



TECHNICAL STANDARD TS 35 31 26.50
FIXED TYPE PRIVATE JETTIES ON WATERWAY
BANKS

Document History and Distribution

CONTROLLED VERSION NO:	3	Approved by:
Issue Date: 20/09/2021		Name: Shayne Lowe
Issued By: Anne Noonan		Position: Manager Technical Standards & Support
[Uncontrolled unless numbered and dated (in red)]		Knowledge Mgrs: Anne Noonan, Scott Wikman

Version(s)

Version	Date	Author(s)	Notes
1	20 Sep 2012	Martina Cusack	Document Creation
2	4 Oct 2012	Martina Cusack	Revision
3	20 Sep 2021	Anne Noonan	Revision

Distribution

Version	Recipient(s)	Date	Notes
Final	G-MW Technical Standards web site		
Final	Objective	20 Sep 2021	

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PART 1 GENERAL**1.01 INTRODUCTION****A. PURPOSE**

- a) The proposed work under this Technical Standard consists of the construction of fixed type private jetties on the Corporation's public foreshore land by others.

B. GENERAL

- a) This Technical Standard is not intended for use in Corporation contract documents.
- b) This Technical Standard provides a guide to proponents for construction of fixed type private jetties to a standard acceptable to the Corporation. Every application will be assessed on its merit for the particular site and proposed use.
- c) The Corporation's general preference is to avoid construction of new private infrastructure on public foreshore land. Potential proponents should contact the Corporation to discuss proposals prior to commencement of any significant design work.

C. EXCLUSIONS

- a) This Technical Standard does not cover floating or transportable type private jetties, which are the subject of separate Technical Standards.

1.02 REFERENCES

- A. The publications listed below form a part of this Technical Standard to the extent referenced.
- B. The publications are referred to in the text by basic designation only. Where no date is given for referenced standards, the latest edition available shall be used.

C. AUSTRALIAN STANDARDS

- ▶ AS 1111.1 – ISO metric hexagon bolts and screws – Product grade C
- ▶ AS 1170.0 - Structural design actions, general principles
- ▶ AS 1170.1 - Structural design actions, permanent, imposed and other actions
- ▶ AS 1170.2 - Structural design actions, wind actions
- ▶ AS 1170.4 - Minimum design loads on structures, earthquake loads
- ▶ AS 1214 – Hot-dip galvanised coatings on threaded fasteners
- ▶ AS 1289 - Methods of testing soils for engineering purposes
- ▶ AS 1379 – Specification and supply of concrete
- ▶ AS 1428.1 - Design for access and mobility

- ▶ AS 1559 – Hot-dip galvanised steel bolts with associated nuts and washers for tower construction
- ▶ AS1657 - Fixed platforms, walkways, stairways and ladders, design, construction and installation.
- ▶ AS 1684.1 - Residential timber framed construction, design criteria
- ▶ AS 1720.1 - Timber structures, design methods
- ▶ AS 1726 - Geotechnical site investigations
- ▶ AS 2156.1- Walking tracks, classification and signage
- ▶ AS 2159 - Piling, design and installation
- ▶ AS 2416.2 - Water safety signage
- ▶ AS 2758.1 – Aggregates and rock for engineering purposes – concrete aggregates
- ▶ AS 3600 - Concrete structures
- ▶ AS 3972 – General purpose and blended cements
- ▶ AS 4100 - Steel structures
- ▶ AS 4671 - Steel reinforcement bars for concrete
- ▶ AS 4680 – Hot-dip galvanised (zinc) coatings on fabricated ferrous articles
- ▶ AS 4791 – Hot-dip galvanised (zinc) coatings on ferrous open sections, applied by an in-line process
- ▶ AS 4792 - Hot-dip galvanised (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialised process
- ▶ AS 4855 – Welding consumables: Covered electrodes for manual metal arc welding of non-alloy and fine grain steels
- ▶ AS 4997 - Guidelines for the design of maritime structures
- ▶ ISO 31000 – Risk Management

D. LEGISLATION

- ▶ Occupational Health and Safety Act 2004
- ▶ Occupational Health and Safety Regulations 2007
- ▶ EPA Publication No. 1896 “Working within or adjacent to waterways”

E. CORPORATION WATER TECHNICAL STANDARDS

- ▶ TS 35 42 37.10 Placement of Rock Beaching under Clear Span Bridges
- ▶ TS 35 42 37.15 - Supply of rock products for rock armouring, rock beaching and rock spalls.
- ▶ TS 35 80 05.5 Erosion Protection of Reservoirs at Full Supply Level

1.03 DEFINITIONS

- A. Goulburn-Murray Water is referred to as the “Corporation” in this Technical Standard.

PART 2 MATERIALS**2.01 FIXED TYPE PRIVATE JETTY CONSTRUCTION MATERIALS**

- A. Jetties may be constructed in concrete, timber or steel, shall be aesthetically and professionally completed. Minimalist unobtrusive infrastructure is preferred, with a small footprint and negligible impact on the environment.

