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MOE Nationwide FLS – Canterbury Block

Nationwide FLS Upgrades – Canterbury Block Structural Specification

Ministry of Education

18 September 2015

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Contents

1 Demolition

1.1 Preliminary

Refer to the Preliminary and General Clauses of this Specification and to the General Conditions of Contract, which are equally binding on all Trades. This Section of the Specification shall be read in conjunction with all other Sections as the requirements are interrelated.

1.2 Scope

This Section is for the demolition of the buildings on the site, including foundations and the removal and disposal of all demolished material and disturbed ground. It includes the provision of all precautionary safety measures, screens, scaffoldings, hoarding, covered walkways and the like for carrying out the demolition work.

1.3 Related Documents

In this Section of the Specification, reference is made to the latest revisions of the following documents:

Health and Safety in Employment Act 1992 – Approved Code of Practice for Demolition
The New Zealand Building Code

1.4 Safety

The Contractor shall conform fully, both on- and off-site, with the provisions of the New Zealand Building Code in all matters related to construction safety, in particular with approved documents F1 (Hazardous Agents on Site), F2 (Hazardous Building Materials), F4 (Safety from Falling) and F5 (Construction and Demolition Hazards). The Contractor shall at all times comply with the Health and Safety in Employment Act 1992, and particularly the Approval Code of Practice for Demolition, as well as the Health and Safety in Employment Regulations 1995 and all subsequent amendments.

The Contractor shall erect all necessary temporary supports to prevent any unexpected collapse of any part of the building during demolition. Contractor to assume responsibility for all temporary works.

The Contractor shall be solely responsible for the entire safety of the work and no indication of approval or disapproval of any demolition methods and sequence, shoring, screen, protection works, etc. by the Engineer shall be interpreted as in any way reducing the Contractor's responsibility for the same.

1.5 Site Inspection Assessment

The Contractor is deemed to have visited the site and examined the building on the site and those adjoining, and shall be fully aware of any and all circumstances that may affect the demolition of the buildings. This includes the materials comprising the buildings to be demolished. It also includes satisfying themselves as to site conditions, levels, access, services, adjoining buildings and all other matters affecting the execution of this Contract.

1.6 Demolition Contractor

The demolition work shall be carried out by a competent firm of contractors employing skilled workmen experienced in that type of work. The Contractor shall keep a competent Foreman on site at all working times. The Foreman shall be empowered to receive and act on instruction given by the Engineer.

The Contractor shall notify the Engineer the name of his Safety Supervisor prior to commencement, who shall be the holder of a current Department of Labour OSH Qualification. Evidence of this shall be made available to the Engineer.

1.7 Demolition Plan

The Contractor shall prepare a demolition plan or method statement prior to commencing the work as outlined in the HSE Approved Code of Practice for Demolition, Section 4.8. The demolition plan shall be submitted to the Territorial Authority at the time of application for demolition consent. The Contractor shall also provide a copy of the demolition plan to the Engineer. However, this does not relieve the Contractor of sole responsibility for carrying out the demolition in a safe and orderly manner.

1.8 Compliance

The Contractor shall be deemed to have allowed for all work associated with the safe and orderly carrying out of the demolition work, including complying with all Territorial Authority requirements, demolition consent, Building Act, Occupational Health and Safety requirements, and all other acts, laws, by-laws and regulations that may affect the execution of the contract. No variations will be allowed on the grounds of ignorance of the site or the buildings on it or adjoining, or the conditions under which the work will be executed.

1.9 Dust and Noise

The Contractor shall take measures to minimise nuisance from dust, noise and other causes affecting adjoining properties and the public.

1.10 Protection of Adjacent Sites

The Contractor shall take all necessary precautions to avoid damage to adjoining public and private property and shall be wholly responsible for reinstating any damage incurred during the contract. The Contractor is responsible for keeping all public thoroughfares clear and free of debris.

Prior to the commencement of excavation, the Contractor shall undertake a condition survey of neighbouring properties likely to be affected by the excavation work. This shall include a photographic survey and the results of the survey shall be agreed with the owners of the neighbouring properties. Failure to do so could render the Contractor liable for claims of damage to neighbouring properties.

1.11 Explosives

The use of explosives is prohibited.

1.12 Fence the Site

The Contractor shall provide all necessary measures to secure the site against unauthorised entry. On completion of the work the Contractor shall securely fence the site.

1.13 Salvage Materials

All materials, debris and other items arising from demolition shall become the property of the Contractor unless specifically stated otherwise, and due allowance for the credit value (if any) of such materials, items, etc. shall be made in the tender. Carefully dismantle any material that is to remain the property of the Owner, store and protect until completion of the works and hand over to the Owner.

1.14 Control of Debris

Debris shall only be allowed to fall freely and without deflection through chutes specially provided for the purpose. Precautions shall be taken against flying or falling debris by sealing off all openings in walls adjacent to the area of fall. Care shall be taken to prevent excessive lateral pressure being built up due to stacking of debris against walls and adjoining properties.

1.15 Materials to be Carted Away

The Contractor shall remove off-site all salvaged materials, debris arising from demolitions and discard all rubbish left on site by the previous occupants to a legal dump to be provided by the Contractor. The Contractor shall remove debris and rubbish in such a manner as to cause as little inconvenience as possible to the adjoining owners and the public.

The Contractor shall not burn debris, rubbish or salvaged material on site. The Contractor shall not allow demolished materials to accumulate on site.

1.16 Loading and Off-Loading Materials

The Contractor shall ensure that the streets, roads and paths are not obstructed and the traffic is not impeded due to loading and off-loading materials for the work.

The Contractor shall conform to Police and Council regulations for carting, loading and off-loading all materials, plant, earth and debris, etc. to or from the work.

2 Structural Steelwork

2.1 Preliminary

Refer to the Preliminary and General Clauses of this Specification and to the General Conditions of Contract, which are equally binding on all Trades. This Section of the Specification shall be read in conjunction with all other Sections as the requirements are interrelated.

2.2 Scope

This Section covers the supply, fabrication, delivery to site and erection of all structural steelwork required for the satisfactory completion of the works including weldplates, bolts and cleats etc. for building into concrete and concrete blockwork.

