

Document owner	Head of Asset Management
Document contact	Infrastructure Standards Engineer

1. Purpose¹

The purpose of this Technical Note is to set out the minimum criteria for plate design and installation. This does not relieve the designer of any responsibility for the design and installation of the required plates.

This Technical Note must be read in conjunction with and comply with the current versions of AS/NZS1170 – Structural Design Actions, and AS5100 Bridge design and AS 3996 Access covers and grates. This Guideline must also be read in conjunction with M209 –Clauses 2.3, 2.4, 2.6, 3.3 and 4.4, except for loadings.

Plates maybe constructed of steel, glass reinforced composite materials or approved similar materials.

A Registered Professional Engineer Queensland (RPEQ) must certify that the trench plates have been appropriately designed and installed for their required use.

Note: The use of trench plates must be discussed with Unitywater stakeholders, including Unitywater's three aligned local authorities (City of Moreton Bay, Sunshine Coast Council, Noosa Council) and the Department of Transport and Main Roads prior to installation.

2. Requirements

Designers must consider whether road plates are the most suitable option for the road opening and whether there are other alternatives. Where an excavated road opening is necessary, it is preferred that the proposed location and layout is minimised during construction to reduce impact on road users and public and private assets.

2.1 Safety in design risk assessment

The trench plate design and placement methodology must comply with *Work Health and Safety Act 2011* (Qld) and *Work Health and Safety Regulation 2011* (Qld). The Contractors must demonstrate that the placement and location of trench plates has been assessed during relevant Safety in Design workshops.

Trench plate design and installation must consider, but not be limited to the following:

All Plates must include the following information:

- trench width, plate clear span and plate length in span direction
- plate thickness and steel grade (for Steel plates)
- number, location and type of connection for each plate.

Each trench plate must be rectangular in plan. Plate joints must be located away from the wheel paths where feasible.

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Surface mounted or recessed Trench plates:

- recessed plates have stability advantages over surface mounted plates
- surface mounted plates may require edge profiling with cold mix in the direction of traffic to avoid bumps, especially by cyclists.

The length and breadth design of the plate's edge supports should minimise surcharge on the trench wall to safe limits or provide shoring in the trench against the lateral pressures.

2.2 Traffic loads

Maximum traffic loads that any trench plate will be subject to are shown in the table below.

Table 1: Trench plate maximum traffic loads

Location	Live Load
Minor Roads, parks, verges, footpaths, Business and industrial allotments	W80 wheel loads and A160 axle loads as per AS5100
Major Roads and State Controlled Roads	As per AS3996

Also consider the following:

- Live load deflection must not exceed 11 mm or plate clear span/150, whichever is less.
- Dynamic rebound from live loads, horizontal plate movement due to vehicle braking and acceleration forces, and impact loading on protruding edges or ramps.
- Plates must not lift off their bearing supports at any time. Ensure that plates remain anchored in their original location for the duration of the project.
- Provide uniform bearing support conditions under trench plates, along all supported sides, to prevent edge loading of the trench and the following requirements. Refer to the examples in Appendix A - Typical trench plate requirements in roadways.
- Trench plates must overlap the adjacent pavement by a minimum of 400 mm from the edge of the shored trench on each side.
- A 200 mm wide strip of bedding material must be provided under each supported side, with the edge of the strip at least 100 mm from the edge of the trench.

2.3 Traffic management considerations

Vehicular speed controls are required when trench plates are in use.

Wet weather impacts must be considered when designing trench plates.

Determine the proposed length of time that the trench plates will be required and prepare a management/monitoring plan that ensures that the plates will remain as safe and fit for purpose for the duration of their placement.

Trench plates must be placed parallel (and at 90°) to the direction of traffic where practicable.

Any trench plates that cross trafficable lanes at an angle to the traffic flow must be recessed.

For trench openings parallel to the direction of traffic, trench plates must extend past each end of the excavated trench greater than the zone of influence, i.e. a distance at least equal to the trench depth.

Plate placement must be such that any gap between adjoining plates does not exceed 5mm. Consider impacts on bicycle, scooter, skateboard, and pram traffic in all circumstances where relevant.

Trench plate design must consider the required skid resistance for each location as well as consideration for safe use by bicycles. Plates to be covered with skid resistant material with a minimum skid value of 55BPN (British Pendulum Number measured using the pendulum friction tester) for vehicle traffic. The minimum skid value must be 45BPN if the plates are accessed by pedestrians. The material must be securely fastened to the trench plate.

2.4 Anchor connections

Provide a minimum of four anchor connection points for each trench plate, one at each corner.

The maximum spacing between connections points must not exceed 2.0 m.

Plate holes must be pre-drilled at locations approved by the plate designer and must be a minimum of 100 mm from each edge. Holes must be recessed to allow installation of a recessed head or nut.

Consider the locations of the anchor connection points for lifting points for plate placement over trench.

Connections must be designed to resist all vertical and horizontal movement.

Design all connections to negate vandalism or theft.

The connection must include a thin compression pad to absorb shocks.

Anchors must not project above the plate, must be smooth and not be hazardous to any traffic.

2.5 Plate finished surface level

Plates must be designed to comply with the following finished surface level (FSL) and recess requirements. Refer to Appendix A - Typical trench plate requirements in roadways.

- Where it is not feasible to recess the plate the plate surface level must not be greater than 70 mm above the adjoining pavement level.
- Plates must not be recessed in concrete pavements.
- Plate cross fall must align with the adjacent pavement cross fall.
- Adjoining plates must have the same surface level.
- Long term plate installations must be recessed.
- All edges of plate recesses must be straight, stepped vertical and neatly trimmed (i.e. saw cut).

2.6 Bedding and ramps

A premium grade proprietary bituminous cold mix material must be used for bedding of trench plates, bituminous ramps or repair of trench plate fixing holes unless otherwise approved.

The bedding thickness material must comply with the following:

- Be uniform with an average thickness of between 10 mm and not more than 15 mm.
- There must be no contact between the plate and the edge of the trench under live loads.

3. Definitions

Table 2: Definitions, abbreviations and acronyms

Term	Meaning
BPN	British Pendulum Number
RPEQ	Registered Professional Engineer Queensland

4. References and resources

Table 3: References and resources

Source	Reference
External	Work Health and Safety Act 2011 (Qld)
	Work Health and Safety Regulation 2011 (Qld)
	AS/NZS 1170 Structural design actions
	AS 3996 Access covers and grates
	AS 5100 Bridge design
	Transport for NSW Specification M209 – Road Openings and Restoration (M209)
Internal	N/A

Appendix A: Typical trench plate requirements in roadways