B. STEEL

- a) Steel is a suitable material for use in the construction of jetties, particularly where design loads are high. However, it is vulnerable to corrosion and it is necessary to consider appropriate systems to protect and maintain the steel members, including methods for installation and connection of steel members to prevent damage to pre-applied protection systems.
- b) Consideration should be given to the selection of steel members to allow ease of application and maintenance of protection systems and not simply based on the most efficient size or shape with regard to strength.
- c) Further advice regarding protection systems for steel structures and elements and the selection of steel members is given in AS 4997.
- d) Steel structures and elements shall generally comply with the design and performance requirements of AS4100. Minimum sizes of steel members and connections shall generally comply with AS 4997.
- e) Requirements for stainless steel shall generally comply with AS 4997.

C. CONCRETE

- a) The deterioration of concrete is predominately caused by the corrosion of steel reinforcement and can be minimised by designing durable concrete structures and limiting concrete crack widths. Crack widths shall be limited by designing structures with low stresses in the reinforcement. Maximum allowable reinforcement stresses shall generally comply with AS 4997.
- b) Care shall be taken by designers in specifying high strength concrete (concrete with a characteristic compressive strength above 50 MPa) in order to improve

durability. Further advice regarding the use of high strength concrete is given in AS 4997.

- c) Concrete structures and elements shall generally comply with the design and performance requirements of AS3600.
- d) Requirements for concrete, reinforcement and prestressing steel shall generally comply with AS 4997.
- e) Exposure classifications for concrete elements and minimum requirements for cover to reinforcement shall be determined generally in accordance with AS 4997.

D. TIMBER

- a) Timber is often used in small craft facilities such as jetties due to its ease of workability. The deterioration of timber is usually by rot or attack by living organisms. Timber durability is dependant predominantly upon the species chosen in the design. Further advice regarding the use of timber is given in AS 4997.
- b) Timber jetty structures and elements shall generally comply with the design and performance requirements of AS 1720.1.
- c) Requirements for timber shall generally comply with AS 4997. Hardwood timbers shall be either durability class 1 or class 2 in accordance with AS 1720.1.

PART 3 RISK ASSESSMENT OF STRUCTURE

3.01 RISK ASSESSMENT

- A. The Proponent shall assess the risk of the structure with consideration being given to its design, use and maintenance and its elements to firstly identify, then minimise or remove risks to future users of the structure. The risk assessment shall be undertaken in accordance with ISO 31000.
- B. Examples of potential risks to users include, but are not limited to the following:
 - a) Tripping.
 - b) Slipping.
 - c) Falling.
 - d) Pinch spots.
 - e) Inadequate safety and rescue equipment.
 - f) Inadequate egress points from the water.

3.02 DESIGN FOR RISK

- A. The design of all structures to be used in a workplace during operation, construction and maintenance, shall take into consideration occupational health and safety requirements in accordance with the Occupational Health and Safety Act 2004.
- B. The use of jetties is only permitted during daylight hours.
- C. No temporary or permanent additional structures are permitted on jetties.
- D. All jetties are to be single level only.

3.03 ASSESSMENT BY THE CORPORATION AND INFORMATION TO BE PROVIDED**A. ASSESSMENT**

- a) The Corporation will assess applications according to the following structure classification:
 - i. Classification "A" Structures - Standard Corporation Drawings
 - ▶ The Proponent shall submit a design which will be assessed by a Corporation assessor, be in accordance with the standard drawings in Annexure 1 and be certified by an engineer registered as a Building Practitioner of Victoria.
 - ▶ Non-standard arrangements will be considered Classification "B" structures.
 - ii. Classification "B" Structures - Non-standard Drawings
 - ▶ The Proponent shall submit a design that has been certified by an engineer registered as a Building Practitioner of Victoria.
 - ▶ The design will be assessed by a Corporation assessor and possibly by a third party structural engineer.

B. INFORMATION TO BE PROVIDED TO THE CORPORATION

- a) In applying to construct a fixed type private jetty on a Corporation foreshore, the Proponent shall include the following:
 - i. Photo of site and site plan, including topographical and water depth contours (to mAHD), existing structures and features.
 - ii. Design of jetty, including the type and layout of the proposed jetty.
 - iii. Required geotechnical investigations/report.
 - iv. Crown Allotment number or copy of title.
 - v. Use and purpose of the jetty.
 - vi. Construction methodology.
 - vii. Risk assessment complying with ISO 31000, which may be audited.

PART 4 DESIGN**4.01 PURPOSE**

- A. The designer shall consider the purpose of the fixed type private jetty as part of the protection of the lake foreshore as well as its use for land and water access and activities.
- B. The design of the jetty structure shall take into account as appropriate, stability, strength, serviceability, durability, safety, construction, operation and maintenance.

