TRANSPORT FOR NSW (TfNSW)

QA SPECIFICATION TfNSW M209

ROAD OPENINGS AND RESTORATION

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REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 1/Rev 0		New Specification	GM, IC	20.05.08
Ed 2/Rev 0	All	General technical review, and revision of some technical requirements. Format revised.	GM, IAM	19.02.13
Ed 2/Rev 1	3.4.3, Annex M1.5	Referenced Documents updated.	MCQ	25.10.19
Ed 2/Rev 2	Global	References to “Roads and Maritime Services” or “RMS” changed to “Transport for NSW” or “TfNSW” respectively.	DCS	22.06.20
Ed 2/Rev 3	Annex M1.1, M.3	Reference to AS/NZS 4360 changed to AS ISO 31000.	SMCSp	16.08.21

GUIDE NOTES

(Not Part of Contract Document)

THESE NOTES ARE NOT PART OF THE SPECIFICATION, CONTRACT OR AGREEMENT.

The following notes are intended to provide guidance to TfNSW personnel on the application of the Specification. They do not form part of the Specification, Contract or Agreement.

USING TFNSW M209

TfNSW M209 has been developed mainly for use by third parties undertaking road opening work within an existing trafficked pavement on a State Road for the purpose of buried public utilities, services or drainage.

M209 may also be used for road opening work carried out by or for the TfNSW, with appropriate amendment to "third party" administrative provisions (e.g. "Proponent" becomes "TfNSW").

M209 must not be used for any excavation or pavement restoration work other than for road openings (e.g. concrete slab replacement, heavy patching or pavement reconstruction).

This specification should be read in conjunction with the issued ROAD OPENING APPROVAL and ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES) for the road opening.

OUTLINE OF M209

Format and Appropriate Use of M209

M209 is designed to be a stand alone specification with minimal cross-referencing to other TfNSW specifications. It assumes little knowledge of TfNSW requirements and documentation.

There is some cross-referencing to TfNSW materials specifications in Clause 3, where suppliers need to be (and are likely to be) familiar with TfNSW requirements. Such cross-referencing is avoided for construction requirements in Clause 4 Execution, where the relevant requirements have been selectively imported from relevant TfNSW specifications. Pavement restoration requirements are based on M250 *Heavy Patching (Flexible Pavement)* and M258 *Slab Replacement (Concrete Pavement)*, which are referenced only as guideline documents for "additional information".

Owing to the relatively high level of risk with road opening work, M209 has a significant content of a prescriptive nature to address the key risks.

For emergency work or time-critical work, some requirements in M209 may need to be simplified by the TfNSW, based on a site-specific risk assessment and expert advice. Any changes to the Specification requirements must be agreed with the TfNSW at the INITIAL SITE MEETING and PRECONSTRUCTION SITE MEETING.

Assumed Scenario for Road Opening Work in M209

Road opening work is typically carried out on urban roads under highly contained conditions (e.g. residential areas, high traffic and pedestrian flows, very tight clearances to traffic, lane closures necessary, close to buildings). It is necessary to obtain a ROAD OPENING APPROVAL and a ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES) for such work. Lane closures may be difficult to obtain and may be of relatively short duration. Night work is often necessary.

Further difficulties arise from:

- the layout of existing utilities within the road may be parallel or skew or dog-legged, particularly in older urban areas. These layouts are far from optimal to carry out the work efficiently, creating additional difficulties such as multi-lane closures and extensive concrete pavement restoration.

- uncertainty of excavation and pavement subgrade conditions, which is usually not evident until the existing pavement is completely removed.

- Strict time restrictions often apply for completion of pavement restoration construction activities, including curing of concrete (described as 'time-critical' work in M209).

M209 is designed for the above conditions and addresses the unique risks of road opening work (e.g. road safety requirements, safe lateral clearances from traffic, excavation zone of influence, separation from pedestrians, use of road plates and time-critical concrete pavement restoration.

Permanent pavement restoration (normally carried out by the TfNSW – see below) is a major component of the work. The pavement restoration may extend well beyond the trench excavation. Restoration of other assets may be significant (e.g. kerbs, accesses, damage to property).

Minimum Work Shift Duration for Concrete Pavement Restoration

To reasonably and effectively carry out concrete pavement restoration work to the minimum acceptable standard of quality and strength, it is considered that a minimum work shift duration of 10 hours continuous lane closure is necessary (including at least 6 hours of concrete curing with use of calcium chloride set accelerating admixtures), before traffic is reinstated (e.g. 7.30 pm to 5.30 am).

Use of road plates (where permitted) to cover immature concrete or an incomplete road opening between work shifts can reduce the necessary shift duration. However, this is expensive and installation and removal of road plates significantly reduces the time available for "productive" work.

CLAUSE 1 GENERAL

M209 and M208

TfNSW M209 is the main comprehensive TfNSW specification for road openings. However, for Low Risk road openings an abbreviated version TfNSW M208 can be used. M208 only contains the necessary technical requirements for excavation, backfill and temporary pavement restoration.

Responsibilities of Proponent and TfNSW and WARRANTY PERIOD

Clause 1.7 of M209 specifies an apportionment of responsibilities for restoration and maintenance work between the Proponent and the TfNSW. These responsibilities will be agreed at the INITIAL SITE MEETING and specified in Annexure A. Normally, critical activities such as permanent concrete pavement restoration will be carried out by the TfNSW at cost to the Proponent.

Owing to the risk of settlement of poorly compacted or restored road openings, or damage to the buried utility, M209 requires maintenance of the road opening restoration (by TfNSW, at Proponent's cost) during the WARRANTY PERIOD (refer Clauses 1, 2, and 5).

The cost recovery arrangements for work by the TfNSW (by deduction from the PERFORMANCE BOND) are explained in Clauses 1.8 and 4.11.

To ensure an integrated approach and awareness of the true scope, costs and risks entailed in road opening work, M209 covers all requirements, even where they are executed by the TfNSW. M209 is written on the assumption that the entire work is the responsibility of the Proponent. Where instead part of the work is undertaken by the TfNSW, the relevant specification requirements are deemed to apply to the TfNSW.

CLAUSE 2 PLANNING

TfNSW Management of Road Opening Applications

TfNSW Regions need to have the necessary arrangements in place to handle road opening work.

The process described in Clause 2.1, Table 1 and the flowchart at Figure GN.1 below show the general process for obtaining Approvals and Licences and the main preconstruction activities prior to commencing work on site. As noted in Clause 2.1.6, this process does not provide the details of the Region-specific or utility-specific arrangements. In these situations the process and flowchart would need to be amended accordingly.

The Proponent should submit maps and drawings showing the location of the road opening.

Risk Category

M209 uses a risk-based approach to road openings, which affects the level of TfNSW management and the technical requirements. Low/Medium/High Risk categories are specified.

Use Table 2 as the guideline on how to assess the Risk Category. The key issue is the need for shoring. Use Table 5 to determine the need for shoring, together with a site-specific risk assessment for shoring requirements.

Pre-Construction Activities by Proponent, including Designs

Where design is the Proponent's responsibility, the TfNSW will not carry out design reviews and will rely on the design certifications provided by the Proponent and the PERFORMANCE BOND to cover the TfNSW risk.

The onus is on the Proponent to:

(a) Ensure and certify that its works proposal and designs meet all relevant requirements. At the PRECONSTRUCTION SITE MEETING, the TfNSW will only clarify and confirm the design requirements, including the limits of concrete pavement restoration.

(b) Comply with all WHS, environmental and any other statutory requirements associated with the works, including necessary research and preparation of documentation. The TfNSW will not carry out reviews of the Proponent's documentation in this regard. However, for "critical" construction activities (as specified in Annexure A.2), the Proponent should provide details of work methods at the PRECONSTRUCTION SITE MEETING.

INITIAL SITE MEETING

This is the only site meeting for Low Risk road openings. The issues, outcomes and requirements agreed at the meeting should be well documented by the TfNSW for future reference.

PRE-CONSTRUCTION SITE MEETING

A separate PRE-CONSTRUCTION SITE MEETING is only required for Medium or High Risk road openings, to confirm details after all designs, plans, and risk assessments have been completed.

Completing Annexure A

In its Approval and Licence Applications, the Proponent should propose particulars of the Work based on the requirements of M209.

After considering these Applications and after the INITIAL SITE MEETING, Annexure A should be completed by the TfNSW Regional Asset Management Section, based on the information provided by the Proponent and the details agreed and confirmed at the INITIAL SITE MEETING. This includes the confirmed Risk Category.

Table GN1 is provided for TfNSW personnel completing Annexure A.

Table GN1 – Guidelines for completing Annexure A

Clause reference(s)	Description	Requirements
1.7, 5.7 to 5.11	WARRANTY PERIOD	Usually 6 months, or 12 months where permanent restoration is the Proponent's responsibility.
2.2.5	PUBLIC LIABILITY INSURANCE	Generally $20 million for any one occurrence. If another amount is chosen, then ensure that the DEED OF INDEMNITY is consistent.
2.2.6 and Annexure L	DEED OF INDEMNITY	Always required, unless the Proponent holds: ▪ an existing Memorandum of Understanding (MOU) with TfNSW; or ▪ an existing DEED OF INDEMNITY with the TfNSW for related development work that covers the road opening work.
2.2.7, 5.9 to 5.11	PERFORMANCE BOND	Always required, unless the Proponent holds: ▪ an existing Memorandum of Understanding [MOU] with TfNSW; or ▪ an existing PERFORMANCE BOND with the TfNSW for related development work that covers the road opening work. Amount: Generally, not less than the estimated value of permanent pavement restoration. Where a TfNSW prequalified civil contractor is engaged, the value of the PERFORMANCE BOND should be reduced by 50%.
2.2.10	Advance notice to surrounding premises	Required: Generally required for work adjacent to business premises, residential premises and for night work, or any work extending past 8.00 pm. Details: Indicate form of notification (e.g. advertisement, letter box drops). Generally, the notice must be provided at least 5 BUSINESS DAYS prior to proposed commencement of Work.
5.11	FINAL INSPECTION and return of PERFORMANCE BOND	TfNSW contact person. This is usually the TfNSW Nominated Representative. Include contact details if someone else.

Road Safety and Stage Construction Requirements

Clause 2.4 integrates the traffic management considerations and worker safety requirements for the Work Area, to allow the road opening work to be staged in daily shifts and to reduce risks.

Road opening work is often critical, including emergency situations and restoring essential services. Such work cannot be avoided due to greater community risk. Furthermore, the older services that generate much road opening work are typically sub-optimally located under very busy roads.

The traffic and pedestrian control requirements in Table 3 are the minimum requirements that must apply to make such onerous work achievable with an adequate level of safety. These requirements are based on the TfNSW Traffic Control at Work Sites (TCWS) Manual, on the assumption of 'Short Term' work. To satisfy this 'Short Term' assumption the work must be completed in accordance with Clause 2.4.

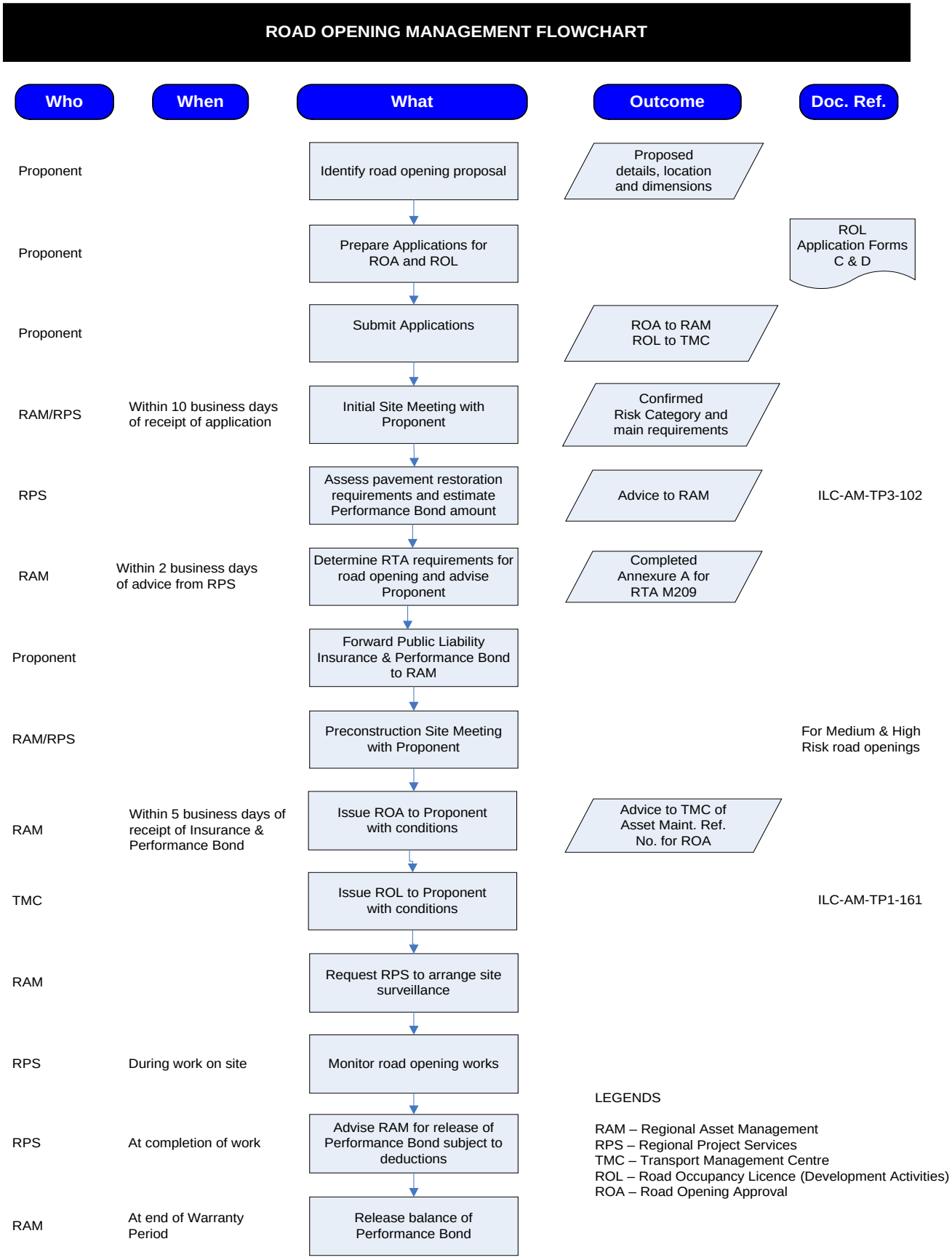

Figure GN1 - Flowchart for TfNSW management of road openings by external organisations.

NOTE: This process may vary for Region-specific arrangements, MOU work or development-related road openings.

Excavation, Shoring and Zone of Influence Issues

An explanation of the concept of zone of influence is provided in the definition in Annexure M.

Figure 1 and Figure 2 show diagrammatically the zones of influence and safe clearances for the unsupported and supported trench conditions. They take into account the "effective zone of influence allowing for pavement" that is incorporated into Table 5 (i.e. different pavement categories).

Temporary Pavement Restoration

The requirements for temporary pavement restoration (as defined in Annexure M) must be agreed with the TfNSW at the INITIAL SITE MEETING. Some of the temporary pavement restoration may form part of the permanent pavement restoration. Site-specific issues (e.g. compatibility with adjoining pavement) and the capabilities of the Proponent should be taken into account when specifying the temporary and permanent pavement restoration.

The use of freshly mixed sand cement material up to the level of the temporary wearing surface is mandated for Low Risk and time-critical road openings, due to its ease and reliability of compaction. This minimises the need for rework at the time of the permanent pavement restoration.

Design of Pavement Restoration

Where pavement restoration is the Proponent's responsibility, the Proponent is responsible for the pavement restoration design. This design is to be based on the standard details provided in Figure E.1 Figure E.1to Figure E.4 (in Annexure E), annotated to suit all site-specific needs and TfNSW requirements (e.g. tiebar spacing, slab layout to suit limits of restoration), as advised at the INITIAL SITE MEETING.

The concrete pavement concept designs shown in Figure E.2 to Figure E.4 are based on Plain Concrete Pavement (PCP). Figure E.5 shows the typical details for concrete pavement (e.g. joints).

Backfill Materials Used as a Protective Layer Around Utilities or Services (Clause 3.4.1)

This clause applies to special materials that are used as a protective layer around buried utilities or services which are specified by the utility or service owner. An example of such material is Thermally Stable Backfill (TSB) material that is used as a protective layer around electricity services. TSB is similar to a lean-mix concrete type of material comprising 10 mm coarse aggregate, fine aggregate, cement, and fly ash, with a slump of about 110 mm and 28 day compressive strength of about 4 MPa to 7 MPa.

The Proponent is required to provide details of any special protective layer material to TfNSW before it is used in the work.

Limits of Concrete Pavement Restoration

The TfNSW is responsible for determining the limits of the concrete pavement restoration to suit the proposed road opening. These limits must be confirmed at the PRECONSTRUCTION SITE MEETING, in conjunction with the location and layout of the road opening. Note that the limits of concrete pavement restoration are normally greater than the limits of the road opening excavation.

The limits of concrete pavement restoration should meet **all** of the following requirements (NOTE: These are general principles and the site-specific constraints may require modified requirements):

.1 Located a minimum of 200 mm outside the limits of the road opening excavation.

.2 Minimum slab replacement width of 1.0 m longitudinally (i.e. parallel to road centreline).

.3 Perimeter comprised of straight line segments, that are either parallel to or at right angles to existing longitudinal joints.

.4 Longitudinally (i.e. parallel to road centreline), to coincide with the existing longitudinal joint on each side (i.e. restoration must extend the full width of each slab).

.5 Transversely (i.e. at right angles to road centreline), at new tied construction joints within existing slabs, located:

- At right angles to existing longitudinal joints.
- Not closer than 1.5 m to an existing transverse contraction joint.
- Where the limits of the trench excavation are at any point closer than 1.5 m to an existing transverse contraction joint, within the adjoining slab at 1.5 m beyond the transverse joint. In this case, install a new contraction joint at the location of the existing transverse contraction joint (refer Figure E.3).

ROAD PLATES

M209 introduces new detailed TfNSW requirements for road plates. This includes increased plate thicknesses compared to the current industry practice, improved fixings and bearing support and many other requirements that will lift the current industry standards in terms of safety and reliability. In particular, increased plate thicknesses should reduce the problems experienced with road plates (e.g. excessive deflections, rebound, noise, differential deflections at joints and movement out of position).

Mandatory skid resistance requirements for the trafficked surface of the road plates are specified in Clause 3.3.3, being either a coating in accordance with the TfNSW 3368, or an alternative treatment that provides an equivalent skid resistance.

A key issue is the resistance of road plates to horizontal slip due to sudden braking forces from heavy vehicle wheel loads on the plate (e.g. at intersection). M209 specifies a combination of strategies to provide such resistance, including bituminous ramps, recessing, fixings to the pavement and frictional bedding material under the supported plate edges. Recessing of plates and bituminous ramps formed with compacted hot mix asphalt (that has good cohesion) are both considered effective to resist braking loads. Pavement fixings generally appear to have limited capacity to resist braking loads, however they are necessary to prevent plate uplifts and horizontal movements (due to rebound).

However, in short term installations with no plate recessing (the most common situation), the ramps are formed with cold mix material that cannot resist braking loads (due to its low cohesion). In these cases, it appears that resistance to braking loads depends on the friction between the plate and the underlying pavement. Limited shear box testing on premium grade pre-packaged proprietary bituminous cold mixes (that are specified in M209) indicates that these products are frictional materials (internal friction angle in order of 35 to 50 degrees). High internal friction angle has better frictional performance, and may correlate with lower compacted voids content. This limited testing is indicative only of the likely performance of the road plates under idealised and assumed conditions. It is recommended that TfNSW personnel monitor and provide feedback on the performance of road plates.

CONCRETE PAVEMENT RESTORATION

The requirements for concrete slab replacement in M209 have been developed specifically for limited slab replacements as part of road opening work (based on maintenance specifications TfNSW M250 and TfNSW 3201). They should not be used for general concrete pavement reconstruction or maintenance.

In M209, it is assumed that work will be conducted under a lane closure and must be reopened to traffic promptly, often within 12 hours. The limited time for work has been considered in developing the M209 requirements, based on a compromise between speed of operations and quality of work.

The requirements for concrete used in slab replacement in M209 are largely based on TfNSW 3201 *Concrete Supply for Maintenance*.

The concrete material requirements are specified in Clause 3.6. Concrete must be one of the mix designs specified in Annexure F, providing a minimum design compressive strength of 20 MPa (at 24 hours) and 40 MPa (at 28 days).

In addition, for time-critical work, M209 makes specific provision for use of a high early strength mix, using calcium chloride ($CaCl_2$) set accelerating admixtures, to achieve a design compressive strength of 5 MPa at 6 hours. Three mix designs are capable of this, either:

- the SP40H Special Class (pavement) mix as per TfNSW 3201 (up to 0.8% $CaCl_2$) or
- the SP40HC Special Class (pavement) mix as per TfNSW 3201 (up to 2.0% $CaCl_2$) or
- the Sydney Region 40 MPa (nightwork) mix based on the SP40HC mix in TfNSW 3201 (1.35 to 1.55% $CaCl_2$).

The assumed application for use of these high early strength mixes is lane closures not exceeding 12 hours (where the time to reopen is critical), hand placement of concrete, and provision of transverse and longitudinal contraction joints as per Figure E.2 to Figure E.4 of Annexure E.

Further guidance on the high early strength SP40H and SP40HC mixes and the use of calcium chloride set accelerating admixtures is provided in TfNSW 3201 Guide Notes.

$CaCl_2$ accelerates both the setting rate (aluminate reaction) and the strength gain (silicate reaction). It greatly accelerates the corrosion of steel tiebars, reinforcement and dowels. It is critical to correctly calculate the dosage rate. Guidelines on dosage are provided in TfNSW 3201 Guide Notes under the heading “Calculation of $CaCl_2$ dose rate”.

Mixes containing doses of $CaCl_2$ greater than 0.8% accelerate the corrosion of tiebars and reinforcement, and must not be used with steel fibres.

Clause 4.10 sets out the requirements for executing concrete pavement restoration work.

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ROAD OPENINGS AND RESTORATION

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VERSION FOR:
DATE:

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FOREWORD

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REVISIONS TO PREVIOUS VERSION

This document has been revised from TfNSW M209 Edition 2 Revision 2.

All TfNSW revisions to the previous version (other than minor editorial and project specific changes) are indicated by a vertical line in the margin as shown here, except when it is a new edition and the text has been extensively rewritten.

PROJECT SPECIFIC CHANGES

Any project specific changes have been indicated in the following manner:

(a) Text which is additional to the base document and which is included in the Specification is shown in bold italics e.g. ***Additional Text***.

(b) Text which has been deleted from the base document and which is not included in the Specification is shown struck out e.g. ~~Deleted Text~~.

CLAUSE REFERENCE FORMAT

References internal to this Specification (Examples)	References external to this Specification (Examples)
■ Clause 3.2 (typical clause reference)	■ M745 Clause 3.2 (corresponding external reference) ■ TfNSW 3021 Clause 3.2
■ Annexure B (typical Annexure reference)	■ M745 Annexure B (ditto)
■ Annexure B.3 (the third section within Annexure B)	■ M745 Annexure B.3 (ditto)
■ Table 1 (the first Table within Specification)	■ M745 Table 1 (ditto)
■ Figure 4 (the fourth Figure within Specification)	■ M745 Figure 4 (ditto)
■ Table E.1 (the first Table within Annexure E)	■ M745 Figure E.1 (ditto)
	■ TfNSW M745 / TfNSW G10 (entire specification)

QA SPECIFICATION TFNSW M209

ROAD OPENINGS AND RESTORATION

1 GENERAL

Scope

1.1 The Work to be executed under this Specification involves the excavation, backfill and restoration of road openings located within, or adjacent to, an existing trafficked pavement that are for the purpose of buried public utilities, services, or drainage.

Road opening work includes:

.1 Maintenance of the excavation (including any shoring, road plates, barriers and signs) during the works.

