

ANCHORAGE & THRUST BLOCK GUIDELINES
TO BE DETERMINED BY STRUCTURAL ENGINEER

A fundamental feature of fully integrated fusion welded polyethylene (PE) pipe systems is that they are end load bearing, anchorage and thrust blocks are not normally required. Where the system includes man and joint bearing joints, thrust blocks must be provided.

The function of thrust blocks is to prevent deflection of the pipe under the action of internal fluid pressure and to transfer resultant forces to surrounding ground of load bearing capacity. Non end load bearing joints will separate if thrust blocks (or anchor points in above ground situations) are not properly designed or omitted from the installation.

In addition to thrust generated by internal pressure, dynamic thrusts may also have to be taken into account where high velocities are present.

The sketches and formulae are indicated only as a guide to the design and position of thrust blocks. These are to be checked and determined by a qualified structural engineer.

In surface installations resultant thrust forces should be transferred to the surrounding ground. The cross sectional area of bearing surface should be determined by dividing the resultant force F by the safe bearing capacity of the soil. In shallow trench conditions or where the soil bearing capacity is inadequate, resultant forces may be taken in mass concrete.

Where P = Maximum applied internal pressure (see test pressure)
D = Inside diameter large pipe
d = Inside diameter small pipe
a = Cross sectional area of pipe bore
A = Area of deviation of pipe

As a general rule non end load bearing joints should be omitted from pipe systems above ground.

In order to providing resistance against thrust provision must be made for concrete support blocks to all heavy fittings or ancillary equipment in P.E. pipelines. The design of such supports must take account of dead weight and thrust (dynamic moment) which may be present under operating conditions (hydraulic, or valves, etc.).

Where dynamic thrusts (D) needs to be considered then this can be calculated from:
 $T_d = 2 \times P \times D \times \sin \frac{\alpha}{2}$
Where W = Weight of fluid in kg/m³
V = Velocity of flow in m/sec
 α & γ as above

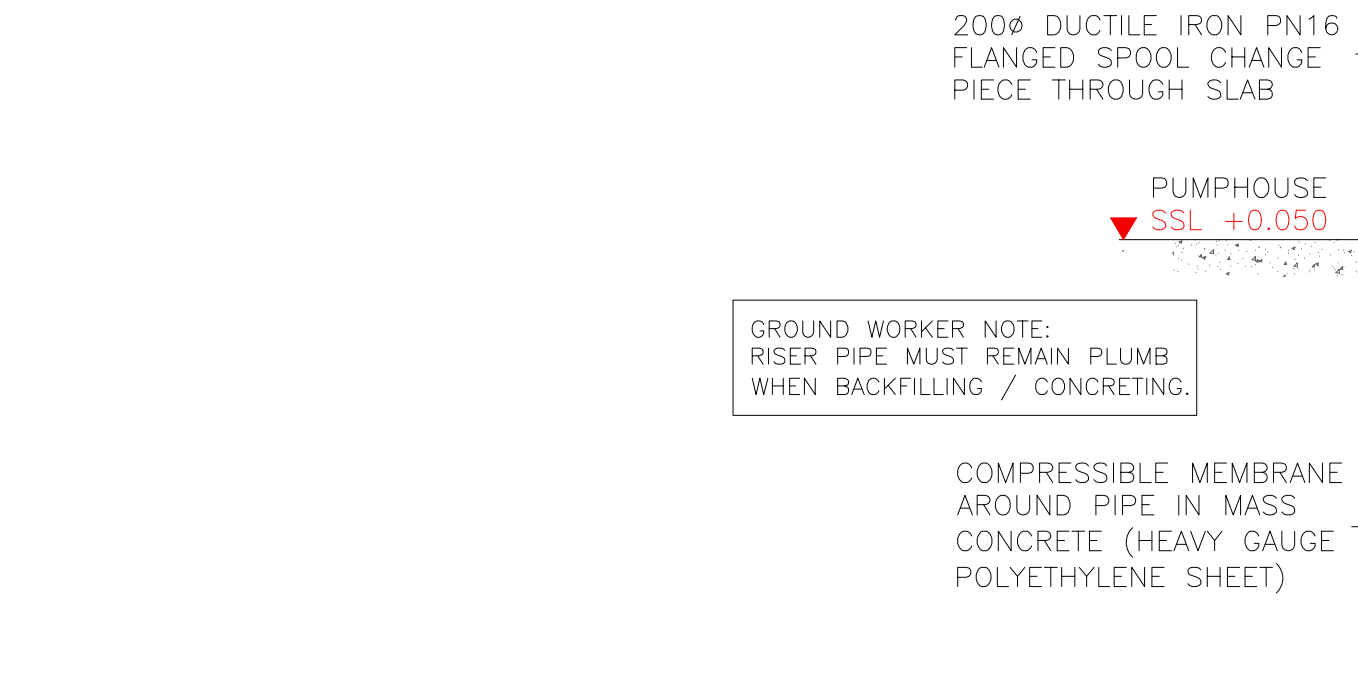
Typical Anchor Blocks for Non End Load Resistant Systems.

