CITY OF
COFFS HARBOUR

STANDARD DRAWINGS FOR TYPICAL TRENCHING & THRUST ANCHORS

DISCLAIMER The City shall have no liability or responsibility to the user or any other person or entity with respect to any liability, loss or damage caused or alleged to be caused, directly or indirectly, by the adoption and use of these Standard Drawings including, but not limited to, any interruption of service, loss of business or anticipatory profits, or consequential damages resulting from the use of these Standard Drawings. Persons must not rely on these Standard Drawings as the equivalent of, or a substitute for, project-specific design and assessment by an appropriately qualified professional.

NOTE: THESE STANDARD DRAWINGS REPLACE ALL PREVIOUS ISSUES

DWG No.	DESCRIPTIONS	REVISION
T - 550 - 01	DRAWING INDEX - TYPICAL TRENCHING & THRUST ANCHOR STANDARDS	Rev 1 12/2024
	EXCAVATION, BEDDING & BACKFILLING	
T - 550 - 02	EMBEDMENT, TRENCHING & PIPE COVER FOR WATER AND SEWER MAINS	Rev 1 12/2024
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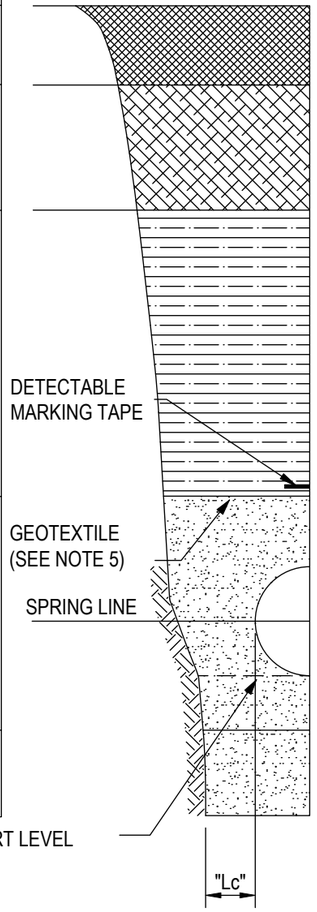
T - 550 - 15	WATER MAIN VERTICAL THRUST BLOCKS FOR BENDS WITH UPWARD THRUST - TYPE 3	Rev 1 12/2024
T - 550 - 16	WATER MAIN THRUST CONNECTOR STOP VALVE ANCHORAGE - TYPE 4	Rev 1 12/2024
T - 550 - 17	SEWER RISING MAIN TYPICAL THRUST BLOCK DETAILS 90° AND 45° BENDS - TYPE 2	Rev 1 12/2024
T - 550 - 18	SEWER RISING MAIN TYPICAL THRUST BLOCK DETAILS 22½° AND 11¼° BENDS - TYPE 2	Rev 1 12/2024
T - 550 - 19	SEWER RISING MAIN TYPICAL THRUST BLOCK DETAILS TEES, BLANK ENDS & TAPERS - TYPE 2	Rev 1 12/2024
T - 550 - 20	SEWER RISING MAIN VERTICAL THRUST BLOCKS FOR BENDS WITH UPWARD THRUST - TYPE 3	Rev 1 12/2024
T - 550 - 21	SEWER RISING MAIN THRUST CONNECTOR STOP VALVE ANCHORAGE - TYPE 4	Rev 1 12/2024
T - 550 - 22	DN100 & DN150 SOC-SOC VALVE THRUST BLOCK DETAIL	Rev 1 12/2024
T - 550 - 23	3 - WAY COMBI VALVE ANCHORAGE DN100 & DN150 SOC-SOC VALVE DETAIL	Rev 1 12/2024
T - 550 - 24	GENERAL ARRANGEMENT CONCRETE THRUST BLOCKS FOR MULTIPLE MAINS	Rev 1 12/2024
T - 550 - 25	CONSTRUCTION METHOD FOR CUT-IN TO LIVE MAIN	Rev 1 12/2024
	TRENCHLESS METHOD	
T - 550 - 30	TRENCHLESS METHOD - TYPICAL CASE BORE	Rev 1 12/2024
T - 550 - 31	HDPE MAIN INSIDE CARRIER PIPE UNDERBORE FOAM FILLER END TREATMENT	Rev 1 12/2024

MATERIAL		ZONE
ROAD SURFACE	VERGE & TRACK	
ROAD SURFACE LAYER	TO MATCH EXISTING	SURFACE COURSE
TO MATCH EXISTING ROAD BASE OR TO DESIGN REQUIREMENTS		ROAD BASE
TRENCH FILL TO DESIGN REQUIREMENTS OR INORGANIC FILL MATIERIAL WITH 75 MAXIMUM STONE SIZE	TRENCH FILL TO DESIGN REQUIREMENTS OR INORGANIC FILL MATIERIAL WITH 75 MAXIMUM STONE SIZE	TRENCH FILL (AS SPECIFIED IN DESIGN DRAWINGS)
EMBEDMENT MATIERIAL IN ACCORDANCE WITH DESIGN DRAWINGS AND THE CITY'S CONSTRUCTION SPECIFICATION. (SEE NOTIE 4) BEDDING MAYBE OMITTIED IF TRENCH BASE IS GRANULAR SAND OR GRAVEL OF SUITABLE GRADING.		OVERLAY (300mm in Rock) — EMBEDMENT SIDE SUPPORT — EMBEDMENT BEDDING — EMBEDMENT OVER-EXCAVATION

VEHICULAR LOADING



DESIGN INVERT LEVEL

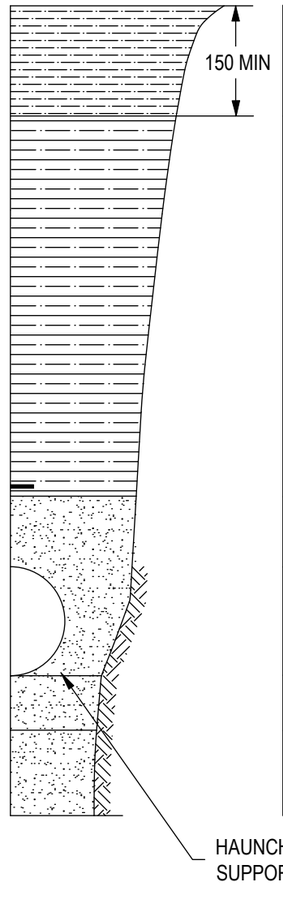
LEGEND
SPECIFIED BY DESIGNER IN DESIGN DRAWINGS

SEWER PIPE MIN. COVER

LOCATION	MINIMUM COVER #
PRIVATE PROPERTY NON VEHICULAR NEW DEVELOPMENTS	600
PRIVATE PROPERTY NON VEHICULAR EXISTING DEVELOPMENTS	450
PRIVATE PROPERTY VEHICULAR	750
FOOTPATHS, SEALED LOCAL ROADS	900
UNSEALED ROADS	1200
ARTERIAL ROADS	1200

WATER MAIN MIN. COVER

LOCATION	MINIMUM COVER #	
NOMINAL DIAMETER	< DN300	≥ DN300
NON TRAFFICABLE	450 (e)	1000 (e)
TRAFFICABLE AREA DRIVEWAYS - RESIDENTIAL INDUSTRIAL/COMMERICAL	600	1000
LOCAL ROAD CARRIAGEWAY & VERGE	600	(a)(b) 1000 / 850
MAJOR ROAD CARRIAGEWAY & VERGE	750	1000
MOTORWAYS ROAD CARRIAGEWAY & VERGE	1200	1200
UNSEALED ROAD CARRIAGEWAY & VERGE	750	1000
EMBANKMENT	750	1000



ZONE		MATERIAL
TOPSOIL OR PAVEMENT		ORIGINAL OR IMPORTED MATERIAL TO MATCH EXISTING
TRENCH FILL		INORGANIC FILL MATERIAL WITH 75 MAXIMUM STONE STONE SIZE
EMBEDMENT	OVERLAY (300mm Rock)	EMBEDMENT MATERIAL IN ACCORDANCE WITH DESIGN DRAWINGS AND THE CITY'S CONSTRUCTION SPECIFICATION AGENCY REQUIREMENTS (SEE NOTE 4) BEDDING MAYBE OMITTED IF TRENCH BASE IS GRANULAR SAND OR GRAVEL OF SUITABLE GRADING
EMBEDMENT	SIDE SUPPORT	
EMBEDMENT	BEDDING	
OVER-EXCAVATION		

NO VEHICULAR LOADING

INCLUDES LOCATI0NS WHERE OCCASSIONAL VEHICLE LOADING OCCURS
EG RESERVES AND FOOTWAYS

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. SPECIFY SPECIAL BEDDING TO SUIT THE CONDITIONS IF THE TRENCH FLOOR HAS:
   - IRREGULAR OUTCROPS OF ROCK.
   - AHBP OF <50 kPa (REFER STD DRG T-550-10), OR
   - BEEN DISTURBED BY UNCONTROLLED GROUND WATER.
3. COMPACT AND EVENLY GRADE FINISHED TRENCH FLOOR .
4. EMBEDMENT, TRENCH FILL AND COMPACTION TO MEET THE REQUIREMENT OF DESIGN DRAWINGS, WSA 02 PART 3 AND THE CITY'S CONSTRUCTION SPECIFICATION
5. USE GEOTEXIILE FILTER FABRIC WHERE SPECIFIED.
6. SIDES OF EXCAVATION TO BE KEPT VERTICAL TO AT LEAST 150 ABOVE THE PIPE.

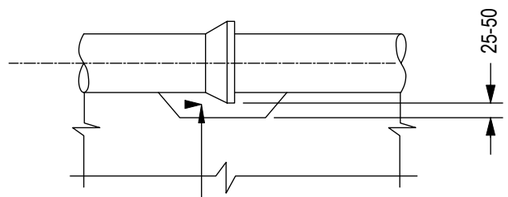
SPRING LINE TRENCH CLEARANCE

NOMINAL DIAMETER DN	MINIMUM CLEARANCE "Lc"
⩽150	⩽100
>150- ⩽300	150
>300- ⩽450	200
>450- ⩽ 900	300
>900- ⩽1500	350

TRENCH WIDTH TO BE SUFFICIENT TO SAFELY LAY PIPE AND COMPACT THE SIDE SUPPORT ZONE.

COVER NOTES

a. MINIMUM COVER FOR ROADS SHALL BE TAKEN FROM KERB INVERT R.L.
b. FOR LOCAL ROADS WITH KERB THE COVER MAY BE REDUCED TO 850mm FOR MAINS ⩾ DN300 WITH TYPE 2 TRENCH.
c. SEWER MAINS SHALL BE DEEPER THAN WATER MAINS WHEN IN VICINITY IN ACCORDANCE WITH WSA CLEARANCES.
d. FOR EXISTING SITES WHERE COVERS ABOVE CANNOT BE ACHIVED DUE TO CLEARENCES TO EXISTING SERVICES, THE COVERS MAY BE REDUCED SUBJECT TO APPROVAL IN ACCORDANCE WITH TABLE 7.2 WSA 03 2011.
e. COVER SHALL BE LOCALLY INCREASED WHERE NECESSARY TO ACCOMMODATE STOP VALVES, HYDRANTS AND OTHER APPURTENANCES. PROVIDE MINIMUM COVER TO ANCHORS BLOCKS AS SHOWN ON STD DRG T-550-11, 12, 13, 14 & 16.



PROVIDE POCKETS IN BEDDING. AT JOINTS PRIOR TO LAYING PIPES. FILL VOID DURING COMPLETION OF EMBEDMENT.

PIPE JOINT BEDDING POCKETS

FOR JOINT PROJECTIONS (SOCKETS. FLANGES ETC)

Drawn	B.P.S					
Checked	C.B					
Approved	D.S.					
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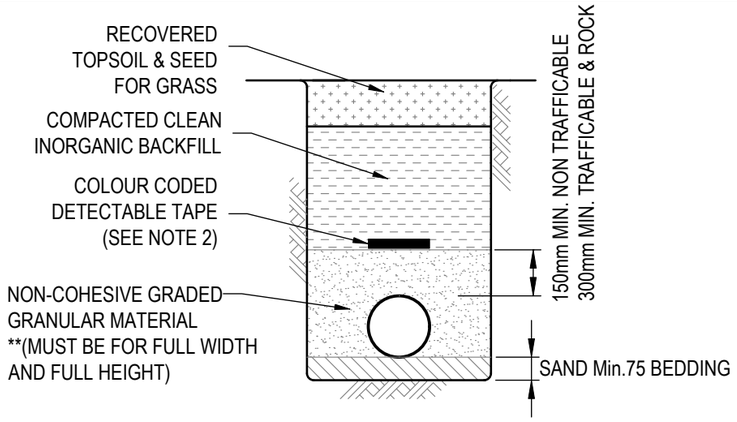
STANDARD DRAWING

TYPICAL ARRANGEMENT
EMBEDMENT, TRENCHING & PIPE COVER
FOR WATER & SEWER MAINS

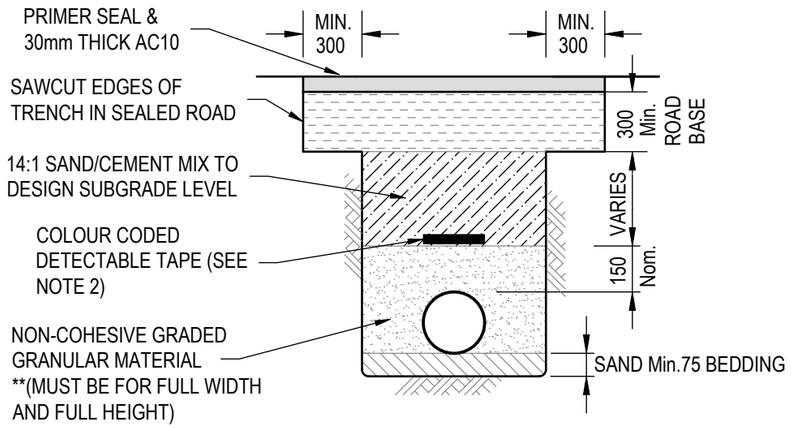
COUNCIL PLAN No. T-550-02

Orig. Size A3 | Revision 1



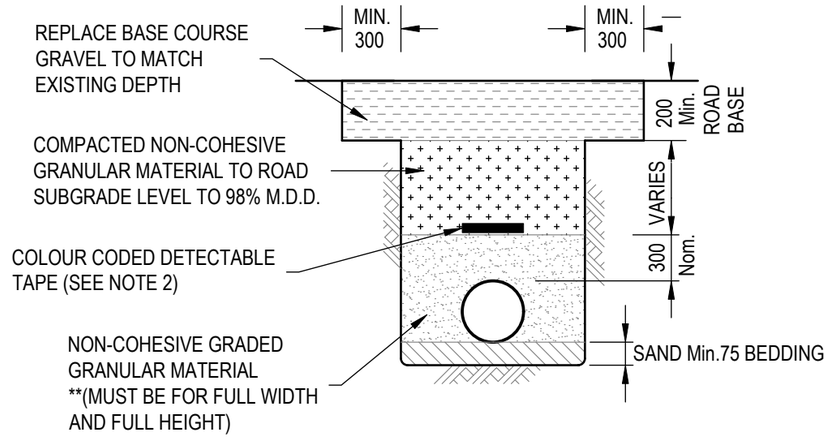
WRAPPED DICL & uPVC PIPE

TRENCH TYPE 1



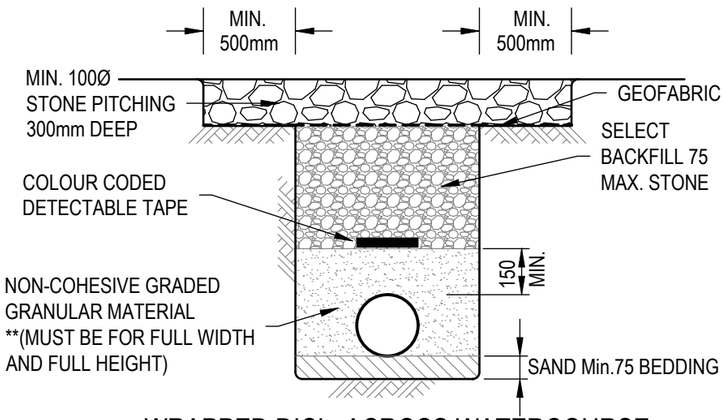
WRAPPED DICL IN SEALED ROAD & WHERE TRENCH IS WITHIN 300mm OF EXISTING SEAL

TRENCH TYPE 2



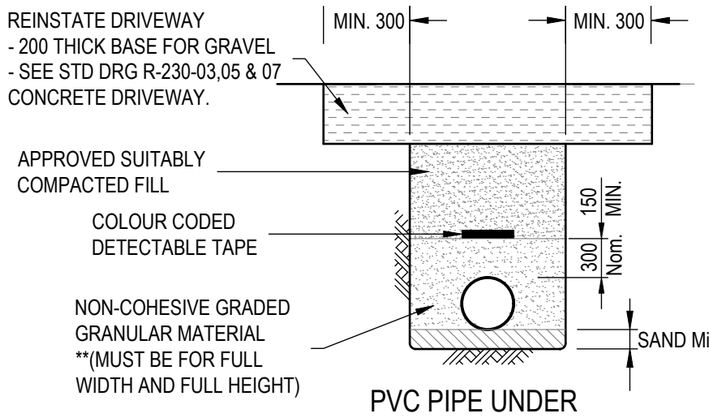
WRAPPED DICL IN ROAD SHOULDER

TRENCH TYPE 2a



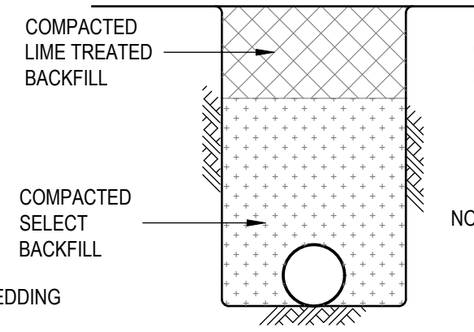
WRAPPED DICL ACROSS WATERCOURSE

TRENCH TYPE 3



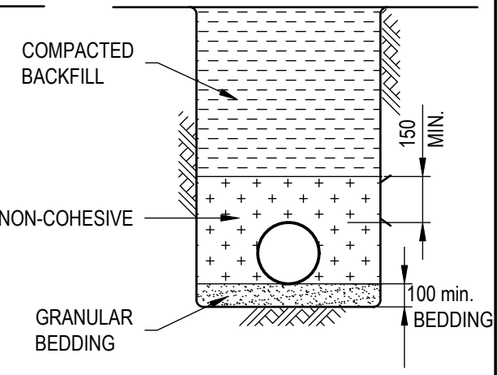
PVC PIPE UNDER GRAVEL/CONCRETE DRIVEWAYS

TRENCH TYPE 4



WRAPPED DICL PIPE IN ACID SULPHATE SOILS

TRENCH TYPE 5



WRAPPED DICL PIPE IN ROCK

TRENCH TYPE 6

TABLE 1 - MINIMUM TRENCH WIDTHS

NOM. PIPE SIZE (DN) (mm)	MIN. CLEAR WIDTH OF TRENCH (INSIDE TIMBERING/SHEET PILING IF ANY)		NOM. PIPE SIZE (DN) (mm)	MIN. CLEAR WIDTH OF TRENCH (INSIDE TIMBERING/SHEET PILING IF ANY)	
	PIPE OTHER THAN PVC/PE (mm)	PVC/PE (mm)		PIPE OTHER THAN PVC/PE (mm)	PVC/PE (mm)
80	400	350	375	700	650
100	400	350	400	700	650
150	450	400	450	750	700
200	500	450	500	850	800
225	550	500	525	850	800
250	550	500	600	950	900
300	600	550	750	1100	1050

NOTES:

1. MINIMUM COVER TO BE SPECIFIED BY DESIGNER IN DESIGN DRAWINGS. REFER TO DRG. T-550-02 FOR NOMINAL MINIMUM COVER REQUIREMENTS FOR WATER MAINS & SEWER LINES.
2. PROVIDE COLOURED CODED DETECTABLE TAPE FOR WATER (BLUE), REUSE (LILAC) & SEWER RISING MAINS (CREAM) AS PER AS2648. DETECTABLE TAPE NOT REQUIRED FOR SEWER GRAVITY MAINS.
3. SPECIFY SPECIAL BEDDING TO SUIT THE CONDITIONS IF THE TRENCH FLOOR HAS:
   - IRREGULAR OUTCROPS OF ROCK.
   - AHBP OF <50 kPa (SEE SEW-1200), OR
   - BEEN DISTURBED BY UNCONTROLLED GROUND WATER.
4. COMPACT AND EVENLY GRADE FINISHED TRENCH FLOOR .
5. EMBEDMENT, TRENCH FILL AND COMPACTION TO MEET THE REQUIREMENT OF DESIGN DRAWINGS AND WSA 02 PART 3.
6. USE GEOTEXTILE FILTER FABRIC WHERE SPECIFIED.
7. SIDES OF EXCAVATION TO BE KEPT VERTICAL TO AT LEAST 150 ABOVE THE PIPE.
8. BENCH TRENCH FOR TRENCH HEIGHT OVER 1.5m OR ALTERNATIVELY USING TRENCH SHORING.
9. STANDARD DRAWING OVERRIDES - WSSA SEW-1202, SEW-1203, SEW-1204

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Approved	D.S.					
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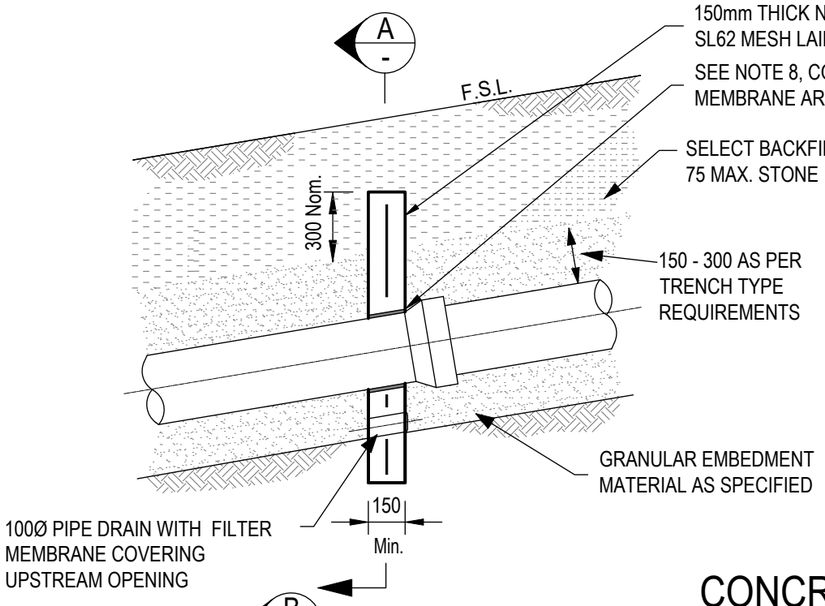
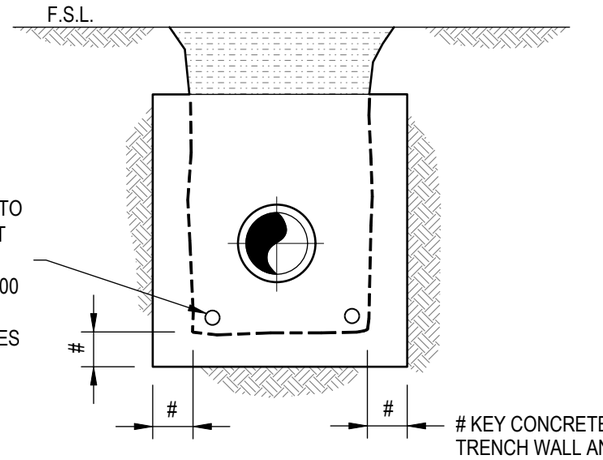
STANDARD DRAWING

TRENCH TYPES
FLEXIBLE AND RIGID PIPES

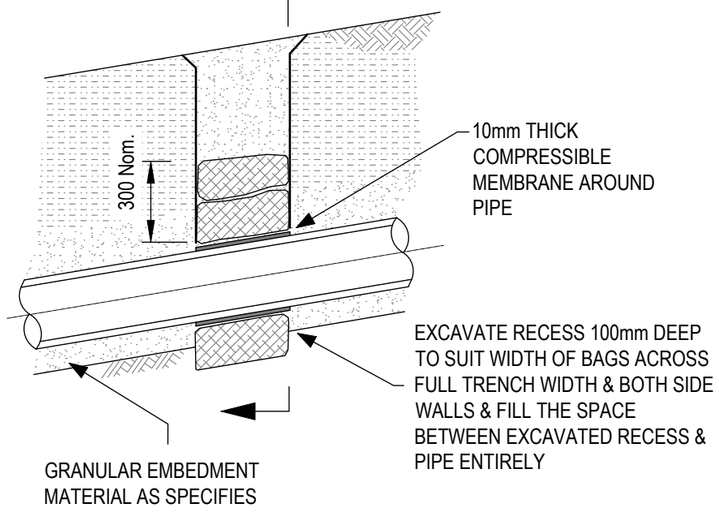
COUNCIL PLAN No. T-550-03

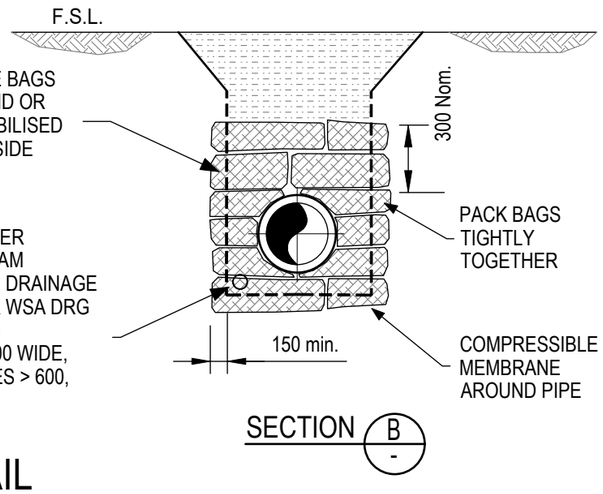
Orig. Size A3 | Revision 1





CONCRETE BULKHEAD DETAIL





TRENCH STOP DETAIL

TRENCH STOP AND CONCRETE BULKHEADS

	PIPE GRADE (%)	TRENCH STOP SPACING	CONC. BULKHEAD SPACING
TRENCH STOPS	5.00	20.0	
	5.50	18.2	
	6.00	16.7	
	6.50	15.4	
	7.00	14.3	
	7.50	13.3	
	8.00	12.5	
	8.50	11.8	
	9.00	11.1	
	9.50	10.5	
	10.00	10.0	
	10.50	9.5	
	11.00	9.1	
	11.50	8.7	
	12.00	8.3	
	12.50	8.0	
	13.00	7.7	
	13.50	7.4	
	14.00	7.1	
	14.50	6.8	
TRENCH STOPS INTEGRATED WITH CONCRETE BULKHEAD	15.00	6.6	29.3
	15.50	6.4	28.4
	16.00	6.2	27.5
	16.50	6.0	26.7
	17.00	5.8	25.9
	17.50	5.6	25.1
	18.00	5.5	24.4
	18.50	5.3	23.8
	19.00	5.2	23.2
	19.50	5.0	22.6
	20.00	4.9	22.0
	20.50	4.8	21.5
	21.00	4.7	21.0
	21.50	4.6	20.5
	22.00	4.4	20.0
	22.50	4.3	19.6
	23.00	4.2	19.1
	23.50	4.2	18.7
	24.00	4.1	18.3
	24.50	4.0	18.0
	25.00	3.9	17.6
	25.50	3.8	17.3
	26.00	3.7	16.9
	26.50	3.7	16.6
	27.00	3.6	16.3
	27.50	3.5	16.0
	28.00	3.5	15.7
	28.50	3.4	15.4
	29.00	3.3	15.2
	29.50	3.3	14.9

NOTES: TRENCH STOP AND CONCRETE BULKHEAD

1. TRENCH STOPS ARE TO BE PLACED ON GRADES ≥ 5% < 15% AND TO BE INCORPORATED WITH CONCRETE BULKHEADS ON GRADES >15% ≤ 30%
2. THE DISTANCE BETWEEN TRENCH STOPS SHOWN ON THE DESIGNS ARE MINIMUM DISTANCES. WHERE THE DISTANCE STATED IS GREATER THAN THE DISTANCE BETWEEN PITS/BENDS/VALVES, A TRENCH STOP IS STILL TO BE PLACED ON THAT LINE.
3. CONSTRUCT CONCRETE BULKHEADS AND TRENCH STOPS AT LOCATIONS SPECIFIED IN DESIGN DRAWINGS.
4. BULKHEAD AT A RETAINING WALL TO BE UNDER THE WALL.
5. KEY CONCRETE BULKHEADS INTO SIDES AND BOTTOM OF TRENCH AGAINST A BEARING SURFACE OF UNDISTURBED SOIL.
5. CONCRETE TO BE CLASS N20
6. DO NOT DEFORM PIPES DURING PLACEMENT OF CONCRETE.
7. SEAL BAGS TO PREVENT LEAKAGE OF CONTAINED MATERIAL.
8. COMPRESSIBLE MEMBRANE AROUND PIPE TO BE 10mm THICK ABELFLEX OR SIMILAR FOR BULKHEADS ADJACENT TO KERBS AND 3mm THICK RUBBER FOR BULKHEADS AND TRENCH STOPS ON SLOPES.
9. PROVIDE CONTINUOUS DRAINAGE PATH. REFER TO WSA DRG WAT-1210 FOR TYPICAL DISCHARGE DETAILS
   - THROUGH BULKHEADS AND TRENCH STOPS
   - AROUND VALVE CHAMBERS
   - IN TRENCH EXCAVATIONS ACROSS ROADS
10. ALL DIMENSIONS ARE IN MILLIMETRES.