4.02 DESIGN STANDARDS

- A. Fixed type private jetties that are proposed to be constructed on Corporation waterways shall be designed and constructed to the following performance standards:
 - a) Design Life
 - i. Design life is the period of time for which a structure or an element of the structure remains fit for use for its intended purpose with appropriate maintenance.
 - ii. The designer, in consultation with the proponent, shall determine an appropriate maintenance regime consistent with the adopted design and materials that will achieve the design life. Particular care should be taken when considering design life and maintenance regimes for inaccessible elements of the jetty. Such elements should have a design life (with no maintenance) equal to the design life of the jetty.
 - iii. At the end of its design life, the jetty should have adequate strength to resist ultimate loads and be serviceable, but may have reached a stage where further deterioration will result in inadequate structural capacity.
 - iv. Fixed type private jetties shall be designed, constructed and maintained for a minimum design life of 50 years.
 - b) Minimise Public Risk
 - i. All jetties are for private use, but must be accessible to the Corporation at all times.
 - ii. The Proponent, designer and constructor shall consider the operational risk posed by the jetty during its design, construction, use and maintenance, and demonstrate that risks have been minimised.
 - iii. A detailed engineering design and certification of the jetty is required.
 - c) Standards and Legislation
 - i. Fixed type private jetties shall be designed and constructed to AS 4997 and other relevant current Australian Standards and Legislation as listed in Sec 1.02.

4.03 LOCATION OF THE FIXED TYPE PRIVATE JETTY

- A. The designer shall consider Corporation access to the jetty, site conditions, constructability and the likely loading conditions on the jetty.

4.04 LOADING ON THE JETTY

- A. The designer shall consider the use and location of the jetty to determine the worst likely loading cases. The designer shall refer to AS 1170 for loading design.
- B. Some of the forces the designer shall consider include water flow / currents, debris impact, thermal movement, boat wash and berthing forces on the jetty structure.

4.05 RISK

- A. The designer shall mitigate the risk and consequence of failure of the jetty. The risk of failure shall determine the level of design information required.
- B. The designer shall consider the access to and on the jetty and include fall protection in accordance with the risk assessment for the jetty and AS 1657 if required.
- C. One safe form of personnel access to the water is also to be provided, subject to the outcome of the risk assessment. Ladders or steps with hand rails may be considered in accordance with AS 1657.
- D. Appropriate signage shall be installed in accordance with AS 2156.1.

4.06 TOPOGRAPHY

- A. The designer shall consider the surrounding topography as the slope above and below the jetty may influence the likelihood of failure.
- B. The bathymetry at the location of the proposed jetty will determine its' extent i.e. it's length from the shore to achieve 0.75-1m depth of water at full supply level.
- C. The topography will determine the access conditions. Consideration should be given in the design to access for disabled persons in accordance with AS 1428.1.

4.07 GEOTECHNICAL INVESTIGATIONS

- A. Detailed site specific geotechnical investigations shall be carried out in accordance with AS 1726 for each structure classification, to determine the following design parameters:
 - i. Substrata type.
 - ii. Effect of any drainage discharge onto surrounding site.
 - iii. Nature of existing ground material.
 - iv. Foundation and embankment strength parameters.
 - v. Water measurement depths.
 - vi. Effects of any excavations and filling.

vii. Location of existing or proposed adjacent structures.

viii. Ground movement.

ix. Global stability.

B. Geotechnical testing shall be in accordance with AS 1726 and AS 1289.

4.08 SOIL PARAMETERS REQUIRED FOR DESIGN

A. Geotechnical investigations shall be used to determine the internal friction angle (Φ), cohesion factor (c), skin friction and bearing capacity.

4.09 FLOOD LEVELS, FREEBOARD AND FETCH

A. The designer shall consider the normal operating level, the high water level, the 1 in 100 year flood level and the deck height of the jetty to determine the risk and likelihood of hydrostatic forces and/or inundation.

B. If inundation is likely, the jetty shall be designed to withstand uplift, inundation and submergence.

C. The designer shall consider the wave fetch and the type of boats using the jetty and determine an appropriate amount of freeboard on the jetty, which should be a minimum of 300 mm above the high water level. However, it is recognised that this may be limited by the topography at the location and the requirement to minimise fall hazards, particularly when the storage is drawn down from time to time and the type of boats proposed.

D. The designer shall consider the impact of waves on the jetty structure and the associated dynamic loads from vessels tied to it.

4.10 SCOUR PROTECTION

A. The designer shall consider and include provision for scour and erosion in the vicinity of the structure, which will include the analysis of the geomorphology of the area, water depths, current and fetch at the location, as well as the proposed boats types and use of the jetty.

4.11 REDUNDANCY

A. Consideration should be given in the design of the jetty and its elements to allow for redundancies to prevent failure of the structure in the event of the loss of a critical element.

4.12 ENVIRONMENTAL CONSIDERATIONS

A. The design and construction of the jetty shall consider the environmental values at the location and mitigate against any damages to terrestrial or aquatic flora, fauna and habitats. Jetties which unacceptably impact environmental values will not be approved.