.2 Maintenance of the temporary pavement restoration (or permanent restoration if carried out by the Proponent) during the WARRANTY PERIOD.

.3 Repair and restore any assets, property or environmental features damaged or affected by the road opening work.

The TfNSW will undertake certain parts of the Work at cost to the Proponent such as maintenance (refer Clause 1.7).

This Specification does NOT include large area excavation within pavements for purposes such as concrete slab replacement, heavy patching or pavement reconstruction.

Details of Work

1.2 Details of the Work and any additional TfNSW requirements associated with the road opening are described in Annexure A.

The extent of the pavement restoration required will be determined by the TfNSW and may extend beyond the limits of the excavation.

No cost to the TfNSW

1.3 Except as provided in Clause 1.7, all work including restoration will be at Your (i.e. the Proponent's) cost and at no cost to the TfNSW.

Comply with approval conditions

1.4 This Specification must be read in conjunction with the following approvals issued for the Work:

.1 ROAD OPENING APPROVAL.

.2 ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES)

Key requirements for work

1.5 All work must be carried out in accordance with the:

.1 Risk Category confirmed by the TfNSW (refer Clause 2.3).

.2 Road safety and stage construction requirements for road openings (refer Clause 2.4).

.3 Relevant layout and structural designs for the road opening (refer Clauses 2.5 and 2.6).

1.6	Where the Risk Category is confirmed as Low Risk (refer Clause 2.3), You may use Specification TfNSW M208 *Road Openings and Restoration (Low Risk)* as an alternative to this Specification. TfNSW M208 provides simplified requirements.	**Simplified requirements for Low Risk road openings**

1.7 Responsibilities for restoration and maintenance work must be as agreed with the TfNSW at the INITIAL SITE MEETING. **Responsibilities for restoration and maintenance work**

Unless otherwise agreed and specified in Annexure A.2:

.1 Backfilling and temporary pavement restoration will be undertaken by the Proponent.

.2 Maintenance of the temporary pavement restoration up to time of permanent restoration will be undertaken by the TfNSW at the Proponent's cost.

.3 Permanent pavement restoration will be undertaken by the TfNSW at the Proponent's cost.

.4 Reinstatement of damaged or disturbed traffic signals, traffic facilities or pavement delineation will be undertaken by the TfNSW at the Proponent's cost.

.5 Maintenance of the permanent pavement restoration during the WARRANTY PERIOD will be undertaken by the TfNSW at no cost to the Proponent, unless maintenance work results from defects in the Work carried out by the Proponent (e.g. settlement of backfill).

.6 Reinstatement and restoration of property or other public or private assets that are disturbed or damaged by the Work will be undertaken by the Proponent (refer Clause 4.11).

Where the permanent pavement restoration is undertaken by the Proponent, maintenance of the permanent pavement restoration during the WARRANTY PERIOD will be undertaken by the TfNSW at cost to the Proponent.

Where work is undertaken by the Proponent, the TfNSW will provide surveillance as it deems necessary at the Proponent's cost.

1.8 Where work or surveillance is undertaken by the TfNSW at the Proponent's cost, the amount due will be invoiced by the TfNSW and the TfNSW must receive full payment prior to authorising release of the PERFORMANCE BOND (refer Clause 5). **Cost recovery by TfNSW**

1.9 This Specification is written on the basis that the entire work is the responsibility of the Proponent, notwithstanding the responsibilities mentioned in Clause 1.7. **Work undertaken by TfNSW**

Where Clause 1.7 specifies part of the Work to be undertaken by the TfNSW (e.g. permanent pavement restoration), the relevant specification requirements are deemed to apply to the TfNSW.

1.10 Use the NSW SOC Guide to Codes and Practices for Streets Opening (SOC Guide) as a general reference for road opening work that involves buried utilities or services. Where there is an inconsistency (e.g. required cover depth), the requirements in this Specification take precedence.

SOC Guide for road opening work

1.11 All excavation and shoring work must comply with:

- WorkCover NSW Excavation Code of Practice.
- All other relevant statutory requirements.
- TfNSW Traffic Control at Worksites Manual.

Risk Management for excavation and shoring

1.12 Use the TfNSW Asset Maintenance Reference Number quoted on the issued ROAD OPENING APPROVAL in all relevant correspondence.

Correspondence with TfNSW

1.13 Provide the Identified Records (refer TfNSW Q) summarised in Annexure C.2.

Records

1.14 The standards, specifications and test methods referred to by this Specification are referenced using an abbreviated form (eg AS 1478). The titles are given in Annexure M.

Referenced documents

1.15 Some words and phrases have special meanings in this Specification. In some cases, the defined meaning is different from the meaning that the word or phrase might have in ordinary usage. In order to understand this Specification, You need to take these special meanings into account.

Defined terms have the special meanings set out in Annexure M. All defined terms are indicated by using small capitals (e.g. DEFINED TERM) unless they are one of the following basic terms, which appear too often for small capitals to be used:

- You
- Specification
- Proponent
- Work

Defined terms

1.16 Some technical words and abbreviations used in this Specification are also defined in Annexure M.

Definitions and abbreviations

1.17 Unless otherwise specified, the issue of an Australian Standard or TfNSW Test Method to be used is the issue current on the date that the ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES) is issued. The TfNSW specification to be used is the issue contained in the project documentation.

Applicable issue

1.18 You (the Proponent) are responsible for all activities, actions, works and supply of materials, unless Clause 1.7 specifies otherwise. Accordingly, this Specification does not generally use wording such as "You must …" because this is the underlying requirement. However, it is used where actions in a clause involve both the Proponent and the TfNSW and the roles need to be unambiguous.

Interpretation

2 PLANNING

2.1 APPLICATIONS FOR ROAD OPENING APPROVAL / ROAD OCCUPANCY LICENCE

Submit Application for ROAD OPENING APPROVAL

2.1.1 Except in the case of a GENUINE EMERGENCY (as defined in Annexure M.3), You must obtain, fill out and submit the following information to the TfNSW Regional Asset Management Section at least 20 BUSINESS DAYS (or 10 BUSINESS DAYS for Low Risk road openings) prior to the intended date of commencement of site work:

.1 Application for a ROAD OPENING APPROVAL:

- Road Occupancy Licence Checklist - Form C.
- Road Occupancy Licence Application (Development Activities) - Form D.
- Both Forms C and D to be completed except for the TfNSW Asset Maintenance Reference Number.

.2 Proposed details of road opening (refer Annexure A.1), including a sketch of the proposed layout, consistent with details provided in the completed Forms C and D.

.3 Details of PUBLIC LIABILITY INSURANCE, PERFORMANCE BOND, DEED OF INDEMNITY (where specified in Annexure A.2), consistent with requirements of Clause 2.2:

- The TfNSW will specify details in Annexure A.2 based on Items (1) and (2) of the Applications submitted above.

Concurrent submission of Application for ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES)

2.1.2 Except in the case of a GENUINE EMERGENCY (as defined in Annexure M.3), You must submit to the TfNSW Transport Management Centre an Application for ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES), being a copy of the completed Forms C and D (i.e. the same as submitted for the ROAD OPENING APPROVAL), at least 20 BUSINESS DAYS (or 10 BUSINESS DAYS for Low Risk road openings) prior to the intended date of commencement of site work.

This must include a TRAFFIC MANAGEMENT PLAN (TMP) that is submitted with the Application for ROAD OPENING APPROVAL.

Contact and submission details

2.1.3 Refer to Table 1 for details of where to obtain the Application Forms and where to submit each Application.

Provide all necessary details of work

2.1.4 Each Application must provide all necessary details of the proposed work. Details include the proposed scope, location, layout, LATERAL CLEARANCES, trench dimensions, stage construction and timings for the road opening and any proposed use of road plates.

Details must be based on Your preliminary planning for the work, to the stage of a developed proposal (not detailed design). The level of detail must be appropriate for the proposed Risk Category.

2.1.5 For Medium and High Risk road openings, You must provide Your justification for the proposed road opening and demonstrate that: **Provide justification for road opening**

.1 Suitable alternatives to an excavated road opening (e.g. using trenchless technology or existing ducts) have been investigated and found to be not feasible or cost-effective.

.2 Where an excavated road opening is necessary, its proposed length will be the minimum feasible and its proposed location and layout will minimise the work duration and the impact on road users and public and private assets.

Table 1 - TfNSW Contacts for Submission of Approval and Licence Applications

Detail	ROAD OPENING APPROVAL	ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES)	
Source	Submit the same completed Form C and Form D as submitted for the ROAD OCCUPANCY LICENCE	http://www.rms.nsw.gov.au/publicationsstatisticsforms/downloads/forms_roadoccupancy_dl1.html [Form C] http://www.rms.nsw.gov.au/publicationsstatisticsforms/downloads/forms_roadoccupancy_dl1.html [Form D] http://www.rms.nsw.gov.au/publicationsstatisticsforms/downloads/forms_roadoccupancy_dl1.html [Form R] Note: There are also Explanatory Notes available for each of these Forms.	
	All Regions	TfNSW Sydney Region	Other TfNSW Regions
Submit to	TfNSW Regional Asset Management Section	By facsimile to TfNSW Transport Management Centre (TMC)	By facsimile to TfNSW Regional Traffic Operations Unit
Contact Person	Regional Asset Manager	Manager, Planned Incident Unit	Regional Traffic Operations Manager
Address	Local TfNSW Regional Office (refer to following link and choose relevant Office): http://www.rms.nsw.gov.au/contactus/administration.html	TfNSW Transport Management Centre (TMC)	As for ROAD OPENING APPROVAL
Tel. No	Local TfNSW Regional Office (refer above link)	02 8396 1512	
Fax No.	Local TfNSW Regional Office (refer above link)	02 8396 1530	

2.1.6 The procedures or contacts in Clause 2.1 and Table 1 may vary for: **Variations to Application procedures**

.1 Region-specific arrangements (outside Sydney Region); or

.2 Road opening work by utility authorities that hold an existing Memorandum of Understanding (MOU) with the TfNSW; or

.3 Road opening work that is related to a development work covered by a separate agreement with the TfNSW.

2.1.7 The TfNSW will advise the name and telephone number of the TfNSW Nominated Representative upon receipt of the Applications.

TfNSW Nominated Representative to organise INITIAL SITE MEETING

The TfNSW Nominated Representative will organise and advise the time and place of the INITIAL SITE MEETING, to occur within 10 BUSINESS DAYS of receipt of the Applications (refer Clause 2.1.9).

2.1.8 The TfNSW will make every endeavour to issue the Approval and Licence within 20 BUSINESS DAYS (or 10 BUSINESS DAYS for Low Risk road openings) but does not guarantee their issue. Each will contain the TfNSW Asset Maintenance Reference Number for the Work.

Issue of the Approval and Licence

The ROAD OPENING APPROVAL will not be issued until after the PRECONSTRUCTION SITE MEETING and will be in the form of a letter of approval (usually sent by facsimile).

The ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES) will not be issued (by TMC) until after issue of the ROAD OPENING APPROVAL and will be in the form of an approved Form C.

2.1.9 **Processes Held:** Detailed planning and design for road opening work. Commencement of work on site (Low Risk road openings).

HOLD POINT

INITIAL SITE MEETING

Submission: After submitting the Approval and Licence Applications, You must attend an INITIAL SITE MEETING with the TfNSW Nominated Representative (time and place advised by TfNSW).

(NOTE: For Low Risk road openings, this serves as the PRECONSTRUCTION SITE MEETING)

At this INITIAL SITE MEETING, after considering all site issues, the TfNSW will review and confirm:

.1 The submitted Applications (You must provide copies).

.2 The scope, location, trench dimensions and cover depth of the road opening.

.3 The Risk Category and permitted use of road plates.

.4 The responsibilities for restoration and maintenance.

.5 The extent and type of temporary pavement restoration.

.6 The main design requirements.

.7 Where the Risk Category is Low, all relevant construction requirements, including designated stockpile sites.

Release of Hold Point: The TfNSW will review the submission and may direct further work be done on the submission and/or the preparation for the work before releasing the Hold Point.

2.2 GENERAL PRECONSTRUCTION REQUIREMENTS

2.2.1 Immediately after the INITIAL SITE MEETING, submit a completed Form R "Speed Zone Authorisation Application" to the TfNSW Transport Management Centre for approval (refer Table 1).

Submit Speed Restriction Application

2.2.2 Where specified in Annexure A.2, comply with any special requirements of the TfNSW for the Work.

TfNSW special requirements

2.2.3 Make due allowance in Your work planning (e.g. TRAFFIC CONTROL PLAN (TCP), stage construction) for development of sufficient strength in concrete pavement restoration for it to carry traffic (refer Clause 4.10).

Permanent reinstatement to traffic

2.2.4 You must warrant in writing to the TfNSW that You have the people, equipment and materials to properly and timely perform the Work.

Warranty on capacity

2.2.5 You or Your agents must hold PUBLIC LIABILITY INSURANCE:

PUBLIC LIABILITY INSURANCE

.1 In the amount specified in Annexure A.2.

.2 That provides coverage for road opening type of work.

.3 Extended to cover the interests of the Transport for NSW, or its agent, and the local Council.

.4 That provides coverage until the expiration of the WARRANTY PERIOD specified in Annexure A.2.

You must provide evidence of insurances to the TfNSW prior to commencement of work and whenever requested to do so.

2.2.6 Where specified in Annexure A.2, You must provide a DEED OF INDEMNITY in the form of Annexure L to the TfNSW prior to commencement of work.

DEED OF INDEMNITY

2.2.7 Where specified in Annexure A.2, You or Your agents must lodge a PERFORMANCE BOND with the TfNSW prior to commencing work:

PERFORMANCE BOND

.1 In favour of the Transport for NSW.

.2 In the form of an original unconditional Bank Guarantee, with no end date.

.3 In the amount advised by the TfNSW at the PRECONSTRUCTION SITE MEETING, once the details of work and risks are known.

The TfNSW will retain the PERFORMANCE BOND until the end of the WARRANTY PERIOD specified in Annexure A.2 (refer Clause 5).

2.2.8 Prior to commencement of excavation works, You must: **Buried public utilities, drainage systems and traffic facilities loops**

.1 Contact 'Dial Before You Dig' on telephone 1100 (free call) to ensure identification of all buried public utilities at the site.

.2 Where buried public utilities are identified, liaise with the relevant public utility owners to identify the exact location of their buried services and to determine any potential effects of the Work on their assets.

.3 Liaise with the TfNSW and the local Council regarding drainage systems or traffic facilities loops under the road and determine any potential effects of the Work on these assets.

You must accommodate and meet all reasonable requirements of the public utility owners, TfNSW and local Council.

2.2.9 Consult and liaise with the local Council if the Work affects any Council asset, e.g. footpaths. **Liaise with Council and other parties**

Consult other road users such as bus companies and taxi operators if the Work requires the temporary relocation of a bus or taxi stop.

2.2.10 Where specified in Annexure A.2, provide advance notification of the Work to adjacent premises. **Advance notice to adjacent premises**

2.2.11 Where work at night or weekends is specified, obtain the separate approval of the NSW Department of Environment and Climate Change (DECC) and Council to work at night or weekends. **Night time and weekend work**

2.2.12 Where specified in Annexure A.2, provide details of Your proposed work methods for critical construction activities. Work methods must comply with and take into account: **Critical work methods**

.1 Relevant WorkCover NSW and other statutory requirements (refer Clause 1.11).

.2 The TfNSW Traffic Control at Worksites Manual (TCWS).

.3 The approved TRAFFIC CONTROL PLAN (TCP) for the work.

2.2.13 **Processes Held:** Commencement of work on site (Medium and High Risk road openings).

HOLD POINT

PRECONSTRUCTION SITE MEETING

(for Medium and High Risk road openings)

Submission Details: At least 20 BUSINESS DAYS (or such longer period directed by the TfNSW) prior to the intended date of commencement, submit documentation to the TfNSW as follows:

.1 All project documentation (including a copy of necessary checks and approvals) required under this Clause 2.2.

.2 Certification that all necessary designs, drawings and procedures have been completed and are structurally adequate and comply with this Specification.

.3 Certification that a site-specific risk assessment has been completed by a Competent Person for the proposed excavation and shoring work.

.4 Stage construction sequence.

.5 Details of critical work methods.

Release of Hold Point: The TfNSW will review the submission and may direct further work prior to organising a PRECONSTRUCTION SITE MEETING with You and Your designer(s).

At the PRECONSTRUCTION SITE MEETING, the TfNSW will:

.1 Confirm the design requirements (including limits of trench excavation, limits of pavement restoration, tiebar spacing).

.2 Confirm the detailed construction requirements (including any modified requirements for time-critical work).

.3 Confirm the critical construction activities for provision of work methods and conformity testing (refer Clause 5).

and may direct further work prior to issuing the ROAD OPENING APPROVAL and the ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES) and authorising the release of the Hold Point.

2.2.14 Prior to commencement of work, You must prepare a site-specific TRAFFIC CONTROL PLAN (TCP) according to the TCWS that:

TRAFFIC CONTROL PLAN (TCP)

.1 Complies with the issued ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES) and the approved TMP.

.2 Complies with the road safety and stage construction requirements for road opening work (refer Clause 2.4).

.3 Includes all necessary signage.

2.3 RISK CATEGORY

Determination of Risk Category

2.3.1 The Risk Category for the road opening is:

.1 Selected by You according to Table 2 and Table 5, based on a site-specific risk assessment using the best available information and a developed work proposal.

.2 Reviewed and determined by the TfNSW at the INITIAL SITE MEETING (refer Clause 2.1) and documented in Annexure A.2.

The TfNSW reserves the right to review the Risk Category upon commencement of excavation or at any other time (e.g. where it is evident that unforeseen risk factors are present that affect the previously-determined Risk Category).

Where Table 5 indicates that shoring is not required, this is always subject to the WorkCover NSW requirement for a site-specific risk assessment at the time of actual excavation, which may determine that shoring is required because of actual excavation conditions.

Conditions for Low Risk road openings

2.3.2 A road opening is determined as Low Risk if:

.1 The warrants in Table 2 for Low Risk are met in regard to all criteria other than shoring.

.2 Shoring of the excavation is not required according to Table 5 and/or the site-specific risk assessment. This will depend upon the trench depth, proximity to traffic, pavement conditions and excavation conditions.

If shoring is required, the Risk Category is Medium or High.

Structural design requirements for Risk Category

2.3.3 Where the Risk Category is Low, a site-specific design is not required.

Where the Risk Category is Medium or High, You must provide site-specific structural designs for the road opening as follows:

.1 For excavation and shoring, according to Clause 2.6.2.

.2 For road plates, according to Clause 2.6.3.

Other requirements

2.3.4 You must meet the other requirements for the Risk Category according to Table 2.

Table 2 - Risk Category for Road Opening

Risk Category	Conditions	Requirements
1. Low Risk	Where no MAJOR RISK FACTORS (refer 3. High Risk) are present and ALL of the following conditions apply: ▪ Shoring of the excavation is not required (according to Table 5 and/or the site-specific risk assessment). ▪ Trench depth does not exceed 1.3 m. ▪ Trench width does not exceed 1.2 m. ▪ Area of excavation does not exceed 6 m^2 at one time, unless otherwise approved by TfNSW. ▪ No road plates are used.	Each stage of the road opening must be excavated and backfilled on the same working day. The traffic LATERAL CLEARANCE must exceed that specified in Table 5 for the trench depth. A site-specific structural design is not required. *NOTE:* *The Risk Category will become Medium where shoring of the excavation is required according to either Table 5 or the site-specific risk assessment, even if the trench depth does not exceed 1.3 m. This will depend on trench depth, proximity of traffic, and pavement and soil conditions.*
2. Medium Risk	Where no MAJOR RISK FACTORS (see 3. High Risk) are present and ONE OR MORE of the conditions for 1. Low Risk do not apply.	A site-specific design for the road opening must be provided according to Clause 2.6. The design must be certified by the Proponent's Structural Engineer. Shoring of the excavation must be provided, unless specifically certified by the Structural Engineer as safe for no shoring (refer Clause 2.6.2.5). Regular inspection is required (refer Clauses 4.2.1, 4.3.3, and 4.4.2).
3. High Risk	Where MAJOR RISK FACTORS are present, such as: ▪ In a GENUINE EMERGENCY (see Annexure M.3) . ▪ Very large trench width (i.e. exceeds 2.1 m), depth or length. ▪ Road openings parallel or at small skew to direction of traffic. ▪ High risk traffic situations. ▪ Hazardous excavation conditions (e.g. groundwater, excessive ground vibrations). ▪ Buried utilities which could cause a significant hazard, if disturbed (e.g. high voltage power). ▪ Adjacent buildings or structures within the zone of influence, especially those aligned parallel to the excavation. ▪ Long duration openings.	A site-specific design must be provided as for 2. Medium Risk. However, the design must also be independently verified (refer to Clause 2.6.1.2). Shoring of the excavation must be provided as for 2. Medium Risk. More intensive TfNSW requirements, review and surveillance will apply than for 2. Medium Risk. Regular inspection is required as for 2. Medium Risk. *NOTE:* *In a GENUINE EMERGENCY, some requirements in TfNSW M209 may be simplified to expedite the work, based on an appropriate risk assessment and expert advice. Adoption of designs and requirements for a similar situation is acceptable for such emergencies.*

2.4 ROAD SAFETY AND STAGE CONSTRUCTION REQUIREMENTS

Scope of clause

2.4.1 Clause 2.4 specifies the road safety and stage construction conditions that must apply to road opening work to ensure the safe execution of the work in proximity to traffic (e.g. in urban situations). This includes the safe lateral clearance to traffic, traffic and pedestrian control requirements and signposting, both during and after working hours. Clause 2.4 integrates traffic management considerations and worker safety requirements for the Work Area.

You must comply with these requirements in planning the layout, design, stage construction, TMP and TCP for the road opening.

Deemed to be Short Term work

2.4.2 In accordance with TCWS Section 3.6, road opening work is deemed to be Short Term work, with a Safe Clearance between Workers and Through Traffic less than 1.2 m (Option 4), provided that all the conditions in Clause 2.4 are complied with.

The Work Area is deemed to include both the open and road plated sections of an excavation.

Stage construction and limits on size of excavation

2.4.3 Unless otherwise approved by the TfNSW, the stage construction of the road opening must ensure that:

.1 Each new section of excavation is opened up and completed (i.e. either backfilled or road plated) within 1 working day.

.2 Lane closures at any one time are minimised.

.3 Where shoring is required, the length of unsupported trench does not exceed 5 linear m at any one time and is shored immediately after each new stage of excavation (refer Clause 2.6.2).

.4 The equivalent length of excavated road opening (i.e. parallel to the direction of traffic) at any one time must not exceed:

- 5 linear m (open excavation, not covered with road plates).
- 15 linear m (road plated section).
- 20 linear m (including open and road plated sections).

.5 Measures are taken to prevent surface runoff water from entering the excavation.

Daily stage construction requirements and conditions at end of each working day

2.4.4 You must meet the following conditions for daily stage construction of the road opening excavation (refer Table 3):

.1 For Low Risk road openings, each stage is excavated and backfilled to be trafficable within 1 working day.

.2 For Medium and High Risk road openings, each stage is excavated and completed to either of the following conditions at the end of each working day:

- The trench is fully backfilled to be trafficable; or
- The trench is not fully backfilled and sections of open excavation within the trafficked pavement are covered with a road plate.

Minimum LATERAL CLEARANCE for traffic

2.4.5 The minimum traffic LATERAL CLEARANCE from the edge of the road opening to the edge of the nearest trafficked lane must be:

.1 0.5 m, either during or after working hours, where shoring is in place and effective or where shoring is not required; or

.2 Where shoring is required but the trench is unsupported (i.e. newly excavated trench prior to shoring, or when shoring is removed):

- The minimum LATERAL CLEARANCE specified in Table 5 for which shoring is not required; or
- Where the trench depth exceeds 1.5 m, the clearance determined by Your Structural Engineer.

Where feasible, provide a larger clearance (e.g. at intersections, on curves or as advised by the TfNSW).

