📘 Commentary C1 – Key Changes Summary

Topic	1997 Version	2025 Draft Version	Key Changes
Scope	Applied to general steel structures; excluded thin elements and high-strength steel >450 MPa	Expanded to include buildings, bridges, cranes; allows steel up to 690 MPa (non-seismic); includes composite members	- Broader applicability - Higher yield stress limit - Clearer bridge design scope
Use with NZ Building Code	Referenced BIA and verification methods	Explicitly aligned with NZBC Approved Documents B1, B2, C4; defines verification vs alternative solutions	- Clear compliance pathways - Integration with NZBC structure
Definitions & Roles	Provided technical terms and roles like design engineer, construction reviewer	Expanded and clarified roles (e.g. fire design engineer, coatings inspector); aligned with Building Act 2004	- More detailed role definitions - Updated terminology and legal references
Notation	Adopted ISO notation; listed key symbols	Greatly expanded symbol list; clarified units and design action notation	- Comprehensive symbol definitions - Improved clarity for design calculations
Alternative Materials/Methods	Encouraged expert advice; referenced HERA	Formalized process for new materials/methods via special study, testing, or rational design	- Clearer process for alternative solutions - Linked to NZBC compliance
Design & Documentation	Listed minimum info for drawings/specs	Expanded to include seismic categories, weld demands, reuse markings, AESS, tolerances, fire protection	- Detailed documentation requirements - Alignment with AS/NZS 5131 and sustainability goals
Construction Review	Defined CM2–CM4 levels; linked to QA systems	Reorganized and clarified reviewer responsibilities; aligned with AS/NZS 5131 and NZS 3404.1:2009	- More structured review process - Updated terminology and references

Topic	1997 Version	2025 Draft Version	Key Changes
Workmanship & Categories	General workmanship guidance	Introduced Construction Categories (CC1–CC4) and AESS classifications; linked to AS/NZS 5131	- Tiered quality levels - Formal AESS integration
Abbreviations	Not included	New section listing key abbreviations (e.g. CVN, FCM, NDE, RHS, SHS)	- Improved readability and consistency

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📘 Commentary C2 – Key Changes Summary

Topic	1997 Version	2025 Draft Version	Key Changes
Yield Stress & Tensile Strength	Minimum values defined; actual mill test values not permitted	Reaffirms minimum values; clarifies use of both Table 3.3 and 3.4; references C17.5.2.1 for project-specific steel	- Clarified table usage - Added guidance for mixed-section yield stress
Structural Steel	Based on NZ/AU/UK/JP standards; test certificates required	Clarifies approval process for non-listed standards; emphasizes traceability	- Stronger emphasis on documentation and traceability
Unidentified Steel	Conservative assumptions: 170 MPa yield, 300 MPa tensile	Updated to 210 MPa yield, 370 MPa tensile based on MBIE Part C6	- Increased default values - Reference to seismic assessment guidelines
Through-Thickness Properties	Not covered in detail	Introduces lamellar tearing risk assessment; exemptions based on ZEd, sulphur content, joint type	- New provisions for Z-grade steel - Reference to Weld Australia TN06
Seismic Applications	Covered in Section 12.4	Moved to Section 2; introduces conforming steel types; new flowchart; updated Charpy and tensile limits	- Consolidated seismic steel guidance - Relaxed category 3 criteria
Bridge Steel	Not covered	Reintroduces withdrawn NZS 3404.1:2009 bridge steel provisions	- New section for bridge-specific steel selection
Fasteners	Based on AS/NZS 1252	Adds EN 14399 as acceptable alternative; allows equivalent high-strength bolts	- Broader fastener standard coverage

