TRANSPORT FOR NSW (TfNSW)

SPECIFICATION D&C B58

BORED CAST-IN-PLACE REINFORCED CONCRETE PILES (WITH PERMANENT CASING)

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SPECIFICATION D&C B58

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FOREWORD

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BASE SPECIFICATION

This document is based on Specification TfNSW B58 Edition 6 Revision 0.

TfNSW SPECIFICATION D&C B58

BORED CAST-IN-PLACE REINFORCED CONCRETE PILES (WITH PERMANENT CASING)

1 GENERAL

1.1 SCOPE

This Specification sets out the requirements for bored cast-in-place reinforced concrete piles, utilising steel casings (acting as lining), which are left in place, to support the sides of the pile hole excavation.

This Specification does not cover driven tubular steel piles (where the steel tubes are structural components of the piles), which is covered by Specification TfNSW D&C B54.

Materials and construction must conform to AS 5100.3 and this Specification.

1.2 STRUCTURE OF THE SPECIFICATION

This Specification includes a series of annexures that detail additional requirements.

1.2.1 (Not Used)

1.2.2 (Not Used)

1.2.3 Schedules of HOLD POINTS, WITNESS POINTS and Identified Records

The schedules in Annexure B58/C list the **HOLD POINTS** and **WITNESS POINTS** that must be observed. Refer to Specification TfNSW D&C Q6 for the definitions of **HOLD POINTS** and **WITNESS POINTS**.

The records listed in Annexure B58/C are **Identified Records** for the purposes of TfNSW D&C Q6.

1.2.4 Planning Documents

The PROJECT QUALITY PLAN must include each of the documents and requirements listed in Annexure B58/D and must be implemented.

1.2.5 Frequency of Testing

The Inspection and Test Plan must nominate the proposed testing frequency to verify conformity of the item, which must not be less than the frequency specified in Annexure B58/L. Where a minimum frequency is not specified, nominate an appropriate frequency. Frequency of testing must conform to the requirements of TfNSW D&C Q6.

You may propose to the Principal a reduced minimum frequency of testing. The proposal must be supported by a statistical analysis verifying consistent process capability and product characteristics. The Principal may vary or restore the specified minimum frequency of testing, either selectively or permanently, at any time.

1.2.6 Referenced Documents

Standards, specifications and test methods are referred to in abbreviated form (e.g. AS 1234). For convenience, the full titles are given in Annexure B58/M.

1.3 DEFINITIONS

The terms "you" and "your" mean "the Contractor" and "the Contractor's" respectively.

The following definitions apply to this Specification:

Design Toe Level Reduced level (RL) of the pile toe as specified on the Design Documentation drawings.

Dynamic Analysis Wave equation analysis of a specific blow using dynamic data and measured pile/soil parameters to replicate the traces of force and velocity obtained by the Pile Driving Analyser (PDA) to determine pile resistance, distribution of resistance and pile integrity (e.g. CAPWAP, TNOWAVE).

Dynamic Data Force and velocity measurements taken near the head of a pile using electronic equipment (e.g. PDA and associated transducers) during pile driving.

Dynamic Testing Process of obtaining dynamic data from each blow of the hammer and subsequent dynamic analysis of specific blows. It is also termed "high-strain dynamic testing" in AS 2159.

Integrity Testing Non-destructive test carried out on a concrete pile after its installation / construction to verify the quality of the pile shaft, i.e. continuity, density, shape and length.

Pile Design Load Design ultimate axial load shown on the Design Documentation drawings for the pile.

Piling Supervisor Your employee responsible for supervision and control of the piling operations.

Test Piles Piles nominated on the Design Documentation drawings for load testing to confirm pile design parameters.

Tremie (pipe) Rigid pipe with watertight joints, or without joints, used to place concrete in a pile hole.

2 MATERIALS

2.1 PERMANENT STEEL CASING

2.1.1 General

Unless specified otherwise on the Design Documentation drawings, materials and fabrication of permanent casings must conform to Specification TfNSW D&C B201 Construction Category CC2.