Where road plates are in use or the open excavation has been backfilled under the trafficked lanes, the LATERAL CLEARANCE is measured from the edge of the road plate or the edge of compacted backfill to the edge of the nearest trafficked lane.

Traffic and pedestrian control requirements for road opening work

2.4.6 You must implement the relevant traffic and pedestrian control requirements specified in Table 3 for the road opening, according to the TCWS and consistent with the issued ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES) and the approved TMP.

Permitted use of road plates

2.4.7 Road plates may only be used:

.1 For Medium or High Risk road openings (refer Table 2).

.2 Where permitted in Annexure A.2.

.3 When the road opening excavation cannot be properly backfilled within a working day and it is necessary to restore unobstructed traffic flow at the end of the working day.

Road plates must not be used on motorways, freeways or roads with a posted speed limit over 90 km/h under any circumstances. Use road plates only as a last resort on roads with a posted speed limit between 70 km/h and 90 km/h.

2.4.8 Unless otherwise approved by the TfNSW, road plates must not be used for a period longer than 1 month at any one location, after which the road opening must be backfilled. Periodic inspections at an appropriate frequency must be undertaken to ensure that the excavation conditions have not deteriorated and become unfavourable during this period.

Limited duration for use of road plates

2.4.9 Exceptional circumstances may include emergencies, unforeseen problems, excavations within a footpath, or where it is not practical to use road plates, and must meet all the following conditions:

When exceptional circumstances apply

.1 You must obtain the TfNSW approval or confirmation.

.2 The road opening must be Medium or High Risk.

.3 Work must occur within the road opening each working day.

Table 3 - Traffic and Pedestrian Control Requirements for Road Opening Work

Control measure	During working hours	After working hours		
		No road plates in use	Road plates in use	Exceptional circumstances
Condition of road opening at end of each working day (refer Clause 2.4.4)	Not applicable	Trench is fully backfilled and trafficable (i.e. after temporary pavement restoration)	Trench is not fully backfilled. All sections of open excavation within trafficked pavement must be covered with a road plate.	Trench is not fully backfilled. Excavation within trafficked pavement may be left open and not covered by road plates (within lane closure).
Lane closures	As per approved TMP	Not required	Not required	Formal lane closure must be in place to enclose any section of open excavation within trafficked pavement. As per approved TMP.
Speed restriction for passing traffic	All of the following: ▪ Temporary road work speed zone (40 km/hr signposted limit) ▪ Provide a traffic controller at all times during active work on road opening (to control speed zone and stop traffic if necessary) ▪ Other appropriate traffic control devices (e.g. signs, flashing lights, tapers)	Not required	Where normal posted speed limit is between 70 km/h and 90 km/h: ▪ Temporary road work speed zone (60 km/h signposted limit)	Both of the following: ▪ Temporary road work speed zone (60 km/hsignposted limit) ▪ Other appropriate traffic control devices (e.g. signs, flashing lights, tapers)
Delineation between trafficked lane and excavated road opening	Cones or bollards. Do not use barriers or containment fences that impose loads on edge of trench, even if covered by	Not applicable	Not required	Pedestrian barricade (as for Pedestrian safety) Delineate barricade as per TCWS.

Control measure	During working hours	After working hours		
		No road plates in use	Road plates in use	Exceptional circumstances
	road plates.			
Pedestrian safety	Enclose all sections of open excavation within footpath or road reserve. Use secure, lightweight pedestrian barricade.	Not required	Not required	Fully enclose all sections of open excavation within trafficked pavement, footpath and road reserve. Use secure, continuous lightweight pedestrian barricade.
Signage (additional to TCWS)	Exhibit a Rough Surface sign (T3-7) ahead of road plates, where used.	Nil	Exhibit a Rough Surface sign (T3-7) ahead of road plates	Nil

2.5 LOCATION AND LAYOUT DESIGN FOR ROAD OPENING

2.5.1 Determine the scope, location, layout, cross sectional dimensions and stage construction for the road opening, including the limits of the road opening excavation, consistent with:

Location, layout and dimensions

Limits of excavation

.1 The proposed limits specified in Annexure A.1.

.2 The lateral clearance, limits on size of excavation, stage construction and other requirements of Clause 2.4.

.3 The design requirements of Clause 2.6.

.4 The limits for pavement restoration (refer Clause 2.7.2).

2.5.2 Minimise the number of separate road openings. Where feasible, use shared trench arrangements for multiple utilities or services.

Minimise separate road openings

2.5.3 Where feasible, and subject to agreement with the local Council, locate new utilities or services fully within the footpath and not within the trafficked pavement. Refer to the space allocations shown in Clause 6 of the SOC Guide.

Locate within footpath where feasible

2.5.4 The layout and alignment must be agreed with the TfNSW at the INITIAL SITE MEETING.

Layout and alignment of road opening

Unless otherwise approved by the TfNSW, the layout and alignment of the road opening must be at right angles (i.e. at 90 degrees) to the direction of traffic.

Where a road opening parallel to the direction of traffic is approved by the TfNSW, locate the road opening within the kerbside lane.

Cover depth of new buried utilities and services

2.5.5 In order to prevent future damage from roadworks, the cover depth of new buried utilities or services within the trafficked pavement must be not less than that specified in Table 4, unless otherwise approved by the TfNSW. The cover depth and requirements for utility protection must be agreed with TfNSW at the INITIAL SITE MEETING.

The cover depth is measured from the top of the utility (including any protective sleeving, but disregarding concrete encasement) to the pavement Finished Surface Level (FSL). The minimum cover depth to the top of the concrete encasement is 0.5 m in all cases.

Table 4 - Cover Depth of New Buried Utilities or Services

Application	State Roads (TfNSW control)			Regional and Local roads (Council control)	Footpath
	New main (unprotected)	New main (protected)	New lateral to existing main		
Minimum Cover Depth	1.2 m	1.0 m	Depth of existing main; or 0.5 m top of encasement (whichever is greater)	As per SOC Guide	As per SOC Guide
Protection Requirements	Nil	Sleeved within concrete encasement	Sleeved within concrete encasement		

Low risk and maintenance–free design, location and installation

2.5.6 Design, locate and install new buried utilities or services:

.1 To minimise the risk of future collapse or damage (e.g. due to settlement, traffic, use of vibrating rollers in roadworks). Ensure durable construction, with adequate reserve strength.

.2 To be maintenance-free (e.g. provide protective sleeving).

.3 To minimise interference with other buried utilities/services.

.4 To provide for future upgrades of the utility or service, with minimal disturbance to the trafficked pavement.

.5 To be in previously undisturbed ground, where feasible.

Remove obsolete utilities or services

2.5.7 Unless otherwise approved by the TfNSW, You must remove any buried utility or service that becomes obsolete as a result of Your work, including related restoration, according to this Specification.

Isolating valves

2.5.8 Provide isolating valves at each end of crossings under a trafficked pavement, at locations within the footpath agreed with the TfNSW.

Manholes and pits flush with FSL

2.5.9 Manholes and pits must be finished flush with the pavement or footpath Finished Surface Level (FSL).

2.6 STRUCTURAL DESIGNS FOR ROAD OPENINGS

2.6.1 General

Overall design requirements

2.6.1.1 Provide a structural design for the road opening excavation that:

.1 Is appropriate for the Risk Category determined by the TfNSW (refer Clause 2.3).

.2 Meets the road safety and stage construction requirements for road openings (refer Clause 2.4).

.3 Meets the location and layout requirements of Clause.2.5.

.4 Meets the structural design requirements for:

- Excavation and shoring (refer Clause 2.6).
- Road plates, where permitted (refer Clause 2.6).

Structural design control

2.6.1.2 Each design must be:

.1 Prepared and certified by Your Structural Engineer.

.2 Where the Risk Category is High, verified by an independent Structural Engineer.

A copy of the design certification must be provided to the TfNSW.

Design Drawings

2.6.1.3 The design Drawings must specify all:

.1 Relevant loads, dimensions and design assumptions.

.2 Site-specific requirements and stage construction sequence.

Structural designs available at site

2.6.1.4 A copy of the design Drawings must:

.1 Be kept on site at all times during the road opening work.

.2 Be provided to the TfNSW if requested.

Design for permanent restoration

2.6.1.5 Where permanent restoration is Your responsibility, provide a pavement design for the backfill and permanent restoration of the road opening according to Clause 2.7.

2.6.2 Design of Excavation and Shoring

Shoring required

2.6.2.1 Determine the need for shoring based on a site-specific risk assessment completed by a Competent Person for the proposed excavation work.

Table 5 provides guidance for assessing the need for shoring.

Design requirements for excavation and shoring

2.6.2.2 The excavation and shoring design must be site-specific and:

.1 Meet the stage construction requirements of Clause 2.4.

.2 Meet the location and layout requirements of Clause 2.5.

.3 Facilitate staged excavation and ensure safe, stable conditions at each end of the excavation (i.e. backfilled and working face ends).

.4 Comply with relevant WorkCover NSW and other statutory requirements for excavation and shoring (refer Clause 1.11).

.5 Ensure the stability of, and prevent undermining of, the adjacent pavement.

.6 Take into account relevant geotechnical considerations according to Clause 2.6.2.5 and actual pavement conditions.

.7 Take into account the effects of vibration (e.g. from live loads or construction plant).

Design loads

2.6.2.3 The excavation and shoring design must:

.1 Ensure that shoring can support surcharge from live loads in the trafficked lane adjacent to the excavation (assuming the vehicle tracks along the edge of the trafficked lane nearest to the excavation). Use the same live load as for road plate design (refer Clause 2.6.3).

.2 Where road plates are permitted, ensure that shoring can support all live and dead loads from the road plates that bear on the edge of the excavation according to Clause 2.6.3.

.3 Where necessary, support surcharge from, and ensure the stability of, adjacent buildings or structures (i.e. within their zone of influence) according to Clause 2.6.2.7.

.4 Support construction loadings (e.g. excavation plant, trucks and materials).

Trench width

2.6.2.4 The trench width must provide sufficient clearance on each side of a buried utility or service that:

.1 Meets the utility owner's requirements.

.2 Permits adequate compaction of backfill.

Geotechnical considerations in design, including shoring exemptions

2.6.2.5 The excavation and shoring design must include an assessment of actual site, soil and groundwater conditions (based on soil sampling) by a qualified Geotechnical Engineer, unless worst case (i.e. conservative) soil conditions are assumed. Refer to Table 2.

Exemptions from shoring must be justified and certified on a similar basis. No exemptions are permitted if road plates are used.

2.6.2.6 Where shoring is required: **Restrictions on unsupported trench**

.1 The length of unsupported trench must ensure stability of the trench sides and must not exceed 5 linear m at any one time.

.2 Each new section of the trench must be shored immediately after excavation.

.3 While the trench is unsupported, the LATERAL CLEARANCE must be increased to the clearance specified in Clause 2.4.5.

2.6.2.7 Do not excavate within the zone of influence of any building or structure (refer Figure 1 and Figure 2), unless it is absolutely necessary. **Zone of influence**

Your structural design must ensure the stability of nearby buildings or structures, both for unshored and shored stages of excavation.

2.6.2.8 The shoring system may be permanent or removable and must: **Shoring system requirements**

.1 Provide effective ground support, with uniform bearing against trench sides and no excessive deflection under loads.

.2 Prevent loss of backfill material through gaps in shoring.

.3 Facilitate the filling of gaps and voids behind shoring or under the pavement according to Clause 4.3 (e.g. by using sacrificial formwork to allow re-use of shoring components).

For removable shoring, the design must allow for the sudden release of bracing forces and mobilisation of passive soil pressures when shoring bracing is removed. The design must ensure stability of the excavation is maintained during these conditions.

2.6.2.9 The shoring design Drawings must include: **Design details**

.1 A description of the shoring system.

.2 Shoring materials and their properties.

.3 Sizes, dimensions and spacing of main components.

.4 Engineering product data (reference all specific items).

.5 The stage construction sequence.

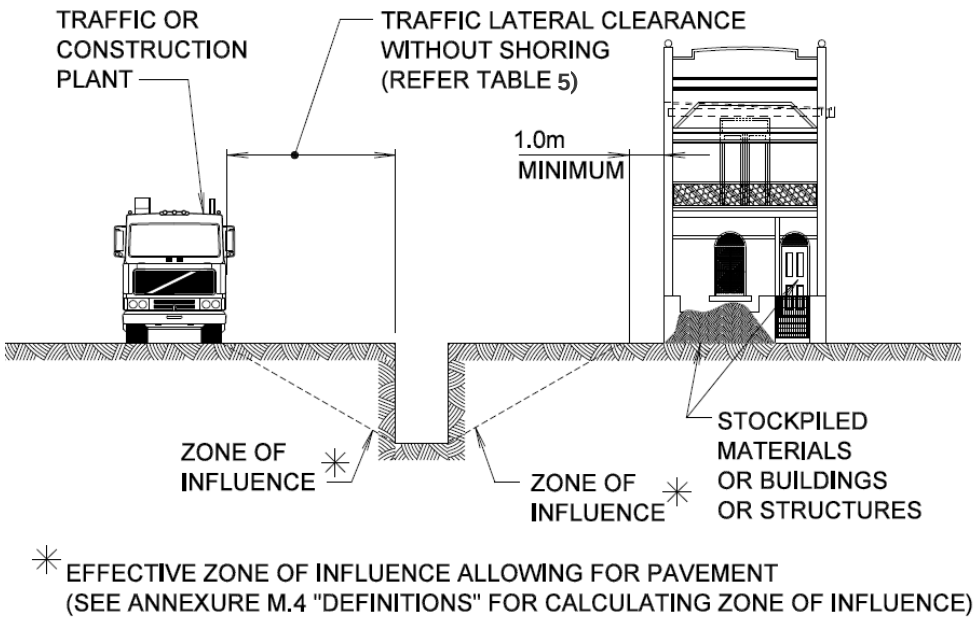


Figure 1 - Unsupported zone of influence/clearances, where:
(a) shoring is not required (WorkCover NSW requirements or Table 5); or
(b) shoring is required, but not yet in place or effective

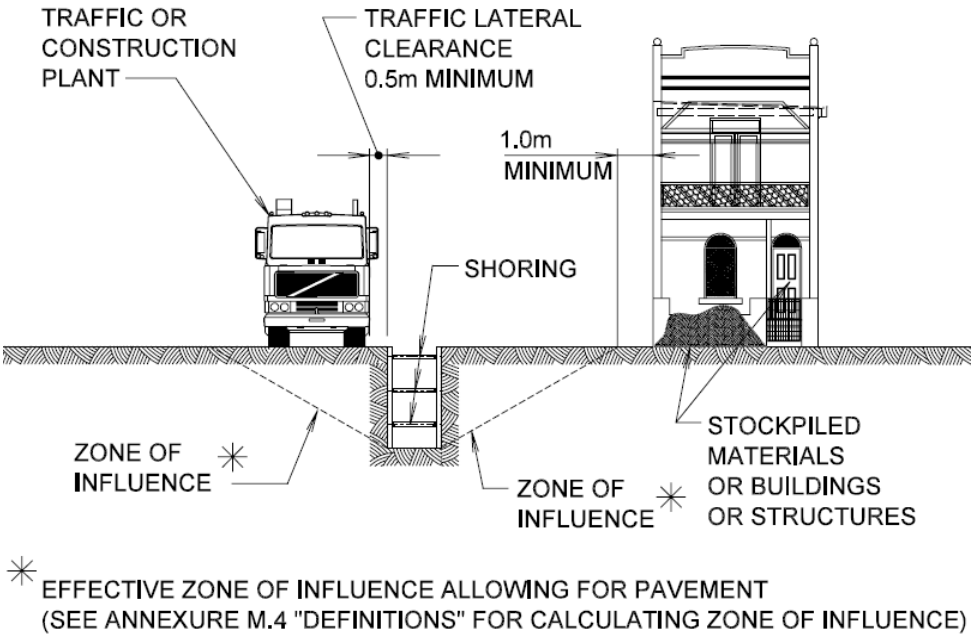


Figure 2 - Supported zone of influence/clearances, where shoring is in place and effective

Table 5 - Guidelines for Assessing the Need for Shoring of Road Opening Excavations

NOTE: THIS TABLE IS FOR GUIDANCE ONLY AND MUST ONLY BE USED IN CONJUNCTION WITH A SITE-SPECIFIC RISK ASSESSMENT OF ACTUAL TRENCH CONDITIONS AT TIME OF EXCAVATION

Trench Depth (mm)	Indicative Shoring Requirements (includes site-specific shoring design) [1]			
	Where road plates will be used over road opening	Any pavement type with unfavourable excavation conditions [2]	Flexible pavement or unsound concrete slab [3] with favourable excavation conditions [2]	Sound concrete slab pavement with favourable excavation conditions [2]
Less than 400	Not required if plate bearing width > 0.6 m each side	Not required *	Not required *	Not required *
400 – 500	Not required if plate bearing width > 0.6 m each side	Required unless traffic LATERAL CLEARANCE > 0.6 m *	Not required *	Not required *
500 – 600	Always Required	Required unless traffic LATERAL CLEARANCE > 0.8 m *	Required unless traffic LATERAL CLEARANCE > 0.6 m *	Not required *
600 – 700	Always Required	Required unless traffic LATERAL CLEARANCE > 1.0 m *	Required unless traffic LATERAL CLEARANCE > 0.8 m *	Not required *
700 – 800	Always Required	Required unless traffic LATERAL CLEARANCE > 1.2 m *	Required unless traffic LATERAL CLEARANCE > 0.9 m *	Required unless traffic LATERAL CLEARANCE > 0.6 m *
800 – 900	Always Required	Required unless traffic LATERAL CLEARANCE > 1.4 m *	Required unless traffic LATERAL CLEARANCE > 1.1 m *	Required unless traffic LATERAL CLEARANCE > 0.7 m *
900 - 1000	Always Required	Required unless traffic LATERAL CLEARANCE > 1.6 m *	Required unless traffic LATERAL CLEARANCE > 1.2 m *	Required unless traffic LATERAL CLEARANCE > 0.8 m *
1000 - 1100	Always Required	Required unless traffic LATERAL CLEARANCE > 1.8 m *	Required unless traffic LATERAL CLEARANCE > 1.4 m *	Required unless traffic LATERAL CLEARANCE > 0.9 m *
1100 – 1200	Always Required	Required unless traffic LATERAL CLEARANCE > 2.0 m *	Required unless traffic LATERAL CLEARANCE > 1.5 m *	Required unless traffic LATERAL CLEARANCE > 1.0 m *
1200 - 1300	Always Required	Required unless traffic LATERAL CLEARANCE > 2.2 m *	Required unless traffic LATERAL CLEARANCE > 1.7 m *	Required unless traffic LATERAL CLEARANCE > 1.1 m *
1300 - 1400	Always Required	Required unless traffic LATERAL CLEARANCE > 2.4 m *	Required unless traffic LATERAL CLEARANCE > 1.8 m *	Required unless traffic LATERAL CLEARANCE > 1.2 m *
1400 - 1500	Always Required	Required unless traffic LATERAL CLEARANCE > 2.6 m *	Required unless traffic LATERAL CLEARANCE > 2.0 m *	Required unless traffic LATERAL CLEARANCE > 1.3 m *
More than 1500	Always required	Always required *	Always required *	Always required *

NOTES:

* Minimum LATERAL CLEARANCE to traffic (measured from edge of excavation to edge of trafficked lane) for all cases is 0.5 m (refer Clause 2.4).
Where shoring is required, maintain the traffic LATERAL CLEARANCE limit shown in Table 5 until the shoring is in place and effective.
Where shoring is not required, maintain the traffic LATERAL CLEARANCE limit shown in Table 5 throughout the work.

1. Table 5 indicates the need for shoring in proximity to traffic to provide for traffic safety, allowing for load distribution through pavement.
If in doubt, consult a Structural Engineer to confirm the shoring and traffic separation design requirements.

2. 'Unfavourable excavation conditions' means any of the following conditions (otherwise, favourable excavation conditions may be assumed):

- Excavation in saturated clay or silt (i.e. one can indent one's fingernail depth when applying maximum finger pressure) or any soil materials which are non cohesive (e.g. sandy type soils)
- Any signs of erosion, instability, crumbling or loose materials in vertical faces of the excavation
- Water seepage occurs from sides or base of the excavation

3. "Unsound concrete slab" includes concrete pavement with a parallel joint <1.0 m from edge of excavation.

2.6.3 Design of Road Plates

Warrant for site-specific design

2.6.3.1 Where road plates are permitted (refer Clause 2.4.7 and Annexure A.2), either:

.1 Use Table 7 to determine the road plate thickness, provided that the trench width does not exceed 2.1 m and the other design requirements of Clause 2.6.3 are met; or

.2 Provide a site-specific structural design for the road plates according to this clause (e.g. trench widths exceeding 2.1 m).

Alignment of road plates and joint location

2.6.3.2 Unless otherwise approved by the TfNSW:

.1 Each road plate must be rectangular in plan.

.2 Plates must be aligned parallel to the line of the trench.

.3 Locate plate joints to avoid the wheel paths, where feasible.

.4 The gap between adjoining plates must not exceed 5 mm.

Main design parameters

[refer to diagram at Clause 2.6.3.6]

2.6.3.3 The road plate design must specify the main parameters, including:

.1 Trench width, plate clear span and plate length (in the span direction, i.e. at right angles to line of trench).

.2 Plate width (at right angles to the span direction).

.3 Plate thickness and steel grade.

.4 Number, location and type of fixings per plate.

.5 Details of holes in plate for fixings, where permitted.

Key design assumptions

2.6.3.4 The road plate design must assume:

.1 Unstiffened steel plates are used according to Clause 3.3, unless otherwise approved by the TfNSW. In this case a site-specific design must be provided (refer Clause 2.6.3.1).

.2 Fully shored trench conditions for the road opening.

.3 A plate clear span equal to the trench width plus 400 mm to allow for bearing support on each side (refer Clause 2.6.3.9).

Design code, design assumptions and live loading

2.6.3.5 Design road plates according to AS 5100, using elastic analysis, a limit state stress of first yield and the following live load conditions:

.1 Live loading must be a series of moving 48 kN wheel loads spaced on a repeating 1.2 m square grid (to replicate T44 Truck rear axle group – single or adjacent trucks).

.2 Each wheel load must be distributed over a contact area of 400 mm x 200 mm, with the 200 mm dimension measured parallel to the direction of traffic.

.3 Wheel loads must be positioned in the most unfavourable loading position, i.e. along the unsupported edge of plate.

.4 The Live Load Factor (LLF) and Dynamic Load Allowance (DLA) must be as specified in Table 6.

Limits on plate thickness and size

2.6.3.6 The thickness of a road plate must be no less than 25 mm and must not exceed 60 mm.

The area of each road plate must be no less than 3.6 m^2.

The plate length (in the span direction – see diagram) must exceed the trench width by at least 800 mm (refer Clause 2.6.3.9).

The length to width ratio of each plate must not exceed 3:1.

Where the trench width exceeds 1.8 m, plate widths in between 1.2 m and 2.2 m are not permitted (to avoid critical load patterns).

