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G1	These structural drawings shall be read in conjunction with all architectural and other consultants' drawings and specifications and with such other written instructions as may be issued during the course of the contract. Any discrepancy shall be referred to the Structural Engineer before proceeding with the work.			
G2	Construction using these structural drawings shall not commence until a Construction Certificate is issued by the Principal Certifying Authority.			
G3	All materials and workmanship shall be in accordance with the relevant current Standards Australia Codes and with the Building Code of Australia.			
G4	All dimensions shown on these structural drawings shall be verified by the Builder on site. These structural drawings shall not be scaled for dimensions.			
G5	Unless noted otherwise all levels are in metres and all dimensions are in millimetres.			
G6	<p>The structural components detailed on these structural drawings have been designed in accordance with the relevant Standards Australia Code and the Building Code of Australia for the following loadings. Refer to Architectural drawings for proposed floor usage.</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">Floor Usage</td> <td style="width: 33%;">Live Load (kPa)</td> <td style="width: 33%;">Superimposed Dead Load (kPa)</td> </tr> </table> <p>Wind Loads are in accordance with AS 1170.2 as follows:</p> <p>Basic Wind Velocity, <math>V_s = \dots</math> m/s    <math>V_u = \dots</math> m/s</p> <p>Region: ....</p> <p>Terrain Category: ....</p> <p>The relevant provisions of AS 1170.4 have been applied for an earthquake design category of ..... with site factor, <math>S = \dots</math> and ground acceleration, <math>a = \dots</math>, for a type ... structure</p>	Floor Usage	Live Load (kPa)	Superimposed Dead Load (kPa)
Floor Usage	Live Load (kPa)	Superimposed Dead Load (kPa)		
G7	The method of construction and the maintenance of safety during construction is the responsibility of the Contractor. If any structural element presents difficulty in respect of constructability or safety, the matter shall be referred to the Structural Engineer for resolution before proceeding with the work.			
G8	During construction the structure shall be maintained in a stable condition and no part shall be overloaded. Temporary bracing shall be provided by the Contractor in order to keep the building works and excavations stable at all times.			

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<b>Footings</b>	
F1	Footings have been designed for an allowable bearing capacity of ....kPa on .....material. The foundation material shall be approved by the Geotechnical Engineer for this allowable bearing capacity before placing membrane, reinforcement or concrete.
F2	Refer to Geotechnical Investigation Report No. .... prepared by ..... dated .....
F3	Footings shall be located centrally under walls and columns unless noted otherwise on the structural drawings.
F5	Residential slabs and footings have been designed for a reactivity Class ..... to AS2870.
F6	Footings shall be constructed and backfilled as soon as possible following excavation to avoid either softening of the founding material or drying out by exposure.
F7	Excavate for footings to the nominated size and depth. Footing founding levels are provisional subject to actual site conditions and approval by the Geotechnical Engineer.


<b>Retaining Walls</b>	
R1	Do not backfill retaining walls (other than cantilever walls) until floor construction at top and bottom is completed.
R2	Ensure free draining backfill and drainage is in place behind all retaining walls.

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<b>Formwork</b>	
FW1	The design, certification, construction, inspection and performance of the formwork and false work shall be the responsibility of the Contractor, except to the extent that formwork design is shown on the structural drawings.
FW2	Formwork shall be designed to accommodate movements and load re-distribution due to any post tensioning.
FW3	The formwork shall not be designed to rely on restraint or support from the permanent structure without prior approval from the Structural Engineer.
FW4	Design information for the foundations under the formwork shall be determined from the conditions existing on site at the time of construction. Refer to the Geotechnical Report for the site.
FW5	Formwork construction tolerances and stripping times shall comply with AS3610 and AS3600 unless otherwise approved by the Structural Engineer.
FW6	During construction, support propping will be required where loads from stacked materials, formwork and other supported slabs induce loads in a slab or beam which exceed the design capacity for strength or serviceability limit states at that age. Once the nominated 28 day strength has been attained, these loads shall not exceed the design superimposed loads set out in these general notes at item G6.
FW7	It is to be anticipated in multi-storey construction that propping may be required to extend a number of levels below the floor being cast. Prop removal is to be programmed to avoid distress to previously cast floors. Re-shoring or backpropping proposals shall be subject to the approval of the Structural Engineer.
FW8	Formed concrete surfaces shall have finishes in accordance with AS3610, as specified by the Project Architect.
FW9	Do not place permanent loads on the concrete structure until after formwork and propping is removed
FW10	Refer to Project Architect's drawings for test panel requirements. Reinforcement for test panels shall be similar to that in the permanent structure being represented by the test panel.
FW11	Before placing reinforcement in the formwork, apply a release agent to the face of the formwork compatible with the required surface finish.
FW12	Dimensional tolerances shall comply with AS3610 for the appropriate finish class.
FW13	Chamfer re-entrant angles and fillet at corners by 25mm UNO.
FW14	Before placing concrete, remove all water, dust, and debris from the formwork.
FW15	Fill all holes left by form tie bolts with mortar matching the surface colour of the finished surface.

