEED TO BE INSPECTED & MAINTAINED REGULARLY, ESPECIALLY AFTER STORM EVENTS, BY THE CONTRACTOR.

ALL WORK IS TO BE CARRIED OUT TO PREVENT EROSION, CONTAMINATION & SEDIMENTATION OF THE STORAGE SITE, SURROUNDING AREAS & DRAINAGE SYSTEMS.

MINIMIZE DISTURBED AREA COVERED WITH NATURAL VEGETATION. ONLY THOSE AREAS DIRECTLY REQUIRED FOR CONSTRUCTION ARE TO BE DISTURBED.

INSTALL EROSION/SEDIMENT CONTROL MEASURES PRIOR TO COMMENCEMENT OF CONSTRUCTION OR EXCAVATION OPERATIONS.

PROVIDE SILT FENCE/STRAW BAIL BARRIERS TO THE LOW SIDE OF ALL EXPOSED EARTH EXCAVATIONS. THE SEDIMENT FENCING MATERIAL TO CYCLONE WIRE SECURITY FENCE. SEDIMENT CONTROL FABRIC SHALL BE AN APPROVED MATERIAL (EG. HUMES PROPEX SILT STOP) STANDING 300mm ABOVE GROUND & EXTENDING 150mm BELOW GROUND.

ISOLATE EXISTING STORMWATER PITS WITH STRAW BALES OR SILT TRAPS TO FILTER ALL INCOMING FLOWS.

DO NOT STOCKPILE EXCAVATED MATERIAL ON THE ROAD WAY.

DIVERT CLEAN WATER FROM UNDISTURBED AREAS AROUND THE WORKING AREAS.

CONSTRUCTION ENTRY/EXIT SHALL BE VIA THE LOCATION NOTED ON THE DRAWING. CONTRACTOR SHALL ENSURE ALL DROPPABLE SOIL & SEDIMENT IS REMOVED PRIOR TO CONSTRUCTION TRAFFIC EXITING SITE. CONTRACTOR SHALL ENSURE ALL CONSTRUCTION TRAFFIC ENTERING AND LEAVING THE SITE DO SO IN A FORWARD DIRECTION.

TREAT THE STORMWATER RUNOFF WITH SUSPENDED SOLIDS SO THE DISCHARGE WATER QUALITY TO COUNCIL STORMWATER DRAINAGE SYSTEM HAS A MAXIMUM CONCENTRATION OF SUSPENDED SOLIDS THAT DOES NOT EXCEED 50 MILLIGRAMS PER LITRE IN ACCORDANCE WITH THE PROTECTION OF THE ENVIRONMENT OPERATION ACT (POEO 1997) AND SHALL BE APPROVED BY LOCAL COUNCIL

ADOPT TEMPORARY MEASURES AS MAY BE NECESSARY FOR EROSION & SEDIMENT CONTROL, INCLUDING BUT NOT LIMITED TO THE FOLLOWING: –  
– DRAINS: TEMPORARY DRAINS AND CATCH DRAINS.  
– SPREADER BANKS OR OTHER STRUCTURES: TO DISPERSE CONCENTRATED RUNOFF.  
– SILT TRAPS: CONSTRUCTION AND MAINTENANCE OF SILT TRAPS TO PREVENT DISCHARGE OF SCOURED MATERIAL TO DOWNSTREAM AREAS.

AFTER RAIN, INSPECT, CLEAN, AND REPAIR IF REQUIRED, TEMPORARY EROSION & SEDIMENT CONTROL MEASURES.

REMOVE TEMPORARY EROSION & SEDIMENT CONTROL MEASURES WHEN THEY ARE NO LONGER REQUIRED.

COMPLY WITH THE REQUIREMENTS OF LANDCOM'S MANAGING URBAN STORMWATER – SOIL AND CONSTRUCTION 'THE BLUE BOOK' LATEST EDITION

THE EROSION & SEDIMENT CONTROL PLAN PROVIDED IS ONLY INDICATIVE. THE CONTRACTOR SHOULD PREPARE A DETAILED ESCP SUITABLE FOR THE SPECIFIC SITE CONDITIONS



DIAL BEFORE YOU DIG SHOULD BE CONTACTED PRIOR TO ANY EXCAVATION ON SITE

TM: TRADE MARK OF THE ASSOCIATION OF DIAL BEFORE YOU DIG SERVICES LTD. USED UNDER LICENSE.

## GENERAL NOTES

ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH COUNCIL'S REQUIREMENTS, BUILDING CODE OF AUSTRALIA, NSW CODE OF PRACTICE AND THE TO THE RELEVANT SERVICE CODES.

THESE DRAWINGS 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. ALL DISCREPANCIES SHALL BE REFERRED TO THE SUPERINTENDENT FOR DECISION BEFORE PROCEEDING WITH THE WORK.

