

OPTION	ALTERNATIVE OPTION	TYPICAL SITUATIONS OF USE	RISKS THAT WOULD REQUIRE MITIGATION
1	LOCALLY BRINGING THE PIPE ABOVE GROUND	WITHIN A SECURE FACILITY, PUBLIC OPEN SPACE OR LOW RISK OF TRAFFIC COLLISION	NOISE, ODOUR, VEHICLE COLLISION, VANDALISM AND HYDRAULIC (EG. AIR ACCUMULATION). WHERE INVERTED "U" SHAPE PIPE USED, INSTALL AIR VALVE AT HIGH POINT AND ENSURE AIR VALVE DOES NOT CAUSE A TRANSIENT HYDRAULIC ISSUE
2	SELECT OR MODIFY EQUIPMENT SO IT IS SUITABLE FOR BURIED SERVICE	LOWER RISK OF FAILURE ITEMS ⁴ OR WHERE BURYING IS PREFERRED ⁵	PROTECT ELECTRICAL ITEMS FROM MOISTURE INGRESS. SELECT NON-RETURN VALVES WITHOUT EXTERNAL MOVING PARTS (NO COUNTER WEIGHT ARMS) etc. DAMAGE TO OTHER ASSETS DURING EXCAVATION AND TRAFFIC RISKS

- PITS TYPICALLY REQUIRED FOR "HIGH MAINTENANCE EQUIPMENT" (REFER TABLE 2) WHEN REGULAR ACCESS IS NEEDED TO EQUIPMENT SITUATED BELOW GROUND.
- PITS ARE OFTEN CLASSIFIED AS CONFINED SPACES. CONFINED SPACES SHOULD BE AVOIDED WHEREVER PRACTICAL UNLESS OTHERWISE STATED IN RELATED STANDARDS.
- FOR DEFINITION OF **LOW TRAFFIC COLLISION RISK**, REFER SHEET 2 OF AM2883-AIR VALVE STANDARD.
- LOW RISK OF FAILURE ITEMS** INCLUDE:
 - DN225 WATER SUPPLY APPURTENANCES
 - DN150 PRESSURE SEWER RETICULATION APPURTENANCES
 ALL OTHER APPURTENANCES INCLUDING SPS PRESSURE MAIN APPURTENANCES ARE NOT CONSIDERED TO BE LOW RISK (ie: SHOULD NOT BE DIRECT BURIED).
- ISOLATION VALVES** ARE TYPICALLY PREFERRED **IN PITS** WHEN:
 - THE VALVE IS i) **NOT** LOW RISK ⁴, AND ii) HAS A GEARBOX, AND ONE OF iii) OR iv) BELOW
 - iii) EXCAVATION IS NOT PRACTICAL (ie: MINIMUM CLEARANCE FROM THE OUTSIDE OF THE VALVE BODY IS **NOT** ACHIEVABLE), OR
 - iv) IS WITHIN MAJOR ROAD PAVEMENT AND NOT WITHIN 3m OF KERB.

EQUIPMENT	SUB-TYPE	TYPICALLY OFFSET	TYPICALLY IN-LINE	PLACEMENT PREFERENCE	REFERENCE
VALVE	WATER AIR VALVE	VERTICAL &/OR HORIZONTAL #		OFFSET NON-ENTRY PIT OR ABOVE GROUND	MRWA-W-304 & 305
	SEWERAGE AIR VALVE	VERTICAL &/OR HORIZONTAL #		OVER MAIN ENTRY PIT	AM2883
	NON-DRINKING WATER CROSS CONNECTION VALVES		YES	ABOVE GROUND CAGE	DUAL WATER INTERCONNECTION DRAWING 2
	ISOLATION VALVE (BURIED ⁵)		YES	BURIED	MRWA-W-302
	ISOLATION VALVE (IN PIT ⁵)		YES	INLINE ENTRY PIT	SHEETS 2 to 5
	NON-RETURN VALVE (LOW RISK ⁴)		YES	BURIED	MRWA-W-204 to 206
FLOW METER	CONTROL VALVE (EG. PRV)		YES	INLINE ENTRY PIT	SHEETS 2 to 5
	FLOW METER (LOWER RISK)		YES	BURIED	AM2832
	FLOW METER (HIGHER RISK)		YES	INLINE ENTRY PIT	SHEETS 2 to 5
FLUSHING POINT	VALVE-CONTROLLED HYDRANT	VERTICAL &/OR HORIZONTAL #		OFFSET NON-ENTRY PIT	MRWA-W-304 & 305
	END OF LINE WASHOUT		YES	INLINE NON-ENTRY PIT	MRWA-W-109 & 205
	TANKER CONNECTION POINT	VERTICAL &/OR HORIZONTAL #		OFFSET NON-ENTRY PIT	MRWA-W-307

OFFSET APPURTENANCES MAY BE OFFSET VERTICALLY OVER AND/OR TO THE SIDE OF THE MAIN. WHERE LOCATED OVER THE MAIN, THE PIT NEED ONLY ENCAPSULATE THE APPURTENANCE (NOT THE MAIN, UNLESS OTHERWISE SPECIFIED).

FEATURE	GUIDANCE	OPENING SIZE	REFERENCE
A ENTRY/ NON-ENTRY	SMALL SHALLOW ITEMS WHICH CAN BE ACCESSED FROM GROUND LEVEL. GENERALLY NON ENTRY (E.G. WASHOUTS, HYDRANTS AND WATER AIR VALVES).	NON-ENTRY OPENINGS SAME AS PIT FOOTPRINT	MRWA-W-305
B LADDER	LADDER REQUIRED FOR ENTRY PITS >600 DEEP. WHERE STANDARD STANCHIONS DO NOT FIT WITHIN A SHALLOW PIT, FIT ABOVE GROUND PERMANENT STANCHIONS. WHERE THIS IS NOT PRACTICAL, IMPLEMENT A BESPOKE SOLUTION (eg. FOLDABLE OR MULTIPART STANCHIONS). LOCATE LADDER SUCH THAT ONLY ONE COVER NEEDS TO BE OPENED TO GAIN ACCESS	NA	SEWL-STD-005
C VENTILATION	AIR VALVE PITS REQUIRE VENTILATION	NA	SHEET 1 NOTES
D PENETRATIONS	PIPE PENETRATIONS VARY DEPENDING ON PIPE TYPE AND THRUST	NA	SHEET 3
E DRAINAGE	PITS SHALL BE DESIGNED ASSUMING THAT LEAKAGE & INFILTRATION WILL OCCUR	NA	SHEET 2
F DISMANTLING	DISMANTLING JOINT REQUIRED ADJACENT TO EACH HIGH MAINTENANCE ITEM. TYPICALLY FLANGE ADAPTORS, RESTRAINED OR UNRESTRAINED FLANGE ADAPTORS USED	NA	SEW APPROVED PRODUCTS
G LIGHTING	REQUIRED WHEN MAINS POWER AVAILABLE AND PIT FOOTPRINT > 3 m ²	NA	SHEET 1 NOTES
H SPINDLES	PIT ISOLATION VALVE SPINDLES SHALL RISE TO AND BE OPERABLE FROM SURFACE	NA	AM2757
I COVERS	COVERS, SURFACE FEATURES AND FALL PROTECTION AS PER SEW STANDARD	NA	AM2757
J SHAPE	SINGLE PIPELINE APPURTENANCES OFTEN COST EFFECTIVELY CONTAINED WITH CIRCULAR STRUCTURES, ESPECIALLY FOR DEEPER ITEMS APPURTENANCES ON ≥2 PIPELINES TYPICALLY BETTER CONTAINED WITH RECTANGULAR STRUCTURES	PITS < 2.0m FLOOR TO CEILING, OPENING AND PIT FOOTPRINT SAME.	MRWA-S-307 TO 313 FOR CIRCULAR PITS SHEET 5
K ACCESS TO BOTH SIDES OF PIT EQUIPMENT (ACCESS REQUIRED TO ALL DISMANTLING JOINT FASTENERS)	ACCESS FROM ONE SIDE WHERE BOTH SIDES OF ITEMS ARE ACCESSIBLE FROM ONE SIDE. TYPICALLY SUITABLE FOR ITEMS ON MAINS ≤DN300.	PITS ≥2.0m FLOOR TO CEILING MAY HAVE A FIXED CEILING, PROVIDED THE OPENING FOOTPRINT ENCOMPASSES THE FOOTPRINT OF ALL LADDER WORKING SPACES AND HIGH MAINTENANCE EQUIPMENT	NO EXAMPLE SHOWN
	ACCESS ITEMS BY GOING OVER PIPE (IE: STRADDLE PIPE IF TOP OF PIPE <600 FROM STANDING LEVEL (STEP OR FLOOR)). TYPICALLY SUITABLE FOR ITEMS ON MAINS ≥DN600		FIGURES 1 to 3, SHEET 5
	ACCESS ITEMS FROM MULTIPLE LADDERS. TYPICALLY SUITABLE FOR ITEMS ON MAINS ≥DN375		FIGURE 4, SHEET 5
	ACCESS ITEMS BY GOING UNDER PIPE (ie: CRAWL WAY). NOT TYPICALLY ACCEPTABLE. SEW APPROVAL REQUIRED. POSSIBLY SUITABLE FOR ITEMS ON MAINS ≥DN375		NO EXAMPLE SHOWN
	ACCESS ITEMS FROM STAIRCASE OVER MAIN(S). POSSIBLY SUITABLE FOR ITEMS ON MAINS ≥DN375. NOT TYPICALLY ACCEPTABLE. SEW APPROVAL REQUIRED		NO EXAMPLE SHOWN

