

FIGURE 205B-A: PLAN VIEW. TEE CROSSING WITH DOGLEG BENDS & INLINE RESTRAINT

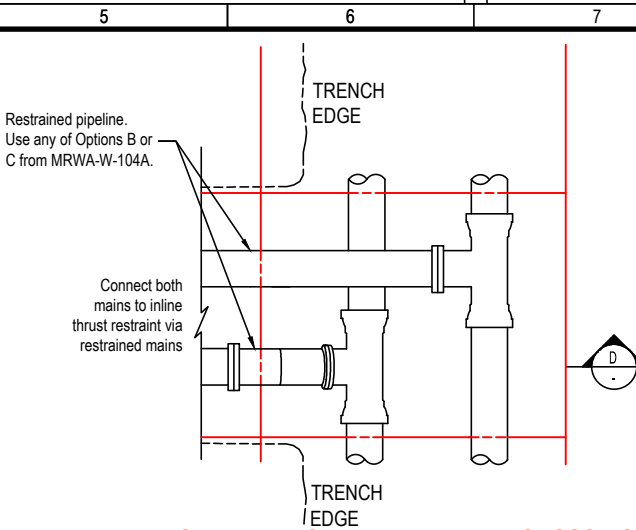


FIGURE 205B-C: PLAN VIEW. TEE CROSSING WITH HOST MAINS AT DIFFERENT DEPTHS

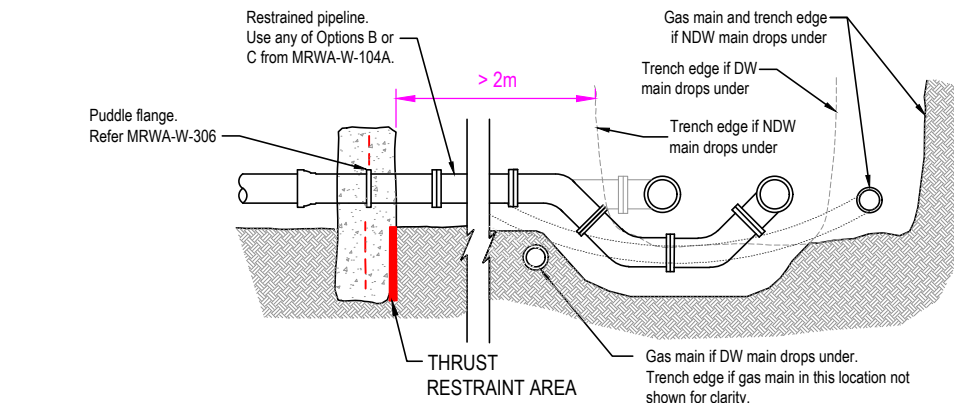


FIGURE 205B-B: SECTION VIEW. TEE CROSSING WITH DOGLEG BENDS & INLINE RESTRAINT

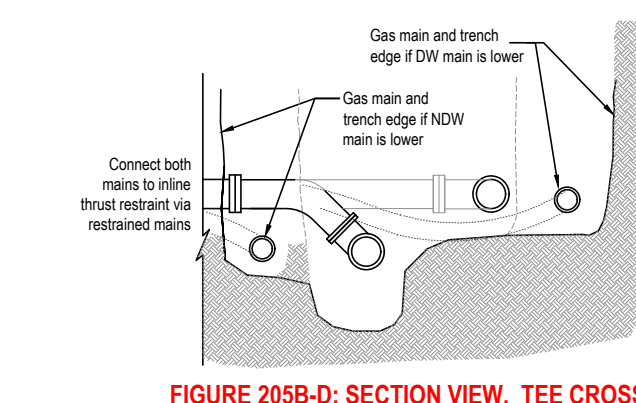


FIGURE 205B-D: SECTION VIEW. TEE CROSSING WITH HOST MAINS AT DIFFERENT DEPTHS

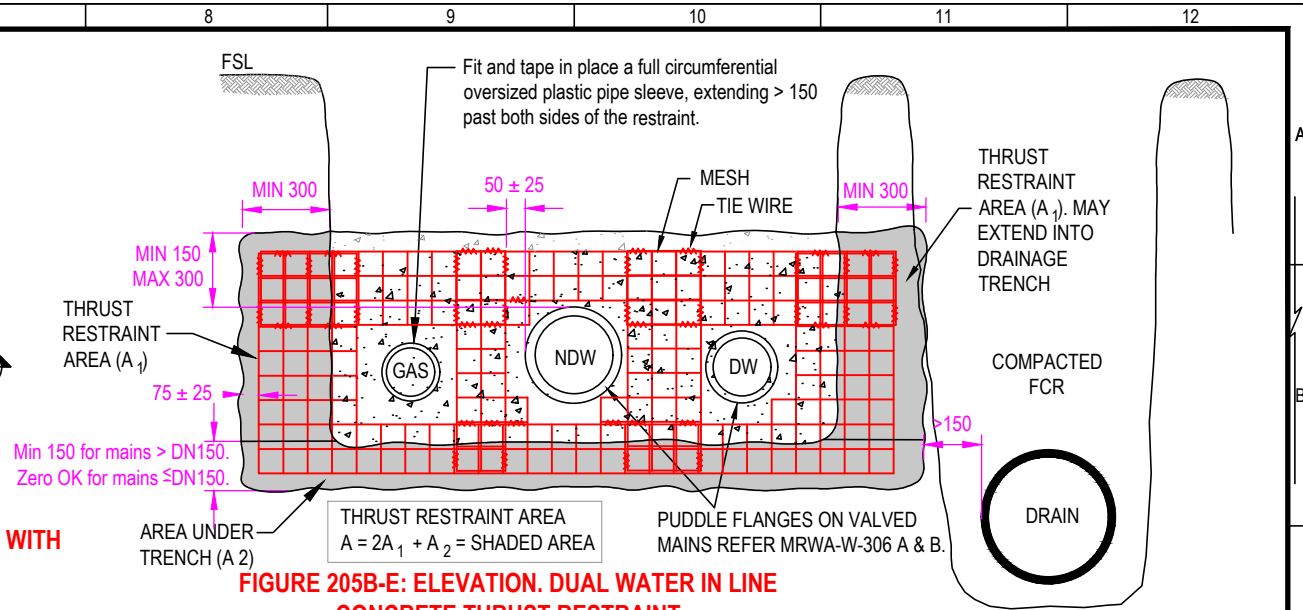


FIGURE 205B-E: ELEVATION. DUAL WATER IN LINE CONCRETE THRUST RESTRAINT

TABLE 205B-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:

- In line thrust restraint 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 restraints, the main wire (thicker & closer spaced wire) shall span the trench.

NOTES Regarding Plain Restraints:

- Plain thrust restraints shall have a minimum of 2m of solid undisturbed ground behind the bearing area.
- For plain restraints, maximum encasement around pipe to be 180°.
- All dual main plain concrete restraints must be steel reinforced with SL81 mesh.
- Minimum cover of all mains shall be met when mains are at differing depths.
- For information on Vertical Deflection of mains, refer to MRWA-104B & 212.
- Higher main (whether DW or NDW) shall be the one closest to the bearing surface.

NOTES Regarding Inline Thrust Restraints:

- Any restrained pipework can be used between the thrust restraint and the Tee (ie: any of Options B or C from MRWA-W-104A). If PE is used, a restraint is not required at the 'Tee' end (If CWW or YVW). If PE is used, the in line restraint shall take into account shrinkage forces (Refer Figure-205A-L).
- In line thrust restraints shall have a minimum of 2m of solid undisturbed ground or compacted crushed rock around the bearing area on both sides of the restraint.