Topic	1997 Version	2025 Draft Version	Key Changes
Steel Castings	AS 2074 accepted; others under clause 1.5	Notes clause renumbering (now 1.9); maintains AS 2074 as primary standard	- Editorial update for clause reference
Brittle Fracture	Based on AS 4100; Charpy impact guidance; bending strain equations	Expanded with seismic-specific temperature limits; cold-forming effects; Charpy requirements for welded steels	- Unified selection table - Cold-forming temperature adjustments - Mandatory Charpy impact for welded steels
Fabrication Strain	Bending strain equations; springback discussed	Adds temperature adjustments for >1% strain; references Weng & White	- New temperature modifiers - More detailed strain analysis
Welding Consumables	Must match parent metal toughness	Toughness must exceed parent metal; 47 J at −20°C required for seismic; overmatching allowed with limits	- Tougher seismic requirements - Reference to AS/NZS 5131 and classification rules

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📘 Commentary C3 – Key Changes Summary

Topic	1997 Version	2025 Draft Version	Key Changes
Design Objectives	Focused on ultimate and serviceability limit states	Reaffirmed limit states; clarified terminology and added references to updated standards	- Terminology aligned with AS/NZS 1170 - More explicit safety index notation (β)
Safety Indices	Used average values for different structural components	Same values retained; clarified notation and rationale	- Clarified β vs. b confusion - Added commentary references
Load Effects	Covered AS/NZS 1170, crane loads, construction phase	Expanded to include composite construction and inelastic shortening	- Added AS/NZS 2327 - More detailed treatment of construction-phase effects

Topic	1997 Version	2025 Draft Version	Key Changes
Ultimate Limit State	Explained nominal vs design values; superposition; strength reduction factors	Added diagrams and equations; clarified seismic design and instability checks	- New figure (C3.3) - Clearer equations and terminology - Expanded seismic and instability guidance
Serviceability Limit State	Covered deformation, vibration, bolt slip, corrosion	Expanded vibration guidance (SCI & AISC); added SNZ TS 3404 for corrosion	- New vibration references (Murray, Smith et al.) - SNZ TS 3404 added for corrosion - Updated bolt slip commentary
Deflection Limits	Referenced AS/NZS 1170.0 Table C1; HERA guides	Added AS/NZS 2327; flagged outdated references	- Suggests updating older references - Adds composite beam guidance
Vibration of Beams	Cited ASCE, HERA, Murray (1989)	Adds SCI (2009), AISC (2016), AS/NZS 2327; clarifies vibration thresholds	- Modernized vibration references - Clearer frequency guidance (1–4 Hz, <8 Hz)
Bolt Serviceability	Discussed slip-critical connections	Reaffirms friction-type (TF) connections; cites Galambos et al.	- No major change; updated citation formatting
Corrosion Protection	Mentioned HERA R4-133 and sacrificial steel	Adds SNZ TS 3404; clarifies site-specific vs published data	- Stronger emphasis on SNZ TS 3404 - More guidance on corrosion rate estimation
References	~23 references, mostly 1980s–1990s	Expanded to ~30 references; includes AS/NZS 2327, SNZ TS 3404, SCI, AISC	- Modernized reference list - Added commentary supplements and design guides

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📘 **Commentary C4 – Key Changes Summary**

Topic	1997 Version	2025 Draft Version	Key Changes
Scope & Introduction	Focused on elastic, elastic with redistribution, and plastic analysis	Adds “advanced analysis” (e.g. direct analysis, NLRHA); acknowledges NZ-specific design context	- New analysis category - Recognizes modern computational methods
Structural Stability	Discussed sway/braced members and second-order effects	Expanded to include global/local imperfections, notional loads, and direct modelling	- More detailed treatment of imperfections - Clarifies when notional loads are needed
Second-Order Effects	Covered P-Δ and P-δ effects; allowed amplification or second-order analysis	Clarifies when each method applies; adds flowcharts and thresholds for switching methods	- Improved guidance and thresholds - More conservative sway frame treatment
Elastic Analysis	Required members to remain essentially elastic	Reaffirms but clarifies “essentially elastic” includes compact and non-compact sections	- Clarified terminology and application
Elastic Analysis with Redistribution	Allowed redistribution with limits; linked to seismic detailing	Reframes redistribution as common practice; ties redistribution levels to seismic categories	- Stronger link to seismic detailing - Updated redistribution limits
Plastic Analysis	Allowed for limited ductility frames; not suitable for seismic	Reaffirms limitations; adds commentary on compatibility with NZS 1170.5	- Clarifies incompatibility with seismic design - Adds ductility validation requirements
Advanced Analysis (New)	Not included	Introduces direct analysis and NLRHA (nonlinear response history analysis)	- Major addition - Supports alternative solutions and modern tools
Direct Analysis Method	Not included	Based on AISC 360; includes stiffness reduction, imperfection modelling, and NZ-specific adjustments	- Enables stability design via analysis - Aligns with international practice