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APPROVED C. PAXMAN			

OPTION	TYPICAL SITUATIONS OF USE	RELEVANT STANDARDS
CAST IN-SITU CONCRETE	NEW PITS CONSTRUCTED OVER EXISTING MAINS. NON STANDARD AND LARGER PITS	AM2882 – SEW CONCRETE STANDARD
PRECAST CONCRETE or PREFABRICATED FRP	RECTANGULAR SMALLER PITS	WSA PS – 323 (CONC). BS 4994 (FRP)
PRECAST CONCRETE OR PLASTIC CIRCULAR SHAFT	TYPICALLY OFFLINE OR SINGLE APPURTENANCES	WSA PS – 323 (CONC). WSA 137 (PLASTIC)

PRIORITY	PRINCIPLE	PREFERENCE/ LIMITATION
1	PREVENT FALLS	WORKSAFE VICTORIA COMPLIANCE CODE – PREVENTION OF FALLS IN GENERAL CONSTRUCTION. REFER SOUTH EAST WATER DOC AM2757: COVERS FOR UNDERGROUND CHAMBERS.
	MINIMISE CONFINED SPACE RISK AS FAR AS PRACTICAL. LIMIT NEED FOR CONFINED SPACE ENTRY	CONFINED SPACE ENTRY ASSESSMENT SHALL BE DONE FOR ALL PITS IN ACCORDANCE WITH SOUTH EAST WATER REQUIREMENTS. WHERE A PIT IS A CONFINED SPACE, MAXIMISE EASE OF ACCESS, EGRESS AND RESCUE
2	MINIMISE RISK OF SEWAGE SPILLS	PREVENT AND CONTAIN SEWAGE DISCHARGES AS MUCH AS PRACTICAL
3	ENSURE STRUCTURALLY SOUND	REFER MRWA-S-307 to 310 FOR CIRCULAR PITS, AS3600 AND SHEET 3 FOR THRUST RESTRAINT
4	PROVIDE ACCESS FOR OPERATION AND MAINTENANCE	PROVIDE SAFE ACCESS TO ALL AREAS OF THE PIT REQUIRING ACCESS. REFER SHEET 4
5	PROTECT THE ASSET	LOCATE AS PER TABLE 6. COMPLY WITH AM2757: COVERS FOR UNDERGROUND STRUCTURES AND AM2759: FACILITY SECURITY SPECIFICATION
6	MAINTAIN CLEARANCES FROM OTHER SERVICES AND STRUCTURES	REFER MRWA SEWER CODE SECTION 5.4 AND MRWA WATER CODE SECTION 5.12.5.2
7	PROVIDE ADEQUATE CLEARANCES WITHIN THE PIT	IN CONSIDERATION OF THE LIKELY TOOLS REQUIRED (eg: TORQUE WRENCHES), PROVIDE SUFFICIENT FREE SPACE AROUND ALL FASTENERS. REFER TABLE B AND TABLE C ON SHEET 4
8	MINIMISE DEPTH OF PITS	WHERE PRACTICABLE, DEPTH OF PIT SHOULD BE <1.5m TO REDUCE COST AND REDUCE FALLING AND CONFINED SPACE RISKS.
9	ENSURE MAINTAINABLE ITEMS REMOVABLE	ENSURE ADEQUATE OPENING ABOVE MAINTAINABLE ITEMS. REFER TABLE B ON SHEET 4
10	ENSURE CORRECT ALIGNMENT OF PIPELINE COMPONENTS	PIPELINE ASSEMBLY MUST BE FULLY BOLTED TOGETHER BEFORE BEING SECURED TO PIT

PREFERENCE	PIT LOCATION
1	SOUTH EAST WATER-OWNED LAND
2	PUBLIC OPEN SPACE
3	NATURE STRIP / MEDIAN STRIP / ROAD SHOULDER
4	< 3m OF KERB IN NO PARKING LOCATION UNDER ROAD PAVEMENT (REQUIRES SEW APPROVAL).
5	>3m FROM KERB OR IN A PARKING LOCATION UNDER ROAD PAVEMENT (REQUIRES SEW APPROVAL).

NOTES REGARDING TABLE 6:

- WHERE ITEMS CANNOT BE MANUALLY LIFTED, PIT LOCATION REQUIRES ACCESS BY A CRANE TRUCK IN ACCORDANCE WITH SOUTH EAST WATER FACILITY ACCESS STANDARD AM2761.
- WHERE POSSIBLE, LOCATE PITS OUT OF ROADWAY TO ENSURE SAFE ACCESS AND MINIMISE TRAFFIC DISRUPTION DURING MAINTENANCE.
- LOCATE PITS TO PROVIDE CLEAR SPACE FOR ANY LIKELY FUTURE EXPANSION.
- FOR EXAMPLES OF PREFERRED LOCATIONS TO LOCATE PITS IN THE ROAD RESERVE, REFER SHEET 2 OF AM2883- SEWAGE AIR VALVE STANDARD.

BOUYANCY:

- ASSUME GROUND WATER AT SURFACE LEVEL UNLESS IT CAN BE DEMONSTRATED THAT A DIFFERENT LEVEL IS APPROPRIATE.
- CYLINDRICAL PIT BOUYANCY MITIGATION AS PER MRWA-S-307 TABLE 307-B.

STRUCTURAL:

- PITS SHALL BE DESIGNED AS WATER RETAINING STRUCTURES.
- PREFABRICATED PITS SHALL BE STRUCTURALLY DESIGNED BY PIT SUPPLIER, ENSURING THAT THE PIT DESIGN IS SUITABLE FOR THE GROUND CONDITIONS.
- CAST INSITU PITS REQUIRE STRUCTURAL DESIGN BY THE DESIGNER.
- ALL PITS REQUIRE STRUCTURAL REINFORCEMENT UNLESS PIT IS CYLINDRICAL, BUILT TO MRWA MAINTENANCE HOLE STANDARDS AND NOT INVOLVED IN THRUST RESTRAINT.
- THE PIT AND ALL PIPELINE PENETRATION DETAILS SHALL BE DESIGNED TO ACCOMMODATE ANY HYDRAULIC THRUST ACTING ON THE PIPELINE.
- CONCRETE PITS, WALLS AND CEILING SHALL BE MINIMUM 150 THICK WITH MINIMUM SL81 REINFORCEMENT.

BACKFILL:

THE AREA AROUND THE PIT IS TO BE BACKFILLED WITH GRANULAR BACKFILL, AS PER MRWA BACKFILL SPECIFICATION. THIS MAY BE CEMENT STABILISED IF APPROPRIATE (COMPACTION DENSITY DIFFICULT TO ACHIEVE).

EMBEDMENT:

- PIPELINE EMBEDMENT ADJACENT TO PIT SHALL CONFORM TO PIPELINE EMBEDMENT STANDARDS (MRWA-S-202 & MRWA-W-203). OVER-EXCAVATION SHALL BE FILLED WITH CEMENT STABILISED EMBEDMENT OR CONCRETE.
- CAST INSITU PITS SHOULD BE PLACED ON NATIVE SOIL.
- PREFABRICATED PITS SHOULD BE PLACED ON:
 - PITS WITH FOOTPRINT < 4m²: CEMENT STABILISED CRUSHED ROCK (CLASS 4)
 - PITS WITH FOOTPRINT ≥ 4m²: > 100 THICK BLINDING CONCRETE.

SEWAGE PUMP STATION VALVE PITS:

REFER TO SOUTH EAST WATER SUPPLEMENT TO WSA04 FOR ADDITIONAL REQUIREMENTS OF SEWAGE PUMP STATION VALVE PITS.

PIPE SUPPORTS:

- IF ANY COMPONENT WITHIN THE PIT IS REMOVED, ALL REMAINING COMPONENTS SHOULD REMAIN SECURELY IN POSITION.
- FABRICATED STAINLESS STEEL (SS) SUPPORTS PREFERRED. ENSURE COMPLIANCE WITH STANDARDS AM2760: STAINLESS STEEL SPECIFICATION.
- ON REQUEST, THE DESIGNER SHALL PROVIDE STRUCTURAL VERIFICATION OF THE PIPE SUPPORTS.

COVERS AND CONCRETE APRONS:

- PIT COVER(S) AND SURFACE CONCRETE APRONS SHOULD BE IN ACCORDANCE WITH SOUTH EAST WATER STANDARD AM2757: COVERS FOR UNDERGROUND CHAMBERS.
- WHERE COVER SUPPORT BEAMS ARE REQUIRED:
 - THEY SHALL BE LOCATED SUCH THAT HIGH MAINTENANCE EQUIPMENT CAN BE REMOVED FROM THE PIT WHILE THE BEAM(S) REMAIN IN PLACE.
 - THE DEPTH FROM FLOOR OR STEP TO UNDERNEATH OF BEAMS SHALL BE ≥2m.

