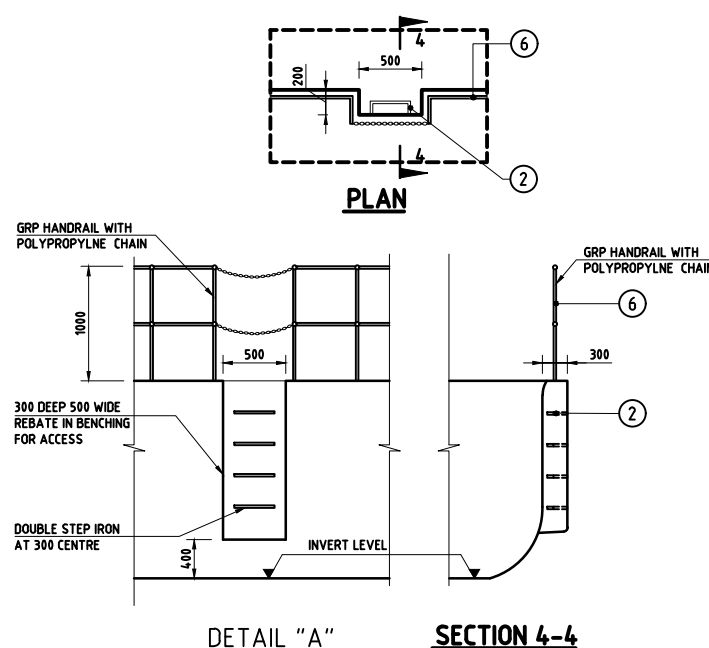


- NOTES:**
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
  - ALL MATERIALS, FABRICATION AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS/QCS 2014.
  - WHERE THERE IS A DISCREPANCY BETWEEN THE REQUIREMENTS IN THE SPECIFICATION AND THOSE SHOWN ON THIS DRAWING THE SPECIFICATION SHALL BE FOLLOWED UNLESS DIRECTED OTHERWISE BY THE ENGINEER.
  - ALL CONCRETE SHALL BE GRADE 40/20 (32MPa CYLINDER) UNLESS OTHERWISE STATED.
  - MICROTUNNEL PIPES SHALL BE CONCRETE LINED WITH GRP.
  - MINIMUM PIPE STRENGTH TO COMPLY WITH THE REQUIREMENTS STATED IN THE SPECIFICATIONS.
  - SEE DRAWING NO SD 8-4-103 FOR TANKING.
  - ALL JOINTS BETWEEN SECTIONS OF GRP LINERS SHALL BE LAMINATED OVER WITH 100MM WIDE RESIN RICH GLASS TAPE OR AN APPROVED INSITU BANDAGE JOINT TO THE OUTSIDE OF THE GRP LINER PRIOR TO CONCRETING.
  - ALL JOINTS BETWEEN PIPES, FIXTURES AND GRP LINERS SHALL BE SEALED.
  - ALL JOINTS BETWEEN PIPES AND CONCRETE SHALL BE WATERTIGHT.
  - ALL INCOMING PIPES SHALL BE LAID SOFFIT TO SOFFIT WITH THE OUTGOING PIPE UNLESS A RAMP/BACKDROP IS CONSTRUCTED.
  - STAINLESS STEEL SAFETY CHAIN AND TOE HOLES SHALL BE CONSIDERED FOR PIPES GREATER THAN 600mm DIA.
  - MANHOLES TO BE GENERALLY IN ACCORDANCE WITH PWA MANHOLE STANDARD DETAILS UNLESS STATED OTHERWISE.
  - PVC PIPES OF VORTEX UNITS MUST BE ANCHORED AS NEEDED AND SEALED THE WALL.
  - VORTEX SHALL BE REQUIRED ONLY IF THE DROP PIPE IS GREATER THAN 600mm DIAMETER AND THE DROP DEPTH IS GREATER THAN 6.0m.
  - ALL VORTEX TOP FORMS SHALL BE SUPPORTED BY REINFORCED CONCRETE BEAMS.
  - DISSIPATION POOLS OF VORTEX SHALL BE BENCH TO ENSURE NO AXIAL OR LATERAL MOVEMENT AND THAT THE FLOW IS DIRECTED INTO THE STORM DRAIN PIPE.
  - DETAILS OF THE VORTEX SHOULD CONFORM TO MANUFACTURER'S SPECIFICATION.
  - THE MID LANDING SLABS SHOULD BE LOCATED AT APPROPRIATE LEVELS SUITABLE FOR ACCESSING THE VORTEX UNIT FOR MAINTENANCE AND SERVICING.
  - VORTEX UNITS SHOWN INDICATIVE ONLY, THE VORTEX UNITS TO BE LOCATED INSIDE THE SHAFT AS PER MANUFACTURER'S SPECIFICATIONS AND DESIGN MECHANICAL ELEMENTS AND CONNECTION DETAILS TO BE AS PROVIDED BY SUPPLIER. TYPE OF VORTEX DROP AND DESIGN TO BE APPROVED BY THE ENGINEER.
  - THE CONTRACTOR IS RESPONSIBLE FOR GENERATING THE SHOP DRAWINGS OF THE VORTEX MANHOLES / SHAFTS AND FLOW CONTROL CHAMBERS AND GET APPROVAL BY THE ENGINEER IN CHARGE AT SITE PRIOR TO CONSTRUCTION.
  - VARIATION TO STANDARD DETAIL ARE PERMITTED TO FIT THE SITE SPECIFIC REQUIREMENTS AS APPROVED BY ENGINEER IN CHARGE AT SITE / ASHGHAL REPRESENTATIVE PRIOR TO CONSTRUCTION.
  - FOR ADDITIONAL INFORMATION REFER THE FOLLOWING PWA STANDARD DETAIL DRAWINGS: SD 8-4-203/ SD 8-4-204 / SD 8-4-320 / SD 8-2-307 / SD 8-4-227 / SD 8-4-306 / SD 8-2-303 / GE4 / SD 6-17-103 / SD 6-17-101 / SD 6-17-102 / SD 8-4-110 / SD 8-4-114.
  - TOP OF ENERGY DISSIPATION BUCKET TO MATCH THE SPRINGER LEVEL OF THE OUTGOING PIPE.
  - ROCKER PIPE IS 600MM IN LENGTH OR 15D WHICH EVER IS GREATER.
  - FOR PIPE AND OTHER GENERAL ARRANGEMENT DETAILS - REFER PWA RELEVANT STANDARD DRAWINGS.
  - DOUBLE STEP IRON TYPE C PLASTIC ENCAPSULATED. ANY SHAPE TREAD WITH PATTERNED SURFACE AND WITHOUT UPSTAND TO BS EN 13101:2002.
  - WHERE MANHOLES ARE LOCATED IN A CARRIAGEWAY WITH A POSTED SPEED LIMIT OF 100KM/HR. OR GREATER, CLASS E600 COVERS ARE TO BE USED.