Topic	1997 Version	2025 Draft Version	Key Changes
Nonlinear Dynamic Analysis (NLRHA)	Not included	Introduces Sesoc Design Guide: NLRHA; defines force vs deformation-controlled actions	- Supports performance-based seismic design - Aligns with NZ practice and ASCE 41
Plastic Hinge Rotation Limits	Based on 1990s testing; conservative for cold-formed sections	Reviewed and benchmarked against ASCE 41-17; reduced limits for SHS/RHS; clarified axial load effects	- Updated limits - Cold-formed section adjustments - More nuanced axial load treatment
Buckling Analysis	Covered member and frame buckling; used effective length factors	Adds portal frame-specific methods; clarifies use of elastic buckling load factor λ_c	- More detailed portal frame treatment - Updated stiffness ratio guidance

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📘 Commentary C5 – Key Changes Summary

Topic	1997 Version	2025 Draft Version	Key Changes
Structure & Scope	Focused on bending and shear design	Retains structure; adds clarity and updated references	- Improved formatting and cross-referencing - More consistent terminology
References & Sources	Based on HERA R4-80 and classic texts	Expanded references; includes newer HERA bulletins and updated citations	- More comprehensive bibliography - Clarified citation formatting
Flowcharts & Figures	Included key flowcharts (e.g. C5.1, C5.6)	Retains flowcharts; some flagged for replacement (e.g. Figure C5.1)	- Image updates pending - Improved figure annotations
Section Modulus & Slenderness	Defined compact, non-compact, slender sections	Clarified definitions; added guidance for hollow sections and stiffeners	- More precise slenderness limits - Enhanced treatment of stiffened plates
Restraint Conditions	Classified as F, P, L, U	Retains classification; adds guidance from HERA R4-92	- Clearer restraint definitions - More practical examples and diagrams

Topic	1997 Version	2025 Draft Version	Key Changes
Moment Capacity Calculations	Used α_m *and* α_s factors	Retains method; adds simplified equations and tables	- Table C5.6.1.1 expanded - Equation C5.6.1.1 clarified
Buckling Analysis	Appendix H and elastic buckling methods	Consolidated into main text; more guidance on when to use	- Encourages buckling analysis for critical members - Adds commentary on software use
Shear & Bending Interaction	Included proportioning method	Retains method; adds graphical representation (Figure C5.12.2)	- More conservative default method - Proportioning method clarified
Web Design & Stiffeners	Covered transverse and longitudinal stiffeners	Expanded guidance; added minimum stiffness and area rules	- More detailed stiffener design rules - Clarified end post requirements
Bearing & Buckling	Defined dispersion and slenderness	Retains approach; adds guidance for hollow sections	- New provisions for thin-walled hollow sections - Updated figures and equations
Biaxial Bending & Non-Principal Planes	Covered angle sections and crane girders	Retains approach; adds torsion commentary and design suggestions	- More guidance on torsion and lateral loads - Improved treatment of unconstrained bending

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📘 Section C6 – Summary of Changes

Topic	1997 Version	2025 Draft Version	Key Updates
Language Consistency	Mixed use of “must” and “shall”	Standardized to “shall” throughout	- Improved legal clarity and consistency
Clause Numbering	Static headings	Dynamic linking issues noted	- Headings rewritten for stability in digital formats
References	Cited by clause numbers	Updated to full bibliographic references	- More precise and complete citations