AIR VALVE PITS:

- AIR VALVE PITS WILL REQUIRE VENTILATION.
- FOR WATER SUPPLY AIR VALVE DESIGN, REFER MRWA-W-305
- FOR SEWAGE PRESSURE MAIN AIR VALVE INSTALLATION DESIGN, REFER SEW STANDARD AM2883.

LIGHTING:

- PROVIDE LIGHTING WHERE ALL OF THE FOLLOWING CONDITIONS EXIST:
 - MAINS POWER IS ALREADY AVAILABLE ON SITE, AND
 - THE PIT HAS A FOOTPRINT > 3 m²
- PROVIDE 10 W OF WHITE LED LIGHTING PER m² OF PIT FOOTPRINT.
- PLACE LIGHTING CENTRALLY ON AT LEAST TWO OPPOSITE WALLS AT 1.8m ABOVE FLOOR LEVEL.



101 Wells Street, Frankston, VIC 3199 W : www.sew.com.au
T: 61 3 9552 3000 F: 61 3 9552 3001 E: info@sew.com.au

SOUTH EAST WATER
AM2884- PIT STANDARD

PRINCIPLES AND REQUIREMENTS

DATUM: NA	
MELWAY REF: NA	
SCALE: AS SHOWN	SHEET SIZE: A1
SEW DRAWING NUMBER	
AM2884- SHEET 1	
SEW JOB No:	REV

WATER
OPTIONS SHOWN IN ORDER OF PREFERENCE

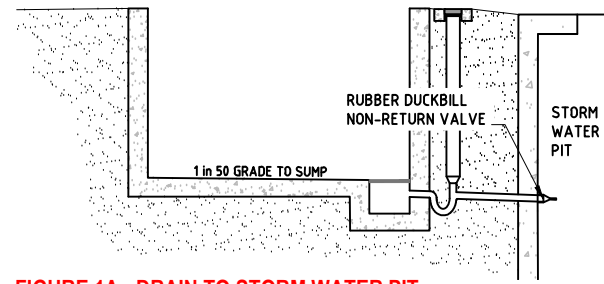


FIGURE 1A: DRAIN TO STORM WATER PIT

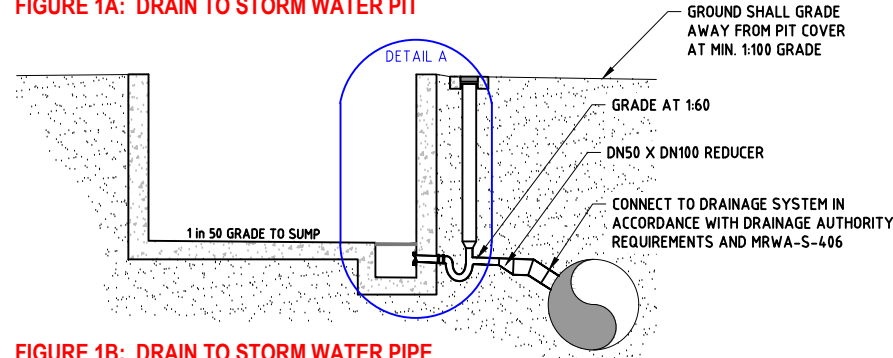


FIGURE 1B: DRAIN TO STORM WATER PIPE WHEN DRAINAGE SYSTEM IS LOWER THAN PIT FLOOR

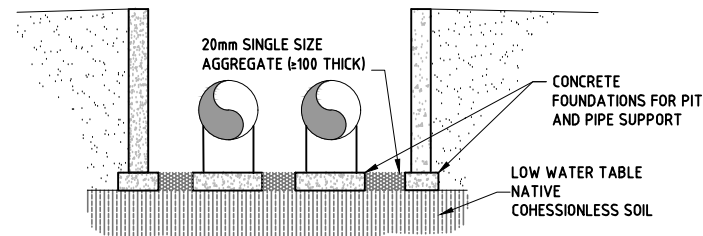


FIGURE 1C: DRAIN TO NATIVE COHESIONLESS SOIL

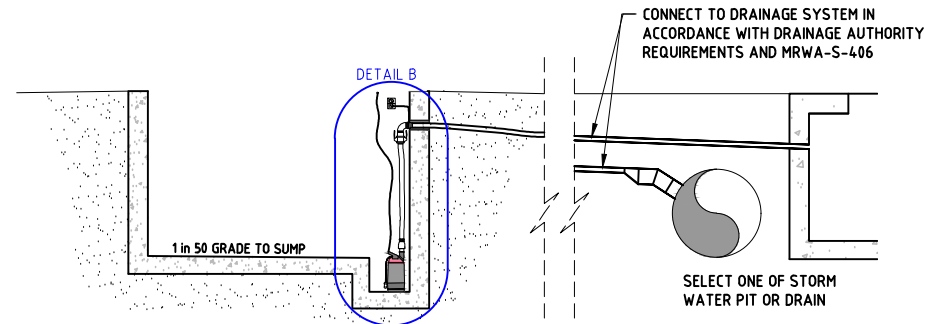


FIGURE 1D: SUMP PUMP TO STORM WATER PIT (PREFERRED) OR STORM WATER DRAIN MAY BE NECESSARY WHEN DRAINAGE SYSTEM IS HIGHER THAN PIT FLOOR

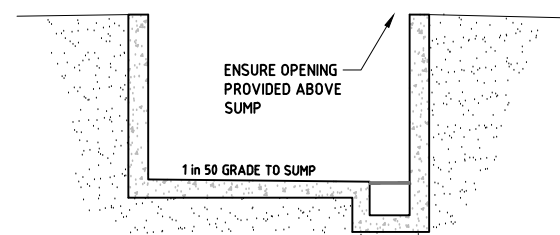


FIGURE 1E: SUMP COLLECTION (EDUCTION OR MANUAL PUMP OUT)

SEWAGE
OPTIONS SHOWN IN ORDER OF PREFERENCE

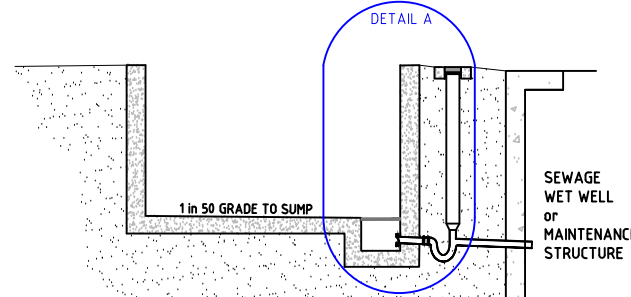


FIGURE 2A: DRAIN TO SEWAGE WET WELL OR MAINTENANCE STRUCTURE

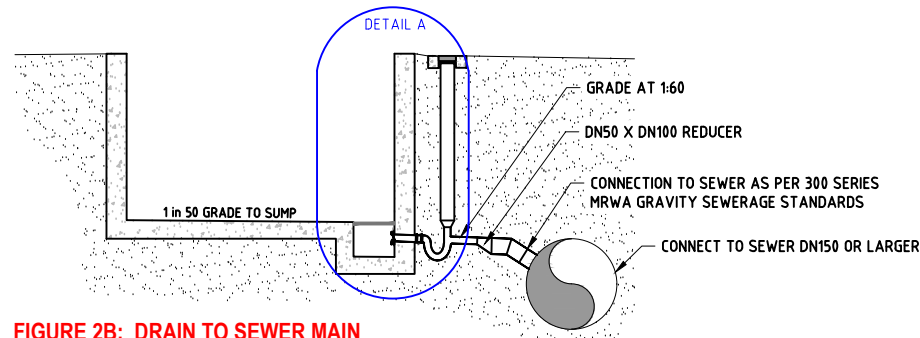


FIGURE 2B: DRAIN TO SEWER MAIN

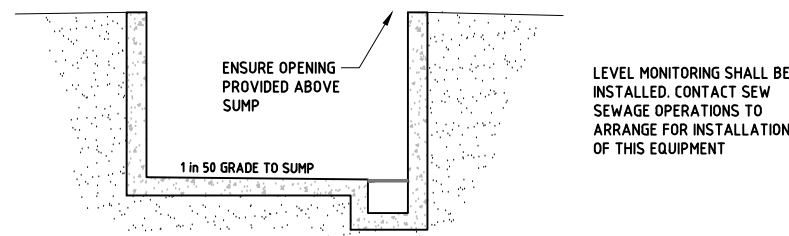


FIGURE 2C: SUMP COLLECTION (EDUCTION OR MANUAL PUMP OUT)