ALL DIMENSIONS SHOWN ON THE DRAWINGS ARE IN MILLIMETERS (U.N.O.). DIMENSIONS SHALL NOT BE OBTAINED BY SCALING OF THESE DRAWINGS. USE FIGURED DIMENSIONS ONLY.

BENCHMARKS HAVE BEEN ESTABLISHED WHERE INDICATED ON THE DRAWINGS. ALL LEVELS ARE TO AUSTRALIAN HEIGHT DATUM (A.H.D.). THE CONTRACTOR SHALL UNDERTAKE ALL NECESSARY SURVEY WORK TO ENSURE THAT THE WORKS ARE CONSTRUCTED TO DESIGN LINE AND LEVEL.

SETTING OUT DIMENSIONS AND LEVELS SHOWN ON THE DRAWINGS SHALL BE VERIFIED BY THE CONTRACTOR.

ALL MATERIALS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE RELEVANT SAA CODES AND THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES.

IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ALL SAFETY FENCES, WARNING SIGNS, TRAFFIC DIVERSIONS AND THE LIKE DURING CONSTRUCTION. ALL WORKS TO COMPLY WITH WORK HEALTH AND SAFETY REQUIREMENTS AND OTHER RELEVANT AUTHORITY SAFETY REQUIREMENTS.

NO TREES SHALL BE REMOVED, CUTBACK OR RELOCATED WITHOUT THE WRITTEN INSTRUCTION FROM THE SUPERINTENDENT.

WHERE NEW WORKS ABUT EXISTING THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE, FREE FROM ABRUPT CHANGES IS OBTAINED.

ALL WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS AND THESE SPECIFICATIONS.

DESIGN LEVELS GIVEN ARE TO FINISHED SURFACE LEVEL AND INCLUSIVE OF TOPSOIL. (TOPSOIL DEPTH VARIES)

THE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A N.A.T.A. REGISTERED SURVEYOR.

CARE IS TO BE TAKEN WHEN EXCAVATING NEAR EXISTING SERVICES. NO MECHANICAL EXCAVATIONS ARE TO BE UNDERTAKEN OVER TELECOMMUNICATIONS OR ELECTRICAL SERVICES. HAND EXCAVATE IN THESE AREAS.

THE LOCATIONS OF UNDERGROUND SERVICES SHOWN ON THE DRAWING HAVE BEEN PLOTTED FROM DIAGRAMS PROVIDED BY SERVICE AUTHORITIES. THIS INFORMATION HAS BEEN PREPARED SOLELY FOR THE AUTHORITIES OWN USE AND MAY NOT NECESSARILY BE UPDATED OR ACCURATE.

THE POSITION OF SERVICES AS RECORDED BY THE AUTHORITY AT THE TIME OF INSTALLATION MAY NOT REFLECT CHANGES IN THE PHYSICAL ENVIRONMENT SUBSEQUENT TO INSTALLATION.

MODULAR ENGINEERS DOES NOT GUARANTEE THAT THE SERVICES INFORMATION SHOWN ON THE DRAWING SHOWS MORE THAN THE PRESENCE OR ABSENCE OF SERVICES, AND WILL ACCEPT NO LIABILITY FOR INACCURACIES IN THE SERVICES INFORMATION SHOWN FROM ANY CAUSE WHATSOEVER.

IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN FROM THE UTILITY SERVICES AUTHORITIES A CURRENT COPY OF UNDERGROUND SERVICES SEARCH FOR THE LOCATION OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF ANY WORK AND NOTIFY ANY CONFLICT WITH THE DRAWINGS IMMEDIATELY. CLEARANCE SHALL BE OBTAINED FROM THE RELEVANT REGULATORY AUTHORITY. CONTRACTOR TO KEEP COPY OF UNDERGROUND SERVICES SEARCH ON SITE AT ALL TIMES. ANY DAMAGES TO SERVICES OR SERVICES ADJUSTMENTS SHALL BE CARRIED OUT BY THE CONTRACTOR OR RELEVANT AUTHORITY AT THE CONTRACTOR'S EXPENSE.