2.3 Related Documents

In this Section of the Specification, reference is made to the latest revisions of the following documents:

AS 1111: 2000	ISO Metric Hexagon Bolts and Screws
AS 1112: 2000	ISO Metric Hexagon Nuts etc.
AS 1163: 2009	Cold-Formed Structural Steel Hollow Sections
AS 1397:2011	Continuous Hot-Dip Metallic Coated Steel Sheet and Strip
AS 1627.1:2003	Metal Finishing - Preparation and Pretreatment of Surfaces – Removal of Oil, Grease, and Related Contamination
AS 1627.4:2005	Metal Finishing – Preparation and Pretreatment of Surfaces – Abrasive Blast Cleaning of Steel
AS 1627.9:2002	Metal Finishing – Preparation and Pretreatment of Surfaces – Pictorial Surface Preparation Standards for Painting Steel Surfaces
AS 1897:1976	Electroplated Coatings on Threaded Components
ASTM C633-01(2008)	Test Method for Adhesion or Cohesion Strength of Thermal Sprayed Coating
AS/NZS 1252:1996	High strength steel bolts with associated nuts and washers for structural Engineering
AS/NZS 1554.1:2011	Part 1: Welding of Steel Structures
AS/NZS 1554.2:2003	Part 2: Stud Welding
AS/NZS 1554.4:2011	Part 4: Welding of High Strength Quenched and Tempered Steels
AS/NZS 1554.5:2011	Part 5: Welding of Steel Structures Subject to High Levels of Fatigue Loading
AS/NZS 1554.6:2012	Part 6: Welding Stainless Steels for Structural Purposes
AS/NZS 1554.7:2006	Part 7: Welding of Sheet Steel Structures
AS/NZS 2312:2002	Guide to the Protection of Structural Steel against Atmospheric Corrosion by the Use of Protective Coatings
AS/NZS 2980:2007	Qualification of welders for fusion welding of steels
AS/NZS 3678:2011	Structural Steel - Hot-Rolled Plates, Floorplates and Slabs
AS/NZS 3679.1:2010	Part 1: Structural Steel - Hot Rolled Bars and Sections
AS/NZS 3679.2:2010	Part 2: Structural Steel - Welded I Sections
AS/NZS 3750 (Parts 1-23)	Paints for Steel Structures
AS/NZS 4600:2005	Cold Formed Steel Structures
AS/NZS 4680:2006	Hot-Dip Galvanised (Zinc) Coatings on Fabricated Ferrous Articles
AS/NZS 4791:2006	Hot-Dip Galvanised (Zinc) Coatings on Ferrous Open Sections, Applied by an In-Line Process

AS/NZS 4792:2006	Hot-Dip Galvanised (Zinc) Coatings on Ferrous Hollow Sections, Applied by a Continuous or a Specialised Process
AS/NZS ISO 14171:2013	Welding consumables – Solid wire electrodes, tubular cored electrodes and electrode/flux combinations for submerged arc welding of non-alloy and fine grain steels
AS/NZS ISO 14174:2013	Welding consumables - Fluxes for submerged arc welding and electroslag welding
AS/NZS ISO 14341:2012	Welding consumables - Wire electrodes and weld deposits for gas shielded metal arc welding of non-alloy and fine grain steels
AS/NZS ISO 16834:2013	Welding consumables - Wire electrodes, wires, rods and deposits for gas shielded arc welding of high strength steels
AS/NZS ISO 17632:2006	Welding consumables - Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non-alloy and fine grain steels
AS/NZS ISO 17634:2006	Welding consumables - Tubular cored electrodes for gas shielded metal arc welding of creep-resisting steels
AS/NZS ISO 18276:2006	Welding consumables - Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of high-strength steels
AS/NZS ISO 21952:2012	Welding consumables - Wire electrodes, wires, rods and deposits for gas shielded arc welding of creep-resisting steels
BS 4320:1968	Metal Washers for Engineering Purposes
ISO 2063:2005	Thermal spraying – Metallic and other inorganic coatings – Zinc, Aluminium and their alloys
ISO 8501-1:2007	Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coating
NZS 3101:2006	Concrete Structures Standard
NZS 3404:1997	Steel Structures Standard
NZS/BS 4848	Hot Rolled Structural Steel Sections
	Part 2:1991 Hollow Sections
	Part 4:1972 Equal and Unequal Angles
	Part 5:1980 Bulb Flats
Hera Design Guides Volume 2: 1989	
The New Zealand Building Code	

Should there be conflict between the requirements of these standards and this Specification, the Specification shall take precedence.

2.4 Safety

The Contractor shall conform fully, both on- and off-site, with the provisions of the New Zealand Building Code in all matters related to construction safety, in particular with approved documents F1 (Hazardous Agents on Site), F2 (Hazardous Building Materials), F4 (Safety from Falling) and F5 (Construction and Demolition Hazards). The Contractor shall at all times comply with the Health and Safety in Employment Act 1992 and the Health and Safety in Employment Regulations 1995 and all subsequent amendments.

2.5 Quality Assurance

This clause of the Specification describes the Quality Assurance Procedures that are to be maintained by the Contractor, and the reporting procedures to the Engineer.

The Quality Assurance procedures shall comply with the New Zealand Standards NZS 9000 series.

The Structural steelworker's quality assurance procedures should encompass all aspects of the structural steel construction including, but not necessarily limited to:

- Compliance for materials
- Welding procedures
- Steel preparation prior to painting
- Quality of painting/coatings
- Erection

The structural steelworker shall advise the Engineer in writing the name of a suitably experienced and qualified representative, to be responsible for the quality control of all structural steelwork.
The structural steelworker shall provide details of the fabrication and erection quality control procedures to the Contractor for forwarding to, and approval of, the Engineer. These procedures should encompass all aspects of fabrication.

The Engineer may arrange to have an independent inspection service which may encompass aspects of the above. This is entirely independent of the Structural steelworkers own procedures, and alleviates none of the Structural steelworkers responsibilities to maintain their own quality assurance programme.

2.6 Drawings

The drawings indicate the general arrangement and dimensions of the steelwork and have been made to scale. Where dimensions have not been given, scaled dimensions shall not be used.

The structural drawings and the Architectural drawings are complementary and the Contractor shall consult the latter for materials, details and dimensions not shown on the former. If any discrepancies are found within the drawings refer to the Engineer for instructions before proceeding.

2.7 Shop Drawings

Shop drawings will be required and before fabrication is commenced, these drawings shall be submitted to the Engineer for review. The Contractor shall allow a minimum of 10 working days for the review of shop drawings by the Engineer.

The drawings shall provide complete details of each assembly in the steelwork together with all information relative to their fabrication, surface treatment and erection. Each component and connection shall show the relevant work points.

The review of shop drawings by the Engineer and permission to fabricate shall not relieve the Contractor of his responsibility for the accuracy of these drawings and for the correctness of the fabrication, setting out and erection of the steelwork. The cost of rectifying any errors shall be at the Contractor's sole expense.

Provide the final drawings to the Engineer.

2.8 Welding Certificates

The Contractor shall forward to the Engineer a list of proposed welders and their welding certificates prior to any welding being carried out.

No welder shall carry out work for which he is not certified.

2.9 Producer Statements

When the works are sufficiently complete that they are ready for application to the Territorial Authority for a Code Compliance Certificate, the Contractor shall furnish a fully completed Producer Statement. This certificate shall cover all work completed under this Section of the Specification.

Issue and acceptance of Producer Statements shall not relieve the Contractor of any responsibilities in respect of the full completion and maintenance of the works. Refer to the Preliminary and General Section of the Specification.

2.10 Rejection

Defective material or workmanship found at any time prior to the final acceptance of the work will be rejected. Field welds used in place of shop welds shall be deemed to be defective unless subject to specific non-destructive testing in accordance with AS/NZS 1554 and to the satisfaction of the Engineer. Defective materials shall be removed and replaced by the Contractor at his own expense and he shall be responsible for all delays caused by rejection. Any rejected work or material is to be repaired or replaced without delay.

