



SPECIFICATION

STRUCTURAL AND CIVIL ENGINEERS

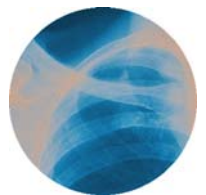
CDHB - ORAL HEALTH LIGHT FIXED FACILITIES

PREPARED FOR

CANTERBURY DISTRICT HEALTH BOARD

101838

MAY 2009





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Prepared For:

CANTERBURY DISTRICT HEALTH BOARD

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1. EXCAVATION

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.

1.2 SCOPE

This section of the Contract consists of all excavation, backfilling under the floor slab and around foundations; hardfilling and making good for construction of the specimen designs. Specimen designs are based on the assumptions of a level site and 'good ground' conditions as specified in NZS 3604:1999.

Users of the specimen designs shall be responsible for employing suitably qualified professionals to verify and assume responsibility for the design, validate or vary the design as necessary to suit the site specific conditions, and carry out construction monitoring activities, hereafter referred to as the 'Engineer'.

1.3 RELATED DOCUMENTS

In this section of the Specification reference is made to the latest revisions of the following documents:-

The New Zealand Building Code	(BIA)
NZS 4402:1986	Methods of Testing Soils (SANZ)
NZS 4431:1989	Earth Fill for Residential Development (SANZ)
NZS 3604:1999	Timber Framed Buildings

Reference shall also be made to the section of this Specification which applies to Concrete - General.

1.4 QUALITY ASSURANCE

1.4.1 General

It is the Contractor's responsibility to ensure that all work associated with this part of the contract is performed in accordance with the plans and specifications.

The Contractor shall advise the Engineer in writing of the name of a suitably qualified and experienced representative to be responsible for ensuring that quality assurance procedures are being followed, prior to commencement on site.

1.4.2 Inspection

No backfilling, site concrete or reinforcing shall be placed until the Engineer has had adequate opportunity to inspect the relevant area.

The Contractor shall give 24 hours notice of when inspections can be made.

Inspection shall not relieve the Contractor of his responsibility to check and verify that the work conforms to this Specification.

1.5 NATURE OF THE SITE

The nature of the site and its applicability to the specimen designs shall be verified by suitably qualified professionals, taking responsibility for the design and any variations required as necessary to suit the specific site conditions.

Specimen design is based on the assumption of a level site and good ground, as defined by NZS 3604:1999.

1.6 LEVELS

The Levels are to be in accordance with the levels shown on the Architect's drawings, confirmed for specific site conditions.

1.7 EXISTING SERVICES

The Contractor shall:-

1. Give all required notices to the Water, Sewerage, Gas and Electricity Authorities or Companies, the Local Council and Telecom and pay all relevant fees and charges.
2. Locate and protect existing services, rectify any damage or interference to them and provide temporary services whilst repairs are being carried out.
3. Protect footpaths, gutters, crossings, etc and pay all fees required for restoration of same.
4. Keep all thoroughfares free and clear of debris.

1.8 DUST AND NOISE

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

1.9 PROTECTION OF ADJOINING BUILDINGS AND PUBLIC PROPERTY

The Contractor shall take all necessary precautions to avoid damage to adjoining public and private property. He shall be wholly responsible for reinstating any damage he does incur during the contract. Refer to Preliminary and General Clauses.

Make good all roads and footpaths.

1.10 EXPLOSIVES

The use of explosives is considered unnecessary and is prohibited.

1.11 EXCAVATION

1.11.1 Methods of Excavation

The Contractor shall perform excavation work in such a manner that the risks of injunction to cease work or the threat of injunction from adjoining or adjacent owners or occupiers shall be avoided as far as it is practicably possible to do so for the entire period of the Contract. The cost effect of any such action shall be borne by the Contractor, and no time extensions will be considered as a result of these causes.

The manner of excavation shall be the responsibility of the Contractor. Excavation methods shall be such to avoid damage to concrete and reinforcing in foundations.

Excavation shall be carried out to the dimensions confirmed by and shown on the drawings of the Engineer engaged for design validation and construction monitoring, to a tolerance of -0, +50mm, for both line and level.