4.13 MAINTENANCE

- A. The designer shall design a jetty to require minimum maintenance over its' entire life.
- B. The designer must consider the following in the design of the jetty: -
 - a) Access to the various parts of the jetty for maintenance / repair work.
 - b) The ability to remove or contain waste materials during repairs.
 - c) The ability to undertake repair work in situ to achieve the required standard.
 - d) The future availability of replacement members or elements.
 - e) The future availability of skilled tradespersons to undertake the maintenance / repairs over the design life.
- C. Access shall be maintained for maintenance vehicles.
- D. During the design life of the jetty maintenance will need to be undertaken to ensure that the design life is achieved. Such maintenance activities would include: -
 - a) Regular inspections.
 - b) Timely repairs.
 - c) Timely renewal of protection systems.
 - d) Timely replacement of worn-out components.
 - e) Keeping records of inspections carried out and maintenance performed.
- E. For continued licensing, the jetty must be well maintained and be in a satisfactory condition. It must be inspected and certified as being fit for use, every five years, by a certified engineer registered as a Building Practitioner of Victoria.

4.14 SAFETY

- A. The designer shall design a jetty that is practical and safe to construct, use, maintain and dispose of over its entire life.

PART 5 EXECUTION

5.01 SATURATED AND INUNDATED GROUND CONDITIONS

- A. The jetty will likely be constructed within the waterway and subject to saturated and inundated ground conditions, which will affect the method of construction. No cutting into the existing bank will be permitted.
- B. The construction methodology provided with the application shall provide details on how the jetty is to be constructed and how it will mitigate against any negative impacts on the waterway. It should also consider the prevailing water levels.
- C. The Proponent will be required to consult with the Corporation in regard to the timing of the construction works.

5.02 COMPACTION

- A. The Proponent will demonstrate that any fill is compacted to the required level of compaction.
- B. Soil compaction and density tests shall be conducted for all fill in accordance with AS 1289.5. The Proponent shall be responsible for making good any subsidence.

5.03 ROCK BEACHING

- A. Rock beaching shall be installed in accordance with the following Corporation Technical Standards:
 - a) TS 35 42 37.10 Placement of Rock Beaching under Clear Span Bridges
 - b) TS 35 42 37.15 - Supply of rock products for rock armouring, rock beaching and rock spalls.
 - c) TS 35 80 05.5 Erosion Protection of Reservoirs at Full Supply Level

PART 6 OHS CONSIDERATIONS**6.01 OCCUPATIONAL HEALTH AND SAFETY**

- A. The Proponent shall comply with the following safety standards and legislation, as updated and amended from time to time:
 - a) ISO 31000 - Risk Management.
 - b) Occupation Health and Safety Act 2004 and OHS Regulations (2007).
- B. The Proponent shall assess the safety risks associated with the proposed jetty in accordance with ISO 31000.

PART 7 ENVIRONMENTAL CONSIDERATIONS**7.01 ENVIRONMENTAL IMPACT**

- A. The Proponent shall comply with the following guidance and risk assessment, as updated and amended from time to time:
 - ▶ EPA Publication No. 1896 “Working within or adjacent to waterways”
- B. The Proponent shall assess the environmental risks associated with the proposed jetty in accordance with ISO 31000.

ANNEXURE 1 – DRAWINGS

GENERAL WORKS

- G1 THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH GMW TECHNICAL STANDARD TS 35 31 26.50. THESE DRAWING DETAILS ARE GENERIC ONLY AND ARE APPLICABLE TO THE SOIL CONDITIONS IN NOTE F4. THESE DESIGN DRAWINGS SHOULD BE CERTIFIED BY A QUALIFIED ENGINEER TO ENSURE THE GROUND AND LOADING CONDITIONS ARE SUITABLE FOR EACH INDIVIDUAL SITE.
- G2 UNLESS NOTED OTHERWISE, ALL DIMENSIONS ARE IN MILLIMETRES.
- G3 THESE DRAWINGS SHALL NOT BE USED FOR FINAL SET OUT FOR THE PROJECT. THE PROPONENT SHALL CHECK OR OBTAIN ALL DIMENSIONS RELEVANT TO SETTING OUT OF THE SITE WORKS, AND THE PROVISION OF ANY TEMPORARY BRACING, INCLUDING DESIGN, IN ACCORDANCE WITH THE SPECIFICATION.
- G4 SETTING OUT DIMENSIONS AND SIZES OF STRUCTURAL MEMBERS SHALL NOT BE OBTAINED BY SCALING THE STRUCTURAL DRAWINGS. ANY SETTING OUT DIMENSIONS INCLUDING LEVELS SHOWN IN THE STRUCTURAL DRAWINGS SHALL BE CHECKED BY THE PROPONENT BEFORE CONSTRUCTION COMMENCES.
- G5 THESE ENGINEERING DRAWINGS HAVE BEEN PREPARED FROM INFORMATION STATED ON THE DRAWINGS. AS THIS INFORMATION MAY BE SUBJECT TO CHANGE PRIOR TO OR DURING CONSTRUCTION THE PROPONENT IS TO INFORM GMW WHERE DISCREPANCIES OCCUR.
- G6 PRIOR TO THE COMMENCEMENT OF WORKS THE PROPONENT IS TO IDENTIFY ALL EXISTING SERVICES, ANY DAMAGE TO EXISTING SERVICES TO BE RECTIFIED AT THE PROPONENT'S EXPENSE.
- G7 DURING CONSTRUCTION, THE STRUCTURE SHALL BE MAINTAINED IN A SAFE AND STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED. TEMPORARY BRACING SHALL BE PROVIDED BY THE PROPONENT AS REQUIRED TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.
- G8 THE STRUCTURAL COMPONENTS DETAILED ON THESE DRAWINGS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND LOCAL AUTHORITY ORDINANCES FOR THE FOLLOWING LOADINGS:

LIVE LOADS : SURCHARGE 3 kPa
- G9 ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT AUSTRALIAN STANDARDS AND WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES.