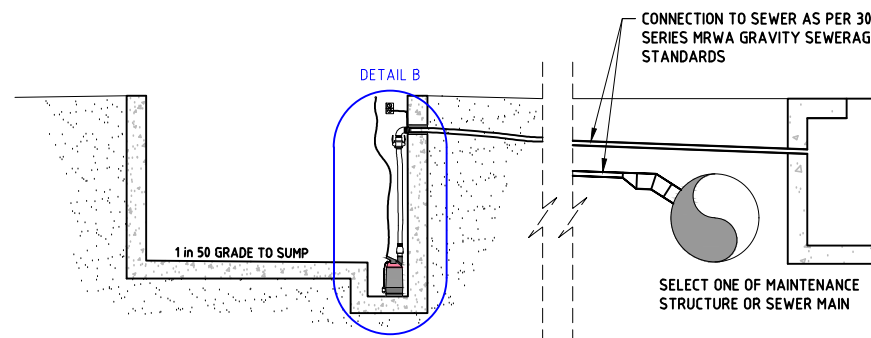
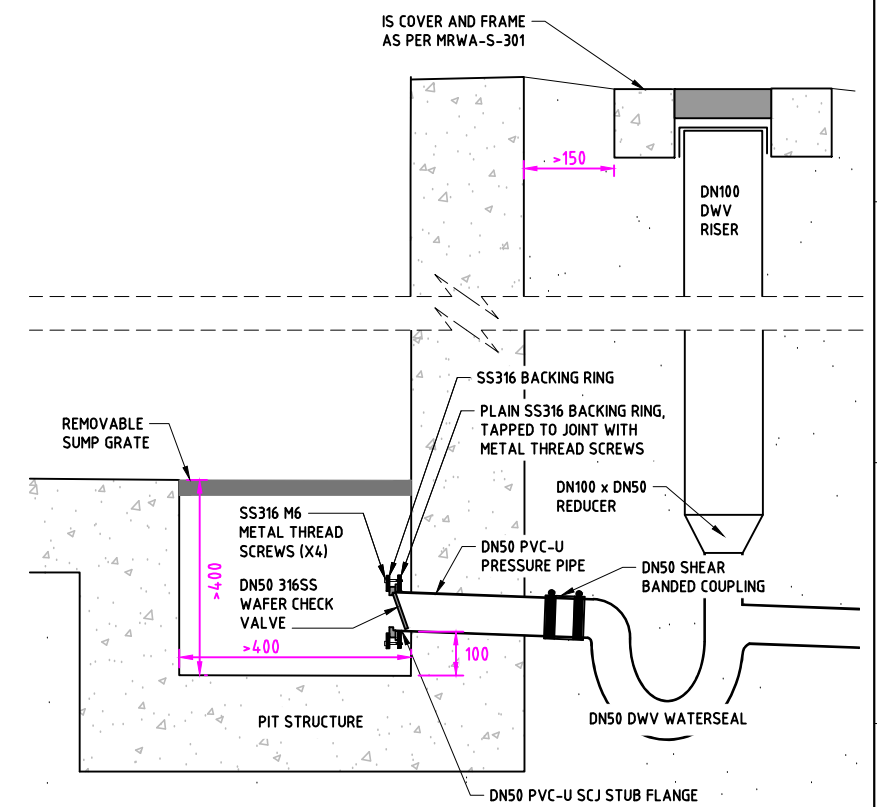


FIGURE 2D: SUMP PUMP TO MAINTENANCE STRUCTURE (PREFERRED) OR SEWER MAIN MAY BE NECESSARY WHEN SEWERAGE SYSTEM IS HIGHER THAN PIT FLOOR

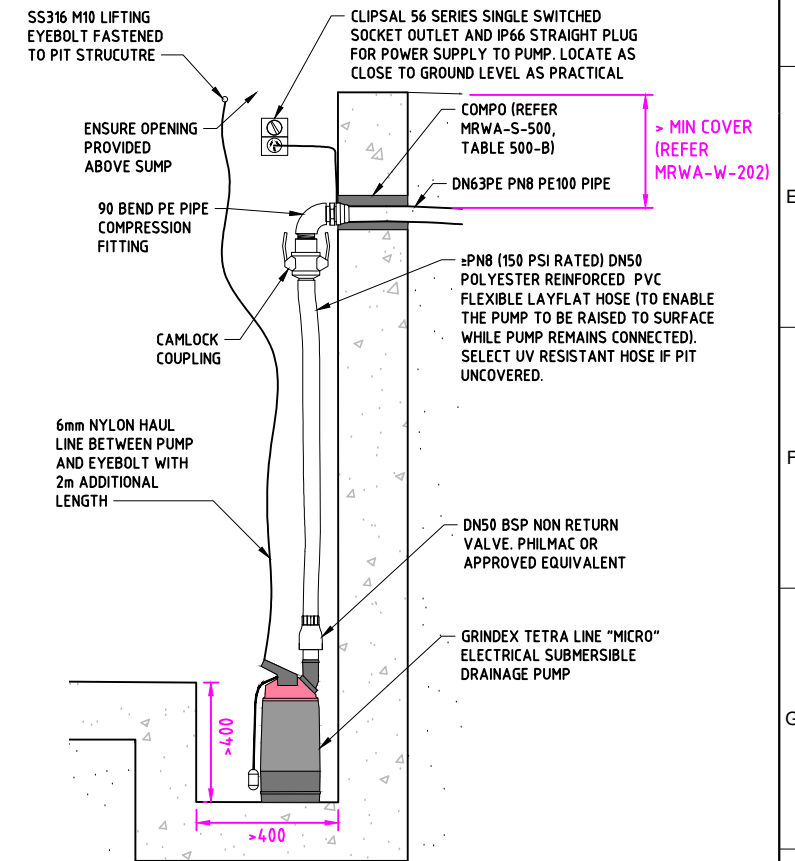
DRAINAGE:

1. SELECT THE HIGHER ORDER DRAINAGE OPTION UNLESS THIS IS IMPRACTICAL. AN OPTION IS CONSIDERED IMPRACTICAL IF:
 - 1.1. THE PREFERRED RECEIVING STRUCTURE IS > 20m AWAY AND THE PIT CONTAINS AN AIR VALVE OR SURGE ANTICIPATION VALVE.
 - 1.2. THE PREFERRED RECEIVING STRUCTURE IS OTHERWISE > 5m AWAY.
2. GROUND SHALL GRADE AWAY FROM THE PIT (50mm ABOVE SURROUNDING AREA) WITH SURFACE AT A MINIMUM 1:100 GRADE WHERE PRACTICAL.
3. THE FLOOR OF THE PIT SHALL BE GRADED AT 1 in 50 TO THE SUMP.
4. DRAINAGE PIPE SHALL BE DN50, DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH DN100 DWV MRWA PROPERTY SERVICE SEWERAGE STANDARDS.
5. ALL PIT SUMPS SHALL BE MINIMUM 400 X 400 X 400 WITH GRATED COVER AT FLOOR LEVEL. GRATE SHALL BE GALVANISED IF WATER PIT AND 316 STAINLESS STEEL IF SEWAGE PIT.
6. ALL NON-RETURN VALVES SHALL BE MOUNTED SO THEY ARE NORMALLY CLOSED.

DETAILS



DETAIL A: SUMP WITH WAFER CHECK VALVE AND WATER SEAL



DETAIL B: SUMP WITH PERMANENT SUMP PUMP

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REV	DESCRIPTION	JOB No	DRAFTER	DES. REVIEW	PM. APP'D	DATE
B	PUBLISHED FIRST VERSION					OCT 21
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DESIGNER R. JAGGER OCT 21	DRAFTER R. JAGGER OCT 21	SEW PROJECT MANAGER C. PAXMAN
DESIGN REVIEW M. LOWE OCT 21	DRAFT CHECK J. STREET OCT 21	ASSET/ENG. MANAGER J. TULLY OCT 21
APPROVED C. PAXMAN	OCT 21	