SHOWING ANCHOR BLOCKS AT:
1. Gate valve
2. Tapered reducer.
3. and 4. Bends
5. Block ends
6. Equal tee

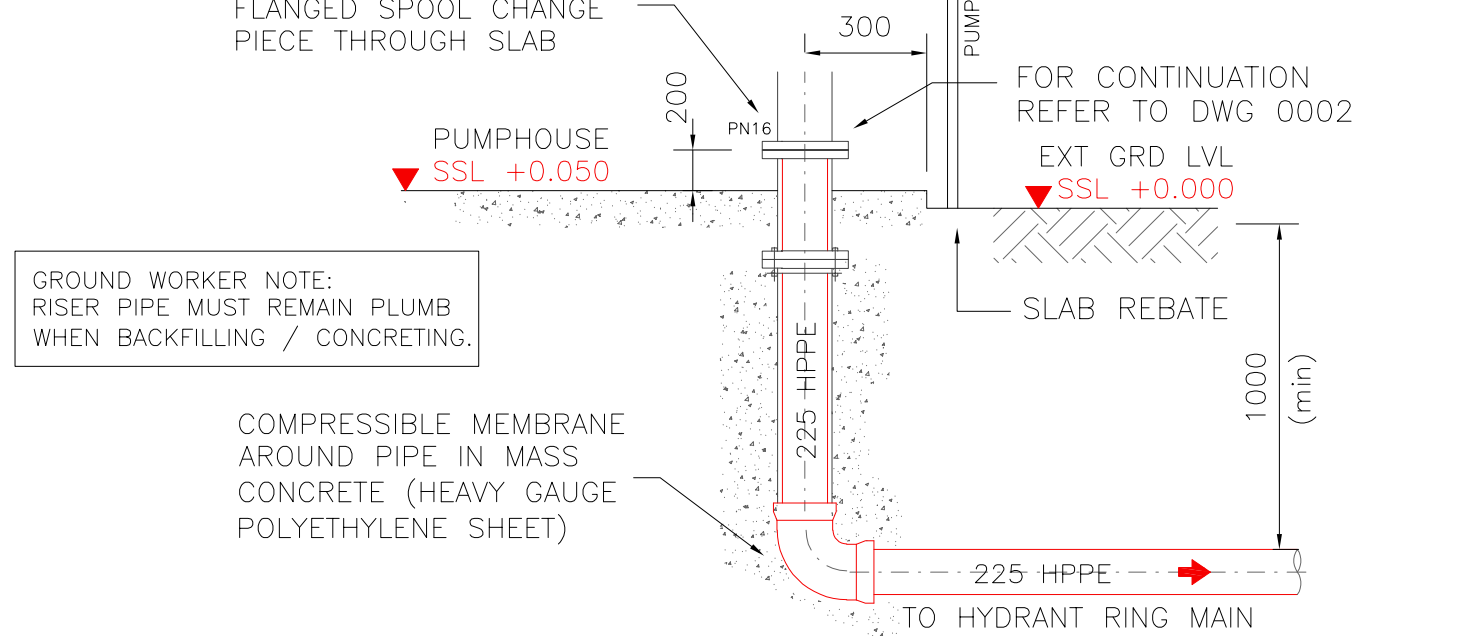
Forces "F" acting in the direction shown on the diagrams can be calculated as follows:
Point 2 reducer: $F = P \times D \times \sin \frac{\alpha}{2}$
Point 3 bends: $F = P \times D \times \sin \frac{\alpha}{2}$
Point 4 90 bends: $F = P \times D$
Point 5 block ends: $F = P \times D$

