

## CHAPTER 7: OTHER CONSIDERATIONS

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### 7.1 ANALYSIS SOFTWARE AND DESIGN AIDS

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The NCC has a formal requirement that, for certain building sizes and forms of construction, software used for design without oversight by a professional engineer must comply with the ABCB *Protocol for structural software*. This is currently limited to trussed roof systems with framed walls. The Protocol sets out the minimum requirements for structural software to ensure that designs correctly apply the seemed-to-satisfy provisions of the NCC.

The NCC Protocol includes procedures for the architecture, updating and use of software systems including the following:

- Scope and limitation of application of software (particularly applications that are NOT appropriate for use);
- User qualifications - degree of training/competence required (if any);
- Name and edition of the NCC and its referenced documents that have been incorporated into the software;
- References for general installation instructions and specific recommended installation/transport procedures which are not part of the “general requirements” or “standard industry practice”;
- Availability of a guide or training program for users, and
- History of revision/upgrading.

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### 7.2 GOOD DETAILING PRACTICE

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Good building design includes attention to the details that will produce a structurally sound and serviceable building. Many of these details are in the form of standard drawing notations applied in the design office of the shed manufacturer. The following list is not exhaustive, and not all details will apply to all buildings.

#### PURLINS AND GIRTS

- Clearly distinguish between single and continuous spans, especially where known openings create single spans.
- Where structural continuity of purlins and girts is assumed in design, detail laps correctly with clear overlap dimensions.
- Include clear notation on drawings and design certifications that wall openings added later will require redesign of girt system.
- Ensure loads are not applied to Cee or Zed purlin lips or top hat flanges and include warnings to alert service installers.
- Where Cee and Zed purlins and girts are used, they should generally be installed with the top flange directed up the wall or roof slope.
- For Cee purlins, orientate web towards ridge for all pitches 10° and under, otherwise orientate purlin flanges to ridge line.

#### SECTION ORIENTATION

- Unless designed otherwise, end wall members should ideally be loaded in their major axis (i.e. with the plane of the web normal to the plane of the end wall). This requires careful consideration at corners where the end or side bay is an opening.



- Where end wall mullions connect to the end frame rafter, the connection detail must avoid rotational movement in the rafter due to eccentricity of loading.
- Correct door jamb orientation is important, especially where a door fills an entire bay at a corner.
- Transfer of roller door curtain loads to door jambs requires careful attention to resist rotational forces on the jamb section, especially where wind locks are installed.
- Detailing of door and window openings generally requires care to transfer wind and bracing loads to locations designed to take them. Supplier drawings and specifications should alert customers to precautions required where openings are made after construction.
- It is preferable for window or door openings to be located where wall bracing interference will not occur.
- Whenever possible, locate roof and side wall bracing within the same bays.
- If door mullions are to be orientated about the weaker axis, sufficient restraint must be considered to avoid section failure when under load.

## SLAB AND HOLD-DOWN

- Drawings and specifications should clearly identify critical hold-down points where effective hold-down capacity must be provided.
- Where hold-down bolt edge distances are small, screwbolts or chemical anchors are preferable to expanding type anchors.
- Chemical anchors may not be suitable where fire resistance is a consideration.
- Beware of green concrete and specify minimum curing times for setting and loading of anchors.
- All concrete specifications must include minimum curing period, method of curing and characteristic strength at 28 days( f'c Mpa)
- Good construction practice dictates that masonry anchors should not be placed in concrete which has not reached 50% of its design strength (typically 7 days).
- When specifying cast-in hold-down bolts, ensure that adequate thread is available for the hold-down bracket and nut(s). For all cast-in members, a distance from above concrete surface penetration must be specified to ensure all base plate and fasteners have sufficient anchor to fix to.
- Bituminous paint top 150-200 mm of cast-in HD bolts before casting slab to protect thread.
- Expanding type masonry anchors are susceptible to becoming loose due to frame movement and vibration. They should not be used on main frames due to limited restraint from wind uplift.
- In all cases, a cast-in anchor is preferable to an expanding or chemical anchor.
- If framing members are to be cast into wet concrete, a surface coating (e.g. bitumen) must be considered to inhibit corrosion from member coating reacting with concrete.

