MCL® Stucco Rite® CAVITY WALL CLADDING SYSTEM

APPRAISAL CERTIFICATE #23/0509 Dated May 2011

THE APPRAISER

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THE PRODUCT

This Appraisal relates to the MCL® Stucco Rite® Cavity Wall Cladding System (the MCL® Stucco Rite® System) The MCL® Stucco Rite® System is a plastered cladding similar to traditional stucco external wall cladding but uses proprietary plaster, mouldings and reinforcement on a 35mm deep, drained and ventilated cavity. It is appraised as an alternative to stucco cladding as described in Paragraph 9.3 'Stucco' of E2/AS1.

E2/AS1 refers to the acceptable solution contained in the Department of Building and Housing's Compliance Document for New Zealand Building Code Clause E2 'External moisture' Third Edition including Amendments 1 to 4 and Erratum 1.

The MCL® Stucco Rite® System's proprietary components and the pumps (the MCL® Stucco Rite® Mortar Pumps) necessary to apply the plaster are supplied by MCL®. The components and pumps enable completion of the system to the requirements of this Appraisal and therefore achieve a code complying result.

THE SCOPE

The MCL® Stucco Rite® System shall be used in conjunction with timber external wall framing, aluminium joinery and other components of a wall assembly that comply with E2/AS1, except as varied herein, in order to meet the performance requirements of the Building Code claimed in this Appraisal.

This limitation includes restricting the use of the MCL® Stucco Rite® System to timber framed buildings complying with NZS 3604:1999 'Timber Framed Buildings', incorporating Amendments 1 and 2.

The buildings external walls shall be supported either by concrete slab or continuous concrete footings. All details of the plaster work shall comply with NZS 4251.1:2007 'Cement Plasters for Walls, Ceilings and Soffits' except as varied by this Appraisal.

The proprietary reinforcement for the MCL® Stucco Rite® System comes in two galvanising weights. The heavier galvanising weight shall be used in buildings within the Sea Spray Zone as defined in NZS 3604.

Installation of the MCL® Stucco Rite® System shall be in accordance with the MCL® Stucco Rite® Cavity Wall Cladding System Technical Manual dated May 2011(the Technical Manual).

The MCL® Stucco Rite® System has been appraised for exterior wall applications where it does not carry any vertical load other than its self weight.

All aspects of design, use, installation and maintenance contained in this Appraisal and the Technical Manual must be followed. Weather tightness details that differ, such as the use of the MCL® Stucco Rite® System on specifically designed structural timber wall framing, including roof parapets, solid deck balustrades, curved walls or other sculptured effects, are outside the scope of this Appraisal.

The MCL® Stucco Rite® System will not provide bracing resistance but will perform with adequate strength and ductility over braced wall panels.

BUILDING REGULATIONS

In the opinion of J.H. Little & Associates, the MCL® Stucco Rite® System, if used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the relevant provisions of the following clauses of the New Zealand Building Code (NZBC): B1 Structure

B2 Durability

E2 External Moisture

F2 Hazardous Building Materials.

Specific NZBC compliance details are contained within this Appraisal.

PRODUCT ACCREDITATION

The MCL® Stucco Rite® System has been issued a product accreditation by the Department of Building and Housing. Refer to Certification No 2011/01 on the Current Product Certificates Register on the Department's website.

Go to www.dbh.govt.nz/product-certification-current-register and look under the heading 'Product certificates of accreditation issued under the Building Act 1991'

DESCRIPTION OF THE MCL® STUCCO RITE® SYSTEM

The MCL® Stucco Rite® System is broadly similar to a traditional stucco plaster system but uses electric powered MCL® Stucco Rite® rotor/stator Mortar Pumps for the application of premixed bagged plaster.

The MCL® Stucco Rite® System is a blending of existing European and North American off-site stucco technology and has been modified for New Zealand use. Factory bagged plaster, is mixed with water preset by the applicator at the pump. The flow rate is controlled by the applicator at the nozzle. This eliminates on-site plaster quality variation. The MCL® Stucco Rite® Mortar Pumps are designed to pump the plaster at the correct consistency. The flat MCL® Stucco Rite® Mesh Sheet with self furring and pre-papered backing simplifies the on-site stapling of the mesh. MCL® uPVC mouldings, corners and flanges provide additional reinforcement to corners, openings, and top and bottom edges.