South East Water

101 Wells Street, Frankston, VIC 3199 W | www.sew.com.au
T: 61 3 9552 3000 F: 61 3 9552 3001 E: info@sew.com.au

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AM2884- PIT STANDARD

PIT DRAINAGE

DATUM: NA	SHEET SIZE: A1
MELWAY REF: NA	
SCALE: AS SHOWN	SEW DRAWING NUMBER AM2884- SHEET 2
SEW JOB No: NA	REV

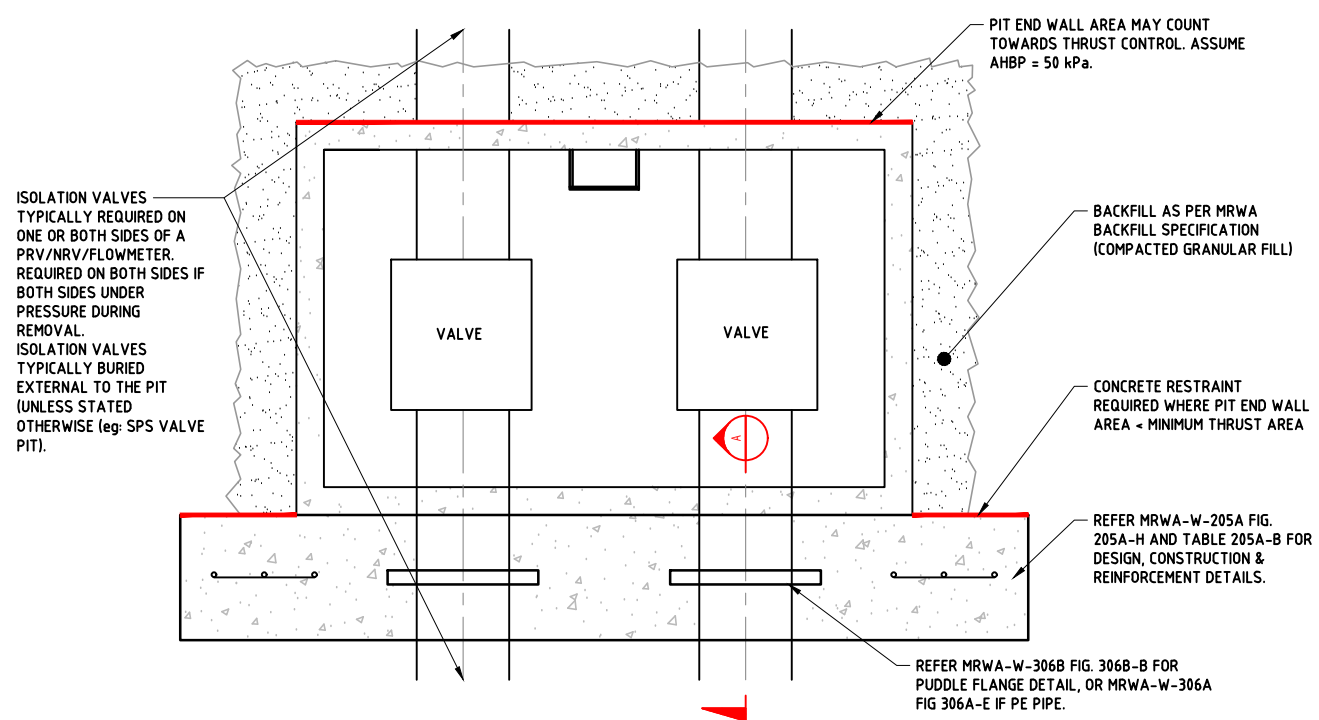


FIGURE 1: PIT PLAN

- THRUST CONTROL:**
- PIPELINE REQUIRES RESTRAINT WHERE PIT CONTAINS A PRV, NRV, ISOLATION VALVE OR A PE PIPE CONNECTS TO THE PIT.
 - FITTINGS EXTERNAL TO THE PIT (eg: ISOLATION VALVE) MAY OR MAY NOT BE PROTECTED USING THESE FIGURES. THIS WOULD NEED TO BE SEPARATELY ASSESSED AND WOULD DEPEND ON THE FITTING TYPE, ITS LOCATION AND JOINT TYPE.
 - THE THRUST CONTROL ARRANGEMENTS SHOWN MAY NEED TO BE DUPLICATED ON BOTH SIDES OF THE PIT WHERE THRUST MAY BE PRESENT ON BOTH SIDES.
 - CALCULATE THRUST AREA REQUIRED AS PER MRWA-W-204 & MRWA-W-205-A.
 - THE STRUCTURAL DESIGN OF PIT SHALL TAKE INTO ACCOUNT THE THRUST WHICH WILL BE TRANSFERRED TO THE PIT WALL BY THE PIPELINE.

- PIPE FLEXIBILITY ADJACENT TO PIT ENTRY POINTS:**
- FLEXIBLE PIPELINES (eg: MS, DI, PVC, PP AND PE) DO NOT REQUIRE BURIED ROCKER PIPES (SHORT FLEXIBLE PIPE SEGMENTS) ADJACENT TO PIT ENTRY AND EXIT POINTS.
 - GRP PIPES REQUIRE ROCKER PIPES AS INDICATED IN MRWA-S-310, FIGURE 310-G.

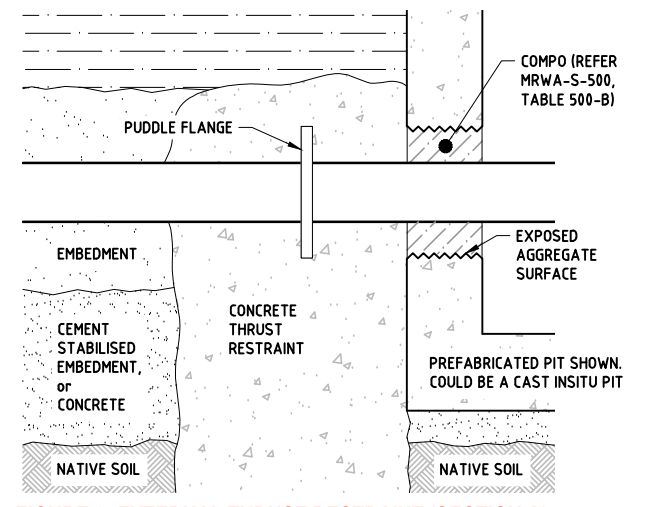


FIGURE 2: EXTERNAL THRUST RESTRAINT (SECTION A)
THIS ARRANGEMENT IS REQUIRED WHERE THE CROSS SECTIONAL AREA OF THE PIT END WALL IS LESS THAN THE REQUIRED THRUST RESTRAINT AREA

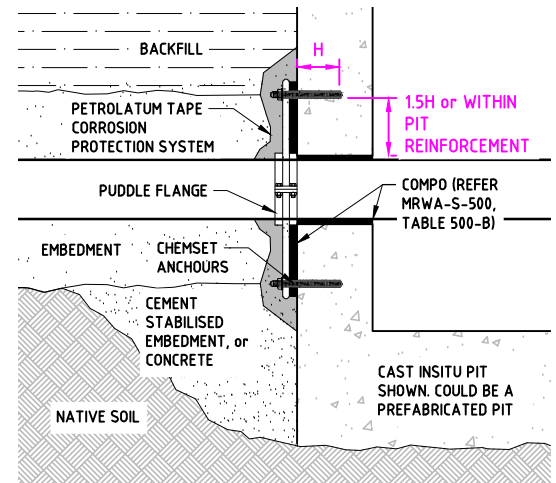


FIGURE 3: EXTERNAL THRUST RESTRAINT (SECTION A)
THIS ARRANGEMENT IS ACCEPTABLE WHERE THE CROSS SECTIONAL AREA OF THE PIT END WALL IS GREATER THAN OR EQUAL TO THE REQUIRED THRUST RESTRAINT AREA

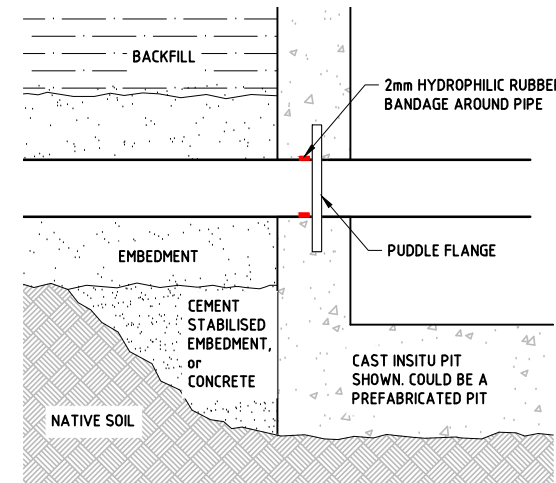


FIGURE 4: CAST IN SITU END WALL RESTRAINT (SECTION A)
THIS ARRANGEMENT IS ACCEPTABLE WHERE THE CROSS SECTIONAL AREA OF THE PIT END WALL IS GREATER THAN OR EQUAL TO THE REQUIRED THRUST RESTRAINT AREA

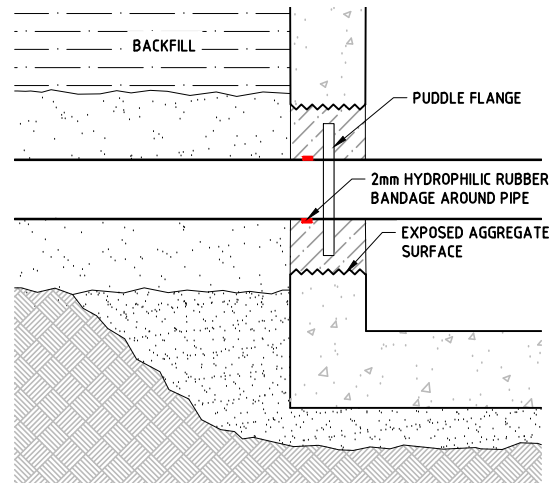


FIGURE 5: PRECAST END WALL THRUST RESTRAINT

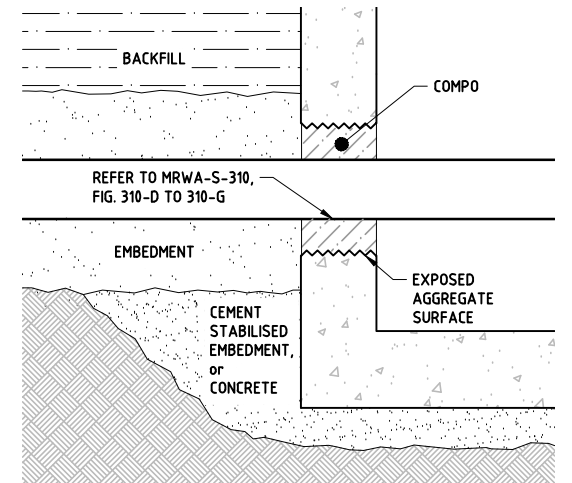


FIGURE 6: NON-PRESSURE or AIR PIPELINE WHICH IS NOT PE.