Topic	1997 Version	2025 Draft Version	Key Updates
Form Factor (*k*f_)	Based on older references	Updated to cite Rasmussen et al. (1989)	- Clarified derivation and application
Effective Width (*b*e_)	General guidance	Enhanced with specific references and relaxation conditions	- Added clause C6.2.4.4 for circular hollow sections under low axial load
Nominal Member Capacity (*N*C_)	Based on slenderness reduction factor	Retains method; cites Rotter (1982) and adds interpolation guidance	- Clarified use of tables and equations - Added note on torsional buckling modes
Laced & Battened Members	Based on AS 1250	Updated with BS 5950 references and earthquake category distinctions	- More detailed subclauses (e.g., C6.4.2.1–C6.4.2.7) - Earthquake-specific guidance
Back-to-Back Members	General treatment	Split into separated and contact configurations	- Clearer design force and connection requirements
Discontinuous Members	Based on BS 5950	Refined scope and added eccentricity considerations	- New slenderness limits - Explicit moment checks for stockier members
Restraining Elements	General rules	Expanded with parallel member considerations	- Added clause C6.7.3 for 1.25% force transfer in parallel systems
Figures & Tables	Included key diagrams	Retained (e.g., Figure C6.3.3)	- No major graphical changes noted yet

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📘 Section C7 – Summary of Changes

Topic	1997 Version	2025 Draft Version	Key Updates
Language Consistency	Mixed use of “must” and “shall”	Standardized to “shall”	- Improved consistency and legal clarity
Clause Numbering	Static headings	Dynamic linking issues noted	- Headings adjusted for digital formatting
References	Cited by clause numbers	Updated to full bibliographic references	- More precise and complete citations
Nominal Section Capacity	Based on gross and net section failure	Retains method; clarifies ductility implications	- Added references to ductility studies

Topic	1997 Version	2025 Draft Version	Key Updates
			- Emphasized seismic implications
Area Replacement Plates	Brief mention	Expanded clause C7.2.2	- Clearer guidance for seismic applications - Specific dimensions and welding requirements
Tensile Stress Areas Table	Included	Retained	- No changes to values; formatting improved
Force Distribution at Connections	General discussion	Clarified with references and correction factors	- Correction factor *k*te_ emphasized - Seismic restrictions added
Multi-Component Members	Linked to compression member rules	Retained	- Cross-referenced to Sections 6.4 and 6.5 - Seismic category guidance added
Pin Connections	Based on BS 5950	Retained with clearer empirical basis	- Figure C7.5 retained - Requirements clarified for seismic categories

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📘 **Section C8 – Summary of Changes**

Topic	1997 Version	2025 Draft Version	Key Updates
Clause Structure	Mixed layout with cross-references	Streamlined layout: 8.3 for section capacity, 8.4 for member capacity	- Improved clarity and usability - Clear separation of design routes
Member Definition	Based on bending/compression separately	Unified definition for combined actions	- Consistent with Sections 5 & 6 - Clarified segment vs member length
Design Flowcharts	Included for major axis bending	Retained and clarified (Figures C8.1.1 & C8.1.2)	- Notes updated for inelastic demand and restraint conditions

Topic	1997 Version	2025 Draft Version	Key Updates
Alternative Design Provisions	Access via cross-references	All requirements consolidated in 8.1.5	- Easier access and application - Relaxed flange slenderness limits for category 3 sections
Torsion Commentary	Brief discussion	Expanded into C8.5 with detailed analysis and design guidance	- Covers uniform, warping, and non-uniform torsion - Includes combined bending and torsion
Biaxial Bending	Conservative linear interaction	Power law alternatives added	- More economical design options - Clarified restraint-dependent application
Portal Frame Guidance	Referenced older bulletins	Updated references to HERA R4-160 (2025)	- More accurate design paths for columns and rafters
Yielding Regions	Scattered across clauses	Centralized in C8.1.6	- Clearer boundary conditions for plastic hinges and seismic design
Single Angles in Compression	Covered in 8.4.6	Retained with cross-reference in C8.1.7	- Ensures visibility of special provisions
Terminology	“Must” and “should” used variably	Standardized to “shall”	- Improved consistency and legal precision