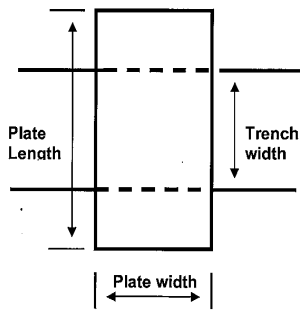


Table 6 - Live Load Design Requirements for Road Plates

Road Type	Location of Road Plate	Functional Road Class [AS 5100.7 App. A Table A1]	Live Load Factor (LLF)	Dynamic Load Allowance (DLA)
A	Major arterial road, highway, port access, transport depot access or abnormal case	Urban: Class 6 and 9 Rural: Class 1, 2 and 5	1.8	0.6
B	Minor arterial road, state route, sub-arterial or local road (except port or transport depot access)	Urban: Class 7 and 8 Rural: Class 3 and 4	1.5	0.4
C	Light vehicle property access (<10 tonnes gross)	Not applicable	1.0	0.2
D	Heavy vehicle property access (>10 tonnes gross)	Not applicable	As per the adjoining road	

Table 7 - Design Sizes for Road Plates [trench width up to 2.1 m]

Trench Width (mm)	Plate Clear Span [Trench Width plus 400] (mm)	Minimum Plate Length [Trench Width plus 800] (mm)	Minimum Plate Thickness [1] (mm) [Grade 250 Plate]			
			Road Type for Plate Location (refer Table 6)			
			Type A	Type B	Type C	Type D
300 or less	700	1100	32	28	25	As per the adjoining road
450	1150	1550	36	28	25	
600	1000	1400	36	32	28	
900	1300	1700	40	36	32	
1200	1600	2000	45	40	36	
1500	1900	2300	50	45	45	
1800	2200	2600	55	55	50	
2100	2500	2900	60 [2]	60 [2]	55 [2]	
More than 2100	Site-specific structural design for road plate is mandatory					

DESIGN ASSUMPTIONS:

1. Road plate design in accordance with Clause 2.6.3.
2. Where the trench width exceeds 1.8 m, plate widths in between 1.2 m and 2.2 m are not permitted (refer Clause 2.6.3.6 and its diagram).

Serviceability design requirements

2.6.3.7 Road plates must meet the following serviceability design requirements under live loads:

.1 The live load deflection must not exceed 11 mm or Plate Clear Span/150, whichever is the lesser.

.2 Plates must not lift off their bearing supports at any point.

Plate extensions at ends of trench

2.6.3.8 For road openings parallel to the direction of traffic, road plates must extend past each end of the excavated trench:

.1 By a dimension not less than the trench depth.

.2 With same bearing support conditions as for trench (i.e. by extension of bedding strips - refer Clause 2.6.3.9).

Bearing support conditions

2.6.3.9 To prevent edge loading of the trench, provide uniform bearing support conditions under road plates, along all supported sides, to meet the following requirements (refer Figure E.6 of Annexure E):

.1 Plates must overlap the adjacent pavement by a minimum 400 mm from the edge of the (shored) trench on each side.

.2 A 200 mm wide strip of bedding material conforming to Clause 3.3 must be provided under each supported side, with the edge of the strip at least 100 mm from the edge of the trench.

.3 The bedding layer thickness must:

- Be uniform, with an average thickness of not less than 5 mm and not more than 10 mm.
- Ensure that no contact occurs between the plate and the pavement along each edge of the trench under live loads.

Road plate FSL and recessing into pavement

2.6.3.10 Installed road plates must meet the following Finished Surface Level (FSL) and recessing requirements (refer Figure E.6 of Annexure E):

.1 The plate crossfall must match adjacent pavement crossfall.

.2 Adjoining plates must have matching FSL.

.3 Do not recess plates into concrete pavement.

.4 For long term installations in flexible pavement or asphalt overlays, fully recess the plate to match the adjoining pavement FSL (where feasible).

.5 Where it is not feasible to fully recess the plate, the plate FSL must be no higher than 70 mm above the adjoining pavement FSL (excluding bituminous ramps).

.6 The edges of plate recesses must be straight, stepped vertical, and neatly trimmed.

Road plate fixings into pavement

2.6.3.11 Road plate pavement fixings must meet the following requirements:

.1 Provide at least 1 fixing every 2 m along each exposed edge of plate, with a minimum of 4 fixings per plate (one at each corner). However, for concrete pavement, provide 4 epoxied fixings per plate (one at each corner).

.2 Fixings must be dog spikes or alternative anchorages that can physically retain the edges or holes of the plate and resist both plate uplift due to dynamic rebound from live loads and horizontal plate movement due to vehicle braking forces.

.3 Fixings must have minimum 20 mm diameter and minimum embedment length 250 mm within the pavement.

.4 Fixings must not project more than 10 mm above the plate. Projections must be non-hazardous to traffic (smooth faces).

.5 At contact face between a dog spike fixing and top of plate, provide a thin compressed pad of shock-absorbing neoprene.

.6 Embedment of fixings in pavement must be as follows:

- Driven or drilled (into flexible pavement).
- Secured with rapid-setting epoxy in drilled holes, either directly or using ferrules (in concrete pavement). Use threaded bolts in epoxied threaded ferrules for repeated use at same location. Directly epoxied fixings must be cut off flush with pavement FSL when plate removed.

.7 Do not place fixings at critical locations (e.g. over traffic signal conduits).

Holes in road plates for fixings

2.6.3.12 Holes in road plates for fixings are only permitted:

.1 For concrete pavement; or

.2 For long-term installations; or

.3 Where the trench is parallel to the direction of traffic; or

.4 Where the plate thickness exceeds 40 mm.

Holes, where permitted, must be pre-drilled at locations approved by the plate owner (at least one at each corner), providing an edge distance of at least 100 mm and with a counter-bored recess in top of plate (up to 60% plate thickness) to allow use of threaded fixings with fully recessed head or nut.

Alternative means of fixing

2.6.3.13 Where it is not feasible to provide the specified fixings, You must provide an alternative means for fixing that both:

.1 Addresses the site-specific risks, based on a risk assessment.

.2 Is approved by the TfNSW.

Onerous or high risk situations

2.6.3.14 Additional or more robust fixings may be necessary for long term installations, on steep grades or crossfalls, for high risk traffic situations, to reduce noise or to minimise the risk of dislodgement.

2.7 DESIGN FOR RESTORATION OF ROAD OPENING

2.7.1 General

Scope of restoration

2.7.1.1 The road opening restoration includes the backfill and the pavement restoration.

Concept design for pavement restoration

2.7.1.2 The concept design and requirements for the pavement restoration are specified in Annexure A.3, including the APPLICABLE DRAWINGS in Figure E.1 to Figure E.4 of Annexure E.

Low Risk road openings

2.7.1.3 For Low Risk road openings:

.1 Use the APPLICABLE DRAWINGS.

.2 In addition, meet the other requirements of this clause (NOTE: Additional drawings are not required).

Medium Risk or High Risk road openings

2.7.1.4 For Medium Risk or High Risk road openings:

.1 Prepare design Drawings for the pavement restoration, based on the APPLICABLE DRAWINGS.

.2 The Drawings must meet the requirements of this Clause.

2.7.2 Pavement Restoration Design

Limits of pavement restoration

2.7.2.1 The limits of pavement restoration in Your pavement restoration design must be:

.1 As agreed with the TfNSW at the PRECONSTRUCTION SITE MEETING, consistent with, but larger than, the agreed limits of the road opening excavation.

.2 Determined by the TfNSW and confirmed at the PRECONSTRUCTION SITE MEETING (for concrete pavement).

.3 Included in the location and layout design (refer Clause 2.5).

Note that the limits of concrete pavement restoration will normally be larger than the limits of the road opening trench excavation.

Pavement type

2.7.2.2 Use the concept design that is consistent with the adjoining pavement type (Figure E.1 for flexible pavement; Figure E.2 to Figure E.4 for concrete pavement – refer Annexure E).

Flexible pavements include all configurations where the base course does not consist of concrete.

Concrete pavements include all pavement configurations where the base course includes concrete, with or without asphalt surfacing.

2.7.3 Concrete Pavement Restoration Design

Design thickness of replacement slab

2.7.3.1 The minimum thickness of the replacement slab in Your design must be 250 mm. In the case where the thickness of adjoining slabs is greater than 250 mm, match the thickness of the adjoining slabs (refer Figure E.2 to Figure E.4 of Annexure E). Specialist design of the replacement slab is required in the case where the thickness of the replacement slab is greater than 250 mm.

Basis for detailing in design

2.7.3.2 Use the typical details provided in Annexure E and the materials requirements of Clause 3.6 as the basis for the detailing in Your design (e.g. joint details, bar sizes).

Joints

2.7.3.3 Joints in the replacement slab must meet the following requirements:

.1 The location and alignment of joints must be consistent with those in the adjoining existing base slabs.

.2 Install a new tied construction joint where the limits of the concrete pavement restoration are within an existing slab.

.3 Joints must be of the type and dimensions specified in the APPLICABLE DRAWINGS and Figure E.5 of Annexure E.

.4 Reinstate the existing joint details between kerb and gutter and adjoining new base slabs.

.5 Inlet pits and structures must be separated from adjoining new base slabs by an isolation joint using preformed joint filler (refer Figure E.5 of Annexure E).

Tiebars

2.7.3.4 Tiebars in tied construction joints must be:

.1 Placed in drilled holes in the adjoining slab face at mid-depth of the replacement slab or mid-depth of the adjoining slab (whichever is the thinner slab).

.2 Spaced at the dimension specified by the TfNSW at the PRECONSTRUCTION SITE MEETING.

.3 Located no closer than:

- 300 mm to a transverse joint or existing crack in the adjoining slab (for longitudinal tied joints).
- 150 mm to a longitudinal joint or slab corner (for transverse tied joints).

Dowels

2.7.3.5 Dowels in transverse contraction joints must be:

.1 Prefabricated in self-supporting welded assemblies.

.2 Placed at mid-depth of the replacement slab or mid-depth of the adjoining slab (whichever is the thinner slab).

.3 Aligned parallel to the pavement surface.

.4 Spaced at 300 mm centres.

.5 Located no closer than 150 mm to a longitudinal joint or slab corner.

3 RESOURCES

3.1 PERSONNEL

3.1.1 Supervise the work on site at all times using a person who has extensive experience in road opening excavation and restoration. **Site Supervisor**

3.1.2 The qualified Designer, Certifier and Independent Verifier must each be a Civil or Structural Engineer with the following qualifications and experience: **Structural Engineer**

.1 Eligible for membership of the Institution of Engineers, Australia to the grade of Member.

.2 At least 5 years relevant experience in structural design and assessment of shored excavations and road plates.

.3 Understanding of geotechnical requirements for trenched excavations.

.4 For pavement restoration, relevant experience in pavement design.

3.1.3 Using Your leading Structural Engineer, engage and manage other appropriate experts and specialists for relevant parts of the design (e.g. a qualified Geotechnical Engineer). **Engage other experts for design**

3.1.4 The qualified Geotechnical Engineer, where required, must be an Engineer with the following qualifications and experience (refer WorkCover NSW Excavation Code of Practice): **Geotechnical Engineer**

.1 Eligible for membership of the Institution of Engineers, Australia to the grade of Member.

.2 At least 5 years relevant experience in stability design of geotechnical structures.

3.1.5 You must use a Competent Person for assessing and monitoring excavation, shoring and road plates (WorkCover NSW requirement). **Competent Person**

3.2 MATERIALS FOR SHORING

3.2.1 Shoring and bracing components must meet the minimum requirements of the WorkCover NSW Excavation Code of Practice. **Shoring and bracing**

Steel shoring components must conform to AS 4744.1.

3.2.2 Weak lean mix concrete for filling voids behind shoring and under adjoining concrete pavement must comply with Table 8. **Weak lean mix backfill behind shoring**

3.3 MATERIALS FOR ROAD PLATES

Steel plate grade

3.3.1 Road plates used for trench covers over road openings must be structural steel plate of minimum Grade 250 to AS/NZS 3678. Unless otherwise approved by the TfNSW, use unstiffened steel plates.

Identification marks, including steel grade

3.3.2 Road plates must be clearly identified by the following permanent marks on the uncoated underside or edge of the plate:

.1 A serial number provided by the road plate owner, to identify the individual plate, the year and details of its manufacture, and its service history.

.2 The steel grade.

.3 The mass of the plate (in kg).

Skid resistant surface

3.3.3 The trafficked surface of road plates must have either:

.1 A skid resistant coating complying with Specification TfNSW 3368; or

.2 An alternative treatment that is approved by the TfNSW and provides uniform long-life skid resistance equivalent to that specified in TfNSW 3368.

Plate surfaces must not be otherwise modified (e.g. by use of chequer plates or mesh tack welded to the plate surface).

Straightness

3.3.4 Road plates must be flat and straight within a tolerance of +/- 5 mm at any point from the true, straight and level position.

Cold mix material for bedding, ramps and hole repairs

3.3.5 Material for bedding of road plates, bituminous ramps or repair of road plate fixing holes must be a premium grade proprietary bituminous cold mix.

3.4 MATERIALS FOR BACKFILL

Bottom backfill layers, including protective layer

3.4.1 Backfill materials used below, around and immediately above a buried utility or service, including the protective layer, must comply with the requirements of the utility or service owner. Provide details of this protective layer material to TfNSW before it is used in the work.

3.4.2 Backfill material used above the protective layer of a buried utility or service must be free from organic, contaminated, corrosive or reactive content and must be one of the following: **Backfill above the protective layer**

.1 Freshly mixed subbase material conforming to Clause 3.5. Do not use a higher strength concrete in lieu of weak lean mix concrete.

.2 Select fill material with:

- Particle size not exceeding 50 mm.
- Plasticity Index between 2 and 12, tested to Test Method TfNSW T109.

However, for Low Risk road openings and time-critical work, only use freshly mixed sand cement mix conforming to Clause 3.5.

3.4.3 Drainage pipe for subsoil drains must: **Subsoil drains**

.1 Be corrugated perforated plastic drainage pipe complying with AS 2439.1, with a diameter of 65 mm or 100 mm.

.2 Be inserted within a suitable seamless knitted tubular filter fabric complying with Specification TfNSW 3580.

Filter material (e.g. permeable sand or gravel) for the filter zone surrounding the subsoil drainage pipe must comply with TfNSW 3580.

3.5 MATERIALS FOR PAVEMENT RESTORATION (EXCEPT CONCRETE PAVEMENT)

3.5.1 Use the subbase type specified in Annexure A.3. The requirements for each subbase type are specified in Table 8. **Subbase**

Subbase materials must be freshly mixed at a batch plant and delivered to site by a transit mixer.

Obtain subbase from a supplier who has satisfactorily produced material to relevant TfNSW requirements within the last 12 months.

3.5.2 Use Class 2 DGB dense graded granular material for roadbase as specified in Annexure A.3. Roadbase material must conform to Specification TfNSW 3051. **Roadbase**

Obtain roadbase from a supplier who has satisfactorily produced material conforming to TfNSW 3051 within the last 12 months.

3.5.3 Bitumen emulsion used for curing and tackcoating must conform to Specification TfNSW 3254. **Tackcoat**

Asphalt

3.5.4 Asphalt used in the wearing course or for bituminous ramps for road plates must be the asphalt type specified in Annexure A.3 and must conform to Specification TfNSW R116.

Obtain asphalt from a supplier which:

.1 Has satisfactorily produced material conforming to TfNSW R116 within the last 12 months.

.2 Has a current TfNSW approved mix design for the asphalt type.

Repair of road plate fixing holes

3.5.5 Repair road plate fixing holes using the following materials:

.1 For flexible or asphalt pavement, a premium grade proprietary bituminous cold mix. Normal cold mix asphalt is not acceptable. Store and handle mix according to the manufacturer's recommendations.

.2 For concrete pavement, a low-shrinkage cementitious repair concrete of minimum 40 MPa compressive strength.

The maximum aggregate size must suit the hole diameter.

Table 8 – Requirements for Subbase Materials

Material Type	Requirement
Sand cement mix	- Mix proportion of 8:1 sand to cement, with a moisture content of approximately 8%. - Suitable for compaction. - Freshly plant mixed and delivered to site in a transit mixer within 45 minutes after batching.
Weak lean mix concrete	- Compressive strength at 28 days: minimum 3 MPa and maximum 5 MPa. - Freshly plant mixed.
Cement bound granular material	- Stabilised with 4% GP cement, with a moisture content of approximately 8%. - Suitable for compaction. - Freshly plant mixed.

3.6 MATERIALS FOR CONCRETE PAVEMENT RESTORATION

Concrete for pavement restoration

3.6.1 Concrete for slab replacement must conform to Specification TfNSW 3201 and one of the mix designs specified in Annexure F.

The minimum design compressive strength of the concrete must be:

.1 5 MPa at 6 hours (for time-critical work only, where calcium chloride set accelerating admixtures are approved for use).

.2 20 MPa at 24 hours.

.3 40 MPa at 28 days.

3.6.2 Obtain concrete, freshly mixed at a batch plant and delivered to site in a transit mixer not more than 45 minutes after batching, from a supplier which: **Proven supplier**

.1 Has satisfactorily produced concrete to TfNSW specification requirements (bridge or road) within the last 12 months.

.2 Has a current TfNSW-approved mix design for the relevant mix.

3.6.3 Admixtures for use in concrete must conform to, and be used according to, Specification TfNSW 3201. **Admixtures for concrete**

3.6.4 Accelerating admixtures containing calcium chloride may be used to expedite the setting time of concrete, where approved by the TfNSW at the PRECONSTRUCTION SITE MEETING for time–critical work (e.g. overnight placement and reinstatement to traffic). **Set-accelerating admixtures**

Where calcium chloride set accelerating admixture is used, it must:

.1 Be added to the concrete in solution after the transit mixer arrives on site and just before the concrete is to be placed.

.2 Be thoroughly mixed in the transit mixer according to the mixing time specified on the transit mixer's conformance plate.

3.6.5 Surface debonding materials for weak lean mix concrete subbase must comply with the requirements in Specification TfNSW M258 Table 2. **Surface debonding materials**

3.6.6 Steel dowels, tiebars and mesh reinforcement must: **Dowels, tiebars and mesh reinforcement**

.1 Conform to the details shown in the design Drawings and the additional requirements of Table 9.

.2 Be without any unwanted kinks or bends and not be bent or straightened in a manner that will damage the material.

.3 Have a surface free of contamination and surface condition that does not impair its bond to the concrete slab.

3.6.7 Chemical anchor adhesives used to anchor tiebars into drilled holes in concrete slabs must be a suitable medium-set two-component epoxy or polyester setting system that is thoroughly mixed within the injection delivery system. Do not use rapid setting adhesive. **Chemical anchor adhesive system**

Where chemical anchors are supplied as glass capsules, the supplied diameter must just fit the design diameter of the drilled holes.

3.6.8 Material in isolation joints must be as follows: **Isolation joints**

.1 Preformed joint filler must be bitumen impregnated fibreboard conforming to Specification TfNSW 3204.

.2 Joint sealant must be a highway grade silicone sealant detailed according to the manufacturer’s requirements.

Table 9 - Requirements for Steel Dowels, Tiebars and Mesh Reinforcement

Component	Requirement	Specification
▪ Dowels	▪ Plain round reinforcing steel bars Grade 250N to AS/NZS 4671 (or AS/NZS 3679.1). ▪ Straight, 450 mm long and of 32 mm diameter. ▪ Prefabricated in welded assemblies, using cross bars, to ensure bar alignment. ▪ Free of irregularities (e.g. crimped ends, burrs, protrusions) which could hinder their movement at movement joints. Guillotining to length is not acceptable. ▪ Hot dip galvanised according to AS/NZS 4680. ▪ Debonded at one end by coating a length of 275 mm by two dips in bitumen emulsion, each being blinded with sand.	Specification TfNSW M258
▪ Tiebars	▪ The reinforcement material supplier must be certified by the Australian Certification Authority for Reinforcing Steels (ACRS) for the supply of reinforcement material. ▪ Deformed round reinforcing steel bars Grade 500N to AS/NZS 4671. ▪ Straight, 750 mm long and of 16 mm diameter.	TfNSW M258
▪ Mesh reinforcement	▪ The reinforcement material supplier must be certified by the Australian Certification Authority for Reinforcing Steels (ACRS) for the supply of reinforcement material. ▪ Plain round mesh reinforcement R500SL92 (or SL92 Grade 500L) to AS/NZS 4671. ▪ Be cut to the sizes, dimensions and shapes shown in the Drawings or the typical details provided in Annexure E. ▪ Where required, be bent to an internal bend radius at least twice the diameter of the bar.	TfNSW M258

3.6.9 Curing compounds must be one of the following: **Curing compounds**

.1 Where the base slab will be surfaced with asphalt, a bitumen emulsion conforming to Clause 3.5, or

.2 Where the base slab will be the wearing surface:

- A water-borne hydrocarbon resin or styrene butadiene resin (SBR) compound conforming to AS 3799 Class Z; or
- A C5 hydrocarbon resin compound conforming to AS 3799 Class B, with no added aromatic hydrocarbons.

3.6.10 Supply certification from the relevant manufacturers demonstrating that the chemical anchor adhesive system, curing compounds, and surface debonding compounds are suitable for the purpose. **Manufacturer's certification**

3.7 MATERIALS FOR RESTORATION OF OTHER ASSETS

Concrete other than slab replacement

3.7.1 Concrete for structures other than pavement must conform to Specification TfNSW 3201 and the following:

.1 Kerb/gutter alongside of or on top of flexible pavement or on top of concrete base: N40 (hand placed) or S25A10 (extruded or slipformed).

.2 Kerb/gutter alongside and tied to concrete base: N40 (hand placed) or S32A20Q (slipformed).

.3 Traffic islands, edge strips, medians, driveways: N32 (hand placed, reinforced, or unreinforced).

.4 Drainage structures: N40.

Other assets

3.7.2 Materials for restoration of other assets must meet the requirements of the relevant Council, road authority, property or service owner.

3.8 PLANT AND EQUIPMENT

Sawcutting existing asphalt and concrete

3.8.1 Sawcut existing asphalt and concrete pavements using a diamond or abrasive circular saw that is suitable for this use and fitted with a water coolant dust suppression and slurry recovery system.

Compaction equipment

3.8.2 Asphalt and granular materials must be compacted by self-propelled rollers equipped to deliver variable compactive effort. Where use of self-propelled rollers is impractical, vibrating plates may be used.

Internal vibrators for concrete compaction

3.8.3 Internal vibrators used for compacting concrete and weak lean mix concrete subbase must meet the following requirements:

.1 Have a minimum diameter of 50 mm.

.2 Operate at a frequency of between 8,000 and 12,000 vibrations/minute (130–200 Hz).

At least two vibrators must be available at the site (one as back up).

4 EXECUTION

4.1 GENERAL

4.1.1 **Process Held:** Commencement of road opening work on site. **HOLD POINT**

Submission Details: At least 2 BUSINESS DAYS prior to starting work on site, notify the TFNSW Nominated Representative of the confirmed date and time for commencement of works and submit documentation that verifies that the TfNSW has issued **all four of** the following:

.1 ROAD OPENING APPROVAL.

.2 ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES).

.3 Speed Zone Authorisation.

.4 Approved TCP for the work.

The commencement date must comply with the approved ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES).

Release of Hold Point: The TfNSW will review the submission and may direct further work prior to authorising release of the Hold Point.

4.1.2 Comply at all times with every requirement of the issued ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES) and the approved Speed Zone Authorisation, for example: **Comply with ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES) and approved Speed Zone Authorisation**

- Specified conditions for lane closures.
- Any restricted hours of work or night work requirements.
- All relevant records (e.g. dates of speed zones).

4.1.3 Manage traffic in accordance with: **Traffic management and night work**

.1 The issued ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES).

.2 The approved TCP for the Work.

During night work, ensure adequate reflective signposting and lighting is provided in accordance with the TCP (refer Clause 2.2).

4.1.4 Ensure the safety of all members of the public who may be affected by the execution of the Work (e.g. road users, pedestrians, residents, local workers and businesses). Provide safe access, detour arrangements and ramps for pedestrians. **Ensure public safety**

This includes, without limitation, providing all safety devices, traffic control, barricades, signs, warnings, and training of Your workers that are necessary for the protection of people and property.

Comply with relevant requirements of Clause 2.4 and the TCWS.

4.1.5 Stop work as necessary where risks to public health or safety exist. **Stop works and eliminate hazards**

Take prompt corrective action to eliminate existing, identified and predictable hazards.

4.1.6 Carry out the Work in a timely and expeditious manner to minimise and, where possible, prevent nuisance or inconvenience to anyone who may be affected by the performance of the Work. **Prevent nuisance or inconvenience**

Where access to private property is affected, liaise with the owner or tenant and make every effort to maintain access at all times.

Where disturbance to existing property services is unavoidable, maintain temporary service arrangements at all times.

4.1.7 Prevent any loss or damage or disturbance to any property, assets, services and the environment, except for unavoidable impacts that: **Prevent damage**

.1 Are limited to the minimum extent necessary for the performance of the Work in accordance with good engineering practice.