WSA TABLE 7.5 REQUIREMENTS FOR BULKHEADS AND TRENCHSTOPS

GRADE %	REQUIREMENT	SPACING (m)
≥ 5 < 15	TRENCHSTOPS	S = 100/GRADE (%)
≥15 < 30	CONCRETE BULKHEAD	S = Lp/Grade (%), WHERE Lp = 80 x PIPE LENGTH*, m (450 m MAX) WHERE Lp >100 m - USE INTERMEDIATE TRENCHSTOPS AT SPACING < 100/GRADE (%)
≥30 - 50	CONTINUOUS CONCRETE ENCASEMENT OF PIPELINE AND CONCRETE BULKHEADS	S = 100/GRADE (%)
> 50	SPECIAL DESIGN	

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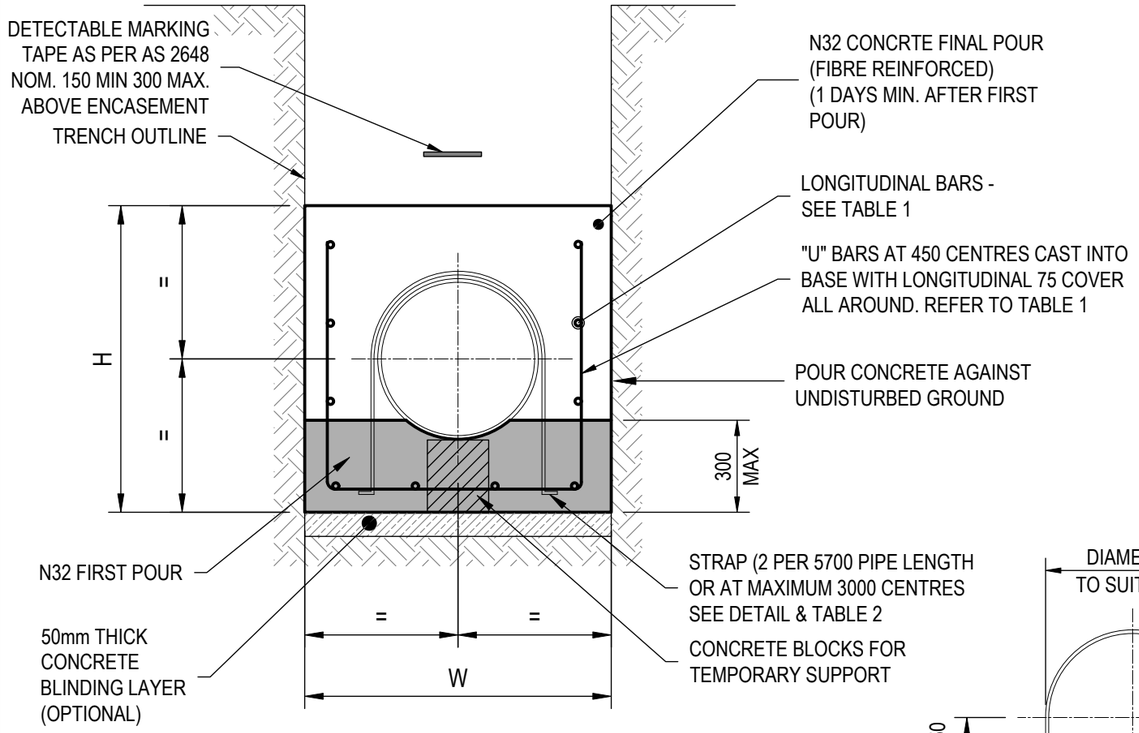
STANDARD DRAWING

TRENCH
BULKHEADS & TRENCHSTOP

COUNCIL PLAN No.
T-550-04

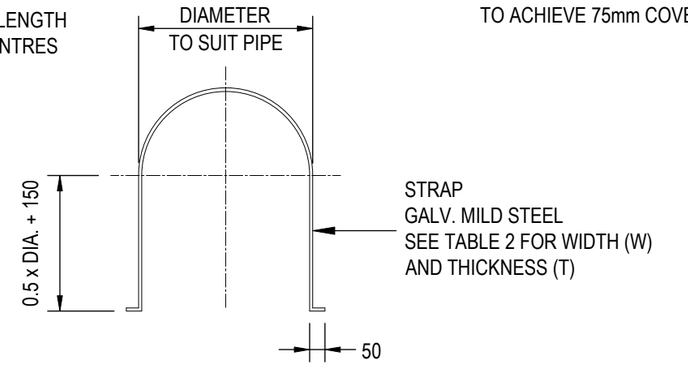
Orig. Size A3

Revision 1

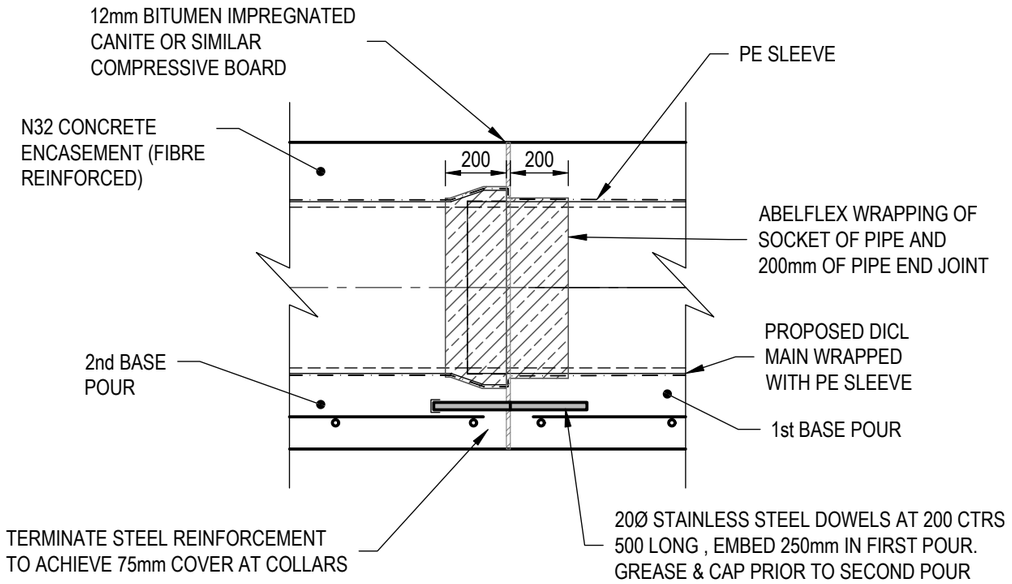


CONRETE ENCASED DICL PIPEWORK

SECTION



TYPICAL STRAP



DCJ & PIPE COLLAR DETAIL

ELEVATION

DCJ - DENOTES DOWELLED CONSTRUCTION JOINT

TABLE 1 - NOMINAL ENCASEMENT DIMENSIONS

PIPE SIZE (DICL)	O.D.	ENCASEMENT		REINFORCEMENT	
		H (mm)	W (mm)	U BAR	LONGITUDINAL
100Ø DICL	122	550	450	N12 - 450	N12 - 200
150Ø DICL	177	600	500	N12 - 450	N12 - 200
200Ø DICL	232	650	550	N12 - 450	N12 - 200
225Ø DICL	259	650	550	N12 - 450	N12 - 200
250Ø DICL	286	700	600	N12 - 450	N12 - 200
300Ø DICL	345	750	650	N12 - 450	N12 - 200
375Ø DICL	426	850	750	N16 - 450	N16 - 200
450Ø DICL	507	900	850	N16 - 450	N16 - 200
500Ø DICL	560	950	900	N16 - 450	N16 - 200
600Ø DICL	667	1100	1000	N16 - 450	N16 - 200

FOR DUAL PIPES ADD PIPE SEPARATION DISTANCE AND DIAMETER OF NEW PIPE TO WIDTH

TABLE 2 - LENGTHS OF HOLD DOWN STRAPS FOR CONCRETE ENCASEMENT TO RESTRAIN FLOATATION FOR DICL MAINS

PIPE SIZE (DICL)	O.D.	STRAP SIZES		LENGTH (mm)	
		T (mm)	W (mm)	Calculated length	**Recommended Min. length**
100Ø DICL	122	3	50	592	**600**
150Ø DICL	177	3	50	678	**680**
200Ø DICL	232	3	50	764	**770**
225Ø DICL	259	3	50	807	**810**
250Ø DICL	286	3	50	849	**850**
300Ø DICL	345	3	50	942	**950**
375Ø DICL	426	5	50	1069	**1070**
450Ø DICL	507	5	50	1196	**1200**
500Ø DICL	560	6	65	1279	**1300**
600Ø DICL	667	6	65	1447	**1460**

NOTES:

1. PLAN SUITABLE FOR MECHANICAL PROTECTION OF DICL PIPEWORK ONLY.
2. SPECIAL DESIGN REQUIRED FOR CONCRETE ENCASEMENTS WITH HIGH EMBANKMENT LOADINGS WHERE GROUND SETTLEMENT IS EXPECTED DUE TO SOIL LONG TERM ELASTIC MODULUS
3. WHERE CONCRETE ENCASEMENT IS CONSTRUCTED AT A STEEP GRADE OF 30-50%, INTEGRAL CONCRETE BULKHEADS SHALL BE PROVIDED AS SHOWN ON STD DRG T-550-04 AT A SPACING OF 100 DIVIDED PIPE GRADE (%)
4. CONCRETE FOR FIRST POUR BASE SLAB TO BE N32 CONCRETE. CONCRETE TO BE MECHANICALLY VIBRATED.
5. CONCRETE FOR SECOND POUR ENCASEMENT TO BE FIBRE REINFORCED N32 CONCRETE TO INCLUDE 30kg/m^3 OF CORRUGATED STEEL FIBRES. CONCRETE TO BE MECHANICALLY VIBRATED.
6. EXCAVATE TRENCH, INSTALL PIPEWORK ON CONCRETE BLOCKS AND FIX "U" BAR REINFORCEMENT AND TIE DOWN STRAPS AS NOTED.
7. PROVIDED GALVANISED MILD STEEL STRAPS TO PREVENT FLOATATION DURING ENCASEMENT POUR, TYPICALLY TWO STRAPS PER 5700mm DICL PIPE LENGTH (2850mm CENTRES) OR OTHERWISE ELSEWHERE AT 3000 MAXIMUM CENTRES.
8. CONCRETE ENCASEMENT ARE TO BE CURED FOR A MINIMUM OF 7 DAYS BEFORE BEING SUBJECTED TO ANY LOADING
9. DICL PIPES TO BE WRAPPED WITH COLOUR CODED PE SLEEVING
10. ALL PIPE COLLARS ARE TO BE WRAPPED WITH ABELFLEX AS SHOWN IN DETAIL PIPE COLLAR DETAIL.
11. PROVIDE 75mm COVER TO REINFORCEMENT UNLESS NOTED OTHERWISE.

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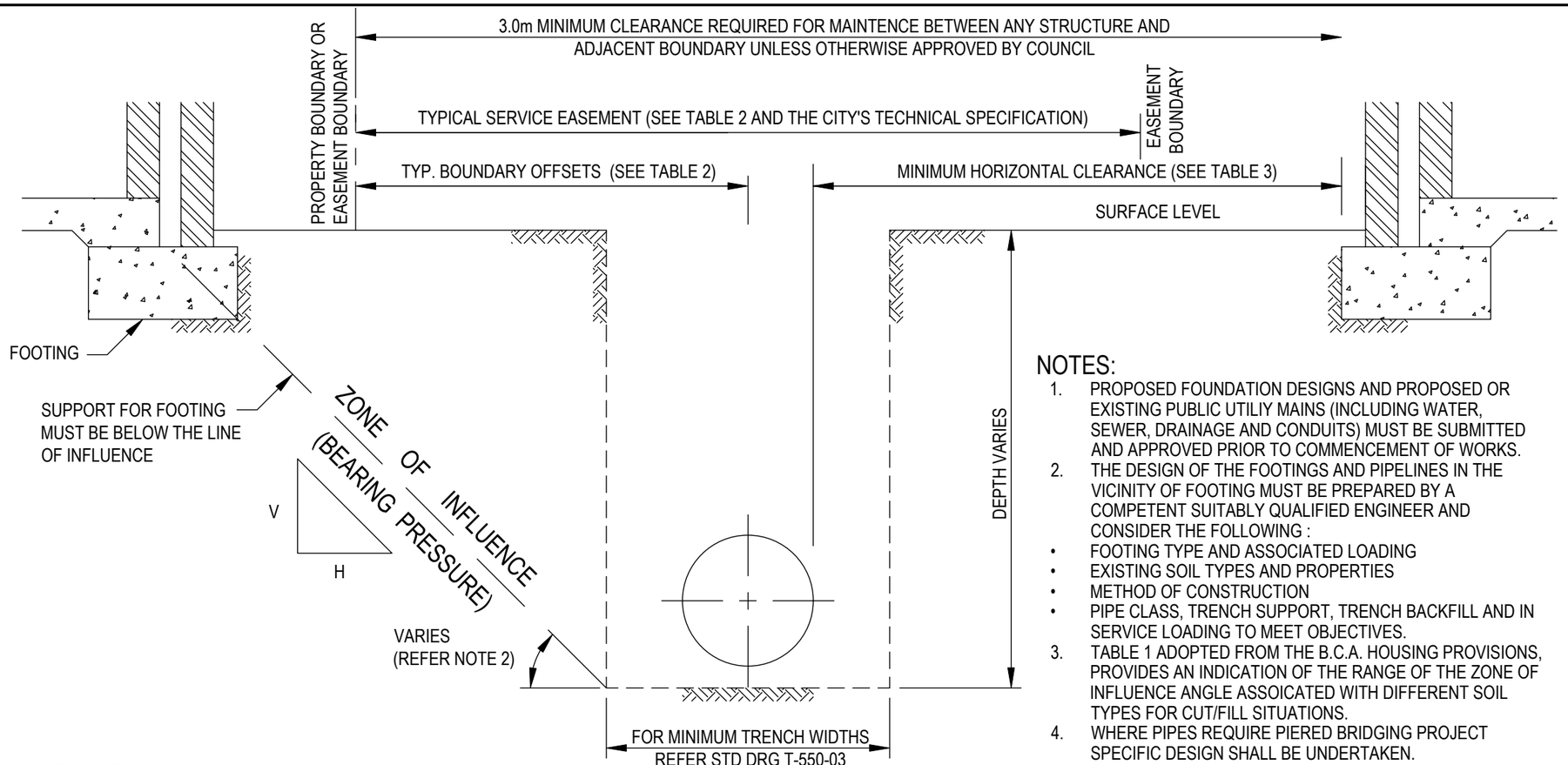
STANDARD DRAWING

TYPICAL CONCRETE ENCASEMENT

COUNCIL PLAN No. T-550-05

Orig. Size A3 | Revision 1



PIPELINE - TYPICAL SECTION

(BUILDING ADJACENT TO PIPELINE)

(SHORING NOT SHOWN FOR CLARITY)
NOT TO SCALE

OBJECTIVES:

MINIMISE THE RISK OF:

a. DAMAGE CAUSED BY AN ADJACENT TRENCH EXCAVATION TO AN EXISTING STRUCTURE DUE TO:
   - A REDUCTION IN SUPPORT OF THE FOOTINGS.
   - A CHANGE IN MOISTURE CONTENT IN THE VICINITY OF THE FOOTINGS.

b. FAILURE OF A PIPELINE RESULTING FROM FORCES FROM AN ADJACENT FOOTING IN ADDITION TO THE ANTICIPATED BACKFILL AND IN SERVICE LOADS ON THE PIPELINE.

c. TRENCH COLLAPSE AND INJURY TO WORKERS DURING A PIPELINE INSTALLATION AS A RESULT OF FORCES APPLIED TO THE TRENCH SIDES FROM AN ADJACENT FOOTING.

NOTES:

1. PROPOSED FOUNDATION DESIGNS AND PROPOSED OR EXISTING PUBLIC UTILIY MAINS (INCLUDING WATER, SEWER, DRAINAGE AND CONDUITS) MUST BE SUBMITTED AND APPROVED PRIOR TO COMMENCEMENT OF WORKS.
2. THE DESIGN OF THE FOOTINGS AND PIPELINES IN THE VICINITY OF FOOTING MUST BE PREPARED BY A COMPETENT SUITABLY QUALIFIED ENGINEER AND CONSIDER THE FOLLOWING :
   - FOOTING TYPE AND ASSOCIATED LOADING
   - EXISTING SOIL TYPES AND PROPERTIES
   - METHOD OF CONSTRUCTION
   - PIPE CLASS, TRENCH SUPPORT, TRENCH BACKFILL AND IN SERVICE LOADING TO MEET OBJECTIVES.
3. TABLE 1 ADOPTED FROM THE B.C.A. HOUSING PROVISIONS, PROVIDES AN INDICATION OF THE RANGE OF THE ZONE OF INFLUENCE ANGLE ASSOICATED WITH DIFFERENT SOIL TYPES FOR CUT/FILL SITUATIONS.
4. WHERE PIPES REQUIRE PIERED BRIDGING PROJECT SPECIFIC DESIGN SHALL BE UNDERTAKEN.
5. PIPES LOCATED UNDER A RETAINING WALL SHALL BE PIERED. PROJECT SPECIFIC DESIGN SHALL BE UNDERTAKEN.

APPLICATION:

THIS DRAWING TO BE USED FOR ALL PUBLIC UTILITY'S INCLUDING, WATER, SEWER, DRAINS, AND CONDUITS

REFERNCES:

- AS 3500.2 : 2003 "PLUMBING AND DRAINAGE"
- BCA HOUSING PROVISIONS
- THE CITY OF COFF HARBOUR STANDARD DRAWING T-550-03 FOR TYPICAL TRENCHING DETAILS.
- REFER TO CHCC POLICY - CONSTRUCTION IN THE VICINITY OF AND PROTECTION OF COUNCIL UNDERGROUND ASSETS PROCEDURE (PRO-091 13/02/2018)

TABLE 1 (SEE NOTE 3)

SOIL TYPE	ANGLE OF SLOPE (H : V)	
	COMPACTED FILL	CUT
STABLE ROCK *	3H : 2V	1H : 8V
SAND *	2H : 1V	2H : 1V
SILT **	4H :1V	4H :1V
FIRM CLAY	2H : 1V	1H : 1V
SOFT CLAY	NOT SUITABLE	3H : 2V
SOFT SOILS **	NOT SUITABLE	NOT SUITABLE

* MOST SAND AND ROCK SITES WITH LITTLE OR NO GROUND MOVEMENT FROM MOISTURE CHANGES.

** SITES INCLUDE SOFT SOILS, SUCH AS SOFT CLAY OR LOOSE SANDS, LANDSLIP, MINE SUBSIDENCE, COLLAPSING SOILS SUBJECT TO EROSION, REACTIVE SITES SUBJECT ABNORMAL MOISTURE CONDITIONS OR SITES WHICH CANNOT BE CLASSIFIED OTHERWISE

*** NOTE : EXCAVATIONS OVER 1500 DEEP MAY REQUIRE BENCHING AND OR SHORING - CONTRACTOR TO UNDERTAKE THEIR OWN RISK ASSESMENT

TABLE 2

UTILITY	OFFSET FROM BOUNDAY	EASEMENT WIDTH
INTERALLOT DRAINGAGE < 1m DEEP	750	1500
INTERALLOT DRAINGAGE > 1m DEEP	1500	3000
DRAINAGE ≤ Ø600	1500	3000
SEWER < 3m DEEP	1500	3000
SEWER > 3m DEEP	2500	5000

TABLE 3

PIPE DIAMETER DN (mm)	MINIMUM CLEARANCE TO WALL OR BUILDING
LESS THAN 100	600
100 TO 150	1000
200 TO 300	1500
375	2000

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STANDARD DRAWING

GUIDE TO TRENCHING ADJACENT TO FOOTINGS

COUNCIL PLAN No. T-550-06

Orig. Size A3 | Revision 1

PREPARING THE TEST AREA:

CONDUCT ALL NATIVE SOIL IDENTIFICATION TESTS ON A FRESHLY EXPOSED, DAMP, HAND TRIMMED AREA OF THE TRENCH WALL IN THE PIPE ZONE. TAKE CARE THAT THE SOIL IN THE EXPOSED TEST AREA IS NOT COMPACTED OR LOOSENED DURING TRENCH EXCAVATION. IF THE SOIL IN THE TRENCH FLOOR AND WALL IS VERY DRY AT THE TIME THE TRENCH IS OPENED THEN FLOOD THE TEST AREA AND ALLOW TIME FOR THE WATER TO BE ABSORBED BY THE SOIL BEFORE IT IS TRIMMED AND TESTED.

IDENTIFYING CLAY SOILS:

A LUMP OF CLAY SOIL WILL BE DIFFICULT TO BREAK WHEN DRY. IT WILL BE STICKY AND NEED SOME EFFORT TO MOULD WITH THE FINGERS WHEN WET. CLAY WILL NOT WASH OFF EASILY. INDIVIDUAL CLAY PARTICLES ARE HARD TO SEE.

TESTING CLAY SOILS:

CLAY SOILS ARE BEST TESTED IN THE WALL OF THE TRENCH. THE FIST, THE THUMB OR THE THUMBNAIL ARE USED TO DETERMINE THE CONSISTENCY (STRENGTH) OF THE CLAY (SEE TABLE.)

IDENTIFYING CLEAN SAND SOILS:

THE INDIVIDUAL GRAINS OF SAND WILL BE VISIBLE TO THE EYE. A LUMP OF CLEAN SAND, IF IT CAN BE PICKED UP AT ALL, WILL CRUMBLE WITH VERY LITTLE EFFORT. CLEAN SAND WASHES OFF EASILY.

TESTING CLEAN SAND SOILS:

CLEAN SAND SOILS ARE BEST TESTED IN THE FLOOR OF THE TRENCH BY PUSHING WITH THE WHOLE BODY WEIGHT ON ONE FOOT. THE DEPTH OF THE DEPRESSION LEFT BY THE BOOT IS RELATED TO THE DENSITY OF THE SAND (SEE TABLE). TAKE CARE TO ENSURE THAT THE SAND IN THE TRENCH FLOOR WAS NOT COMPACTED OR LOOSENED DURING THE EXCAVATION OF THE TRENCH OR THE TRIMMING OF THE TEST AREA.

TESTING ROCK:

THE RECOMMENDED FIELD IDENTIFICATION TESTS FOR ROCK RELY ON OBSERVING THE EASE WITH WHICH THE ROCK CAN BE DUG WITH A PICK, AND ESTIMATING THE SPACING OF THE JOINTS IN THE ROCK. (JOINTS ARE COMMONLY CALLED CRACKS OR BREAKS). THE SPACING BETWEEN JOINTS IS IMPORTANT BECAUSE THE ALLOWABLE BEARING PRESSURE ON ROCK IS USUALLY CONTROLLED BY THE JOINTS IN IT, RATHER THAN THE INHERENT STRENGTH OF THE BLOCK OF ROCK. JOINTS MAY BE TIGHTLY CLOSED (LIKE HAIRLINE CRACKS), BUT CAN ALSO BE OPEN (FILLED WITH AIR) OR FILLED WITH SOFT CLAY OR OTHER SOIL.