THRUST BLOCK GUIDELINES FOR POLYETHYLENE PIPE
MAXIMUM WORKING PRESSURE = 16 bar

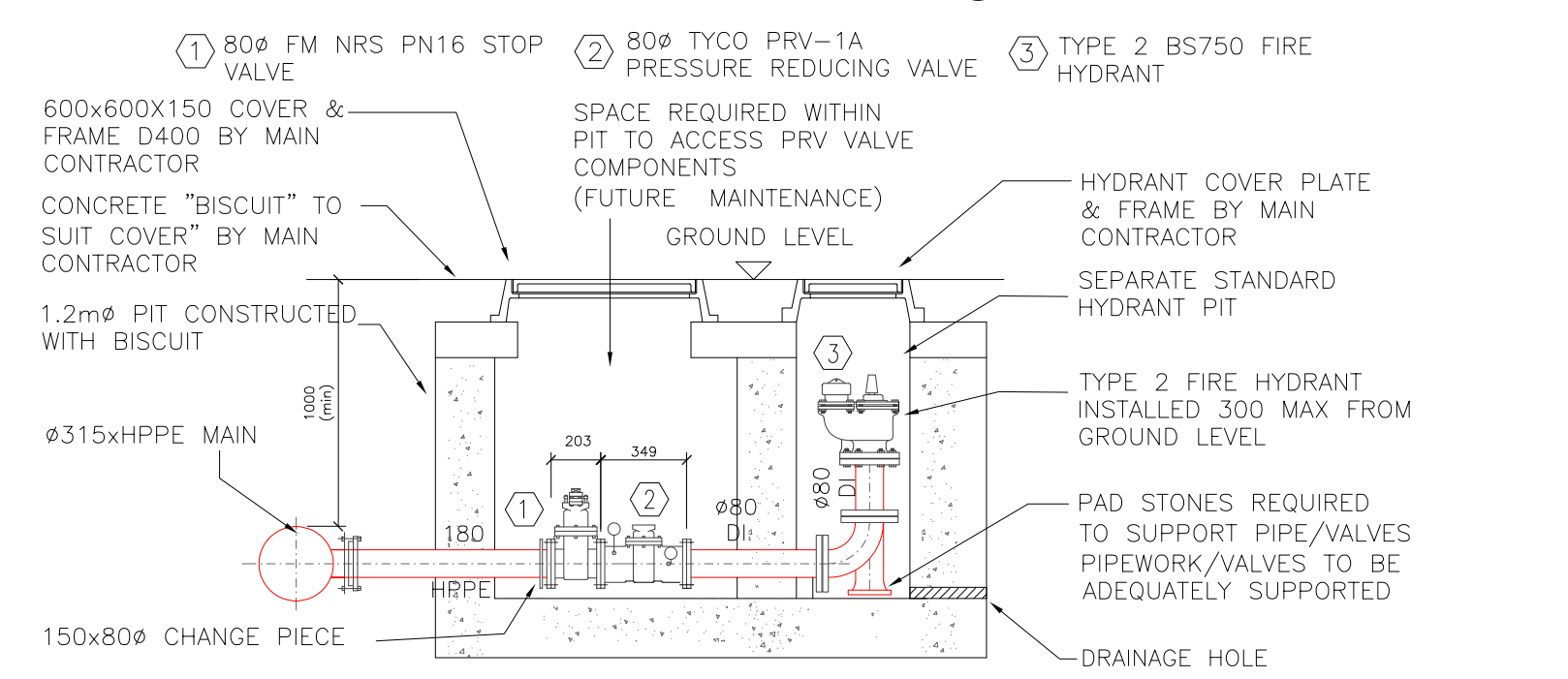
TANK INFILL CONNECTION AT BOUNDARY
DETAIL - 1