.2 Are identified and agreed at the planning stage.

.3 Are approved by the TfNSW and affected property owners.

.4 Are planned for reinstatement according to Clause 4.11.

Ensure that Your compaction methods do not cause damage or disturb buried utilities or services.

Do not remove or disturb any permanent survey marks, boundary markers or milestones located within the road reserve.

4.1.8 Promptly make good any damage to property or the environment caused by performance of the Work. Repair and restore damaged assets in accordance with this Specification. **Make good damage**

4.1.9 Additional information can be obtained from the following TfNSW Specifications regarding the pavement restoration requirements: **Use TfNSW M250 and TfNSW M258 for additional information on pavement restoration**

.1 Specification TfNSW M250 for an existing flexible pavement.

.2 Specification TfNSW M258 for an existing concrete pavement.

Some requirements may not be suitable for road opening work due to site-specific requirements, limited scale and time constraints.

4.1.10 Comply with all relevant environmental statutory requirements. **Environmental compliance**

This includes, but is not limited to, erosion and sedimentation control measures, and noise and dust control measures.

4.1.11 Tie-ins of the restored surface with kerbs, gutters, structures or adjacent pavement must not pond water or create a potential hazard for vehicles or pedestrians. **Tie-ins not to pond water or create hazards**

4.1.12 Keep the trafficked pavement adjacent to the road opening clean and safe for traffic at all times, including sweeping if necessary. **Keep adjacent roadway clean and avoid spillage and tracking**

Your vehicles or plant leaving the Work Area must not spill material or track mud onto the public road, footpath, or road reserve.

4.1.13 You are responsible for the appropriate and legal disposal of all surplus spoil material, removed material and waste that result from the Work and related road cleaning activities. All such material will become Your property unless otherwise specified. **Disposal of spoil material and waste**

4.1.14 The TfNSW Nominated Representative may direct the Proponent to suspend the whole or part of the Work for any reason or to carry out certain related works as required. **Directions to suspend work**

4.2 EXCAVATION OF ROAD OPENING

4.2.1 General

4.2.1.1 Under no circumstances is excavation to commence before You have completed the preconstruction check for buried utilities and services (refer Clause 2.2.8). **Restriction on commencement of excavation**

4.2.1.2 Prior to any excavation below the pavement layer using mechanical equipment, You must physically check the precise location and depth of any buried utilities or services that are identified in the vicinity of the road opening, using: **Physical check for identified buried utilities**

.1 Careful hand excavation or potholing techniques.

.2 Accredited services locators or appropriately trained personnel, where feasible.

4.2.1.3 Carry out excavation work according to the: **Key requirements**

.1 Risk management requirements for excavation and shoring (refer Clause 1.11).

.2 Road safety and stage construction requirements (refer Clause 2.4).

.3 Location and layout determined in Clause 2.5.

.4 Excavation and shoring design provided in Clause 2.6.2.

4.2.1.4 Avoid excavation work during rain or when rain is imminent. **Rain**

4.2.1.5 Inspect excavation and shoring according to the following minimum frequency:

Inspection

.1 Where road plates are in use – daily (refer Clause 4.4.2).

.2 Where road plates are not used and work is in progress – daily.

.3 Where road plates are not used and no work is in progress – at the frequency determined by the site-specific risk assessment.

4.2.2 Cut Out and Remove Existing Pavement Layer

4.2.2.1 Prior to excavation of the road opening, sawcut (where necessary), break out and remove the existing pavement layer(s), according to:

Remove existing pavement layer(s) for trench excavation

.1 The limits of the road opening trench excavation specified in the location and layout design (refer Clause 2.5).

.2 The minimum width necessary to excavate the trench.

.3 The sawcutting requirements set out below.

Mark out the limits of the trench excavation on site.

4.2.2.2 Saw cut and remove asphalt courses over flexible pavement:

Sawcutting of asphalt over flexible pavement

.1 Initially, 150 mm outside the limits of the road opening trench excavation.

.2 To the full depth of the wearing surface or, in the case of deep lift asphalt, to a minimum depth of 75 mm.

4.2.2.3 Sawcut concrete pavement slabs (including asphalt overlays), before breaking out and removing the slab for excavation, as follows (refer Figure E.2 to Figure E.4 of Annexure E):

Sawcutting of concrete pavement (including asphalt overlays)

.1 Initially, 200 mm outside the limits of the proposed trench excavation (or 100 mm where road plates will be used).

.2 To the full depth of the existing concrete pavement base slab and subbase slab (where present).

.3 With sawcuts not extending horizontally beyond the section of slab to be replaced. However, when cutting along existing longitudinal or transverse joints, sawcuts may extend 250 mm beyond the limits of the slab replacement.

4.2.2.4 Do not break out concrete pavement slabs and asphalt courses in a manner that will cause damage to, displace or undermine adjacent concrete slabs or kerb and gutter.

Precautions during removal of existing concrete pavement

4.2.3 Construction Requirements

4.2.3.1 Do not use blasting.

No blasting

4.2.3.2 Where natural seepage zones or subsoil drains are intercepted and the excavation makes water, maintain effective temporary drainage. If necessary, the excavation must be kept pumped out.

Drainage of excavation during works

4.2.3.3 Use the designated stockpile sites agreed with the TfNSW at the INITIAL SITE MEETING for stockpiling excavated material.

Stockpiling of excavated material

Do not stockpile excavated material within the zone of influence of the excavation (refer Figure 1 and Figure 2).

4.2.3.4 At each stage of excavation:

Condition of completed excavation

.1 The completed sides of the excavation must be straight, vertical and neatly trimmed. Ends of trenched excavations must be square to the line of trench.

.2 All loose waste material must be removed.

4.2.4 Stability of Excavation

4.2.4.1 Where excavation within the zone of influence of any building or structure (refer Figure 1 and Figure 2) is necessary:

Excavation within zone of influence of any structure

.1 Implement measures to ensure the stability of the building or structure according to Your excavation and shoring design (refer Clause 2.6.2).

.2 Provide on site supervision of the excavation work using Your Structural or Geotechnical Engineer.

.3 Minimise ground disturbance and vibration and the impact and severity of excavation.

4.2.4.2 For traffic or construction plant, the zone of influence may be assumed to be the minimum LATERAL CLEARANCE specified in Table 5 for which shoring is not required (refer Clause 2.6.2).

Zone of influence for traffic or construction plant

4.2.4.3 Do not locate construction plant (e.g. excavators, trucks) within the zone of influence of the excavation except where:

No construction plant within zone of influence prior to shoring

.1 Shoring is in place and effective (refer Figure 2); or

.2 Permitted according to Your excavation and shoring design.

4.2.4.4 Where shoring is required, it must be in place and effective before:

Restrictions on workmen and traffic prior to shoring

.1 Workmen enter the trench; or

.2 Traffic is permitted closer to the trench than the minimum LATERAL CLEARANCE specified in Table 5 for which shoring is not required (refer Clause 2.6.2).

4.2.4.5 Monitor long-term excavations to ensure that conditions have not deteriorated and become unfavourable (refer Table 5). In this case:

Long-term excavations

.1 Unshored excavations may require shoring; or

.2 Existing shoring may need to be upgraded.

4.3 SHORING OF EXCAVATION

Key requirements

4.3.1 Shore and brace the excavation according to:

.1 The shoring design requirements of Clause 2.6.2.

.2 The risk management requirements for excavation and shoring (refer Clause 1.11).

.3 The stage construction requirements of Clause 2.4.

Install and remove shoring according to design

4.3.2 Install and remove shoring according to Your shoring design.

Install shoring immediately after each new stage of excavation.

Immediately after removal of shoring, backfill the trench according to Clause 4.5.

Inspection and monitoring

4.3.3 Inspect and check shoring for adequacy and conformity with the shoring design using a Competent Person (or a Structural Engineer where the trench depth is 2 m or greater):

.1 Immediately after initial installation of each stage of shoring.

.2 During service, according to the minimum frequency specified in Clause 4.2.1.5.

.3 Where, during trenching, any significant changes occur to the original design conditions or assumptions. In this case, the shoring design must be reviewed by Your Structural Engineer and may need to be upgraded.

Fill voids

4.3.4 Fill gaps and voids:

.1 Behind shoring, to ensure that the shoring is stable and provides effective ground support.

.2 Under adjoining concrete pavement, to promote effective bearing support and load distribution.

Use good quality, non-friable, non-erodible filling material that is able to be compacted to provide adequate bearing capacity (e.g. weak lean mix concrete or sand cement mix conforming to Table 8). Compact the filling material using a method suitable for the confined space.

4.4 ROAD PLATES

4.4.1 **Process Held:** First use of road plates by traffic. **HOLD POINT**

Submission Details: At least 2 BUSINESS DAYS prior to first use of road plates by traffic, notify the TFNSW Nominated Representative of the intended date for use and submit documentation as follows:

.1 Design details and/or drawings for the road plates (refer Clause 2.6.3).

.2 Certification verifying that the installed shoring and road plates comply with the design and are safe for use by traffic.

Release of Hold Point: The TfNSW will review the submission and may direct further work prior to authorising release of Hold Point.

4.4.2 Inspect road plates daily to monitor their performance. **Inspect road plates**

4.4.3 Install, provide uniform bearing support conditions under, and fix the road plate according to the design (refer Clause 2.6.3) so that: **Uniform support and correct installation**

.1 The road plate is stable and does not rock under loads.

.2 The road plate operates with minimum noise.

Before traffic uses the plate, confirm uniform bearing using a test vehicle and correct any uneven bearing.

4.4.4 Where road plates are not fully recessed into the existing pavement, provide bituminous ramps to provide a smooth transition between the road plate FSL and the pavement FSL along all exposed edges. The bituminous material must be thoroughly compacted. **Provide bituminous ramps**

Bituminous ramps must have a minimum taper length of 1500 mm for each 50 mm vertical height difference at the edge of the road plate or part thereof.

Unless otherwise approved, the bituminous material must be asphalt hot mix conforming to Clause 3.5, with an aggregate size of 7 mm or 10 mm, tack coated to the pavement using bitumen emulsion.

However, for short term installations not exceeding 7 days, the ramps may be formed with a premium grade proprietary bituminous cold mix, tack coated to the pavement where necessary.

4.4.5 Permanent deformation of each installed road plate must not exceed 10 mm from the true, straight and level position (using a straight edge placed parallel to either long or short axis of plate). **Permanent deformation**

Immediately remove excessively deformed road plates from service and replace them. Do not heat or cold straighten or turn upside down excessively deformed road plates.

4.4.6 Maintain the skid resistance of the road plate surface to meet the requirements of Specification TfNSW 3368 at all times on at least:

Maintain skid resistant surface

.1 90% of the total surface area of the road plate.

.2 80% of the surface area of each clearly defined wheel path.

Otherwise, replace with a complying road plate.

4.4.7 Maintain road plates and bituminous ramps to ensure the stability and serviceability of the plates and the line and level of the ramps while they are under traffic.

Maintain road plates and ramps

4.4.8 After removal of road plates from a trafficked pavement:

Restore roadway after removal of road plates

.1 Remove asphalt ramps, bedding materials, and plate fixings.

.2 Clean the pavement surface.

.3 Repair redundant fixing holes in the pavement.

4.4.9 Repair redundant road plate fixing holes as follows:

Repair of redundant fixing holes in pavement

.1 For asphalt pavement, fill the hole with a premium grade proprietary bituminous cold mix according to the manufacturer's recommendations.

.2 For concrete pavement, fill the hole with cementitious repair concrete. Ensure the hole is clean prior to filling.

.3 Compact the repair material to slightly overfill the hole and roll the surface smooth.

4.5 BACKFILLING OF EXCAVATION

4.5.1 For shored excavations, each section of trench must be backfilled immediately after removal of shoring in that section. Backfilling of each section must be completed within 1 working day.

Backfill immediately after shoring removed

4.5.2 Where natural seepage zones or subsoil drains are affected by the excavation or the proposed use of impermeable backfill (e.g. weak lean mix concrete or sand cement mix), their continuity must be restored by replacing damaged subsoil drains and by including a 100 mm thick layer of permeable sand or gravel to surround the subsoil drains before backfilling.

Restore permanent subsoil drainage

Where excavation occurs in impermeable material (e.g. clay), ensure that a moisture trap is not created that could weaken the road pavement. Install effective subsoil drainage (including a suitable outlet) as necessary.

Install and restore buried utilities

4.5.3 Before commencement of backfilling:

.1 Install new buried utilities and services to the requirements of the utility or service owner(s), including protective sleeving.

.2 Restore all existing stormwater pipes, subsoil drainage pipes, and other buried utilities and services to the requirements of the relevant utility or service owner(s).

.3 Where concrete bedding or concrete encasement of a buried utility or service is required, ensure that the concrete has achieved its required early design strength.

Bottom backfill layers, including protective layer

4.5.4 For bottom backfill layers around a buried utility or service or drainage pipe, including the protective layer and replacement of any unsuitable material at the excavation base, backfilling must comply with the requirements of the utility or service or pipe owner.

Backfill above the protective layer

4.5.5 For backfill above the protective layer of a buried utility or service or pipe, place and compact the backfill material as follows:

.1 In layers not exceeding 150 mm compacted thickness.

.2 Where subbase material is used (i.e. sand cement mix, weak lean mix concrete, or cement bound granular material), according to the requirements of Table 10.

.3 Where select fill material is used, to achieve a minimum 98% standard relative compaction according to Test Method TfNSW T166.

Moisture content of backfill

4.5.6 Backfill material must have adequate moisture content to achieve the specified compaction. Adjust and control the moisture content as necessary. Prevent over-wetting or excessive drying of material that would cause loss of material density and strength. Moisture must be uniformly distributed within each layer at the time of compaction.

4.6 TEMPORARY PAVEMENT RESTORATION

Scope

4.6.1 To enable prompt reopening of the Work Area to traffic after completion of backfilling, provide a temporary restoration of the road pavement that includes the following courses:

.1 Subbase Course (refer Clause 4.7).

.2 Asphalt Course (refer Clause 4.9), if required under Clause 4.6.2.

The temporary pavement restoration may be partly or fully replaced during the permanent pavement restoration. In some cases, a temporary pavement restoration may not be required.

Details of work

4.6.2 The requirements for temporary pavement restoration (e.g. course thickness and type) must be agreed with the TfNSW at the INITIAL SITE MEETING.

The course thicknesses need not match the corresponding course thicknesses of the adjoining pavement or the permanent restoration.

Where there is no existing asphalt course on the adjoining pavement or an asphalt course is not required, apply a sprayed bituminous seal in lieu of the asphalt course.

Low Risk road openings and time–critical work

4.6.3 For Low Risk road openings and time-critical work, You must only use freshly mixed sand cement mix subbase material.

Restriction on reopening work to traffic

4.6.4 Do not reopen the temporary pavement restoration work to traffic unless:

.1 The restoration matches the adjoining pavement FSL.

.2 The surface is safe for use by traffic.

.3 When measured by a 1.5 metre straight edge laid in any direction achieves a gap below the straight edge no greater than 5 mm.

Maintenance of temporary pavement restoration

4.6.5 The condition of the temporary pavement restoration must satisfy the conditions in Clause 4.6.4 until the permanent pavement restoration is completed. Maintenance of the temporary pavement restoration will be undertaken in accordance with Clause 1.7.

4.7 PAVEMENT RESTORATION – SUBBASE COURSE

Type and thickness of course

4.7.1 The type and thickness of the reinstated subbase course is specified in Annexure A.3 and Your approved pavement restoration design.

Moisture content

4.7.2 Subbase material must have adequate moisture to achieve the specified compaction according to Table 8. Moisture must be uniformly distributed within each layer at the time of compaction.

Place and compact subbase

4.7.3 Each layer of subbase material must be placed and uniformly compacted according to the requirements of Table 10 before the next layer is commenced. The full depth of the material must be compacted over the entire area of placement.

Table 10 – Requirements for reinstating subbase

Material Type	Requirement
Weak lean mix concrete	Place, spread and compact concrete mix using internal vibrators according to Clause 4.10.
Sand cement mix	Compact plant mixed material using at least 3 passes with a vibrating plate compactor. Compacted thickness of each layer must not exceed 100 mm.
Cement bound granular material	Compact plant mixed material using at least 3 passes with a vibrating plate compactor. Compacted thickness of each layer must not exceed 100 mm.

4.8 PAVEMENT RESTORATION – ROADBASE COURSE

4.8.1 The type and thickness of the reinstated roadbase course is specified in Annexure A.3 and Your approved pavement restoration design. **Type and thickness of course**

4.8.2 Roadbase material must have adequate moisture to achieve the specified compaction and to ensure that the road can be trafficked without shoving, ravelling or rutting after compaction. Moisture must be uniformly distributed within each layer when compacted. **Moisture content**

4.8.3 Each layer of roadbase material must be placed and uniformly compacted before the next layer is commenced as follows: **Placement and compaction**

.1 In layers not exceeding 100 mm compacted thickness. **Layer thickness**

.2 Compaction must be a continuous operation commencing as soon as practicable after spreading each new layer of material. The full depth of the material must be compacted over the entire area of placement.

.3 The compaction effort is either:

- At least 4 passes with a vibrating plate compactor; or
- At least 6 passes with a self-propelled vibrating smooth drum roller that fits within the trench width.

4.8.4 Trim the top of the roadbase course to produce an even surface parallel to the pavement Finished Surface Level (FSL). **Trimming**

4.9 PAVEMENT RESTORATION – ASPHALT COURSE

4.9.1 The type and thickness of the reinstated asphalt course is specified in Annexure A.3 and Your approved pavement restoration design. **Type and thickness of course**

4.9.2 Prior to pavement restoration, remove the existing asphalt course or asphalt overlay as follows: **Remove existing asphalt for final pavement restoration**

.1 150 mm outside the limits of pavement restoration specified in the pavement restoration design with a minimum asphalt cut out width of 1800 mm (refer Clause 2.7.2 and Figure E.1 of Annexure E). Joints must not be located in wheel paths.

.2 To provide a milled or jack hammered face along the edges of the asphalt pavement restoration, after asphalt removal. Edges must be straight, near-vertical and neatly trimmed. Saw cut edges are not acceptable.

All loose waste material must be removed.

4.9.3 Do not place asphalt if the underlying pavement is wet or rain is imminent. **Climatic and pavement temperature constraints**

Asphalt layers of 50 mm thickness and less must not be placed unless the pavement temperature is at least 8°C for dense graded asphalt and 13°C for open graded asphalt, and rising in each case.

4.9.4 Preparation of the pavement must be completed prior to tackcoating and placing asphalt and must include cleaning the surface so that it is free of loose stones, dirt or foreign materials. **Preparation of surface**

4.9.5 Prior to laying asphalt, apply a tackcoat to the vertical sides and bottom (i.e. over the restored roadbase or concrete base course) of the pavement restoration. Avoid overspray where the bitumen can be picked up by traffic or construction equipment. **Tackcoating**

The residual bitumen from the tack coat must be evenly spread over the surface at an application rate nominated by You, which must be between 0.15 and 0.30 litres per square metre (doubled for vertical surfaces and contact surfaces of kerbs and gutters).

4.9.6 The as-constructed thickness of each compacted layer of asphalt must be within the limits of 3.0 to 5.0 times the nominal mix size. **Layer thickness**

4.9.7 Unless otherwise specified by the TfNSW, place asphalt using a mechanised process such as an asphalt paving machine that minimises handling and the segregation of uncompacted asphalt. **Placing asphalt**

Hand placement of asphalt is only permitted for minor correction of the existing surface and in areas where placement by mechanical means is impracticable.

4.9.8 Place and compact asphalt within the range of temperatures specified in the asphalt supplier's written recommendations. Measure asphalt temperature prior to placing according to Table 12. **Temperature of asphalt**

Asphalt that exhibits a temperature variation must not be incorporated in the Works unless it has been remixed to a consistent and adequate temperature for compaction.

4.9.9 Compaction must be a continuous operation and must commence as soon as practicable after spreading the new material. The full depth of the material must be compacted over the entire area of placement. Uniformly compact each layer before the next layer is commenced. **Compacting asphalt**

All activities associated with compaction and primary trimming must be completed within the allowable working time of the asphalt. No surface indentations are permitted after compaction.

4.9.10 The asphalt course must be finished with a flat planar surface, and when measured by a 3 metre straight edge laid in any direction, achieves a gap below the straight edge no greater than 5 mm. Joints and edges must be compacted to avoid reduced density along edges of the pavement restoration. **Joints and edges**

Joints must be constructed by:

.1 Removing uncompacted or cracked material along the edge of the adjoining existing pavement prior to placing asphalt adjacent to the edge.

.2 Providing a positive bond by tackcoating to the adjoining pavement material.

4.9.11 Do not reopen newly placed asphalt pavement work to traffic until the dry pavement surface temperature is less than 60°C. **Restriction on reopening work to traffic**

4.10 PAVEMENT RESTORATION – CONCRETE PAVEMENT COURSE

4.10.1 **Process to be Witnessed:** Placement of concrete pavement restoration and reopening the work to traffic (for each stage). **WITNESS POINT**

Submission Details: At least 3 BUSINESS DAYS prior to placement of each stage of concrete pavement, notify the TFNSW Nominated Representative of the date and time for placement of that stage.

4.10.2 The type and thickness of the reinstated concrete course is specified in Annexure A.3 and Your approved pavement restoration design. **Type and thickness of course**

4.10.3 Prior to concrete pavement restoration, sawcut, break out and remove the existing concrete pavement slabs according to: **Remove existing concrete and subbase for pavement restoration**

.1 The limits of concrete pavement restoration determined by the TfNSW (refer Clause 2.7.2). The TfNSW will mark out these limits on site, using pavement markings.

.2 The requirements for sawcutting of concrete pavement slabs set out in Clause 4.2.2.3 (except limits).

Remove the existing subbase underlying removed base slabs down to the level specified in the concrete pavement restoration design.

4.10.4 Comply with the requirements of Clauses 4.2.2.4 and 4.2.3 for precautions during concrete slab removal work, stockpiling of removed material, and condition of the completed opening for the concrete pavement restoration. **Requirements for concrete slab removal work**

4.10.5 Where unsuitable subbase material is uncovered after removal of existing concrete slabs (i.e. deemed unsuitable by the TfNSW), remove the unsuitable material and replace it with subbase material according to Clause 4.7. This work is at no cost to the Proponent. **Replace unsuitable subbase material uncovered by concrete removal**

4.10.6 The surface under the concrete course must be free of any loose debris, unevenness or irregularity that would restrain the overlying base concrete from horizontal movement.

No surface irregularities under base

Bumps, defects or protrusions must be removed.

4.10.7 Where weak lean mix concrete is the subbase, apply a membrane of surface debonding material of adequate thickness to the top of the subbase course to ensure that complete debonding is achieved.

Debond weak lean mix concrete subbase

4.10.8 Do not place concrete during rain or when rain is imminent.

Rain

4.10.9 Prior to placing concrete:

Preparation of sides and base of sawcut opening for concrete pavement restoration

.1 At tied construction joints, with the exception of the top and bottom 45 mm of the joint face, lightly scabble the vertical joint faces of the adjoining slab. Avoid damage to tiebars.

.2 Ensure that the sawcut opening for the concrete pavement restoration, including all vertical joint faces and projecting tiebars, is clean and free of loose material or excess water.

4.10.10 Install dowels for transverse contraction joints, in prefabricated assemblies, at the locations specified in the design Drawings.

Installation of dowels

Dowels must be:

.1 Installed with the debonded end located on one side of the contraction joint.

.2 Supported so that no part of the assembly except the dowel crosses the joint.

4.10.11 Drill holes for tiebars (for tied construction joints) in the adjoining slab face according to the tiebar locations and details specified in the design Drawings.

Drilled holes for tiebars

The diameter and length of the drill hole must suit the size of the tiebar and the type of chemical anchor adhesive system used. Unless otherwise specified, the drill hole diameter must not be more than 4 mm greater than the diameter of the tiebar.