SOIL CLASSIFICATION		FIELD IDENTIFICATION TEST	AHBP kPa
CLAY SOILS	VERY SOFT	EASILY PENETRATED 40mm WITH FIST.	<50*
	SOFT	EASILY PENETRATED 40mm WITH THUMB.	<50*
	FIRM	MODERATE EFFORT NEEDED TO PENETRATE 30 mm WITH THUMB.	<50*
	STIFF	READILY INDENTED WITH THUMB BUT PENETRATED ONLY WITH GREAT EFFORT.	50
	VERY STIFF	READILY INDENTED WITH THUMBNAIL.	100
	HARD	INDENTED WITH DIFFICULTY BY THUMBNAIL.	200
SAND & GRAVEL	LOOSE CLEAN SAND	TAKES FOOTPRINT MORE THAN 10mm DEEP.	<50*
	MEDIUM-DENSE CLEAN SAND	TAKES FOOTPRINT 3 mm TO 10mm DEEP.	50
	DENSE CLEAN SAND OR GRAVEL	TAKES FOOTPRINT LESS THAN 3mm DEEP.	100
ROCK	BROKEN OR DECOMPOSED ROCK	DIGGABLE. HAMMER BLOW "THUDS". JOINTS (BREAKS IN ROCK) SPACED AT LESS THAN 300mm APART.	100
	SOUND ROCK	DIGGABLE. HAMMER BLOW "THUDS". JOINTS (BREAK IN ROCK) SPACED AT MORE THAN 300mm APART.	200
	UNCOMPACTED FILL DOMESTIC REFUSE	OBSERVATION AND KNOWLEDGE OF THE SITE HISTORY.	<50*

LEGEND

AHBP ALLOWABLE HORIZONTAL BEARING PRESSURE FOR:
- 10 mm MOVEMENT.
- CENTRE OF THRUST 800 mm BELOW THE NATURAL SURFACE LEVEL.
- HIGH WATER TABLE.

* SPECIAL GEOTECHNICAL ASSESSMENT REQUIRED

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STANDARD DRAWING

SOIL CLASSIFICATION GUIDELINES FOR THRUST BLOCKS

COUNCIL PLAN No. T-550-10

Orig. Size A3

Revision 1

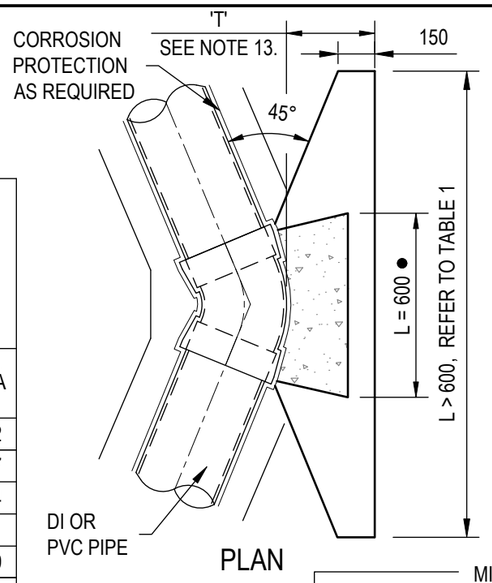
WATER MAINS MINIMUM DIMENSIONS OF HORIZONTAL THRUST BLOCKS 1200kPa X 1.2 FACTOR OF SAFETY

TABLE 1
DN100-DN300 MAINS

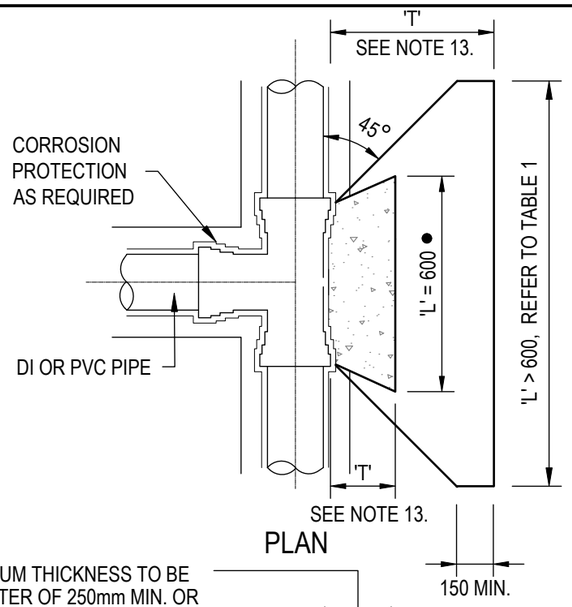
PIPE DN.	FITTING	MAX. THRUST IN KN x 1.2 F.O.S.	HEIGHT (mm) THRUST BLOCK	50kPa STIFF CLAY. MEDIUM-DENSE CLEAN SAND.		100kPa VERY STIFF CLAY. SANDY LOAM DECOMPOSSED ROCK.		200kPa HARD CLAY. SOUND ROCK	
				L (mm)	MIN. AREA (m²)	L (mm)	MIN. AREA (m²)	L (mm)	MIN. AREA (m²)
100	90° BEND	24.9	400	1250	0.50	650	0.25	●	0.12
	45° BEND	13.2		700	0.26	●	0.13	●	0.07
	22.5° BEND	7.3		●	0.15	●	0.07	●	0.04
	11.25° BEND	2.9		●	0.06	●	0.03	●	0.01
	TEE OR BLANK END	17.6		900	0.35	●	0.18	●	0.09
150	90° BEND	51.4	450	*	1.03	1150	0.51	●	0.26
	45° BEND	27.9		1250	0.56	650	0.28	●	0.14
	22.5° BEND	14.7		700	0.29	●	0.15	●	0.07
	11.25° BEND	7.3		●	0.15	●	0.07	●	0.04
	TEE OR BLANK END	36.7		*	0.73	820	0.37	●	0.18
200	90° BEND	88.1	550	*	1.76	1600	0.88	800	0.44
	45° BEND	47.0		1700	0.94	860	0.47	●	0.24
	22.5° BEND	24.9		900	0.50	●	0.25	●	0.12
	11.25° BEND	11.7		●	0.23	●	0.12	●	0.06
	TEE OR BLANK END	61.6		*	1.23	1150	0.62	●	0.31
225	90° BEND	110.1	600	*	2.20	1850	1.10	950	0.55
	45° BEND	58.7		1950	1.17	1000	0.59	●	0.29
	22.5° BEND	30.8		1050	0.62	●	0.31	●	0.15
	11.25° BEND	14.7		●	0.29	●	0.15	●	0.07
	TEE OR BLANK END	77.8		*	1.56	1300	0.78	●	0.39
250	90° BEND	133.6	650	*	2.67	2100	1.34	1050	0.67
	45° BEND	71.9		*	1.44	1100	0.72	●	0.36
	22.5° BEND	36.7		1150	0.73	●	0.37	●	0.18
	11.25° BEND	19.1		●	0.38	●	0.19	●	0.10
	TEE OR BLANK END	93.9		*	1.88	1450	0.94	750	0.47
300	90° BEND	195.2	750	*	3.90	2600	1.95	1300	0.98
	45° BEND	105.7		*	2.11	1450	1.06	710	0.53
	22.5° BEND	54.3		1550	1.09	750	0.54	●	0.27
	11.25° BEND	26.4		750	0.53	●	0.26	●	0.13
	TEE OR BLANK END	138.0		*	2.76	1850	1.38	950	0.69

● INDICATES BLOCK LENGTH OF 600mm IS ADOPTED
* = REFER TO TYPE 2 ANCHOR BLOCK ON STD DRG T-550-12, 13 & 14.

TABLE 1 SHOWS ANCHOR DIMENSIONS BASED ON NATURAL UNDISTURED GROUND CONDITIONS WITH NO IMPACTS OF EXISTING ADJACENT SERVICES. CONSIDERATION SHOULD BE GIVEN TO ANY POSSIBLE FUTURE SERVICE IN DESIGN OF A THRUST RESTRAINT WHICH MAY DISTURB THE THRUST BLOCK SOIL BEARING AREA.



PLAN



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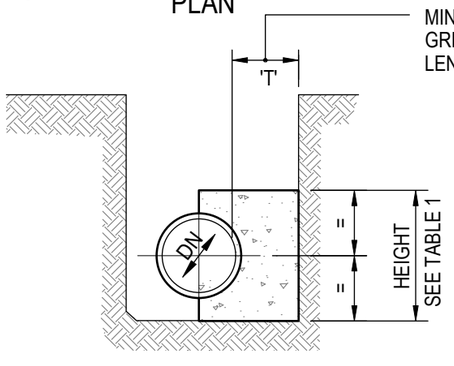
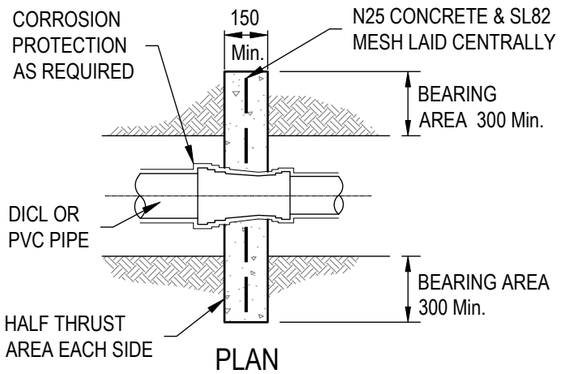


ELEVATION

THRUST BLOCK FOR BENDS

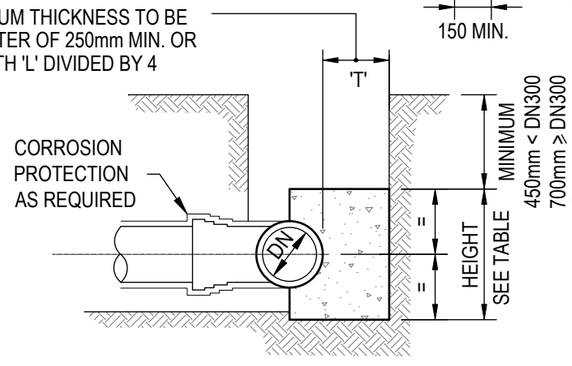
(FOR HORIZONTAL THRUST)



PLAN

TAPER THRUST BLOCK

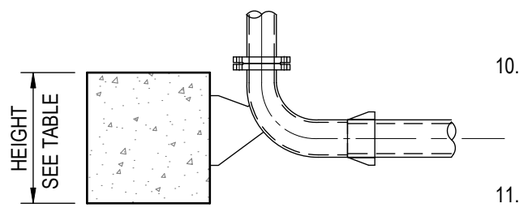
(FOR HORIZONTAL THRUST) SEE NOTE 10



ELEVATION

THRUST BLOCK FOR TEES

(FOR HORIZONTAL THRUST)



ELEVATION

FLUSHING POINTS

(FOR HORIZONTAL THRUST)
MINIMUM REQUIRED THRUST AREA AS PER TEE OR CLOSED END)

NOTES

1. PLAN SHOWS TYPE 1 MASS CONCRETE ANCHOR DIMENSION FOR DN100 TO DN300 RETICULATION MAINS BASED ON REQUIRED TEST PRESSURE OF 1200kPa x 1.2 FACTOR OF SAFETY. THE WATERMAIN FOR A TYPE 1 ANCHOR BLOCK IS LOCATED VERTICALLY CENTRAL IN THE BLOCK AS SHOWN.
2. THRUST BLOCK DIMENSIONS IN TABLE MAY BE VARIED TO SUIT SPECIFIC SITE CONDITIONS WITH WRITTEN APPROVAL BY CITY OF COFFS HARBOUR REPRESENTITIVE WITH THE MAXIUMUM RATIO OF LENGTH : OVERALL HEIGHT TO ACHIEVE THE MINIMUM BEARING AREA SHALL BE 3:1, THE BLOCK THICKNESS SHALL ALSO BE MODIFIED TO BE A MINIMUM THICKNESS OF THE LENGTH DIVIDED BY 4.
3. CAST THE THRUST AREA OF ALL THRUST BLOCKS AGAINST A CLEAN FACE OF UNDISTURBED NATURAL SOIL. THRUST BLOCKS SHALL NOT INTERFERE WITH OR BE CAST AGAINST OTHER SERVICES.
4. WHERE THE REQUIREMENTS OF NOTES 1, 2 & 3 CANNOT BE ACHIEVED A SPECIAL DESIGN SHALL BE UNDERTAKEN.
5. DO NOT USE STANDARD THRUST BLOCKS AS SPECIFIED IN THIS DRAWING IN SOIL CLASSIFICATIONS IDENTIFIED TO BE <50kPa:
   - VERY SOFT, SOFT OR FIRM CLAY.
   - LOOSE CLEAN SAND.
   -UNCOMPACTED FILL OR REFUSE.

   A GEOTECHNICAL ASSESSMENT AND INDIVIDUAL DESIGN IS REQUIRED FOR THESE SOILS.
6. CONCRETE FOR UNREINFORCED THRUST BLOCKS TO BE GRADE N25 CONCRETE MECHANICALLY VIBRATED. LOCATE ANCHOR BLOCK CENTRALY TO FITTING.
7. FINISH THRUST BLOCKS APPROXIMATELY 150mm ABOVE THE TOP OF THE FITTING OR BEARING PAD AND EXTEND TO THE FLOOR OF THE TRENCH OR DEEPER IF NECESSARY TO ACHIEVE THE REQUIRED THRUST AREA. MAXIMUM ENCASEMENT TO BE 180°.
8. WHEN POURING CONCRETE AGAINST FITTINGS PLACE A MEMBRANE OF POLYETHYLENE OR FELT BETWEEN THE FITTING AND CONCRETE TO PREVENT DAMAGE TO THE FITTING. KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS.
9. CONCRETE THRUST BLOCKS TO BE CURED FOR MINIMUM 7 DAYS BEFORE BEING SUBJECTED TO ANY THRUST LOAD UNLESS OTHERWISE DIRECTED BY THE SUPERINTENDENT.
10. MINIMUM THRUST AREA FOR THE TAPER BLOCKS TO BE EQUAL TO THE DIFFERENCE BETWEEN THE THRUST AREAS FOR TEES OR CLOSED ENDS OF EQUIVALENT DIAMETER TO THOSE EACH SIDE OF THE TAPER. REINFORCEMENT IN ACCORDANCE WITH DESIGN PLANS.
11. FOR DOWNWARD VERTICAL THRUST, THE ALLOWABLE BEARING PRESSURES FOR VARIOUS SOILS MAY BE TAKEN AS TWICE THAT FOR HORIZONTAL THRUST SHOWN.
12. AREA OF THRUST BLOCKS AT MULTIPLE BENDS OR FITTINGS ARE TO EQUAL THE SUM OF THE BEARING AREAS GIVEN IN THE SCHEDULE FOR EACH BEND OR FITTING (eg. SUM OF THRUST AREA FOR COMBINED 45° & 11.25° BENDS)
13. THE THICKNESS 'T' SHALL BE THE GREATER OF 250mm MINIMUM OR LENGTH 'L' DIVIDED BY 4.

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STANDARD DRAWING

WATER MAINS
THRUST BLOCK TYPICAL DETAILS
FOR DN100 - DN300 - TYPE 1

COUNCIL PLAN No.
T-550-11

Orig. Size A3 | Revision 1

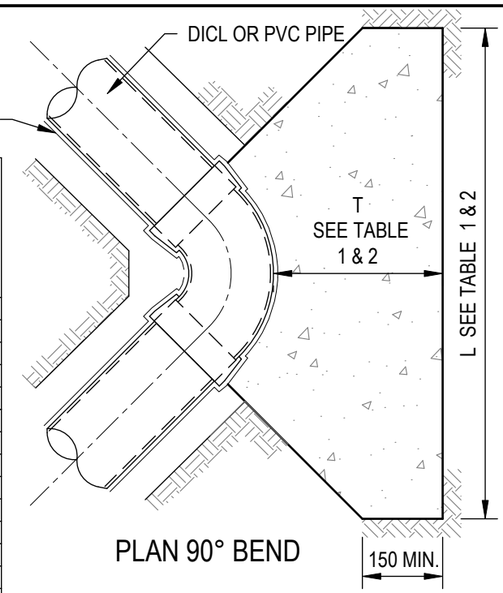
WATER MAIN MINIMUM DIMENSIONS OF HORIZONTAL THRUST BLOCKS
1200kPa TEST PRESSURE x 1.2 FACTOR OF SAFETY

TABLE 1 - 90° BENDS WATER MAIN

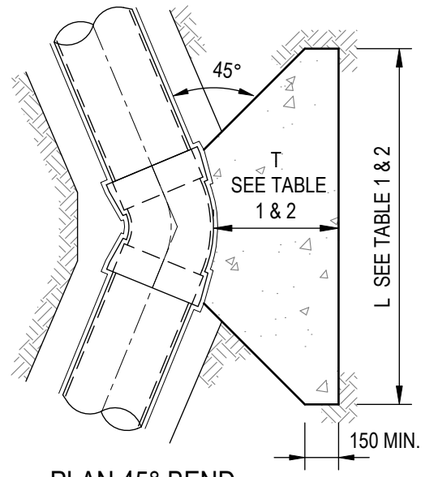
NOM. DIAM. DN(mm)	LOAD (kN)	AHPB (kPa)	MINIMUM BEARING AREA (m^2)	LENGTH L (mm)	HEIGHT ABOVE ℄ H(mm)	DEPTH BELOW ℄ G(mm)	T MINIMUM (mm)
80	14.7	50	0.29	800	150	240	250
		75	0.20	650	150	160	250
		100	0.15	550	150	120	250
		150	0.10	450	150	120	250
		200	0.07	400	150	120	250
100	24.9	50	0.50	1000	160	340	250
		75	0.33	850	160	250	250
		100	0.25	700	160	190	250
		150	0.17	600	160	160	250
		200	0.12	500	160	160	250
150	51.4	50	1.03	1450	240	480	400
		75	0.68	1200	240	350	300
		100	0.51	1000	240	280	250
		150	0.34	850	240	180	250
		200	0.26	750	240	180	250
200	88.1	50	1.76	1900	270	670	500
		75	1.17	1550	270	500	400
		100	0.88	1350	270	400	350
		150	0.59	1100	270	280	300
		200	0.44	950	270	200	250
225	110.1	50	2.20	2100	280	770	550
		75	1.47	1700	280	590	450
		100	1.10	1500	280	460	400
		150	0.73	1210	280	330	300
		200	0.55	1050	280	250	300
250	133.6	50	2.67	2310	290	860	600
		75	1.78	1900	290	650	500
		100	1.34	1650	290	520	450
		150	0.89	1350	290	370	350
		200	0.67	1150	290	290	300
300	195.2	50	3.90	2800	320	1070	700
		75	2.60	2300	320	820	600
		100	1.95	2000	320	670	500
		150	1.30	1600	320	490	400
		200	0.98	1400	320	380	350
375	296.5	50	5.93	3450	510	1210	900
		75	3.95	2800	510	900	700
		100	2.96	2450	510	700	650
		150	1.98	2000	500	500	500
		200	1.48	1720	430	430	450
450	419.7	50	8.39	4100	550	1500	1100
		75	5.60	3350	550	1120	900
		100	4.20	2900	550	900	750
		150	2.80	2400	550	630	600
		200	2.10	2050	510	510	550
500	512.2	50	10.24	4530	580	1680	1200
		75	6.83	3700	580	1270	1000
		100	5.12	3200	580	1020	800
		150	3.41	2600	580	740	700
		200	2.56	2260	580	550	600
600	725.0	50	14.50	5400	630	2060	1400
		75	9.67	4400	630	1560	1100
		100	7.25	3800	630	1280	1000
		150	4.83	3110	630	920	800
		200	3.62	2700	630	710	700

TABLE 2 - 45° BENDS WATER MAIN

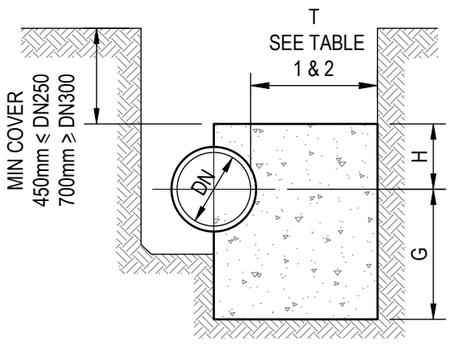
NOM. DIAM. DN(mm)	LOAD (kN)	AHPB (kPa)	MINIMUM BEARING AREA (m^2)	LENGTH L (mm)	HEIGHT ABOVE ℄ H(mm)	DEPTH BELOW ℄ G(mm)	T MINIMUM (mm)
80	8.8	50	0.18	600	150	150	250
		75	0.12	500	150	150	250
		100	0.09	450	150	150	250
		150	0.06	350	150	150	250
		200	0.04	350	150	150	250
100	13.2	50	0.26	730	160	200	250
		75	0.18	600	160	150	250
		100	0.13	510	160	150	250
		150	0.09	420	160	150	250
		200	0.07	360	160	150	250
150	27.9	50	0.56	1060	190	340	250
		75	0.37	860	190	240	250
		100	0.28	750	190	180	250
		150	0.19	610	190	120	250
		200	0.14	530	190	120	250
200	47.0	50	0.94	1370	250	440	350
		75	0.63	1120	250	310	300
		100	0.47	970	250	240	250
		150	0.31	790	250	150	250
		200	0.23	690	250	150	250
225	58.7	50	1.17	1530	280	490	400
		75	0.78	1250	280	350	350
		100	0.59	1080	280	260	300
		150	0.39	880	280	160	250
		200	0.29	770	280	160	250
250	71.9	50	1.44	1700	290	560	450
		75	0.96	1380	290	400	400
		100	0.72	1200	290	310	300
		150	0.48	980	290	200	250
		200	0.36	850	290	200	250
300	105.7	50	2.11	2060	320	710	550
		75	1.41	1680	320	520	450
		100	1.06	1450	320	400	400
		150	0.70	1190	320	270	300
		200	0.53	1030	320	270	300
375	160.0	50	3.20	2530	510	750	650
		75	2.13	2070	510	520	550
		100	1.60	1790	510	380	450
		150	1.07	1460	510	220	400
		200	0.80	1260	510	220	350
450	227.5	50	4.55	3020	550	950	800
		75	3.03	2460	550	680	650
		100	2.27	2130	550	510	550
		150	1.52	1740	450	450	450
		200	1.14	1510	450	450	400
500	277.4	50	5.55	3330	580	1090	850
		75	3.70	2720	580	780	700
		100	2.77	2360	580	600	600
		150	1.85	1920	500	500	500
		200	1.39	1670	420	420	450
600	391.8	50	7.84	3960	630	1350	1000
		75	5.22	3230	630	980	850
		100	3.92	2800	630	770	700
		150	2.61	2290	570	570	600
		200	1.96	1980	500	500	500



PLAN 90° BEND



PLAN 45° BEND



ELEVATION

THRUST BLOCK FOR BENDS
(FOR HORIZONTAL THRUST)

NOTES

1. PLAN SHOWS TYPE 2 MASS CONCRETE ANCHOR BLOCK DIMENSION FOR WATER RETICULATION MAINS BASED ON REQUIRED TEST PRESSURE OF 1200kPa WITH A 1.2 FACTOR OF SAFETY. THE WATERMAIN FOR A TYPE 2 ANCHOR BLOCK MAY BE VERTICALLY NON CENTRAL IN THE BLOCK AS SHOWN TO ACCOMODATE TYPICAL MINIMUM PIPE COVERS.
2. THRUST BLOCK DIMENSIONS IN TABLE MAY BE VARIED TO SUIT SPECIFIC SITE CONDITIONS WITH WRITTEN APPROVAL BY CITY OF COFFS HARBOUR REPRESENTITIVE WITH THE MAXIUMUM RATIO OF LENGTH : OVERALL HEIGHT TO ACHIEVE THE MINIMUM BEARING AREA SHALL BE 3:1, THE BLOCK THICKNESS SHALL ALSO BE MODIFIED TO BE A MINIMUM THICKNESS OF THE LENGTH DIVIDED BY 4.
3. CAST THE THRUST AREA OF ALL THRUST BLOCKS AGAINST A CLEAN FACE OF UNDISTURBED NATURAL SOIL. THRUST BLOCKS SHALL NOT INTERFERE OR BE CAST AGAINST OTHER SERVICES.
4. WHERE THE REQUIREMENTS OF NOTES 1, 2 & 3 CANNOT BE ACHIEVED A SPECIAL DESIGN SHALL BE UNDERTAKEN.
5. DO NOT USE STANDARD THRUST BLOCKS AS SPECIFIED IN THIS DRAWING IN SOIL CLASSIFICATIONS IDENTIFIED TO BE <50kPa:
   - VERY SOFT, SOFT OR FIRM CLAY.
   - LOOSE CLEAN SAND.
   -UNCOMPACTED FILL OR REFUSE.