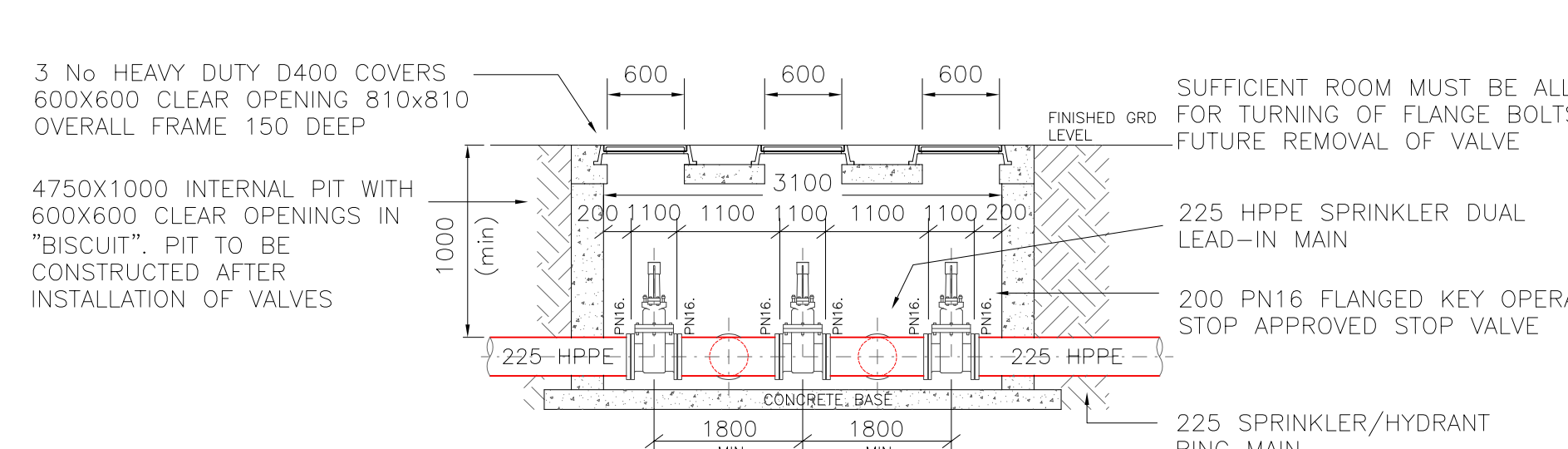
TANK INFILL RISER
(BASE OF TANK)
DETAIL-2