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<b>Concrete</b>								
C1	All workmanship and materials shall be in accordance with the current edition of AS3600 including amendments, except where varied by the contract documents.							
C2	Readymix concrete supply shall comply with AS1379.							
C3	Concrete Quality							
	Element	Strength Grade (MPa)	Slump	Max Agg Size (mm)	Cement Type	Max W/C Ratio	Min Cement Content	Max Shrinkage Strain
C4	Project control testing shall be carried out in accordance with AS1379, Clause B7.							
C5	No admixtures shall be used in concrete unless approved in writing by the Structural Engineer.							
C6	Clear concrete cover to all reinforcement for durability shall be as follows unless shown otherwise.							
	Element In Structure	Exposure Classification to AS3600	Concrete Grade MPa	Fire Rating	Minimum Cover			
C7	All reinforcement shall be firmly supported on mild steel plastic tipped chairs, plastic chairs or concrete chairs at not greater than 1 metre centres both ways. In exposure condition B2 or C use only plastic or concrete chairs. Bars shall be tied at alternate intersections.							
C8	Concrete sizes shown do not include thicknesses of applied finishes.							
C9	Depths of beams are given first and include slab thickness.							
C10	For chamfers, drip grooves, reglets, etc., refer to Project Architect's details. Maintain cover to reinforcement at these details.							
C11	No holes, chases or embedment of pipes other than those shown on the structural drawings shall be made in concrete members without the prior written approval of the Structural Engineer.							
C12	Where not shown on the structural drawings construction joints shall be located to the approval of the Structural Engineer.							
C13	Conduits, pipes etc. shall only be located in the middle one third of slab depth and spaced at not less than 3 diameters. Pipes or conduits shall not be placed within the cover to the reinforcement.							
C14	Slabs and beams shall be constructed to bear only on the beams, walls, columns, etc. shown on the structural drawings. All other building elements shall be kept 15mm minimum clear from the soffits of the structure.							
C15	<b>Reinforcement</b>							
	All reinforcing bars shall be Grade D500N to AS4671 unless noted otherwise. All mesh shall be Grade 500L to AS4671 and shall be supplied in flat sheets.							


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	<p>Reinforcement notation shall be as follows in the following order number of bars in group bar grade nominal bar size in mm. spacing in mm e.g. 17 N20.250</p> <p>The figures following the fabric symbols RL, SL, L. TM is the reference number for fabric in accordance with AS4671.</p> <p>Reinforcement is represented diagrammatically and not necessarily in true projection.</p> <p>Slab reinforcement shall extend at least 65mm onto masonry support walls and 50 percent of bottom reinforcement shall be cogged to achieved anchorage at simply supported ends.</p> <p>Splices in reinforcement shall be made only in positions shown on the structural drawings or in positions otherwise approved in writing by the Structural Engineer. Laps shall be in accordance with AS3600 and not less than the development length for each bar.</p> <p>Site bending of reinforcing bars shall be done without heating using mechanical bending tools.</p> <p>Welding of reinforcement shall not be permitted unless shown on the structural drawings or approved by the Structural Engineer.</p> <p>Joggles to bars shall be 1 bar diameter over a length of 12 bar diameters.</p> <p>Fabric shall be lapped 2 transverse wires plus 50mm. Bundled bars shall be tied together at 30 bardiameter centres with 3 wraps of tie wire.</p>
C16	The Structural Engineer shall be given 24 hours notice for reinforcement inspection and concrete shall not be delivered until final approval has been obtained from the Structural Engineer.
C17	The finished concrete shall be a dense homogeneous mass, completely filling the formwork thoroughly embedding the reinforcement and free of stone pockets. All concrete shall be compacted with mechanical vibrators.
C18	Curing of all concrete is to be achieved by keeping surfaces continuously wet for a period of 3 days, or by prevention of loss of moisture for a total of 7 days followed by a gradual drying out. Approved spray on curing compounds that comply with AS3799 may be used where floor finishes will not be affected (refer Manufacturers Specification). Polythene sheeting or wet hessian may be used to retain concrete moisture where protected from wind and traffic.
C19	Construction support propping is to be left in place where needed to avoid overstressing the structure due to construction loading. All backpropping shall be approved by the Structural Engineer. No brickwork or partition walls are to be constructed on suspended levels until all propping is removed and the slab has absorbed its dead load deflection.