2.11 Inspection and Testing

Where there is a requirement in this Specification for a site inspection of the work or for an opportunity to be provided to inspect the work the Engineer shall be given at least 48 hours' notice that such work is ready for inspection. At the time the notice is given all preparations shall have been completed to the extent that work could proceed immediately if so instructed.

The Engineer may arrange for specialist welding or protective coatings advice and inspections to amplify his own inspections. The Contractor shall allow a Provisional Sum if specified elsewhere in the Contract Documents for specialist advice as instructed by the Engineer. This Provisional Sum is for routine inspections which are not initiated by concerns about the quality of the workmanship.

Should the Engineer require inspections and tests by specialist inspectors due to concerns about the quality of workmanship, then the full costs of these shall be borne by the Contractor.

2.12 Materials

The Contractor shall adhere to all relevant requirements of NZS 3404, AS/NZS 1554.1 for the supply of all materials and in workmanship both on- and off-site.

The use of materials complying with Standards equivalent to those given in this Subsection will only be permitted with the prior approval of the Engineer.

2.13 Steel

All hot rolled steel Sections shall be Grade 300 complying with BHP-300 PLUS specification and AS/NZS 3679.1, unless otherwise noted. BHP-300 PLUS specification shall take precedence where conflict exists with AS/NZS 3679.1.

All mild steel shall comply with the requirements of AS/NZS 3679.1.

Welded Sections (welded beams and welded columns) shall be Grade 300 unless otherwise noted and comply with AS/NZS 3679.2.

Hollow Sections shall be Grade C350, unless otherwise noted, and comply with the requirements of AS 1163.

Solid Sections shall comply with the requirements of AS/NZS 3678.

All steel intended to be welded shall be suitable for welding in accordance with the specified welding procedures of AS/NZS 1554.1.

The condition of the surface shall not be worse than Rust Grade C as defined in ISO 8501-1.

All structural steel for this contract shall be obtained from sources approved by the Engineer. Any unidentified steel shall not be used unless approved by the Engineer. When the use of such steel is approved it shall only be used as specified in NZS 3404 Clause 2.2.3. Mill certificates meeting New Zealand Standards must be provided to the Engineer for all steel used on the project.

2.14 Alternative Sections

The Contractor shall ascertain at the time of tendering whether the steel sizes detailed on the drawings will be available for the job. Any tender based on substitute sizes must be accompanied by a statement listing the substitutions. Substitute sizes will be permitted only with the approval of the Engineer. The extra cost of substitute sizes required, but not notified at the time of tender will be borne by the Contractor.

2.15 Bolts

Mild steel (black) bolts, nuts and washers shall comply with the requirements of

- AS 1111
- AS 1112

High-strength bolts, nuts and washers shall comply with the requirements of

- AS/NZS 1252

Bolts, nuts and washers which form a permanent part of a structure subject to weather exposure shall be galvanised. Hot dip galvanised bolts shall be limited to those received from the bolt manufacturer. Where these are not available, the bolts, nuts and washers shall be electro-galvanised, but only in accordance with AS 1897. Where necessary to ensure even bearing, tapered washers to BS 4320 shall be used.

Bolts and bolting procedures to be used are noted on the drawings in an abbreviated form of the type NMD-G/B where

- N Number of bolts in joint
- M Metric
- D Diameter of bolt
- G Steel grade of bolt, either 4.6 (low strength) or 8.8 (high strength)
- B Bolt tightening procedure, as listed below

Bolt tightening procedures are denoted by the following abbreviated forms:

- S “Snug tight" is the tightness obtained by a few impacts of an impact wrench or by the full effort of a person using a standard podger wrench
- TB a friction type joint with the bolts being installed as for the Tension Bearing procedure
- TF a friction type joint with the bolts being installed as for the Tension Friction procedure

For example:

- 3M20-8.8/TF
  denotes a friction type joint with three 20mm diameter, grade 8.8 ISO Metric bolts tightened by the "turn-of-nut" method or by use of a direct tension indicator.
- 2M16-4.6/S
  denotes a joint with two 16mm diameter, grade 4.6 ISO Metric bolts tightened "snug tight".

All bolts shall be installed with one washer and one nut unless shown otherwise on the drawings. A washer shall be placed under the rotating component.

Hardened or plate washers shall be used under both the bolt head and nut for any slotted and oversize holes.

Tensioning procedures shall conform to the requirements of NZS 3404.

2.16 Steel Shear Studs

Steel shear studs shall be proprietary shear connector 'headed' studs appropriate for use in weld through deck applications.

Stud material shall comply with Section 2 of AS/NZS 1554.2.

2.17 Welding Consumables

Welding electrodes shall comply with the requirements of:

- AS/NZS ISO 14171
- AS/NZS ISO 14174
- AS/NZS ISO 14341
- AS/NZS ISO 16834
- AS/NZS ISO 17632
- AS/NZS ISO 17634
- AS/NZS ISO 18276
- AS/NZS ISO 21952

and be appropriate for the grade of steel being welded.

Welding wire shall be of a type recommended by the manufacturer for the materials to be joined and the welding position. Wire which shows signs of rust or has been in contact with oil shall not be used.

Welding flux used from sealed containers must be dry. Unused flux recovered from welds may be used in the proportions of one part of used flux to four parts of new flux, however reground flux will not be acceptable.

Material for arc stud welding shall confirm to the requirements of AS 1554.2.

2.18 Fabrication

Fabrication shall comply with the requirements of NZS 3404, Section 14, except as modified by this Specification.

The Engineer shall be notified well in advance of commencement of work in the shop in order that inspections of materials and workmanship may be made.

The Contractor shall provide all necessary penetrations and fixings in members for other trades, as advised prior to fabrication and approved by the Engineer.

2.19 Verification of Dimensions

Where steelwork is being placed on to or connecting with existing construction, the Contractor shall check and verify all dimensions and levels on site before commencing fabrication of any new steel. Any discrepancy found between the drawings and the site dimensions shall be referred immediately to the Engineer who shall direct any amendments as necessary.

2.20 Cutting

Cutting shall be performed by either shearing, cropping, sawing, or machine flame cutting. Hand cutting shall not be permitted unless specifically approved by the Engineer.

Surfaces produced by such cutting shall be representative of good workmanship, finished square (unless a bevelled edge is called for), true to the required dimensions and free from defects such as excessive roughness. All sharp edges and corners shall be rounded off by light grinding to ensure the adherence of paint films. For normal applications where the surface is used "as cut" and in the absence of specific requirements on the drawings or in this Specification, the surface shall comply with the Australian Welding Research Association Class 3 surface.

Re-entrant corners shall be shaped notch free to a minimum radius of 10mm unless specifically indicated otherwise by geometry of detail.

Surfaces to be fused by welding shall be free from notches but may accommodate mounded gauges of up to 2mm maximum depth consistent with the surface quality required for the type and position of welding being undertaken.

Lengths of members required to yield in tension and specifically marked on the drawings, shall be free of gauges, notches or similar defects, and shall comply with the Australian Welding Research Association Class 2 surface quality.