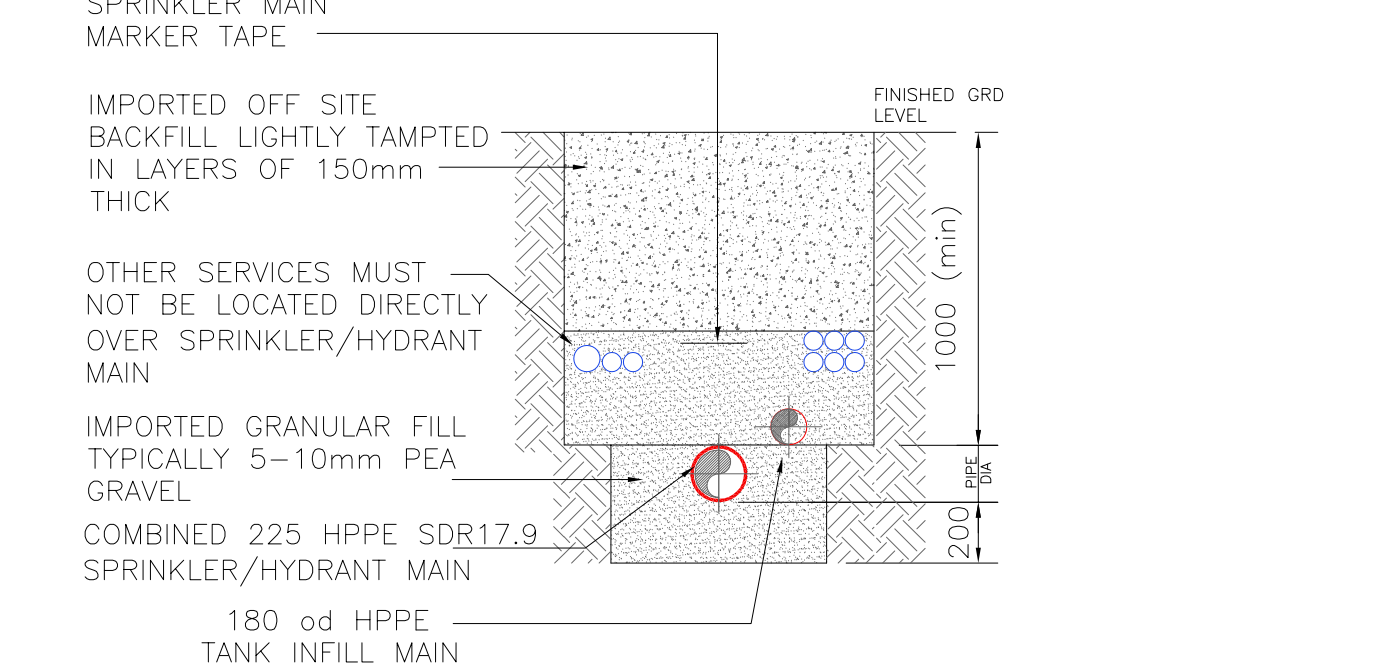
SPRINKLER MAIN EXIT
FROM PUMPHOUSE
DETAIL-3