Drilling must not cause damage to the slab (e.g. broken edges). Repair any damage and fill any holes that are drilled but not used.

Installation of tiebars

4.10.12 Tiebars must be securely fixed in pre-drilled holes using a chemical anchor adhesive system installed according to the adhesive manufacturer's recommendations.

Prior to insertion of adhesive, the drilled holes must be thoroughly cleaned to remove drilling dust and debris, using an industrial vacuum cleaner or oil-free compressed air. Ensure complete removal of dust from the end of the hole.

Insert a sufficient volume of adhesive into the cleaned hole such that the adhesive will just fill the hole once the tiebar is inserted.

Immediately after insertion of adhesive, insert the tiebar, rotating the tiebar into the hole in order to maximise bond between the adhesive and both the tiebar and the concrete. Confirm complete filling of the hole by observing excess adhesive squeeze from the hole.

Installation of mesh reinforcement

4.10.13 Mesh reinforcement must be placed:

.1 Above the tiebars and dowels.

.2 To provide at least 65 mm top cover to the mesh.

.3 Horizontally, terminating at 50 mm from joints or slab edges.

The mesh must be supported in place on bar chairs to which it is tied. Use sufficient chairs to prevent deflections or displacement of the mesh during placing and compaction of the concrete.

Installation of isolation joints

4.10.14 Install isolation joints at pits and structures using preformed joint filler according to the design Drawings.

Placing and vibrating concrete

4.10.15 Place and spread concrete into its final position using shovels. Internal vibrators must not be used to spread concrete.

Vibrate the placed concrete in two passes (with a maximum speed of advance of 1.5 m/min) using either:

.1 A vibrating screed supported off adjacent concrete slabs; or

.2 A vibrating bull float.

Compaction of concrete

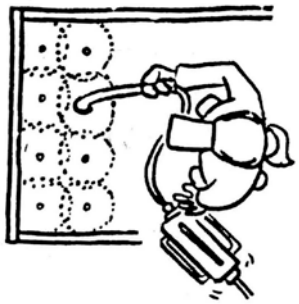
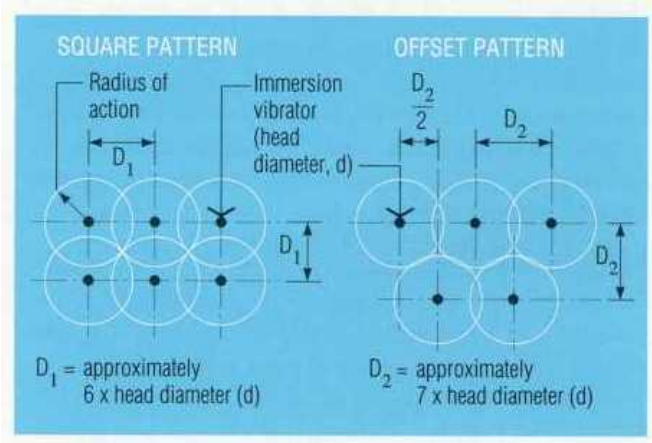
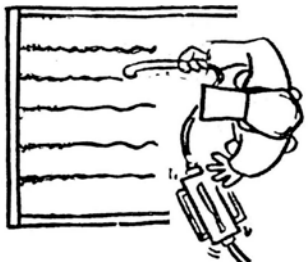
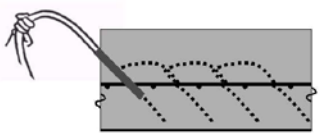
4.10.16 You must compact concrete using:

.1 Internal vibrators complying with Clause 3.8.

.2 A pattern of regular and systematic insertions using one of the methods shown in Table 11.

Vibration near unsupported edges of concrete or when the concrete is moving is not included as part of the compaction time or effort.

Table 11 – Internal Vibration Methods

Method	Diagram	Guideline Parameters (i)
1. Dip method	 Plan view of method	▪ Insertions using one of the patterns in the diagram below, where the spacings D_1 and D_2 must be 300 mm maximum, and ▪ Insertion durations of 10 secs minimum, and ▪ Withdrawal speed not exceeding 1.5 m/min.  *Source: "Concrete Practice on Building Sites". SAA Handbook HB67 – 1995, jointly as Cement & Concrete Association publication C&CAA T43 (1995).*
2. Drag method	 Plan view of method	▪ Vibrator paths at spacings of 350 mm maximum, and ▪ Travel speed of 1.5 m/min maximum.
3. Modified Drag method (for reinforced pavement)	 Section view of method	▪ Vibrator paths at spacings of 350 mm maximum, and ▪ Insertion spacings of 350 mm maximum, and ▪ Nett horizontal travel speed of 1.5 m/min maximum, and ▪ Withdrawal speed not exceeding 1.5 m/min.

NOTES:

(i) The vibration intensity required to achieve compaction conformity will vary according to the workability of the concrete. The guideline parameters are specified as minimum levels only, and higher compaction levels may be required to produce conforming results.

4.10.17 The concrete course must be finished with a flat planar surface, matching the surface of the adjoining concrete pavement slabs. Neatly trim all joins with adjoining slabs (not using edging tools). **Finishing and texturing of concrete surface**

Provide a transversely textured finish to the surface as follows:

.1 Where an asphalt wearing surface will cover the concrete, to achieve a lightly broomed texture finish.

.2 Where there is no asphalt wearing surface, to match the surface texture in adjoining slabs.

4.10.18 Immediately after finishing and texturing, apply a sprayed film of curing compound to the concrete surface, so as to form a continuous uniform and unbroken film. **Curing of concrete**

Where hydrocarbon resin curing compound is used, it must be applied at an application rate of at least 0.40 L/m^2.

Where bitumen emulsion curing compound is used, it must be applied at an application rate of not less than 0.50 L/m^2 residual bitumen.

4.10.19 Where feasible, cover the concrete surface with waterproof plastic sheeting immediately after applying curing compound, so as to minimise temperature losses and related cracking. Covers must be secured and weighed down to prevent air movement under the cover. Do not remove covers during very cold conditions. **Covering concrete**

4.10.20 Protect newly placed concrete from damage (e.g. from finishing and covering operations, rain, or construction vehicles) at all times until the newly placed concrete is reopened to traffic. **Protecting concrete**

4.10.21 Do not reopen newly placed concrete pavement work to traffic until it has developed a nominal compressive strength of at least: **Restriction on reopening work to traffic**

.1 5 MPa (for time-critical work); or

.2 20 MPa (where set-accelerating admixtures are not used).

so that it can carry traffic without damaging the Work.

NOTE: Use of a mix design in Annexure M209/F containing calcium chloride is deemed to meet requirement (1) at 6 hours after placing.

4.11 RESTORATION OF OTHER ASSETS

4.11.1 Unless otherwise specified on the Drawings, You must replace, repair, reinstate or otherwise restore as near as practicable to their pre-existing condition all road assets, other TfNSW assets, buried public utilities, surfaces, services and other public or private assets that are disturbed, destroyed, or damaged during the work.

Scope of restoration work in road reserve or on private property

"Other public or private assets" is deemed to include but not be limited to: existing shrubs, gardens, retaining walls, fences, signs, shelters and all other structures. Take photographs to record the condition of such assets before and after the Works.

4.11.2 All such restoration work must be at Your cost and at no cost to the TfNSW (refer Clause 1.3).

Restoration at no cost to the TfNSW

4.11.3 The extent and details of restoration of road assets and other TfNSW assets will be determined by the TfNSW and confirmed at the PRECONSTRUCTION SITE MEETING.

Restoration details

Where there is damage to the surrounding road pavement resulting from Your work, the TfNSW reserves the right to extend the extent of the necessary restoration.

4.11.4 Where the road opening extends beyond the trafficked pavement, backfill the trench with the previously excavated material.

Trenches outside pavement areas

Backfill material must not be placed above the original ground surface level (after making reasonable allowance for settlement). Place topsoil in the top layer of the backfilled trench at the same thickness as in adjacent areas.

4.11.5 Where loops for traffic signals or traffic facilities, or pavement delineation (e.g. line marking, pavement markers), are disturbed or damaged during the Work, You must:

Reinstatement of loops for traffic signals or traffic facilities and pavement delineation

.1 Immediately notify the TfNSW Transport Management Centre (TMC) when loops for traffic signals or traffic facilities have been disturbed or damaged.

.2 Provide alternative signposting and/or temporary measures for pavement delineation as necessary.

You must liaise with the TfNSW regarding the permanent reinstatement of loops for traffic signals or traffic facilities and pavement delineation. Permanent reinstatement will be carried out by the TfNSW at Your cost according to Clause 1.7.

4.11.6 Reinstate all traffic control devices (e.g. speed limit signs, other regulatory or warning road signs) that are affected by the Work to their previous location and condition.

Traffic control devices

4.11.7 Reinstate pavement markings to match existing pavement markings.

Pavement markings

4.11.8 During backfill, restore all existing buried utilities to the requirements of the utility/service owner (refer Clause 4.5).

Buried utilities

4.11.9 Restore kerbs and gutters according to their original design and configuration, with profile matching that of adjacent sections. **Concrete kerbs and gutters**

Where a section of kerb and gutter has been removed, neatly cut each end of the section using a concrete saw prior to restoration.

Kerb and gutter must be tied to concrete pavement using tiebars placed at mid-depth of the cross section and spaced at 300 mm centres.

4.11.10 Restore, to the requirements of the TfNSW and Council, any footpaths and landscaping damaged or affected by the Work. **Footpaths and landscaping**

4.11.11 Restore, to the requirements of the TfNSW and Council and property owners, any fencing and other public or private assets damaged or affected by the Work. **Fencing and other public or private assets**

4.11.12 Reinstate accesses using materials and standards of construction of equal or better quality to the original construction. **Private accesses**

4.11.13 Restoration work is an integral part of the Work. **Failure to restore damaged assets**

Failure to restore any asset to the joint requirements of the TfNSW, Council and respective utility owner or property owner will be deemed to be incomplete work and may affect release of the PERFORMANCE BOND (refer Clause 5).

In this case, the TfNSW reserves the right to undertake the necessary restoration work at Your cost (refer Clause 1.7).

5 CONFORMITY

5.1 A certificate from the supplier must accompany supply of all materials to certify that their quality complies with this Specification. The TfNSW may request such documentation for audit. The minimum period for retention of the certificates is until the end of the WARRANTY PERIOD for the Work. **Supply of materials**

Supplied materials found to be unsuitable must not be used in the Work.

5.2 The as-constructed Work must comply with the process controls and conformity criteria listed in Table 12. **Process control and conformity**

Conformity testing and verification

5.3 For Low Risk road openings, You are not required to provide test results to verify construction conformity of the Work.

For Medium or High Risk road openings, You must provide test results to verify construction conformity of the Work, according to the relevant testing requirements and conformity criteria set out in Table 12, for the following construction activities:

.1 Concrete pavement restoration.

.2 Any other construction activities deemed to be critical by the TfNSW at the PRECONSTRUCTION SITE MEETING.

The TfNSW reserves the right to carry out any audit, inspection, and testing deemed necessary to audit conformity of the Work.

You are responsible for meeting the cost of all testing (including the necessary audit testing by the TfNSW).

Concrete pavement

5.4 For concrete pavement, unless otherwise specified by the TfNSW, You must provide:

.1 Testing documentation verifying that, when the new concrete is reopened to traffic, the restored pavement would have developed the compressive strength required in Clause 3.6.

.2 A completed concrete pavement check list (Annexure D), including details of the mix design.

Photos of each stage of excavation

5.5 Provide photographs of the work in progress that show each stage of excavation prior to backfilling of that stage.

WORK-AS-EXECUTED DRAWINGS

5.6 Progressively annotate any changes to the Drawings on a separate set of WORK-AS-EXECUTED DRAWINGS.

The WORK-AS-EXECUTED DRAWINGS must:

.1 Provide work-as-constructed details of the buried utility or service, including the cover depth below the pavement FSL.

.2 Represent the final position, layout, and dimensions of the backfilled road opening.

.3 Provide details of the permanent restoration (where carried out by the Proponent).

Within 20 BUSINESS DAYS after completing the Work submit a copy of the WORK-AS-EXECUTED DRAWINGS:

.1 To the utility owner.

.2 To the TfNSW (for Medium and High Risk road openings only).

DATE OF COMPLETION

5.7 The DATE OF COMPLETION for commencement of the WARRANTY PERIOD is as defined in Annexure M.3.

5.8 You must warrant that the Work as completed will be free from defects in workmanship and materials during the WARRANTY PERIOD. **Warranty on completed work**

5.9 Where defects in the Work carried out by You (e.g. buried utility or service, backfill and temporary restoration) become evident during the WARRANTY PERIOD: **Repair of defective work**

.1 You must re-excavate the defective section of road opening, repair the defects, and again backfill and carry out a temporary restoration of the defective section, at Your cost.

.2 The TfNSW will undertake the permanent pavement restoration of the defective section of road opening at Your cost by deduction from the PERFORMANCE BOND.

Alternatively, the TfNSW reserves the right to undertake all necessary rectification work at Your cost by deduction from the PERFORMANCE BOND.

5.10 If the Work is commenced and for any reason is not able to be completed within a reasonable time or is unfinished, the PERFORMANCE BOND may be called upon. **Incomplete works**

The PERFORMANCE BOND will be used to either complete the Work, or if the amount of funds does not permit completion, take the Work to a stage where it is rendered safe for the public and traffic.

5.11 At the end of the WARRANTY PERIOD, You must contact the TfNSW to organise a joint FINAL INSPECTION at the site. **FINAL INSPECTION and return of PERFORMANCE BOND**

The TfNSW will, on Your written request, return the PERFORMANCE BOND, or balance thereof, subject to any deductions which have occurred during the Work:

.1 To rectify Your nonconforming or incomplete work, or

.2 For any other work carried out by the TfNSW at Your cost and invoiced, but unpaid by You (refer Clause 1.8).

Table 12 – Process controls and conformity criteria

Item	Clause Reference	Property	Test Method	Criteria	Minimum Testing Frequency
Excavation	2.2.8 and 4.2.1	Identification of existing buried utilities	'Dial Before You Dig' check	Certified check	Before excavation
	4.2.1	Location/depth of existing buried utilities	Physical check	± 20 mm	Before excavation
	2.5 and 4.2.2	Limits of excavation and sawcutting	Measure	± 50 mm parallel & square to trench	Each edge
	4.2, 4.3 and Tables 2 & 4	Trench depth and width Trench sides and ends	Measure Inspect	± 50 mm Straight & vertical	At 1 m intervals along trench

Item	Clause Reference	Property	Test Method	Criteria	Minimum Testing Frequency
Shoring of Excavation	2.6.2, 3.2 and 4.3	Shoring and bracing (Medium or High Risk road openings)	Inspect using Competent Person	Safe, complies with design and Clause 3.2 (for components)	As per Clause 4.2.1
Road Plates	2.6.3	Plate thickness	Physical check	Table 7 or per design	Before use
	3.3	Plate material grade	Check plate ID	250 MPa or greater	Before use
	2.6.3 and 4.4	Plate correctly installed: ▪ Plate FSL ▪ Recessing ▪ Alignment/gaps ▪ Bearing support ▪ Noise level	Inspect	Clause 2.6.3: ▪ FSL ± 5 mm ▪ Complies ▪ Complies ▪ Plate stable ▪ Minimal noise	Every day
	2.6.3.11	Road plate fixings	Inspect	Not loose and comply with Clause 2.6.3.11	Every day
	4.4.4	Bituminous ramps	Inspect	Clause 4.4.4	Every day
Road Plates (cont'd)	3.3.4 and 4.4.5	▪ Initial straightness ▪ Permanent deformation	Straight edge over both long and short axes of plate	▪ ≤ 5 mm ▪ ≤ 10 mm	▪ Before use ▪ Every day
	3.3 and 4.4.6 TfNSW 3368 Clause 3	Skid resistant top surface	Visual inspection BPN test	> 90% intact (overall) > 80% intact (wheel path) BPN ≥55	Before use and Every day TfNSW 3368
Backfilling	3.4	Backfill material	Check	Clause 3.4	Each load
	4.5.4	Bottom layers incl. utility protective layer	Inspect	Utility owner's requirements	Each stage of backfill
	4.5.5	Thickness of each layer	Measure	≤ 150 mm	During placing
	4.5.6	Moisture content	Inspect	Clause 4.5.6	During placing
	4.5.5	Compaction: ▪ Subbase material ▪ Select fill material	▪ Inspect ▪ TfNSW T166	▪ Table 10 ▪ ≥ 98% relative compaction	During placing
Temporary Pavement Restoration	2.7.2	Limits of pavement restoration	Measure	± 100 mm parallel & square to trench	Each edge of restoration
	4.6	Subbase, Roadbase and Asphalt courses as for Subbase, Roadbase and Asphalt below			
	4.6.3	Temporary restoration FSL	Measure	- 0 / + 5 mm adjoining pavement FSL	After compaction
	4.6.4	Restoration Shape	1.5 m Straight Edge	5 mm in any direction	After compaction
Subbase	3.5.1 & 5.1	Subbase material	Supplier certificate	Table 8	Each load
	4.7.2	Moisture content	Inspect	Table 8	During placing
	4.7.3	Thickness of each layer	Measure	≤ 100 mm	During placing
	4.7.3	Compaction	Inspect	Table 10	During placing

Item	Clause Reference	Property	Test Method	Criteria	Minimum Testing Frequency
Roadbase	3.5.2 & 5.1	Roadbase material	Supplier certificate	TfNSW 3061	Each load
	4.8.2	Moisture content	Inspect	Clause 4.8.2	During placing
	4.8.3	Thickness of each layer	Measure	≤ 100 mm	During placing
	4.8.3	Compaction	Inspect	Clause 4.8.3	During placing
	4.8.4	Finished surface - levels	Measure	- 0 / + 10 mm design RL	After compaction
Asphalt	3.5.4 & 5.1	Asphalt material	Supplier certificate	TfNSW R116	Each load
	4.9.3	Temperature of pavement	Measure	Clause 4.9.3	Before placing
	4.9.4	Pavement surface preparation	Inspect	Clause 4.9.4	Before placing
	4.9.6	Thickness of each layer	Measure	3.0 to 5.0 times the nominal mix size	During placing
	4.9.5	Tackcoating	Inspect	Clause 4.9.5	Before placing
	4.9.8	Temperature of asphalt	See Note 1	Supplier's written recommendations	Before placing
Asphalt (cont'd)	4.9.9	Compaction	Inspect	Clause 4.9.9	During placing
	4.9.10	Asphalt joints - FSL	Measure	-0 / +2 mm adjoining pavement FSL	After compaction
	4.9.10	Shape	3 m straight edge	5 mm in any direction	After compaction
Concrete	2.7.2 and 4.10.3	Limits of concrete pavement restoration and sawcutting	Measure	± 50 mm parallel & square to existing longitudinal joints	Each edge of restoration
	4.10.6 and 4.10.9	Preparation of base and sides of saw-cut opening for concrete pavement	Inspect	Clean, even and defect-free surfaces. Scabbled at tied joints	Before placing
	3.6 & 5.1	Concrete materials	Supplier certificate	Clause 3.6 and TfNSW 3201	Before placing
	3.6.1	Design compressive strength of concrete	Supplier certificate based on trial mix	Clause 3.6.1 and Annexure F	Before placing
	4.10.2	Thickness of concrete slab	Measure	-0 / +10 mm design thickness	Before placing
	4.10.10	Dowels at contraction joint: ▪ Location (x and y axes) ▪ Alignment in assembly ▪ Debonded ends	Inspect and Measure	Clause 4.10.10 ▪ ± 10 mm design ▪ Horizontal ± 2 mm ▪ All on same side	Each dowel
	4.10.11	▪ Tiebars: Drill hole details and installation	Inspect	Clause 4.10.11	Each tiebar
	4.10.13	Mesh reinforcement : Layout, cover, laps, location	Inspect	Clause 4.10.13	Before placing

Item	Clause Reference	Property	Test Method	Criteria	Minimum Testing Frequency
	4.10.16	Compaction	Inspect	Table 11	During placing
	4.10.18-20	Curing and protection	Inspect	Clauses 4.10.18 to 20	After placing
	4.10.17	Concrete joints - FSL	Measure	- 0 / + 2 mm adjoining pavement FSL	At 1 m intervals along joints
	4.10.17	Finished surface – levels	2 m straight edge	± 5 mm design FSL	After placing
	4.10.17	Finished surface - texture	Inspect	Clause 4.10.17	After placing
	4.10.21	Compressive strength of concrete prior to reopening to traffic	Nominal strength based on certificate for trial mix	▪ 5 MPa (time-critical work) ▪ 20 MPa (other)	Based on curing time upon re-opening to traffic
Restoration of other assets	4.11	Compare before and after condition	Compare before and after photos	As near as practicable to pre-existing condition	After restoration

NOTES:

1 The temperature of asphalt must be measured immediately prior to placing. Measure and monitor paving and compaction temperatures with a hand held or machine mounted infrared thermometer readable and accurate to within ± 2ºC at the discharge point from a tipper truck or at the distribution auger on the paver.