The System comprises proprietary plaster, reinforced with pre-papered hot dipped galvanised zinc steel wire MCL® Stucco Rite® Mesh Sheet and other reinforcement, to achieve a nominal thickness of 21mm with a standard sponge or plastic float finish. The plaster is applied by MCL® Stucco Rite® Mortar Pumps over the mesh which is stapled to 35mm x 40mm nominal sized H3.1 or H3.2 treated vertical timber battens providing a ventilated and drained cavity.

The proprietary plaster is applied in three coats; a base coat, a levelling and mesh coat, and a top coat. The base coat encapsulates the pre-papered MCL® Stucco Rite® Mesh Sheet reinforcement as well as additional reinforcement at corners and around joinery. The levelling and mesh coat contains further reinforcement in the form of a fibreglass mesh (MCL® Fibreglass Mesh).

The final top coat is sponge or plastic float finished.

The MCL® Stucco Rite® Mesh Sheet is fabricated from cold drawn hot dipped galvanised zinc vertical face wires and horizontal back wires, electrically welded at all points of intersection. The face and back wires are 1.5mm diameter with openings not exceeding 51mm. A layer of absorptive, slot perforated paper (suction paper) is placed between the face and back wires. The mesh is self furring by being fabricated horizontally into the lath at 152mm centres with a 6.5mm crimp in each face wire at its intersection with double back wires. A layer of Type 1, Grade D, Style 2 black building paper which exceeds Federal Specification UU-B-790a is strip glued to the back of the suction paper and is extended 100mm beyond the lath at the left end of the sheet and 100mm beyond the upper long edge of the sheet. There are two weights of wire galvanising used in the manufacture of MCL® Stucco Rite® Mesh Sheet being: Standard Class W02 with a minimum zinc coating of 35g/m^2 and identified by red coloured printing on its suction paper; and, Sea Spray Zone Class W10 with a minimum zinc coating of 200g/m^2 and identified by green coloured printing on its suction paper.

Reinforcement at all external corners is provided by MCL® uPVC Kwik corners being a 55mm x 55mm angle with nosing and MCL® uPVC Kwik flanges, being 65mm x 15mm angles with nosing, provide reinforcement at window and door openings.

MCL® Fibreglass Mesh is included locally in the base coat at certain locations and continuously in the levelling and mesh coat. The MCL® Fibreglass Mesh is alkali resistant and woven with a 4mm x 4mm aperture weighing not less than 165 grams per square metre.

The edges of the plaster are formed and supported by a number of uPVC mouldings. The MCL® Bottom J-Mould with Drip Edge and the MCL® Window/Door head with Drip Edge also provide vermin proofing and allow for drainage and ventilation to the cavity.

Movement is accommodated by providing physical breaks in the plaster. This is achieved with a uPVC moulding for the vertical movement control joint (VMCJ) and with a uPVC window head moulding and plain aluminium Z flashing for the horizontal movement control joint. (HMCJ)

Joinery shall comply with the requirements of E2/AS1 and be flashed with head and sill Z flashings as described in this Appraisal.

To provide a moisture resistant surface the completed plaster is sealed with the MCL® Water Repellent Plaster Sealer. The MCL® Stucco Rite® System is completed by being waterproofed with the application of not less than a 2 coat paint system in accordance with Paragraph 9.3.7 of E2/AS1.

COMPONENTS OF THE MCL® STUCCO RITE® SYSTEM

The components of the MCL® Stucco Rite®System are as listed in A and B on the following page.

A. COMPONENTS SOURCED FROM BUILDING SUPPLY MERCHANTS OR MCL®

- No.1 framing Radiata Pine battens rough sawn or gauged 35mm x 40mm and treated to H3.1 or H3.2. Tolerance shall be + or - 3mm on both dimensions.
- No.1framing Radiata Pine dwangs treated to H3.1 or H3.2. Minimum gauged 45mm x 90mm.
- Wall wrap complying with Table 23 of E2/AS1.
- Flashing tape complying with Paragraph 4.3.11 of E2/AS1.
- Powder Coated Aluminium Z Flashings at head and sill of joinery.