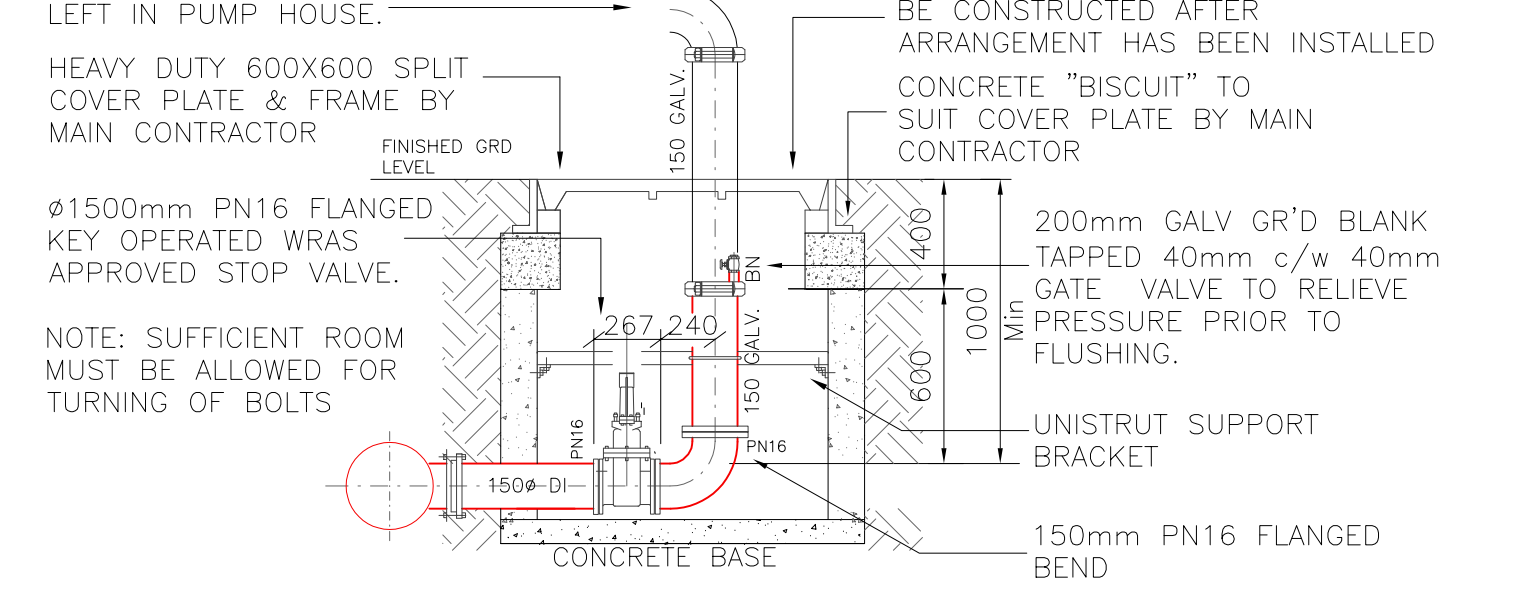
UNDERGROUND HYDRANT WITH PRV
& ISOLATING VALVE / PIT.
DETAIL - 4



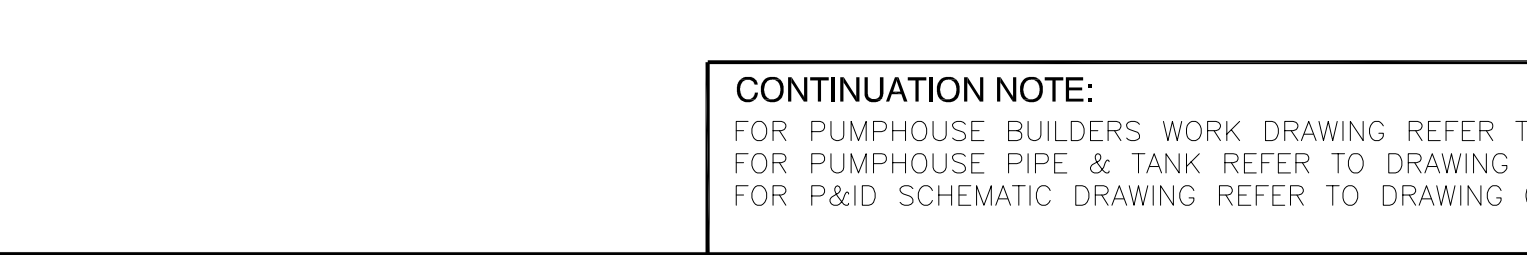
SPRINKLER/HYDRANT SECTIONAL
STOP VALVE / PIT
DETAIL-5



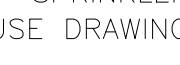
SPRINKLER / HYDRANT TRENCH
DETAIL-6



SPRINKLER / HYDRANT FULL BORE
FLUSHING ARRANGEMENT
DETAIL-7



CONTINUATION NOTE:
FOR PUMPHOUSE BUILDERS WORK DRAWING REFER TO DRAWING 0002
FOR PUMPHOUSE PIPE & TANK REFER TO DRAWING 0003
FOR P&ID SCHEMATIC DRAWING REFER TO DRAWING 0004