   A GEOTECHNICAL ASSESSMENT AND INDIVIDUAL DESIGN IS REQUIRED FOR THESE SOILS.
6. CONCRETE TO BE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 25MPa IN ACCORDANCE WITH AS 1379 AND AS3600. CONCRETE SHALL BE MECHANICALLY VIBRATED. LOCATE ANCHOR BLOCK CENTRALLY TO FITTING. KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS
7. FINISH THRUST BLOCKS APPROXIMATELY 150mm ABOVE THE TOP OF THE FITTING OR BEARING PAD AND EXTEND TO THE FLOOR OF THE TRENCH OR DEEPER IF NECESSARY TO ACHIEVE THE REQUIRED THRUST AREA. MAXIMUM ENCASEMENT TO BE 180°.
8. WHEN POURING CONCRETE AGAINST FITTINGS PLACE A MEMBRANE OF POLYETHYLENE OR FELT BETWEEN THE FITTING AND CONCRETE TO PREVENT DAMAGE TO THE FITTING.
9. CONCRETE THRUST BLOCKS TO BE CURED FOR MINIMUM 7 DAYS BEFORE BEING SUBJECTED TO ANY THRUST LOAD UNLESS OTHERWISE DIRECTED BY THE SUPERINTENDENT.
10. POLYETHLENE PIPE WRAPPING TO BE CONTINUOUS THROUGH THRUST BLOCKS. ALL FITTINGS SHALL BE PE WRAPPED. WHERE FLANGED CONNECTIONS ARE ADOPTED, THE BOLT ASSEMBLY SHALL ALSO BE PE WRAPPED.
11. FOR DOWNWARD VERTICAL THRUST, THE ALLOWABLE BEARING PRESSURES FOR VARIOUS SOILS MAY BE TAKEN AS TWICE THAT FOR HORIZONTAL THRUST SHOWN.
12. AREA OF THRUST BLOCKS AT MULTIPLE BENDS OR FITTINGS ARE TO EQUAL THE SUM OF THE BEARING AREAS GIVEN IN THE SCHEDULE FOR EACH BEND OR FITTING (eg. SUM OF THRUST AREA FOR COMBINED 45° & 11.25° BENDS)

Drawn	B.P.S						
Checked	C.B						
Approved	D.S.						
Date	DEC 2024	1	ISSUED FOR USE	B.P.S	D.S.	12/2024	
Issue	FIRST ISSUE	Rev.	Amendments	Drawn	Apprd.	Date	

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STANDARD DRAWING

WATER MAIN
TYPICAL THRUST BLOCK DETAILS
90° AND 45° BENDS - TYPE 2

COUNCIL PLAN No.
T-550-12

Orig. Size A3

Revision 1

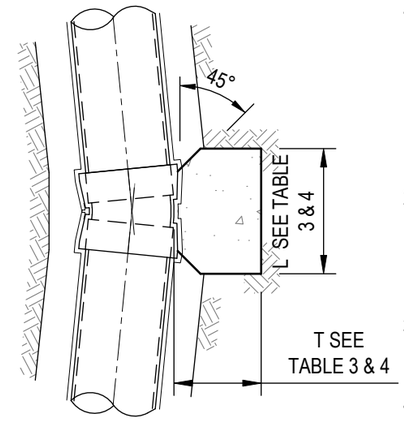
WATER MAINS MINIMUM DIMENSIONS OF HORIZONTAL THRUST BLOCKS
1200kPa X 1.2 FACTOR OF SAFETY

TABLE 3 - 22½° BENDS WATER MAIN

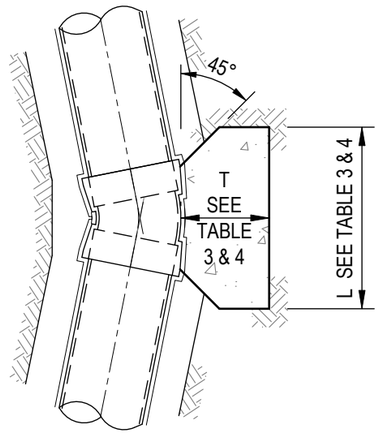
NOM. DIAM. DN(mm)	LOAD (kN)	AHPB (kPa)	MINIMUM BEARING AREA (m^2)	LENGTH L(mm)	HEIGHT ABOVE ℄ H(mm)	DEPTH BELOW ℄ G(mm)	T MINIMUM (mm)
80	4.4	50	0.09	300	150	150	250
		75	0.06	300	150	150	250
		100	0.04	300	150	150	250
		150	0.03	300	150	150	250
		200	0.02	300	150	150	250
100	7.3	50	0.15	400	160	220	250
		75	0.10	350	160	150	250
		100	0.07	350	160	110	250
		150	0.05	350	160	160	250
		200	0.04	350	160	160	250
150	14.7	50	0.29	540	190	350	250
		75	0.20	440	190	250	250
		100	0.15	380	190	190	250
		150	0.10	310	190	150	250
		200	0.07	270	190	150	250
200	24.9	50	0.50	710	240	470	250
		75	0.33	580	240	340	250
		100	0.25	500	240	260	250
		150	0.17	410	240	200	250
		200	0.12	350	240	200	250
225	30.8	50	0.62	790	280	510	300
		75	0.41	640	280	360	250
		100	0.31	560	280	280	250
		150	0.21	450	230	230	250
		200	0.15	400	200	200	250
250	36.7	50	0.73	860	290	560	300
		75	0.49	700	290	410	250
		100	0.37	610	290	310	250
		150	0.24	500	250	250	250
		200	0.18	450	230	230	250
300	54.3	50	1.09	1040	320	720	400
		75	0.72	850	320	530	300
		100	0.54	740	320	410	300
		150	0.36	600	300	300	250
		200	0.27	520	260	260	250
375	82.2	50	1.64	1280	510	770	500
		75	1.10	1050	510	530	400
		100	0.82	910	400	400	350
		150	0.55	740	370	370	300
		200	0.41	640	320	320	250
450	102.7	50	2.05	1430	550	880	550
		75	1.37	1170	550	620	450
		100	1.03	1010	510	510	400
		150	0.68	830	420	420	300
		200	0.51	720	360	360	250
500	140.9	50	2.82	1680	580	1100	600
		75	1.88	1370	580	790	500
		100	1.41	1190	580	610	450
		150	0.94	970	500	500	350
		200	0.70	840	430	430	300
600	199.6	50	3.99	2000	630	1360	750
		75	2.66	1630	630	1000	600
		100	2.00	1410	630	780	500
		150	1.33	1150	580	580	450
		200	1.00	1000	500	500	400

TABLE 4 - 11¼° BENDS WATER MAINS

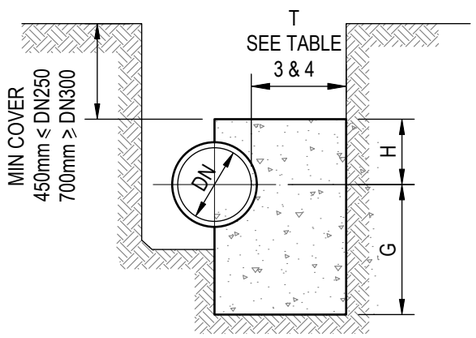
NOM. DIAM. DN(mm)	LOAD (kN)	AHPB (kPa)	MINIMUM BEARING AREA (m^2)	LENGTH L(mm)	HEIGHT ABOVE ℄ H(mm)	DEPTH BELOW ℄ G(mm)	T MINIMUM (mm)
80	1.5	50	0.03	200	150	100	250
		75	0.02	150	150	100	250
		100	0.01	120	150	100	250
		150	0.01	100	150	100	250
		200	0.01	100	150	100	250
100	2.9	50	0.06	240	160	100	250
		75	0.04	200	160	100	250
		100	0.03	170	160	100	250
		150	0.02	140	160	100	250
		200	0.01	120	160	100	250
150	7.3	50	0.15	400	190	190	250
		75	0.10	350	190	120	250
		100	0.07	300	190	120	250
		150	0.05	300	190	120	250
		200	0.04	300	190	120	250
200	11.7	50	0.23	550	220	220	250
		75	0.16	400	220	220	250
		100	0.12	400	220	220	250
		150	0.08	300	220	220	250
		200	0.06	300	220	220	250
225	14.7	50	0.29	600	270	270	250
		75	0.20	500	230	230	250
		100	0.15	500	230	230	250
		150	0.10	450	230	230	250
		200	0.07	450	230	230	250
250	19.1	50	0.38	800	240	240	250
		75	0.25	550	240	240	250
		100	0.19	450	240	240	250
		150	0.13	450	240	240	250
		200	0.10	450	240	240	250
300	26.4	50	0.53	1000	270	270	260
		75	0.35	700	270	270	250
		100	0.26	550	270	270	250
		150	0.18	550	270	270	250
		200	0.13	550	270	270	250
375	41.1	50	0.82	910	310	590	350
		75	0.55	750	310	430	300
		100	0.41	650	310	330	250
		150	0.27	600	310	310	250
		200	0.21	600	310	310	250
450	58.7	50	1.17	1200	350	700	400
		75	0.78	1150	350	350	350
		100	0.59	900	350	350	300
		150	0.39	600	350	350	250
		200	0.29	600	350	350	250
500	70.4	50	1.41	1200	380	810	450
		75	0.94	1000	380	590	350
		100	0.70	1000	380	380	300
		150	0.47	700	380	380	250
		200	0.35	600	380	380	250
600	99.8	50	2.00	1400	430	1000	500
		75	1.33	1200	430	700	450
		100	1.00	1000	430	570	400
		150	0.67	800	430	430	300
		200	0.50	700	430	430	250



PLAN 11¼° BEND



PLAN 22½° BEND



ELEVATION

THRUST BLOCK FOR BENDS
(FOR HORIZONTAL THRUST)

NOTES

1. PLAN SHOWS TYPE 2 MASS CONCRETE ANCHOR BLOCK DIMENSION FOR WATER RETICULATION MAINS BASED ON REQUIRED TEST PRESSURE OF 1200kPa WITH A 1.2 FACTOR OF SAFETY. THE WATERMAIN FOR A TYPE 2 ANCHOR BLOCK MAY BE VERTICALLY NON CENTRAL IN THE BLOCK AS SHOWN TO ACCOMODATE TYPICAL MINIMUM PIPE COVERS.
2. THRUST BLOCK DIMENSIONS MAY BE VARIED TO SUIT SPECIFIC SITE CONDITIONS WITH WRITTEN APPROVAL BY CITY OF COFFS REPRESENTITIVE. THE MAXIMUM RATIO OF LENGTH : OVERALL HEIGHT TO ACHIEVE THE MINIMUM BEARING AREA SHALL BE NO GREATER THAN 3:1
3. CAST THE THRUST AREA OF ALL THRUST BLOCKS AGAINST A CLEAN FACE OF UNDISTURBED NATURAL SOIL. THRUST BLOCKS NOT TO INTERFERE WITH OTHER SERVICES.
4. WHERE THE REQUIREMENTS OF NOTES 1, 2 & 3 CANNOT BE ACHIEVED A SPECIAL DESIGN SHALL BE UNDERTAKEN.
5. DO NOT USE STANDARD THRUST BLOCKS AS SPECIFIED IN THIS DRAWING IN SOIL CLASSIFICATIONS IDENTIFIED TO BE <50kPa:
   - VERY SOFT, SOFT OR FIRM CLAY.
   - LOOSE CLEAN SAND.
   -UNCOMPACTED FILL OR REFUSE.

   A GEOTECHNICAL ASSESSMENT AND INDIVIDUAL DESIGN IS REQUIRED FOR THESE SOILS.
6. CONCRETE TO BE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 25MPa IN ACCORDANCE WITH AS 1379 AND AS3600. CONCRETE SHALL BE MECHANICALLY VIBRATED. LOCATE ANCHOR BLOCK CENTRALLY TO FITTING. KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS
7. FINISH THRUST BLOCKS APPROXIMATELY 150 ABOVE THE TOP OF THE FITTING OR BEARING PAD AND EXTEND TO THE FLOOR OF THE TRENCH OR DEEPER IF NECESSARY TO ACHIEVE THE REQUIRED THRUST AREA. MAXIMUM ENCASEMENT TO BE 180°.
8. WHEN POURING CONCRETE AGAINST FITTINGS PLACE A MEMBRANE OF POLYETHYLENE OR FELT BETWEEN THE FITTING AND CONCRETE TO PREVENT DAMAGE TO THE FITTING.
9. CONCRETE THRUST BLOCKS TO BE CURED FOR MINIMUM 7 DAYS BEFORE BEING SUBJECTED TO ANY THRUST LOAD UNLESS OTHERWISE DIRECTED BY THE SUPERINTENDENT.
10. POLYETHLENE PIPE WRAPPING TO BE CONTINUOUS THROUGH THRUST BLOCKS. ALL FITTINGS SHALL BE PE WRAPPED. WHERE FLANGED CONNECTIONS ARE ADOPTED, THE BOLT ASSEMBLY SHALL ALSO BE PE WRAPPED.
11. FOR DOWNWARD VERTICAL THRUST, THE ALLOWABLE BEARING PRESSURES FOR VARIOUS SOILS MAY BE TAKEN AS TWICE THAT FOR HORIZONTAL THRUST SHOWN.
12. AREA OF THRUST BLOCKS AT MULTIPLE BENDS OR FITTINGS ARE TO EQUAL THE SUM OF THE BEARING AREAS GIVEN IN THE SCHEDULE FOR EACH BEND OR FITTING (eg. SUM OF THRUST AREA FOR COMBINED 45° & 11.25° BENDS)

Drawn	B.P.S						
Checked	C.B						
Approved	D.S.						
Date	DEC 2024	1	ISSUED FOR USE	B.P.S	D.S.	12/2024
Issue	FIRST ISSUE	Rev.	Amendments	Drawn	Apprd.	Date

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STANDARD DRAWING

WATER MAIN
TYPICAL THRUST BLOCK DETAILS
22½° AND 11¼° BENDS - TYPE 2

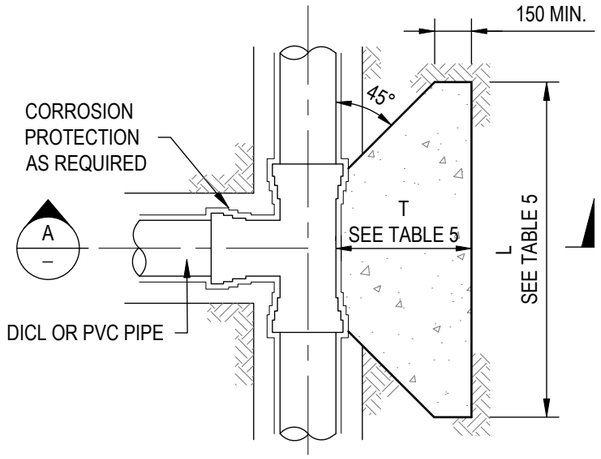
COUNCIL PLAN No.
T-550-13

Orig. Size A3

Revision 1

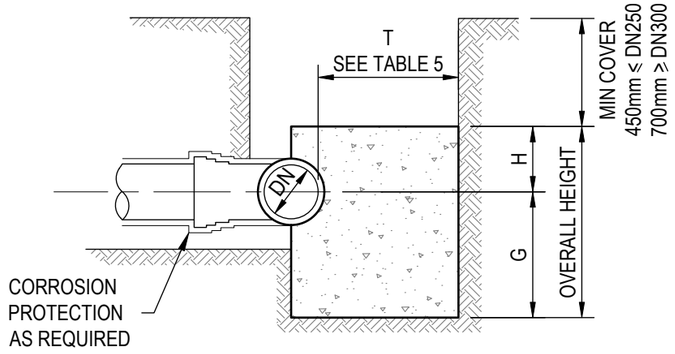
WATER MAINS MINIMUM DIMENSIONS OF HORIZONTAL THRUST BLOCKS
1200kPa X 1.2 FACTOR OF SAFETY
TABLE 5 - TEES, END CAPS &

NOM. DIAM. DN(mm)	LOAD (kN)	AHPB (kPa)	MINIMUM BEARING AREA (m^2)	LENGTH L (mm)	HEIGHT ABOVE ℄ H (mm)	DEPTH BELOW ℄ G (mm)	T MINIMUM (mm)
80	10.3	50	0.21	650	150	170	250
		75	0.14	550	150	150	250
		100	0.10	450	150	150	250
		150	0.07	400	150	150	250
		200	0.05	350	150	150	250
100	17.6	50	0.35	850	160	260	250
		75	0.23	700	160	180	250
		100	0.18	600	160	140	250
		150	0.12	500	160	100	250
		200	0.09	400	160	100	250
150	36.7	50	0.73	1250	190	420	250
		75	0.49	1000	190	310	250
		100	0.37	860	190	240	250
		150	0.24	700	190	160	250
		200	0.18	650	190	110	250
200	61.6	50	1.23	1600	270	520	400
		75	0.82	1300	270	380	350
		100	0.62	1100	270	300	300
		150	0.41	900	270	200	250
		200	0.31	800	270	130	250
225	77.8	50	1.56	1800	280	600	500
		75	1.04	1450	280	440	400
		100	0.78	1250	280	340	350
		150	0.52	1000	280	240	250
		200	0.39	900	280	160	250
250	93.9	50	1.88	1950	290	680	500
		75	1.25	1600	290	500	400
		100	0.94	1400	290	390	400
		150	0.63	1120	290	270	300
		200	0.47	1000	290	190	250
300	138.0	50	2.76	2350	470	700	600
		75	1.84	1900	320	650	500
		100	1.38	1700	320	510	500
		150	0.92	1400	320	360	400
		200	0.69	1200	320	260	300
375	209.9	50	4.20	2900	510	940	800
		75	2.80	2400	510	670	600
		100	2.10	2050	510	510	600
		150	1.40	1700	510	320	450
		200	1.05	1450	360	360	400
450	296.5	50	5.93	3450	550	1170	900
		75	3.95	2850	550	850	700
		100	2.96	2450	550	660	650
		150	1.98	2000	550	440	500
		200	1.48	1750	480	480	500
500	362.5	50	7.25	3850	580	1320	100
		75	4.83	3150	580	970	800
		100	3.62	2700	580	770	700
		150	2.42	2200	580	520	600
		200	1.81	1900	480	480	500
600	513.7	50	10.27	4550	630	1630	1200
		75	6.85	3700	630	1220	1000
		100	5.14	3250	630	970	800
		150	3.42	2650	630	680	700
		200	2.57	2300	570	570	600

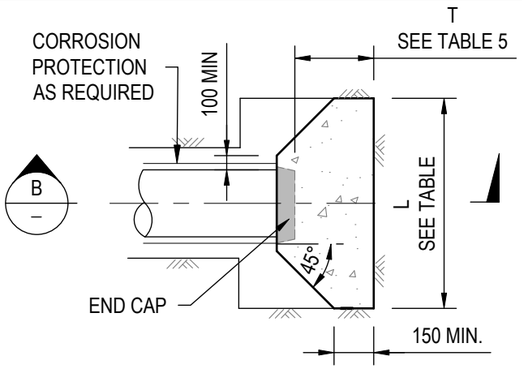


PLAN

TEE THRUST BLOCK

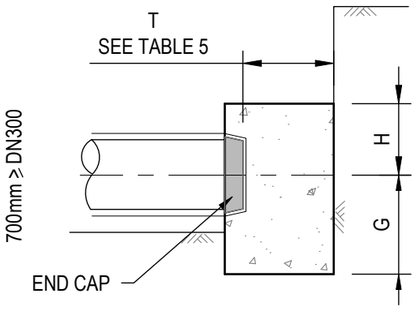


SECTION A

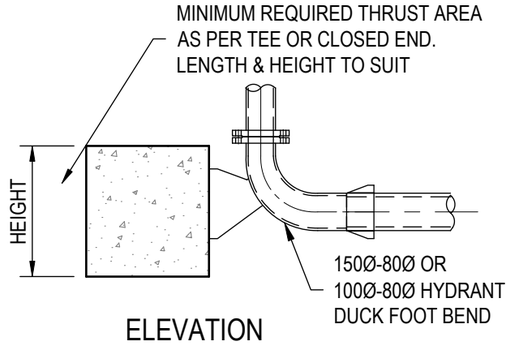


PLAN

END CAP THRUST BLOCK

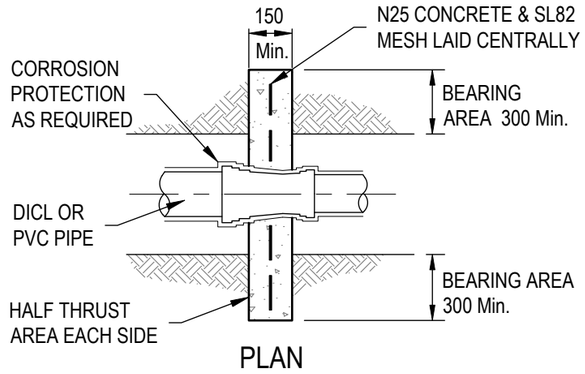


SECTION B



ELEVATION

FLUSHING POINTS
(FOR HORIZONTAL THRUST)



PLAN

TAPER THRUST BLOCK
(FOR HORIZONTAL THRUST) SEE NOTE 10

NOTES

1. PLAN SHOWS TYPE 2 MASS CONCRETE ANCHOR BLOCK DIMENSION FOR WATER RETICULATION MAINS BASED ON REQUIRED TEST PRESSURE OF 1200kPa WITH A 1.2 FACTOR OF SAFETY. THE WATERMAIN FOR A TYPE 2 ANCHOR BLOCK MAY BE VERTICALLY NON CENTRAL IN THE BLOCK AS SHOWN TO ACCOMODATE TYPICAL MINIMUM PIPE COVERS.
2. THRUST BLOCK DIMENSIONS MAY BE VARIED TO SUIT SPECIFIC SITE CONDITIONS WITH WRITTEN APPROVAL BY CITY OF COFFS REPRESENTITIVE. THE MAXIMUM RATIO OF LENGTH : OVERALL HEIGHT TO ACHIEVE THE MINIMUM BEARING AREA SHALL BE NO GREATER THAN 3:1
3. CAST THE THRUST AREA OF ALL THRUST BLOCKS AGAINST A CLEAN FACE OF UNDISTURBED NATURAL SOIL. THRUST BLOCKS SHALL NOT INTERFERE OR BE CAST AGAINST OTHER SERVICES.
4. WHERE THE REQUIREMENTS OF NOTES 1, 2 & 3 CANNOT BE ACHIEVED A SPECIAL DESIGN SHALL BE UNDERTAKEN.
5. DO NOT USE STANDARD THRUST BLOCKS AS SPECIFIED IN THIS DRAWING IN SOIL CLASSIFICATIONS IDENTIFIED TO BE <50kPa:
   - VERY SOFT, SOFT OR FIRM CLAY.
   - LOOSE CLEAN SAND.
   -UNCOMPACTED FILL OR REFUSE.

   A GEOTECHNICAL ASSESSMENT AND INDIVIDUAL DESIGN IS REQUIRED FOR THESE SOILS.
6. CONCRETE FOR UNREINFORCED THRUST BLOCKS TO BE GRADE N25 CONCRETE MECHANICALLY VIBRATED. LOCATE ANCHOR BLOCK CENTRALLY TO FITTING.
7. FINISH THRUST BLOCKS APPROXIMATELY 150mm ABOVE THE TOP OF THE FITTING OR BEARING PAD AND EXTEND TO THE FLOOR OF THE TRENCH OR DEEPER IF NECESSARY TO ACHIEVE THE REQUIRED THRUST AREA. MAXIMUM ENCASEMENT TO BE 180°.
8. WHEN POURING CONCRETE AGAINST FITTINGS PLACE A MEMBRANE OF POLYETHYLENE OR FELT BETWEEN THE FITTING AND CONCRETE TO PREVENT DAMAGE TO THE FITTING. KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS.
9. CONCRETE THRUST BLOCKS TO BE CURED FOR MINIMUM 7 DAYS BEFORE BEING SUBJECTED TO ANY THRUST LOAD UNLESS OTHERWISE DIRECTED BY THE SUPERINTENDENT.
10. MINIMUM THRUST AREA FOR THE TAPER BLOCKS TO BE EQUAL TO THE DIFFERENCE BETWEEN THE THRUST AREAS FOR TEES OR CLOSED ENDS OF EQUIVALENT DIAMETER TO THOSE EACH SIDE OF THE TAPER. REINFORCEMENT IN ACCORDANCE WITH DESIGN PLANS.

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Checked	C.B					
Approved	D.S.					
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STANDARD DRAWING

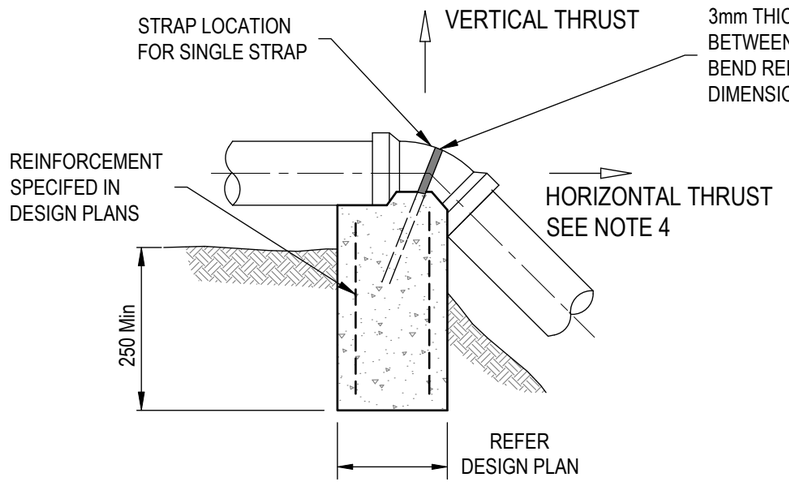
WATER MAIN
TYPICAL THRUST BLOCK DETAILS
TEES, BLANK ENDS & TAPERS - TYPE 2

COUNCIL PLAN No.
T-550-14

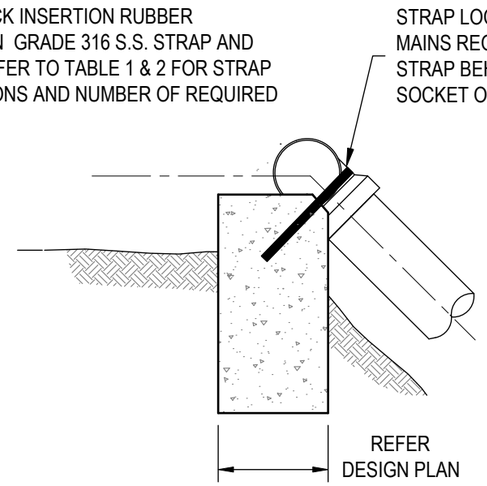
Orig. Size A3
Revision 1

TABLE 1. LENGTHS OF HOLD DOWN STRAPS FOR ANCHORAGE TO CONCRETE BLOCK TO RESTRAIN THRUST FROM VERTICAL BENDS FOR PRESSURE MAINS

PIPE SIZE (DICL)	O.D.	A (mm)	D (mm)	B (mm)	LENGTH (mm)		SUGGESTED SIZES	
					Calculated length	**Recommended Min. length**	T (mm)	W (mm)
100Ø DICL	122	50	200	61	814	**850**	5	25
150Ø DICL	177	50	300	88.5	1155	**1200**	5	25
200Ø DICL	232	65	300	116	1326	**1350**	5	25
225Ø DICL	259	65	300	129.5	1396	**1400**	6	50
250Ø DICL	286	65	400	143	1665	**1700**	6	50
300Ø DICL	345	75	400	172.5	1837	**1850**	6	50
375Ø DICL	426	75	500	213	2245	**2250**	6	75
450Ø DICL	507	75	500	253.5	2453	**2500**	6	100
500Ø DICL	560	100	500	280	2640	**2650**	10	100
600Ø DICL	667	100	500	333.5	2955	**3000**	10	100



SIDE ELEVATION



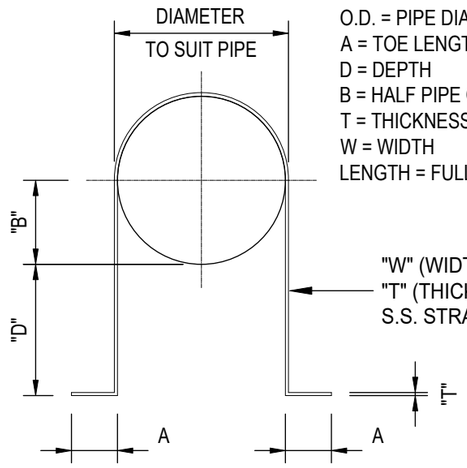
ELEVATION

VERTICAL BENDS

(FOR UPWARD THRUST)

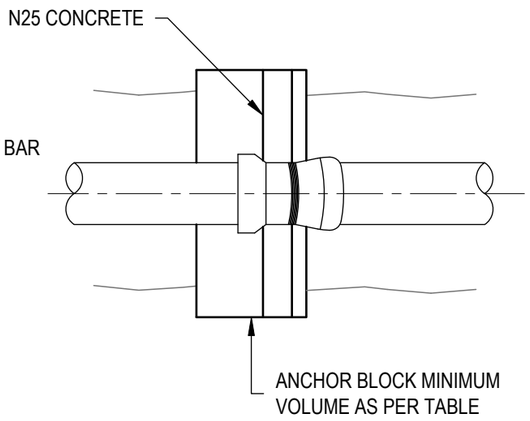
TABLE 2
No. OF STRAPS REQUIRED FOR THE PIPE SIZES ABOVE