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📘 Section C9 – Summary of Changes

Topic	1997 Version	2025 Draft Version	Key Updates
Connection Classification	Rigid, simple	Added semi-rigid with seismic context	- Semi-rigid connections now formally recognized and defined for seismic systems
Design Models	Based on Hogan & Thomas (1994)	Expanded to include SCNZ guides and ASI suite	- Clearer guidance for NZ-specific applications - Updated references and design procedures

Topic	1997 Version	2025 Draft Version	Key Updates
Minimum Design Actions	Fixed values	Clarified for seismic vs non-seismic	- Splice design clarified - Threaded rod tension requirements retained
Block Shear	Not included	New clause added	- Based on Cowie & Fussell (2021) - Uses effective shear plane concept
Bolting Categories	Focus on 8.8 bolts	Added support for 10.9 bolts	- AS/NZS 1252.1:2016 integration - Notes on ductility and shear capacity adjustments
Bearing and Tearout	Based on older research	Updated equations and commentary	- Clarified edge distance effects - Added seismic-specific guidance
Slip Resistance	General treatment	Expanded with surface condition table	- Includes EN 1090-2 comparisons - Appendix K testing emphasized
Weld Metal Strength	Matching only	Allows higher strength welds	- Must check parent metal interface - Designer must specify f_uw explicitly
Butt Welds	Complete/incomplete penetration	Added equivalent butt welds for T-joints	- Based on Taheri et al. (2023) - Conservative throat thickness guidance
Fillet Welds	Traditional vectorial/von Mises	Retained with clarified kv = 1.0	- Added commentary on deformation-based methods
Plug & Slot Welds	Brief mention	Detailed provisions added	- Based on AWS D1.1 and Judd et al. (1986)
Weld Group Analysis	Elastic and plastic methods	Alternative method added	- Treats weld group as extension of member - Aligns with member design assumptions
References	Mixed and outdated	Fully updated and expanded	- Includes SCNZ, ASI, NZSEE, SESOC, AWS, AISC, CIDECT, and more

🔥 Section C11 – Summary of Changes

Topic	1997 Version	2025 Draft Version	Key Updates
Scope & Structure	Focused on PSA and FRR	Expanded to include natural fire, advanced analysis, and practical detailing	- Clearer separation of prescriptive vs performance-based design - Integration with AS/NZS 2327 for composite structures
Terminology	FRR, PSA, SF	Added definitions for natural fire types, limiting temperature, load-bearing function	- Harmonised with C/AS2, EN 1993-1-2, AS 1530.4
Design Domains	PSA via test or regression	Time, temperature, and strength domains	- Flexible design pathways - Equivalent time method for natural fire scenarios
Material Properties	Steel only	Steel + fire protection materials	- Temperature-dependent properties for SFRMs - Guidance on reactive vs non-reactive materials
Thermal Analysis	Lumped mass model	Detailed methods for protected/unprotected members and connections	- Shadow effect, section factor, convective coefficients clarified
Connection Temperatures	General guidance	Specific methods for standard and localised fire	- Empirical ratios for flange/web temperatures - SCNZ carpark guide referenced
Simple Analysis	PSA-based	Time, temperature, strength domains	- Transfer beams, bracing systems, and connections addressed - New detailing rules for slab reinforcement
Advanced Analysis	Limited mention	Full framework for FEM, validation, and practitioner competence	- Three-model integration: fire, thermal, mechanical - Validation and sensitivity guidance added
Connection Detailing	Minimal	Extensive rules for simple, semi-rigid, and seismic connections	- Rotation capacity, protection overlap, stiffeners, gusset plates

Topic	1997 Version	2025 Draft Version	Key Updates
Slab Reinforcement	General	Specific reinforcement rules for slabs with/without decking	- Based on Cardington and NIST tests - Tables and figures for detailing
Transfer Members	Not covered	New provisions for deformation, robustness, and insulation	- Cbf factor introduced - Sprinkler recommendation added
Practical Fire Protection	Not covered	New section on installation, durability, and construction records	- FPANZ CoP referenced - Tables for corrosion categories and coating suitability
Figures & Tables	Few	Extensive illustrations and tabulated guidance	- Deck voids, web penetrations, reinforcement layouts, coating types