Remove all excavated material from site. Compact the exposed surface with suitable compacting equipment, to achieve 95% standard compaction, as defined in NZS 4431 Clause 7.4.1.1.

Where excavation extends through previously compacted hardfill or basecourse, stockpile for later use if desired, subject to the Engineer's approval.

1.11.2 Excavation for Foundations

Excavate for foundations as shown on the drawings of the Engineer. In any case, the excavation shall proceed to the minimum of the depth nominated on the drawings, or to good bearing, whichever is greater.

Note that excavations which require hardfill under the foundations shall be excavated to a width equal to the width of the foundation plus half the depth of the hardfill each side; in all directions.

The sides of the excavations which are to be immediately backfilled shall be battered at a slope of 2 vertical to 1 horizontal. Excavations which are to remain open for more than one day shall be battered to a slope of 1 to 1.

Excavation shall not proceed with in a zone extending through a plane of 1 vertical and 2 horizontal from the founding of any existing building, pipeline or other structure, without notifying the Engineer. In such cases, a suitable ground retention system may first have to be completed to allow excavation to proceed.

1.11.3 Maintain Excavations

Secure and maintain excavations free from slips, erosion, water and other fluids or fallen materials. Provide and maintain stable battered slopes, pile liners, shoring, strutting, sheet piling, planking, pumps and other materials or plant necessary for carrying out and maintaining excavations and remove them when no longer necessary.

1.11.4 Existing Softspots

Excavate and remove from site all material from softspots at the direction of the Engineer. Backfill these areas to comply with the BACKFILL section of this Specification.

1.11.5 Excavation for Services

Excavate for all services, including plumbing, drainage, electrical, gas and telecommunications as indicated. Cross reference with the services drawings.

Refill trenches with compacted hardfill consolidated in layers not exceeding 200mm thick.

1.12 HARDFILL

1.12.1 Filling - General

The fill material shall be spread and compacted in layers of uniform quality and thickness. The maximum uncompacted thickness of each layer of fill shall be 250mm and the minimum thickness shall be 130mm, or as otherwise specified by the Engineer.

Fill shall be placed and compacted to a uniformly dense condition of at least 95% standard compaction, as defined in NZS 4431 Clause 7.4.1.1. Compaction of each layer shall continue until the whole layer has attained the required uniform density.

1.12.2 Hardfill Material

All material used shall be sound river or pit shingle, free from all non-mineral matter. Fill material shall have a maximum size of 100mm, with 35-55% passing 19mm and not more than 15% passing 600 μ m standard sieves, or as otherwise specified by the Engineer to suit the site specific conditions. It shall be free from material which may cause it to weave when wet.

1.13 BACKFILL

Backfill around foundation and retaining walls, except where otherwise required by this Specification, with approved hardfill as specified above and to the same degree of compaction. Remove all rubbish, timber and other debris before backfilling.

The Contractor shall coordinate all associated trades so as to ensure the correct finished relationship, both as to dimensions, details, and finishes, between excavation work and all other trades, in particular DRAINLAYER and PLUMBER, who will be laying drains, sumps, pipes and wastes.



2. CONCRETE - GENERAL

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.

2.2 SCOPE

This Section consists of the following items relating to the specimen design:-

1. The forming, supply and casting of all insitu concrete.
2. The supply and laying of DPM.
3. Building in or grouting of all bolts, plates, fixings and the like, including all items necessary to complete the work indicated on the drawings but not specifically described in this Specification.

Supply and fixing of reinforcing is covered in REINFORCING STEELWORK.

Users of the specimen designs shall be responsible for employing suitably qualified professionals to verify and assume responsibility for the design, validate or vary the design as necessary to suit the site specific conditions, and carry out construction monitoring activities, hereafter referred to as the 'Engineer'.