ANNEXURE A – DETAILS OF WORK

A.1 APPLICATIONS FOR LICENCES AND PROPOSED DETAILS

ROAD OPENING APPROVAL	Application Submitted?: Yes / No *
ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES)	Application Submitted?: Yes / No *
Name of Proponent (e.g. contractor for utility owner or developer) (as per Form D)	
Owner of utility or developer for purpose of road opening	
Proposed Location (as per Form D)	
Proposed Scope and Layout of Road Opening	
Proposed Overall Length	
Proposed trench dimensions (Depth / Width)	
Details of proposed buried utility (Type / Diameter)	
Proposed minimum Cover Depth to proposed buried utility	(related to pavement FSL)
Proposed Use of Road Plates	
Notes: (*) Strike out options that do not apply	

A.2 SCHEDULE OF PRESCRIBED REQUIREMENTS

Clause reference(s)	Description	Requirements
1. Technical Requirements		
2.3.1 and 2.1.9	Confirmed Risk Category	
2.4.7 and 2.1.9	Use of Road Plates Permitted?	Yes / No *
1.7 and 2.1.9	Permanent pavement restoration by:	Proponent / TfNSW *
2.5.1 and 2.1.9	Confirmed Location and Layout of Road Opening	
2.5.1 and 2.1.9	Confirmed Overall Length	
2.5.5 and 2.1.9	Confirmed Cover Depth of buried utility	
2.5.5	Confirmed utility protection requirements	
2.5.1 and 2.1.9	Confirmed trench dimensions (Depth / Width)	
2.2.12 and 2.2.13	Details of proposed work method(s) for critical activities	Required: Yes / No *
2.2.2	TfNSW special requirements (in addition to those provided in the Licences)	Required: Yes / No * Details:
2. Contractual/ Administrative Requirements (advised by TfNSW)		
1.12 and 2.1.8	TfNSW Asset Maintenance Reference No.	
2.1.7	TfNSW Nominated Representative	
1.1, 1.7, 5.8 and 5.11	WARRANTY PERIOD	
2.2.5	PUBLIC LIABILITY INSURANCE	Amount: $

2.2.7, 5.9 to 5.11	PERFORMANCE BOND	Required: Yes / No * Amount:: $
2.2.6 and Annexure L	DEED OF INDEMNITY	Required: Yes / No *
2.2.10	Advance notice to adjacent premises	Required: Yes / No * Details:
5.11	FINAL INSPECTION and return of PERFORMANCE BOND	TfNSW Contact person:
Notes: (*) Strike out options that do not apply		

A.3 PAVEMENT RESTORATION DESIGN REQUIREMENTS

Requirements for pavement restoration of road opening	
1. Flexible pavement restoration	
APPLICABLE DRAWINGS (refer Annexure E):	▪ Figure E.1
Asphalt course:	Type: _____ Thickness: To match existing adjacent asphalt Plan dimensions: _____ mm x _____mm
Roadbase course:	Type: Class 2 DGB dense graded granular material. Thickness: _____ mm Plan dimensions: _____ mm x _____mm
Subbase course:	Type: _____ Thickness: _____ mm Plan dimensions: _____ mm x _____mm
2. Concrete pavement restoration	
APPLICABLE DRAWINGS (in Annexure E): * based on distance from edge of minimum concrete cut-out to an existing joint [Refer to Guide Notes]	▪ Figure E.2 where distance* exceeds 1500 mm ▪ Figure E.3 where distance* is less than 1500 mm (transverse joint) ▪ Figure E.4 where distance* is less than 1000 mm (longitudinal joint) ▪ Figure E.5 (typical restoration details - for all cases)
Asphalt course:	Type: _____ Thickness: To match existing adjacent asphalt Plan dimensions: _____ mm x _____mm
Concrete course:	Type: _____ Minimum thickness: 250 mm .Match existing slab thickness if existing slab is thicker than 250 mm. Specialist design of the replacement slab is required in the case where the thickness of the replacement slab is greater than 250 mm. Plan dimensions: _____ mm x _____mm
Subbase course:	Type: _____ Thickness: 150 mm Plan dimensions: As for concrete course

ANNEXURE B – MEASUREMENT AND PAYMENT – (NOT USED)

ANNEXURE C – SCHEDULE OF HOLD AND WITNESS POINTS AND IDENTIFIED RECORDS

C.1 SCHEDULE OF HOLD AND WITNESS POINTS

Reference	Type	Process(es) Held or Witnessed	Submission Details
Clause 2.1.9	HOLD POINT	Detailed planning and design for road opening work Commencement of work on site (Low Risk road openings). [INITIAL SITE MEETING]	At INITIAL SITE MEETING provide copies of Applications for: ▪ ROAD OPENING APPROVAL. ▪ ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES).
Clause 2.2.13	HOLD POINT	Commencement of work on site (Medium and High Risk road openings) [PRECONSTRUCTION SITE MEETING)]	At least 20 BUSINESS DAYS (or such longer period directed by the TfNSW) prior to the intended date of commencement: ▪ All project documentation (including copies of approvals) required under Clause 2.2. ▪ Certification that all necessary designs, Drawings and procedures have been completed, and are structurally adequate and comply with TfNSW M209. ▪ Certification that a site-specific risk assessment has been completed by a Competent Person for proposed excavation and shoring work. ▪ Stage construction sequence. ▪ Details of critical work methods.
Clause 4.1.1	HOLD POINT	Commencement of road opening work on site	At least 2 BUSINESS DAYS prior to starting work on site, notify the TFNSW Nominated Representative of the confirmed date and time for commencement and submit documentation that verifies that the TfNSW has issued all four of the: ▪ ROAD OPENING APPROVAL. ▪ ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES). ▪ Speed Zone Authorisation. ▪ Approved TCP for the work.
Clause 4.4.1	HOLD POINT	First use of road plates by traffic	At least 2 BUSINESS DAYS prior to first use of road plates by traffic, notify the TFNSW Nominated Representative of the intended date for use and submit documentation as follows. ▪ Design details and/or drawings for the road plates. ▪ Certification verifying that the road opening excavation, shoring and road plates have been installed in accordance with the design Drawings and are safe for use by traffic.
Clause 4.10.1	WITNESS POINT	Placement of concrete pavement restoration and reopening to traffic (for each stage)	At least 3 BUSINESS DAYS prior to the intended date for placement of each stage of concrete pavement restoration: ▪ Notification of the time and date for commencing that stage of work.

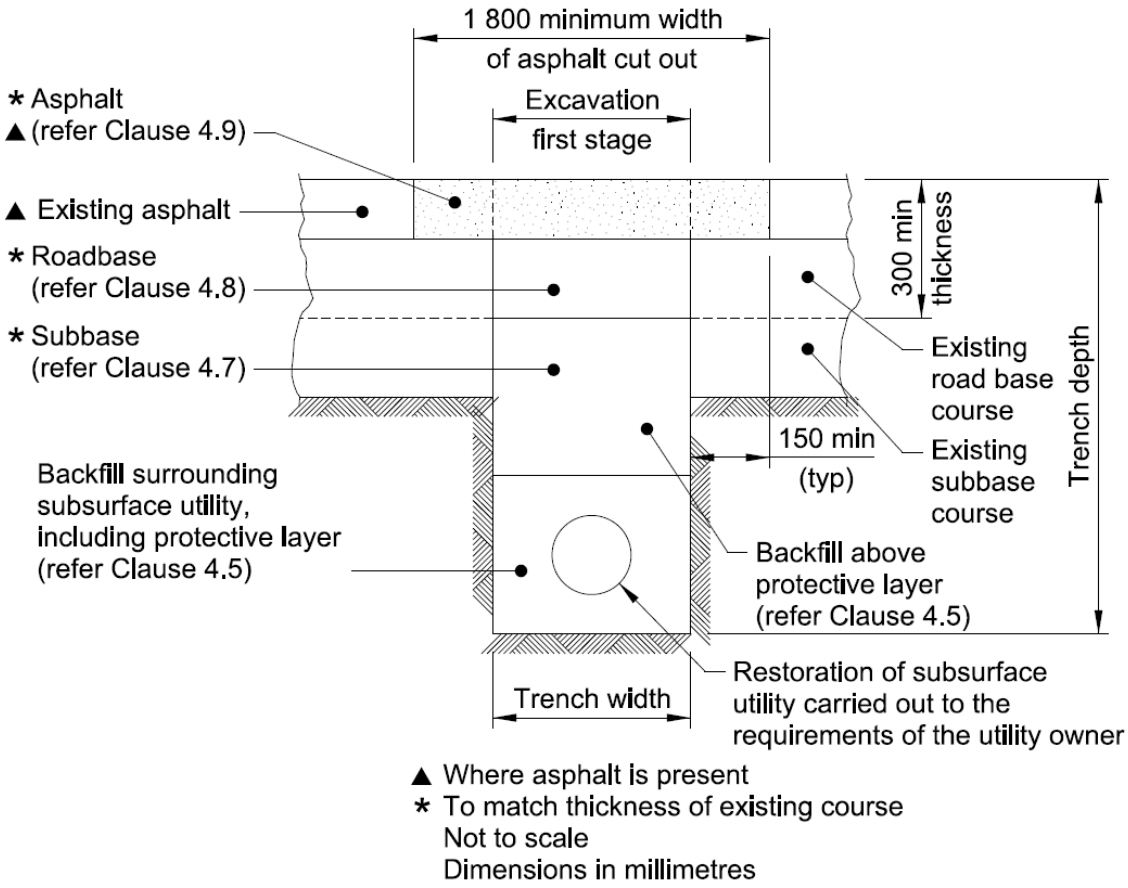
C.2 SCHEDULE OF IDENTIFIED RECORDS

Clause Reference	Description of Identified Record
2.2.8 and 4.2.1	Certified "Dial before You Dig" check for buried utilities and services
2.5.1	Location and layout design for road opening
2.2.13 and 2.6.1	Certified structural designs and Drawings for road opening **
2.2.13 and 2.6.2.1	Certified site-specific risk assessment for proposed excavation and shoring work **
2.2.13 and 2.2.12	Details of critical work method(s)
2.7.2	Design drawings for pavement restoration, including limits of restoration **
3.3	Road plate serial number(s) **
3.6.10	Manufacturer's certification that materials are suitable for purpose (chemical anchor adhesive, curing compounds, surface debonding compounds) **
4.1	TfNSW approvals for the road opening work: ▪ ROAD OPENING APPROVAL ▪ ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES) ▪ Speed Zone Authorisation ▪ Approved TRAFFIC CONTROL PLAN (TCP)
4.4.1	Certification that installed shoring and road plates comply with design and are safe for use by traffic (where road plates used) **
4.11.1	Before and after photographs of "other public or private assets" affected by the Work
5.1	Supplier's certificate of compliance for materials used
5.3	Test results ** to verify construction compliance for: ▪ Concrete pavement restoration ▪ Other construction activities deemed critical by TfNSW
5.4	Completed concrete pavement checklist (refer Annexure D), including details of mix design **
5.5	Photographs showing each stage of excavation, prior to backfilling that stage
5.6	WORK-AS-EXECUTED DRAWINGS showing location, dimensions and details of road opening, including cover depth of buried utility or service.
Notes:	(**) For Medium and High Risk road openings only

ANNEXURE D – CHECKLIST FOR CONCRETE PAVEMENT RESTORATION

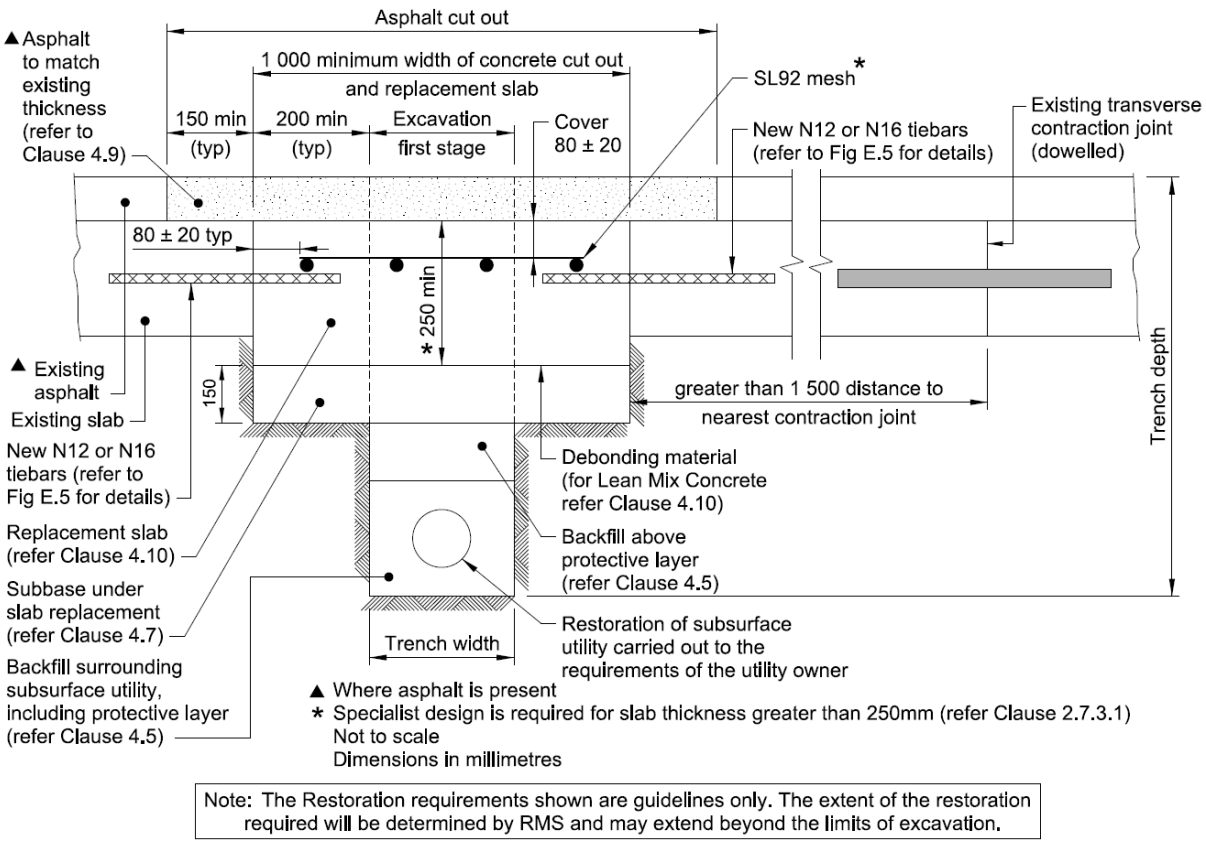
Clause Reference	Process	Details
3.6	Supply and delivery of concrete	▪ Material supply sources (name and location of batch plant or quarry). ▪ Details of the concrete mix design (including strength). ▪ Supplier's conformity testing.
3.6	Supply of steel tiebars, dowels and mesh reinforcement	▪ Source of material supply (name and location of mill). ▪ Supplier's QA status. ▪ Manufacturer's certification verifying steel grade and compliance with materials requirements.
3.6	Supply of chemical anchor adhesive, joint sealant, joint filler, debonding compound, curing compound	▪ Manufacturer's name. ▪ Manufacturer's specification data sheet and SDS for product. ▪ Manufacturer's recommendations for use and installation.
2.2.12 and 4.1.7	Project constraints	▪ Methods to address project constraints, including dealing with time, weather and temperature constraints and protection of work.
4.2 and 4.10	Removal of existing concrete	▪ Method to remove existing concrete pavement base slabs, including measures to prevent damage to adjoining slabs, kerbs or gutters. ▪ Method to prevent horizontal sawcuts into adjoining slabs. ▪ Assessment of subbase material under removed concrete slabs.
4.10	Joints and edges	▪ Method of preparation of vertical joint faces, sides and base of concrete pavement restoration.
4.10	Placing steel tiebars, dowels and mesh reinforcement	▪ Method for drilling holes for tiebars and installation of tiebars. ▪ Method for installation of prefabricated dowel assemblies.
4.10	Placing, compacting and finishing concrete	▪ Details of equipment and methods for placing, spreading, vibrating, finishing and surface texturing concrete.
4.10	Protection and curing	▪ Procedures for protection, covering and curing concrete.

ANNEXURE E – ROAD OPENINGS – TYPICAL DETAILS



Note: The Restoration requirements shown are guidelines only. The extent of the restoration required will be determined by RMS and may extend beyond the limits of excavation.

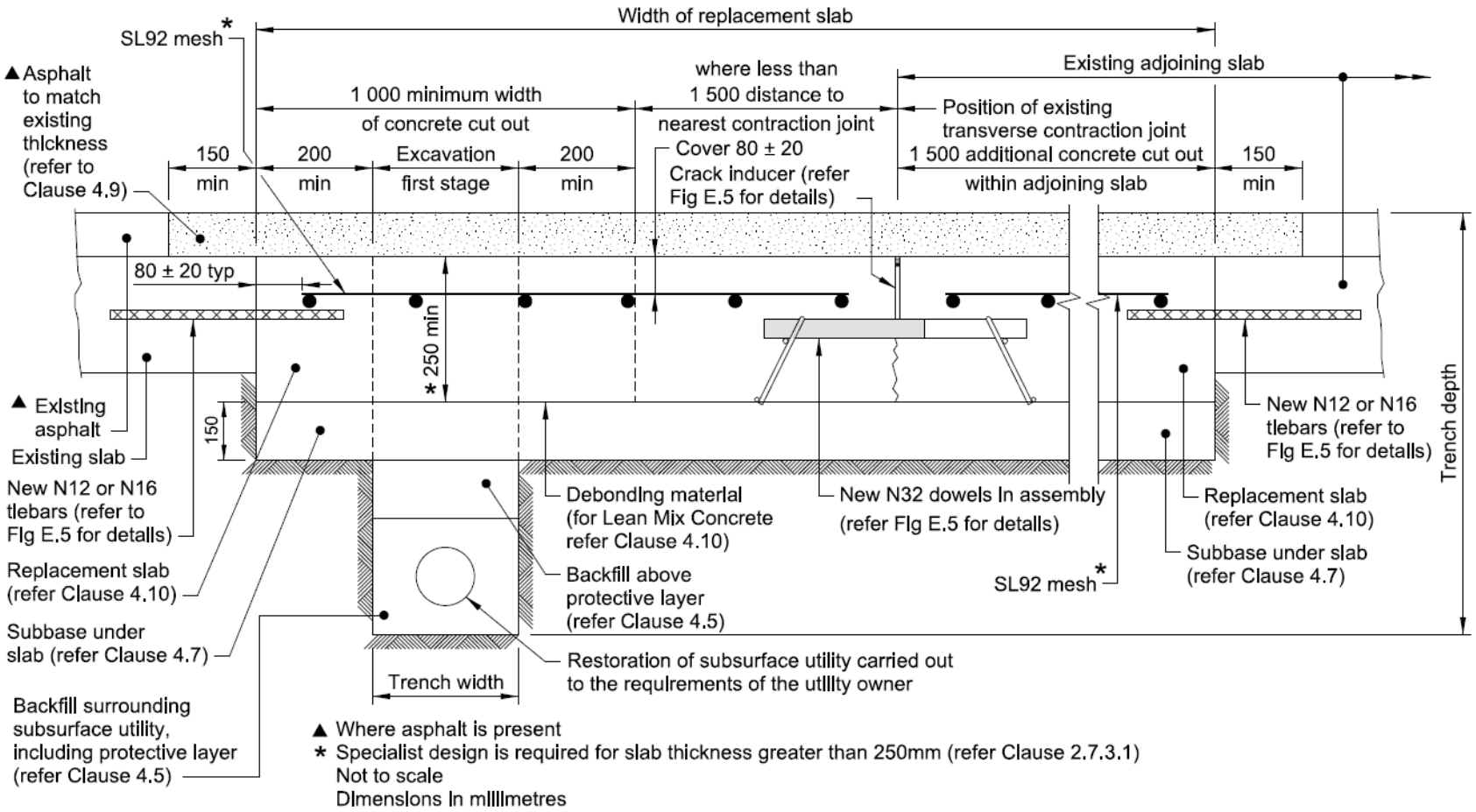
Figure E.1 – Restoration in flexible pavement (typical cross-section)



Note: The Restoration requirements shown are guidelines only. The extent of the restoration required will be determined by RMS and may extend beyond the limits of excavation.

Figure E.2 Restoration in concrete pavement (typical cross-section)

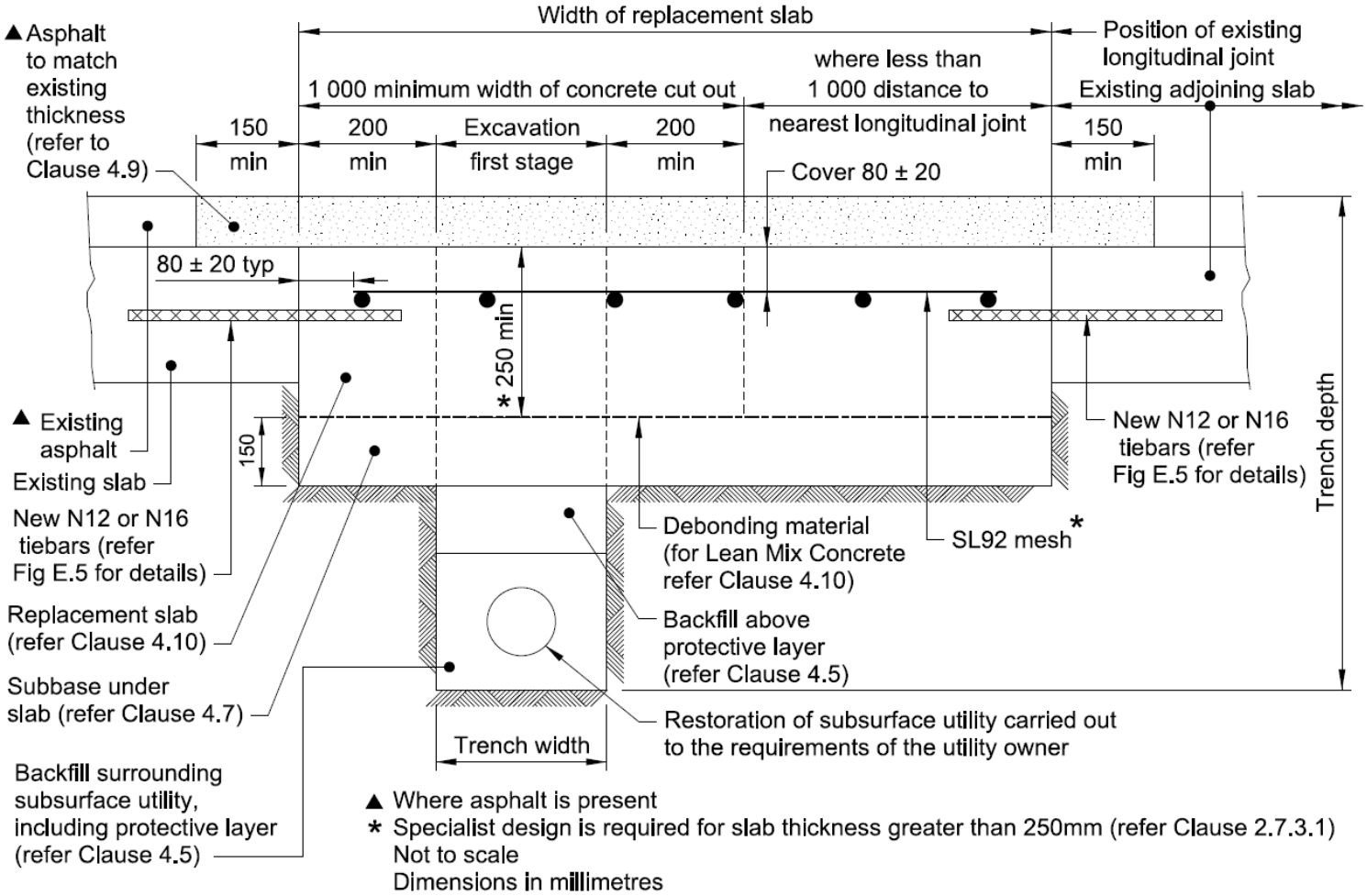
Case 1 – Road opening at right angles to direction of traffic, where edge of minimum concrete cut-out is greater than 1500 mm from an existing transverse contraction joint



Note: The Restoration requirements shown are guidelines only. The extent of the restoration required will be determined by RMS and may extend beyond the limits of excavation.

Figure E.3 Restoration in concrete pavement (typical cross-section)

Case 2 – Road opening at right angles to direction of traffic, where edge of minimum concrete cut-out is less than 1500 mm to an existing transverse contraction joint



Note: The Restoration requirements shown are guidelines only. The extent of the restoration required will be determined by RMS and may extend beyond the limits of excavation.