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🏗️ Section C12 – Summary of Key Updates

Topic	1997 Edition	2025 Draft Edition	Key Updates
Terminology	Used numeric categories (1–4)	Uses descriptive terms: *fully ductile*, *limited ductile*, *nominally ductile*, *elastic*	- Aligned with NZS 1170.5 - Reduces confusion between system and member categories
Critical Height	Applied only to MRFs	Applies to all seismic-resisting systems	- Introduced to manage risk in taller buildings - Triggers enhanced ductility and detailing requirements
Overstrength Factors	Based on local steel data	Updated with international data	- Removed origin-based differentiation - Factors now based on steel type and manufacturing method
Capacity Design	Required for ductile systems	Required for ductile and some nominally ductile systems	- Clarified application to associated systems - Introduced sway index check for pseudo-capacity design

Topic	1997 Edition	2025 Draft Edition	Key Updates
Member Classification	Based on system category	Based on expected inelastic demand and detailing	- More nuanced guidance for columns, braces, and collectors - New axial load limits for beam-style columns
Connection Design	Allowed upper limit actions	Now restricted for non-ductile connections in taller or ductile systems	- Ensures brittle failure modes are avoided - Clarified hierarchy and redundancy expectations
Moment-Resisting Frames (MRFs)	Focused on welded joints	Expanded to include dissipative and RBS connections	- Introduced OSHJ and SHJ-AFC systems - Slab participation and sway index requirements added
Eccentrically Braced Frames (EBFs)	Focused on shear links	Expanded to include long links and replaceable links	- Clarified member categories - Added redundancy and continuity requirements
Concentrically Braced Frames (CBFs)	Limited elastic design guidance	Strengthened elastic design provisions	- New axial load and member category requirements - Clarified use in diaphragms and roof bracing
Associated Systems	Limited guidance	Detailed requirements for columns and continuity	- Clarified hinge locations and axial load limits - Emphasized redundancy and compatibility with seismic systems
Gusset Plates	General guidance	Specific detailing for BRBs and inelastic rotation	- Added requirements for joint opening and weld strength
Advanced Analysis	Mentioned briefly	Integrated with 4.7 provisions	- Encouraged for special studies and irregular systems
References & Cross-Referencing	Outdated or missing	Updated and expanded	- Aligned with NZS 1170.5, ASCE 7-22, AISC 341-22, CSA S16

Topic	1997 Edition	2025 Draft Edition	Key Updates
			- Improved internal consistency and clarity

📦 Section C13 – Composite and Hybrid Steel–Concrete Structures

Topic	1997 Edition	2025 Draft Edition	Key Updates
Scope	Focused on composite members	Expanded to hybrid steel–concrete systems	- Includes non-composite steel–concrete interfaces - Aligns with AS/NZS 2327 and NZS 3101 - Recognizes MBIE B1/VM1 Amendment 17
Slab Reinforcement	Based on BS 5950-4	Updated using NZS 3101, AS 3600, Eurocode 2	- Clear crack control categories: *minor*, *moderate*, *strong* - New reinforcement tables and equations - Enhanced guidance for exposed slabs and fire conditions
Diaphragm Design	Limited coverage	New provisions for seismic diaphragm forces	- References HERA R4-161 - Emphasizes ductile connectors and post-splitting reinforcement - Details for collector beams and slab anchorage
Construction Sequencing	General guidance	Detailed implications of propping, precambering	- Links to HERA R4-107 - Addresses ponding, deflection, and crack control
Steel–Concrete Connections	Focused on shear studs	Broader coverage including plunge columns, diaphragm transfer	- New detailing for lateral restraint and corrosion protection - Clarifies edge conditions and anchorage requirements
Composite Columns	Covered encased and filled types	Clarified seismic and fire design requirements	- Waiver for axial load limits clarified - AS/NZS 2327 alpha factors referenced

