TECHNICAL NOTE

TECHNICAL INFORMATION FROM THE CONCRETE PIPE ASSOCIATION OF AUSTRALASIA

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# UPDATE – LARGE BOX CULVERTS & AS 1597.2

The new Australian Standard for large steel reinforced concrete box culverts AS1597.2-2013 "Precast reinforced concrete box culverts – large" was revised and published in August 2013, an update on the 1996 version of the document.

The organisations represented on the Standards Australia committee for this revision, CE26, were AUSTROADS, Australian Railway Association, Engineers Australia, National Precast Association of Australia, the University of Sydney and the Concrete Pipe Association of Australasia.

The objective of this Standard is to provide industry with minimum requirements for the design, manufacture and installation of precast reinforced concrete rectangular box culverts of spans up to 4200 mm.

The objective of this revision was to align the Standard with current manufacturing and installation practices as well as governing design codes.

As a result this means that there are a number of significant changes and additions that will affect manufacturers, designers, specifiers and contractors. This Technical Note will outline the significant sections of the document that will impact industry and alert specifiers and contractors of changes related to manufactured product.

**1. The latest version of AS1597.2 standardises the following practices that currently take place and introduces new requirements for the materials and manufacture of large box culverts:**

- It states that culverts manufactured in accordance with the Standard can expect to achieve a design life in excess of 100 years.
- Materials used for large box culvert manufacture are now referenced to the current material Standards.
- Class L reinforcement is distinguished between Class N with the note - *"If a culvert is designed with Class N reinforcement, then Class L reinforcement shall not be substituted for Class N reinforcement unless the culvert is specifically designed for Class L reinforcement."* Class L reinforcement must meet the requirements of the appropriate clauses in AS3600-2009.
- Durability details have been updated to align with AS5100 and to reflect current design requirements. This includes:
  - Specification of durable concrete materials (e.g. aggregate durability, restriction on chemical content, use of blended cement).
  - With blended cements the Standard allows individual authorities to specify minimum percentages for supplementary cementitious materials.
  - Exposure classifications, concrete strength and cover to reinforcement. This includes:
    - B1 classification 40 MPa, 30mm cover 50 MPa, 25mm cover
    - B2 classification 40 MPa, 45mm cover 50 MPa, 35mm cover
    - C classification 50 MPa, 50mm cover
- Minimum curing requirements for various methods (e.g. time, maturity, concrete strength) have been updated to reflect current practice and requirements.
- Provisions for moist, membrane and accelerated curing have all been provided in the Standard.

**2. The design requirements and relevant procedures for large box culverts have been updated in the Standard.**

**The major changes include:**

- Vertical earth pressure design now allows for different fill material types for trench and embankment installations. There is also a new embankment installation for compacted fill load.
- Traffic loads are now consistent with AUSTROADS requirements – W80 wheel, A160 axle and M1600 tri-axle loads, as well as heavy load platforms (HLP 400 the default design requirement).
- The distribution of wheel load through fill is detailed and specific for buried concrete box culverts.
- Where significant traffic volumes of heavy vehicles (road) or heavy rolling stock volumes (rail) are likely, fatigue design loads for culverts with < 1m fill are to be in accordance with fatigue requirements of AS5100.2.
- With respect to the effective width of culvert for wheel load direct on deck, the serviceability case formulae has been corrected (effective width = 0.5 + 0.3 Span (L)).
- Detailing of reinforcement and crack control to be designed in accordance with AS 3600 – 2009.
- Appendix A contains advice and recommendations on the information that should be supplied by a purchaser at the time of inquiry or order to assist with these design requirements.

## 3. Testing and sampling requirements have been amended in AS 1597.2

- The previous version of the Standard included comprehensive details of load testing regimes for each culvert type and size. This has been removed from AS 1597.2 – 2013 as it is superfluous to the Standard.
- A detailed sampling and testing plan has been included in Appendix F to check for concrete strength, reinforcement strength, reinforcement configuration, cover to steel, and dimensional accuracy.

With the introduction of any new Standard a reasonable period of time is required to phase out previous manufacture and specification methods. CPAA members are well advanced in updating their designs, quality processes and manufacturing requirements to comply with the new version of AS1597.2.

It is expected that specifiers and contractors throughout Australia will also amend current practice to comply with the latest requirements outlined in the Standard.

The revised version of AS1597.2-2013 "Precast reinforced concrete box culverts – large" is now available through SAI Global on www.saiglobal.com or through your organisation's direct link to Standards Australia.