NOM. PIPE SIZE	45° BEND No. Required	22½° BEND No. Required	11¼° BEND No. Required
63	1	1	1
80	1	1	1
100	1	1	1
150	1	1	1
200	2	1	1
225	1	1	1
250	1	1	1
300	1	1	1
375	2	1	1
450	2	1	1
500	2	1	1
600	2	1	1



TYPICAL STRAP

O.D. = PIPE DIAMETER
A = TOE LENGTH
D = DEPTH
B = HALF PIPE O.D.
T = THICKNESS
W = WIDTH
LENGTH = FULL LENGTH OF FLAT BAR



PLAN

TABLE 3. THRUST BLOCK DIMENSIONS 1200kPa TEST PRESSURE x 1.2 FACTOR OF SAFETY

VERTICAL BENDS MINIMUM BLOCK VOLUME FOR ANCHORAGE OF VERTICAL THRUST			
NOM. PIPE SIZE	11¼°(m³)	22½°(m³)	45°(m³)
80	0.05	0.15	0.28
100	0.10	0.25	0.42
150	0.25	0.50	0.90
200	0.41	0.85	1.51
225	0.51	1.05	1.88
250	0.66	1.25	2.31
300	0.91	1.85	3.40
375	1.42	2.80	5.15
450 500 600	SPECIAL DESIGN REQUIRED ALTERNATIVE METHODS TO BE CONSIDERED		

IN CALCULATING THE VOLUME NO CONTRIBUTION OF THE PIPELINE WEIGHT HAS BEEN TAKEN INTO CONSIDERATION

NOTES:

1. ANCHOR BLOCK IN TABLE 3 ARE DESIGNED FOR A TEST PRESSURE OF 1200kPa x 1.2 FACTOR OF SAFETY
2. WHERE DICL PIPES AND FITTINGS WITH RESTRAINED JOINTS ARE USED THRUST BLOCKS ARE NOT REQUIRED.
3. THRUST BLOCK REINFORCEMENT TO BE AS SPECIFIED IN DESIGN DRAWINGS
4. DESIGN OF ANCHOR BLOCKS AT VERTICAL BENDS TO INCLUDE ALLOWANCE FOR THE HORIZONTAL COMPONENT OF THE THRUST. NOTE THAT BEARING AREAS AS PER T-550-12 & 13 MAY NOT BE APPROPRIATE.
5. LOCATE ANCHOR BLOCK CENTRALLY AROUND BEND.
6. KEY IN ANCHOR BLOCK INTO BASE OF TRENCH A MINIUMUM DEPTH OF 250mm MINIMUM.
7. POUR CONCRETE AGAINST A SOLID EXCAVATION FACE.
8. KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS
9. ALL DIMENSIONS ARE IN MILLIMETRES

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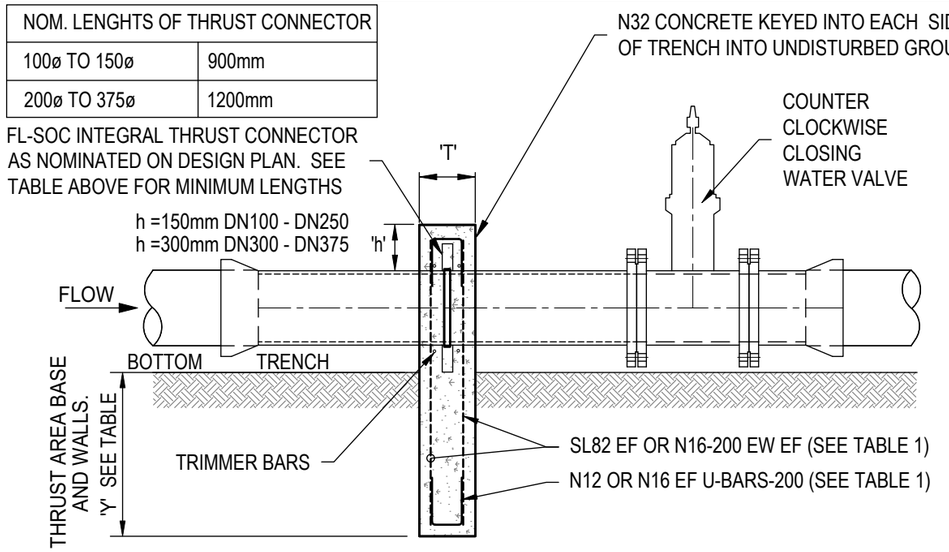
STANDARD DRAWING

WATER MAIN
VERTICAL THRUST BLOCKS FOR BENDS
WITH UPWARD THRUST - TYPE 3

COUNCIL PLAN No.
T-550-15

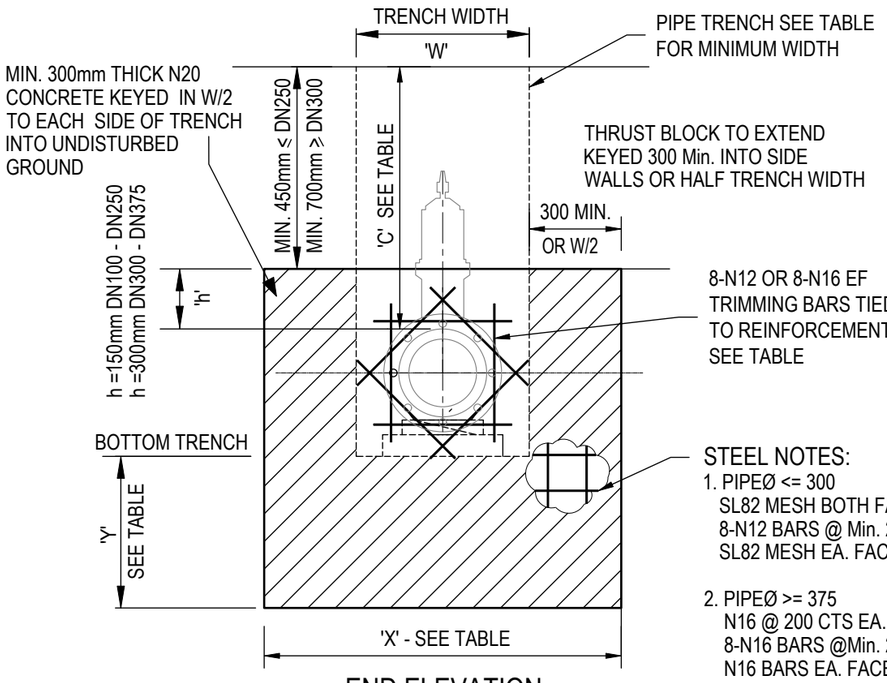
Orig. Size A3 | Revision 1

NOM. LENGHTS OF THRUST CONNECTOR	
100ø TO 150ø	900mm
200ø TO 375ø	1200mm



SIDE ELEVATION

PUDDLE FLANGE CENTERED BETWEEN REINFORCEMENT
THRUST SIZE TO BE DETERMINED BY TEST PRESSURE & SOIL TYPE



STEEL NOTES:

1. PIPEØ <= 300
   SL82 MESH BOTH FACES
   8-N12 BARS @ Min. 2 x Ø TIED TO SL82 MESH EA. FACE.(16 BARS TOTAL)

2. PIPEØ >= 375
   N16 @ 200 CTS EA. WAY BOTH FACES
   8-N16 BARS @Min. 2 x Ø TIED TO N16 BARS EA. FACE. (16 BARS TOTAL)

END ELEVATION

THRUST CONNECTOR ANCHOR

(FOR HORIZONTAL THRUST)
DIMENSIONS FOR X, Y, & T DEPEND ON REQUIRED BEARING AREA. REFER TO SCHEDULE

TABLE 1 - AXIAL THRUST RESTRAINT

SIZE	FITTING	T (mm)	REINFORCEMENT (BAR DIA. & SPACING)	COVER (mm)
DN100 - DN250	PUDDLE FLANGE	300	SL82 MESH EF, N12 U BARS-200 WITH N12 TRIMMER BARS EF	50
DN300 - DN375	PUDDLE FLANGE	400	N16-200 EW EF, N16 U BARS-200 WITH N16 TRIMMER BARS EF	50

NOTES:

1. PLAN SHOWS CONCRETE THRUST BLOCKS FOR WATER MAIN STOP VALVES WITH THRUST CONNECTOR FOR 1200kPa TEST PRESSURE x 1.2 FACTOR OF SAFETY.
2. THRUST BLOCK DIMENSIONS ARE BASED ON THE MINIMUM ALLOWABLE HORIZONTAL BEARING PRESSURES OF THE SOIL AS SHOWN IN TABLE. REFER TO STD. DRG. T-550-10 FOR SOIL CLASSIFICATION GUIDELINES.
3. THRUST BLOCKS ARE TO BE CONSTRUCTED SUCH THAT THEY TRANSFER THE THRUST ONTO UNDISTURBED GROUND.
4. CONCRETE FOR THRUST BLOCKS TO BE GRADE N32. CONCRETE TO BE MECHANICALLY VIBRATED. IF ACID SULPHATE SOILS, THEN INCREASE CONCRETE STRENGTH TO N40
5. CONCRETE THRUST BLOCKS ARE TO BE CURED FOR A MINIMUM OF 7 DAYS BEFORE BEING SUBJECTED TO ANY THRUST LOAD.
6. WHEN POURING CONCRETE AGAINST FITTINGS PLACE A MEMBRANE OF POLYETHYLENE, PVC OR FELT BETWEEN THE FITTING AND CONCRETE TO PREVENT DAMAGE TO THE FITTING. KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS
7. ALL PIPE AND FITTINGS INCLUDING FCP STOP VALVES TO BE COMPLETELY WRAPPED WITH (COLOUR SPECIFIED) LPS (LOOSE POLYETHYLENE SLEEVING)
8. IN THE EVENT THAT FREE PERMANENT GROUNDWATER (&/OR BEARING MATERIAL THAT IS SO SATURATED THAT IT COLLAPSES) IS ENCOUNTERED AT THE INTENDED INSTALLATION DEPTH FOR ANY THRUST BLOCK, CONTACT A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER FOR FURTHER ADVICE PRIOR TO CONSTRUCTING AFFECTED THRUST BLOCKS.
9. ADJUST ANCHOR BLOCKS DIMENSIONS TO ACHIEVE MINIMUM BEARING AREA IN ROAD RESERVE VERGES WHERE DIMENSIONS SHOWN IN TABLE CONFLICT WITH ADJACENT SERVICES. SEE STD. DRG. R-210-04 & R-210-05 FOR TYPICAL SERVICE ALLOCATIONS IN ROAD VERGE.
10. FOR MAINS LARGER THAN DN375 INDIVIDUAL DETAILED DESIGN IS REQUIRED. DESIGNER TO NOMINATE DIMENSION X, Y & T TO SUIT LOCATION.
11. DO NOT USE STANDARD THRUST BLOCKS AS SPECIFIED IN THIS DRAWING IN SOIL CLASSIFICATIONS IDENTIFIED TO BE <50kPa:
    - VERY SOFT, SOFT OR FIRM CLAY.
    - LOOSE CLEAN SAND.
    - UNCOMPACTED FILL OR REFUSE.

A GEOTECHNICAL ASSESSMENT AND INDIVIDUAL DESIGN IS REQUIRED FOR THESE SOILS

MINIMUM COVER TABLE FOR STOP VALVE

VALVE DIAMETER (mm)	MINIMUM COVER 'C' (mm)
100	500
150	550
200	630
250	730
300	810
375	980

(REFER TO T-550-02 FOR ADDITIONAL COVER REQUIREMENTS)

MINIMUM TRENCH WIDTHS

NOM. PIPE SIZE (DN) (mm)	MIN. TRENCH WIDTH (mm) 'W'
100	400
150	450
200	500
225	550
250	550
300	600
375	700

TABLE 2 - MINIMUM BLOCK DIMENSIONS FOR THE ANCHORAGE OF THE IN-LINE THRUST

IN LINE THRUST BLOCK
FOR TEST PRESSURE OF 1200 kPa x 1.2 FACTOR OF SAFETY
SOIL ALLOWABLE HORIZONTAL BEARING PRESSURE
IN kPa OF 50, 100 OR 200 LISTED

SOIL ALLOWABLE HORIZONTAL BEARING PRESSURE (SEE NOTE 2)	STIFF CLAY. MEDIUM-DENSE CLEAN SAND.	VERY STIFF CLAY. CLEAN DENSE SAND OR GRAVEL. DECOMPOSSED ROCK.	HARD CLAY. SOUND ROCK
AHBP	50kPa	100kPa	200kPa
PIPE DN	MINIMUM BEARING AREA (m²) FOR THRUST		
100	17.6 KN THRUST		
AREA MIN.	0.35m²	0.18m²	0.09m²
X	1000	1000	1000
Y	400	200	150
150	36.7 KN THRUST		
AREA MIN.	0.73m²	0.37m²	0.18m²
X	1050	1050	1050
Y	700	400	200
200	61.6 KN THRUST		
AREA MIN.	1.23m²	0.62m²	0.31m²
X	1100	1100	1100
Y	1150	600	300
225	77.8 KN THRUST		
AREA MIN.	1.56m²	0.78m²	0.39m²
X	1200	1200	1200
Y	1300	700	350
250	93.9 KN THRUST		
AREA MIN.	1.88m²	0.94m²	0.47m²
X	1200	1200	1200
Y	1600	800	400
300	138 KN THRUST		
AREA MIN.	2.76m²	1.38m²	0.69m²
X	1600	1200	1200
Y	1750	1200	600
375	209.9 KN THRUST		
AREA MIN.	4.2m²	2.1m²	1.05m²
X	1800	1400	1400
Y	2350	1500	800

DIMENSIONS X & Y SHOWN IN TABLE IS AREA BELOW BEDDING ZONE TO ACHIEVE MINIMUM BEARING AREA.

NOTE: ALL PIPE AND FITTINGS INCLUDING FCP STOP VALVES TO BE COMPLETELY WRAPPED WITH (COLOUR SPECIFIED) LPS (LOOSE POLYETHYLENE SLEEVING)

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STANDARD DRAWING

WATER MAIN
THRUST CONNECTOR STOP VALVE ANCHORAGE - TYPE 4

COUNCIL PLAN No.
T-550-16

Orig. Size A3
Revision 1

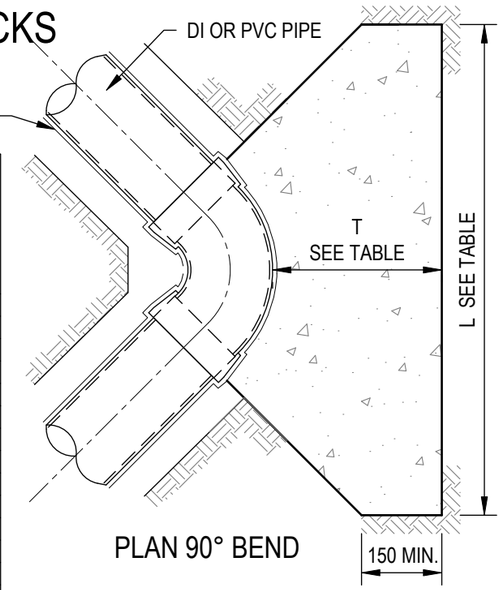
SEWER RISING MAINS MINIMUM DIMENSIONS OF HORIZONTAL THRUST BLOCKS
800kPa X 1.2 FACTOR OF SAFETY

TABLE 6 - 90° BENDS

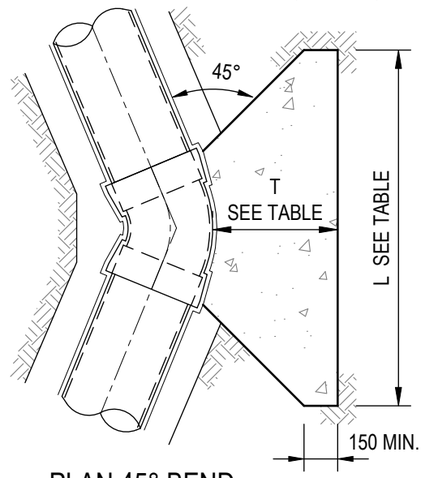
NOM. DIAM. DN(mm)	LOAD (kN)	AHPB (kPa)	MINIMUM BEARING AREA (m^2)	LENGTH L(mm)	HEIGHT ABOVE ℄ H(mm)	DEPTH BELOW ℄ G(mm)	T MINIMUM (mm)
80	9.8	50	0.20	630	150	160	250
		75	0.13	510	150	150	250
		100	0.10	440	150	150	250
		150	0.07	360	150	150	250
		200	0.05	310	150	150	250
100	16.6	50	0.33	820	210	210	250
		75	0.22	670	170	170	250
		100	0.17	580	160	160	250
		150	0.11	470	160	160	250
		200	0.08	410	160	160	250
150	34.2	50	0.68	1170	240	350	300
		75	0.46	960	240	240	250
		100	0.34	830	210	210	250
		150	0.23	680	190	150	250
		200	0.17	590	190	100	250
200	58.7	50	1.17	1530	270	500	400
		75	0.78	1250	270	360	350
		100	0.59	1080	270	270	300
		150	0.39	880	220	230	250
		200	0.29	770	220	170	250
225	73.4	50	1.47	1710	280	580	450
		75	0.98	1400	280	420	350
		100	0.73	1210	280	330	300
		150	0.49	990	250	240	250
		200	0.37	860	230	200	250
250	89.0	50	1.78	1890	290	650	500
		75	1.19	1540	290	480	400
		100	0.89	1330	290	370	350
		150	0.59	1090	280	260	300
		200	0.44	940	240	230	250
300	130.1	50	2.60	2280	470	670	600
		75	1.73	1860	470	460	500
		100	1.30	1610	400	400	400
		150	0.87	1320	330	330	350
		200	0.65	1140	290	280	300
375	197.6	50	3.95	2810	510	890	700
		75	2.63	2300	510	630	600
		100	1.98	1990	500	500	500
		150	1.32	1620	410	400	450
		200	0.99	1410	350	350	350
450	279.7	50	5.59	3340	550	1120	900
		75	3.73	2730	550	810	700
		100	2.80	2370	550	630	600
		150	1.86	1930	550	410	500
		200	1.40	1670	420	420	450
500	341.3	50	6.83	3690	580	1270	1000
		75	4.55	3020	580	930	800
		100	3.41	2610	580	730	800
		150	2.28	2130	580	490	550
		200	1.71	1850	460	470	500
600	483.1	50	9.66	4400	630	1560	1100
		75	6.44	3590	630	1160	900
		100	4.83	3110	630	920	900
		150	3.22	2540	630	640	650
		200	2.42	2200	550	550	600

TABLE 7 - 45° BENDS

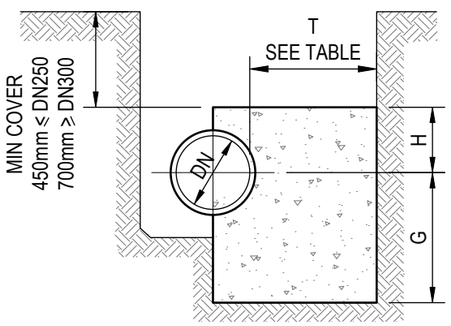
NOM. DIAM. DN(mm)	LOAD (kN)	AHPB (kPa)	MINIMUM BEARING AREA (m^2)	LENGTH L(mm)	HEIGHT ABOVE ℄ H(mm)	DEPTH BELOW ℄ G(mm)	T MINIMUM (mm)
80	5.9	50	0.12	500	150	150	250
		75	0.08	400	150	150	250
		100	0.06	350	150	150	250
		150	0.04	300	150	150	250
		200	0.03	250	150	150	250
100	8.8	50	0.18	600	160	160	250
		75	0.12	500	160	160	250
		100	0.09	400	160	160	250
		150	0.06	350	160	160	250
		200	0.04	300	160	160	250
150	18.6	50	0.37	850	230	230	250
		75	0.25	700	190	180	250
		100	0.19	600	190	180	250
		150	0.12	500	190	180	250
		200	0.09	450	190	180	250
200	31.3	50	0.63	1150	280	280	300
		75	0.42	900	270	220	250
		100	0.31	800	220	220	250
		150	0.21	650	220	220	250
		200	0.16	600	220	220	250
225	39.1	50	0.78	1250	280	350	350
		75	0.52	1020	280	230	300
		100	0.39	900	230	230	250
		150	0.26	700	230	230	250
		200	0.20	600	230	230	250
250	47.9	50	0.96	1400	290	400	350
		75	0.64	1150	290	270	300
		100	0.48	1000	290	250	250
		150	0.32	800	240	240	250
		200	0.24	700	240	240	250
300	70.4	50	1.41	1700	470	370	450
		75	0.94	1400	370	310	400
		100	0.70	1200	320	270	300
		150	0.47	1000	270	270	250
		200	0.35	850	270	270	250
375	106.6	50	2.13	2100	510	520	600
		75	1.42	1700	420	420	450
		100	1.07	1500	410	320	400
		150	0.71	1200	310	280	300
		200	0.53	1000	310	310	300
450	151.6	50	3.03	2460	550	680	650
		75	2.02	2010	500	500	500
		100	1.52	1750	440	440	450
		150	1.01	1400	400	400	400
		200	0.76	1200	350	350	350
500	184.8	50	3.70	2720	580	780	700
		75	2.46	2200	580	580	600
		100	1.85	1900	500	500	550
		150	1.23	1600	430	430	400
		200	0.92	1400	380	380	350
600	261.1	50	5.22	3250	630	980	850
		75	3.48	2650	630	690	700
		100	2.61	2300	570	570	650
		150	1.74	1900	480	480	500
		200	1.31	1600	430	430	400



PLAN 90° BEND



PLAN 45° BEND



ELEVATION

THRUST BLOCK FOR BENDS
(FOR HORIZONTAL THRUST)

NOTES

1. PLAN SHOWS TYPE 2 MASS CONCRETE ANCHOR BLOCK DIMENSION FOR SEWER RISING MAINS BASED ON REQUIRED TEST PRESSURE OF 800kPa WITH A 1.2 FACTOR OF SAFETY. THE SRM FOR A TYPE 2 ANCHOR BLOCK MAY BE VERTICALLY NON CENTRAL IN THE BLOCK AS SHOWN TO ACCOMODATE TYPICAL MINIMUM PIPE COVERS.
2. THRUST BLOCK DIMENSIONS MAY BE VARIED TO SUIT SPECIFIC SITE CONDITIONS WITH WRITTEN APPROVAL BY CITY OF COFFS HARBOUR REPRESENTITIVE. THE MAXIUMUM RATIO OF LENGTH : OVERALL HEIGHT TO ACHIEVE THE MINIMUM BEARING AREA SHALL BE 3:1
3. CAST THE THRUST AREA OF ALL THRUST BLOCKS AGAINST A CLEAN FACE OF UNDISTURBED NATURAL SOIL. THRUST BLOCKS NOT TO INTERFERE WITH OTHER SERVICES.
4. WHERE THE REQUIREMENTS OF NOTES 1, 2 & 3 CANNOT BE ACHIEVED A SPECIAL DESIGN SHALL BE UNDERTAKEN.
5. DO NOT USE STANDARD THRUST BLOCKS AS SPECIFIED IN THIS DRAWING IN SOIL CLASSIFICATIONS IDENTIFIED TO BE <50kPa:
   - VERY SOFT, SOFT OR FIRM CLAY.
   - LOOSE CLEAN SAND.
   -UNCOMPACTED FILL OR REFUSE.