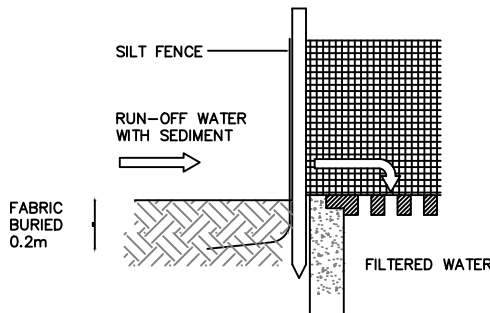
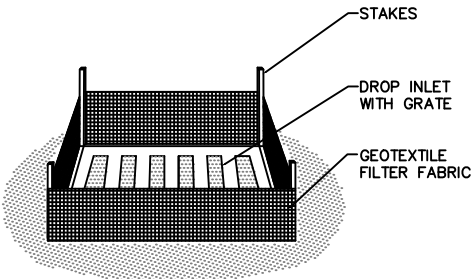
VISIT THE SITE BEFORE SUBMITTING THE FINAL TENDER PRICE TO ASSESS 'ON SITE' CONDITIONS. FAILURE TO DO SO WILL FORFEIT ANY CLAIM FOR NOT BEING AWARE OF CONDITIONS AFFECTING THE TENDER.

THE CONTRACTOR SHALL PREPARE ACCURATE WORK-AS-EXECUTED DRAWINGS FOLLOWING THE COMPLETION OF ALL WORKS.

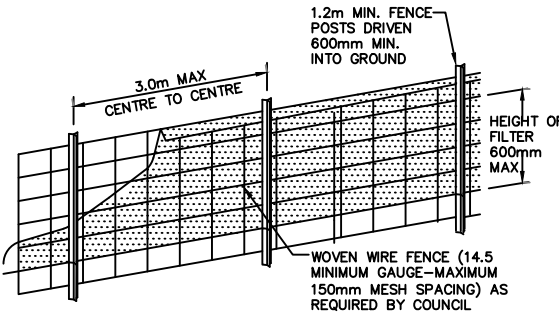
IT IS THE CONTRACTOR'S RESPONSIBILITY TO HAVE IN PLACE & MAINTAIN TRAFFIC FACILITIES AT ALL TIMES DURING CONSTRUCTION.

LEGEND	
	DENOTED Ø100 DIAMETER PIPE TO RAINWATER TANK UNLESS DENOTED
	DENOTED Ø100 DIAMETER PIPE TO STORMWATER TANK UNLESS DENOTED
	DENOTED Ø100 DIAMETER SEALED CHARGE LINE PIPE TO STORMWATER TANK UNLESS DENOTED
	DENOTED Ø100 DIAMETER SEALED CHARGE LINE PIPE TO RAINWATER TANK UNLESS DENOTED
	DENOTED DOWN PIPE SPREADER
	DENOTES DOWN-PIPE
	DENOTES EXISTING DOWN-PIPE
	DENOTES RAINWATER 1% MIN. FALL GRAVITY LINE
	DENOTES STORMWATER 1% MIN. FALL GRAVITY LINE
	DENOTES STORMWATER SEALED CHARGE LINE
	DENOTES RAINWATER SEALED CHARGE LINE
	DENOTES ANTICIPATED ALIGNMENT OF EXISTING UNDERGROUND STORMWATER SYSTEM
	DENOTES SUBSOIL LINE
	DENOTES EXISTING STORMWATER LINE
	DENOTES AUTHORITY SEWER LINE
	DENOTES SEDIMENT FENCE
	DENOTES CLEAR OUT EYE POINT
	DENOTES SEALED CLEAR OUT EYE POINT
	DENOTES GRATED SURFACE INLET PIT
	DENOTES GRATED TRENCH DRAIN
	DENOTES PROPOSED SPOT LEVEL
	DENOTES EXISTING GRATED SURFACE INLET PIT
	DENOTES EXISTING JUNCTION PIT
	DENOTES EXISTING KERB INLET PIT
	DENOTES EXISTING TELSTRA PIT
	DENOTES EXISTING HYDRANT
	DENOTES EXISTING STOP VALVE
	DENOTES EXISTING GAS VALVE
	DENOTES EXISTING POWER POLE
	DENOTES EXISTING SEWER MANHOLE
	DENOTES OVERLAND FLOW PATH
	DENOTES FLOOR WASTE

