Bridge manual – 3rd edition amendment 2 summary of updates

What has changed

The following changes have been made to the *Bridge manual* since the third edition, amendment 1:

Section	Change
Various	Various amendments have been made throughout the *Bridge manual* to clarify requirements for different structure types, in particular bridges, culverts (major and minor), stock underpasses and subways.
1.1	The overarching *Highway structures design guide* introduced and referenced.
2.1.6(c)	Clarification of requirements for items that are partially cast in added.
2.1.9	Provision for internal working room for mechanical plant to clear out significant amounts of gravel or debris, where expected, added.
2.6.3	Requirement for urban design assessments for major retaining walls that are visible from surroundings communities, public open spaces or the highway itself added.
3.2.4	Lane factors for overload vehicles have been amended. By reference this also affects 7.4.4 although the text in 7.4.4 has not been amended.
3.4.12(b	The combinations of earth loads to be considered have been amended.
3.4.18	The collision loading provisions have been amended extensively. Load factors for collision loads in load combination 3C have been lowered (to 0.67 at SLS in tables 3.1 and D1 and 1.00 at ULS in tables 3.2 and D2), with a commensurate increase in nominal collision loads.
3.5(a)	The consideration of a 'permanent' load that is not always present added if a worse effect can be obtained.
3.5(d)	Details of how to consider both stability and the design of bridge deck joints for seismic response referenced as these are not captured by tables 3.1 and 3.2.
Tables 3.1 and 3.2	Grouping of load factors for the load combinations amended (although in general the load combinations have not changed). Tsunami loading and load combination 3E added.
4.2.1(j)	Pedestrian loading has been removed from repetitive loading that needs to be considered in concrete fatigue design.
4.3.6	The Transport Agency's protective coatings guide is referenced.
4.7.1(b)	Preferred bearing types added.
4.7.2(a)	Limit states for design and robustness and displacement capacity requirements for bearings amended.

Section	Change
4.7.2(f)	Consideration of collision loading for the design of elastomeric bearings added.
4.7.2(g)	Requirement to protect sliding surfaces in bearings from dirt and debris ingress added.
4.10.1	Cover requirements over culverts, subways and stock underpasses amended.
4.11	Consideration of eccentric tendons added.
4.12.2	Details of when settlement slabs may or may not be needed added.
4.12.5	Need to consider spacing of services added.
5.1.2	Requirement that repeat design level earthquakes shall be considered as a major earthquake event added.
5.2.1	Clarification that major earthquake loading to be taken as 1.5 times design level earthquake added.
5.2.3(a)	Clarification that spectra adopted from site specific seismic studies shall not be less than that corresponding to ZRu=0.13.
5.4.10	Provisions for foundation settlements added.
5.6	Design considerations for tsunami effects on bridges introduced.
6.1.2	Seismic and non-seismic performance requirements for soil structures collated with various details added. Process for applying for departures from the specified standards added.
6.3	Liquefaction assessment, identification and mitigation procedures and design scenarios to consider have been amended extensively. NZ Transport Agency research report 553 referenced.
6.4.1	Reference to embankments considered as dams added.
6.6.1	Interpretation of Building Code requirements, in particular Clause F4, added.
6.6.6	Details for the long-term performance and maintenance of anchors added.
6.6.7	Details for the long-term performance and maintenance of soil nails added.
6.6.9	Amended to align with performance requirements detailed in 6.1.2.
6.8.3	Requirement for unique labelling of rolls of geosynthetic soil reinforcement added.
7.5.1	Wheel positioning on decks clarified, particularly for narrow decks.
7.5.3(a)	Composite and non-composite decks defined in terms of the clause. Clarity added that concrete deck slabs shall be supported on all four sides when simplified evaluation method is used.
Figure A1	TL4 rigid barrier with top rail @ 1400mm removed from figure.

Section	Change
Appendix B	Various provisions for pedestrian, cyclist and equestrian barriers moved from B6 to B2 for consistency of presentation, with clarity added where necessary.
B2.1, B3.1.6, B6.4	Interpretations of Building Code requirements, in particular Clause F4 Safety from falling, added.
B2.9	New clause detailing provision for the occasional presence of people added. This affects the use of barrier performance level 3 barriers as detailed in B3.1.4. Figure B1 also amended to reflect new clause B2.9.
Table B2	Details for F shape barriers amended.
B6.3	Expanded to give design details for retaining walls to resist barrier forces.
B6.4	Load factor for design loads for pedestrian, cyclist and equestrian barriers amended to 1.8 to align with AS/NZS 1170.1 and AS 5100.2. Increased load option for crowd/panic situations added. Clearance between top rails and supports on barriers to allow for cycle pedals added.
B6.6	Height requirements for combination barriers when cyclists are accommodated on a path outside of the barrier added.
D2.2	Reference to 3.1.6 for 'no barrier' option added and pedestrian barriers not required where pedestrians are not likely noting the requirements of new clause B2.9 for the occasional presence of people.
D2.5(a)	Crack widths to be considered under load combination 1B rather than 1A in advance of a similar change to NZS 3101, aligning clause with 4.2.1(a).
Tables D1 and D2	Grouping of load combinations amended. Tsunami loading and load combination 3E added.
Appendix F	Appendix F has been removed and will be located in appendix A of the *Highway structures design guide* (see Technical advice note #16-10).