2.3 RELATED DOCUMENTS

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

The New Zealand Building Code		(BIA)
NZS 3104:1991	Specification for Concrete Production - High Grade and Special Grade.	(SANZ)
NZS 3109:1997	Specification for Concrete Construction	(SANZ)
NZS 3112:1986	Methods of test for Concrete	(SANZ)
NZS 3114:1987	Specification for Concrete Surface Finishes	(SANZ)
NZS 3441:1978	Specification for Hot-dipped Zinc-coated Steel Coil and Cut Lengths.	(SANZ)

2.4 QUALITY ASSURANCE

2.4.1 General

It is the Contractor's responsibility to ensure that the construction of all insitu concrete work complies in all respects with the drawings and specifications.

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 insitu concrete.

The Contractor shall supply evidence of production quality standards to the Engineer in advance of construction in accordance with NZS 3109, clause 6.10.

2.4.2 Inspection

The Engineer will review construction in accordance with NZS 3109, clause 1.3. Before pouring commences, the Engineer or his representative shall be notified and a reasonable opportunity given him to inspect formwork, reinforcement and construction joints.

Where necessary, the Engineer's instructions shall be carried out before concrete placing commences.

2.5 MATERIALS & WORKMANSHIP

2.5.1 General

The Contractor shall adhere to all requirements of NZS 3109, except where specified otherwise herein or instructed otherwise by the Engineer. A copy of this standard shall be kept on the site and relevant parts read with the following Clauses of this Specification.

2.5.2 Concrete

2.5.2.1 General

All other concrete shall be NORMAL CLASS as defined in NZS 3109, Clause 6.2, with sufficient cement quantity to ensure satisfactory finish and durability, from an approved Ready Mix plant.

Calcium Chloride shall not be used.

Maximum aggregate size shall generally be 19mm.

The slump of the concrete shall not exceed the values stated Table 6 of NZS 3109.

Concrete shall not be pumped without the Engineer's prior approval.

2.5.2.2 Concrete Strength

Concrete shall have the following strengths:-

Foundations, excluding basement floors and walls	25 MPa
Slabs on grade	25 MPa
All other insitu concrete	30 MPa
Site concrete and concrete required to make good excavations shall be 7 MPa at 28 days or better.	

2.5.3 Reinforcement

Reinforcement, including all necessary distance pieces required to maintain cover, is specified in REINFORCING STEELWORK.

The Contractor is to be responsible for checking that reinforcement is not displaced during concreting. The Contractor shall have suitably experienced workmen continuously on call during all concrete pours to correct any damage or displacement which may occur. Any reinforcing displaced or damaged through the Contractor's neglect is to be remedied at the Contractor's expense.

2.5.4 Formwork

Formwork shall conform to NZS 3109, Section 5.

All ties and spreaders shall be of an approved type and placed so as to leave a regular and neat pattern on the surface when withdrawn and filled. Wire ties will not be permitted.

The formwork surface in contact with the concrete shall be clean and shall be treated with a suitable form release oil to ensure separation from the concrete. Care shall be taken that oil is kept out of contact with the reinforcement and is compatible with any subsequent paint systems to be applied to the finished product. All rubbish, clippings, shavings and sawdust shall be removed from the formwork immediately before concrete is placed. Formwork shall be checked for dimensional accuracy and alignment, before, during and after concreting and damaged formwork shall be replaced.

All formwork shall be removed without shock or vibration which might damage the concrete.

Stripping times shall be as in NZS 3109, Clause 5.4 unless otherwise agreed by the Engineer.

2.5.5 Construction Joints

Construction joints shall conform to NZS 3109, Clause 5.6.3, type B, unless agreed otherwise with the Engineer and their position shall be as shown on the drawings, or otherwise as agreed with the Engineer in advance.

Concrete shall be poured between properly positioned stops. The existing concrete shall be cleaned and roughened at all construction joints. Ensure that all laitence is removed over the face of the construction joint.

2.5.6 Tolerances

Dimensional tolerances are to conform to NZS 3109 and to NZS 3114, unless specified otherwise herein.

2.5.7 Concrete Finishes

All concrete finishes shall be in accordance with NZS 3114 and the Architect's specification.

In general, slab finishes shall comply with Part 3, NZS 3114; formed finishes shall be to Part 1, NZS 3114.

2.5.8 Site Welding

All welded connections shall be metal arc welded as shown on the drawings.