Fabricated casings must be one of the following types:

(a) Casings fabricated from steel plate rolled to a circular cross-sectional shape and welded at the longitudinal joint to form segments which are then shop spliced into suitable lengths. The welds for the longitudinal joints and shop splices must be full penetration butt welds. The longitudinal joints for adjoining segments must be staggered by 90° to each other.

(b) Spirally welded tubes with full penetration butt welds carried out using the submerged arc process from both sides of the tube.

2.1.2 Steel Material Properties

Steel for permanent casings must have a minimum yield strength of 250 MPa conforming to AS 1579.

2.1.3 Size and Wall Thickness

Unless specified otherwise, casing sizes must accommodate one of the following standard pile diameters as specified on the Design Documentation drawings: 450, 600, 750, 900, 1050, 1200, 1500 or 1800 mm.

Steel casings must have a wall thickness not less than that shown on the Design Documentation drawings and must be suitable for the intended installation method.

The casing roundness must be such that the concrete cover specified on the Design Documentation drawings is maintained.

2.2 CONCRETE

Unless specified otherwise in this Specification, concrete for piles must conform to Specification TfNSW D&C B80.

Use only self-compacting concrete or high workability concrete conforming to Annexure B80/G of TfNSW D&C B80, as approved by the Principal. The fresh properties of the proposed concrete must suit the actual site conditions.

2.3 STEEL REINFORCEMENT

Unless specified otherwise in this Specification, steel reinforcement for piles must conform to Specification TfNSW D&C B80.

Fix reinforcement for piles in conformity to Specification TfNSW D&C B80 and this Specification. Use templates when fabricating the reinforcement cages to ensure that the required reinforcement distribution is maintained.

3 CONSTRUCTION – GENERAL REQUIREMENTS

3.1 WEEKLY PROGRAM

Submit to the Principal and Project Verifier each week a program showing your daily scheduled pile construction work for the week.

3.2 SUPERVISION

3.2.1 Piling Supervisor

Your Piling Supervisor must supervise and control the piling operations at all times.

3.2.2 Attending Geotechnical Engineer

During excavation of each pile, a Geotechnical Engineer, engaged by you, must be in attendance.

The attending Geotechnical Engineer will direct the Piling Supervisor as to when ground or rock of the class specified on the Design Documentation drawings has been reached, the extent of further excavation required to form the socket in conformity to the Design Documentation drawings, and when the pile hole and socket are considered to be clean.

The attending Geotechnical Engineer must be a Chartered Professional Engineer with membership of Engineers Australia practising in the field of geotechnical engineering (or equivalent) and experienced in the geotechnical assessment of pile excavations. Submit for acceptance details of relevant qualifications and experience of the attending Geotechnical Engineer.

An equivalent to membership of Engineers Australia would be an Engineer registered on the National Engineering Register (NER) in the general area of practice of Civil Engineering and experienced in the geotechnical assessment of pile hole excavations.

3.3 PILING PLANT AND EQUIPMENT

HOLD POINT

Process Held:	Delivery of piling plant and equipment to the Site.
Submission Details:	Details of proposed piling plant and method together with certification, including calculations, by a Chartered Professional Engineer, that the proposed piling equipment and working platforms or supports, comply with Clauses 3.3.1 and 3.4.1.
Release of Hold Point:	The Nominated Authority will consider the submitted details and certification prior to authorising the release of the Hold Point.

3.3.1 Capacity

The piling equipment must have the capacity to excavate the pile shaft and socket in the founding material to the specified depth and diameter to achieve the design pile resistance, including the capability to excavate an additional pile depth (if required) of either 3 m or 3 pile diameters, whichever is the greater.

3.4 WORK HEALTH AND SAFETY REQUIREMENTS

3.4.1 Engineering Certification

Without limiting the requirements of Specification TfNSW D&C G22, prior to bringing any piling equipment or plant to the site, provide drawings and calculations certified by a Chartered Professional Engineer with membership of Engineers Australia practising in the field of geotechnical engineering

(or equivalent), verifying that under the proposed set up and site conditions, the proposed piling equipment and working platforms or supports will operate safely.

3.4.2 Pile Hole Protection and Safety

Provide effective measures to prevent stormwater run-off and loose material falling in during excavation.