2.21 Repair of Cutting Defects

Before undertaking any repairs the Engineer shall be advised of the type of defect and its location. After notification, the following methods would be acceptable.

- Grinding and forming out at a slope not exceeding 1:2.5 except that for designated seismic yielding and fatigue zones this shall be reduced to 1:10.
- Welding performed with low hydrogen electrodes not exceeding 4mm diameter which is subsequently dressed flush with the adjacent surface. This shall be the only method to be adopted should notches or gauges exceed 5mm depth.

Seismic yielding and fatigue zones: the repaired area shall be checked initially for cracks by dye penetrant.

Grinding marks shall be parallel to the directions of the cut.

2.22 Welding

Weld quality shall be Category SP (Structural Purpose) unless specified reference is made in the drawings to Category GP (General Purpose).

All welding shall be shop welds unless noted otherwise. Shop welds shall be understood to mean weldment laid under controlled conditions in an approved facility by certified welders under continuous supervision of certified welding inspectors. As such field welding is specifically banned without prior permission of the Engineer.

The Contractor is hereby notified that any and all field welds made without prior written permission may be subject of rejection in accordance with Clause 7.10.

Welding shall comply with AS/NZS 1554.1, AS/NZS 1554.2 or AS/NZS 1554.5 in conjunction with NZS 3404 as appropriate including the current SNZ amendments. All references in these standards to AS 4100 shall be read as references to NZS 3404. Copies of the above appropriate standards shall be kept in the workshop or on the site when there is a requirement for site welding.

The Contractor shall submit to the Engineer for approval, details of the welding procedures to be used including details of the equipment and consumables before any welding is carried out.

All weld runs shall be as specified and not finish with a concave surface. Welds shall have proper penetration, with all slag deposits removed as work proceeds, and when the runs are complete. All welds shall be continuous around joints to prevent the ingress of moisture.

All butt welds are to be full penetration unless otherwise specified on the drawings. Butt welds shall be ground flush.

Welding of hollow sections shall incorporate internal sections or backing plates as necessary to complete the specified weld.

Open ended hollow sections shall be capped using 3mm material and seal welded, unless shown otherwise on the drawings.

2.23 Qualification of Welding Procedures and Personnel

All welding procedures as a minimum shall be prequalified in accordance with Section 4.3 of AS/NZS 1554.1 or AS/NZS 1554.5 as appropriate. If, in the opinion of the Engineer, additional qualification tests are required they shall be carried out in accordance with Section 4.6 of AS/NZS 1554.1 or AS/NZS 1554.5 as appropriate.

Welding supervisors shall hold Welding Supervisor qualifications from the International Institute of Welding or an equivalent qualification acceptable to the Institute. In addition all personnel involved in welding shall only be employed on the types of weld for which they are suitably qualified and they shall hold current Welding Certificates in accordance with AS/NZS 2980. Should qualification testing be required it shall be the Contractor's responsibility for the arranging and payment of such tests.

2.24 Welding Inspection and Testing

All welds shall be subject to inspection and testing.

The minimum level of testing shall be 100% visual scanning as defined in Clause 7.3 of AS/NZS 1554.1. At the completion of the work the Welding Supervisor shall supply a written statement verifying that the visual scanning has been completed. In addition to the 100% visual scanning the following non-destructive examination is required.

Visual Examination

All welds shall be subject to a minimum of 25% visual examination to Table 6.2.1 and Table 6.2.2 of AS/NZS 1554.1. The schedule of visual examination shall be as follows:

1. Test the first five components of each type. If these conform, then;
2. Test 1 in 4 components of each type. If any of these do not conform, then;
3. Repair and test until 3 consecutive components conform, then;
4. Reduce frequency of testing to 1 in 4 again.
5. Welds marked “XT” on the drawings shall be subject to 100% visual examination.
6. A record of all welds examined and tested shall be kept and made available on request.

Ultrasonic

All welds marked “ST” shall be subject to a minimum of 15% ultrasonic examination. If no welds are marked “ST” then a minimum of 5% of all welds shall be subject to ultrasonic examination. The schedule of ultrasonic testing shall be as follows:

1. Test the first five components of each type. If these conform, then;
2. Test 1 in 5 components of each type. If any of these do not conform, then;
3. Repair and test until 3 consecutive components conform, then;
4. Reduce the frequency of testing to 1 in 5 again.
5. A record of all welds examined and tested shall be kept and made available on request.

The testing of welds as noted above will commence with the first joints to be fabricated.

The various methods of Non Destructive Testing shall be in accordance with Section 6 of AS/NZS 1554.1 or AS/NZS 1554.5 as appropriate. Imperfection levels shall not exceed the maximum permissible levels given in Table 6.2 and Table 6.3 of AS/NZS 1554.1

Inspectors for the various types of testing shall hold certification from the Certification Board for Inspection Personnel (CBIP). All costs of testing shall be borne by the Contractor.

The Contractor shall give the Engineer 48 hours' notice of any welding that is to be closed in by further construction thereby limiting any further inspections.

2.25 Repair of Welding Defects

Welding defects disclosed by inspection or other investigation shall be cut out, remade and re-tested.

When welding defects are disclosed, testing of further welds may be ordered at the structural steelworker's expense. If stiffeners or other concealing details have been added, these may be required to be removed to permit this additional testing. Retesting shall comply with the programme set out in figure 7.2.3.2 of HERA Design Guides Volume 2, Section 17.

If, in the opinion of the Engineer, the total amount of repair in any one welded seam is excessive, the whole of the seam shall be cut out and re-welded. Repair of defective welds shall be in accordance with Clause 5.8 of AS/NZS 1554.1 or AS/NZS 1554.5.

The Inspector shall examine all seams from which defects have been cut out and his approval obtained before re-welding is commenced. Re-welding shall be executed in a manner and by practices acceptable under this Specification. Where practicable, the re-welding shall be by the same process as used in the original welding.

Preheating shall be used for all weld repairs. This shall be maintained for the duration of the weld repair. The cost of testing and repairs to all defects shall be borne by the Contractor.

2.26 Holing

Holes may be formed by drilling or punching providing that where punching is the proposed method, the criteria of Clause 14.3.5 of NZS 3404 shall be strictly adhered to. Holes shall not be gas cut.

Unless specifically referred to on the drawings, the forming of holes in the specified material shall be considered as the non-fatigue situation. Gas cutting of holes is not permitted.

All surface imperfections such as burrs, fins and other defects formed during the holding operation which prevent proper seating of the faying surfaces shall be removed.

Standard holes for bolts shall be D + 2mm, unless otherwise noted, where D is the bolt diameter. Slotted holes shall be D + 2mm wide and 2.5D long, unless otherwise noted.

Standard holes for pins shall be D+1mm, unless otherwise noted, where D is the pin diameter.

2.27 Bolting

All bolts and associated nuts and washers shall comply with the material properties relevant to the items specified in the Subsection on materials.