- Plain Aluminium lintel Z Flashing at garage door heads.
- Mesh staples to the battens shall be not less than 1.6mm diameter, 38mm x 9.5mm or wider type 304 stainless steel gun driven divergent point staples.
- Batten nails shall be not less than 75mm long x 2.8mm diameter ring grip 304 stainless steel gun driven nail.
- 20mm x 6 gauge Type 304 stainless steel screws.
- 20mm x 2.8mm diameter hot dipped galvanized round head nails.
- Sealant as per Paragraph 4.5.2 (g) of E2/AS1which is a neutral cure silicone sealant.
- At meter boxes 20mm x 20mm x 0.75mm aluminium angle.
- Etching Primer for Aluminium
- Paint complying with Paragraph 9.3.7 of E2/AS1 with a light reflective value of 40% or more

At decks:

- No.1 framing Radiata Pine packers 90 x 35 x 260mm long treated to H3.1 or H3.2.
- M12 bolt with nut and washers; all Type 304 stainless steel length to suit.
- 50mm x 50mm sq. x 3mm washer with 14mm diameter hole, Type 304 stainless steel.
- 50mm x 50mm sq. x 3mm EPDM washer.
- 10DN PVC Sleeve 22mm long.
- Proprietary Type 304 Stainless Steel Joist Hangers with capacity (kN) of half joist span (m) x joist spacing (m) x 3.35 for 2 kPa decks, or half joist span (m) x joist spacing (m) x 4.85 for 3.0 kPa decks.
- 140mm x 140mm sq. x 13mm fibre cement board with 14mm diameter hole.
- Saddle flashing as described in NZS 3604 (see Fig. 7.6) and E2/AS1 (see Fig.16) but to the dimensions of Drawing No
- Saddle flashing as described in NZS 3604 (see Fig. 7.6) and E2/AS1 (see Fig. 16) but to the dimensions of Drawing No. F13 in the Technical Manual. Flashing material shall comply with the '50 year requirement of Table 20 in E2/AS1.

B. COMPONENTS SOURCED FROM MCL®

Aluminium Z Flashings, uPVC Mouldings, Jointers and Head, Jamb & Sill Decorative Mouldings:

Refer to the Technical Manual.

- MCL® Plain Aluminium deck and HMCJ Z Flashings including uPVC Jointers and Corners to the HMCJ Z Flashings all as detailed in the Technical Manual.
- MCL® uPVC Bottom J-Mould with Drip Edge
- MCL® uPVC Window/Door head with Drip Edge
- MCL® uPVC Soffit/Sill Flange
- MCL® uPVC Side Jamb Flashing
- MCL® uPVC Vertical Movement Control Joint
- MCL® Pre meshed EPS Head, Jamb & Sill Decorative Mouldings having a maximum size of 150mm x 50mm.

Plaster and Sealer:

Refer to the Technical Manual.

- MCL® Stucco Rite® NZ 660 Multicoat Cement plaster in bags
- MCL® Stucco Rite® NZ 500 Adhesive plaster in bags
- MCL® Stucco Rite® AL 40 SP Polymer Modified Finishing Plaster in bags and premixed in plastic buckets
- MCL® Water Repellent Plaster Sealer in plastic container

Reinforcement:

Refer to the Technical Manual.

- MCL® Stucco Rite®Mesh Sheets by K-Lath, Division of Tree Island Wire (USA) Inc., Walnut, CA, 91789 Product No. KL60137NZW02, Standard Class W02 (Red Suction Paper) and Product No. KL60137NZW10, Sea Spray Zone Class W10 (Green Suction Paper) MCL® Stucco Rite® 2.170m x 0.7m Mesh Sheet with Double Wire and both classes are made with galvanized soft temper steel.
- MCL® uPVC Kwik Corner Reinforcing
- MCL® uPVC Kwik Flange Reinforcing
- MCL® Fibreglass Mesh with 4mm x 4mm apertures and weighing 160g/sqm (1m x 50m rolls)

ESSENTIAL EQUIPMENT

The MCL® plaster shall be mixed with potable water and applied to walls by a MCL® Stucco Rite® Mortar Pump. These electric powered rotor/stator pumps are as shown in the Technical Manual and are supplied for purchase or hire by MCL®.

HANDLING AND STORAGE

All MCL® Stucco Rite® System components including MCL® Stucco Rite® Mesh Sheets, mouldings, fixings, fibreglass mesh, MCL® Stucco Rite® NZ 660 Multicoat Cement Plaster, MCL® Stucco Rite® AL 40 SP Polymer Modified Finishing Plaster and MCL® Stucco Rite® NZ500 Adhesive Plaster and the EPS Decorative Mouldings shall be protected from physical damage and the weather at all times including during transportation. When not stored in a dry building all materials shall be kept covered in a weather tight condition.

