

Some thoughts about the revision of AS 4678

1. There appears to be an SA format, whereby the initial sections are:
 - 1 Scope and general
 - 2 Investigation and testing (Site investigation)
 - 3 Design requirements (and procedures)
 - 4 Design loads (Geotechnical design)

in which the bracketed headings are from AS 2159-2009.

2. There is a need for a major revision of AS 4678-2002, because there are a number of inconsistencies, including:
 - a. The standard deals mainly with gravity structures, but never clearly states this.
 - b. While the standard deals with gravity structures, Appendix B is on Ground anchors (Informative).
 - c. There is no reference in the main text to earth pressure
 - d. The main text refers to and gives notation for characteristic strength, without defining how it is determined
 - e. There are figures illustrating what appear to be anchored bulkheads, but no relevant text
 - f. In Appendix E it states “where retaining walls using ‘embedded piles’ are adopted at a site, the design of such structures should be carried out as suggested in AS 2159 for laterally loaded piles. This is considered to be highly misleading since AS 2159 considers piles buried in the soil and subject to vertical and lateral loads, but not piles excavated on one side and subject to earth pressure
 - g. Although the standard is called Earth Retaining Structures, the Committee is called Reinforced Soils and Retaining Structures, and there is much content on Reinforced Fills, mainly informative
3. I would therefore like to propose a restructuring of AS 4678 into parts, similar to AS 5100. My initial thoughts are:
 - a. Part 1 Scope and general; Investigation and testing; Design requirements and procedures
 - b. Part 2 Gravity retaining walls; special investigation and testing; special design requirements and procedures
 - c. Part 3 Reinforced fill structures; special investigation and testing; special design requirements and procedures
 - d. Part 4 Embedded retaining walls; special investigation and testing; special design requirements and procedures
4. My idea is that, for any given wall, Part 1 **and** Parts 2, 3 **or** 4 would apply, which I believe to be a simple and workable structure. It also has the advantage that much of the work on the Parts can be done by separate teams of people in parallel and simultaneously
5. I note that AS 2159 was among the leaders to encompass limit state design for geotechnical engineering in 1995 (Eurocode 1993, Canada 1995, USA 1980, Denmark 1965), and that the use of risk assessment to evaluate the geotechnical resistance reduction factor was novel and is now accepted. I suggest that a similar approach is taken to ϕ_g in AS 4678, and have already received a draft proposal in that regard
6. I note that reliability based design has been promoted for many years now, and is currently being discussed in connection with standards both in Europe and in South Africa. An opportunity exists for Australia to lead the world again in offering a standard

in which reliability based design is accepted as one option. While attending the 19th ICSMGE in Seoul last September, I got agreement from Farokh Nadim of NGI, Vaughan Griffiths of the Colorado School of Mines, and Peter Day who is a Fellow of the SAICE, to assist us in this aspect of the standard

7. There are also important moves taking place to make to easier to use numerical analysis, such as finite element or finite difference methods, in design, with particular regard to the Serviceability Limit State. I would like to see AS 4678 encompassing these movements
8. In order to avoid reinventing the wheel, as well as rearranging as much as possible of the previous text, we should be able to make use of text from the now withdrawn BS 8002:1994, and also BS 8006:1995, both of which have been replaced by standards compatible with the Eurocodes. SA has been requested to facilitate this