Topic	1997 Edition	2025 Draft Edition	Key Updates
Fire Design	Basic guidance	Integrated with AS/NZS 1170.0 and AS/NZS 2327	- Fire shear transfer requirements retained - Highlights loss of shear transfer under heating - Requires mechanical connectors for fire load cases
References & Standards	NZS 3101:1995, BS 5950	Updated to NZS 3101:2006, AS/NZS 2327, Eurocode 2	- Extensive editorial cleanup - Consistent citation formatting - New references added (e.g. Pascua et al., Alizadeh 2024)

🛠️ Notable Additions

- **Crack Control Definitions**: Clear descriptions of *minor*, *moderate*, and *strong* crack control with exposure classifications.
- **Slab Edge Detailing**: Figures and commentary added for flush edge and collector beam detailing.
- **Hybrid Systems**: Commentary now bridges steel and concrete standards for hybrid buildings.
- **Fire Resistance**: Explicit requirements for shear transfer under fire conditions.
- **Editorial Improvements**: Numbering, heading styles, and cross-references corrected and clarified.

🏗️ Section C14 – Fabrication

Topic	Original Version	2025 Draft Version	Key Updates
Title & Language	"Workmanship" used	Changed to "work" or "quality"	Gender-neutral terminology applied
References	Multiple legacy references (e.g. WTIA, ASCE)	Streamlined to AS/NZS 5131 and key sources	- Redundant or outdated references removed - Reference formatting aligned with style guide
Material Identification	Detailed commentary on lamellar tearing and marking	Condensed and focused on fabrication phase	- Removed discussion of ultrasonic testing and lamellar tearing

Topic	Original Version	2025 Draft Version	Key Updates
			- Emphasis on traceability during fabrication
Fabrication Procedures	Extensive detail on bending, cutting, welding, holing	Referenced AS/NZS 5131 for procedures	- Simplified by deferring to AS/NZS 5131 - Removed commentary on WTIA replicas and flame cutting classes
Hole Size & Bolting	Detailed commentary on punching, drilling, vibration	Retained key provisions, referenced AS/NZS 5131	- Commentary on vibration and thread engagement retained - Removed historical studies and fatigue commentary
Tolerances	Detailed tolerances for beams, columns, splices	Referenced AS/NZS 5131	- Removed figures and commentary on camber/sweep - Simplified tolerance discussion to align with standard practice
Inspection & Contract Documents	Extensive checklist and inspection guidance	Removed section	- Inspection guidance now assumed to be covered by referenced standards - Contract document checklist removed
References Section	17 references, including WTIA, MBMA, ASCE	Reduced to 3 references	- Focused on AS/NZS 5131, Allen & Fisher (1988), and HERA R4-99

✂ Summary of Editorial Improvements

- **Heading Structure**: Corrected numbering and formatting inconsistencies.
- **Style Guide Compliance**: Removed abbreviations like “e.g.”, “i.e.”, “etc.” and replaced with full phrases.
- **Commentary Cleanup**: Removed outdated or redundant commentary, especially where covered by AS/NZS 5131.
- **Simplification**: Focused on actionable fabrication requirements rather than historical context or theoretical background.