MCL® Stucco Rite®NZ 660 Multicoat Cement Plaster, MCL® Stucco Rite®NZ 500 Adhesive Plaster and MCL® Stucco Rite® AL 40 SP Polymer Modified Finishing Plaster shall be used immediately after opening the bag or container and shall not be stored for more than 6 months.

MCL® Water Repellent Plaster Sealer has a shelf life of 12 months and shall be stored in tightly closed containers and protected from sunlight.

COMPLIANCE WITH NEW ZEALAND BUILDING CODE

NZBC CLAUSE B1: STRUCTURE

The MCL® Stucco Rite® System when used in accordance with the provisions of this Appraisal, will meet the performance requirements of NZBC Clauses B1.3.1, B1.3.2 and B1.3.4 with respect to face loads from wind B1.3.3(h), earthquake B1.3.3(f) and human impact B1.3.3(j).

This Appraisal covers only the application to nonspecific designed timber wall framing conforming to NZS 3604.

The MCL® Stucco Rite® System shall be supported either by continuous concrete footings or concrete slab.

The MCL® Stucco Rite® System is intended to be fixed to timber walls with studs at 600mm centres, heights up to 4.8m and dwangs spaced at up to 900mm centres. Additional dwangs are required at soffit level and may be required at HMCJ locations all as described in the Technical Manual.

The system is able to resist wind face loading up to and including those associated with VH wind speed zones.

The weight of the total system is 41kg/m2 and does not contribute to the building lateral bracing.

The MCL® Stucco Rite® System will withstand human impact loads associated with domestic living. Hard body impacts and impacts likely to occur in commercial or industrial applications are outside the scope of this Appraisal.

The MCL® Stucco Rite® System may be fixed to wet timber framing provided the interior lining and insulation is not installed until the framing moisture content is less than 18%.

The location of Movement Control Joints (MCJ's), openings and additional MCL® Fibreglass Mesh Reinforcing shall be shown on the consented building elevations in compliance with the rules given in Section G of the Technical Manual.

Vertical Movement Control Joints (VMCJs) shall be provided at changes in elevation, at certain openings and to break the length of a wall into panels no wider than 8 metres or 2.75 times the panel's average height all as required by Section G of the Technical Manual. Where VMCJs are required they shall not be located any closer than 175mm to any penetrations including those for windows or doors. Horizontal Movement Control Joints (HMCJs) shall be provided at intermediate floor level where the moisture content of flooring timbers or wall plates abutting the intermediate floor is greater than 18%. Checks on moisture content shall be conducted prior to plastering commencing to ensure this requirement is met.

Where battens extend continuously past an intermediate floor (i.e. with no provision for a HMCJ) and checks before plastering reveal a moisture content higher than 18% then either the wall shall be re-battened allowing for the provision of a HMCJ at intermediate floor level or plastering operations shall be delayed until such time as the moisture content has dropped to 18% or less.

In addition to any HMCJ that may be required at the intermediate floor level, HMCJs shall be provided at horizontal steps and to break the height of the wall into panels with a maximum average height of 5.2 metres except at gable ends and certain other sloping panels all as required by Section G of the Technical Manual. Where HMCJs are required to limit height they shall be located at an intermediate floor as shown in the Technical Manual.

The MCL® Stucco Rite® System allows for the construction of decks, simply supported or cantilevered, provided the details of the Technical Manual are followed. The requirements of NZS 3604 must be followed except as specifically noted to account for the junction of the deck with the MCL® Stucco Rite® System.

NZBC CLAUSE B2: DURABILITY

The MCL® Stucco Rite® System will meet the performance requirements of NZBC B2.3.1(b). In other words, the system will be durable for 15 years.

The class of the MCL® Stucco Rite® Mesh Sheet shall be shown on the consented plans and specifications. In NZS 3604's Sea Spray Zones the MCL® Stucco Rite® System must use the MCL® Stucco Rite® Mesh Sheets with the heavier galvanising weight i.e the Sea Spray Zone Class W10 (Green Suction Paper) product. In all other areas the Standard Class W02 (Red Suction Paper) product shall be used.

The durability of the MCL® Stucco Rite® System is dependent on maintenance as described later in this Appraisal.

The maintenance requirements are the same for the MCL® Stucco Rite® System as for conventional stucco work with the objective being to ensure that the external surface and the waterproof coating, is continuously maintained.