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DESIGNER	R. JAGGER	OCT 21	DRAFTER	R. JAGGER	OCT 21	SEW PROJECT MANAGER	C. PAXMAN
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T: 61 3 9552 3000 F: 61 3 9552 3001 E: info@sew.com.au

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AM2884- PIT STANDARD
PIT FOUNDATION, PIPE PENETRATIONS
AND THRUST CONTROL

DATUM:	NA	
MELWAY REF:	NA	
SCALE:	AS SHOWN	SHEET SIZE: A1
SEW DRAWING NUMBER		
AM2884- SHEET 3		
SEW JOB No:	NA	REV

ACCESS REQUIREMENTS

TABLE A: PIT DEPTH, WIDTH AND MATCHING COVER OPTIONS

OPTION	PIT HEIGHT	COVER OPTION	TYPICAL SITUATION	SHEET 5 EXAMPLES
1	AS SHALLOW AS PRACTICAL	FULL WIDTH COVERS CAN BE EMPLOYED	- MINIMUM COVER OF THE TRANSFER MAIN IS PROVIDED, & - PIT IS NARROW ENOUGH TO BE SPANNED BY COVER(S), ie: NO COVER SUPPORT BEAMS REQUIRED. FOR TRAFFICABLE DUCTILE IRON COVER SYSTEMS, TYPICALLY PITS FOR :DN200 APPERTENANCES CAN HAVE FULL WIDTH COVERS	FIGURES 1 AND 2
2	STANDING HEIGHT WITHIN PIT \geq 2m	COVER SUPPORT BEAMS &/OR CEILING IS REQUIRED	- FULL WIDTH COVERS IMPRACTICAL, & - DEEPENING THE TRANSFER MAIN IS PRACTICAL (ie: WILL NOT DIMINISH HYDRAULIC OUTCOMES BY CREATING ADDITIONAL UNDESIRABLE HIGH POINTS)	FIGURES 3 & 4
3. DISPENSATION REQUIRED	AS SHALLOW AS PRACTICAL. STANDING HEIGHT WITHIN PIT $<$ 2m	COVER SUPPORT BEAMS REQUIRED. (ie: FULL WIDTH COVERS NOT PRACTICAL). (NOTE: CEILING NOT ACCEPTABLE).	WHERE NEITHER OPTION 1 OR 2 ARE PRACTICAL. TYPICALLY WHEN: - THE PIT NEEDS TO BE LARGER (OPENING WIDTH CAN ONLY BE $>$ 900), AND - THE PIT CAN ONLY BE TRAFFICABLE (ie: DUCTILE IRON COVERS REQUIRED), AND - THE TRANSFER MAIN CANNOT PRACTICALLY BE DEEPEINED	NONE SHOWN

HEIGHT OPTIONS LISTED IN ORDER OF PREFERENCE

FULL WIDTH COVERS SYSTEMS PREFERRED:

- A. SHEET 5 FIGURES 1, 2 AND 4 ARE BASED ON FULL WIDTH COVER SYSTEMS.
 B. FULL WIDTH COVER SYSTEM OPTIONS TYPICALLY INCLUDE:
 B.A. ALUMINUM COVERS (NON-TRAFFICABLE LOCATIONS)
 B.B. SINGLE ROW MULTI-PART DUCTILE IRON COVERS (TRAFFICABLE LOCATIONS), TYPICALLY WITH COVERS WHICH ARE 900 LONG (THE ROW WIDTH) AND MULTIPLES OF 450, 600 OR 750 WIDE. SMALLER AND LIGHTER COVERS PREFERRED WHERE PRACTICAL.
 C. FULL WIDTH COVER SYSTEMS ARE PREFERRED AND SHALL BE USED WHERE PRACTICAL BECAUSE:
 C.A. THEY DO NOT REQUIRE COVER SUPPORT BEAMS OR CEILING AND SO ENABLE SHALLOW PITS $<$ 2m IN HEIGHT.
 C.B. THEY TYPICALLY ENABLE MORE ECONOMIC SMALLER FOOTPRINT PITS AS HORIZONTAL CLEARANCE FROM COVER SUPPORT BEAMS TO LADDERS AND EQUIPMENT IS NOT REQUIRED.
 D. MULTIPLE ROW GROUND LEVEL COVER SYSTEMS SHALL BE AVOIDED WHERE PRACTICAL, ESPECIALLY WHERE PIT HEIGHT IS $<$ 2m. SOUTH EAST WATER APPROVAL WOULD BE REQUIRED FOR MULTI-ROW COVER SYSTEMS USED IN CONJUNCTION WITH PITS WHICH HAVE A STANDING HEIGHT $<$ 2m.

TABLE B: ACCESS ALTERNATIVES TO BOTH SIDES OF PIPES

OPTION	OPTION DESCRIPTION	TYPICAL SITUATIONS OF USE	SHEET 5 EXAMPLES
1	LEAN OVER OR STRADDLE OVER PIPE FROM LADDER ACCESS SIDE OF PIPE	PIPES \geq DN300 WHERE TOP OF PIPE IS \geq 600 ABOVE LOWEST FLOOR LEVEL	FIGURES 1 & 2
2	STRADDLE OVER PIPE FROM LADDER ACCESS SIDE OF PIPE, USING A STEP UP AT THE PIT END OPPOSITE THE LADDER	PIPES BETWEEN AND INCLUDING DN375 TO DN600, WHERE TOP OF PIPE IS \geq 600 ABOVE THE FLOOR OR STEP LEVEL	FIGURE 3
3	PROVIDE LADDER ACCESS TO BOTH SIDES OF ALL PIPES	PIPES \geq DN375 WHERE TOP OF PIPE IS \geq 600 ABOVE THE TOP OF FLOOR OR STEP LEVEL	FIGURE 4

TABLE C: HORIZONTAL CLEARANCES WITHIN PITS

DISTANCE FROM ...	DISTANCE TO ...	NOMINAL CLEARANCE
PIPEWORK OR FITTING \geq DN300	SIDE WALL	400
PIPEWORK OR FITTING \geq DN375	SIDE WALL	600
HIGH MAINTENANCE FITTING PLAN OUTLINE	COVERED OPENING PLAN OUTLINE (WITH SUPPORT BEAMS IN PLACE)	100
\geq DN200 FITTING ie: FLANGE	END WALL	200
\geq DN225 FITTING ie: FLANGE	END WALL	300
\geq DN200 FITTING ie: FLANGE	LADDER	200
\geq DN225 FITTING ie: FLANGE	LADDER	300
FRONT OF LADDER	ANY OBJECT	750 X 750 FREE WORK SPACE REQUIRED IN FRONT OF LADDER
PIPEWORK OR FITTING \geq DN375	END WALL ADJACENT TO STRADDLE LOCATION	600
PIPEWORK OR FITTING	ADJACENT PARALLEL PIPEWORK OR FITTING	750

TABLE D: VERTICAL CLEARANCES WITHIN PITS

DISTANCE FROM ...	DISTANCE TO ...	NOMINAL CLEARANCE
PIPEWORK OR FITTING (ie: FLANGE OD)	FLOOR, CEILING OR COVER	300
TOP OF PIPE DESIGNED TO BE STRADDLED	STANDING LEVEL	600
UNDERNEATH OF CEILING	STANDING LEVEL	2000
OPERABLE VALVE HANDLE	STANDING LEVEL	1100 to 1200

CLEARANCE NOTES:

- "STANDING LEVEL" COULD BE FROM STEP OR FLOOR LEVEL.
- THE CLEARANCES PROVIDED ARE NOMINAL. DESIGNER SHALL ENSURE WORKERS CAN SAFELY ACCESS ALL ITEMS AND HAVE ADEQUATE CLEAR SPACE TO ADJUST FASTENERS USING MOST APPROPRIATE TOOL(S) (eg: TORQUE WRENCH, RATTLE GUN, SPANNER etc).