🏗️ Section C15 – Erection

Topic	Original Version	2025 Draft Version	Key Updates
Scope & Structure	Detailed commentary on erection practices	Streamlined and aligned with AS/NZS 5131	- Removed legacy references and commentary - Focused on compatibility with AS/NZS 5131
Terminology	"Workmanship" used	Replaced with "work" or "quality"	Gender-neutral language applied
Safety During Erection	Included detailed safety planning and HB62 references	Removed	Safety guidance now assumed to be covered by external standards
Bolted Connections	Extensive commentary on washers, nuts, packing, tensioning	Retained key points, referenced AS/NZS 5131	- Commentary simplified - Subheadings numbered for clarity
Tensioning Methods	Covered torque-control, part-turn, direct-tension devices	Retained with updated references	- Clarified limitations of torque-control - Emphasized two-stage tightening process - Updated SCNZ and AISC references
Tolerances	Detailed tolerances for anchor bolts, columns, beams	Referenced AS/NZS 5131 Class 1 and 2	- Commentary on fabrication vs erection tolerances removed - Simplified to match AS/NZS 5131 Appendix F
Inspection & Grouting	Included inspection procedures and grouting guidance	Removed or condensed	- Inspection assumed to follow AS/NZS 5131 - Grouting details removed, assumed covered elsewhere
Contract Documents	Detailed checklist	Condensed	- Focused on alignment with AS/NZS 5131 - Removed legacy references and commentary
References	15 legacy references (e.g. WTIA, HB62, HERA)	Reduced to 6 modern references	- Focused on AS/NZS 1252, AS/NZS 5131, SCNZ 2018 - Removed outdated or withdrawn documents

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✂ Summary of Editorial Improvements

- **Heading Structure**: Corrected numbering and formatting inconsistencies.
- **Style Guide Compliance**: Removed abbreviations like “e.g.”, “i.e.”, “etc.” and replaced with full phrases.
- **Commentary Cleanup**: Removed outdated or redundant commentary, especially where covered by AS/NZS 5131.
- **Simplification**: Focused on actionable erection requirements rather than historical context or theoretical background.

🏗 Section C16 – Modification of Existing Structures

Topic	Original Version	2025 Draft Version	Key Updates
Scope & Source	Based on AWS D1.1 and HERA R4-99	Same source, with added AS/NZS 5131 reference	- Explicit cross-reference to AS/NZS 5131 for modification procedures
Language & Style	“Recognized”, “program”, “character”	NZ spelling: “recognised”, “programme”, “programme”	- Aligned with NZ English conventions
Material Identification	Detailed guidance on testing and legacy materials	Retained	- Minor edits for clarity and formatting - Bullet formatting improved
Welding Under Load	Commentary on heat input and temperature limits	Retained	- Reference to Certified Welding Engineer and NZ Welding Centre preserved
Fatigue & Inspection	Guidance on fatigue life and inspection programs	Retained	- No substantive changes, but language slightly modernised
References	AWS D1.1, HERA R4-99	AWS D1.1, AS/NZS 5131, ISO 2566.1	- Added ISO and AS/NZS references - Removed HERA R4-99 from reference list (though still relevant in context)

✂ Summary of Editorial Improvements

- **Formatting**: Improved list formatting and paragraph structure.

- **Terminology**: Updated to align with current standards and NZ usage.
- **Reference Updates**: Added ISO 2566.1:2021 and AS/NZS 5131:2016 for material testing and structural steelwork.

🧪 Section C17 – Testing of Structures or Elements

Topic	Original Version	2025 Draft Version	Key Updates
Purpose & Scope	Based on ASCE guidance	Retained	- Minor editorial improvements for clarity and consistency
Limit States	Defined ultimate and serviceability	Retained	- Improved formatting and punctuation - Reference to C3.1 clarified
Definitions	Proof vs prototype testing	Retained	- Clarified implications for design reliability - Improved sentence structure
Test Requirements	Detailed guidance on loading and deflection	Retained	- Language refined for readability - Commentary unchanged
Proof Testing	Recovery criteria: 85% (ultimate), 95% (serviceability)	Retained	- Source citation (Bares & Fitzsimons, 1975) clarified
Prototype Testing	Includes table of multipliers for test load factors	Retained	- Table formatting improved - Equations C17.5.2(1) and (2) referenced more clearly - Commentary on use of test-derived material properties expanded
Reporting	No commentary	Still no commentary	- No changes made
References	One reference (ASCE, 1975)	Same	- Citation formatting improved

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✂ Summary of Editorial Improvements

- **Style Guide Compliance**: Replaced “include” with “are” where lists are exhaustive.
- **Formatting**: Improved table layout and equation references.
- **Clarity**: Enhanced explanations of test types, acceptance criteria, and variability factors.
- **Consistency**: Aligned terminology with other sections (e.g. “this standard” vs “this Standard”).