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED					LEGEND:	APPROVAL REFERENCE:	MAIN CONTRACTOR TO PROVIDE:	TYCO INSTALLER NOTES:	TYCO EXTERNAL CONTRACTOR TO SUPPLY THE FOLLOWING:	HYDRANT MARKER POSTS + MARKER PLATES (SUPPLY ONLY) PIT COVERS/FRAME (SUPPLY ONLY) MARKER TAPE (SUPPLY & INSTALL)	MARKER/IDENTIFICATION TAPE TO BE LAID DIRECTLY ABOVE THE UNDERGROUND MAIN AT A LEVEL OF APPROXIMATELY 300mm BELOW FINISHED GROUND LEVEL. THE INDELIABLE PVC TAPE WILL BE LABELED "CAUTION - FIRE MAIN BELOW". IF THE BACK-FILLING CANNOT COMMENCE IMMEDIATELY AFTER SUCCESSFUL TESTING OF THE UNDERGROUND MAINS, THEN THE MARKER/IDENTIFICATION TAPE IS TO BE HANDLED TO THE MAIN CONTRACTOR FOR LAYING DURING BACK FILLING.	ALL JOINTS TO BE WRAPPED (WHERE APPLICABLE).	ALL BOLTS FITTED ON UNDERGROUND FLANGES TO BE BZP	ALL UNDERGROUND FLANGES TO BE DENSE WRAPPED, PIPEWORK TO BE PLUGGED/CAPPED WHILST STORED ON SITE OR IF INCOMPLETE LAYING IN TRENCH.	IN THE EVENT OF MAINS BEING INSTALLED LOWER THAN 1m COVER, HYDRANT RISER PIPES MUST BE ADJUSTED.	HYDRANTS TO BE SPACED MAX 90m APART.	MATERIAL DESCRIPTION	QUANTITY	PRELIMINARY / INFORMATION	COMMITTEE NO:	COMMITTEE NO:	REV	
P01	FIRST ISSUE FOR COMMENT & APPROVAL	28.03.25	FB	SL	 225 OD COMBINED HYDRANT/SPRINKLER UNDERGROUND SDR 11 HPPE RING MAIN.		1) ALL EXCAVATING AND BACKFILLING OF TRENCHES. 2) HYDRANT VALVE PITS AS REQUIRED, SEE DETAILS. 3) WHERE PIPEWORK PASSES UNDER ROADWAYS OR OTHER SIMILAR HEAVY LOAD AREAS, SPECIAL PRECAUTIONS SHOULD BE TAKEN TO AVOID DAMAGE BY THESE SUPERIMPOSED LOADS. TYCO CANNOT ACCEPT ANY RESPONSIBILITY FOR PIPE FRACTURE DUE TO DIFFERENTIAL SETTLEMENT BETWEEN PIPES AND BUILDING OR BUILDING AND BUILDING. 4) MAIN CONTRACTOR TO PROVIDE ASSISTANCE WITH & REASONABLE ACCESS FOR OFFLOADING & STORAGE OF MATERIALS WITHIN CLOSE PROXIMITY TO PERMITTED WORKING AREA, REASONABLE WORKING AREA FOR TOOLS/CUTTING & SCREWING MACHINES & CLEAR ACCESS FOR INSTALLATION. 5) WATER SUPPLY TO FACILITATE TESTING OF UNDERGROUND PIPEWORK VIA BOWSER IF REQUIRED. 6) SERVICE TRENCH BACKFILL TO BE OF NON CONTAMINATED MATERIAL. 7) THRUST BLOCKS ARE NOT NORMALLY REQUIRED TO BE INSTALLED ON HPPE UNDERGROUND PIPE WITH A BURY DEPTH GREATER THAN 300mm, HOWEVER TFIS RECOMMEND A SOIL CONDITION STRUCTURAL CHECK TO BE CARRIED OUT. THRUST BLOCK TO BE INSTALLED AS REQUIRED.	