Make each pile hole safe using appropriate measures, including provision of barriers and covering it with a secure lid whenever the pile is not under construction. Leave the finished top of the casing at least one metre above ground level to prevent personnel and loose materials from falling into the pile hole.

3.5 ENVIRONMENTAL REQUIREMENTS

Remove all excavated material from the Site, unless specified otherwise.

Collect and treat the water resulting from your piling operations in conformity to Specification TfNSW D&C G36.

3.6 SET OUT

Set out the site with adequate recovery pegs and survey markers so that the drilling and/or piling rig can be set up accurately at the specified location and aligned correctly for each pile.

3.7 ADDITIONAL SITE INVESTIGATION

Where required by site conditions, prior to commencing pile hole excavation, drill additional boreholes and take cores to confirm the adequacy of the pile shaft and base.

Commence taking minimum 50 mm diameter continuous rock core samples at one metre above the level of the top of the rock socket shown on the Design Documentation drawings for the pile, to a depth that is at least 3 m or 3 pile diameters, whichever is the greater, below the pile Design Toe Level.

Log the boreholes and cores starting from natural surface level in conformity to AS 1726. Place the cores in suitable core boxes and make them available for inspection by the Project Verifier as required.

4 PILE HOLE EXCAVATION AND CLEANING

4.1 CASING INSTALLATION AND PILE HOLE EXCAVATION

4.1.1 Proposed Methods

Provide in the PROJECT QUALITY PLAN the proposed methods for installation of the casing, excavating and cleaning the pile holes, and verifying that the specified requirements have been met.

Unless specified otherwise on the Design Documentation drawings, install the pile casings by one, or a combination, of the following methods:

(a) Driving the casing with an appropriate pile driving hammer and helmet and excavating the material from inside the casing.

(b) Sinking the casing with a drilling rig and excavating the material from inside the casing.

HOLD POINT

Process Held:	Commencement of excavation of pile hole.
Submission Details:	(a) Certification that pile hole set out (refer Clause 3.6), and additional boreholes (refer Clause 3.7) where required, have been completed. (b) Borehole logs and cores, where required. (c) If not previously submitted, details of the following: (i) Method of casing installation. (ii) Method of placing concrete in the pile hole including size and number of any proposed tremie pipes (refer Clause 6.5).
Release of Hold Point:	The Nominated Authority will consider the submitted documents and may carry out further investigation, prior to authorising the release of the Hold Point for each pile.

4.1.2 Casing Installation

Drive or sink the casing through any inferior and/or hard materials, without damaging it, to bear on the founding layer.

Keep the toe of the casing far enough ahead of the excavation so that the excavation will not cause significant disturbance in the adjoining ground. Control the driving energy to prevent the casing from buckling, crumpling or being forced out of round.

Control the alignment of the casing with sufficient accuracy to ensure that the drilling head can be inserted and withdrawn without fouling against the casing.

Ensure that the casing toe is fully embedded in the founding layer where it is on a slope, or in ground that is comprised of variable materials.

Fill any gaps between the casing and the sides of excavations with sand, and compact the sand by flooding.

4.1.3 Casing Splicing

Where splicing of casings is required, the welded connection must be full penetration butt welds over the whole cross-section. Welding must conform to Specification TfNSW D&C B201 Construction Category CC2 or better.

The inside of the casing must be clean and free of any projections (such as weld backing rings) which could be an obstacle to the placing and positioning of the reinforcement cage for the piles, or which might prevent the proper completion of the pile.

4.1.4 Excavation of Rock Socket

After completion of casing installation, excavate inside the casing past the toe of the casing and into the founding material to obtain a rock socket of the specified depth in the class of rock or founding material specified on the Design Documentation drawings.

Where necessary, use acceptable methods to prevent the pile hole excavation below the casing from collapsing.

4.1.5 Record of Drilling Parameters

Record and measure the operating parameters of the drilling rig when excavating the first pile hole.

Excavate subsequent pile holes after the first pile with the same drilling rig operating parameters and work methods as that recorded during excavation of the first pile hole.