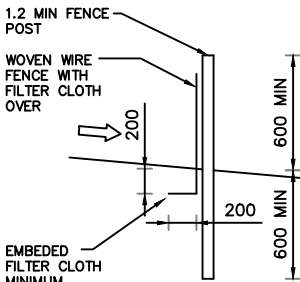
ABBREVIATIONS	
Ø/DIA	DENOTED DIAMETER
CBR	DENOTED CALIFORNIA BEARING RATIO
CH	DENOTED CHAINAGE
CL	DENOTED CENTER LINE
CO	DENOTED CLEAR OUT
DD	DENOTES DISH DRAIN
DDO	DENOTES DISH DRAIN OUTLET
RCP	DENOTES REINFORCED CONCRETE PIPE
DP	DENOTES DOWNPIPE
ext	DENOTES EXISTING
FFL	DENOTES FINISHED FLOOR LEVEL
GTD	DENOTES GRATED TRENCH DRAIN
GSIP	DENOTES GRATED SURFACE INLET PIT
HYD	DENOTES HYDRANT
IJ	DENOTES ISOLATING JOINT
IL	DENOTES INVERT LEVEL
IP	DENOTES INTERSECTION POINT
KIP	DENOTES KERB INLET PIT
KO	DENOTES KERB OUTLET
K&G	DENOTES KERB & GUTTER
KR	DENOTES KERB RETURN
LS	DENOTES LONGITUDINAL SECTION
NGL	DENOTES NATURAL GROUND LEVEL
ONP	DENOTES OVERLAND FLOW PATH
OSD	DENOTES ON-SITE DETENTION
R	DENOTES RADIUS
RL	DENOTES REDUCED LEVEL
RW	DENOTES RETAINING WALL
RWT	DENOTES RAINWATER TANK
SJ	DENOTES SAWN CONTROL JOINT
SMH	DENOTES SEWER MAN HOLE
SW	DENOTES STORMWATER
SWP	DENOTES STORMWATER PIT
SWRM	DENOTES STORMWATER RISING MAIN
SV	DENOTES STOP VALVE
TOK	DENOTES TOP OF KERB
TOW	DENOTES TOP OF WALL
TWL	DENOTES TOP WATER LEVEL
TP	DENOTES TANGENT POINT
UPVC	DENOTES UNPLASTICISED POLYVINYL CHLORIDE
UNO	DENOTES UNLESS NOTED OTHERWISE
FF	DENOTES FIRST FLUSH DEVICE
TYP	DENOTES TYPICAL



SUMP SEDIMENT TRAP  
NOT TO SCALE

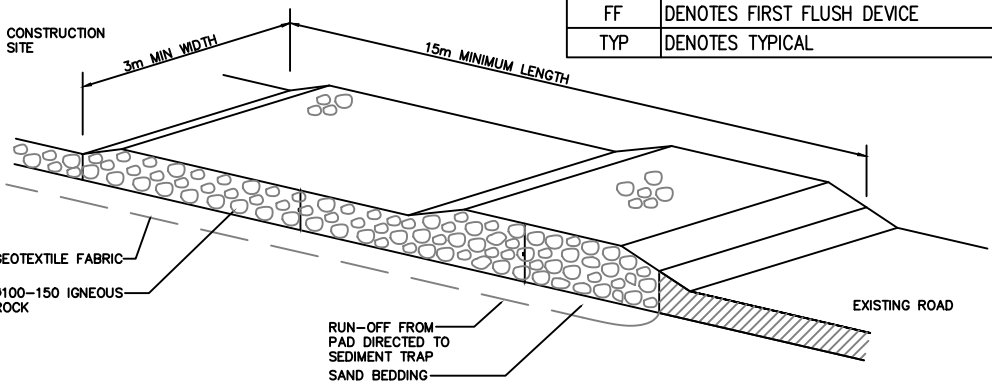


DIAGRAMMATIC VIEW



TYPICAL SECTION

SEDIMENT FENCE DETAIL  
NOT TO SCALE



TEMPORARY CONSTRUCTION EXIT (RUBBLE ALTERNATIVE)  
NOT TO SCALE

REVISIONS				
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DESIGNED	SARA	TITLE PAGE, NOTES & DETAILS			
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- UPPER LEVEL
- A. INSTALL Ø65mm uPVC SPITTER PIPES 20mm ABOVE SURFACE LEVEL FOR BALCONY AND CONCRETE ROOF AREAS TO ALLOW FOR EMERGENCY OVERFLOW IN CASE OF BLOCKAGES DURING HEAVY STORMS. PLUMBER TO CONFIRM LOCATION DURING CONSTRUCTION.
  - B. BALCONY, TERRACE & CONCRETE ROOF AREAS TO BE FITTED WITH RAINWATER OUTLETS AND CONNECTED TO NEAREST DOWNPIPE WHERE REQUIRED (TYP).
  - C. DOWNPIPES (DP) SHOWN ON PLAN ARE TO BE Ø100mm uPVC OR 100x75 U.N.O. (TYP).
  - D. CHARGED DOWNPIPES SHOWN ON PLAN MUST BE SEWER GRADE Ø100mm uPVC WITH ALL JOINTS SOLVENT WELDED TO AN INLET 1200mm ABOVE THE RAINWATER TANK LEVEL R.L. (TYP).
  - E. PROPOSED DOWNPIPE LOCATIONS ARE NOMINAL AND TO BE CONFIRMED DURING CONSTRUCTION (TYP).
  - F. INSTALL DOWNPIPE WITH SPREADER PIPE (SP) (IF REQUIRED) TO DISPERSE STORMWATER ONTO LOWER ROOF AREAS EFFECTIVELY.