All site welding, welding inspection and repairs of welding defects shall be as specified in STRUCTURAL STEELWORK.

All welds shall have slag removed, and welds exposed in the finished building shall have splatter removed and ground to a neat clean joint. Exposed surfaces shall be cleaned by wire brush or sandblasting and finished in accordance with the relevant clauses of STRUCTURAL STEELWORK.

The Engineer shall be given reasonable notice when each section of the work is prepared and ready for welding and shall be given every opportunity to arrange for inspection and to satisfy himself as to the quality of the work and competence of the operators.

2.5.9 Dampcourse Membrane

Provide and lay 250 Micron Polythene or equivalent DPM over sand blinding on hardfill on existing ground beneath all areas of slab on grade, and all thickenings.

Join DPM as necessary by lapping a minimum of 250mm and completely sealing the joints with 50mm wide pressure sensitive polythene tape to produce a continuous membrane. Turn damp proofing up or down against foundations, walls and columns as appropriate and adequately seal around protrusions and service pipes to ensure the waterproofness of the complete membrane.

Protect the DPM during all operations until the floor slab is completed, and repair any damage that may occur or replace damaged material.

2.6 CONCRETING

2.6.1 General

The Contractor shall comply fully both on and off site with the provisions of the New Zealand Building Code in all matters relating to construction safety.

All concreting shall conform to NZS 3109, section 7.

2.6.2 Curing and Protection

All concrete shall be cured as defined in NZS 3109, Clause 7.7. The use of plastic curing compound shall be as agreed with the Engineer specifically for each occasion before it is used. The Contractor shall be responsible for ensuring that the curing compound proposed is compatible with subsequent floor covering or paint finish.

All concrete elements shall be protected from damage at all times. Any damaged items shall be repaired or remade to the satisfaction of the Engineer.

2.6.3 Building In

As the work proceeds, build in all necessary bolts and other fixings and where not supplied by other trades, supply these. The Contractor shall ascertain from all Sub-Contractors all particulars relating to their work with regard to order of execution and details of all such provisions of fixings, sleeves, chases, holes etc and of all necessary items to be built into concrete and shall ensure that all such items are provided for and/or positioned.

Cross reference with Architectural Drawings to ensure that all rebates, reveals, etc are correctly formed. This is particularly important in relation to window and door openings.

No claim will be recognised or allowed for extra cost of cutting away or drilling concrete work already executed in consequence of any neglect of the Contractor to ascertain these particulars and make the necessary provision beforehand.

Set concrete shall not be cut, hacked or cored unless specific approval is obtained from the Engineer.

2.6.4 Repairs and Cleaning

After all the concrete work of the building has been completed and the majority of other trades finished (except PAINTER and FLOOR COVERINGS) all finished exposed concrete surfaces throughout, including precast concrete, shall be closely inspected for faults in surface finish, damage to corners or edges, dirty marks, splashes or dribbles and visible imperfections of every kind.

All such imperfections shall be removed by the Contractor as required by the Engineer.

2.6.5 Sawcutting

The slabs on grade are to be sawcut within 24 hours of pouring (assuming a wet screed pour). The positions of the sawcut joints are to be discussed and agreed with the Engineer before pouring the slab.

The saw cuts are to be no less than one-third the slab depth and 10mm wide minimum, and are to be cleaned out and filled to the Architect's specification as late as possible in the job.

Sawcut joints shall be placed to eliminate re-entrant corners. This will usually require diamond shaped sawcuts around columns.



3. REINFORCING STEEL

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.

3.2 SCOPE

This section of the Contract refers to the supply, bending and placing of all reinforcing for concrete and reinforced blockwork including distance pieces and spacers, as shown in the specimen designs.

Users of the specimen designs shall be responsible for employing suitably qualified professionals to verify and assume responsibility for the design, validate or vary the design as necessary to suit the site specific conditions, and carry out construction monitoring activities, hereafter referred to as the 'Engineer'.