Unless noted otherwise on the drawings; all bolts M16 or larger shall be Strength Grade 8.8, and all bolts to be installed "snug tight" by the use of a standard podger wrench. The threads need not be excluded from the plies.

Surface preparation for the various type of bolt connections shall be in accordance with Clause 14.3.6.3 of NZS 3404.

The structural drawings do not necessarily show the bolt requirements for other trades. The Contractor shall ascertain the requirements of these trades and provide the necessary bolts and form the appropriate holes.

Bolted connections marked on the drawings with the suffix /TB or /TF shall be fully tensioned in accordance with NZS 3404 Clause 15.2.5, using the "part-turn method of tensioning" or load indicating washers, subject to the Engineer's approval. When using the part turn method, location marks shall be permanent, and clearly identifiable for subsequent inspection. Ensure that all finishes are clear of the faying (contact) surfaces between all plies of the joint, unless by the express permission of the Engineer, or alternately if the appropriate testing of slip factors has been undertaken in accordance with Appendix K of NZS 3404.

Tensioning of fully tensioned joints shall proceed from the stiffest point, typically the centre, towards the outer free edges of the joint, to ensure that all bolts carry an equal proportion of the load.

2.28 Splices

All members shall be in one length with splices only at positions shown on the drawings. If the Contractor requires additional splices or wishes to relocate detailed splices elsewhere, he shall submit his proposals to the Engineer for review. No fabrication shall proceed until this review has been completed.

Full contact splices may be produced by cold saw cutting or machining. The surfaces of these splices shall be such that when abutted the gap shall be within the tolerance specified in Clause 15.3 of NZS 3404.

2.29 Bending

Steel may be bent or pressed to the required shape by either cold or hot bending.

For hot bending the Engineer shall be advised of the temperature timing and cooling rate.

For cold bending, the requirements noted in Clause 7.30 apply.

2.30 Cold Bending of Plates and Flats

For cold bending of plates and flats the minimum internal radii of bends in terms of thickness t, with bend lines transverse to the direction of final rolling shall be not less than values in the following table.

Recommended Minimum Inside Radius for Cold Bending of Mechanically Tested Plate During Fabrication					
Plate Thickness, t (mm)	**Bend Direction (see notes 1 and 2)**	**Inside radius (mm)**			
		Grade Designation			
		200	250 and 300	350 and 400	450 and WR350
≤6	Transverse Longitudinal	0.5t 1.0t	1.0t 1.5t	1.5t 2.25t	1.5t 2.25t
>6 ≤10	Transverse Longitudinal	1.0t 1.5t	1.5t 2.25t	2.0t 3.0t	2.0t 3.0t
>10 ≤20	Transverse Longitudinal	1.5t 2.25t	2.0t 3.0t	2.5t 3.75t	3.0t 4.5t
>20 ≤50	Transverse Longitudinal	- -	4.0t 6.0t	(See note 4) (See note 4)	Hot-form Hot-form

>50 ≤150	Transverse Longitudinal	- -	(See note 4) (See note 4)	Hot-form Hot-form	- -

NOTE:

1. A transverse bend is one where the axis of the bend is at right angles to the direction of rolling.
2. A longitudinal bend is one where the axis of the bend is parallel to the direction of rolling.
3. Where radii in the approximate range of 3t to 10t is desired, bending should be carried out by hot-forming. Where large bend radii (greater than 10t) is desired, bending may be carried out by cold-forming. With plate thickness greater than 40 mm, slight warming to approximately 75°C is recommended before forming.
4. It is generally desirable to hot-form. If bend radii is large (greater than 15t) and the steel is preheated to approximately 75°C, cold-forming methods should be satisfactory.
5. The recommended minimum bending radii of floorplates are as above except that where the raised figures are in tension, more liberal radii should be used.

2.31 Camber

Beams and trusses detailed without specified camber shall be fabricated so that after erection any camber due to rolling or shop fabrication is upward.

2.32 Erection

The Contractor shall be responsible for inspecting the site at the time of tendering to determine those matters that will influence the erection of the structural steel.

The Contractor shall give at least 48 hours' notice to the Engineer of the time when he proposes to start erection.

The Contractor shall provide and install the safety protection required by statutory bodies for his own work and personnel.

2.33 Storage, Handling and Delivery

All steelwork stacked outside, either on- or off-site, shall be adequately covered to keep the steel dry and shall be stacked clear of the ground in such a manner as will prevent twisting and/or bending of the various items.

Store fasteners in watertight premises.

Handle and store electrodes, electrode wire and flux in accordance with the manufacturer's recommendations.

Make all arrangements necessary with relevant authorities for transportation of steelwork.

During delivery, stiffen free ends and otherwise protect steelwork from distortion.

2.34 Assembly

The component parts shall be assembled in a manner such that they are neither twisted nor otherwise damaged and shall be so prepared that the specified cambers, if any, are provided.

All steel members such as upturned channels, horizontally placed beams, composite members, girts, etc. which may be capable of holding water, shall be provided with weep holes to prevent accumulation of water during construction or of condensation afterwards.

Assembled parts shall be brought into close contact and drift pins shall be used only for bringing members into position, not to enlarge or distort holes. Field errors shall not be corrected by gas cutting except with the permission of the Engineer.

Each part of the structure shall be aligned as soon as practicable after it has been erected. Permanent connections shall not be made until sufficient of the structure has been aligned, levelled, plumbed and temporarily connected to ensure that members will not be displaced during subsequent erection or alignment of the remainder of the structure.

2.35 Seatings

The Contractor shall check all seatings for steelwork to ensure that they are at the correct level, truly flat and in a condition to receive the steelwork. The Contractor shall be responsible to see that steelwork is accurately and correctly fixed.

2.36 Temporary Bracing

The Contractor shall provide, install and afterwards remove, sufficient temporary bracing to keep the structure plumb and in true alignment until other structural units provide the necessary permanent bracing. The steelwork shown on the drawings is that required in the design for the finished structure only and is not necessarily adequate for construction purposes. Any failure to make proper and adequate provision against damage during erection shall be the entire responsibility of the Contractor. The temporary guying and bracing should be capable of resisting all loading liable to be encountered on the structure during the erection period, including those loadings from erection plant and its operation, wind loads and other construction loads.

The Contractor shall submit to the Engineer for his review, his method of erection and of all assembly cleats and bolts, but such approval shall not limit the Contractor's responsibility to ensure the safety and alignment of the structure.

All connections for temporary bracing and members to be provided for erection purposes shall be made in such a manner so as not to weaken the permanent structure or to impair its serviceability.

Bracing shall not be used to force the structural frame into its correct position. Tighten bracing only after the frame has been squared, aligned and plumbed or, if inserted at an earlier time, loosen to permit these operations and tighten on completion.

2.37 Existing Structure

Where Sections of existing structure are to be removed or strengthened, the Contractor shall provide all the necessary support required to prevent distortion of the existing structure and excessive loads being placed on other parts of the structure.

2.38 Re-tensioning of Bolts

Re-tensioning of Grade 8.8 bolts which have been fully tensioned will not be permitted unless written approval is given by the Engineer. If the Engineer gives approval for re-tensioning to be carried out, it shall only be permitted once and only where the bolt remains in the same hole in which it was originally tensioned and with the same grip.