   A GEOTECHNICAL ASSESSMENT AND INDIVIDUAL DESIGN IS REQUIRED FOR THESE SOILS.
6. CONCRETE TO BE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 25MPa IN ACCORDANCE WITH AS 1379 AND AS3600. CONCRETE SHALL BE MECHANICALLY VIBRATED. LOCATE ANCHOR BLOCK CENTRALLY TO FITTING. KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS
7. FINISH THRUST BLOCKS APPROXIMATELY 150mm ABOVE THE TOP OF THE FITTING OR BEARING PAD AND EXTEND TO THE FLOOR OF THE TRENCH OR DEEPER IF NECESSARY TO ACHIEVE THE REQUIRED THRUST AREA. MAXIMUM ENCASEMENT TO BE 180°.
8. WHEN POURING CONCRETE AGAINST FITTINGS PLACE A MEMBRANE OF POLYETHYLENE OR FELT BETWEEN THE FITTING AND CONCRETE TO PREVENT DAMAGE TO THE FITTING.
9. CONCRETE THRUST BLOCKS TO BE CURED FOR MINIMUM 7 DAYS BEFORE BEING SUBJECTED TO ANY THRUST LOAD UNLESS OTHERWISE DIRECTED BY THE SUPERINTENDENT.
10. POLYETHLENE PIPE WRAPPING TO BE CONTINUOUS THROUGH THRUST BLOCKS. ALL FITTINGS SHALL BE PE WRAPPED. WHERE FLANGED CONNECTIONS ARE ADOPTED, THE BOLT ASSEMBLY SHALL ALSO BE PE WRAPPED.
11. FOR DOWNWARD VERTICAL THRUST, THE ALLOWABLE BEARING PRESSURES FOR VARIOUS SOILS MAY BE TAKEN AS TWICE THAT FOR HORIZONTAL THRUST SHOWN.
12. AREA OF THRUST BLOCKS AT MULTIPLE BENDS OR FITTINGS ARE TO EQUAL THE SUM OF THE BEARING AREAS GIVEN IN THE SCHEDULE FOR EACH BEND OR FITTING (eg. SUM OF THRUST AREA FOR COMBINED 45° & 11.25° BENDS)

CAUTION: PLAN FOR SEWER RISING MAINS ONLY WITH A TEST PRESSURE OF 800kPA. NOT TO BE USED FOR WATER MAIN RESTRAINT. REFER TO STD DRG T-550-12 TO 14 FOR WATER MAINS ANCHORAGE AT 1200kPA TEST PRESSURE

Drawn	B.P.S						
Checked	C.B						
Approved	D.S.						
Date	DEC 2024	1	ISSUED FOR USE	B.P.S	D.S.	12/2024	
Issue	FIRST ISSUE	Rev.	Amendments	Drawn	Apprd.	Date	

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STANDARD DRAWING

SEWER RISING MAIN
TYPICAL THRUST BLOCK DETAILS
90° AND 45° BENDS - TYPE 2

COUNCIL PLAN No.
T-550-17

Orig. Size A3 | Revision 1

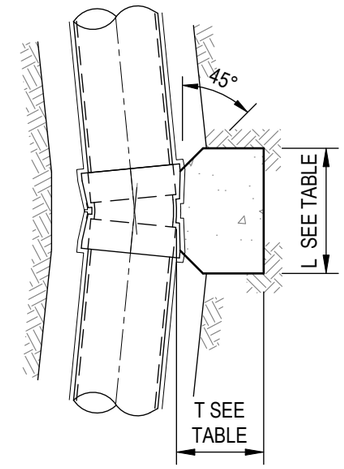
SEWER RISING MAINS MINIMUM DIMENSIONS OF HORIZONTAL THRUST BLOCKS
800kPa X 1.2 FACTOR OF SAFETY

TABLE 8 - 22½° BENDS

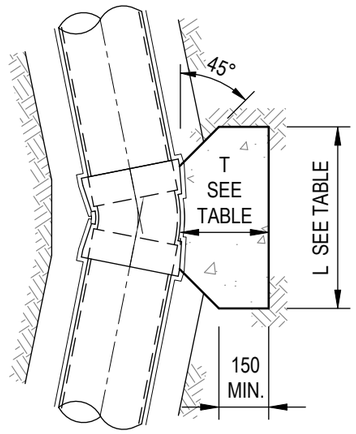
NOM. DIAM. DN(mm)	LOAD (kN)	AHPB (kPa)	MINIMUM BEARING AREA (m^2)	LENGTH L(mm)	HEIGHT ABOVE ℄ H(mm)	DEPTH BELOW ℄ G(mm)	T MINIMUM (mm)
80	2.9	50	0.06	250	150	150	250
		75	0.04	250	150	150	250
		100	0.03	250	150	150	250
		150	0.02	250	150	150	250
		200	0.01	250	150	150	250
100	4.9	50	0.10	350	160	160	250
		75	0.07	300	160	160	250
		100	0.05	300	160	160	250
		150	0.03	300	160	160	250
		200	0.02	300	160	160	250
150	9.8	50	0.20	450	190	250	250
		75	0.13	400	190	190	250
		100	0.10	300	190	150	250
		150	0.07	300	190	150	250
		200	0.05	300	190	150	250
200	16.6	50	0.33	600	240	340	250
		75	0.22	500	240	230	250
		100	0.17	400	240	220	250
		150	0.11	350	240	220	250
		200	0.08	350	240	220	250
225	20.5	50	0.41	650	280	360	250
		75	0.27	550	280	240	250
		100	0.21	450	280	230	250
		150	0.14	400	280	230	250
		200	0.10	400	280	230	250
250	24.5	50	0.49	700	290	410	250
		75	0.33	600	290	280	250
		100	0.24	500	290	250	250
		150	0.16	450	290	250	250
		200	0.12	400	250	250	250
300	36.2	50	0.72	1200	300	300	300
		75	0.48	1000	270	270	250
		100	0.36	600	320	280	250
		150	0.24	500	270	270	250
		200	0.18	450	270	270	250
375	54.8	50	1.10	1500	370	370	400
		75	0.73	1200	360	360	300
		100	0.55	800	510	350	300
		150	0.37	600	300	350	250
		200	0.27	500	360	350	250
450	68.5	50	1.37	1650	420	400	450
		75	0.91	1350	400	400	350
		100	0.68	850	400	400	300
		150	0.46	700	400	400	250
		200	0.34	600	400	400	250
500	93.9	50	1.88	1950	540	430	500
		75	1.25	1600	430	430	400
		100	0.94	1000	500	470	350
		150	0.63	800	430	380	300
		200	0.47	700	430	380	250
600	133.0	50	2.66	2400	580	570	600
		75	1.77	1900	480	480	500
		100	1.33	1150	630	520	450
		150	0.89	950	520	520	350
		200	0.67	800	430	430	300

TABLE 9 - 11¼° BENDS

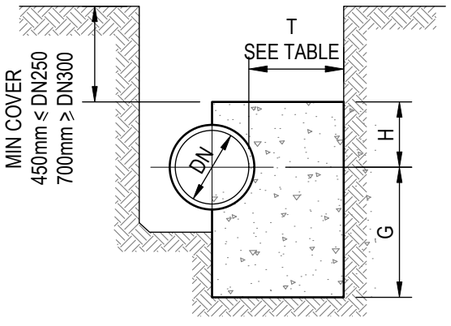
NOM. DIAM. DN(mm)	LOAD (kN)	AHPB (kPa)	MINIMUM BEARING AREA (m^2)	LENGTH L(mm)	HEIGHT ABOVE ℄ H(mm)	DEPTH BELOW ℄ G(mm)	T MINIMUM (mm)
80	1.0	50	0.02	200	150	150	250
		75	0.01	200	150	150	250
		100	0.01	200	150	150	250
		150	0.01	200	150	150	250
		200	0.00	200	150	150	250
100	2.0	50	0.04	250	160	160	250
		75	0.03	250	160	160	250
		100	0.02	250	160	160	250
		150	0.01	250	160	160	250
		200	0.01	250	160	160	250
150	4.9	50	0.10	360	180	180	250
		75	0.07	360	180	180	250
		100	0.05	360	180	180	250
		150	0.03	360	180	180	250
		200	0.02	360	180	180	250
200	7.8	50	0.16	400	220	220	250
		75	0.10	400	220	220	250
		100	0.08	400	220	220	250
		150	0.05	400	220	220	250
		200	0.04	400	220	220	250
225	9.8	50	0.20	500	230	230	250
		75	0.13	450	230	230	250
		100	0.10	400	230	230	250
		150	0.07	400	230	230	250
		200	0.05	400	230	230	250
250	12.7	50	0.25	500	250	250	250
		75	0.17	450	250	250	250
		100	0.13	400	250	250	250
		150	0.08	400	250	250	250
		200	0.06	400	250	250	250
300	17.6	50	0.35	600	320	270	250
		75	0.23	500	270	270	250
		100	0.18	450	270	270	250
		150	0.12	400	270	270	250
		200	0.09	400	270	270	250
375	27.4	50	0.55	750	370	380	250
		75	0.37	600	310	310	250
		100	0.27	550	310	310	250
		150	0.18	450	310	310	250
		200	0.14	400	310	310	250
450	39.1	50	0.78	900	440	440	350
		75	0.52	750	360	360	300
		100	0.39	650	350	350	300
		150	0.26	500	350	350	300
		200	0.20	450	350	350	300
500	46.9	50	0.94	1000	490	490	350
		75	0.63	800	430	430	300
		100	0.47	700	430	430	300
		150	0.31	600	580	430	300
		200	0.23	500	580	430	300
600	66.5	50	1.33	1150	630	520	450
		75	0.89	1000	480	480	400
		100	0.67	850	480	480	300
		150	0.44	700	480	480	300
		200	0.33	600	480	480	300



PLAN 11¼° BEND



PLAN 22½° BEND



ELEVATION

THRUST BLOCK FOR BENDS
(FOR HORIZONTAL THRUST)

NOTES

1. PLAN SHOWS TYPE 2 MASS CONCRETE ANCHOR BLOCK DIMENSION FOR SEWER RISING MAINS BASED ON REQUIRED TEST PRESSURE OF 800kPa WITH A 1.2 FACTOR OF SAFETY. THE SRM FOR A TYPE 2 ANCHOR BLOCK MAY BE VERTICALLY NON CENTRAL IN THE BLOCK AS SHOWN TO ACCOMODATE TYPICAL MINIMUM PIPE COVERS.
2. THRUST BLOCK DIMENSIONS MAY BE VARIED TO SUIT SPECIFIC SITE CONDITIONS WITH WRITTEN APPROVAL BY CITY OF COFFS HARBOUR REPRESENTITIVE. THE MAXIUMUM RATIO OF LENGTH : OVERALL HEIGHT TO ACHIEVE THE MINIMUM BEARING AREA SHALL BE <=3:1
3. CAST THE THRUST AREA OF ALL THRUST BLOCKS AGAINST A CLEAN FACE OF UNDISTURBED NATURAL SOIL. THRUST BLOCKS NOT TO INTERFERE WITH OTHER SERVICES.
4. WHERE THE REQUIREMENTS OF NOTES 1, 2 & 3 CANNOT BE ACHIEVED A SPECIAL DESIGN SHALL BE UNDERTAKEN.
5. DO NOT USE STANDARD THRUST BLOCKS AS SPECIFIED IN THIS DRAWING IN SOIL CLASSIFICATIONS IDENTIFIED TO BE <50kPa:
   - VERY SOFT, SOFT OR FIRM CLAY.
   - LOOSE CLEAN SAND.
   -UNCOMPACTED FILL OR REFUSE.

   A GEOTECHNICAL ASSESSMENT AND INDIVIDUAL DESIGN IS REQUIRED FOR THESE SOILS.
6. CONCRETE TO BE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 25MPa IN ACCORDANCE WITH AS 1379 AND AS3600. CONCRETE SHALL BE MECHANICALLY VIBRATED. LOCATE ANCHOR BLOCK CENTRALLY TO FITTING. KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS
7. FINISH THRUST BLOCKS APPROXIMATELY 150mm ABOVE THE TOP OF THE FITTING OR BEARING PAD AND EXTEND TO THE FLOOR OF THE TRENCH OR DEEPER IF NECESSARY TO ACHIEVE THE REQUIRED THRUST AREA. MAXIMUM ENCASEMENT TO BE 180°.
8. WHEN POURING CONCRETE AGAINST FITTINGS PLACE A MEMBRANE OF POLYETHYLENE OR FELT BETWEEN THE FITTING AND CONCRETE TO PREVENT DAMAGE TO THE FITTING.
9. CONCRETE THRUST BLOCKS TO BE CURED FOR MINIMUM 7 DAYS BEFORE BEING SUBJECTED TO ANY THRUST LOAD UNLESS OTHERWISE DIRECTED BY THE SUPERINTENDENT.
10. POLYETHLENE PIPE WRAPPING TO BE CONTINUOUS THROUGH THRUST BLOCKS. ALL FITTINGS SHALL BE PE WRAPPED. WHERE FLANGED CONNECTIONS ARE ADOPTED, THE BOLT ASSEMBLY SHALL ALSO BE PE WRAPPED.
11. FOR DOWNWARD VERTICAL THRUST, THE ALLOWABLE BEARING PRESSURES FOR VARIOUS SOILS MAY BE TAKEN AS TWICE THAT FOR HORIZONTAL THRUST SHOWN.
12. AREA OF THRUST BLOCKS AT MULTIPLE BENDS OR FITTINGS ARE TO EQUAL THE SUM OF THE BEARING AREAS GIVEN IN THE SCHEDULE FOR EACH BEND OR FITTING (eg. SUM OF THRUST AREA FOR COMBINED 45° & 11.25° BENDS)

CAUTION: PLAN FOR SEWER RISING MAINS ONLY WITH A TEST PRESSURE OF 800kPA. NOT TO BE USED FOR WATER MAIN RESTRAINT. REFER TO STD DRG T-550-12 TO 14 FOR WATER MAINS ANCHORAGE AT 1200kPa TEST PRESSURE

Drawn	B.P.S					
Checked	C.B					
Approved	D.S.					
Date	DEC 2024	1	ISSUED FOR USE	B.P.S	D.S.	12/2024
Issue	FIRST ISSUE	Rev.	Amendments	Drawn	Apprd.	Date

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STANDARD DRAWING

SEWER RISING MAIN
TYPICAL THRUST BLOCK DETAILS
22½° AND 11¼° BENDS - TYPE 2

COUNCIL PLAN No.
T-550-18

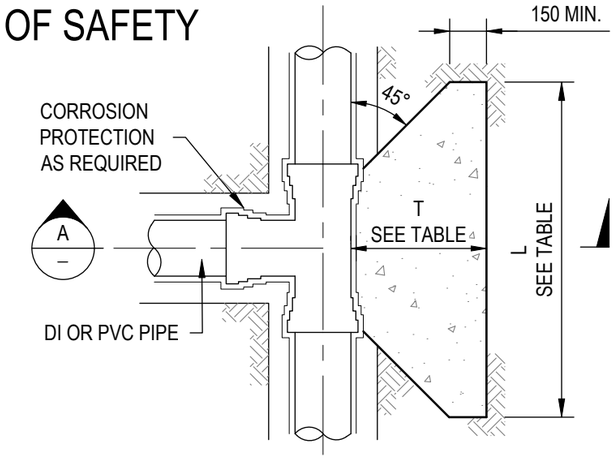
Orig. Size A3

Revision 1

SEWER RISING MAINS MINIMUM DIMENSIONS OF HORIZONTAL THRUST BLOCKS - 800kPa X 1.2 FACTOR OF SAFETY

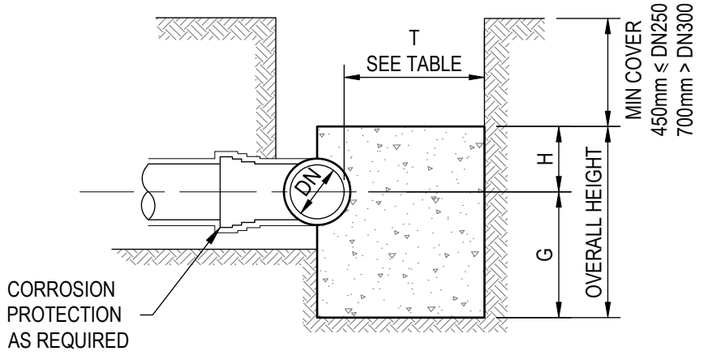
TABLE 10 - TEES, END CAPS &

NOM. DIAM. DN(mm)	LOAD (kN)	AHPB (kPa)	MINIMUM BEARING AREA (m^2)	LENGTH L (mm)	HEIGHT ABOVE ℄ H (mm)	DEPTH BELOW ℄ G (mm)	T MINIMUM (mm)
80	6.8	50	0.14	550	150	150	250
		75	0.09	450	150	150	250
		100	0.07	400	150	150	250
		150	0.05	300	150	150	250
		200	0.03	260	150	150	250
100	11.7	50	0.23	700	170	170	250
		75	0.16	600	170	170	250
		100	0.12	500	170	170	250
		150	0.08	400	170	170	250
		200	0.06	350	170	170	250
150	24.5	50	0.49	1000	250	250	250
		75	0.33	800	250	250	250
		100	0.24	700	250	250	250
		150	0.16	600	250	250	250
		200	0.12	500	250	250	250
200	41.1	50	0.82	1300	320	320	350
		75	0.55	1050	260	260	300
		100	0.41	910	230	230	250
		150	0.27	750	220	190	250
		200	0.21	650	220	160	250
225	51.8	50	1.04	1450	360	360	400
		75	0.69	1200	290	290	300
		100	0.52	1000	260	260	250
		150	0.35	850	260	260	250
		200	0.26	750	260	260	250
250	62.6	50	1.25	1600	300	490	400
		75	0.83	1300	300	340	350
		100	0.63	1100	300	300	300
		150	0.42	900	300	300	250
		200	0.31	800	300	300	250
300	91.9	50	1.84	1950	480	480	500
		75	1.23	1600	470	310	400
		100	0.92	1400	340	340	350
		150	0.61	1100	280	280	300
		200	0.46	1000	270	210	250
375	139.9	50	2.80	2400	510	670	600
		75	1.86	1950	510	450	500
		100	1.40	1700	410	420	450
		150	0.93	1400	340	340	400
		200	0.70	1200	310	280	300
450	197.6	50	3.95	2810	550	850	700
		75	2.63	2300	550	590	600
		100	1.98	2000	500	500	500
		150	1.32	1650	410	410	450
		200	0.99	1450	350	350	400
500	241.6	50	4.83	3110	580	970	800
		75	3.22	2550	580	690	650
		100	2.42	2200	550	550	600
		150	1.61	1800	450	450	450
		200	1.21	1550	390	390	400
600	342.3	50	6.85	3700	630	1220	950
		75	4.56	3050	630	880	800
		100	3.42	2600	630	700	650
		150	2.28	2150	530	530	600
		200	1.71	1850	480	440	500

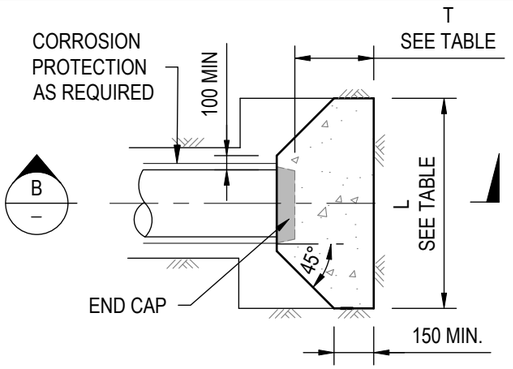


PLAN

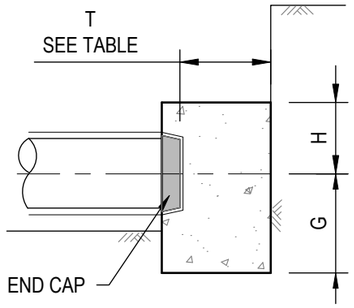
TEE THRUST BLOCK



SECTION A

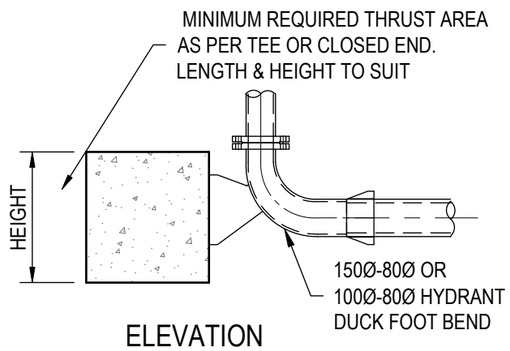


PLAN



SECTION B

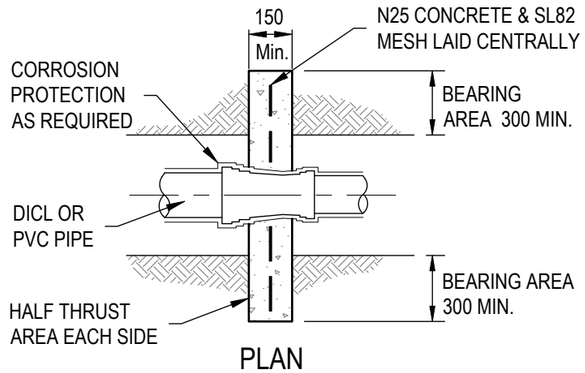
END CAP THRUST BLOCK



ELEVATION

FLUSHING POINTS

(FOR HORIZONTAL THRUST)



PLAN

TAPER THRUST BLOCK

(FOR HORIZONTAL THRUST) SEE NOTE 10

NOTES

1. PLAN SHOWS TYPE 2 MASS CONCRETE ANCHOR BLOCK DIMENSION FOR SEWER RISING MAINS BASED ON REQUIRED TEST PRESSURE OF 800kPa WITH A 1.2 FACTOR OF SAFETY. THE SRM FOR A TYPE 2 ANCHOR BLOCK MAY BE VERTICALLY NON CENTRAL IN THE BLOCK AS SHOWN TO ACCOMODATE TYPICAL MINIMUM PIPE COVERS.
2. THRUST BLOCK DIMENSIONS MAY BE VARIED TO SUIT SPECIFIC SITE CONDITIONS WITH WRITTEN APPROVAL BY CITY OF COFFS REPRESENTITIVE. THE MAXIMUM RATIO OF LENGTH : OVERALL HEIGHT TO ACHIEVE THE MINIMUM BEARING AREA SHALL BE NO GREATER THAN 3:1
3. CAST THE THRUST AREA OF ALL THRUST BLOCKS AGAINST A CLEAN FACE OF UNDISTURBED NATURAL SOIL. THRUST BLOCKS NOT TO INTERFERE WITH OTHER SERVICES.
4. WHERE THE REQUIREMENTS OF NOTES 1, 2 & 3 CANNOT BE ACHIEVED A SPECIAL DESIGN SHALL BE UNDERTAKEN.
5. DO NOT USE STANDARD THRUST BLOCKS AS SPECIFIED IN THIS DRAWING IN SOIL CLASSIFICATIONS IDENTIFIED TO BE <50kPa:
   - VERY SOFT, SOFT OR FIRM CLAY.
   - LOOSE CLEAN SAND.
   -UNCOMPACTED FILL OR REFUSE.

   A GEOTECHNICAL ASSESSMENT AND INDIVIDUAL DESIGN IS REQUIRED FOR THESE SOILS.
6. CONCRETE FOR UNREINFORCED THRUST BLOCKS TO BE GRADE N25 CONCRETE MECHANICALLY VIBRATED. LOCATE ANCHOR BLOCK CENTRALLY TO FITTING.
7. FINISH THRUST BLOCKS APPROXIMATELY 150mm ABOVE THE TOP OF THE FITTING OR BEARING PAD AND EXTEND TO THE FLOOR OF THE TRENCH OR DEEPER IF NECESSARY TO ACHIEVE THE REQUIRED THRUST AREA. MAXIMUM ENCASEMENT TO BE 180°.
8. WHEN POURING CONCRETE AGAINST FITTINGS PLACE A MEMBRANE OF POLYETHYLENE OR FELT BETWEEN THE FITTING AND CONCRETE TO PREVENT DAMAGE TO THE FITTING. KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS.
9. CONCRETE THRUST BLOCKS TO BE CURED FOR MINIMUM 7 DAYS BEFORE BEING SUBJECTED TO ANY THRUST LOAD UNLESS OTHERWISE DIRECTED BY THE SUPERINTENDENT.
10. MINIMUM THRUST AREA FOR THE TAPER BLOCKS TO BE EQUAL TO THE DIFFERENCE BETWEEN THE THRUST AREAS FOR TEES OR CLOSED ENDS OF EQUIVALENT DIAMETER TO THOSE EACH SIDE OF THE TAPER. REINFORCEMENT IN ACCORDANCE WITH DESIGN PLANS.

CAUTION: PLAN FOR SEWER RISING MAINS ONLY WITH A TEST PRESSURE OF 800kPA. NOT TO BE USED FOR WATER MAIN RESTRAINT. REFER TO STD DRG T-550-12 TO 14 FOR WATER MAINS ANCHORAGE AT 1200kPa TEST PRESSURE

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Approved	D.S.					
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STANDARD DRAWING

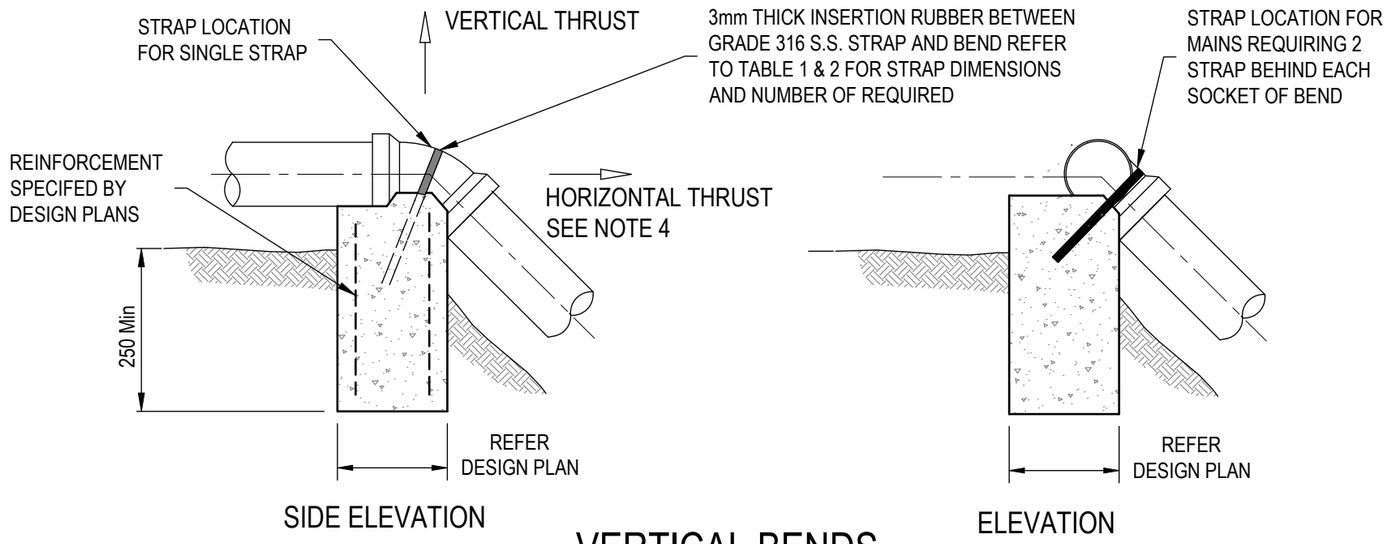
SEWER RISING MAIN
TYPICAL THRUST BLOCK DETAILS
TEES, BLANK ENDS & TAPERS - TYPE 2

COUNCIL PLAN No.
T-550-19

Orig. Size A3 | Revision 1

TABLE 1 - LENGTHS OF HOLD DOWN STRAPS FOR ANCHORAGE TO CONCRETE BLOCK TO RESTRAIN THRUST FROM VERTICAL BENDS FOR PRESSURE MAINS

PIPE SIZE (DICL)	O.D.	A (mm)	D (mm)	B (mm)	LENGTH (mm)		SUGGESTED SIZES	
					Calculated length	**Recommended Min. length**	T (mm)	W (mm)
100Ø DICL	122	50	200	61	814	**850**	5	25
150Ø DICL	177	50	300	88.5	1155	**1200**	5	25
200Ø DICL	232	65	300	116	1326	**1350**	5	25
225Ø DICL	259	65	300	129.5	1396	**1400**	6	50
250Ø DICL	286	65	400	143	1665	**1700**	6	50
300Ø DICL	345	75	400	172.5	1837	**1850**	6	50
375Ø DICL	426	75	500	213	2245	**2250**	6	75
450Ø DICL	507	75	500	253.5	2453	**2500**	6	100
500Ø DICL	560	100	500	280	2640	**2650**	10	100
600Ø DICL	667	100	500	333.5	2955	**3000**	10	100



SIDE ELEVATION

ELEVATION

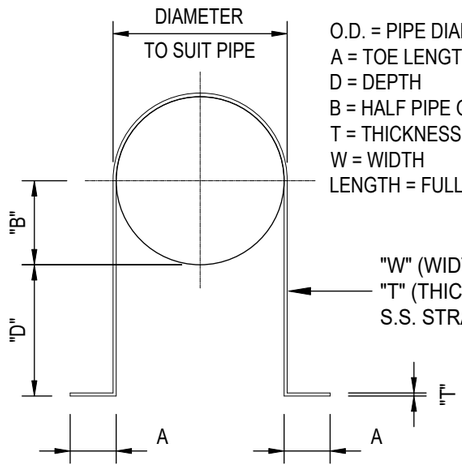
VERTICAL BENDS

(FOR UPWARD THRUST)

TABLE 2

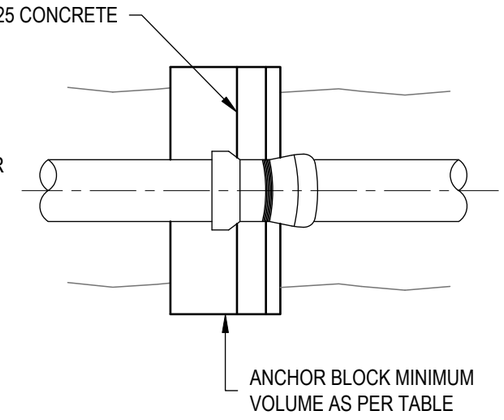
No. OF STRAPS REQUIRED FOR THE PIPE SIZES ABOVE