3.3 RELATED DOCUMENTS

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

The New Zealand Building Code (BIA)

NZS 3109:1987 Specification for Concrete Construction (SANZ)

AS/NZS 4671:2001 Steel reinforcing Materials (SANZ)

3.4 QUALITY ASSURANCE

3.4.1 General

It is the Contractor's responsibility to ensure that the reinforcement placed complies in all respects with the drawings and the specification. The Contractor shall nominate a Foreman reinforcing steelplacer, or equivalent, for approval by the Engineer before commencement on site. The nominated representative shall inspect all completed sections of reinforcing steelwork and advise the Contractor when the work has been carried out in accordance with the drawings and specification. This includes confirming the reinforcing steel used complies with this Specification.

3.4.2 Inspection

The Engineer shall be informed when reinforcement is being fixed and given a reasonable opportunity to inspect the fixed reinforcement before pouring commences.

3.5 MATERIALS AND WORKMANSHIP

All materials and workmanship shall conform to the requirements of NZS 3109.

3.5.1 Reinforcing Steel

Bar reinforcing steel shall comply with AS/NZS 4671 and shall be either Grade 300E or Grade 500E as called up on the drawings.

Reinforcing mesh shall comply with AS/NZS 4671 and shall be either Grade 300E, Grade 500E or Grade 500L as called up on the drawings.

Grade 300E and Grade 500E reinforcing steel shall be manufactured by Pacific Steel Ltd with Grade 500E reinforcing steel manufactured solely using a micro-alloy process.

No substitution of reinforcing steel shall be made without specific written instruction from the Engineer engaged for construction monitoring.

3.5.2 Galvanising

Where reinforcing bars are shown on the drawings to be hot dip galvanised, bars shall be galvanised BEFORE bending to give a coating of at least 700 grams per square metre.

3.5.3 Bending of Bars

Bars shall be cut and bent according to NZS 3109 Section 3 and to the dimensions and shapes shown or indicated in the drawings. Stirrups shall be bent to standard shapes as shown in NZS 3109.

3.5.4 Abbreviations

Bar diameters are prefixed with the following:-

D	deformed grade 300 bar
R	plain grade 300 bar
XD	deformed grade 500E bar
XR	plain grade 500E bar

3.5.5 Cover

Minimum cover shall be as noted on the drawings or otherwise as specified below. For all other covers, default to the values in NZS3109, plus 10mm.

Covers shall be as follows:-

➤ Foundations and all exterior exposed concrete:-

Underside of foundations, or cast against ground to all steel 85mm

Formed foundations/beams, tops of beams, to main steel 60mm

➤ Interior concrete:-

All formed surfaces, insitu concrete to main steel 50mm

Precast concrete to main steel 45mm

The ends of wire ties shall be turned away from the concrete face to maintain cover. Wire ties shall not be tied to formwork.

3.5.6 Laps

Positions of laps are generally shown on the drawings. The positions of laps other than those detailed shall be discussed and agreed with the Engineer before fabrication.

All lapping bars shall be tied to each other.

In concrete, lap lengths shall be a minimum of 300 mm long and not less than that given below, unless specifically noted otherwise:

Bar diameter	Grade 300 deformed	Grade 500 deformed
10	400	650
12	500	800
16	650	1050
20	800	1300
25	1000	1650
28	1100	-
32	1300	2100

Lap lengths for plain round bar shall be two times the length given in the table above for the corresponding grade of deformed bar.

In blockwork lap lengths shall be a minimum of 450 mm long and not less than that given below, unless specifically noted otherwise:-

Grade 300 reinforcing: 55 bar diameters

Grade 500 reinforcing: 90 bar diameters

3.6 FIXING

3.6.1 General

Steel fixing shall conform to NZS 3109. Bars shall be positioned accurately according to the drawings and securely tied with wire ties to form a rigid cage.

Distance pieces shall be wired-on concrete spacer blocks, ABIT plastic pieces or similar. The system of distance pieces and spacers to be used shall be such as to firmly hold the steel against all reasonable Contractors' traffic. Where the formed surface may be visible in the completed work, care shall be taken to select a form of spacer which shall have a minimum of impact on the exposed surface.

All starters and other reinforcing protruding from a concrete pour shall be securely braced to prevent movement in the wet concrete. Starters are NOT to be placed into concrete after it has been poured.