REINFORCEMENT

- R2 BAR LAP LENGTHS SHALL BE SUFFICIENT TO DEVELOP THE FULL STRENGTH OF THE REINFORCEMENT. BAR LAPS IN MILLIMETRES ARE TO BE AS SHOWN BELOW (APPLICABLE FOR 32MPa CONCRETE STRENGTH):-

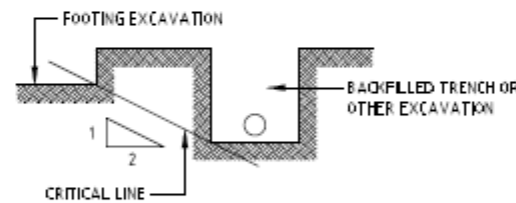
N12	.....	600	N28	.....	1550
N16	.....	800	N32	.....	1900
N20	.....	1050	N36	.....	2300
N24	.....	1300			

MECHANICAL SPLICE FOR TENSION LAP
- R3 BUNDLED BARS SHALL BE TIED TOGETHER AT 30 BAR DIAMETER CENTRES WITH 3 WRAPS OF TW WIRE.
- R4 REINFORCEMENT SYMBOLS :-
 R - DENOTES GRADE 250R HOT ROLLED PLAIN BARS TO AS 4671
 N - DENOTES GRADE 500N HIGH YIELD DEFORMED BARS TO AS 4671

FOUNDATIONS

- F1 THE PROJECT GEOTECHNICAL ENGINEER (PGE) SHALL BE PRESENT FOR ALL EXCAVATIONS FOR BUILDING FOUNDATIONS. SOIL TESTS MUST BE CARRIED OUT AND THE FOUNDATION MATERIAL SHALL BE APPROVED BY THE PGE BEFORE PLACING BLINDING AND/OR REINFORCEMENTS.
- F2 ALL EXCAVATIONS SHALL BE MAINTAINED FREE OF WATER BY PROVISION OF RELIEF DRAINS, OR DRAINAGE TO SUITABLE COLLECTION SUMPS FOR REMOVAL BY PUMPING OR MANUAL MEANS.
- F3 ALL EXCAVATIONS SHALL BE INSPECTED & APPROVED BY PGE, SO AS TO ENSURE DESIGN ASSUMPTIONS ARE MET.
- F4 FOUNDING MATERIAL ON SITE SHALL HAVE MINIMUM CHARACTERISTIC AS LISTED BELOW:

 MATERIALS: CI/CH/SM/SC
 UNIT WEIGHT: 20kN/m³ FOR BACKFILL AND 18kN/m³ FOR NATURAL SOILS
 DRAINED: PHI=28 DEGREES MIN. AND C=0
 UNDRAINED: PHI=0 AND SU=100kPa MIN.
 IAH: 0.41
- F5 REMEDIATION OF ANY IDENTIFIED SOFT AND/OR ORGANIC MATERIAL, OR HARD LAYERS SHALL BE PERFORMED UNDER THE SUPERVISION OF THE ATTENDING PGE & APPROVED BY THE PGE.
- F6 ALL TRENCHES SHALL BE TEMPORARILY PROPPED PRIOR TO BACKFILLING, WITH PROPS BEING RETAINED UNTIL COMPLETION OF CURING OF SUPPORTING FOOTING.
- F7 BACKFILL WITHIN A MINIMUM OF 400mm OF THE BACKFACE OF ANY FOOTING SHALL BE AN APPROVED NON-PLASTIC, FREE DRAINING GRAVEL MATERIAL, FREE OF DELETERIOUS AND ORGANIC MATTER UNLESS NOTED OTHERWISE. OTHER FILL MATERIAL MAY BE MATERIAL AS EXCAVATED, COMPACTED TO 95% OF MAXIMUM DRY DENSITY (STANDARD COMPACTION TEST AS PER AS1289).
- F8 PGE TO INSPECT BATTERS AND ADJUST SLOPES AS NECESSARY DURING CONSTRUCTION TO ENSURE ADEQUATE STABILITY OF BATTERS.
- F9 FOUNDING MATERIAL FORMING BASE ARE TO BE CLEAN AND FREE OF ANY LOOSE MATERIAL SO AS TO ACHIEVE NOMINATED BEARING CAPACITY GIVEN ON THE DRAWINGS.
- F10 UNLESS APPROVED BY THE PGE EXCAVATIONS NEAR FOOTINGS SHALL NOT GO BELOW THE CRITICAL LINE AS SHOWN BELOW.