Re-tensioning of galvanised bolts shall not be permitted.

Under no circumstances shall bolts which have been fully tensioned be used elsewhere.

2.39 Erection Tolerances

Erection tolerances shall confirm to Section 15.3 of NZS 3404.

2.40 Holding Down Bolts

Holding down bolts shall be of the size, number and length to achieve the correct embedment and allow the final fixing to the base plate. To ensure the correct alignment, a template shall be made for each holding down bolt type and configuration.

All holding down bolts, nuts and washers which form a permanent part of a structure subject to weather exposure or are contained within exterior wall framing shall be galvanised.

2.41 Proprietary Fasteners

Proprietary fasteners shall be installed strictly as specified by the manufacturer. These fasteners are referenced on the drawings by the bolt size, and not, in the case of expanding shell anchors, by the anchor or hole size.

2.42 Flowable Grout

The grouting of baseplates and other steelwork, where noted on the drawings, shall be carried out using an approved proprietary, flowable, non-shrink grout in accordance with the manufacturer's recommendations. The grout shall have a minimum strength of 60MPa. Provide the necessary holes and header tubes to ensure the complete filling of the grout spaces.

On completion the stripped edges of the finished work shall be tidied and all grout splashes removed from the steelwork.

Unless shown otherwise all edges shall be finished to give 45 degree slope from the underside of the base plate.

2.43 Corrosion Protection

All welds shall have slag removed, and welds exposed in the finished building shall have spatter removed and be ground to a neat clean finish.

All sharp edges and corners shall be rounded by light grinding to a 2mm radius edge.

Steelwork to be sprayed for fire protection, or to be cast more than 50mm into concrete, shall have all rust and mill scale etc. removed by power or manual wire brushing and shall be left unprimed.

Surface preparation such as abrasive blasting or power discing shall be carried out after fabrication of major elements has taken place, and the appropriate coating applied as soon as possible after preparation, in accordance with the manufacturer’s specification, but in any case within 4 hours.

In all cases the total coating shall be applied in the shop in accordance with the manufacturer's recommendations. On site painting shall be kept to a minimum adjacent to necessary site joints. These areas shall be made good and painted in accordance with the manufacturer's recommendations and adjacent areas shall be protected during welding.

Surfaces which will be in contact or near contact after fabrication or erection should receive their specified surface preparation and treatment prior to assembly. Such surfaces should be dry before assembly.

2.44 Galvanising

Components specified on the drawings as being galvanised are to be hot-dip galvanised in accordance with AS/NZS 4680, AS/NZS 4791 or AS/NZS 4792 as appropriate.

In addition to the requirements of these codes, the following shall be complied with:

- The material used for hot dip galvanising shall be zinc metal specifically made for this purpose and shall be 99.5% pure.

- The average weight of zinc coating shall be not less than 380 gm/sq.m for bolts and washers and not less than 700 gm/sq.m for other structural steelwork.
- All bolts and nuts shall be galvanised after screw cutting and tolerances used in screw cutting shall make allowance for this.
- Damaged surfaces or welded areas shall be made good by power tool preparing damaged surfaces to SSPC SP-3 bright metal followed by applying a spot primer coat of Altex Coatings Zinkex 100 at 75 microns DFT or equivalent applied strictly in accordance with the manufacturer's requirements.

2.45 Thermal Sprayed Metal Coatings

The steel is to be zinc metal sprayed in accordance with the requirements of AS/NZS 2312 Table 5.1 High Classification (20 year life). The metal spray is to be satin or gloss sealed.

The application of metal spray coatings is as follows:

- Abrasive blast clean to AS 1627.4, Class 2½ to the profile specified in AS/NZS 2312 Clause 5.2.2.
- Spray coating is to be applied before any discolouration has occurred, and no later than 4 hours after blasting.
- Steel temperature must be 3°C (min) above dew point and no greater than 40°C.
- The application is to be in accordance with ISO 2063.

Thermal spray wire must be clean before spraying and is to remain in its wrapper until ready for use. All traces of dirt and oil are to be removed before the wire is loaded into the spray unit.

The thermal spray shall be applied over a band width of 13-25mm, depositing a minimum of 50μm with the spray gun travelling at 0.03m/sec. The spray angle of the nozzle shall not exceed 30° to the vertical. Steel shall be preheated to 50° (+10°, -5°) before spray application.

The dry film thickness (DFT) on completion shall be as specified in AS/NZS 2312 Table 5.1 for the classification specified for the project.

Coating prior to sealing shall have a uniform appearance and defects of the zinc coating shall be limited to small modules not exceeding 1mm in diameter and shall not exceed 0.5mm above the sprayed surface.

Adhesion shall be measured in accordance with ASTM C633 (Test Method for Adhesion or Cohesion Strength of Flame Sprayed Coatings). A minimum adhesion of 10 MPa is required. Components which do not achieve the required value shall be blast cleaned and resprayed.

Tests shall be taken at intervals not exceeding 2.5m length of component or one per column or beam component less than 2.5m long.

Four thermal sprayed test samples are required to be produced to check for evenness, appearance, DFT and adhesion.

Coupons shall also be used to test for porosity. Porosity shall not exceed 12% of the coupon area when viewed as a cross Section. "Spotting" using potassium ferricyanide may be used as a visual indicator of porosity using the test coupon as a reference sample.

The results of the tests required shall be noted in such a fashion that the test may be identified with a particular structural component.

The specialist coating applied to steel is to be fully protected at all stages of fabrication, storage and installation. Spot touch up of damaged areas will not be permitted. Repair of damaged areas will be

carried out using methods prepared by the Contractor and agreed with the Architect. Damaged components may be required to be recoated in full.

All zinc spray coated steel is to be de-nibbed and seal coated with a satin or pigmented coloured gloss sealer coat as nominated by the Architect.

For a satin aluminium sealer coat, apply two separate coats of Altex Chem-Bar 900 Aluminium (thinned) or equal equivalent. Alternatives must be submitted to the Architect for approval before use.

For a coloured gloss finish sealer coat, apply as first coat Altex Carboguard 504 (thinned) at 50 microns dry film build. Apply a second coat of Altex E-Line 949 gloss (colour of topcoat as advised by the Architect). Total dry film thickness required over the zinc metal spray is 125-150 microns.

Sealer coatings are to be applied in complete accordance with the manufacturer's data sheets.

2.46 Painting

All items of steelwork shall be cleaned and primed before being dispatched from the fabricating shop, unless otherwise specified.

Do not paint steelwork to be encased in concrete or the faces of fully tensioned high-strength bolted joints.

All surface coatings materials shall be the products of the same manufacturer. The materials shall be supplied to site in unbroken packages plainly labelled with the product name and manufacturer.

The following descriptions outline the coating materials to be used. These are based on Altex Coatings Ltd products. Other products may be proposed but shall follow the application methods and coating thickness recommended by the manufacturer. The coating manufacturer may suggest alternative systems to meet this Specification.