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<b>Post Tensioned Concrete</b>					
PT1	Workmanship, materials and stressing shall comply with AS3600.				
PT2	Tendons shall be made from 12.7mm stress-relieved super grade strand to AS1311. The maximum force applied to the tendons during jacking shall be 85% of the minimum breaking load.				
PT3	All tendon profile dimensions shown on the structural drawings are to underside of ducts from the soffit except at anchorages where dimensions are to the centreline of the tendon. Cable ducts shall be located to within 5mm of their correct position. Tendon profiles shall be parabolic between high and low points unless noted otherwise, and tendons shall be supported at maximum 1000 centres along their length.				
PT4	Minimum cover to tendons to be as follows irrespective of cable profiles shown on drawings:				
	Element In Structure	Exposure Classification to AS 3600	Concrete Grade MPa	Fire Rating	Minimum Cover to Tendons
PT5	Contractor shall supply a Certificate of Compliance to the relevant Australian Standard for each delivery of prestressing steel and components.				
PT6	Ducts are to be galvanised and rigid enough to retain their shape. All duct joints shall be taped to prevent ingress of concrete slurry.				
PT7	Post tensioning is required in two stages (approximately 24 hours ( $f'_{cp}=10\text{MPa}$ ) and 5 days ( $f'_{cp}=22\text{MPa}$ ) after casting). Concrete compressive strength tests using site cured cylinders shall be made in order to determine that the required compressive strength has been achieved. Minimum expected losses for shrinkage, creep, relaxation, friction and draw-in are to be calculated by the Contractor and supplied to the Structural Engineer for checking at least one week prior to first assembling tendons on site.				
PT8	<p><b>Stressing</b></p> <p>All stressing operations are to take place in the presence of experienced personnel. Care shall be taken to ensure safety of all site personnel during stressing.</p> <p>Details of all stressing operations, together with equipment details and calibration charts must be provided to the Structural Engineer at least 3 days before each stressing stage. Approval shall be obtained from the Structural Engineer to the extensions measured during stressing before grouting of cable ducts.</p> <p>Tolerance on required tendon extension to be + 7%.</p> <p>All jacks and gauges used are to be calibrated no more than one week before being used for the first time on this site. These charts showing identification numbers of equipment are to be supplied to the Structural Engineer prior to use on the site.</p>				
ST9	All ducts are to be fully pressure grouted as soon as practicable after stressing records have been approved by the Structural Engineer. Grout shall comply with Clause 19.1.8 of AS3600.				
ST10	On completion of stressing and grouting, permanently protect all anchorage parts and parts of tendons anchored thereto. Provide not less than 40mm cover where protection is by concrete or cement grout.				