NZBC CLAUSE E2: EXTERNAL MOISTURE

The MCL® Stucco Rite® System is a drained, ventilated cavity wall cladding system and uses proprietary uPVC mouldings and aluminium Z-Flashings as detailed in the Technical Manual. The system shall have either a standard sponge or plastic float finish (see Section D of the Technical Manual). The owner shall nominate the choice of finish in the consented plans and specifications.

When used and installed in accordance with this Appraisal the MCL® Stucco Rite® System will meet the performance requirements of NZBC Clauses E2.3.2 and E2.3.6. In other words, the MCL® Stucco Rite® System prevents the penetration of water that could cause undue dampness, damage to building elements, or both, and it enables the dissipation of excess moisture present at completion of construction.

The MCL® Stucco Rite® System shall be used in conjunction with external framing, wall wrap, flashing tape and other components of a wall assembly that comply with E2/AS1, except as varied herein. Flashing tape is required continuously at the side jamb. The MCL® Stucco Rite® System has been appraised as providing an alternative to the requirements of Paragraph 9.3 'stucco' of E2/AS1. Depending on the height of the eave above ground level the following minimum eaves widths, measured horizontally from the exterior face of the MCL® Stucco Rite® System, shall be provided:

Eaves to ground height (m) up to:	Minimum eaves width (mm)
2.4	300
2.7	350
3.0	450
4.0	600
10.0	750

The uPVC Soffit/Sill Flange shall be sealed to eaves soffit lining unless the eaves are wider than 450mm for single storey and 600mm for two storey buildings.

Joinery shall be aluminium meeting the requirements of E2/AS1 and shall be aligned with the battens as shown in the Technical Manual.

The MCL® Stucco Rite® System can be used in all situations where the wall's risk score as determined from E2/AS1 is 20 or less. In all situations, the MCL® Stucco Rite® System shall be installed over battens to provide a drained and ventilated cavity. The MCL® Stucco Rite® System provides a 35mm wide cavity as opposed to the 20mm cavity provided by stucco to E2/AS1. Conventional Aluminium Z Flashings provide for weather tightness at the head and sill of external joinery and at Horizontal Movement Control Joints. The MCL® Stucco Rite® System's mouldings form the plaster edges and provide drip edges and rear anti-capillary gaps where necessary.

Pipes and services penetrations shall comply with the details contained in the Technical Manual and E2/AS1.

Sealant is required at certain roof soffits, window/door jambs, sill Z Flashing stops ends, garage door jambs, HMCJ jointers and corners, meter boxes and all penetrations, all as detailed in the Technical Manual.

Movement is accommodated in the MCL® Stucco Rite® System by use of proprietary mouldings to form vertical control joints and proprietary mouldings and Aluminium Z Flashings to form horizontal control joints. Continuity of the horizontal control joints is provided for by purpose made jointers for the HMCJ Z Flashing. These jointers enable joints to be made in straight runs of the flashing as well as at the building's internal and external corners.

The MCL® Stucco Rite® System provides for the connection of decks, simply supported or cantilevered, to the building. The details given in the Technical Manual, including drawings F11 and F13, ensure weather tightness at the deck junction.

The bottom edge of the MCL® Stucco Rite® System shall extend not less than 50 mm below the ground floor level or top of up stand and there shall be a minimum clear distance from the underside of the system to finished ground level of 100 mm where the ground is paved and 175 mm elsewhere. At roof and wall junctions the bottom edge of the MCL® Stucco Rite® System shall be at least 50mm above the roof surface. Specific details at garage door entries provide that a minimum 50mm clearance to the underside of the plaster is achieved by forming the adjacent concrete path as described in the Technical Manual. The garage door opening shall either have a timber facing or be plastered over battens as detailed in the Technical Manual.

NZBC CLAUSE F2: HAZARDOUS BUILDING MATERIALS

The MCL® Stucco Rite® System when used and installed in accordance with this Appraisal will meet the performance requirements of F2.3.1.

Wet plaster before curing is highly alkaline and prolonged skin contact shall be avoided. For further detail refer to the MCL® Material Safety Data Sheet at www.mclonline.co.nz.

The MCL® Stucco Rite® System presents no hazardous building materials after construction. However, during construction, plaster dust in dry powder form can cause irritation and paper dust masks shall be worn during handling and mixing.