- For Reducers, it is acceptable to place an in line concrete restraint behind the pipe socket instead of around a puddle flange.
- The outer tee may be restrained with a plain restraint instead of an in line restraint.

Key References:

- Refer to MRWA-W-200 for soil classifications details.
- Refer to MRWA-W-201 & 202 for trench, embedment and backfill details.
- Refer to MRWA-W-202 for horizontal and vertical clearances between mains.
- Refer to MRWA-W-204 for thrust area requirements.
- Refer to MRWA-W-104B for details on dual water opposing bend & tee arrangements.
- Refer MRWA-W-306A & B for puddle flange details.

GENERAL NOTES:

- Cast the thrust area of all thrust restraints against a clean face of a material with an AHBP > 50 kPa. Where soils have an AHBP < 50 kPa, restrained joints shall instead be used as per MRWA-W-207. Do not cast thrust restraints against loose sand or landfill.
- Thrust restraints shall not interfere with other services. Restraints maybe cast around sleeved gas services (as shown) where there is no reasonable alternative.
- Gas mains shall be deflected away from the concrete restraint where practicable and minimum cover can be maintained above the gas main.
- Use grade N20 concrete or better.
- All concrete restraints must be formed at the sides (ie: edges other than bearing surface) using temporary formwork or sand bags.
- 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.
- For dual water restraints, the required bearing area is to be the addition of the required area for each pipe (ie: assume both valves closed).
- Shared Trenches shall not exceed 3 pipelines or have any mains > DN250 without water agency approval.