NOM. PIPE SIZE	45° BEND No. Required	22½° BEND No. Required	11¼° BEND No. Required
63	1	1	1
80	1	1	1
100	1	1	1
150	1	1	1
200	2	1	1
225	1	1	1
250	1	1	1
300	1	1	1
375	2	1	1
450	2	1	1
500	2	1	1
600	2	1	1



O.D. = PIPE DIAMETER
A = TOE LENGTH
D = DEPTH
B = HALF PIPE O.D.
T = THICKNESS
W = WIDTH
LENGTH = FULL LENGTH OF FLAT BAR

TYPICAL STRAP



PLAN

TABLE 3

THRUST BLOCK DIMENSIONS
800kPa TEST PRESSURE x 1.2 FACTOR OF SAFETY

VERTICAL BENDS MINIMUM BLOCK VOLUME FOR ANCHORAGE OF VERTICAL THRUST			
NOM. PIPE SIZE	11¼°(m³)	22½°(m³)	45°(m³)
80	0.03	0.10	0.19
100	0.07	0.17	0.28
150	0.17	0.33	0.60
200	0.27	0.57	1.00
225	0.34	0.70	1.25
250	0.44	0.83	1.54
300	0.61	1.23	2.26
375	0.95	1.87	3.42
450 500 600	SPECIAL DESIGN REQUIRED ALTERNATIVE METHODS TO BE CONSIDERED		

IN CALCULATING THE VOLUME NO CONTRIBUTION OF THE PIPELINE WEIGHT HAS BEEN TAKEN INTO CONSIDERATION

NOTES:

1. ANCHOR BLOCK IN TABLE 3 ARE DESIGNED SEWER RISING MAINS FOR A TEST PRESSURE OF 800kPa AND A FACTOR OF SAFETY OF 1.2. PLAN NOT TO BE USED FOR WATER RETICULATION.
2. WHERE DICL PIPES AND FITTINGS WITH RESTRAINED JOINTS ARE USED THRUST BLOCKS ARE NOT REQUIRED.
3. THRUST BLOCK REINFORCEMENT AS SPECIFIED IN DESIGN DRAWINGS
4. DESIGN OF ANCHOR BLOCKS AT VERTICAL BENDS TO INCLUDE ALLOWANCE FOR THE HORIZONTAL COMPONENT OF THE THRUST. NOTE THAT BEARING AREAS AS PER STD DRG T-550-17 & 18 MAY NOT BE APPROPRIATE
5. LOCATE ANCHOR BLOCK CENTRALLY AROUND BEND.
6. KEY IN ANCHOR BLOCK INTO BASE OF TRENCH A MINIUMUM DEPTH OF 250mm MINIMUM.
7. POUR CONCRETE AGAINST A SOLID EXCAVATION FACE.
8. KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS
9. ALL DIMENSIONS ARE IN MILLIMETRES

CAUTION: PLAN FOR SEWER RISING MAINS ONLY WITH A TEST PRESSURE OF 800kPa. NOT TO BE USED FOR WATER MAIN RESTRAINT. REFER TO STD DRG T-550-15 FOR WATER MAINS ANCHORAGE AT 1200kPa TEST PRESSURE

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STANDARD DRAWING

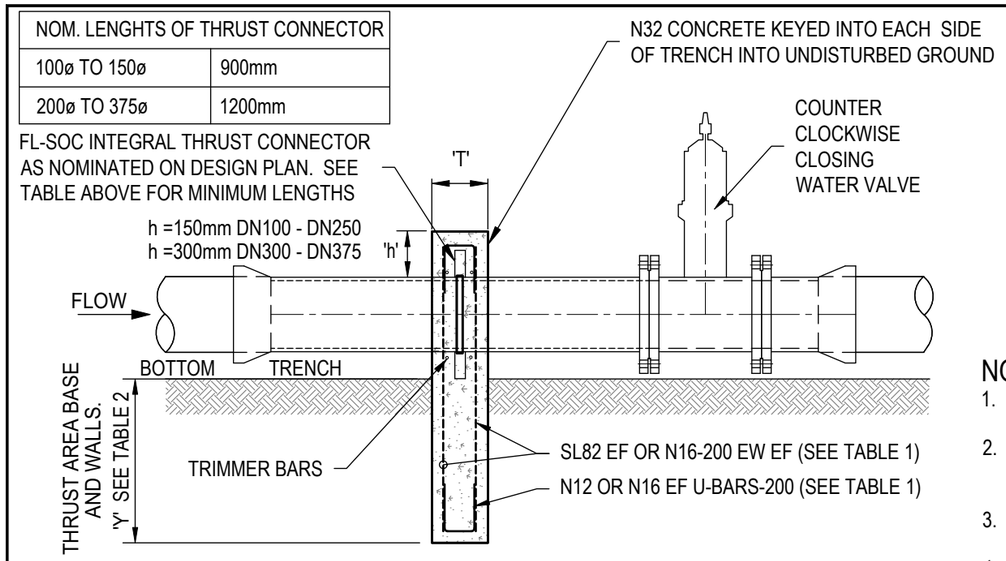
SEWER RISING MAIN
TYPICAL THRUST BLOCK DETAILS
WITH UPWARD THRUST - TYPE 3

COUNCIL PLAN No.
T-550-20

Orig. Size A3

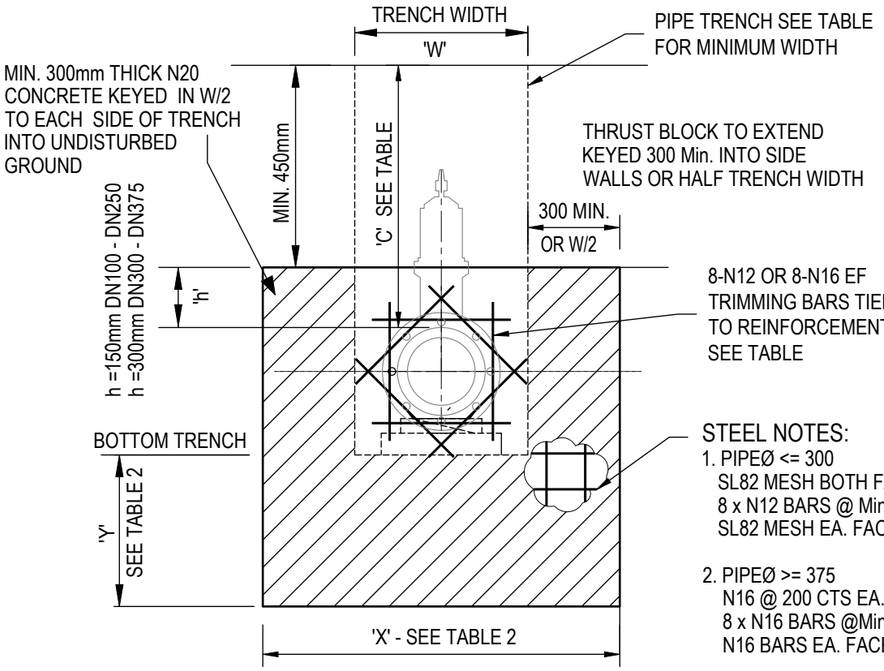
Revision 1

NOM. LENGHTS OF THRUST CONNECTOR	
100ø TO 150ø	900mm
200ø TO 375ø	1200mm



SIDE ELEVATION

PUDDLE FLANGE CENTERED BETWEEN REINFORCEMENT
THRUST SIZE TO BE DETERMINED BY TEST PRESSURE & SOIL TYPE



STEEL NOTES:

1. PIPEØ <= 300
   SL82 MESH BOTH FACES
   8 x N12 BARS @ Min. 2 x Ø TIED TO SL82 MESH EA. FACE.(16 BARS TOTAL)
2. PIPEØ >= 375
   N16 @ 200 CTS EA. WAY BOTH FACES
   8 x N16 BARS @Min. 2 x Ø TIED TO N16 BARS EA. FACE. (16 BARS TOTAL)

END ELEVATION

THRUST CONNECTOR ANCHOR

(FOR HORIZONTAL THRUST)
DIMENSIONS FOR X, Y, & T DEPEND ON REQUIRED BEARING AREA. REFER TO SCHEDULE

NOTE: ALL PIPE AND FITTINGS INCLUDING FCP STOP VALVES TO BE COMPLETELY WRAPPED WITH (COLOUR SPECIFIED) LPS (LOOSE POLYETHYLENE SLEEVING)

TABLE 1 - AXIAL THRUST RESTRAINT

SIZE	FITTING	T (mm)	REINFORCEMENT (BAR DIA. & SPACING)	COVER (mm)
DN100 - DN250	PUDDLE FLANGE	300	SL82 MESH EF, N12 U BARS-200 WITH N12 TRIMMER BARS EF	50
DN300 - DN375	PUDDLE FLANGE	400	N16-200 EW EF, N16 U BARS-200 WITH N16 TRIMMER BARS EF	50

NOTES:

1. PLAN SHOWS CONCRETE THRUST BLOCKS FOR SEWER RISING MAIN STOP VALVES WITH THRUST CONNECTOR FOR 800kPa TEST PRESSURE x 1.2 FACTOR OF SAFETY.
2. THRUST BLOCK DIMENSIONS ARE BASED ON THE MINIMUM ALLOWABLE HORIZONTAL BEARING PRESSURES OF THE SOIL AS SHOWN IN TABLE. REFER TO STD. DRG. T-550-10 FOR SOIL CLASSIFICATION GUIDELINES.
3. THRUST BLOCKS ARE TO BE CONSTRUCTED SUCH THAT THEY TRANSFER THE THRUST ONTO UNDISTURBED GROUND.
4. CONCRETE FOR THRUST BLOCKS TO BE GRADE N32. CONCRETE TO BE MECHANICALLY VIBRATED. IF ACID SULPHATE SOILS, THEN INCREASE CONCRETE STRENGTH TO N40
5. CONCRETE THRUST BLOCKS ARE TO BE CURED FOR A MINIMUM OF 7 DAYS BEFORE BEING SUBJECTED TO ANY THRUST LOAD.
6. WHEN POURING CONCRETE AGAINST FITTINGS PLACE A MEMBRANE OF POLYETHYLENE, PVC OR FELT BETWEEN THE FITTING AND CONCRETE TO PREVENT DAMAGE TO THE FITTING. KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS
7. ALL PIPE AND FITTINGS INCLUDING FCP STOP VALVES TO BE COMPLETELY WRAPPED WITH (COLOUR SPECIFIED) LPS (LOOSE POLYETHYLENE SLEEVING)
8. IN THE EVENT THAT FREE PERMANENT GROUNDWATER (&/OR BEARING MATERIAL THAT IS SO SATURATED THAT IT COLLAPSES) IS ENCOUNTERED AT THE INTENDED INSTALLATION DEPTH FOR ANY THRUST BLOCK, CONTACT A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER FOR FURTHER ADVICE PRIOR TO CONSTRUCTING AFFECTED THRUST BLOCKS.
9. ADJUST ANCHOR BLOCKS DIMENSIONS TO ACHIEVE MINIMUM BEARING AREA IN ROAD RESERVE VERGES WHERE DIMENSIONS SHOWN IN TABLE CONFLICT WITH ADJACENT SERVICES. SEE STD. DRG. R-210-04 & R-210-05 FOR TYPICAL SERVICE ALLOCATIONS IN ROAD VERGE.
10. FOR MAINS LARGER THAN DN375 INDIVIDUAL DETAILED DESIGN IS REQUIRED. DESIGNER TO NOMINATE DIMENSION X, Y & T TO SUIT LOCATION.
11. DO NOT USE STANDARD THRUST BLOCKS AS SPECIFIED IN THIS DRAWING IN SOIL CLASSIFICATIONS IDENTIFIED TO BE <50kPa:
    - VERY SOFT, SOFT OR FIRM CLAY.
    - LOOSE CLEAN SAND.
    - UNCOMPACTED FILL OR REFUSE.

A GEOTECHNICAL ASSESSMENT AND INDIVIDUAL DESIGN IS REQUIRED FOR THESE SOILS

MINIMUM COVER TABLE

VALVE DIAMETER (mm)	MINIMUM COVER 'C' (mm)
100	500
150	550
200	630
250	730
300	810
375	980

(REFER TO STD DRG T-550-02 FOR ADDITIONAL COVER REQUIREMENTS)

MINIMUM TRENCH WIDTHS

NOM. PIPE SIZE (DN) (mm)	MIN. TRENCH WIDTH (mm) 'W'
100	400
150	450
200	500
225	550
250	550
300	600
375	700

TABLE 2 - MINIMUM BLOCK DIMENSIONS FOR THE ANCHORAGE OF THE IN-LINE THRUST

IN LINE THRUST BLOCK
FOR TEST PRESSURE OF 800 kPa x 1.2 FACTOR OF SAFETY
SOIL ALLOWABLE HORIZONTAL BEARING PRESSURE
IN kPa OF 50, 100 OR 200 LISTED

SOIL ALLOWABLE HORIZONTAL BEARING PRESSURE (SEE NOTE 2)	STIFF CLAY. MEDIUM-DENSE CLEAN SAND.	VERY STIFF CLAY. CLEAN DENSE SAND OR GRAVEL. DECOMPOSSED ROCK.	HARD CLAY. SOUND ROCK
AHBP	50kPa	100kPa	200kPa
PIPE DN	MINIMUM BEARING AREA (m²) FOR THRUST		
100	11.7 KN THRUST		
AREA MIN.	0.23m²	0.12m²	0.06m²
X	1000	1000	1000
Y	250	150	150
150	24.5 KN THRUST		
AREA MIN.	0.49m²	0.24m²	0.12m²
X	1050	1050	1050
Y	500	250	200
200	41.1 KN THRUST		
AREA MIN.	0.82m²	0.41m²	0.21m²
X	1100	1100	1100
Y	800	400	200
225	51.8 KN THRUST		
AREA MIN.	1.04m²	0.52m²	0.26m²
X	1200	1200	1200
Y	900	500	300
250	62.6 KN THRUST		
AREA MIN.	1.25m²	0.63m²	0.31m²
X	1200	1200	1200
Y	1100	600	300
300	91.9 KN THRUST		
AREA MIN.	1.84m²	0.92m²	0.46m²
X	1200	1200	1200
Y	1600	800	400
375	139.9 KN THRUST		
AREA MIN.	2.80m²	1.40m²	0.70m²
X	1400	1400	1400
Y	2000	1000	500

DIMENSIONS X & Y SHOWN IN TABLE IS AREA BELOW BEDDING ZONE TO ACHIEVE MINIMUM BEARING AREA.

CAUTION: PLAN FOR SEWER RISING MAINS ONLY WITH A TEST PRESSURE OF 800kPA. NOT TO BE USED FOR WATER MAIN RESTRAINT. REFER TO STD DRG T-550-16 FOR WATER MAINS ANCHORAGE AT 1200kPA TEST PRESSURE

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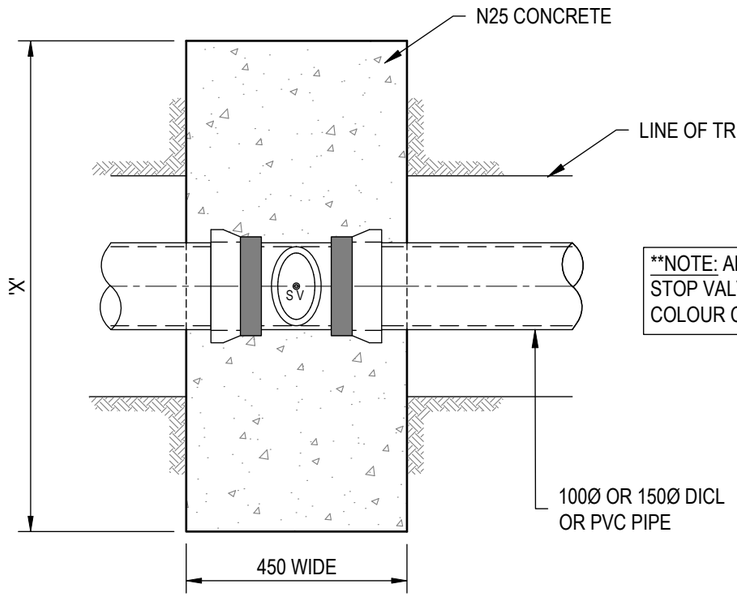
STANDARD DRAWING

SEWER RISING MAIN
THRUST CONNECTOR STOP VALVE ANCHORAGE - TYPE 4

COUNCIL PLAN No.
T-550-21

Orig. Size A3 | Revision 1



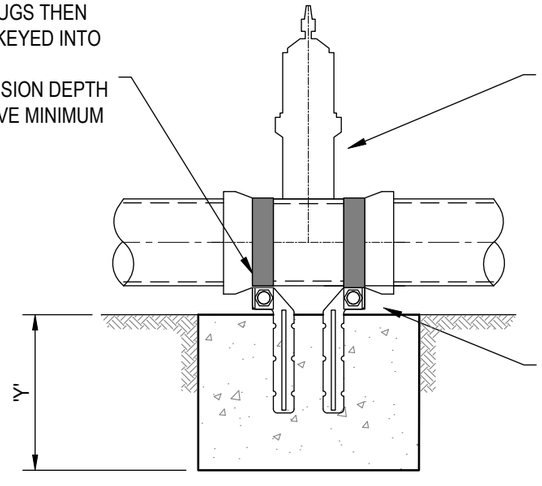
PLAN

**NOTE: ALL DICL PIPE AND FITTINGS INCLUDING FCP STOP VALVES TO BE COMPLETELY WRAPPED WITH COLOUR CODED LPS (LOOSE POLYETHYLENE SLEEVING)

VALVE ANCHORAGE FOR 100Ø AND 150Ø PIPES
SO - SO ANCHORED STOP VALVE

(TYCO CODE: VZ10ANCHORKIT OR APPROVED EQUIVALENT)
(ONLY FOR DN100 AND DN150 PIPES)

ANCHOR LEGS BOLTED TO LUGS THEN SET IN CONCRETE ANCHOR KEYED INTO UNDISTURBED GROUND.
REFER TO TABLE FOR DIMENSION DEPTH 'Y' AND LENGTH 'X' TO ACHIEVE MINIMUM REQUIRED BEARING AREAS



100Ø OR 150Ø SOC VALVE CLOCKWISE CLOSING SO-SO STOP VALVE WITH ANCHOR LUGS SEWER COUNTER CLOCKWISE CLOSING SO-SO STOP VALVE WITH ANCHOR LUGS WATER

ANCHOR BOLTED LEGS
(TYCO CODE: VZ10ANCHORKIT OR APPROVED EQUIVALENT)
(ONLY FOR DN100 AND DN150 PIPES)

SIDE ELEVATION

MINIMUM BLOCK DIMENSIONS FOR THE ANCHORAGE OF THE IN-LINE THRUST

IN LINE SOC-SOC VALVE WITH ANCHOR LEGS ANCHOR BLOCK FOR TEST PRESSURE OF 1200 kPa x 1.2 FACTOR OF SAFETY
SOIL ALLOWABLE HORIZONTAL BEARING PRESSURE IN kPa OF 50, 100 OR 200 LISTED

SOIL ALLOWABLE HORIZONTAL BEARING PRESSURE (SEE NOTE 2)	STIFF CLAY. MEDIUM-DENSE CLEAN SAND.	VERY STIFF CLAY. CLEAN DENSE SAND OR GRAVEL. DECOMPOSSED ROCK.	HARD CLAY. SOUND ROCK
AHBP	50kPa	100kPa	200kPa
PIPE DN	MINIMUM BEARING AREA (m²) FOR THRUST		
100	17.6 KN THRUST		
AREA MIN.	0.35m²	0.18m²	0.09m²
X	1000	600	600
Y	350	300	300
150	36.7 KN THRUST		
AREA MIN.	0.73m²	0.37m²	0.18m²
X	1050	1050	600
Y	700	350	300

NOTES:

1. PLANS SHOWS TYPICAL THRUST ANCHOR RESTRAINT FOR 100Ø-150Ø SOC-SOC VALVE DETAIL WITH ANCHOR BOLTED LEGS, TYCO CODE: VZ10ANCHORKIT OR APPROVED EQUIVALENT. USE AS APPROVED BY CITY OF COFFS HARBOUR REPRESENTIVITIVE.
2. SP/SP VALVES ARE NOT TO BE USED - ONLY EXCEPTION IS FOR TEMPORARY VALVE
3. ANCHOR BLOCK MUST BE CAST INTO UNDISTURBED NATURAL GROUND OR APPROVED ENGINEERED FILL WITH MINIMUM ALLOWABLE HORIZONTAL BEARING CAPACITY AS NOMINATED BY DESIGN PLANS
4. WATER MAIN STOP VALVES TO BE COUNTER CLOCKWISE CLOSING.
5. SEWER RISING MAIN STOP VALVES TO BE CLOCKWISE CLOSING.
6. ALL DICL PIPE AND FITTINGS INCLUDING FCP STOP VALVES TO BE COMPLETELY WRAPPED WITH COLOUR CODED LPS (LOOSE POLYETHYLENE SLEEVING)

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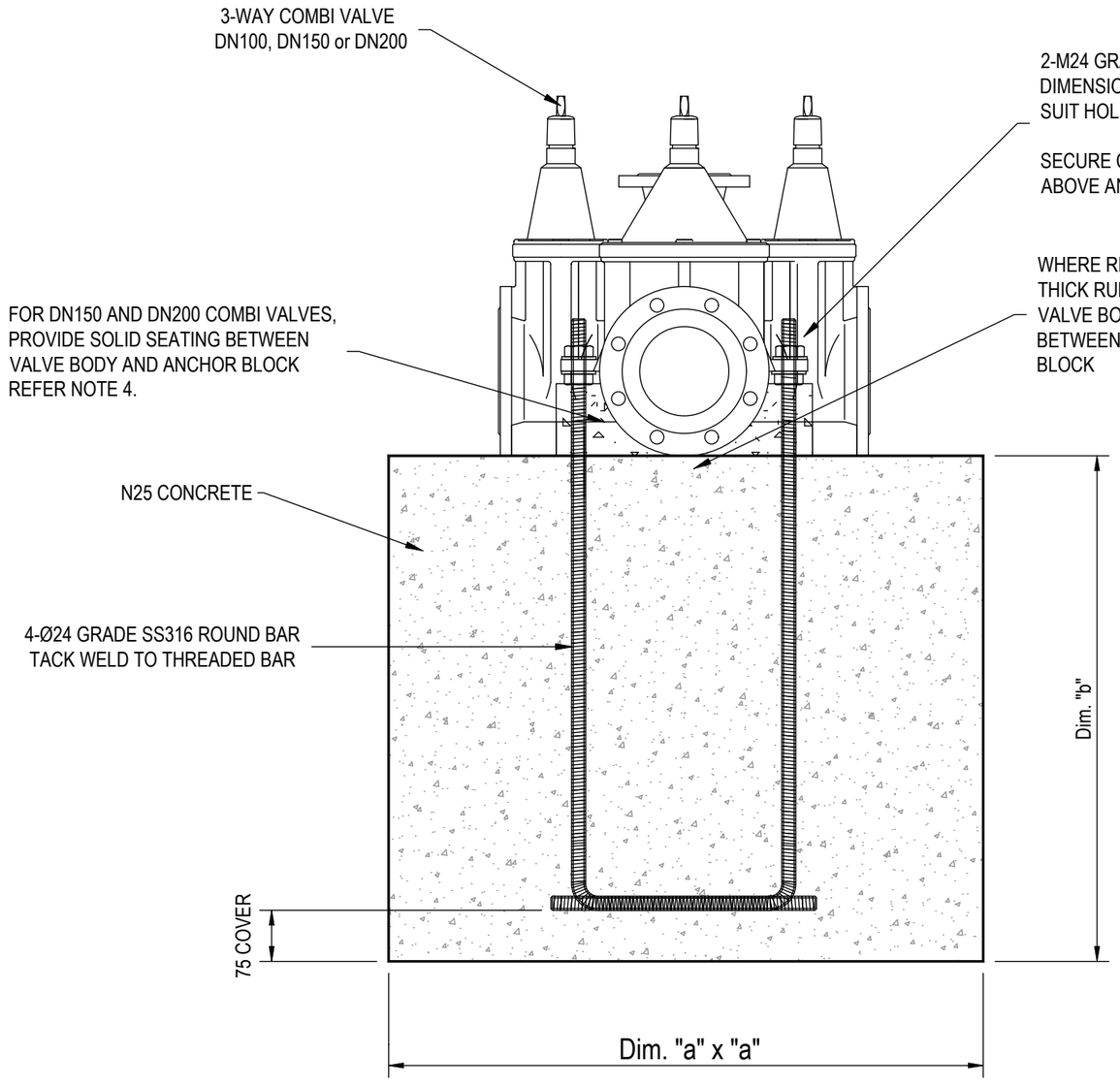
STANDARD DRAWING

DN100 & DN150 SOC-SOC VALVE
THRUST BLOCK DETAILS

COUNCIL PLAN No.
T-550-22

Orig. Size A3
Revision 1



ELEVATION

3-WAY COMBI VALVE ANCHORAGE

NOTES:

1. ANCHOR BLOCK DESIGN PRESSURE = 180m (150m TEST PRESSURE X 1.2 OR 120m OPERATING PRESSURE X 1.5)
2. ANCHOR BLOCK SIZING IS BASED ON THE OVERTURNING MOMENT DUE TO THE OFFSET OF THE COMBI VALVE RELATIVE TO THE BASE OF THE BLOCK.
3. ANCHOR BLOCK MUST BE CAST INTO UNDISTURBED NATURAL GROUND OR APPROVED ENGINEERED FILL WITH MINIMUM ALLOWABLE HORIZONTAL BEARING CAPACITY AS TABULATED
4. FOR DN150 AND DN200 COMBI VALVES, 25MPa CONCRETE OR AN APPROVED GROUT MUST BE USED TO PROVIDE SOLID SEATING OF THE VALVE BODY ONTO THE ANCHOR BLOCK, AS SHOWN. SS THREADED RODS ARE TO BE FULLY ENCASED WITH MINIMUM 75mm COVER
5. STAINLESS STEEL THREADED RODS ARE TO BE GRADE 316

TABLE 1. ANCHOR BLOCK DIMENSIONS

VALVE DIAMETER	ALLOWABLE HORIZONAL BEARING PRESSURE			
		50kPa	100kPa	200kPa
	Dim."b"	Dimension "a"		
DN100	500	950	800	600
DN150	850	1250	1000	700
DN200	1250	1500	1200	800

