

FIGURE 205C-A : PLAN VIEW- CANTILEVER RESTRAINT FOR TEE

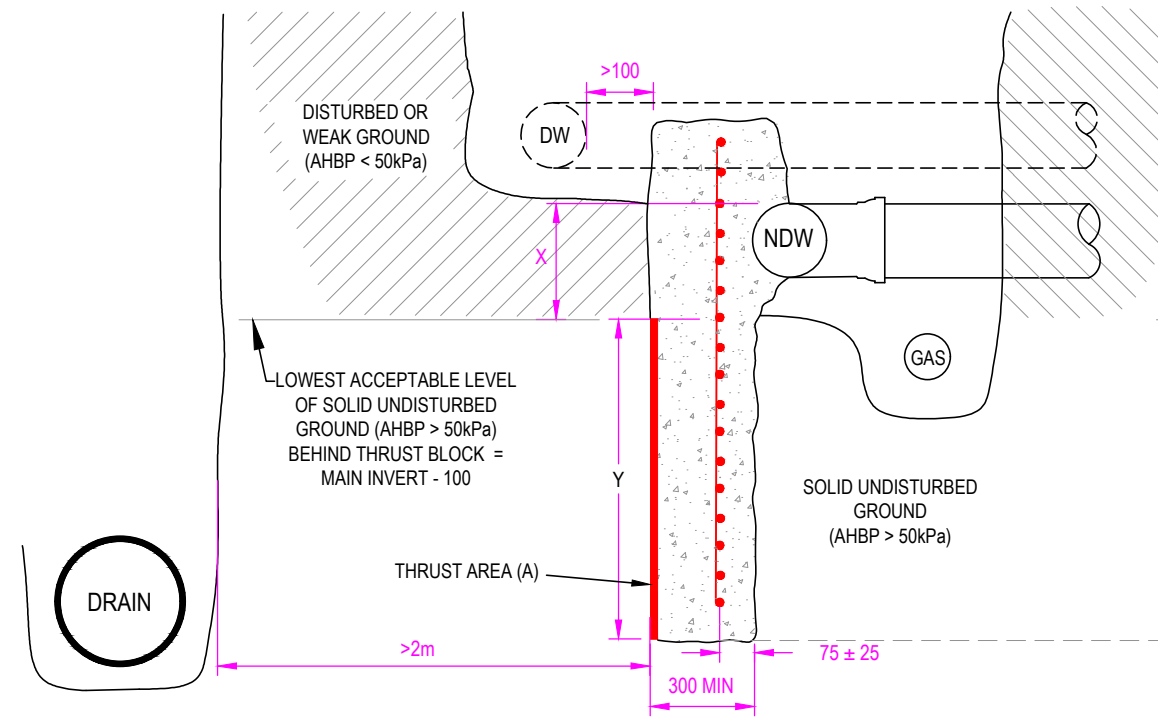


FIGURE 205C-B: SECTION VIEW-CANTILEVER RESTRAINT FOR TEE

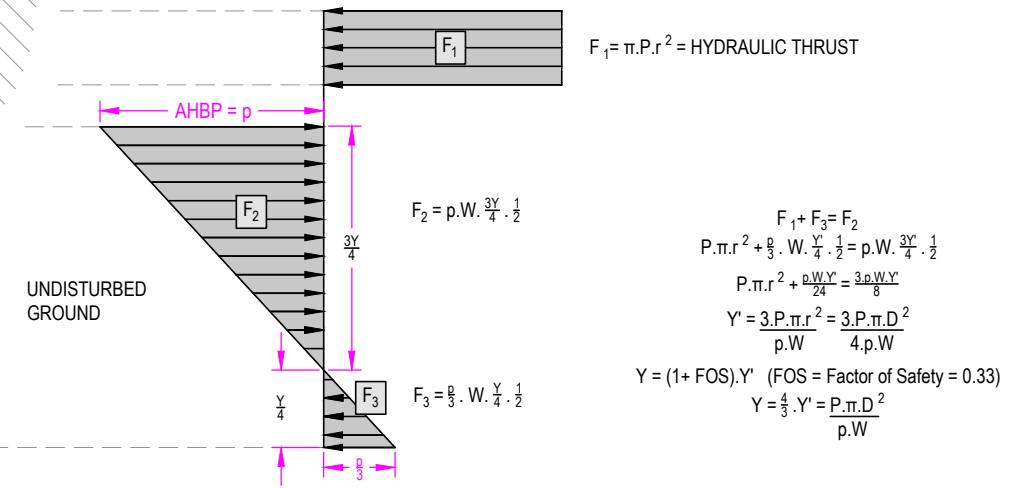


FIGURE 205C-C: STRESS DIAGRAM- CANTILEVER RESTRAINTS FOR TEES & VALVES

TABLE 205C-A: IN LINE RESTRAINT STEEL REINFORCEMENT SELECTION (DUAL MAINS)

THRUST RESTRAINT AREA	MESH REQUIREMENTS
0.3m ²	1 Layer of SL81
0.31m ² to 1.5m ²	1 Layer of RL1018 or 2 layers of SL81
1.51m ² to 3.0 m ²	2 layers of SL81
>3.0m ²	2 layers of RL1018

NOTES on Steel Reinforcing:

- Anchor reinforcement is to consist of mesh as per Table 205B-A and N10 grade bar (as per AS/NZS 4671).
- Steel reinforcement shall have 75 clear cover of concrete (± 25).
- Where there are 2 layers of reinforcement, maintain min 150 separation between layers.
- Cut reinforcement or tie in additional bars to ensure reinforcement is located within 50±25 of pipe OD at all intersections of reinforcement and pipe.
- When using RL (rectangular mesh) in longitudinal anchors, the main wire (thicker & closer spaced wire) shall span the trench.