In the event of starters being placed out of position, bars are NOT to be bent over into position. The Engineer shall be notified and will provide a remedial detail, which may involve drilling and epoxy grouting of new starters.

3.6.2 Cleaning Steel

Reinforcement as fixed shall be cleaned to remove any material which adversely affects the bond to concrete. Any mould oil on the steel shall be thoroughly cleaned off before concrete is placed.

Clean all starter bars before placing steel for subsequent pouring.



4. CARPENTRY

4.1 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.

4.2 SCOPE

This section of the Specification consists of the supply, delivery and fixing of all carpentry work and joinery and connections to the specifically designed (*SD) elements of the specimen designs. All non-specifically designed elements shall be constructed to NZS 3604:1999 as per the Architect's specification.

Users of the specimen designs shall be responsible for employing suitably qualified professionals to verify and assume responsibility for the design, validate or vary the design as necessary to suit the site specific conditions, and carry out construction monitoring activities, hereafter referred to as the 'Engineer'.

4.3 RELATED DOCUMENTS

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

NZS 3601: 1973	Metric Dimensions of Timber
NZS 3602: 1990	Code of Practice for Specifying Timber and Wood based products for use in building
NZS 3603: 1980	Code of Practice for Timber Design
NZS 3604: 1999	Timber Framed Design

4.4 MATERIALS & WORKMANSHIP

4.4.1 General

The Contractor shall adhere to the requirements of NZS 3604: 1999 except where specified otherwise herein, or instructed otherwise by the Engineer. All work shall be carried out to the best trade practice by competent tradesmen using equipment materials and processes that best suit the intended purpose.

4.4.2 Timber Quality

All framing timber shall be kiln dried Pinus Radiata, Machine Stress Graded 8 (MSG8) or Visually Stress Graded 8 (VSG8) treated in accordance with NZS 3602: 1990, selected for dryness and straightness. Moisture content shall be less than or equal to 16%.

Carter Holt Harvey 'Hyspan' LVL members have been specified for the rafters. A similar product may be approved for use by the Engineer provided the fabricator can provide auditable certification that the product complies in full with AS/NZS 4357 plus testing records for the alternative product to show that the characteristic values as defined in NZS 3603 meet or exceed:

- Modulus of Elasticity, $E=13,200$ MPa
- Bending stress, $f_b=42.0$ MPa

4.4.3 Fixings

Nails, brads and screws and bolts shall be of steel, generally in accordance with NZS 3604:1999. Nails shall penetrate the second or holding timber at least half their length. Brads used to attach wall cladding shall be in length at least 3 times the thickness of the cladding but not less than 20mm.

Fixing of nails, bolts and screws to LVL is defined in NZS 3603. Standard edge distances for dry radiata pine timber apply. Refer to product literature for joint group definition.

Fixings shall be generally in accordance with Appendix A of NZS 3604:1990. Bolt set-out, tolerances and edge distance requirements for both timber and steel will comply with NZS 3603:1990 and NZS 3404:1997 respectively.

4.5 WALL FRAMING

Wall framing shall be constructed generally in accordance with NZS 3604:1990 unless shown otherwise on the specimen drawings.

Double studs shall be well nailed together as per NZS 3604:1990.

4.6 BRACING ELEMENTS

Bracing elements shall be applied to the specimen designs as per the drawings, and installed as per the manufacturer's requirements and those of NZS 3604:1999.

4.7 BEAMS AND LINTELS

Lintels shall be constructed generally in accordance with NZS 3604:1999 unless otherwise shown on the specimen drawings.

Beams shall be constructed as shown on the specimen drawings. Built-up lintels and beams shall be well nailed together as per NZS 3604:1990.

Solid 'Hyspan' LVL sections may be rip-sawn or chamfer-cut to create sections of lesser depth as specified. Do not rip-saw to create sections of reduced thickness.

4.7 FLOOR AND SUBFLOOR FRAMING

Floor and subfloor framing shall be constructed generally in accordance with NZS 3604:1999 as per the Architect's specification. Refer to manufacturers specific requirements for fixing Kavo Primus 1058 TM/S dental chairs to timber floors.