## CONNECTIONS AND GENERAL

- Tight hole sizes minimise joint slip, while large hole sizes speed assembly. Maximum hole diameter should be specified and observed for each bolt size. Generally, cleat hole diameters should be 2 mm larger than bolt diameter.
- Ensure bolts are detailed to correct length to give adequate but not excessive stick through of threads. Minimum of three full bolt threads to extruding outer locking nut.
- Hole patterns in brackets and members should ensure minimum edge distances for bolts. Similarly, where screws are used there must be adequate area for correct placement of the required number of screws.
- Minimum thicknesses should be adopted for specific components to minimise handling and construction damage, even if not required for strength or serviceability.
- Brackets should be designed to transfer loads between members with minimum eccentricity. Identify relevant load paths and detail connections to eliminate distortion.



# CONTENTS

TITLE	SUB-SECTION	PAGE
	ACKNOWLEDGEMENTS	3
	FOREWORD	4
<b>CHAPTER 1</b>	<b>INTRODUCTION</b>	<b>7</b>
<b>SHED BASICS</b>	<b>WHAT IS A SHED</b>	<b>7</b>
	<b>NCC CLASSIFICATIONS</b>	<b>8</b>
	<b>IMPORTANCE LEVELS</b>	<b>9</b>
	<b>SCOPE</b>	<b>11</b>
	<b>MATERIALS AND PROCESSES</b>	<b>12</b>
	<b>STANDARDS AND REFERENCES</b>	<b>12</b>
	<b>DEFINITIONS</b>	<b>13</b>
<b>CHAPTER 2</b>	<b>WIND ACTIONS</b>	<b>14</b>
<b>ACTIONS</b>	<b>SNOW ACTIONS</b>	<b>21</b>
	<b>PERMANENT AND IMPOSED ACTIONS</b>	<b>24</b>
	<b>LIQUID PRESSURE ACTIONS</b>	<b>25</b>
	<b>ACTION COMBINATIONS</b>	<b>25</b>
<b>CHAPTER 3</b>	<b>3D ANALYSIS</b>	<b>27</b>
<b>ANALYSIS</b>	<b>TENSION ONLY</b>	<b>27</b>
	<b>PLASTIC ANALYSIS</b>	<b>27</b>
	<b>COLUMN BASE FIXITY</b>	<b>27</b>
	<b>TYPE OF ANALYSIS</b>	<b>27</b>
<b>CHAPTER 4</b>	<b>PRINCIPLES</b>	<b>29</b>
<b>DESIGN</b>	<b>SECTION AND MEMBER DESIGN</b>	<b>29</b>
	<b>DESIGN OF PURLIN AND GIRT SYSTEMS</b>	<b>34</b>
	<b>BRACING SYSTEMS</b>	<b>35</b>
	<b>SLABS AND FOOTINGS</b>	<b>38</b>
	<b>CLADDING</b>	<b>39</b>
	<b>DOORS, WINDOWS AND OPENINGS</b>	<b>40</b>
	<b>DESIGN PRINCIPLES FOR SERVICEABILITY</b>	<b>40</b>
<b>CHAPTER 5</b>	<b>GENERAL</b>	<b>42</b>
<b>CONNECTIONS</b>	<b>DESIGN BASIS</b>	<b>42</b>



<b>TITLE</b>	<b>SUB-SECTION</b>	<b>PAGE</b>
	<b>TYPICAL PRIMARY CONNECTIONS</b>	42
	<b>BOLTED CONNECTIONS</b>	43
	<b>SCREWS</b>	44
	<b>WELDING</b>	44
	<b>OTHER CONNECTION METHODS</b>	44
<b>CHAPTER 6</b>	<b>GENERAL</b>	45
<b>TESTING</b>	<b>PROOF TESTING</b>	45
	<b>PROTOTYPE TESTING</b>	45
	<b>TESTS RESULTS EVALUATION</b>	46
	<b>PRODUCT SUBSTITUTION</b>	46
	<b>CONNECTORS AND CONNECTIONS</b>	46
<b>CHAPTER 7</b>	<b>ANALYSIS SOFTWARE AND DESIGN AIDS</b>	48
<b>OTHER</b>	<b>GOOD DETAILING PRACTICE</b>	48
<b>CONSIDERATIONS</b>	<b>DURABILITY AND CORROSION</b>	50
	<b>FIRE</b>	53
<b>APPENDICES</b>		
<b>1</b>	<b>BUILDING CLASSIFICATIONS</b>	55
<b>2</b>	<b>IMPORTANCE LEVEL AND PRESSURE COEFFICIENT EXAMPLES</b>	56
<b>3</b>	<b>STRUCTURAL DESIGN CHECKLIST</b>	57
<b>4</b>	<b>PRO FORMA CERTIFICATE</b>	63
<b>5</b>	<b>WORKED EXAMPLES – DESIGN WIND SPEED</b>	64