INSTALLATION OF THE MCL® STUCCO RITE® SYSTEM

Installation of the MCL® Stucco Rite® System shall be in accordance with the Technical Manual. The Technical Manual splits the work into 3 sections being the 'Builder's Work' and the 'Plaster Applicator's Work' and the 'Waterproof Coating Applicator's Work'.

The Builder's Work involves the installation of timber framing, penetrations, wall wrap, flashing tape, battens, external joinery, the various mouldings and Aluminium Z Flashings and the MCL® Stucco Rite® mesh sheet. The work involved is no more complex than that associated with normal light timber frame construction.

The Plaster Applicator's Work comprises fixing in position all additional reinforcement at corners and openings, and the mixing, application and finishing of the MCL® Stucco Rite® plaster including placing of the MCL® Fibreglass Mesh.

The Plaster Applicator's Work shall be performed by plasterers with the requisite skill and experience levels as required by NZS 4251.1: Cl 2.1.2.

The plaster shall be mixed and applied by a MCL® Stucco Rite® Mortar Pump with the Plaster Applicator being responsible for operating the pump to provide correct plaster mix consistency. The Plaster Applicator is responsible for ensuring the various plaster coats are properly cured and for the application of the MCL® Water Repellent Plaster Sealer all as described in this Appraisal and the Technical Manual.

The Waterproof Applicator's Work, commences on the completion of the Plaster Applicator's Work and comprises the etch priming of unpainted aluminium HMCJ and garage lintel Z flashings and then painting these flashings and plaster with no less than a two coat system in accordance with Paragraph 9.3.7 of E2/AS1. The paint shall have a Light Reflective Value of 40% or more.

CURING AND SEALING OF THE PLASTER

The plaster shall be cured as set out in Clause 2.5 of NZS 4251 and as modified below.

The objective of curing is to reduce shrinkage of the plaster and reduce the risk of cracking.

- The base coat shall be moist cured for 48 hours before application of the levelling and mesh coat.
- After application of the levelling and mesh coat the plaster shall be moist cured for a further 48 hours.
- After application of the top coat moist cure for 48 hours.
- At all times ensure that the plaster does not dry due to drying wind, low humidity (MC < 60%) or sunshine on East, North or West walls.
- As required by the Technical Manual, MCL® Water Repellent Plaster Sealer shall be applied to the plaster surface after 48 hours.
- The MCL® Water Repellent Plaster Sealer shall be applied in two wet coats being one on top of the other using a backpack sprayer.
- The MCL® Water Repellent Plaster Sealer shall be left for 72 hours before applying the plaster's top coat or waterproof coating.

MAINTENANCE AND REPAIRS

Inspections shall be made at least every12 months to check the condition of the MCL® Stucco Rite® System. The inspection shall ensure that:

- The plaster and flashings are sound, with no structural damage, cracking or deterioration.
- The paint coating continues to provide complete coverage and is not cracked or damaged.
- The plaster and sealant at penetrations is free from cracking and deterioration.
- Ground and roof clearances at the base of the MCL® Stucco Rite System are maintained at all times.

After ensuring the MCL® Stucco Rite® System and coatings are sound, clean all plaster surfaces to remove any grime, dirt and dust particles. Cleaning shall be carried out with a soft brush using warm water and mild detergent. Clean off with fresh water afterwards. Do not use a water blaster to clean surfaces of the MCL® Stucco Rite® System.

Repaint and reseal as necessary to ensure that the integrity of the MCL® Stucco Rite® System and the waterproof coating is maintained at all times. Repainting must be in accordance with Paragraph 9.3.7 of E2/AS1 and have a Light Reflective Value of 40% or more.

Repairs

Any damage or deterioration to the MCL® Stucco Rite® System or coatings must be repaired immediately.

Cracks larger than 1.5mm wide, areas of cracking other than single cracks up to 1.5mm, or structural damage must be repaired by a qualified plasterer as required in NZS 4251 to reinstate the MCL® Stucco Rite® System to the original condition as follows:

1. Remove all damaged plaster, and as necessary, the MCL® Stucco Rite® Mesh Sheet and MCL® uPVC Kwik reinforcement, back to firm undamaged material salvaging at least one square of wire mesh (50mm) and at least 50mm of MCL® Fibreglass Mesh in the levelling and mesh coat.
2. Remove the waterproof coating for a distance of not less than 300mm beyond the repair.
3. If damaged, replace timber wall framing to the requirements of the Technical Manual and NZS 3604.
4. Replace wall wrap, overlaying at the base and under at the top and seal all joints with flashing tape.
5. Reinstate battens to the requirements of the Technical Manual.
6. Replace the MCL® Stucco Rite® Mesh Sheet (overlapping one square) and MCL® uPVC Kwik reinforcement and/or uPVC Mouldings and install to the requirements of the Technical Manual.
7. Apply three coats of MCL® Stucco Rite® Plaster as set out in the Technical Manual, including MCL® Fibreglass Mesh in the levelling and mesh coat overlapping existing mesh by 50mm and seal with MCL® Water Repellent Plaster Sealer and repaint. Repainting must be in accordance with Paragraph 9.3.7 of E2/AS1 and have a Light Reflective Value of 40% or more.

BASIS OF APPRAISAL

In the opinion of J.H. Little & Associates, the following considerations and investigations demonstrate that the MCL® Stucco Rite® System is fit for its intended purpose and will comply with the claimed provisions of the New Zealand Building Code.

The MCL® Stucco Rite® System is a variation of traditional stucco cement plaster work. It is on a non rigid backing with a cavity formed by using vertical battens as required by E2/AS1 and NZS 4251.

Clause B1 Structure

The plaster of the MCL Stucco Rite System in respect of its composition, total thickness, reinforcement, spans, installation and curing meets or exceeds the requirements of NZS 4251 and E2/AS1.The H3.1 treated battens at 300mm centres have adequate strength to span 900mm between plate and dwangs and with 35mm depth also provides adequate stiffness. The ring grip nail fixing of battens to wall framing has adequate strength to resist lateral and other applied forces on the wall cladding.

The pre-papered double wire mesh is stainless steel staple fixed to the batten which provides adequate tensile and shear strength and durability. The strength of the fixing to the lath double wire and plaster is shown by calculation and test – FRI Report TE02-094 and BEAL Appraisal CA521 and C705.

Provision for Movement Control Joints (MCJs) are not as stringent as for conventional stucco due to the ductility of the batten system, the MCL® Stucco Rite® pre-papered reinforcing mesh including its overlapping, the formulation of the plaster, and the corner and flange reinforcement plus the fibreglass reinforcement in the levelling and mesh coat. Other relevant factors are the requirements

on the moisture content of the timber framing and on the light reflective values of the paint coating as spelt out in the Appraisal. The rules for locating MCJs are set out in Section G of the Technical Manual.

Clause B2 Durability

The 15 year durability of the MCL Stucco Rite System is assured by use of its conventional and proven materials as follows: The plaster has the same ingredients as required by NZS 4251.1. The mesh reinforcement has a galvanising weight of no less than 200 g/m2 in sea spray areas and no less than 35 g/m2 in other areas. The timber battens are treated to a minimum of H3.1 and both batten and mesh fixings are Type 304 stainless steel. The waterproof paint coating complies with the requirements of E2/AS1.

The mesh galvanising is as required by NZS 4251 and is considered adequate based on history in use, the experience and knowledge of J.H Little and Associates and by comparison with other galvanised mesh products used and appraised for New Zealand conditions.

The plaster and its waterproof paint coating require normal maintenance as required by this Appraisal.

History in use demonstrates satisfactory performance over a number of years.

Clause E2 External Moisture

The MCL® Stucco Rite® System forms the drained and ventilated cavity system conforming to, but modifying and enhancing, the stucco requirements described in Paragraph 9.3 of E2/AS1. The MCL Stucco Rite System is used in accordance with Table 3 of E2/AS1.

The use of proprietary uPVC mouldings together with aluminium Z flashings, including powder coated aluminium head and sill Z Flashings with stop-ends at external joinery, ensure that the performance requirements of NZBC Clause E2 are achieved.

General

The MCL® Stucco Rite® System with drained and ventilated cavity on battens has been used successfully in New Zealand since 1999.

Quality Control

For MCL® supplied components, J.H. Little & Associates has checked the procurement of raw materials, the manufacturing specifications and the on-going quality assurance measures employed by MCL®, Tree Island Wire (USA) Inc. and MCL's other suppliers and found them to be adequate.

The quality of H3.1 and H3.2 battens is shown by treatment plant identification after cutting to size and preservative treatment.

The quality of ring grip stainless steel nails and staples is by makers' name and product identification on sealed boxes.

