

Appendix V Corrosion and fire protection

For composite structures that are exposed to the weather and particularly for those that are adjacent to a body of salt water, corrosion protection will become a major design issue. The steelwork in a typical steel framed multistorey office building is likely to be well protected from the weather particularly if the building is air conditioned. In such applications a decision can normally be made that no corrosion protection will be required for exposed steelwork within the building.

As discussed in section A3, for the purposes of the main design example, it was assumed that no fire protection would be required to the exposed steel beams forming part of the composite floor beams.

This appendix provides some additional background information related to corrosion and fire protection.

1 Corrosion protection

This section relates to building structures although methods of corrosion protection for other structures such as bridges and wharfs are mentioned. For buildings, atmospheric corrosion is applicable, whereas for bridges and particularly wharfs, exposure to seawater may be the dominant cause of corrosion. Atmospheric corrosion varies depending on the geographic location of the steel and its location in a structure. Where there is no moisture, there is no corrosion. AS/NZS 2312 "Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings" is a very comprehensive source of information and recommendations regarding corrosion and corrosion protection.

When exposed to oxygen and water, iron corrodes to form ferric oxide. When chloride ions are present, as they are in coastal locations, corrosion is very rapid. However, within the interior of totally enclosed buildings, particularly when they are air-conditioned, there is little moisture and virtually no corrosion, making protective coating of structural steel unnecessary. (Steel may, however, be painted for other reasons.)

Methods of corrosion protection include:

- Painting
- Galvanising
- Concrete encasing
- Protective wrapping
- Cathodic protection

These can be characterised as distributed sacrificial anode systems (paints containing zinc and galvanising), barrier systems (other paints, concrete encasement and wrapping), discrete sacrificial anode systems, and active cathodic protection systems. These are discussed below.

1.1 Painting

Preparation for painting.

The performance of all paints is highly dependent on the prior preparation of the surface of the steel surface. For painting of steel intended for a protected environment, a class 1 finish (brush blasting or power wire brushing) is appropriate. For steel exposed to the weather in a non-marine environment, a class 2½ abrasive blast finish should be specified. Class 3 should be specified for a marine environment or other extremely aggressive environments. (The deeper surface profile of a type 3 surface provides the optimum paint adhesion.) For class 2½ and 3 surfaces, all sharp corners should be ground off to avoid a thin paint film that would otherwise occur at these locations.



Composite Design Example for Multistorey Steel Framed Buildings

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FIRST EDITION 2007 (LIMIT STATES)

National Library of Australia Cataloguing-in-Publication entry:

Durack, J.A. (Connell Wagner)

Kilmister, M. (Connell Wagner)

Composite Design Example for Multistorey Steel Framed Buildings

1st ed.

Bibliography.

ISBN 978-1-921476-02-0

1. Steel, Structural—Standards - Australia.
2. Steel, Structural—Specifications - Australia.
3. Composite, (Engineering)—Design and construction.
 - I. Connell Wagner
 - II. Australian Steel Institute.
 - III. Title