CABLE & HYDRAULIC LINE PLACEMENT

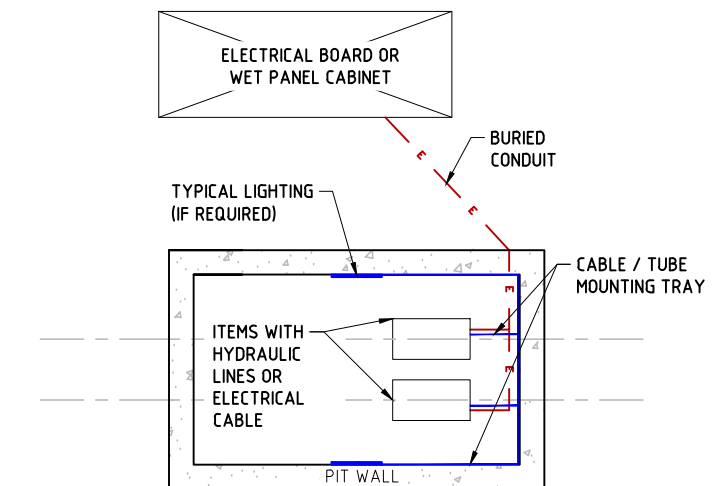


FIGURE 5: ELECTRICAL OR HYDRAULIC LINE MOUNTING

ELECTRICAL & HYDRAULIC LINE CONNECTIONS:

- MINIMISE BURIED CONDUIT DEPTH WHILE PROVIDING MINIMUM COVER. REFER TO AS 3000 FOR MINIMUM COVER OF ELECTRICAL CABLES. REFER TO MRWA-W-202 FOR MINIMUM COVER OF HYDRAULIC LINES.
- CONDUITS SHOULD ENTER PIT CLOSE TO WHERE CABLE / TUBE TERMINATES WITHIN THE PIT.
- MINIMISE BURIED CONDUIT BENDS.
- UTILISE LONG RADIUS BENDS FOR DEFLECTING CONDUIT.
- WITHIN THE PIT, MOUNT CABLES OR HYDRAULIC LINES ON CABLE MOUNTING TRAY. CABLE MOUNTING TRAY SHOULD BE ACCESSIBLE FROM STANDING POSITION. REFER AM2714 ELECTRICAL EQUIPMENT SELECTION & INSTALLATION.
- ELECTRICAL EQUIPMENT IN PITS SHOULD BE RATED TO IP66.
- WHERE REMOTE TRANSMITTER / GAUGE OPTION AVAILABLE FOR ANY PIT MOUNTED TRANSDUCERS, REMOTE TRANSMITTER / GAUGE SHALL BE LOCATED IN SWITCHBOARD OR WET PANEL CABINET OR BUILDING.
- THE DESIGNER SHALL PROVIDE A DIMENSIONED OUTLINE OF ALL CABLE / TUBE MOUNTING TRAY WITHIN THE PIT DRAWINGS (TO ENSURE CLEARANCES FROM CABLE TRAY ARE MET).

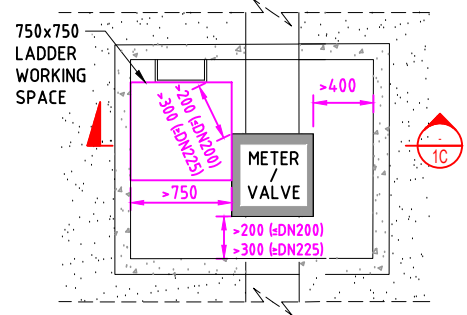
DESIGNER R. JAGGER OCT 21	DRAFTER R. JAGGER OCT 21	SEW PROJECT MANAGER C. PAXMAN
DESIGN REVIEW M. LOWE OCT 21	DRAFT CHECK J. STREET OCT 21	ASSET/ENG. MANAGER J. TULLY OCT 21
APPROVED C. PAXMAN OCT 21		

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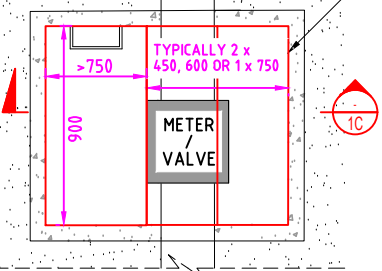
**SOUTH EAST WATER
AM2884- PIT STANDARD
ACCESS REQUIREMENTS
AND CABLE & HYDRAULIC LINE PLACEMENT**

DATUM: NA	
MELWAY REF: NA	
SCALE: NTS	SHEET SIZE: A1
SEW DRAWING NUMBER	
AM2884- SHEET 4	
SEW JOB No: NA	REV

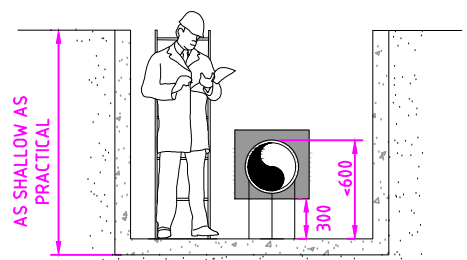


**FIGURE 1A: SMALLER SINGLE MAIN ARRANGEMENT
≤DN300 MAINS. FLOOR LEVEL LAYOUT**

PREFERRED ACCESS OPENING ENCOMPASSES FULL FOOTPRINT OF PIT (UNLESS > 2.0m FROM FLOOR TO CEILING)

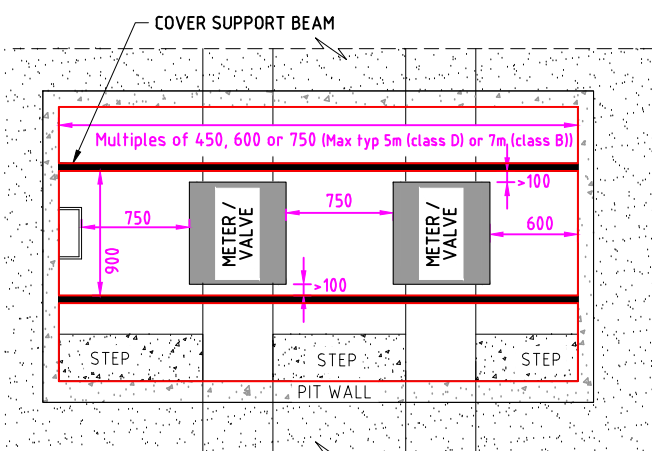


**FIGURE 1B: SMALLER SINGLE MAIN ARRANGEMENT
≤DN300 MAINS. COVER LEVEL. FULL WIDTH COVERS
TRAFFICABLE DUCTILE IRON COVERS INDICATED**

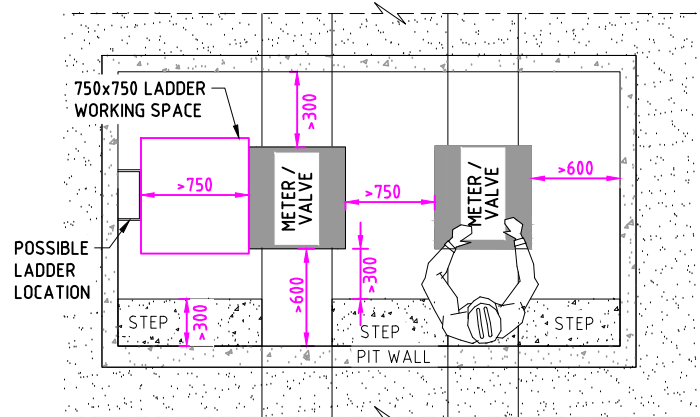


**FIGURE 1C: SMALLER SINGLE MAIN ARRANGEMENT
≤DN300 MAINS (SECTION)**

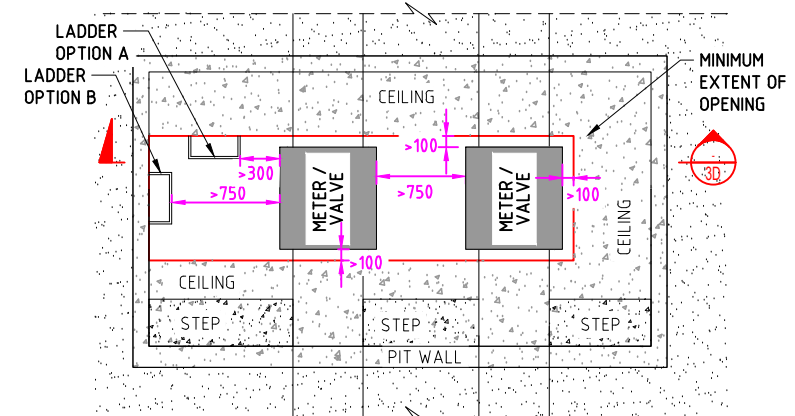
- DESIGN DRAWING REQUIREMENTS:**
1. PLAN AT FLOOR LEVEL, INDICATING WALL AND SUMP DIMENSIONS AND DIMENSIONS FROM PIPE AND FITTINGS TO PIT WALLS AND LADDERS.
 2. PLAN AT COVER LEVEL, INDICATING OPENING OUTLINES AND DIMENSIONS OF ALL COVERS, ANY LIFTING ORDER, ALL HINGED EDGES AND LOCK LOCATIONS.
 3. SECTION / ELEVATION THROUGH THE PIT, INDICATING HEIGHTS AND VERTICAL CLEARANCES.
- WALL OUTLINES SHALL MEET THE CLEARANCE REQUIREMENTS AT BOTH FLOOR LEVEL AND COVER LEVEL, WITH BOTH FLOOR AND COVER LEVEL PLANS BEING DESIGNED CONCURRENTLY.
 - INDICATE COVER OUTLINES IN RED. INDICATE HINGED EDGES IN BLUE
 - INDICATE THE LOCATION AND DIMENSIONS OF ALL CABLE TRAY. NOMINALLY SHOW CABLE TRAY AND CONTENTS AS 50 THICK.