PIPE SCHEDULE				
TAG	SIZE	MATERIAL	GRADE	TYPE
A	DAI.100	P.V.C.	MIN. 1%	GRAVITY
B	DAI.150	P.V.C.	MIN. 1%	GRAVITY
X	DAI.100	P.V.C.	CHARGE	TO RWT/PIT
D	200X100	GALV. STEEL	MIN. 1%	TO KERB
E	EXISTING	EXISTING	EXISTING	EXISTING

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CHECKED	ALI	JOB NO.	APPROVAL TYPE	DRAWN NO.	SIZE	
DATE	14-DEC-22	STW192-2022	FOR CONSTRUCTION	STW002	A3	

A horizontal scale bar for A3 drawings. It is marked with numbers from 0 to 110 in increments of 10. The bar is divided into segments by vertical tick marks. The first segment from 0 to 10 is labeled 'A3 0'.



DESIGN NOTES:

THE SITE IS LOCATED IN NOTHERN BEACHES COUNCIL.

SITE AREA = 1809 m² (BY CALC’S)

THE DEVELOPMENT CONSISTS OF THE CONSTRUCTION OF A DETACHED SECONDARY DWELLING.

INCREASE IN IMPERVIOUS AREA = 68.8m²

THE INCREASE IN NEW DEVELOPMENT IMPERVIOUS AREA IS LESS THAN >50–75 SQM; THEREFORE OSD OF 4500L IS REQUIRED AS PER SECTION TABLE 7 OF THE WATER-MANAGEMENT-DEVELOPMENT-POLICY-AUG2020

USING AN INTEGRATED TANK WOULD INVOLVE A TOTAL CAPACITY OF 6000L STORAGE WITH 4500L OSD AND 1500L RWT. THEREFORE 2X3000L TANKS IS PROVIDED.

THE NEW SITE STORMWATER DRAINAGE WILL BE CONNECTED TO EXISTING AS SHOWN ON PLANS.

ALL NEW STORMWATER PIPES TO HAVE A MINIMUM OF 100mm CONCRETE OR 300mm TOPSOIL COVER U.N.O.

RAINWATER TANK TO BE EQUIPPED WITH FIRST FLUSH AND MOSQUITO PROTECTION DEVICES (REFER DETAIL).

LOCATION RAINWATER TANK SHOWN ON PLAN IS INDICATIVE. TO BE CONFIRMED DURING CONSTRUCTION.

ALL STORMWATER PIPES ARE TO BE A MINIMUM OF 600mm CLEAR FROM EXISTING SEWER LINE (TYP).

Required Orifice Diameter (d)

$Q = CA \cdot 2gh$

$h=0.653$

$Q=2L/s$  (as per table 7)

$Cd= 0.6$

$A= 29.449142$

$d= 34.45 \Rightarrow 35mm$

where

C = coefficient of orifice discharge (0.62)

A = area of orifice in m²

g = acceleration due to gravity = 9.81m²/s

h = depth of water above the center of the orifice in meters.

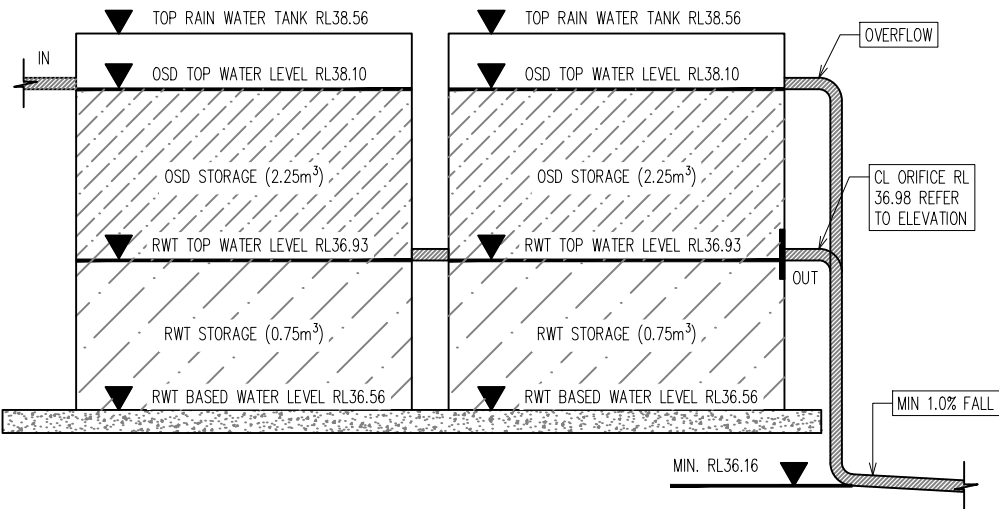
d = diameter of orifice in millimeters.