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Table of contents

Table of contents	iii
Preface	v
Section A: INPUT INFORMATION	1
A1. Client and Architectural Requirements	2
A2. Site Characteristics	4
A3. Statutory Requirements	5
A4. Serviceability	8
A5. Design Loads	9
A6. Materials and Systems	10
A7. Design Aids and Codes	11
Section B: CONCEPTUAL AND PRELIMINARY DESIGN	12
B1. Conceptual and Preliminary Design	13
B1.1 Consideration of alternative floor framing systems– Scheme A	14
B1.2 Consideration of alternative floor framing systems– Scheme B	15
B1.3 Framing system for horizontal loading – initial distribution of load	16
B1.4 Alternatives for overall distribution of horizontal load to ground	17
B2. Preliminary Slab Design	21
B3. From Alternatives to Adopted Systems	22
B3.1 Adopted floor framing arrangement	22
B3.2 Adopted framing arrangement for horizontal loading	23
B4. Indicative Construction Sequence and Stages	24
B4.1 The importance of construction stages in composite design	24
B4.1 Indicative construction sequence and construction stages	25
B4.2 Adopted construction sequence for design of erection columns	27
B4.3 Core construction alternatives	27
B4.4 Adopted construction method for the core	27
B5. Preliminary Sizing of Primary and Secondary Beams	28
B6. Plenum Requirements and Floor to Floor Height	30
B7. Preliminary Column Sizes and Core Wall Thickness	33
Section C: DETAILED DESIGN	35
C1. Detailed Design - Introduction	36
C2. Design Stages and Construction Loading	37
C3. Detailed Load Estimation After Completion of Construction	38
C3.1 Vertical loading	38
C3.2 Wind loading	39
C3.3 Seismic loading Not considered	40
C4. Erection Column Design	41
C4.1 Load distribution for erection column design	42
C4.2 Side Column C5 (typical of C5 to C10)	43
C4.3 End column C2 (typical of C2, C3, C12 and C13)	44
C4.4 Corner column C1 (typical of columns C1, C4, C11 and C14)	44
C5. Floor Beams – Construction Stage 1	45
C5.1 Secondary beams Group S1(11 050, 2800) (Beams B22 – B41, B43 – 48)	45
C5.2 Primary beams Group P1(9800, 5725) (Beams B1, B7 to B12, B18,	46
B19 – 21, B49 – 51 and B42)	46
C5.3 Primary beams Group P2(9250, 6600) (B2, B6, B13 and B17)	47
C6. Floor Beams – Construction Stage 3	48
C6.1 Secondary beams Group S1(11 050, 2800) (Beams B22 – 41, B43 – 48)	48
C6.2 Primary beams Group P1(9800, 5725) (Beams B1, B7 - B12, B18 – 21,	49
B49 – 51 and B42)	49
C6.3 Primary beams Group P2(9250, 6600) (Beams B2, B6, B13, B17)	49
C7 Floor Beam Design for Occupancy Loading	50
C7.1 Secondary beams Group S1(11 050, 2800) (Beams B19, B21, B22 - B41,	51
B43 – B49 and B51)	51



C7.2	Primary beams Group P1(9800,5725) (Beams B1, B7 to B12, B18)	58
C7.3	Primary beams group P2(9050, 6600) (Beams B2, B6, B13, B17)	63
C8.	Assessment of Dynamic Performance of Floor System	69
C8.1	Definition of the dynamic assessment process	69
C8.2	Application of the dynamic assessment process	73
C9	Final Slab Design	79
C9.1	Slab design for the office areas	79
C9.2	Slab design for the compactus areas	80
C10.	Longitudinal Shear Reinforcement Design	81
C10.1	Introduction	81
C10.2	Proprietary longitudinal shear reinforcement products	83
C10.3	Secondary beams group S1, B22 typical – longitudinal shear design	84
C10.4	Internal primary beams group P2, (B2 typical) longitudinal shear design	85
C10.5	Primary beams P1, (B1 typical) – longitudinal shear design	87
C10.6	Perimeter beams B19 to 21 and B49 to 51	88
C11.	Floor System Design Review and Final Decisions	89
C11.1	Floor design review	89
C11.2	Final floor framing plan and deck reinforcement	90
C12.	Final Design of RC Columns	91
C13.	Detailed Design of the Core	91
C13.1	Preliminary discussion and statement of limitations of this section	91
C13.2	Basic modelling of the core using beam elements	92
C13.3	The Space Gass Analysis Model	96
C13.4	Model verification and static deflections for W_s	97
C13.5	Dynamic analysis for natural frequency of building	98
C13.6	Interpretation and application of stress resultants from Space Gass	100
C13.7	Further investigation of the core using a Strand7 finite element model	102
C13.8	Review of core investigations	105
C14.	Steel Connection Design	106
C14.1	Can it be built?	106
C14.2	Representative connections	108
C14.3	Web side plate connection design for $V^* = 142$ kN	108
C14.4	Flexible end plate connection for $V^* = 279$ kN	112
C14.5	B2 to core web side plate connection for $V^* = 308$ kN	113
C14.6	Column splice for a load of $N^* = 1770$ kN	114
C14.7	Column base plate for a load of $N^* = 1770$ kN	115
C15.	Web Penetrations	116
C16.	Some Final Thoughts and Disclaimers	117
Appendix I	Theory and discussion – composite slabs	119
Appendix II	Theory and discussion - composite beams	133
Appendix III	Dynamic assessment of the floor system	149
Appendix IV	Theory and discussion steel connections	163
Appendix V	Corrosion and fire protection	175