CONCRETE

- C1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600.
- C2 CONCRETE SHALL BE FROM AN APPROVED SOURCE AND SHALL COMPLY WITH THE REQUIREMENTS OF THE FOLLOWING STANDARDS, UNLESS NOTED OTHERWISE :-
 AS 3600 CONCRETE STRUCTURES
 AS 4671 STEEL REINFORCING BARS FOR CONCRETE
 AS 3972 PORTLAND CEMENT
 AS 1379 READY-MIXED CONCRETE
 AS 2758.1 CONCRETE AGGREGATES
- C3 CONCRETE SHALL BE SUPPLIED ON A PERFORMANCE BASIS AND HAVE THE FOLLOWING CHARACTERISTICS :-

ELEMENT	SLUMP	MAX. AGG.	CEMENT TYPE	CONC. GRADE MPa	EXPOSURE CLASSIFN	COVER UNO.
FOOTINGS	80	20	G.P.	25	A2	50
SUSPENDED SLAB	100	20	G.P.	32	A1-A2	25
PILING	80	20	G.P.	40	A1	40 SIDE

- C4 CONCRETE MIX DESIGN, INCLUDING PROPORTIONS OF ADDITIVES AND CEMENTITIOUS REPLACEMENT MATERIALS, SHALL BE APPROVED BY THE CERTIFYING ENGINEER PRIOR TO THE PLACEMENT OF ANY CONCRETE. CALCIUM CHLORIDE SHALL NOT BE USED IN ANY MIX. FLYASH SHALL NOT TO BE USED AS A CEMENT REPLACEMENT BUT MAY BE ADDED FOR WORKABILITY TO A MAXIMUM 25% OF CEMENT CONTENT.
- C5 THE FINISHED CONCRETE SHALL BE A DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS.
- C6 ALL FORMED EXPOSED EDGES AND RE-ENTRANT CORNERS SHALL BE CHAMFERED OR FILLETED 15mm.
- C7 FOR CHAMFERS, FILLETS ETC. REFER TO DETAILS. MAINTAIN MINIMUM COVER TO REINFORCEMENT AT THESE LOCATIONS.
- C8 NO PENETRATIONS, CHASES OR TEMPORARY FIXTURES ARE PERMITTED IN THE CONCRETE MEMBERS WITHOUT PRIOR APPROVAL OF THE CERTIFYING ENGINEER.
- C9 WHEN DRILLING INTO EXISTING STRUCTURES, USE HAMMER DRILLS ONLY. DO NOT USE DIAMOND CORE DRILLS, EXCEPT WHERE SPECIFICALLY NOTED. DO NOT CUT OR DAMAGE EXISTING REINFORCEMENT UNLESS NOTED.
- C9 CHEMICAL ANCHORS FOR FIXINGS TO CONCRETE SHALL BE HILTI CHEMSET ANCHORS OR APPROVED SIMILAR.
- C10 ALL CONCRETE, INCLUDING SLABS ON GROUND & FOOTINGS, SHALL BE COMPACTED USING VIBRATION EQUIPMENT.
- C11 THE CONCRETE SHALL BE TESTED FOR COMPLIANCE WITH SPECIFIED STRENGTH & SLUMP IN ACCORDANCE WITH AS3600.
- C12 PROPONENT SUPPORT PROPPING SHALL BE LEFT IN PLACE TO AVOID OVERSTRESSING THE STRUCTURE DUE TO CONSTRUCTION LOADING. IT IS THE PROPONENT'S RESPONSIBILITY TO ENSURE THAT STRIPPING AND BACKPROPPING COMPLIES WITH THE REQUIREMENTS OF AS3610 - FORMWORK FOR CONCRETE.
- C13 NO CONCRETE TO BE POURED WHEN SITE TEMPERATURE EXCEEDS 35°C OR FALLS BELOW 5°C.
- C14 NO WATER SHALL BE ADDED TO CONCRETE ON SITE WITHOUT PRIOR APPROVAL. ANY SAMPLE SHALL HAVE WATER ADDED ONLY TO THE AMOUNT ALLOWED ON THE SUPPLY DOCKET AND SHALL BE TESTED AFTER THE ADDITION OF THE WATER.

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REV	DATE	REFERENCES	SURVEY	DESIGN	DRAWING	M. LON HO KEE MANAGER ENGINEERING & MAINTENANCE SERVICES	GMW CORR. NO. 2001/956/2	GOULBURN MURRAY RURAL WATER AUTHORITY 40 CASEY STREET (PO BOX 165), TATURA VIC. 3616 Telephone (03) 5826 3500 Fax (03) 5826 3501	CAD DRAWING INDEX 485814	SHEET NUMBER 01 of 03	DRAWING NUMBER 485814	REVISION