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<b>Structural Steel</b>													
S1	All workmanship and material shall be in accordance with AS4100 except where varied by the contract documents. Fabrication shall be carried out in accordance with Section 14 of AS4100. Erection shall be carried out in accordance with Section 15 of AS4100.												
S2	Unless noted otherwise, all steel shall be of the following grade in accordance with the following Australian Standards												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%; text-align: center;">Type of Steel</th> <th style="width: 40%; text-align: center;">Grade</th> </tr> </thead> <tbody> <tr> <td>Universal beams and columns, parallel flange channels, large angles to AS/NZS 3679.1</td> <td style="text-align: center;">300</td> </tr> <tr> <td>Welded sections to AS/NZS 3679.2</td> <td style="text-align: center;">300</td> </tr> <tr> <td>Hot rolled plates, floor plates and slabs to AS/NZS 3678</td> <td style="text-align: center;">250</td> </tr> <tr> <td>Hollow sections to AS 1163</td> <td style="text-align: center;">C350</td> </tr> <tr> <td>Cold formed purlins and girts to AS1397</td> <td style="text-align: center;">G450 Z350</td> </tr> </tbody> </table>	Type of Steel	Grade	Universal beams and columns, parallel flange channels, large angles to AS/NZS 3679.1	300	Welded sections to AS/NZS 3679.2	300	Hot rolled plates, floor plates and slabs to AS/NZS 3678	250	Hollow sections to AS 1163	C350	Cold formed purlins and girts to AS1397	G450 Z350
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Cold formed purlins and girts to AS1397	G450 Z350												
S3	Three (3) copies of workshop fabrication drawings shall be submitted to the Structural Engineer for review at least 7 days prior to commencement of fabrication. Fabrication shall not commence without the Structural Engineer's approval of the workshop drawings. All dimensions and setouts to be obtained from architectural drawings where not indicated on structural drawings.												
S4	The Fabricator shall provide all cleats and drill all holes necessary for fixing other elements to the steel whether or not detailed on the structural drawings.												
S5	The fabrication and erection of the structural steelwork shall be supervised by a qualified person experienced in such supervision, in order to ensure that all requirements of the design are met.												
S6	All beams and rafters shall be fabricated and erected with natural camber up.												
S7	All members shall be supplied in single lengths. Splices shall only be permitted in locations shown on the structural drawings.												
S8	All steelwork shall be securely temporarily braced by the erector as necessary to stabilise the structure during erection.												
S9	<b>Bolting</b>												

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	Bolting Categories are identified on the structural drawings in the following manner.																						
	Bolt Category:	Comments:																					
	4.6/S	commercial bolts of grade 4.6 to AS 1111 snug tightened																					
	8.8/S	high strength structural bolts of grade 8.8 to AS1252 snug tightened																					
	8.8/TB	high strength structural bolts of grade 8.8 to AS1252 fully tensioned to AS4100 as a bearing type joint																					
	8.8/TF	high strength structural bolts of grade 8.8 to AS1252 fully tensioned to AS4100 as a friction type joint with faying surfaces left uncoated																					
S10	Unless noted otherwise all bolts shall be M16 category 8.8/S. No connection shall have less than 2 bolts. All bolts and washers shall be galvanised. All holes shall be 2mm larger than the bolt diameter unless noted otherwise.																						
S11	/TB and /TF bolt categories shall be installed in accordance with Section 15 of AS4100, using either the part-turn method or the direct-tension indicator method.																						
S12	<p><b>Welding</b>            All welding shall be carried out in accordance with AS1554.1.            Electrodes shall be to either AS1553, AS1858, AS2203 or AS2717, as appropriate.            Unless noted otherwise, all fillet welds shall be 6mm continuous category SP using E48XX electrodes or equivalent. All butt welds shall be complete penetration butt welds category SP to AS1554.1.            The extent of non-destructive weld examination shall be as noted below.            Radiographic or ultrasonic examination shall be to AS1554.1, AS2177.1 and AS2207 as appropriate.</p> <table border="1"> <thead> <tr> <th>Type of weld and category</th> <th>Examination method</th> <th colspan="2">Extent (% of total length of weld type)</th> </tr> </thead> <tbody> <tr> <td>Fillet welds, GP + SP</td> <td>Visual inspection</td> <td colspan="2">100</td> </tr> <tr> <td>Butt welds, GP</td> <td>Visual inspection</td> <td colspan="2">100</td> </tr> <tr> <td rowspan="2">Butt welds, SP</td> <td>Visual inspection</td> <td colspan="2">100</td> </tr> <tr> <td>Radiographic or ultrasonic inspection</td> <td colspan="2">10</td> </tr> </tbody> </table>				Type of weld and category	Examination method	Extent (% of total length of weld type)		Fillet welds, GP + SP	Visual inspection	100		Butt welds, GP	Visual inspection	100		Butt welds, SP	Visual inspection	100		Radiographic or ultrasonic inspection	10	
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S13	<p><b>Corrosion Protection</b>            Structural steelwork not encased in concrete shall have the following corrosion protection.</p> <table border="1"> <thead> <tr> <th>Element</th> <th>Surface Preparation</th> <th>Prime coat</th> <th>Second Coat</th> <th>Third Coat</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				Element	Surface Preparation	Prime coat	Second Coat	Third Coat														
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	<p>All galvanising of structural steelwork shall be to AS4680. The continuous average zinc coating mass shall be 600g/m<sup>2</sup> (550g/m<sup>2</sup> minimum).</p> <p>Provide seal plates to the ends of all hollow sections, with 'breather' holes if members are to be hot dip galvanized.</p>
S14	<p>Steelwork intended to be concrete encased shall be unpainted. Encasing concrete shall be grade N25 providing a cover adequate to suit fire rating or exposure conditions. Concrete encasement shall be centrally reinforced with 5mm wire to AS4617 or 6mm structural grade bars to AS4617 at 150mm pitch.</p>