4.2 FINAL PILE TOE LEVEL AND PILE HOLE CLEANING

4.2.1 Further Excavation

Where excavation of the pile hole to a level that is lower than that shown on the Design Documentation drawings is directed by the attending Geotechnical Engineer, the Designer will either accept the level reached as the final pile toe level or direct that excavation be continued to a lower level.

Where the Designer directs further excavation to a lower level, carry out further pile hole excavation to the new level directed, including further driving or sinking of the permanent casing if practicable and where necessary, without damaging the casing, and again clean the pile hole in accordance with Clause 4.2.2.

4.2.2 Roughening Sides and Cleaning Pile Hole

Roughen the side of the rock socket as specified on the Design Documentation drawings.

Remove debris and surface smear and expose intact rock over the side and base of the rock socket, unless specified otherwise on the Design Documentation drawings.

4.2.3 Acceptance of Pile Hole

Upon completion of excavation of the pile hole including cleaning, submit to the Project Verifier quality records, signed by the Piling Supervisor, verifying that the pile hole has been excavated to the position, size and level shown on the Design Documentation drawings or in conformity to the directions of the attending Geotechnical Engineer or the Designer, and that the design parameters specified on the Design Documentation drawings have been achieved.

HOLD POINT

Process Held:	Acceptance of pile hole.
Submission Details:	Notification that the pile hole excavation is complete, and documentation verifying that the plan position, size and alignment of the casing and the pile hole will result in a pile that conforms to the specified tolerances and other requirements of the Design Documentation drawings and this Specification.
Release of Hold Point:	The Nominated Authority will consider the submitted documents, and will either accept the pile hole excavation, or direct you to provide access for indirect examination of the pile hole (refer Clause 4.3), or direct you to continue excavation (refer Clause 4.2.1), prior to authorising the release of the Hold Point.

4.2.4 Keep Pile Hole Clean and Stable

Following acceptance of the pile hole by the Project Verifier, keep the pile hole side and base in a clean and stable condition without contamination or softening, until concrete is placed.

4.3 INDIRECT EXAMINATION OF PILE HOLE

To verify conformity with Clause 4.2, provide equipment such as mirrors, probes, plumb weights, bright lights and CCTV cameras (where their use is practicable), including supporting personnel, for the Project Verifier or Geotechnical Engineer to indirectly examine the pile hole from top to bottom, including the socket base and side.

Verify conformity of the depth of each pile hole using a weighted tape at a minimum of three locations of the pile hole.

5 REINFORCEMENT PLACING

5.1 GENERAL

Clean the pile hole and reinforcement cage of all loose and adhering materials before and after the reinforcement cage is placed.

WITNESS POINT

Process to be Witnessed:	Inspection of reinforcement cage prior to placing into pile hole.
Submission Details:	Notify the Nominated Authority at least 2 hours prior to proposed time of placement of reinforcement cage into pile hole.

Place reinforcement for the piles in conformity to Specification TfNSW D&C B80 and this Specification.

The spacers attached to the cage must be of a type and distribution capable of providing the specified concrete cover and maintaining the cage in the specified position, over the whole length of the pile, after placement and during concreting.

Cages for raked piles must incorporate provisions for inserting and removing the tremie pipe without the risk of it being snagged.

Ensure that the reinforcement cage is centralised, particularly where telescopic casing is used, and that the minimum concrete cover is not less than the specified value.

5.2 TIMING

Place the steel reinforcement, and concrete, as soon as practicable following final socket cleaning, and within 24 hours of the excavation of the pile hole.

When there is a delay between pile hole cleaning and concrete placement, do not place the steel reinforcement if further cleaning of the pile hole or rock socket is required.

HOLD POINT

Process Held:	Placing steel reinforcement cage in the pile hole.
Submission Details:	Certification that the pile hole is clean, and that all loose and adhering materials have been cleaned from the reinforcement cage.
Release of Hold Point:	The Nominated Authority will review the submitted documents and may carry out further surveillance and audit, prior to authorising the release of the Hold Point.

6 CONCRETE SUPPLY AND PLACING

6.1 GENERAL

At the time of concreting, the pile hole side and base must be clean and conform to the parameters specified on the Design Documentation drawings.