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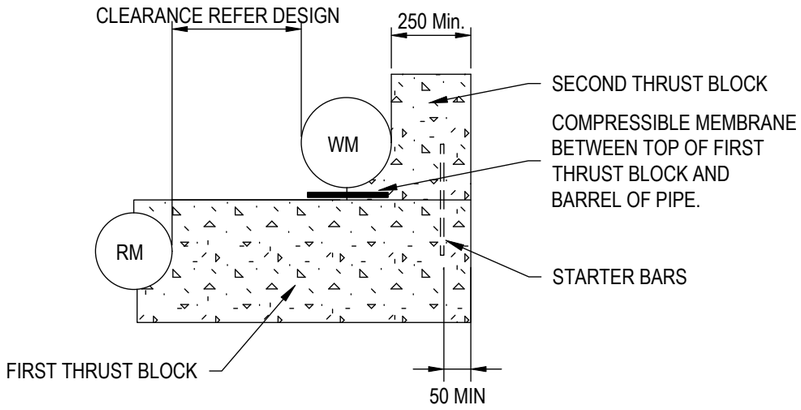
STANDARD DRAWING

3 WAY COMBI VALVE THRUST ANCHORAGE

COUNCIL PLAN No.
T-550-23

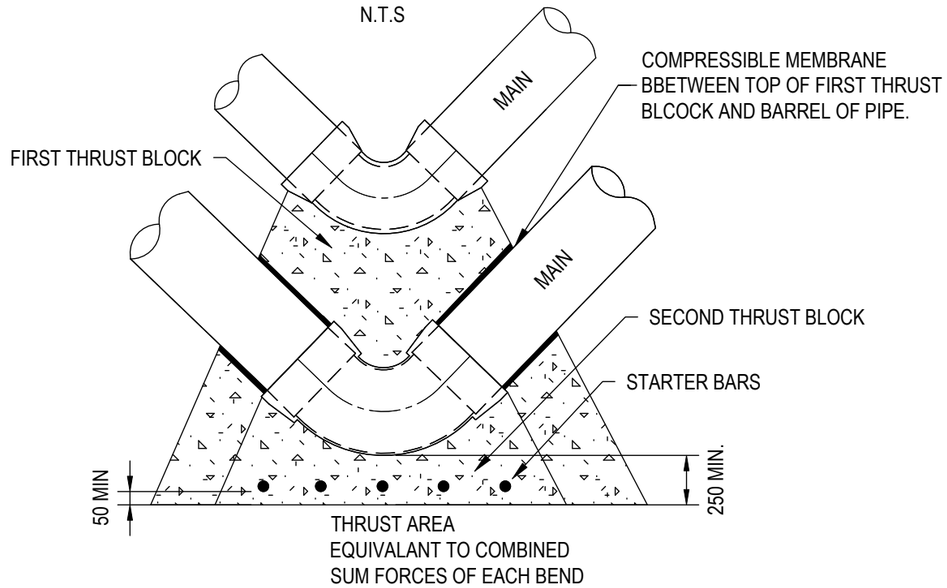
Orig. Size A3

Revision 1



ELEVATION

N.T.S

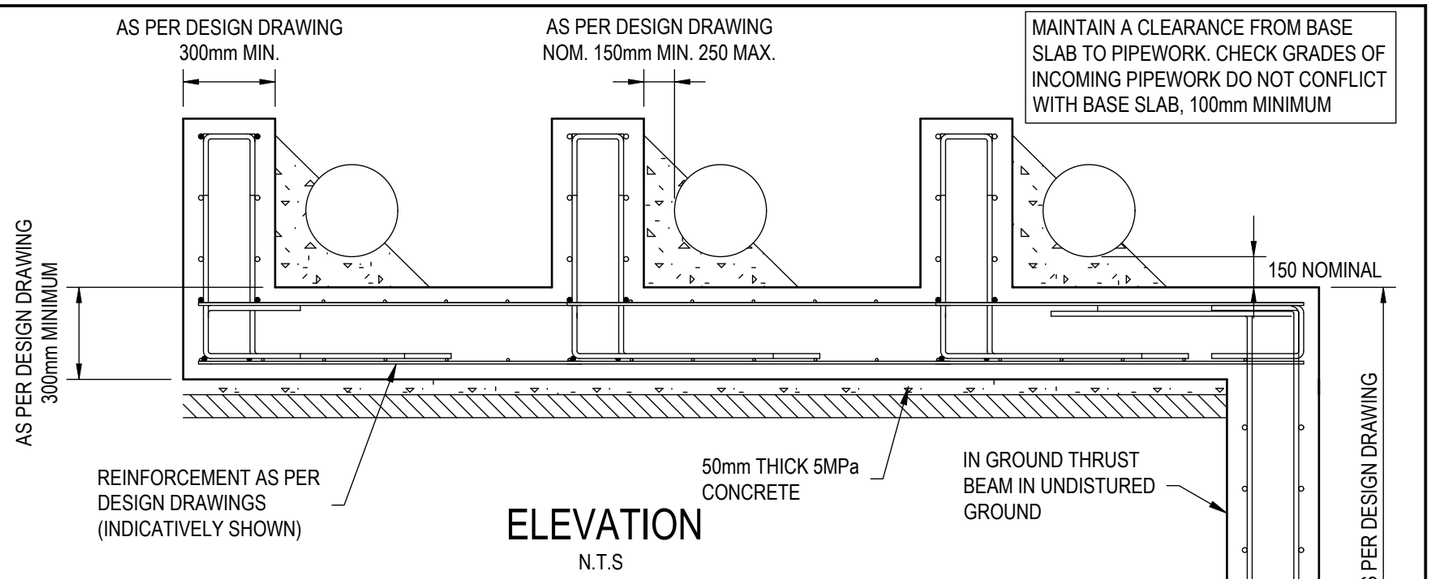


PLAN

N.T.S

TYPICAL GENERAL ARRANGEMENT CONCRETE THRUST BLOCKS
FOR ADJACENT DUAL MAINS WITH VARIED INVERT LEVEL

FOR INFORMATION ONLY
NOT FOR CONSTRUCTION



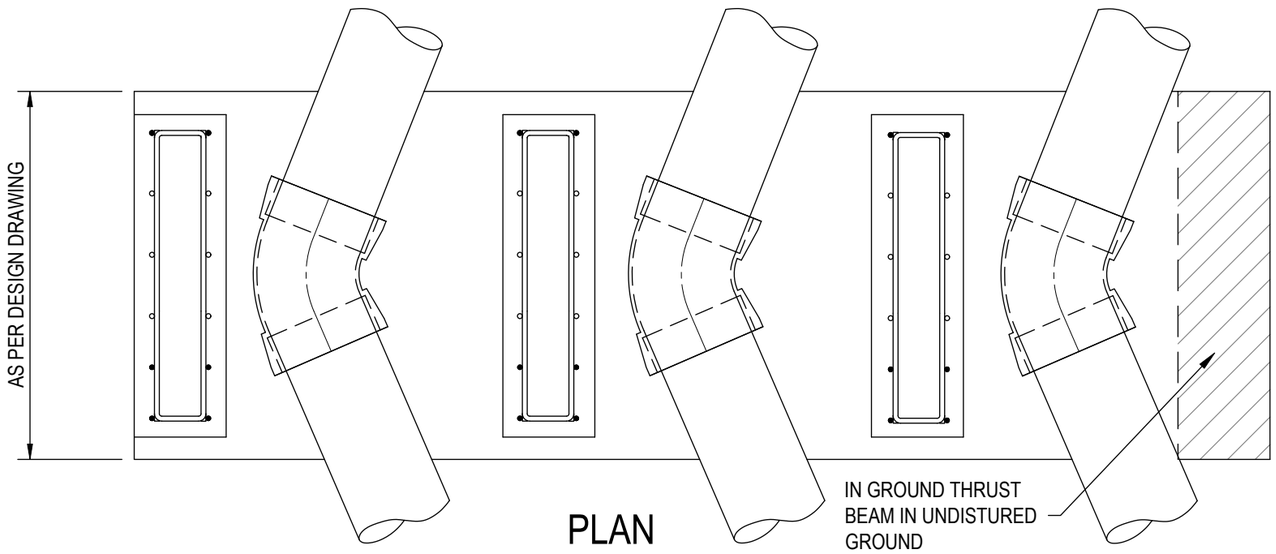
ELEVATION

N.T.S

TYPICAL GENERAL ARRANGEMENT - CONCRETE THRUST BLOCKS
FOR ADJACENT MULTIPLE MAINS AT SAME PIPE INVERT

NOTE:

1. AREA OF THRUST BLOCKS AT MULTIPLE BENDS OR FITTINGS ARE TO EQUAL THE SUM OF THE BEARING AREAS GIVEN FOR EACH BEND OR FITTING.
2. CONCRETE THRUST BLOCKS TO BE CURED FOR MINIMUM 7 DAYS BEFORE BEING SUBJECTED TO ANY THRUST LOAD UNLESS OTHERWISE DIRECTED BY THE SUPERINTENDENT.
3. REINFORCEMENT AS PER DESIGN PLAN.
4. POUR CONCRETE AGAINST A SOLID EXCAVATED FACE.
5. GRADE CONCRETE AS PER DESIGN DRAWINGS. KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS.
6. MINIMUM HORIZONTAL CLEARANCE BETWEEN MAINS IN ACCORDANCE WITH WSA03 - 2011-3.1 TABLE 5.5. UNLESS OTHERWISE SPECIFIED IN DESIGN DRAWINGS



PLAN

N.T.S

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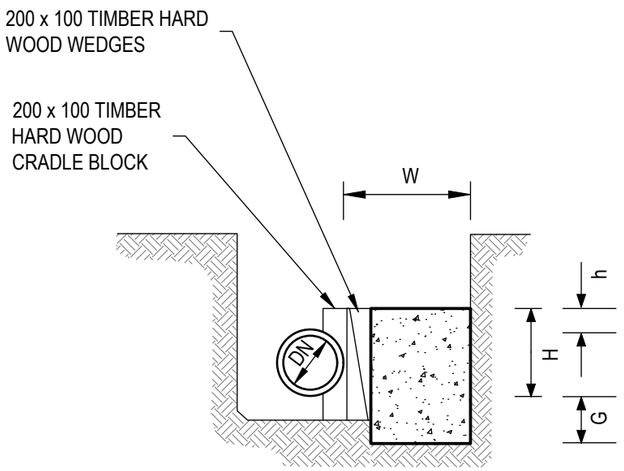
STANDARD DRAWING

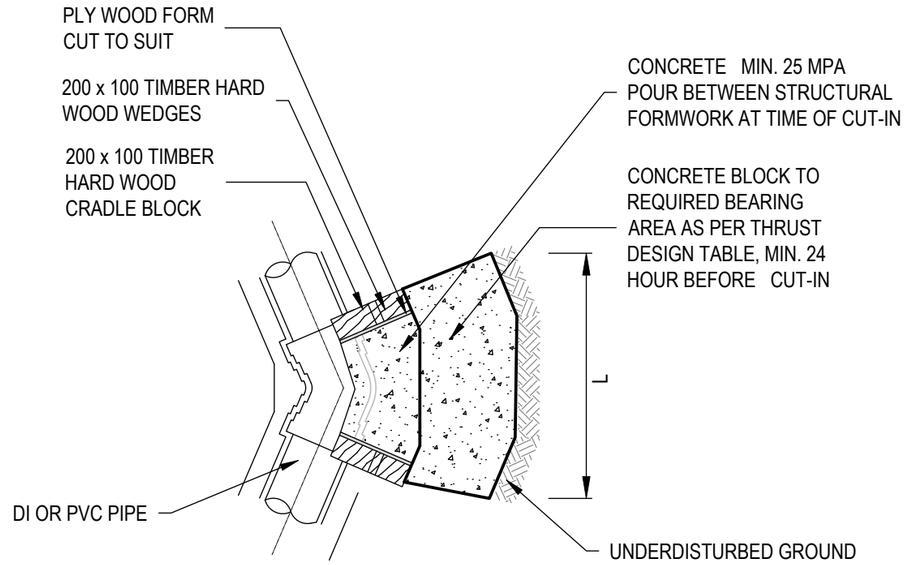
GENERAL ARRANGEMENT
CONCRETE THRUST BLOCKS FOR MULTIPLE MAINS

COUNCIL PLAN No.
T-550-24

Orig. Size	Revision
A3	1



ELEVATION



PLAN

THRUST BLOCK FOR BENDS
CONSTRUCTION OPTION FOR CUT-IN TO LIVE MAIN

(FOR HORIZONTAL THRUST)

CONSTRUCTION METHODOLOGY
FOR CUT-INS INTO LIVE NETWORKS WITH SHORT ISOLATION PERIODS

1. PRE-CONSTRUCT THRUST BLOCK OFFSET TO EXISTING WATER MAIN
   1.1 BLOCK IS TO BE SIZED AS PER THRUST BLOCK BEARING TABLE.
   1.2 ALLOW MIN. 24HRS CURING TIME BEFORE UNDERTAKING CUT-IN.

2. CUT-IN FITTING AS PER DESIGN DETAIL.

3. INSTALL TIMBER HARDWOOD CRADLE BLOCK AND TIMBER HARDWOOD WEDGES TO SECURELY BRACE BETWEEN PRE-FORMED CONCRETE BLOCK AND NEW FITTING.

4. INSTALL PLYWOOD OR PECA FORM, FORMWORK AS REQUIRED.

5. POUR 25MPa CONCRETE INTO STRUCTURAL FORMWORK, VIBRATE TO REMOVE VOIDS.

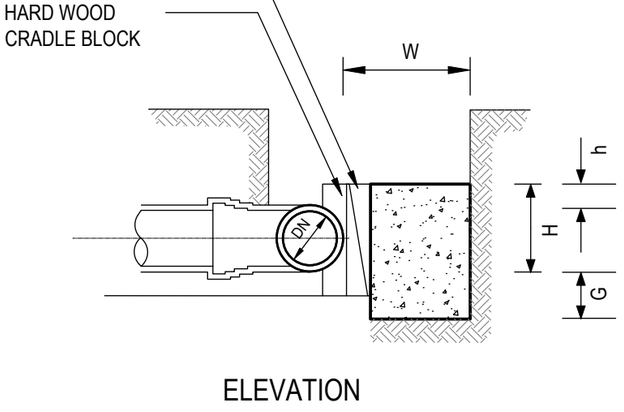
6. BACKFILL TO F.G.L PRIOR TO COMMISSIONING WATER MAIN.

7. WHERE THE "G" IS GREATER THAN 150mm, SL82 MESH IS TO BE INSTALLED AS PER WSAA CODE.

LEGEND:

HEIGHT(H) = PIPE O.D. + (h)
LENGTH (L) = AREA / (H + G)
(G) ** = DEPTH BELOW PIPE
Max. LENGTH (L) = HEIGHT (H) X 3
(h) = Max. HEIGHT ABOVE TOP OF PIPE
m² = BEARING AREA AGAINST UNDISTURBED GROUND

NOTE ** : WHERE (G) IS GREATER THAN 150mm, SL82 REINFORCEMENT IS REQUIRED IN THRUST BLOCK



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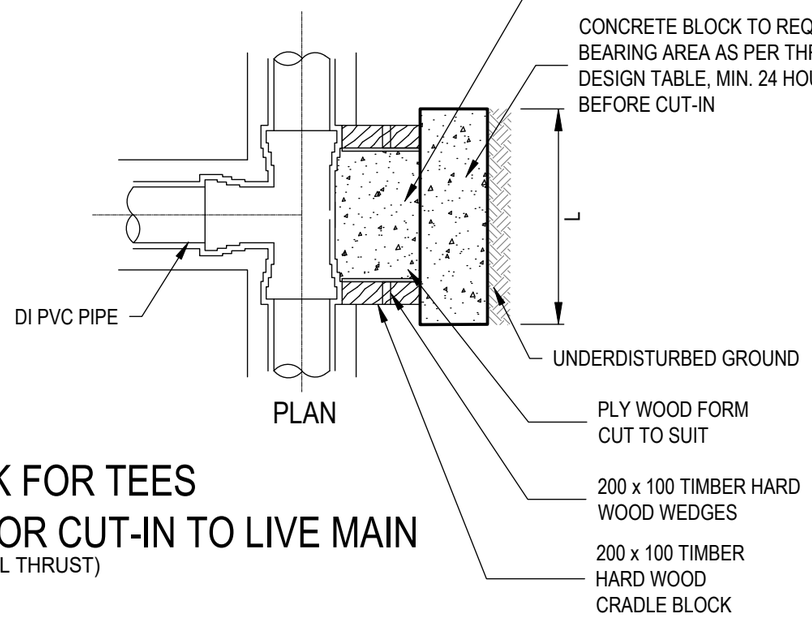

PLAN

THRUST BLOCK FOR TEES
CONSTRUCTION METHOD FOR CUT-IN TO LIVE MAIN

(FOR HORIZONTAL THRUST)

Drawn	B.P.S					
Checked	C.B					
Approved	D.S.					
Date	DEC 2024	1	ISSUED FOR USE	B.P.S	D.S.	12/2024
Issue	FIRST ISSUE	Rev.	Amendments	Drawn	Apprd.	Date

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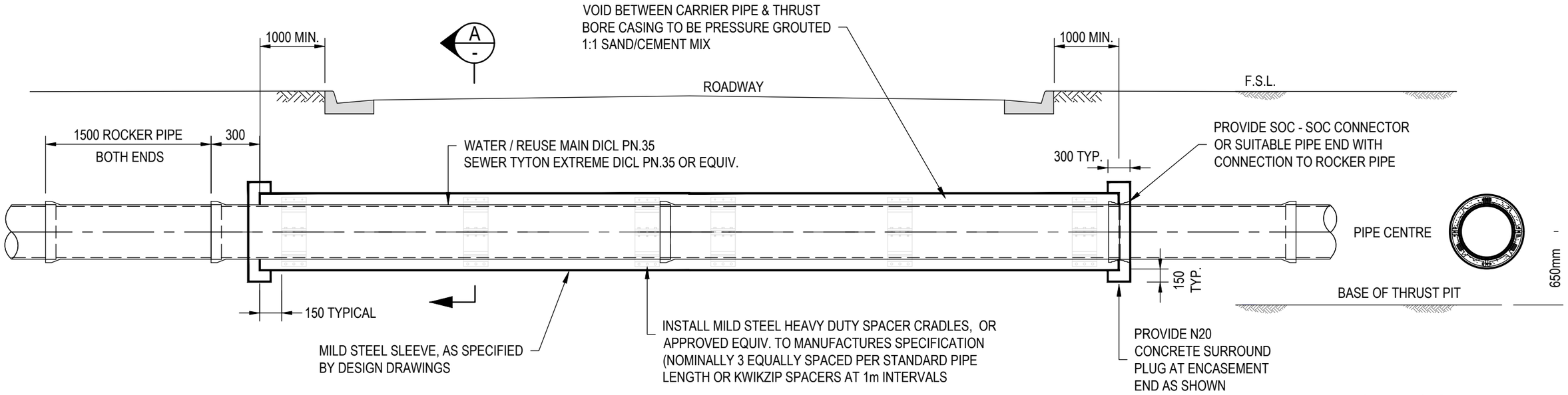
STANDARD DRAWING

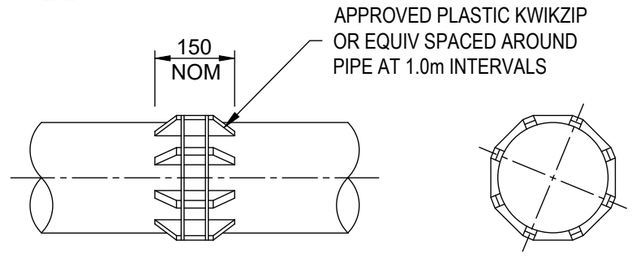
CONSTRUCTION METHOD FOR CUT-IN TO LIVE MAIN

COUNCIL PLAN No.
T-550-25

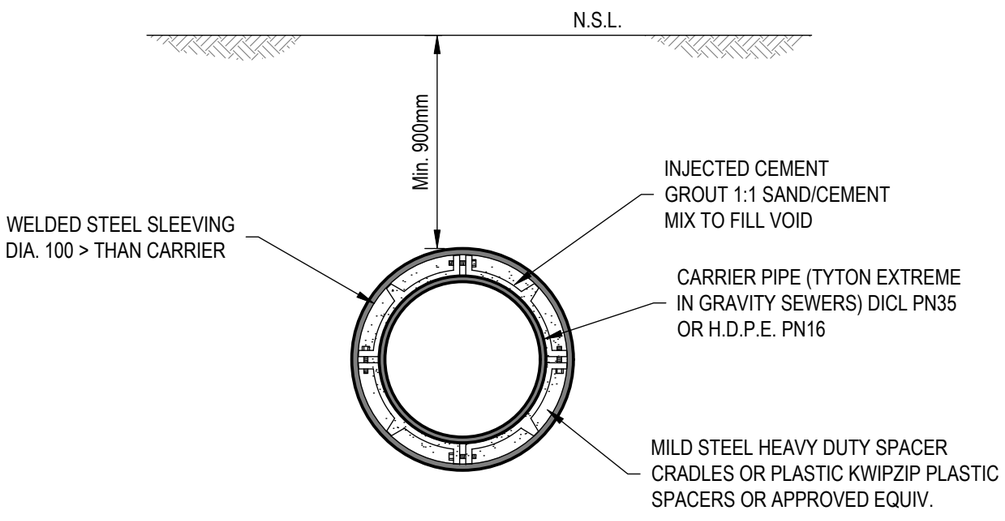
Orig. Size	Revision
A3	1



TYPICAL THRUST BORE DETAIL UNDER ROADWAY (WHERE SPECIFIED)



WATERMAIN PLASTIC SUPPORTS DETAIL



TYPICAL UNDERBORE DETAIL

SECTION A -

NOMINAL DIAMETER OF ENCASING PIPE DETAILS

CARRIER MAIN DN	100	150	200	250	300	375	450	500	600
NOM. ENCASING PIPE DIAMETER MIN 5mm THICK MILD STEEL	250	375	375	450	525	600	700	750	900

NOTE: ENCASING PIPE DIA.& THICKNESS SUBJECT TO UNDERBORE CONTRACTOR & DETAIL DESIGN

NOTES:

1. PLANS SHOWS TYPICAL M.S STEEL THRUST BORE FOR DICL CARRIER PIPE.
2. ENCASING PIPE IS TO BE MILD STEEL WITH THICKNESS SPECIFIED IN DESIGN DRAWINGS (MINIMUM 5mm WALL THICKNESS).
3. VOIDS SHALL BE FILLED WITH GROUT AS SPECIFIED IN THE DRAWINGS. THE MINIMUM CLEARANCE BETWEEN THE SOCKET OF THE WATERMAIN AND THE ENCASING PIPE SHALL BE 25mm TO ALLOW FOR GROUTING.
4. DIRECTIONAL BORING TO INSTALL HDPE PIPE IS ALSO ACCEPTABLE

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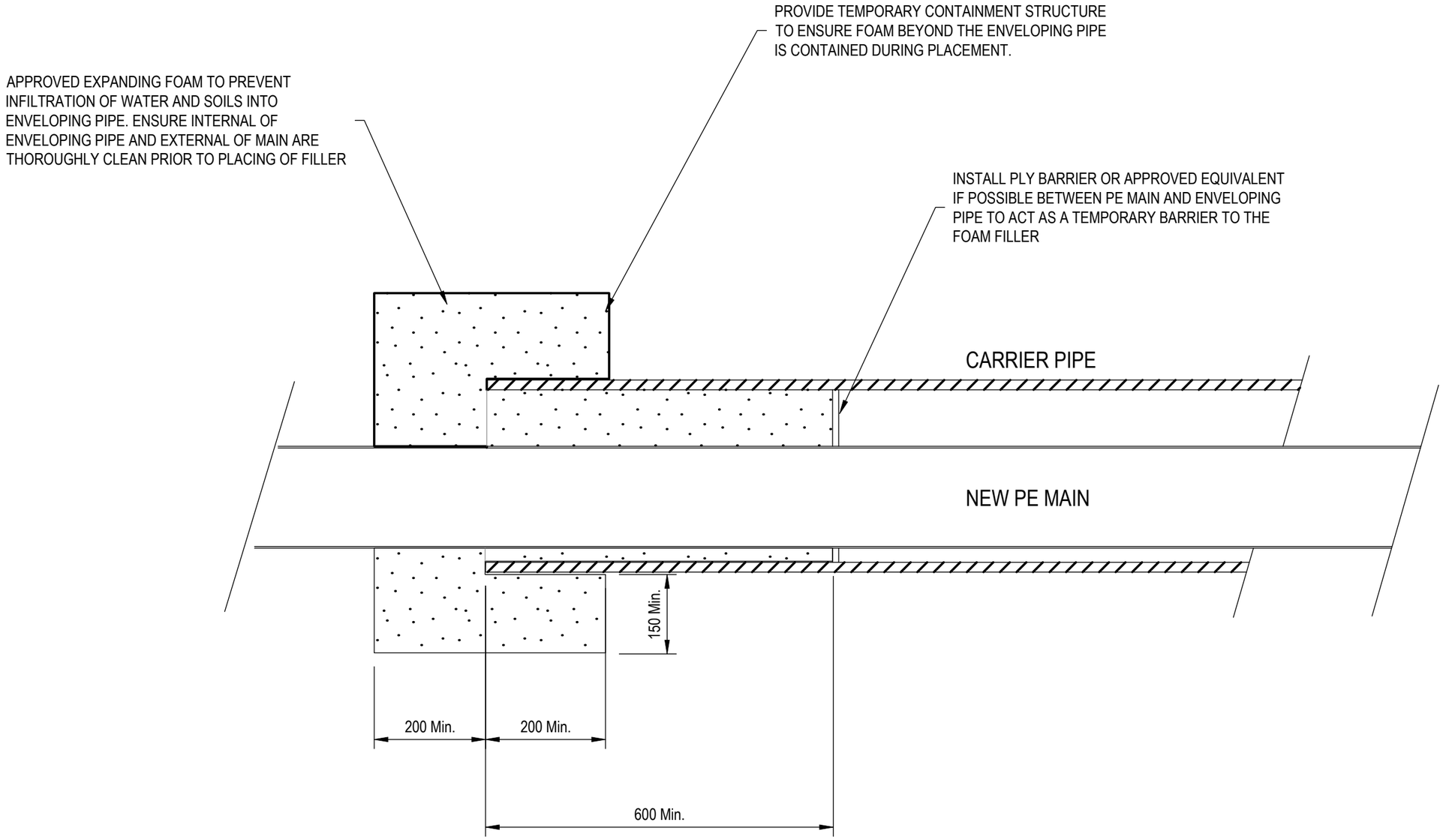
STANDARD DRAWING

TRENCHLESS METHOD - TYPICAL CASE BORE

COUNCIL PLAN No. T-550-30

Orig. Size A3

Revision 1



FOAM FILLER AT END OF CARRIER PIPE

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STANDARD DRAWING

HDPE MAIN INSIDE CARRIER PIPE UNDERBORE
FOAM FILLER END TREATMENT

COUNCIL PLAN No.
T-550-31

Orig. Size	Revision
A3	1