TIMBER

- T1 ALL TIMBER WORKMANSHIP SHALL BE IN ACCORDANCE TO AS1720.
- T2 ALL TIMBER SHALL BE SEASONED AUSTRALIAN HARDWOOD AND SHALL CONFORM TO REQUIREMENTS OF AS2082.
- T3 ALL TIMBER SHALL HAVE A MINIMUM STRESS GRADE OF F22.
- T4 ALL TIMBER SHALL BE OF CLASS 1 OR 2 OF THE NATURAL DURABILITY CLASSIFICATION OF HEARTWOOD e.g.
 - IRONBARK, RED (EUCALYPTUS SIDEROXYLON)
 - IRONBARK, RED BROAD LEAVED (EUCALYPTUS FIBROSA)
 - IRONBARK, GREY (EUCALYPTUS PAMOLATA)
 - GUM, GREY (EUCALYPTUS PROPINQUA)
 - TALLOWWOOD
 - TURPENTINE
 - MERBAU
- T5 ENDS OF ALL TIMBERS SHALL BE GIVEN A COAT OF PETROLEUM JELLY, OR SIMILAR APPROVED GREASE, WITHIN 48 HOURS OF BEING SAWN AT THE MILL.
- T6 ALL EXPOSED END GRAIN (INCLUDING DRILL HOLES) AND TIMBER TO TIMBER CONTACT SURFACES SHALL BE COATED WITH A HEAVY COAT OF PROTIM CN TIMBER PROTECTIVE EMULSION AFTER CUTTING/DRILLING.
- T7 ALL HOLES FOR JOINTS SHALL BE TRULY BORED AND ALL JOINTS CUT TO FIT ACCURATELY AND TIGHTLY. HOLES SHALL BE 10 PER CENT GREATER IN DIAMETER THAN THE BOLTS.
- T8 BOLTHOLE RECESSES (AFTER FINAL TIGHTENING OF BOLTS), SPLITS AND KNOTHOLES IN TIMBER SHALL BE FILLED WITH PABCO 'HYDROSEAL TYPE 367, KNIFE GRADE' OR EQUIVALENT.
- T9 ALL BOLTS, NUTS AND WASHERS SHALL BE HOT DIPPED GALVANISED IN ACCORDANCE WITH AS 4860.
- T10 BOLTS SHALL BE GRADE 4.6S. WASHERS SHALL CONFORM TO AS 1720. BOLTS SHALL BE RETIGHTENED AT SIX MONTHS AFTER COMPLETION OF CONSTRUCTION.
- T11 ALL BOLTHEADS OR NUTS ON EXPOSED SURFACES SHALL BE RECESSED BELOW THE SURFACE.
- T12 TIMBER CONNECTIONS SHALL BE AS SHOWN ON THE DRAWINGS WHERE DETAILED. WHERE NOT DETAILED, THEY SHALL MATCH AS CLOSE AS PRACTICABLE THE EXISTING DETAILS THEY ARE REPLACING.