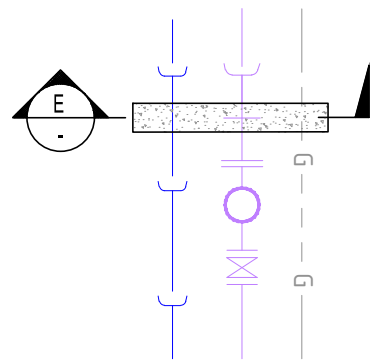


FIGURE 205C-D: PLAN VIEW- CANTILEVER ANCHOR FOR VALVE

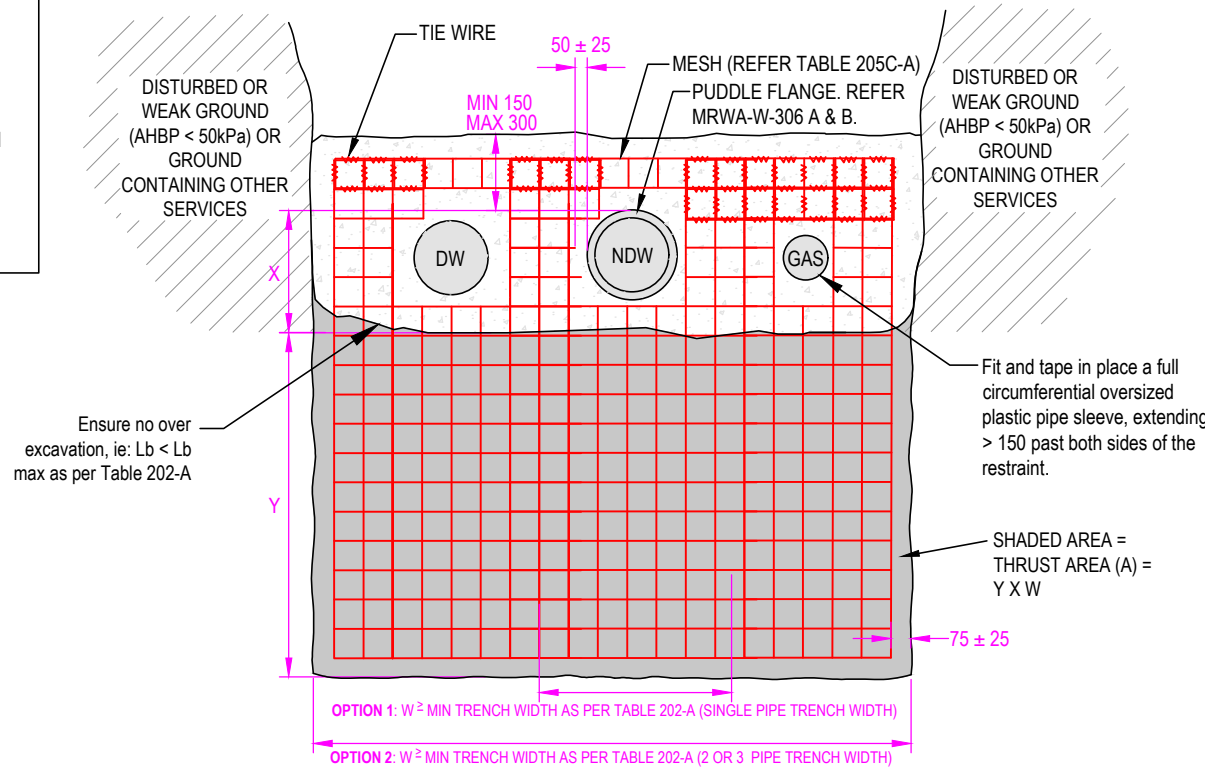


FIGURE 205C-E: SECTION VIEW- CANTILEVER RESTRAINT FOR VALVE(S)

Option 2 is required if restraining both water mains (DW and NDW).
 Either Option 1 or Option 2 is valid to restrain a single water main (either DW or NDW), although Option 1 is preferred where it would be practical to construct (ie: Y < 2m).
 Restraints should either fully surround a neighboring pipe or maintain a minimum 100 clearance.

GENERAL NOTES:

- For mains ≤ DN300 only.
- Cantilevered thrust anchors are generally not suitable in solid rock where precise excavation is not possible.
- Cantilevered thrust anchors are sometimes used when:
 - The ground to the side of the trench is weak (AHBP < 50 Kpa) while the ground underneath is sufficiently strong.
 - The area around the main is cramped with other services and a plain block would interfere with these services.
- Over excavation of the trench is not permitted behind cantilevered thrust anchors.
- $Y = \frac{P \cdot \pi \cdot D^2}{p \cdot W}$ (if single main), or $Y = \frac{P \cdot \pi \cdot (D1 + D2)^2}{p \cdot W}$ (if both DW & NDW mains)
 Where P = pipe test pressure (kPa), D = pipe inside diameter (m),
 p = max horizontal bearing pressure of the ground (kPa),