The approval of the Engineer shall be obtained for all material, preparation and coating options if different to those specified.

Interior Concealed Mild Steelwork

Flame clean, chip and power disc brush to remove all scale and rust to pictorial standard St 3 of AS 1627.9. Alternatively abrasive blast prepare steelwork to AS1627.4 Class 2.

Apply one coat of approved red oxide zinc phosphate alkyd primer (e.g. Altex High Build Rust Barrier) to achieve a minimum dry film thickness of 75 microns.

Interior Exposed Mild Steelwork (not exposed to weather)

Abrasive blast to AS 1627.4 Class 2½ "near white" standard.

Apply one coat of an approved epoxy zinc rich primer (e.g. Altex Carbozinc 859 EZ2) to achieve a minimum dry film thickness of 75 microns, followed by a polyurethane (e.g. Altex E-Line 949 gloss polyurethane or Carbothane 133 LH satin polyurethane) to a thickness of 75 microns, colour and gloss level as selected by the Architect.

Interior Hidden FR Mild Steelwork (Fire Resistance Rated FRR)
No finish coat
FR30/-/- to FR120/-/-

Abrasive blast to AS 1627.4 Class 2½ "near white" standard.

Apply one coat of approved zinc phosphate alkyd primer (e.g. Altex High Build Rust Barrier) to achieve a minimum dry film thickness of 75 microns.

Apply an approved intumescent paint (e.g. Altex FX2002) to the Architects specification and supplier's film thickness loading schedule. Refer also to intumescent supplier's product data sheet for application requirements.

Painted Galvanised Steelwork

Where required by the Architect, galvanised steel shall be painted.

Degrease in accordance with AS 1627.1. Sweep abrasive blast entire surface using non-metallic media.

Apply one coat of an approved epoxy primer (e.g. Altex Carboguard 504) to achieve a dry film thickness of 50 microns.

Apply a topcoat of an approved polyurethane (e.g. Altex E-Line 949 gloss polyurethane or Carbothane 133 LH satin polyurethane) at a minimum dry film thickness of 75 microns. Colour and gloss level as selected by the Architect.

2.47 Painting Inspection

If requested by the Engineer, the Contractor shall arrange for Painting Inspectors to inspect all paint work. Painting Inspectors shall hold Certified Coatings Inspector qualification from the Certification Board for Inspection Personnel (CBIP) or an equivalent qualification acceptable to the CBIP.

3 Structural Timber

3.1 Preliminary

Refer to the Preliminary and General Clauses of this Specification and to the General Conditions of Contract, which are equally binding on all trades. This Section of the Specification shall be read in conjunction with all other Sections as the requirements are interrelated.

3.2 Scope

This Section consists of the supply, fabrication, surface treatment, delivery and erection of the structural timber, glue laminated timber members, plywood and other related items required for the satisfactory completion of the works.

3.3 Related Documents

In this Section of the Specification, reference is made to the latest revisions of the following documents:

AS 1397:2011	Continuous Hot-dip metallic coated steel sheet and strip – Coatings of Zinc and Zinc alloyed with Aluminium and Magnesium
AS/NZS 1170	Structural Design Actions
AS/NZS 1328:1998	Glue Laminated Structural Timber
AS/NZS 1604.1:2012	Specification for Preservation Treatment – Sawn and Round Timber
AS/NZS 1604.2:2012	Specification for Preservation Treatment – Reconstituted Wood-based products
AS/NZS 1604.3:2012	Specification for Preservation Treatment –Plywood
AS/NZS 1604.4:2012	Specification for Preservation Treatment – Laminated Veneer Lumber (LVL)
AS/NZS 1604.5:2012	Preservative Treatment – Glue Laminated Timber Products
AS/NZS 1748:2011	Timber – Stress Graded for Structural Purposes
AS/NZS 2878:2000	Timber – Classification into Strength Groups
AS/NZS 4357.0:2005	Structural Laminated Veneer Lumber
AS/NZS 4364:2010	Timber – Bond Performance of Structural Adhesives
AS/NZS 5068:2006	Timber – Finger Joints in Structural Products – Production Requirements
NZS 3602:2003	Timber and Wood-Based Products For Use In Building
NZS 3603:1993	Timber Structures Standard
NZS 3604:2011	Light Timber Frame Buildings Not Requiring Specific Design
NZS 3605:2001	Timber Piles and Poles For Use In Building
NZS 3640:2003	Chemical Preservation of Round and Sawn Timber
The New Zealand Building Code	

Reference shall also be made to the Sections of this Specification that apply to STRUCTURAL STEELWORK.

Should there be conflict between the requirements of these standards and this Specification, the Specification shall take precedence.

3.4 Safety

The Contractor shall conform fully, both on- and off-site, with the provisions of the New Zealand Building Code in all matters related to construction safety, in particular with approved documents F1 (Hazardous Agents on Site), F2 (Hazardous Building Materials), F4 (Safety from Falling) and F5 (Construction and Demolition Hazards). The Contractor shall at all times comply with the Health and Safety in Employment Act 1992 and the Health and Safety in Employment Regulations 1995 and all subsequent amendments.

3.5 Quality Assurance

It is the Contractor's responsibility to ensure that the construction of all structural timber complies in all respects with the drawings and this Specification.

All timber construction may be subject to inspection by the Engineer to check that the requirements of this specification have been met.

The structural timber manufacturer shall be licensed by Standards New Zealand to use the New Zealand certification mark on their products.

The Contractor's quality assurance procedures should encompass all aspects of the structural timber construction.

The Contractor shall advise the Engineer in writing the name of a suitably experienced and qualified representative to be responsible for the quality control of all structural timber work.

The nominated representative will be required to complete and sign a written quality control checklist for each major component after fabrication and after erection. A copy of each completed checklist is to be forwarded to the Engineer no more than seven days after completion of fabrication/erection.

The format and detail of the checklist shall be agreed to by the Engineer and the Contractor prior to the commencement of any structural timber work.

The Engineer may arrange to have an independent inspection service which may encompass aspects of the above. This is entirely independent of the Contractor's own procedures, and alleviates none of the Contractor's responsibilities to maintain their own quality assurance programme.

3.6 Producer Statements

When the works are sufficiently complete that they are ready for application to the Territorial Authority for a Code Compliance Certificate, the Contractor shall furnish a fully completed Producer Statement. This certificate shall cover all work completed under this Section of the Specification.

The issue and acceptance of Producer Statements shall not relieve the Contractor of any responsibilities in respect of the full completion and maintenance of the works. Refer to the Preliminary and General Section of the Specification.

3.7 Timber

All timber shall be Pinus Radiata SG8 grade, unless otherwise specified on the drawings, and shall meet the requirements of Table 2.3 of NZS 3603 for mechanically graded timber. The modulus of elasticity of any one piece of timber shall not be less than 6.5GPa.

Where requested by the Engineer, the Contractor shall furnish results of testing undertaken on a suitably calibrated and verified stress grading machine demonstrating compliance with the above.

All timber shall be seasoned, straight and true and free from wind, warp and distortion and in lengths suitable for the members required.