STEELWORK

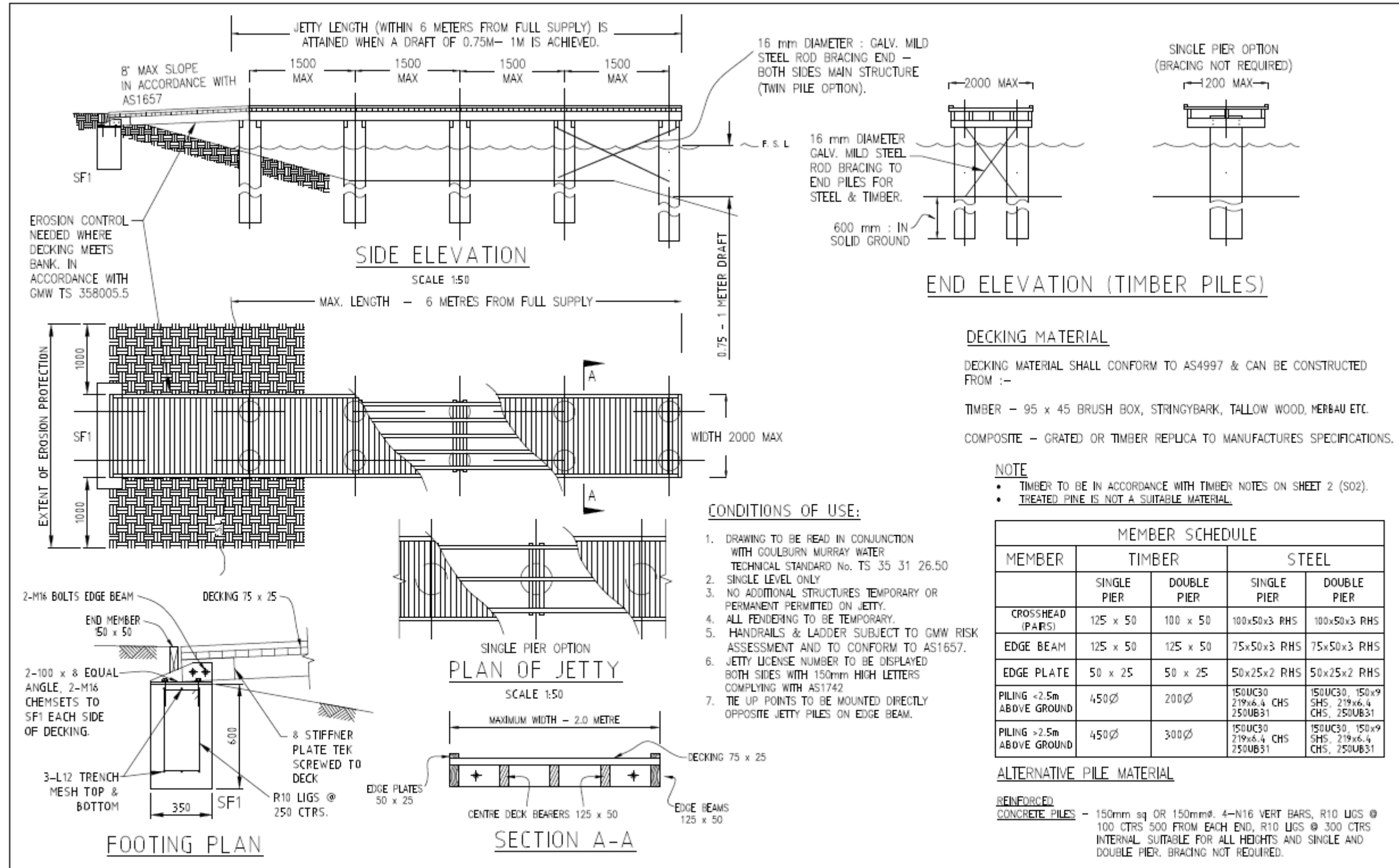
- S1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 4100 AND AS 1554.
- S2 UNLESS SHOWN OTHERWISE, ALL STEEL COMPONENTS SHALL BE IN ACCORDANCE WITH AS3679.1 GRADE 300.
- S3 ALL BOLTS TO BE STRENGTH GRADE 4.6 TO AS1111, TIGHTENED USING A STANDARD WRENCH TO A SNUG TIGHT CONDITION. ALL BOLTS SHALL BE OF SUCH LENGTH THAT AT LEAST ONE FULL THREAD IS EXPOSED BEYOND THE NUT AFTER THE NUT HAS BEEN TIGHTENED.
- S4 ALL WELD TYPES TO BE CATEGORY SP. WELDS SHALL CONFORM TO AS1554 AND WELDING ELECTRODES TO AS/NZS 4855. WELDING SHALL BE PERFORMED BY AN EXPERIENCED OPERATOR. THE INSPECTION/TESTING OF ALL WELDS SHALL BE CARRIED OUT IN ACCORDANCE WITH AS2214 AND NOTES ON THE DRAWING. WELD TYPES ARE DESIGNATED AS FOLLOWS:-
 - CFW - CONTINUOUS FILLET WELD
 - CPBW - COMPLETE PENETRATION BUTT WELD
 - A/R - ALL ROUND
- S5 HOT DIP GALVANISING SHALL BE IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS AS1214, AS1559, AS4680, AS4791 & AS4792. REPAINTING/REPAIR OF DAMAGED GALVANISED SURFACES (EG. SITE WELDS) TO BE PAINTED WITH 2 COATS OF APPROVED ZINC RICH PAINT.

UNLESS SPECIFIED OTHERWISE, STEELWORK SHALL BE PREPARED BY REMOVING LOOSE SCALE BY HAND OR POWER WIRE BRUSHING THEN APPLYING ONE COAT OF RUST INHIBITIVE ALKYD PRIMER (75um), FOLLOWED BY ONE COAT OF ALL-WEATHER GLOSS ENAMEL PAINT (125um).
- S6 CATHODIC PROTECTION SHALL BE INSTALLED IN ACCORDANCE WITH AS 2832.
- S7 APPROPRIATE CORROSION RESISTANT FITTINGS AND FIXTURES TO BE USED.

PILES

- P1 ALL PILES SHALL COMPLY WITH AS2159 & AS4997
- P2 ONE TEST PILE SHOULD BE DRIVEN AWAY FROM BANK.
- P3 LEAVE PILE FOR 24 HRS MINIMUM BEFORE TESTING. MAX TEST LOAD 30kN. TESTING PROCEDURE IN ACCORDANCE WITH SECTION 8 OF AS2159-2009.
- P4 LEAVE PILE A MINIMUM 300mm ABOVE HIGH WATER LEVEL.
- P5 MINIMUM LENGTH OF EMBEDMENT BELOW ANTICIPATED SCOUR LEVEL OF ANY PILE SHALL BE 3 METERS INTO FIRM SOIL AND 6 METERS INTO A SOFT SOIL, OR NOT LESS THAN ONE THIRD OF THE PILE LENGTH. WHERE PILES ARE INSTALLED THROUGH A SHALLOW VERY SOFT STRATUM OVERLYING AN EXTENSIVE HARD STRATUM, THE PILE TOES SHALL BE TAKEN SUFFICIENTLY FAR INTO THE HARD STRATUM TO ACHIEVE END FIXITY.
- P6 TIMBER PILE BASES TO HAVE 100 mm Sq. GALVANISED PRESSED METAL MULTI-NAIL PLATES.
- P7 TIMBER PILE TOPS TO BE FITTED WITH GALVANISED M.S. ANTI-SPLIT RINGS - FORCE FIT.

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