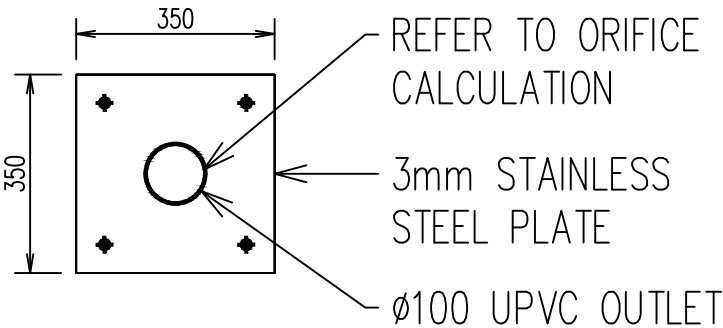
Table 7 Requirements for Size and Allowable Discharge from On-Site Detention Systems

Additional Hard (Impervious) Surface Area (square metres)	Minimum Capacity of On-Site Detention Tank (Litres)	Discharge Rate Litres/Sec
0 -50	Nil	Nil
>50 - 75	4,500	2
>75 - 100	6,000	3
>100 - 150	9,000	4
>150 - 200	12,000	6
>200 - 250	15,000	7
>250 - 300	18,000	9
>300 - 400	24,000	12
>400 - 500	30,000	15
>500 - 600	36,000	18
>600 - 700	42,000	21
>700 - 800	48,000	24
>800 - 900	54,000	27
>900 - 1,000	60,000	30
>1,000*	A minimum storage capacity of 60 liters per m² of additional hard/impervious surface area, and a discharge rate which replicates the discharge from the site were it to be undeveloped.	

\*Developments exceeding 1,000 square metres of additional hard (impervious) surface area must also provide with the Water Management Plan, an Integrated Water Management Strategy prepared by a suitably qualified and experienced Water Engineer. The plan must demonstrate that stormwater flows discharged from the site is to be no greater than what would have occurred predevelopment, and that Water Sensitive Urban Design principles have been practically maximised within the proposed development.