Commence concreting the pile hole immediately after the release of the Hold Point in Clause 5.2. The Hold Point may again apply if the pile hole becomes contaminated prior to concreting.

6.2 TEST MEMBER

Where directed by the Project Verifier, demonstrate using a test member in accordance with TfNSW D&C B80 to prove that the pile can be concreted without deleterious effects. The details of the test member must be agreed on by the Project Verifier.

6.3 DEWATERING

You may dewater the pile hole only where practical and subject to the approval of the Designer.

6.4 CONCRETE SUPPLY

Provide a continuous supply of concrete so that each pile hole is concreted in one uninterrupted operation.

All concrete placed in the pile hole must have the nominated workability (slump flow spread) of the approved concrete mix at the time of placement in the pile hole.

6.5 CONCRETE PLACING - GENERAL

Stir up any sediment in the pile hole into suspension immediately before placing the concrete.

Unless specified otherwise in this Specification, place concrete for piles in conformity to Specification TfNSW D&C B80.

Use a tremie pipe and hopper to place the concrete (refer also Clause 6.6.1).

Place the concrete in a continuous process from the base to above the top of the pile, in such a manner and with such consistency that pockets of air or water or ground materials are not entrapped in the concrete, and the space between the reinforcement and the side of the hole are completely filled with sound concrete.

Take additional measures when selecting and placing concrete in large piles and in piles passing through gravelly soils. Consider the use of a large tremie pipe or multiple tremie pipes equally spaced inside the reinforcing cage perimeter, as appropriate.

Carry out placing of concrete on test members when there is uncertainty about the outcome of placing concrete in the piles (refer Clause 6.2).

6.6 TREMIE METHOD

6.6.1 Equipment

The tremie pipe must be rigid and watertight throughout. Tape a steel plate to the bottom end of the tremie pipe or similar, prior to concrete placing.

Select a tremie pipe size such that at the concrete supply rate, the placed concrete will completely fill the pile hole, flow through the reinforcement cage and push any soil contaminants to the surface of the concrete over-pour.

Where a concrete pump is used, a flexible rubber hose may be used to transport the concrete between the pump and the hopper of the tremie pipe. Ensure that the hose is still capable of doing this when the bottom end of the tremie pipe is raised to the top of the pile at the end of concreting.

6.6.2 Procedure

Discharge any slurry used to prime the concrete pump and tremie pipe away from the pile hole.

Insert the tremie pipe inside the pile hole until the bottom end of the tremie pipe is at the base of pile hole before the tremie pipe is charged with concrete.

Do not commence concreting until the pile hole is filled with such head of water as to equalise the external water pressure from the surrounding ground.

During concreting, lift the tremie pipe progressively as the concrete level rises, but at all times keeping the bottom end of the tremie pipe a minimum of 2 m below the top surface of the concrete until sound concrete appears at a minimum of 400 mm above the pile cut-off level, to avoid defective concrete at or below cut-off level.

When placing concrete in water, a larger over-pour may be required.

6.7 CONCRETING RECORDS

During concreting, maintain a record of the depth of the tremie pipe outlet against the level of the concrete in the pile hole, and the corresponding volume of concrete placed.

6.8 CUT-OFF AND CLEAN UP OF TOP OF PILE

Carefully remove any concrete and/or casing above the cut-off level without damaging the permanent work not earlier than 24 hours after completion of placement of concrete.

The top of the pile to be embedded in the substructure must be undamaged, sound, free of any laitance and loose material and have a surface roughness profile not less than 3 mm.

Where concrete below cut-off level is cracked or defective, cut away and repair the pile to provide a full and sound section to cut-off level as directed by the Project Verifier.

Keep the reinforcement protruding from the top of the pile clean and protected from damage.

7 PILE INSTALLATION TOLERANCES

Tolerances on pile installation must conform to Section 7 of AS 2159, except that the inclination tolerance for vertical piles must not exceed 1%, measured on the inside of the casings.

Demonstrate to the Project Verifier that the inclination tolerances have been achieved.

8 PILE TESTING

8.1 PILE INTEGRITY TESTING - GENERAL

Pile integrity testing must be capable of confirming that the pile is sound over its full length.