3.8 Moisture Content

All framing timber shall have a moisture content of between 12% and 18% before being placed on the job.

All timber in load bearing walls is to be kiln-dried, to prevent excessive shrinkage reduction in the overall vertical dimension.

Where required by the Engineer, the Contractor is to prove the moisture content by the use of a resistance type moisture meter.

3.9 Treatment

All timber shall be treated to the requirements of NZS 3602 including subsequent amendments for a 50 year durability performance, unless specified otherwise. All preservation treatment shall be in accordance with NZS 3640 and the relevant parts of AS/NZS 1604..

3.10 Metalwork

Metalwork should either be a galvanised proprietary timber fixing or a galvanised fabricated structural steel component. Refer to the STRUCTURAL STEELWORK Section of this Specification.

3.11 Bolts

Where bolts are used they shall be complete with nuts and washers unless otherwise specified. All bolts, nuts and washers are to be galvanised finish. Allow to countersink bolt heads and nuts as necessary to clear linings. The diameter of a hole for a bolt shall not be less than the bolt diameter nor exceed it by 1.5mm.

For the following bolt diameters use washer sizes as below unless otherwise specified on the drawings:

- up to M8 30 x 30 x 2mm
- up to M12 50 x 50 x 5m
- up to M20 65 x 65 x 6mm
- over M20 85 x 85 x 7mm

Round washers may be used providing they are of a thickness and area not less than those specified above. Refer also to the STRUCTURAL STEELWORK Section of this Specification.

3.12 Screws and Nails

Nails fixing exposed timbers and nails which will be covered with plaster or similar shall be stainless steel unless otherwise specified.

Screws shall be steel, unless otherwise specified and of suitable gauge and lengths to ensure adequate fixing. Screws exposed to weather shall be stainless steel unless otherwise specified.

Minimum penetration of nails, brads and screws shall be ten times the fastener diameter into framing. Nail penetration through packing will not count. Minimum sheet edge distance for fasteners shall be 10mm.

All folded metal angles/nail plates/joist hangers and miscellaneous timber fasteners shall be galvanised Grade 250 Mild Steel conforming to AS 1397.

3.13 Fixings to Bottom Plates

All fixings to bottom plates on external wall lines shall be galvanised rather than zinc plated. This applies to proprietary fasteners as well as bolts and nails.

3.14 Workmanship

All timber shall be worked and cut to be true and square and free from wind and warp with all joints matching and mating to a proper contact fit.

All connections whether nailed, screwed, glued, mortised or dovetailed shall be accurately made and properly executed to provide sound satisfactory connections for the class of work required. Timbers containing defects or distortions shall not be cramped to provide mating at connections but shall be discarded and replaced by true defect-free timbers before connections are made.

In exposed work all nails shall be well punched and screws adequately countersunk to allow for finishing with stopping work.

Except where raised head screws are shown or specified, all screws shall be countersunk, neatly flush or recessed to allow for flush stopping.

Unless otherwise specified or shown, holding down bolts for plates on horizontal or near horizontal surfaces shall be 12mm diameter at 900mm maximum centres. In all cases there shall be a bolt within 300mm of each end of timber. All bolts shall have hexagonal heads and nuts and have heavy gauge washers bearing on the timber. Bolts shall be set 150mm into concrete and where closer than 75mm to the edge shall be bent into the body of concrete.

Except where otherwise noted or specified, use Selastic for back beading and general caulking which is not exposed and Thioflex One in all positions exposed to sunlight. Surface cleaning and priming, and use of Mastic shall be in accordance with manufacturer's instructions.

Provide and install to good trade practise all necessary fixings and connections (nails, bolts, screws, adhesives, proprietary mechanical fixings, etc.) required for the fabrication and erection of all timber work.

3.15 Protection

Framing timbers stored on the site shall be fillet stacked and protected from moisture and contamination by other agents.

3.16 Framing

All framing shall comply with the requirements of NZS 3604.

All framing shall be fixed true to line and square and/or to the plan profiles. The maximum tolerance from plane or the plan profiles shall be 6mm in 3.0m measured from a straight edge or template. All framing shall be checked before fixing linings.

3.17 Damp Proofing

Place approved bituminous fabric dampcourse materials between all faces of timber and concrete and/or concrete masonry work which would be otherwise in contact whether shown on the drawings or not.

The checking and cutting of timbers and framing shall be reduced to a minimum and checking shall be replaced with bored holes where possible.

The checking of plates and studs shall not be greater than 16mm for 75mm members, or 25mm for 100mm members. Holes drilled through the centres of members in lieu of checking as above may be 25mm diameter and 38mm diameter respectively.

Beams and joists shall not be notched or holed on their edges at any point closer than 600mm to the end supports. Holes shall be drilled only along the neutral axis. Holes or notches shall not exceed one-fifth of the depth of the beam or 32mm diameter or the width dimension, whichever is the lesser.

3.18 Erection

All framework shall be carried up true and plumb and temporary erection bracing shall be introduced wherever necessary to take care of all loads to which the structure may be normally subjected. Such bracing shall be left in place as long as may be required for safety.

The Contractor is to provide and maintain temporary support to all framework until it is adequately built into the final structure.

3.19 Proprietary Sheet Bracing Systems

Proprietary sheet bracing systems to walls, ceilings and sub-floor foundations, including Winstone WallBoards Ltd 'Gib Bracing Systems' and Carter Holt Harvey 'Ecoply Plybrace' bracing systems shall be installed in strict accordance with the manufacturer's specifications and brochures ('Gib Bracing Systems' 2006, and 'Ecoply Plybrace House Bracing System Manual'). No materials specified in these brochures or manufacturer's specifications shall be substituted without written approval from the Engineer.

4 Existing Structures

4.1 Hazardous Substances

This is a partial list of potential material hazards. As with all sections of this Specification it is not exhaustive and the Contractor must at all times perform all works with caution as to the potential hidden dangers of an existing structure as well as in accordance with best practice.

Lead

If the building dates from before 1980, the Contractor should assume that it has been painted with lead paint and take appropriate precautions. Refer to the Architectural specification, or in absence of guidance, to the Architect by written contact regarding all non-structural elements containing, or potentially containing, lead. All work must be carried out in accordance with the New Zealand Department of Labour Guidelines for Management of Lead-Based Paint.

Asbestos

Asbestos is commonly encountered in existing structures. Asbestos is found as a component in many materials, and is often found in seemingly innocuous elements such as floor tiles, ceiling panels, wall linings, etc., as well as more commonly understood insulations and pipe spays. The Contractor must identify and appropriately handle all asbestos on site. Removal shall be at the discretion of the Architect when not required by law. The Contractor shall work in an asbestos safe manner at all times and is encouraged to engage a specialist asbestos firm to handle work with removing Asbestos.

The Contractor shall engage a materials expert to identify and advise on safe handling of all existing materials in the structure. The cost of such an engagement and preparation of an expert report shall be included in the contractor's tender. All work must be carried out in accordance with the New Zealand Department of Labour Guidelines for the Management of Removal of Asbestos.

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