The quality of MCL® Stucco Rite® pre-papered mesh delivered to the MCL® warehouse is verified by certification issued by the manufacturer, Tree Island Wire (USA) Inc. The quality of MCL® Stucco Rite® plaster is subject to exact measurement and control of all ingredients by the manufacturer and includes collection of batch samples and random audit of manufacture by an external agency.

MCL® Stucco Rite® Mortar Pumps have factory settings and adjustable water flow to ensure that the same consistency of plaster is achieved at all times. MCL® maintain the hire pumps and the replacement parts and pumps can be sourced and purchased from MCL®.

MCL® Stucco Rite® plaster bags are date stamped and supplied ex factory to the site when required.

Quality Assurance

The MCL® Stucco Rite® System has an annual QA Audit by an external agency.

SOURCES OF INFORMATION

The following documents have been considered in the preparation of this Appraisal:

Compliance Documents for the following:

- Clause B1 'Structure' including amendment 1 to 9.
- Clause B2 'Durability' including amendment 1 to 6.
- Clause E2 'External moisture' Third Edition including Amendments 1, 2, 3 and 4 and Erratum 1.
- NZS 3604: 1999 : Timber Framed Buildings including amendment No.2.
- NZS 4251 Part 1: 2007 : Solid Plastering - Part 1 - Cement plasters for Walls Ceilings and Soffits.
- MCL® Stucco Rite® Cavity Wall Cladding System Technical Manual Dated May 2011.
- K-Lath Technical Manual and Product Data 09200/KLC.
- K-Lath Brochures 8 pages, A 465, # 09200/KLC
- FRI Report No. TE03-094 P21 Wall Racking Tests on Solid Plaster Walls Dated 17 August 2004.
- BEAL Appraisal CA508 MCL® Stucco Rite® Cavity Wall Cladding System Dated July 2006 Verification of clauses in E2/AS1.
- ASTM C 933
- ASTM C 1063
- International Building Code Sec. 2507.1
- BEAL Appraisal CA521 MCL® Stucco Rite® NZ660 Multicoat Plaster, for use on Stucco Mesh, Masonry, Concrete Block, Brick and Autoclaved Aerated Concrete (AAC) Dated July 2006.
- BEAL Appraisal CA705 MCL® Stucco Rite® AL 40 SP Polymer Modified Pre-Mixed Finishing Plaster in buckets Dated March 2007.
- BEAL Appraisal CA910 MCL® Stucco Rite® AL 40 SP Polymer Modified Finishing Plaster in Bags Dated July 2009.
- BEAL Report *Quality Assurance* Dated July 2007.
- BEAL Appraisal CA622 MCL® Stucco Rite® 500 Adhesive Plaster
- Test Report TE07-105 Withdrawal Testing MSG6 Timber Using 64x2.8mm Stainless Steel Ring Grip Nails Dated July 2008.

CONDITIONS OF APPRAISAL

In the opinion of JH Little & Associates the MCL® Stucco Rite® Cavity Wall Cladding System is suitable for its appraised use as an external wall cladding system provided that.

(1) The MCL® Stucco Rite® System is constructed and maintained in accordance with, and complies with all other requirements and conditions of, this Appraisal.

(2) The MCL® supplied components continue to comply with the manufacturing specifications and quality assurance measures of MCL®, Tree Island Wire (USA) Inc. and MCL's other suppliers. These specifications and quality assurance measures are as viewed and approved by the Appraiser.

(3) MCL® continues to have the MCL® Stucco Rite® System reviewed by J.H. Little & Associates on an annual basis. This includes checks by J.H. Little & Associates that nominated components not supplied by MCL®, continue to be made to the required standard.

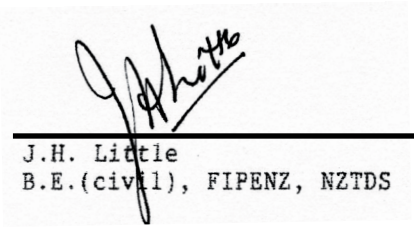
(4) The overall quality and expected performance of the components is maintained. MCL shall notify J. H. Little & Associates of any changes in specification or quality assurance measures prior to them coming into effect.

(5) The opinions expressed in this Appraisal relate to compliance with the New Zealand Building Code as in force at the date of issue of this Appraisal.

JH Little & Associates

Specialist Consulting Engineers

29.04.2011



Dated

J.H. Little
B.E.(civil), FIPENZ, NZTDS