Carry out integrity testing on all piles nominated on the Design Documentation drawings and assess pile integrity in conformity to AS 2159 and relevant TfNSW Bridge Technical Directions.

8.2 PILE INTEGRITY TESTING - CROSS-HOLE SONIC LOGGING

8.2.1 General

Where cross-hole sonic logging is used, carry out testing in accordance with ASTM D6760.

Space the logging tubes equally around the perimeter at an equal distance from the pile axis. Provide sufficient number of logging tubes such that the testing will be able to cover the entire cross-section of the pile. The tube centre-to-centre spacing must be 0.25 to 0.3 m, unless approved otherwise by the Designer.

Extend the logging tubes to the bottom of the pile hole to enable testing the whole length of the pile.

8.2.2 Logging Tubes

Use round steel logging tubes that are watertight and free from contamination (e.g. oil, dirt, loose rust, mill scale, etc.) to ensure adequate bond between the tube and the surrounding concrete.

Do not use plastic or PVC tubes.

The diameter of the logging tubes must be appropriate for the sonic logging probes used.

8.2.3 Tube Installation

Secure the logging tubes to the inside of the main bars of the reinforcement cage. Protect the tubes against contamination and blockages by sealing the bottom and top ends of the tubes with watertight threaded caps before inserting the cage into the pile hole.

Fill the tubes with water prior to concrete placement to avoid debonding between the tube and the surrounding concrete.

Should any of the logging tubes become blocked, the Project Verifier may require drilling new holes or further integrity testing by other means.

8.2.4 Dewatering and Grouting

After completion of the cross-hole sonic testing, dewater the logging tubes and fill them with pourable shrinkage compensated grout with concrete strength not less than that of the pile concrete. Filling of the tubes with grout must commence from the bottom of the tube gradually filling up to the top to prevent air entrapment.

8.2.5 Proposed Details For Approval

Submit to the Principal for approval the proposed:

(a) number, diameter, location and length of the logging tubes;

(b) procedure for securing the tubes in location during concreting;

(c) grout material details and procedure for filling the tubes after the completion of cross-hole sonic testing.

8.3 PILE LOAD TESTING - GENERAL

Where specified on the Design Documentation drawings, carry out pile load testing to confirm pile design parameters. The required pile test load is specified on the Design Documentation drawings and is dependent on the extent of pile testing as specified on the Design Documentation drawings. Carry out the tests specified on the Design Documentation drawings on the nominated test piles.

Additional performance criteria for load testing, if required, will be as specified on the Design Documentation drawings.

Unless specified otherwise, perform static or high-strain dynamic testing in conformity to AS 2159 and Clause 8.4 of this Specification as applicable.

Other types of pile load testing in conformity to AS 2159 may be used, as approved by the Principal.

8.4 PILE LOAD TESTING - HIGH-STRAIN DYNAMIC TESTING

8.4.1 General

Where high-strain dynamic pile testing is to be carried out, extend the top of the pile during concreting as required for the attachment of transducers or other test devices.

Carry out high-strain dynamic testing in conformity to this Clause and AS 2159 using an approved organisation with approved equipment using an approved dynamic testing system with subsequent dynamic analysis, all as listed in the "Lists of Transport for NSW (TfNSW) Approved Bridge Components and Systems" at: http://www.rms.nsw.gov.au/business-industry/partners-suppliers/documents/tenders-contracts/listofapprovedbridgecomponentssystems.pdf.

Testing must not result in the allowable concrete stresses being exceeded.

8.4.2 Testing Procedure

Use the following testing procedure:

(a) Attach four bolt-on transducers to the pile at a minimum of 1.5 times the maximum pile width below the head of the pile in conformity to the requirements of the system supplier.

(b) Following connection of the transducers to the analyser, strike the pile with sufficient energy to verify the required resistance.

Record the blow counts, measured resistance and nominal and measured driving energy.

The relationship between the nominal driving energy and blow counts determined from a dynamic test is valid only for the specific combination of hammer, helmet, cushion, pile rake, pile size, pile material and founding material.