**FIGURE 3B: ONE LADDER & PIPE STRADDLING.
≥DN375 & ≤DN600 MAINS. COVER LEVEL WITH COVER SUPPORT BEAMS
TRAFFICABLE DUCTILE IRON COVERS INDICATED. THIS EXAMPLE MAY BE ACCEPTABLE IF THE PIT HEIGHT IS < 2m IF THERE IS NO ALTERNATIVE AND SEW APPROVAL IS OBTAINED. DEPENDING ON THE METER / VALVE OUTSIDE DIMENSIONS, ≤DN450 ITEMS MAY NOT FIT WITHIN THE MAXIMUM ACCEPTABLE 900 WIDE ROW.**



**FIGURE 3A: ONE LADDER & PIPE STRADDLING
≥DN375 & ≤DN600 MAINS. FLOOR LEVEL LAYOUT**



**FIGURE 3C: ONE LADDER & PIPE STRADDLING
≥DN375 & ≤DN600 MAINS. COVER LEVEL WITH MULTIPLE OPENINGS
SINGLE ROW TRAFFICABLE DUCTILE IRON COVERS INDICATED. WOULD NOT BE PERMITTED WHERE STANDING HEIGHT IS < 2m. OPENINGS MUST BE ADEQUATE TO ENABLE EMERGENCY RESCUE FROM ANYWHERE IN THE PIT.**

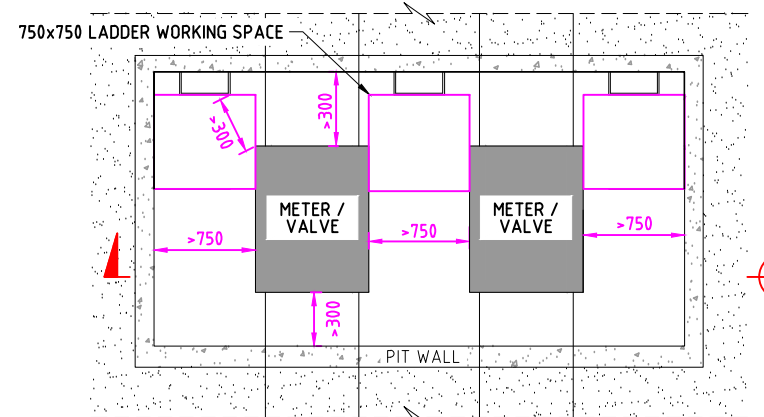
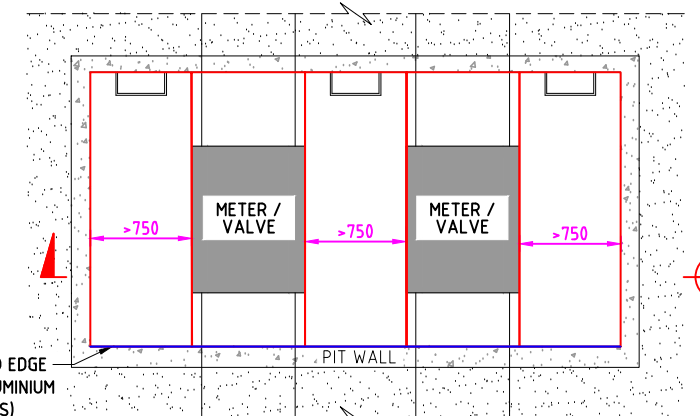
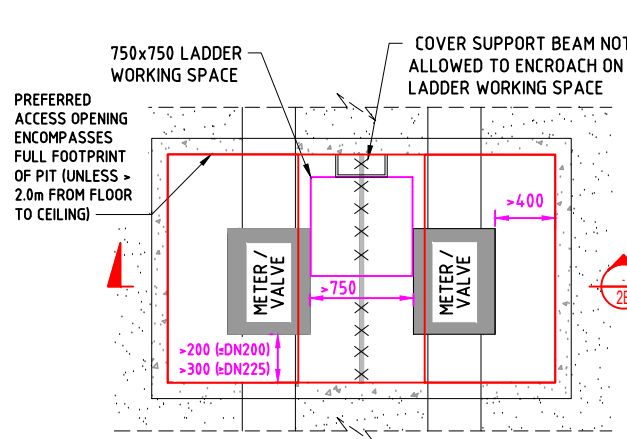


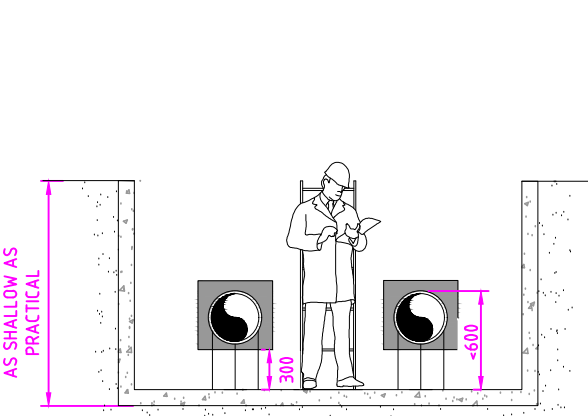
FIGURE 4A: THREE LADDER ACCESS (≥DN375 MAINS). FLOOR LEVEL LAYOUT



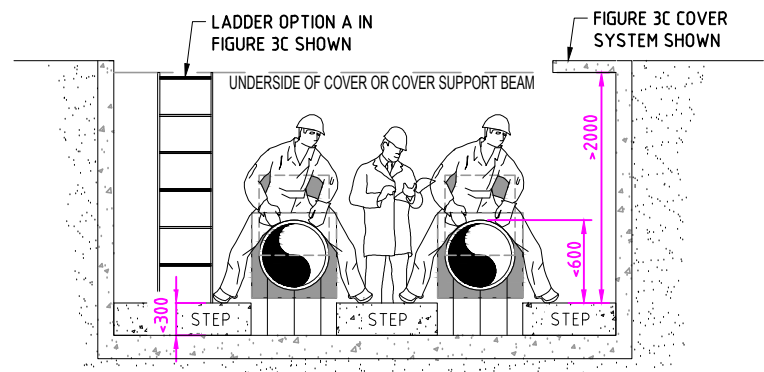
**FIGURE 4B: THREE LADDER ACCESS (≥DN375 MAINS).
COVER LEVEL LAYOUT WITH FULL WIDTH COVERS
THIS EXAMPLE RELATES TO NON-TRAFFICABLE ALUMINIUM COVERS, AS THE COVER LENGTH WOULD ALMOST CERTAINLY EXCEED THE MAXIMUM ALLOWABLE 900 LENGTH OF DUCTILE IRON COVERS.**



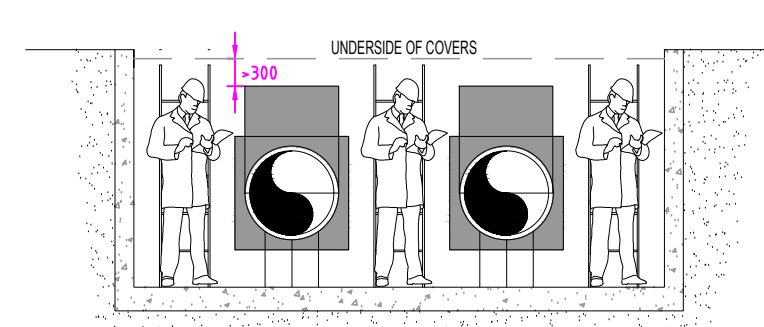
**FIGURE 2A: SMALLER DUAL MAIN ARRANGEMENT
≤DN300 MAINS. FLOOR LEVEL & COVER LAYOUT. FULL WIDTH COVERS
IN THIS INSTANCE FLOOR AND COVER LAYOUTS ARE SHOWN IN ONE FIGURE. THIS WOULD NOT BE ACCEPTABLE IN A DESIGN AS THERE WOULD TYPICALLY BE INSUFFICIENT CLARITY IF ALL REQUIRED DETAILS WERE INDICATED ON ONE PLAN**



**FIGURE 2B: SMALLER DUAL MAIN ARRANGEMENT
≤DN300 MAINS (SECTION)**



**FIGURE 3D: ONE LADDER & PIPE STRADDLING
≥DN375 & ≤DN600 MAINS (SECTION)
STEPS MAY BE FABRICATED FROM ANY SUITABLE CORROSION RESISTANT MATERIALS**



**FIGURE 4C: THREE LADDER ACCESS
≥DN375 MAINS (SECTION)**

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DESIGNER	R. JAGGER	OCT 21	DRAFTER	R. JAGGER	OCT 21	SEW PROJECT MANAGER	C. PAXMAN
DESIGN REVIEW	M. LOWE	OCT 21	DRAFT CHECK	J. STREET	OCT 21	ASSET/ENG. MANAGER	J. TULLY
APPROVED	C. PAXMAN	OCT 21					
REV	1	DESCRIPTION	JOB No	DRAFTER	DES. REVIEW	PM. APPD	DATE
B		PUBLISHED FIRST VERSION					OCT 21
A		ISSUED FOR DISCUSSION					JUN 21

South East Water

101 Wells Street, Frankston, VIC 3199 W | www.sew.com.au
T: 61 3 9552 3000 F: 61 3 9552 3001 E: info@sew.com.au

**SOUTH EAST WATER
AM2884- PIT STANDARD**

PIT DESIGN EXAMPLES

DATUM:	NA
MELWAY REF:	NA
SCALE:	NTS
SHEET SIZE:	A1
SEW DRAWING NUMBER	AM2884- SHEET 5
SEW JOB No:	NA