**TABLE 1**

INTERNAL LININGS	
CONCRETE MANHOLES	GRP LINER TO WALLS AND BENCHING TO 300mm ABOVE INLET PIPE CROWN LEVEL THEN 2 COATS OF SOLVENT FREE EPOXY PAINT TO ALL REMAINING INTERNAL SURFACES
POLYMER RESIN CONCRETE (PRC) MANHOLES/PRECAST MANHOLES ONLY	NO LINING TO WALLS AND COVER SLAB REQUIRED. IF PRC NOT USED FOR BENCHING, GRP LINING TO BENCHING TO BE USED AS PER QCS.

ITEM	DESCRIPTION
1	CONCRETE BENCHING
2	DOUBLE STEP IRONS
3	STAINLESS STEEL SAFETY CHAIN
4	WATERPROOFING MEMBRANE TO QCS 2014
5	2 NOS. COATS OF SOLVENT FREE EPOXY PAINT
6	HANDRAIL
7	CLASS D400 HEAVY DUTY DUCTILE IRON 750 x 750mm NOMINAL CLEAR OPENING RECESSED SINGLE COVER & FRAME DETAIL SHALL BE IN ACCORDANCE WITH SUPPLIER
8	CLASS D400 HEAVY DUTY DUCTILE IRON 4 PART RECESSED MULTISPAN COVER & FRAME DETAIL SHALL BE IN ACCORDANCE WITH SUPPLIER
9	STAINLESS STEEL STRAP
10	PRECAST CONCRETE SLAB GRP PROTECTION
11	GRP HAND GRAB POLES ALONG THE BENCHING SIDES SPACING = 80CM, HEIGHT ABOVE BENCHING = 140CM
12	GRADE 40/20 CONCRETE
13	DRAIN HOLE 200Ø
14	5 THICK SIZE LAMINATED GRP TO BENCHING AND SPLASH POOL. SAND FINISH TO TOP OF BENCHING



- NOTES (continued):**
- PIPE MATERIAL AND DESIGN SIZES TO BE OF GRP OR EQUIVALENT MATERIAL AS APPROVED BY ENGINEER PRIOR TO CONSTRUCTION. IN CASE OF ANY ALTERNATIVE MATERIAL IT IS THE CONTRACTOR'S RESPONSIBILITY TO SELECT A SUITABLE PIPE MATERIAL (AS APPROVED BY PWA FROM ALL TECHNICAL AND COMMERCIAL ASPECTS AND WITHOUT COMPROMISING THE ESTABLISHED AND APPROVED DESIGN AND HYDRAULIC PERFORMANCE AND APPROVED BY ENGINEER PRIOR TO CONSTRUCTION).
  - CONTRACTOR SHALL SUPPLY, INSTALL, PROPOSE, FABRICATE SUITABLE FLOW CONTROL ORIFICES IN THE FLOW CONTROL CHAMBERS IN CONFORMITY WITH PWA REQUIREMENTS AND QCS.
  - 1000 MM DIA MAN ACCESS TO BENCHING AND MID LANDING SLAB SHALL HAVE CLASS D400 TO EN 124 HEAVY DUTY DOUBLE TRIANGULAR DUCTILE IRON COVER AND FRAME WITH CLEAR OPENING TO SUIT ACCESS COVER WITH 750 X 750 CLEAR OPENING.
  - 1000 X 1000 MATERIAL ACCESS CLEAR OPENING AND SHAFT TO BE LOCATED ON THE CHANNEL ON PLAN AND 1000MM DIA MAN ACCESS OPENING SHOULD BE LOCATED ON THE BENCHING OR MID LANDING SLAB (AS REQUIRED) ON PLAN.
  - FOR STRUCTURAL AND REINFORCEMENT DETAILS REFER RELEVANT DRAWINGS.

2	OCT 19	ISSUED FOR USE	
1	APR 19	ISSUED FOR USE	
0	01 MAR 19	ISSUED FOR USE	
Rev.	Date	Revision Details	Appd.
هيئة الأشغال العامة Public Works Authority			
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<b>PA</b> PROJECTS AFFAIRS			
QCS Section: Section 8 - Drainage Works Part 4 - Pipe Installation			
Drawing Title: <b>VORTEX MANHOLE AND SHAFT GA / TYPICAL DETAILS (SQUARE SECTION)</b>			
Approved:	Sheet No: 1 OF 1		
Date: OCT 2019	Scale: 1:20 on A1		
Drawing Number: SD 8-4-321	Revision: 2		