1) TYCO EXTERNAL CONTRACTOR TO SUPPLY THE FOLLOWING: HYDRANT MARKER POSTS + MARKER PLATES (SUPPLY ONLY) PIT COVERS/FRAME (SUPPLY ONLY) MARKER TAPE (SUPPLY & INSTALL) 2) MARKER/IDENTIFICATION TAPE TO BE LAID DIRECTLY ABOVE THE UNDERGROUND MAIN AT A LEVEL OF APPROXIMATELY 300mm BELOW FINISHED GROUND LEVEL. THE INDELIABLE PVC TAPE WILL BE LABELED "CAUTION - FIRE MAIN BELOW". IF THE BACK-FILLING CANNOT COMMENCE IMMEDIATELY AFTER SUCCESSFUL TESTING OF THE UNDERGROUND MAINS, THEN THE MARKER/IDENTIFICATION TAPE IS TO BE HANDLED TO THE MAIN CONTRACTOR FOR LAYING DURING BACK FILLING. 3) ALL JOINTS TO BE WRAPPED (WHERE APPLICABLE). 4) ALL BOLTS FITTED ON UNDERGROUND FLANGES TO BE BZP 5) ALL UNDERGROUND FLANGES TO BE DENSE WRAPPED, PIPEWORK TO BE PLUGGED/CAPPED WHILST STORED ON SITE OR IF INCOMPLETE LAYING IN TRENCH. 6) IN THE EVENT OF MAINS BEING INSTALLED LOWER THAN 1m COVER, HYDRANT RISER PIPES MUST BE ADJUSTED. 7) HYDRANTS TO BE SPACED MAX 90m APART.	HYDRANT MARKER POSTS + MARKER PLATES (SUPPLY ONLY) PIT COVERS/FRAME (SUPPLY ONLY) MARKER TAPE (SUPPLY & INSTALL)	MARKER/IDENTIFICATION TAPE TO BE LAID DIRECTLY ABOVE THE UNDERGROUND MAIN AT A LEVEL OF APPROXIMATELY 300mm BELOW FINISHED GROUND LEVEL. THE INDELIABLE PVC TAPE WILL BE LABELED "CAUTION - FIRE MAIN BELOW". IF THE BACK-FILLING CANNOT COMMENCE IMMEDIATELY AFTER SUCCESSFUL TESTING OF THE UNDERGROUND MAINS, THEN THE MARKER/IDENTIFICATION TAPE IS TO BE HANDLED TO THE MAIN CONTRACTOR FOR LAYING DURING BACK FILLING.	ALL JOINTS TO BE WRAPPED (WHERE APPLICABLE).	ALL BOLTS FITTED ON UNDERGROUND FLANGES TO BE BZP	ALL UNDERGROUND FLANGES TO BE DENSE WRAPPED, PIPEWORK TO BE PLUGGED/CAPPED WHILST STORED ON SITE OR IF INCOMPLETE LAYING IN TRENCH.	IN THE EVENT OF MAINS BEING INSTALLED LOWER THAN 1m COVER, HYDRANT RISER PIPES MUST BE ADJUSTED.	HYDRANTS TO BE SPACED MAX 90m APART.	225 OD COMBINED HYDRANT/SPRINKLER UNDERGROUND SDR 11 HPPE RING MAIN.	5	PRELIMINARY / INFORMATION	COMMITTEE NO:	COMMITTEE NO:	REV		
P02	DRAWING UPDATED IN LINE WITH COMMENTS RECEIVED 10.04.25	10.04.25	FB	SL	 180 OD HPPE SDR 17.6 TANK INFILL MAIN	FM																	
					 BS750 UNDERGROUND FIRE HYDRANT c/w PRESSURE REDUCING VALVE.	WRAS																	
					 HYDRANT/SPRINKLER RING MAIN SECTIONAL GATE VALVE, KEY OPERATED IN PIT.	BS750																	
					 PUMPHOUSE DRAIN - SPRINKLER PUMPHOUSE DRAIN (REFER TO PUMPHOUSE DRAWING 0002 & 03 FOR DRAINAGE)	FM																	
					 HYDRANT RING MAIN FLUSHING VALVE																		