 W = block width (m)
- The thrust area achieved by Y x W must be greater than that shown as being required in MRWA-W-204.
- Y must be > 2X.
- Cast the thrust area of all thrust blocks against a clean face of undisturbed natural soil of AHBP > 50 kPa.
- When pouring concrete against fittings place a membrane of polyethylene, PVC or felt between the fitting and concrete to prevent damage to the fitting.
- Joints, bolts and nuts to be clear of concrete.
- Use grade N20 concrete.
- All concrete blocks must be formed at the sides using timber or sand bags (other than the thrust area).
- All cantilevered concrete thrust blocks must be steel reinforced.
- Steel reinforcement shall be as per Table 205C-A and accompanying notes.

KEY REFERENCES:

- Soil classifications used on this drawing are explained in MRWA-W-200.
- Refer to MRWA-W-104 for options should ground AHBP be insufficient.
- Refer to MRWA-W-201 & 202 for trench, embedment and backfill details.
- Refer to MRWA-W-204 for thrust area requirements.
- Refer to MRWA-W-306 for puddle flange details.

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MELBOURNE RETAIL WATER AGENCIES

MRWA WATER SUPPLY STANDARDS

VERTICALLY CANTILEVERED THRUST RESTRAINTS

NOT TO SCALE

MRWA-W-205C

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