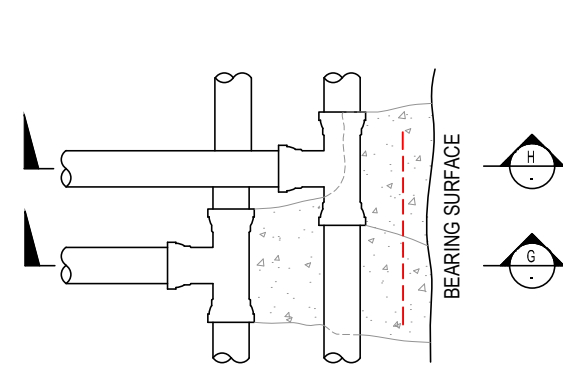


FIGURE 205B-F: PLAN VIEW. DUAL WATER TEE PLAIN THRUST RESTRAINT

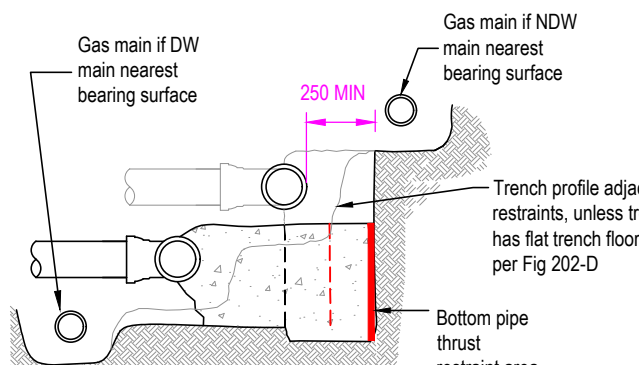


FIGURE 205B-G: SECTION VIEW. LOWER TEE PLAIN THRUST RESTRAINT

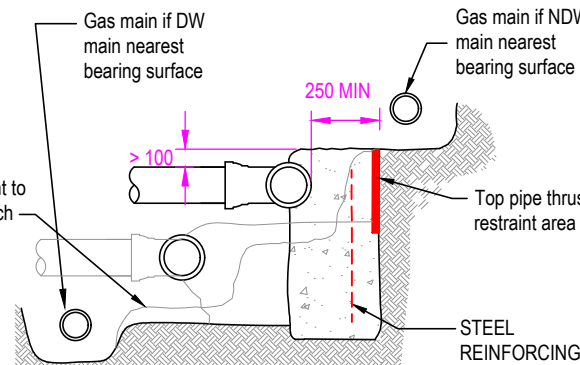


FIGURE 205B-H: SECTION VIEW. UPPER TEE PLAIN THRUST RESTRAINT

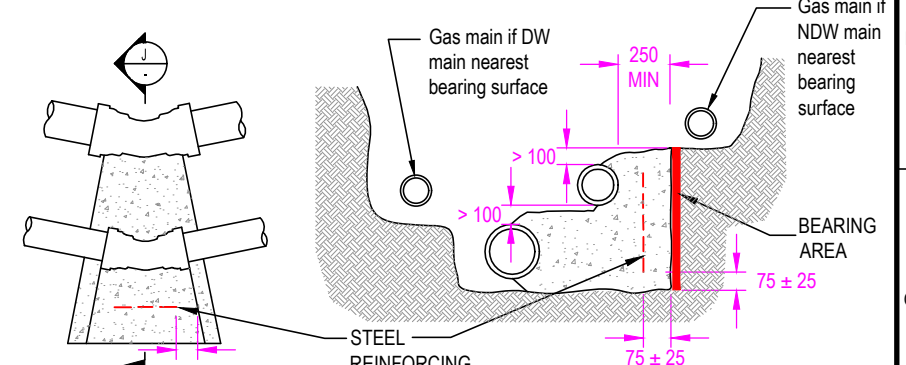


FIGURE 205B-I: PLAN VIEW. DUAL WATER PLAIN BEND RESTRAINT

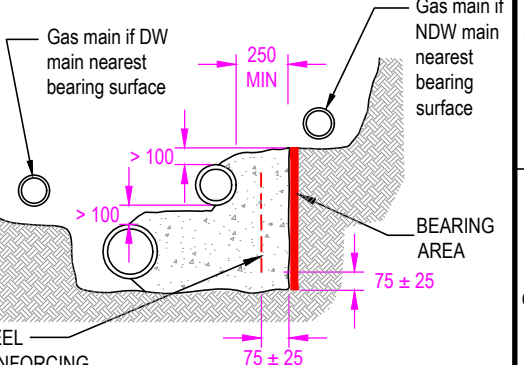


FIGURE 205B-J: SECTION VIEW. DUAL WATER PLAIN BEND RESTRAINT

REV	DESCRIPTION	DATE	APPROVED
3	ALTERED STEEL REINFORCEMENT	01/12/16	RJ / CP / JT
2	PUBLISHED FIRST ISSUE	23/03/12	R. JAGGER
1	PRE PUBLISHED DRAFT FOR COMMENT	12/07/11	R. JAGGER

DESIGNED	R. JAGGER	DATE	20/01/2011
DRAWN	R. JAGGER	DATE	20/01/2011
CHECKED	NAME	DATE	APPROVED
<input checked="" type="checkbox"/>	C. RIVETTE	23/03/12	<input checked="" type="checkbox"/> R.CARRUTHERS
<input checked="" type="checkbox"/>	C. PAXMAN	23/03/12	<input checked="" type="checkbox"/> G.REYNOLDS
<input checked="" type="checkbox"/>	K. DAWSON	23/03/12	<input checked="" type="checkbox"/> A. COSHAM

MELBOURNE RETAIL WATER AGENCIES

MRWA WATER SUPPLY STANDARDS

DUAL MAIN CONCRETE RESTRAINTS

NOT TO SCALE

MRWA-W-205B

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