TYPICAL OSD AND RAIN WATER TANK DETAIL  
NOT TO SCALE



TYPICAL ORIFICE PLATE ELEVATION  
NOT TO SCALE

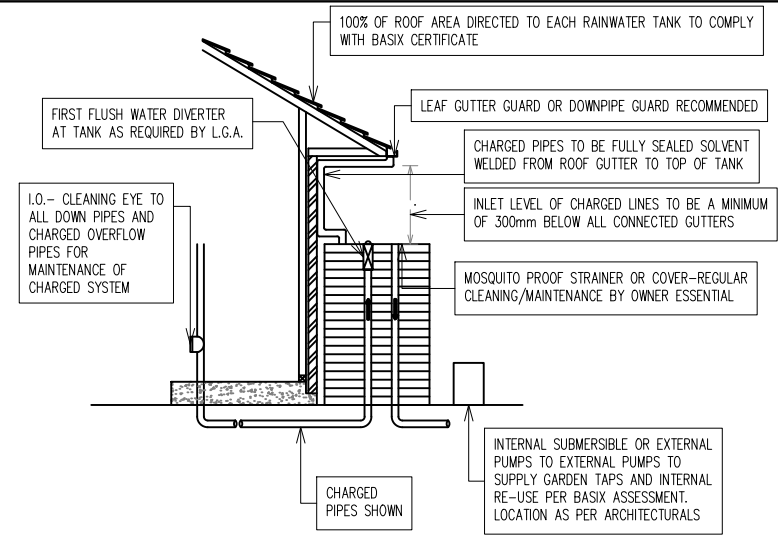
REVISIONS				
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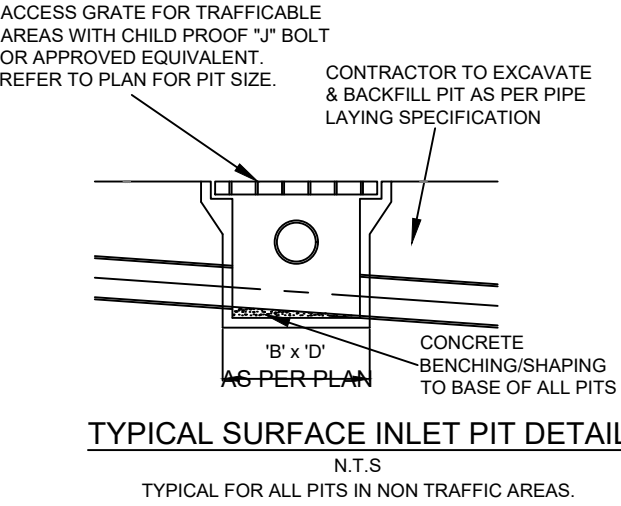
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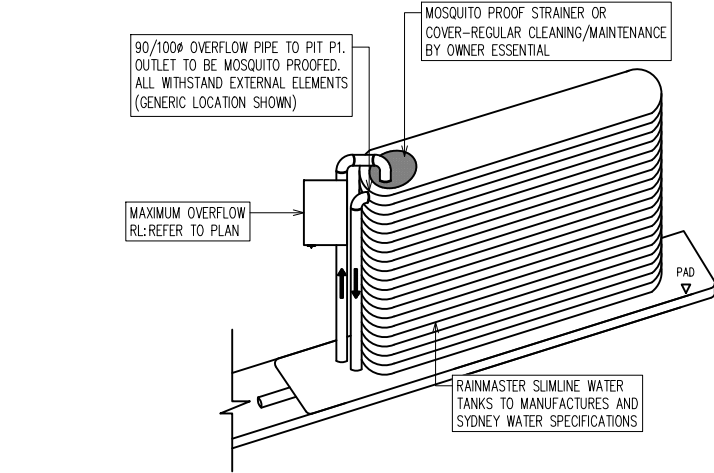
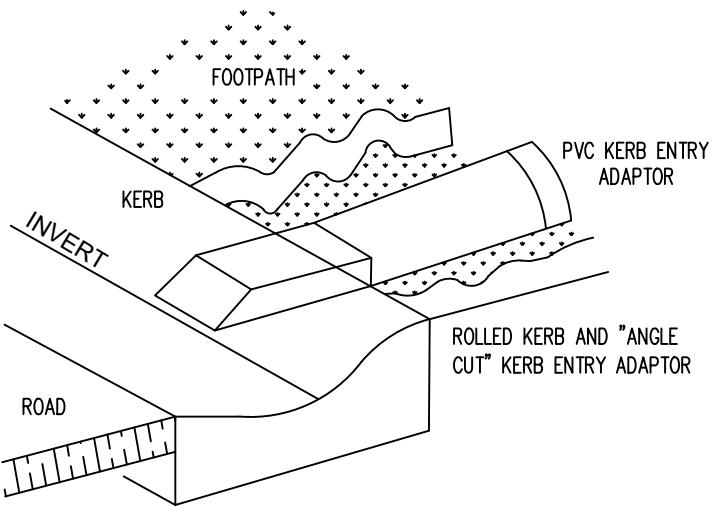
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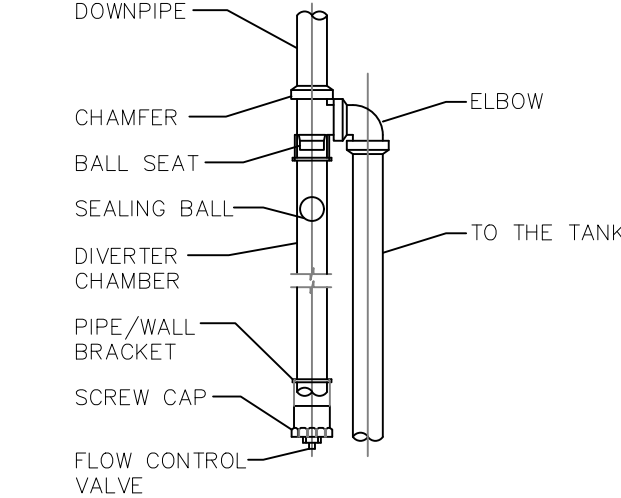
TYPICAL RAIN WATER TYPICAL RAINWATER RE-USE TANK CONFIGURATION  
NOT TO SCALE



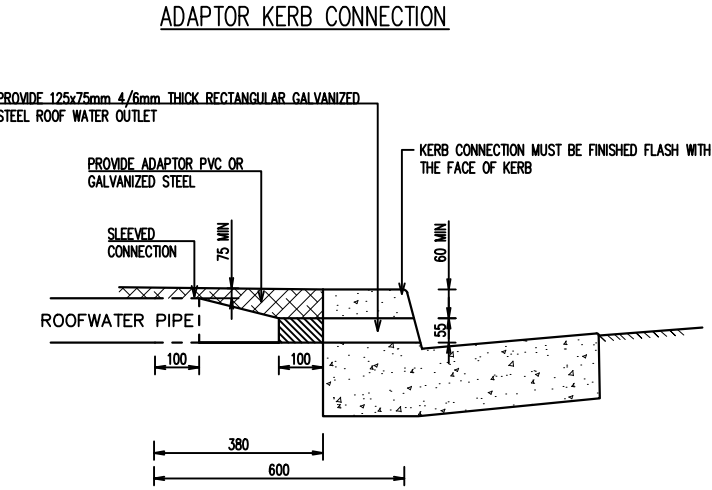
TYPICAL SURFACE INLET PIT DETAIL  
N.T.S  
TYPICAL FOR ALL PITS IN NON TRAFFIC AREAS.