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<b>Timber</b>	
T1	All timber design, material and construction to be AS1720.1 and AS1720.2.
T2	Softwood to be minimum stress grade F7 U.N.O. Hardwood to be minimum grade F14 U.N.O. Submit suppliers certificate as to stress grade of timber members. All timber shall be branded.
T3	External timber shall be either hardwood durability class 1 or class 2 to AS1720.2 or impregnated pine grade F7, pressure treated to AS1604 and re-dried prior to use. Supplementary treatment shall be applied to all cut surfaces. Supply supporting documentation regarding preservation treatment.
T4	Timber trusses are to be pre-cambered an amount equal to dead load deflection. Three (3) copies of shop drawings are to be submitted to the Structural Engineer for approval clearly showing the design loads on the roof and ceiling and truss node point loads and the precamber. Shop drawings shall also indicate member sizes and locations, timber species, stress grade, strength group and joint details.
T5	All bolts in timber construction to be minimum M16 U.N.O. Bolt holes to be drilled exact bolt size.
	Washers under heads and nuts to be at least 2.5 times bolt diameter.
T6	Timber tolerances on the finished width and thickness to be in accordance with AS 2082, AS1748, AS3519 as appropriate
T7	All timber joints and notches are to be 100mm minimum away from loose knots, severe sloping grain, gum veins or other minor defects.

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<b>Masonry</b>				
M1	Materials including mortar, concrete, grout shall comply with Section 10 of AS3700. Masonry units shall comply with AS4455. Wall ties shall comply with AS2699.			
M2	Masonry shall be constructed in accordance with Section 11 of AS3700.			
M3	Mortar proportions shall comply with Tables 5.1 and 10.1 of AS3700. Mortar admixtures shall not be used without the written approval of the Structural Engineer.			
M4	Strengths of bricks, class of blocks and type of mortar shall be as follows:			
	Element	Material	Characteristic Unconfined Compressive Strength, $f'_{uc}$	Mortar Classification to Table of AS3700
M5	All masonry walls and piers supporting slabs and beams shall have a pre-greased galvanised steel slip joint between the concrete soffit and the top of the masonry element. Non load bearing walls shall be separated from concrete above by 10mm thick closed cell polyethylene strip.			
M6	All masonry supporting or supported by concrete floors shall be provided with vertical control joints to match any control joints in the concrete floors.			
M7	No chases or recesses are permitted in load bearing masonry without the approval of the Structural Engineer.			
M8	All bonding, tying and fixing of masonry shall comply with Clause 4.11 of AS3700.			
M9	Do not construct masonry walls on suspended concrete slabs until slab has been stripped and de-propped.			
M10	Provide vertical control joints at 10m max centres, and 5m maximum from corners in all masonry walls, unless shown otherwise on the structural drawings.			
M11	Reinforced concrete blockwork shall comply with the following.:-			
	<ul style="list-style-type: none"> <li>• Blocks shall be strength Grade 15 conforming to AS4455.</li> <li>• Mortar shall comprise 1 cement: 0.25 lime : 3 sand</li> <li>• Provide cleanout holes at base of all walls and rod core holes to remove protruding mortar fins.</li> <li>• Core filling grout to have a characteristic strength of 20MPa, 10mm maximum aggregate, 230mm slump (+30mm) with a minimum cement content of 300kg/m<sup>3</sup> .</li> <li>• Provide 65mm cover to reinforcing bars from the outside face of the blockwork to allow adequate grout cover.</li> </ul>			

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