8.4.3 Dynamic Analysis

Analyse the dynamic test results for each pile tested. Analyses must include full dynamic analysis (e.g. CAPWAP). When requested by the Project Verifier, use field parameters obtained from the test data to provide a minimum of six different resistances with corresponding blow counts.

8.4.4 Report

Provide to the Principal and Project Verifier two copies of a report for each pile tested including:

(a) Complete PDA (or approved equivalent) output for all blows, including driving stresses and net driving energy.

(b) CAPWAP (or approved equivalent) analyses for selected blows.

(c) Certification that the pile has been dynamically tested in conformity to this Specification. If it is not possible for this certification to be provided due to nonconformities in the testing or the pile tested, provide instead an itemised nonconformity report together with the proposed disposition.

ANNEXURES B58/A AND B58/B – (NOT USED)

ANNEXURE B58/C – SCHEDULES OF HOLD POINTS, WITNESS POINTS AND IDENTIFIED RECORDS

Refer to Clause 1.2.3.

C1 SCHEDULE OF HOLD POINTS AND WITNESS POINTS

Clause	Type	Description
3.3	Hold	Submission of details of proposed piling plant and method
4.1.1	Hold	Submission of certification that pile hole set out and additional boreholes have been completed, borehole logs and core, and methods of casing installation and placing concrete
4.2.3	Hold	Submission of notification that pile hole excavation is complete, and pile conformity documentation
5.1	Witness	Inspection of reinforcement cage prior to placing into pile hole
5.2	Hold	Submission of certification that pile hole and reinforcement cage are clean

C2 SCHEDULE OF IDENTIFIED RECORDS

The records listed below are Identified Records for the purposes of TfNSW D&C Q6.

Clause	Description of Identified Record
4.2.3	Piling records, signed by Piling Supervisor, verifying conformity of the pile hole upon completion of its excavation
4.3	Results of pile hole examination
6.7	Records of depth of tremie pipe outlet, concrete level in pile hole and volume of concrete placed during concreting
8.1, 8.2	Pile integrity testing results
8.3, 8.4	Pile load testing results

ANNEXURE B58/D – PLANNING DOCUMENTS

Refer to Clause 1.2.4.

The following documents are a summary of documents that must be included in the PROJECT QUALITY PLAN. Review the requirements of this Specification and other contract documents to determine any additional documentation requirements.

Clause	Description of Document
2.1, 4.1.3	Weld preparation and procedure for splicing of casings
2.2	Details of concrete mix
3.3, 4.1	Equipment and methods for driving casing and excavating pile hole
4.1.2	Method for overcoming obstructions to driving of casing
4.2	Methods of roughening sides and cleaning base and side of pile hole
5.1	Method of supporting reinforcement cage during placing into pile hole
6	Method of placing concrete including method of inserting and withdrawing tremie pipe

ANNEXURES B58/E TO B58/K – (NOT USED)

ANNEXURE B58/L – MINIMUM FREQUENCY OF TESTING

Refer to Clause 1.2.5.

Clause	Characteristic Analysed	Test Method	Minimum Frequency of Testing
2.2	Concrete for piles	As detailed in TfNSW D&C B80	As detailed in TfNSW D&C B80
8.1, 8.2	Pile integrity testing	Clauses 8.1 and 8.2	Nominated Piles as specified on the Design Documentation drawings
8.3, 8.4	Pile load testing	Clauses 8.3 and 8.4	Nominated Piles as specified on the Design Documentation drawings

ANNEXURE B58/M – REFERENCED DOCUMENTS

Refer to Clause 1.2.6.

TfNSW Specifications

TfNSW D&C B80	Concrete Work For Bridges
TfNSW D&C B201	Steelwork for Bridges
TfNSW D&C G22	Work Health and Safety (Construction Work)
TfNSW D&C G36	Environmental Protection
TfNSW D&C Q6	Quality Management System (Type 6)

Australian Standards

AS 1579	Arc welded steel pipes and fittings for water and waste water
AS 1726	Geotechnical site investigations
AS 2159	Piling – Design and installation
AS 5100	Bridge design
AS 5100.3	Part 3: Foundations and soil-supporting structures