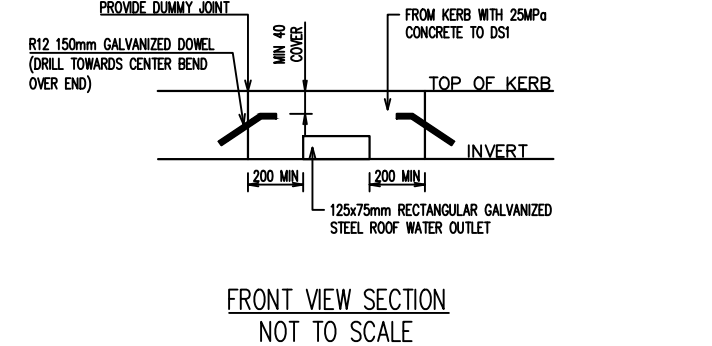
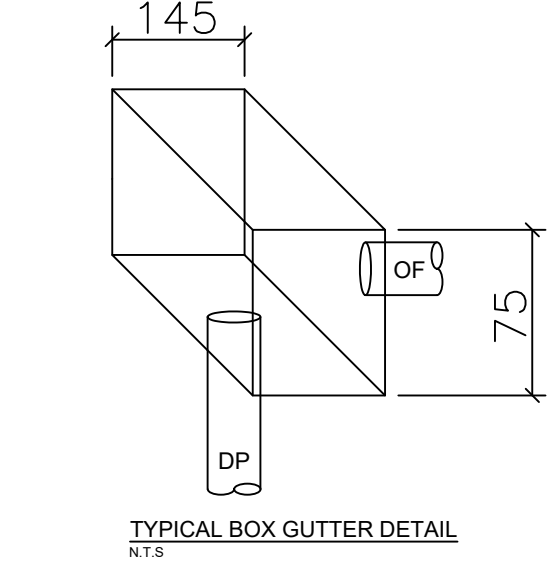
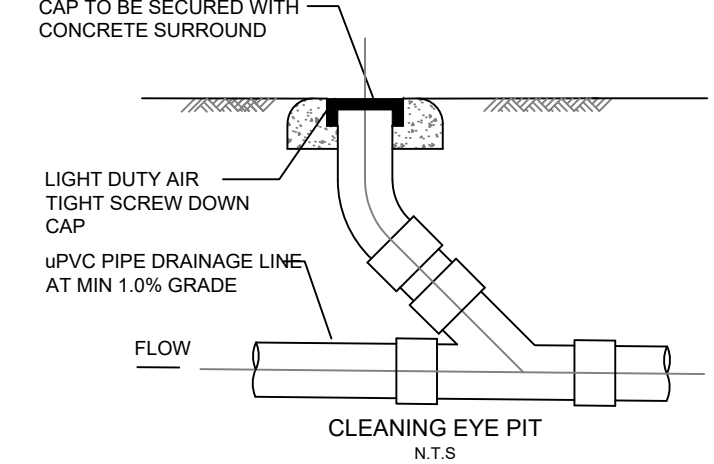
TYPICAL WATER TANK  
NOT TO SCALE



FIRST FLUSH DIVERTER  
SCALE: 1:20

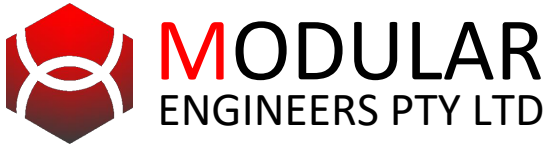


ROOF WATER OUTLET CONNECTION



- NOTES FOR KERB CONNECTION
1. ENSURE THAT ALL CONNECTIONS ARE WATER TIGHT.
  2. FOR TRAFFICABLE AREA SUCH AS DRIVEWAY, USE RECTANGULAR GALVANIZED STEEL ROOF WATER OUTLET FOR FULL LENGTH, EG. BOUNDARY TO KERB.
  3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

REVISIONS				
REV.	DATE	DESCRIPTION	ENG.	DFT.
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DESIGNED	SARA	STORMWATER DETAILS AND NOTES			
CHECKED	ALI	JOB NO.	APPROVAL TYPE	DRAWN NO.	SIZE
DATE	14-DEC-22	STW192-2022	FOR CONSTRUCTION	STW004	A3
A3 0 10 20 30 40 50 60 70 80 90 100 110					