Figure E.4 Restoration in concrete pavement (typical cross-section)

Case 3 – Road opening parallel to direction of traffic, where edge of minimum concrete cut-out is less than 1000 mm to an existing longitudinal joint

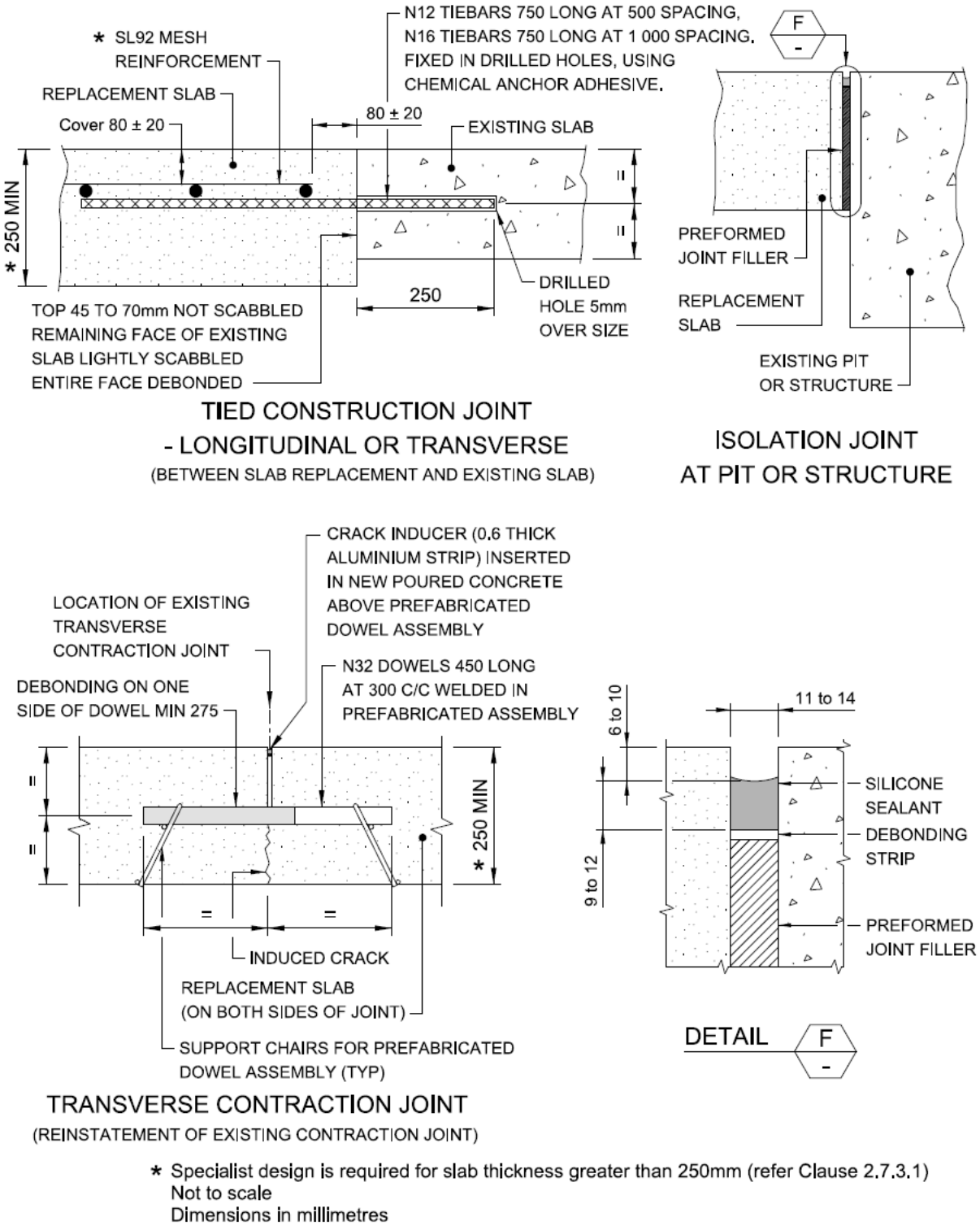


Figure E.5 – Restoration in concrete pavement (typical joint details)

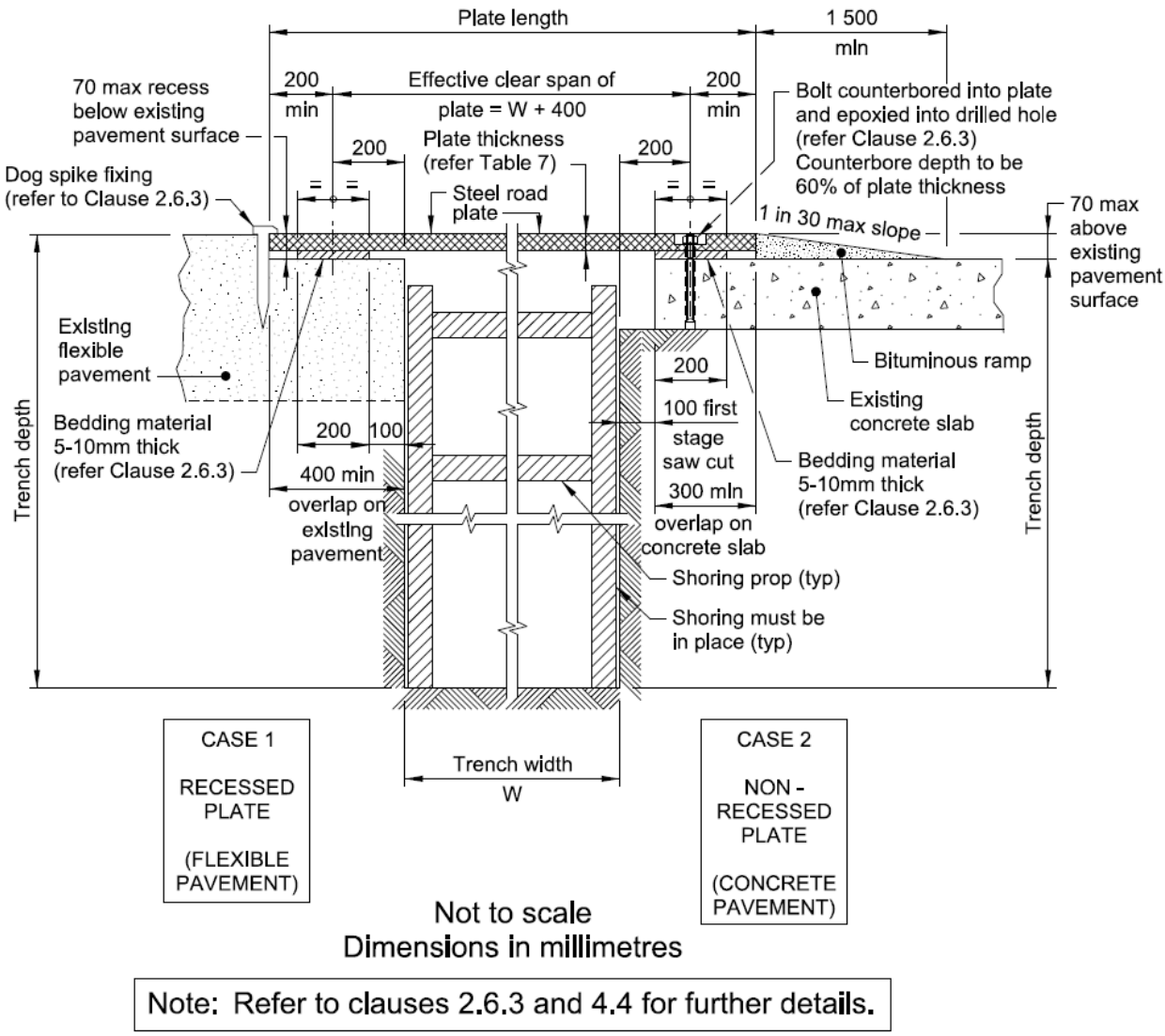


Figure E.6 – Road Plate (typical details)

ANNEXURE F – CONCRETE PAVEMENT RESTORATION – MIX DESIGN DETAILS

Property	Requirement			
	SP40 Special-Class (Pavement) Mix [TfNSW 3201]	SP40H Special-Class (Pavement) Mix [TfNSW 3201]	SP40HC Special-Class (Pavement) Mix [TfNSW 3201]	Sydney Region 40 MPa (Nightwork) Mix [based on SP40HC]
Application	No time constraint on placement	Critical time to reopen	Critical time to reopen	Critical time to reopen
Compressive Strength (MPa)	≥ 40 at 28 days	≥ 40 at 28 days	≥ 40 at 28 days	≥ 40 at 28 days
Early age compressive strength (MPa) (i)	n.a.	≥ 5 at 6 hrs	≥ 5 at 6 hrs	≥ 5 at 6 hrs
Portland cement (kg/m^3)	≥ 320	≥ 430	≥ 430	≥ 430
W/C	≤ 0.5	≤ 0.45	≤ 0.45	0.32 to 0.40
Fly Ash (kg/m^3)	≤ 70	—	—	—
Slump (mm)	55 to 75 (ii)	55 to 75 (ii)	55 to 75 (ii)	85 to 95 (ii)
Max Nom Aggregate Size (mm)	(iii)	(iii)	(iii)	20 (iii)
Placement method	Hand	Hand	Hand	Hand
Admixture	No $CaCl_2$ Air entrainment 4.5 ± 1.0 %	≤ 0.8% $CaCl_2$ Air entrainment 4.5 ± 1.0 %	0.8% < $CaCl_2$ ≤ 2.0% Air entrainment 4.5 ± 1.0 %	1.35 to 1.55 % $CaCl_2$ Air entrainment 4.5 ± 1.0 %
PROJECT ASSESSMENT required (iv)	Yes	Yes	Yes	Yes
Other	Type SL or GB Cement	Type SL, GB or HES Cement	Type SL, GB or HES Cement	Type SL Cement

Notes

— Where no value is specified in the table, YOU must select an appropriate value.

(i) High early strength (HES) and strength requirements must both be met.

(ii) Adjustment by on-site addition of HWR may not be as precise as with water. Slumps in the higher range will increase the risk of downhill flow on grades. Slumps in the lower range are acceptable as long as the vibration (both internal and surface) produces thorough compaction.

(iii) Aggregate must meet the additional requirements in Specification TfNSW 3201 Clause 3.4.

(iv) According to AS 1379 Clause 6.5

ANNEXURE G TO K – (NOT USED)

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ANNEXURE L – DEED OF INDEMNITY

THIS DEED made the …… day of ……

BETWEEN: …… ACN ……
of ……
in the state of …… (hereinafter called "the PROPONENT")

AND: **TRANSPORT FOR NSW**… (hereinafter called "the TfNSW")

WHEREAS:

A. The PROPONENT proposes to undertake … on the land known as … hereinafter called "the WORKS"

NOW THIS DEED WITNESSETH:

1. The PROPONENT hereby indemnifies the TfNSW and its officers, employees, contractors and agents from and against all actions, claims, costs, expenses and damages (the 'Claims") in respect of loss or damage to property or personal injury to any person resulting from the WORKS whether arising out of or by reason of anything done or omitted intentionally or negligently by the PROPONENT or by any agent to the PROPONENT.
2. The PROPONENT'S liability to indemnify the TfNSW and its officers, employees, contractors and agents under clause 1. will be reduced proportionally to the extent that a negligent or wilful act or omission of the TfNSW or its officers, employees, contractors and agents has contributed to the Claims.
3. The PROPONENT must take out or ensure to be taken out public liability insurance for an amount of twenty million dollars ($20,000,000) for any one occurrence which names the TfNSW, the PROPONENT and any contractor or subcontractor of the TfNSW or the PROPONENT in respect of the WORKS.
4. The PROPONENT undertakes to complete all works in accordance with TfNSW conditions of approval including approved drawings and specifications.
5. The PROPONENT undertakes to rectify all defects (excluding fair wear and tear) arising during the WARRANTY PERIOD at no cost to the TfNSW.
6. The provisions of this deed apply from the commencement of the WORKS until the end of the WARRANTY PERIOD which is 6 months / 12 months from the DATE OF COMPLETION as determined by the TfNSW. [*Strike out option that does not apply*]

IN WITNESS THEREOF the parties hereunto set their hands and seals on the day and year first hereinbefore written.

THE COMMON SEAL of)
)
) ……..

In the presence of:

…….

EXECUTED BY TRANSPORT FOR NSW

……..

ANNEXURE M – REFERENCED DOCUMENTS AND DEFINITIONS

M.1 REFERENCED DOCUMENTS

M1.1 Australian and International Standards

AS 1379	Specification and supply of concrete
AS 1742.3	Manual of uniform traffic control devices - Traffic control devices for works on roads
AS 2439.1	Perforated plastics drainage and effluent pipe and fittings – Perforated drainage pipe and associated fittings
AS/NZS 3678	Structural steel - Hot-rolled plates, floorplates and slabs
AS/NZS 3679.1	Structural steel - Hot-rolled bars and sections
AS 3799	Liquid membrane-forming curing compounds for concrete
AS ISO 31000	Risk management - Guidelines
AS/NZS 4671	Steel reinforcing materials
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS 4744.1	Steel shoring and trench lining equipment
AS 5100	Bridge design

M1.2 WorkCover NSW Document

Excavation Code of Practice

M1.3 Other Documents

SOC Guide	NSW Streets Opening Conference: Guide to Codes and Practices for Streets Opening

M1.4 TfNSW Test Methods

TfNSW T109	Plastic limit and plasticity index of road materials
TfNSW T166	Determination of relative compaction

M1.5 TfNSW Specifications

TfNSW Q	Quality Management System
TfNSW R116	Heavy Duty Dense Graded Asphalt
TfNSW 3051	Granular Pavement Base and Subbase Materials
TfNSW 3201	Concrete Supply for Maintenance
TfNSW 3204	Preformed Joint Fillers for Concrete Road Pavements and Structures
TfNSW 3254	Bitumen Emulsion

TfNSW 3368	Skid Resistant Friction Coating for Temporary Steel Road Plates
TfNSW 3580	Aggregate Filter Materials for Subsurface Drainage
TfNSW M208	Road Openings and Restoration (Low Risk)
TfNSW M250	Heavy Patching (Flexible Pavement)
TfNSW M258	Slab Replacement (Concrete Pavement)

M1.6 TfNSW References

TCWS	TfNSW Traffic Control at Worksites Manual

M.2 ABBREVIATIONS

ACRS	Australian Certification Authority for Reinforcing Steel
DTR	Direction to Restrict (Speed) Application (refer Clause 2.2.1)
FSL	Finished Surface Level of a road pavement
HWR	High range water-reducing (for an admixture)
MOU	Memorandum of Understanding between the Proponent and the TfNSW (e.g. for a public utility).
TfNSW	Means the Transport for NSW.
SDS	Safety Data Sheet
SOC	NSW Streets Opening Conference
TCP	TRAFFIC CONTROL PLAN
TMC	TfNSW Transport Management Centre
TMP	TRAFFIC MANAGEMENT PLAN

M.3 DEFINED TERMS

Applicable Drawings	The concept Drawings provided by the TfNSW to represent the permanent restoration of the road opening, showing all relevant details and requirements (see Annexure E Figures E.1 to E.5).
BUSINESS DAY	Any day other than a Saturday, Sunday or public holiday or 27, 28, 29, 30 or 31 December.
Competent Person	A person who has acquired through training, qualification or experience, or a combination of them, the knowledge and skills to carry out a particular task (refer Occupational Health and Safety Regulation 2001).
DATE OF COMPLETION	The date when: ▪ All excavation, backfill and temporary restoration of the road opening is completed and safe for use by traffic; or ▪ Where permanent restoration is carried out by the Proponent, the permanent restoration is completed.
DEED OF INDEMNITY	Means the completed form included in Annexure L.

Drawings	The detailed drawings prepared by the Proponent for structural designs (excavation and shoring, road plates) and road opening restoration. The Drawings for road opening restoration must be based on the APPLICABLE DRAWINGS.
FINAL INSPECTION	Joint inspection mandated at end of the WARRANTY PERIOD (refer Clause 5.11).
Finished Surface Level	The surveyed design or existing level of the finished surface of the road pavement.
GENUINE EMERGENCY	Urgent work where time does not permit the following: ▪ The application for, or issue of, the ROAD OPENING APPROVAL and ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES). ▪ Detailed planning and preparation of site-specific designs for the road opening. Adoption of a design for a similar situation, or of the prescriptive design requirements of Table 5 and Table 7 is acceptable for such emergencies. Such work is deemed to be High Risk. The following types of works are examples of genuine emergency works: ▪ Sewer, water or gas main burst ▪ A major electrical failure ▪ Road subsidence
HOLD POINT	A point beyond which a work process must not proceed without the TfNSW express written authorisation (refer TfNSW Q).
INITIAL SITE MEETING	The joint meeting on site between the Proponent and the TfNSW Nominated Representative immediately after the Proponent has submitted the Applications for the ROAD OPENING APPROVAL and the ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES).
LATERAL CLEARANCE	The safe clearance, measured at right angles to the direction of traffic, from the edge of an open excavation for a road opening to the nearest delineated edge of the trafficked lane. Where road plates are in use bridging over an open excavation, or the open excavation has been backfilled under the trafficked lanes, the LATERAL CLEARANCE is measured from the edge of the road plate or the edge of compacted backfill to the nearest delineated edge of the nearest trafficked lane.
MAJOR RISK FACTOR	A risk factor, additional to excavation and shoring risks, that contributes to elevate the overall risk level of the road opening to High Risk. Typical major risk factors are listed in Table 2.
PERFORMANCE BOND	As defined in Clause 2.2.7. The amount of PERFORMANCE BOND required is set out in Annexure A.2. The Proponent may nominate an agent to lodge on their behalf. This PERFORMANCE BOND must be unconditional and not have an end date.
PRE-CONSTRUCTION SITE MEETING	For Medium and High Risk road openings only, the joint meeting on site between the Proponent and the TfNSW Nominated Representative to consider all detailed issues. It occurs before commencement of work on site, after completion of design and other preconstruction activities.
Proponent	The party undertaking the road opening work, including its agents (i.e. employees, contractors, subcontractors and professional consultants). This is not necessarily the utility or asset owner.
PUBLIC LIABILITY INSURANCE	The insurance must name the TfNSW, the Proponent and any contractor, or subcontractor of the TfNSW or the Proponent as per the DEED OF INDEMNITY. This risk should be insured from the date of physical commencement of the Work and remain in force until the expiration of the WARRANTY PERIOD. The amount of the insurance required is set out in Annexure A.2.
Risk Category	The evaluated risk for the road opening work according to Table 2. The Risk Category reflects the complexity, hazards and associated risk factors for the road opening work. The specified measures or criteria for executing the works will depend on the Risk Category (e. g. level of structural design and inspection). Refer to AS ISO 31000 for guidance on risk evaluation.

Road Type	A grouping, unique to TfNSW M209, based on the traffic and live loading situation for the road opening. This is generally related to the functional road classes under AS 5100.
ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES)	A licence issued by the TfNSW (Transport Management Centre) for the road occupancy aspects of the road opening. Specifies occupancy of road space and lane closures, including the operational dates and times. Approved dates and timings in the Licence are not necessarily the same as those originally requested.
ROAD OPENING APPROVAL	A Licence issued by the TfNSW (Asset Maintenance) for the technical aspects of the road opening. The issued Approval specifies details of excavation, layout, staged construction, use of road plates, WARRANTY PERIOD etc. and any associated TfNSW conditions for the road opening. Details specified in the Approval are not necessarily the same as those originally requested.
TFNSW Asset Maintenance Reference Number	An identification number issued by the TfNSW for the particular road opening work as part of the issued ROAD OPENING APPROVAL. The reference number is provided in Annexure A.2 and should be used for all correspondence with the TfNSW.
TfNSW Nominated Representative	The person nominated in Annexure A.2 as the TfNSW representative for the purpose of ensuring the Proponent's compliance with this Specification. Normally from the TfNSW Regional Asset Management Section. Unless otherwise specified, the first point of contact with the TfNSW is the TfNSW Nominated Representative.
Specification	Means TfNSW M209.
TRAFFIC CONTROL PLAN	The TCP is a detailed plan, in accordance with AS 1742.3 and the TfNSW Traffic Control at Work Sites Manual, which recognises safety for the general public as well as employees on the worksite. This plan must also recognise the designated traffic speed for the road and physical constraints such as road curvature, visibility and structures. The TCP must include but is not limited to: .1 Location and layout of traffic control devices (e.g. cones, signs, barrier boards, bollards) .2 Lane widths and LATERAL CLEARANCE from traffic to Work Area .3 Site access provisions and pedestrian access
TRAFFIC MANAGEMENT PLAN	The TMP is a plan for integrating the Work into the operation of the road network. The TMP is to be submitted, together with the Application for a ROAD OCCUPANCY LICENCE (DEVELOPMENT ACTIVITIES), for approval. The TMP assesses the impact of the proposed work on traffic flow, local residents, businesses, schools, hospitals and public transport. The TMP incorporates method as well as providing the physical arrangements for traffic control (i.e. TCP) that are needed to provide safe handling of vehicular and pedestrian traffic through the worksite. The TMP also identifies the factors governing implementation of traffic control (e.g. clearway restrictions, transit lane provisions, staging of works, night time or day time workings and location of site entry and exit points for construction traffic). The TMP may require a temporary speed reduction through the Work Area. The times for commencement of work and finishing work must be specified as part of the TMP. In certain circumstances, the TMP might need to take account of EPA noise requirements that could dictate the most suitable times for working.
WARRANTY PERIOD	The period set out in Annexure A.2 starting from the DATE OF COMPLETION.
WITNESS POINT	A point in a work process where the Proponent must give prior notice to the TfNSW and the option of attendance may be exercised by the TfNSW (refer TfNSW Q).
Work Area	The specific area on the road or within the road reserve where the road opening work is being carried out. The Work Area includes areas where trucks and machines engaged in the work assemble and manoeuvre (refer TCWS).

Work	The physical work involving carriageway modification such as excavation performed by the Proponent within the State Road reserve and all incidental on-site acts in any way related to such activities. The Work generally results from the need to install a buried utility or service such as a water pipe or a large diameter gas main or underground electric cable.
WORK-AS-EXECUTED DRAWINGS	Drawings recording details of the road opening and any buried services following completion of the Work.
You	Means the Proponent, including subcontractors, employees and agents of the Proponent. However, where a part of the work that is normally the Proponent's responsibility is undertaken by the TfNSW (e.g. permanent pavement restoration), the relevant clauses apply to the TfNSW.

M.4 DEFINITIONS

Term	Alternative Term	Definitions
Backfill		Temporary or permanent filling of a road opening excavation, to make it suitable for use by traffic. In the case of temporary backfill, filling of the road opening excavation until the permanent restoration is required.
Contaminated Material		Foul or polluted material that represents a risk of harm to human health or to the environment.
Cover depth		The vertical distance between the top surface of a utility or service (that is buried or will be buried), including any protective sleeving ducts, and the Finished Surface Level of the road pavement or footpath, measured on the lower side of the trench. Within a trafficked pavement, the cover depth of new utilities must not exceed the depth specified in Table 4, unless otherwise approved by the TfNSW.
Depth		The vertical distance between the base of the trench and the Finished Surface Level of the road pavement or footpath, measured on the higher side of the trench.
Longitudinal		Parallel to the direction of traffic or road centreline.
Open Excavation		For the purpose of this Specification, a road opening excavation that has not been backfilled.
Plate Clear Span		The clear span of a road plate between its supports (i.e. measured at right angles to the line of trench, between the centroids of bearing support material on each side). [This is equal to the trench width plus 400 mm].
Road Opening	Trench	A trench, shallow excavation or hole dug within an existing trafficked pavement or within the zone of influence of an existing trafficked pavement for the purpose of buried public utilities, services or drainage. The road opening must be at least 100 mm deeper than the existing pavement. The road opening is deemed to exist from the time of first excavation until the permanent restoration is complete, notwithstanding that it may be backfilled and temporarily restored.
Road Plate	Steel plate Trench cover	A structural steel plate used to temporarily cover and bridge across an open excavation for the purpose of carrying traffic or pedestrians after the end of a working day. The plate can be removed each working day or left in place.
Shoring		The use of timber, steel or other structural material for the purpose of providing effective and adequate temporary support to maintain the stability of the walls of an excavation (refer WorkCover NSW Excavation Code of Practice).

Span	Clear Span	The distance between the road plate supports on either side of the trench. This is measured to the centrelines of each 200 mm wide bedding strip, i.e. equal to the trench width plus 400 mm (refer Figure E.6 of Annexure E).
Temporary pavement restoration		The extent of pavement restoration necessary to promptly restore each section of backfilled road opening to traffic. For the permanent pavement restoration, the temporary pavement restoration may be partly or fully re-excavated and replaced with the final pavement courses. The extent of such rework will depend on site-specific issues (e.g. compatibility with adjoining pavement) and will be confirmed by the TfNSW at the INITIAL SITE MEETING.
Transverse	Normal	At right angles to the direction of traffic or road centreline.
Trench		An excavation having a depth that exceeds its width, measured at the bottom (refer WorkCover NSW Excavation Code of Practice).
Unsuitable Material		Excavated material from the road opening which the TfNSW deems to be unsuitable for backfilling or pavement support.
Zone of Influence		The volume of soil around the excavation affected by any external load (e.g. vehicles, plant, excavated material). It is the area around the excavation that is susceptible to slippage or collapse (refer to diagrams in Figures 1 and 2). NOTE: This volume is generally assumed to be that formed by planes extending from the load to a maximum angle to the horizontal of 30 degrees in the case of sand and 45 degrees for clay (refer to WorkCover NSW Excavation Code of Practice). For road opening work within a trafficked pavement, the effective zone of influence and the required LATERAL CLEARANCE for traffic and construction plant is indicated in Table 5, Figure 1 and Figure 2. Good pavement conditions (e.g. sound concrete slab) will promote load distribution beyond the zone of influence, so a lesser LATERAL CLEARANCE for traffic is usually tolerable for this type of work. The effective zone of influence for this situation is therefore narrower than for non-pavement situations. Table 5 was developed rationally but conservatively, based on nominal soil failure planes at angles of 45 degrees (favourable excavation conditions) or 23 degrees (unfavourable excavation conditions) and for the different pavement cases. Note that 23 degrees is quite conservative.

….