PGH BRICKS & PAVERS™

Corium

Technical Manual

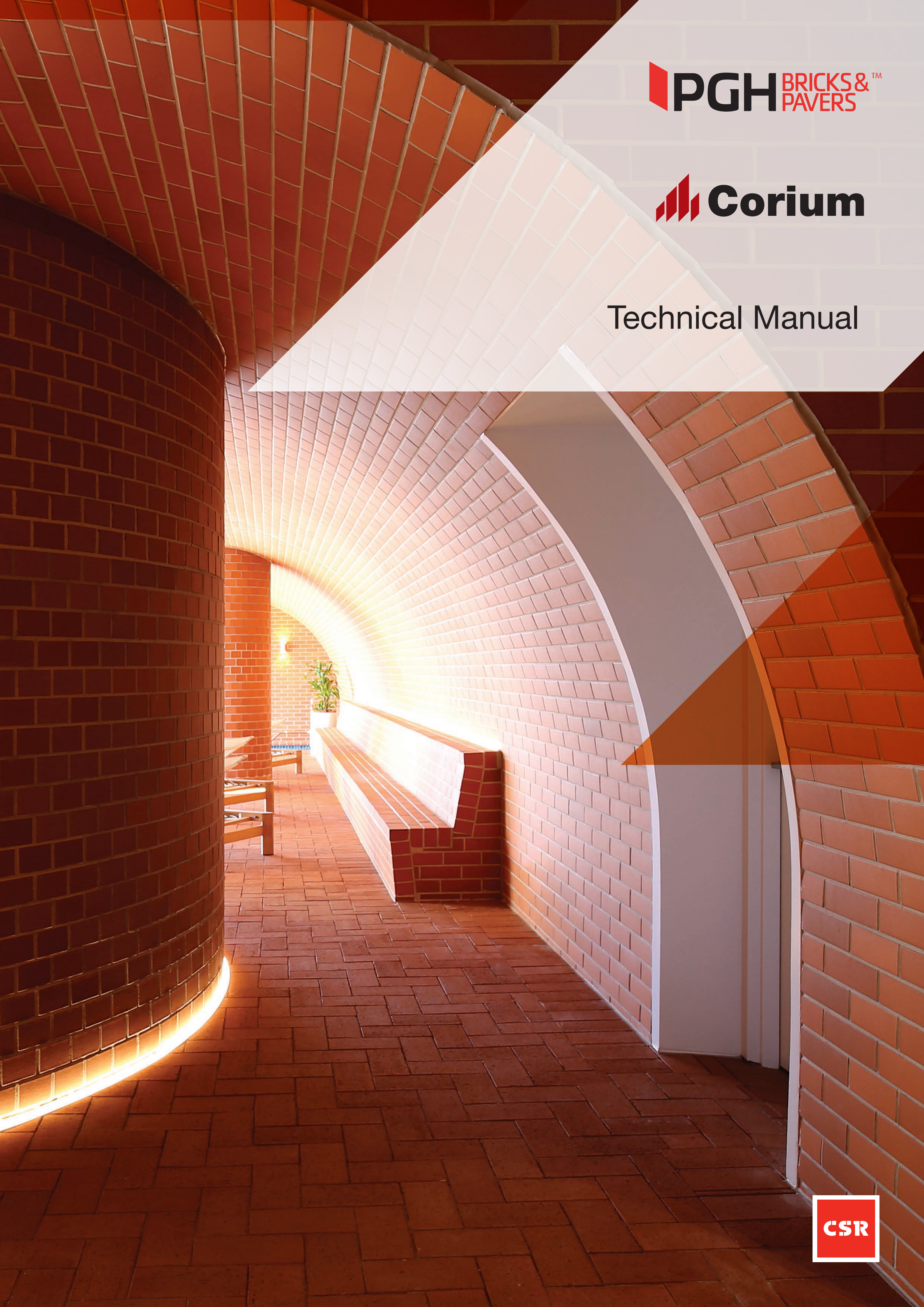

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TABLE OF CONTENTS

Corium

Corium

01 INTRODUCTION

01 INTRODUCTION

CORIUM from PGH Bricks & Pavers offers a genuine brick finish for projects where a lightweight cladding system is required rather than traditional brickwork.

The smart and natural look of brick can now be used to stunning effect in the design of mid to high-rise buildings, new construction, and recladding projects, through this unique cladding system that is CORIUM.

Innovative and versatile, the CORIUM system comprises brick tiles specially manufactured to fix mechanically into a unique steel backing section. These profiled lengths are mounted in horizontal rows onto a vertical support system and the brick tiles are then clipped in place. The mechanical 'clipping' feature is unique to CORIUM and ensures a high strength façade that enables some adjustment of brick tile position during installation. Mortar is then added using a pump system.

CORIUM can be used with a wide range of substructures, including concrete, timber frame, lightweight steel frames, masonry, etc. With care, it can be mounted at any angle to achieve some truly dynamic finishes – even overhead for soffits and ceilings. Decorative and textural patterns, as well as mosaic, are easily achieved to add that extra dimension to project design. And with the large and exciting range of colours and textures available, the possibilities provided by this unique building material are limitless.

CORIUM meets the applicable requirements of the National Construction Code (NCC), is durable, weather resistant, non-combustible and structurally sound for its intended applications, being multi residential, medium-rise and high-rise buildings and fit outs.

This Technical Manual recommends good building practice methodology and has been prepared as a general guide of design considerations, system engineering information and installation procedures for common installations of the CORIUM system. It assumes that the user has an adequate knowledge level of building design and construction.

This Technical Manual does not replace the services of the building design professionals required to design and oversee projects in any way, nor is it an exhaustive guide of all possible scenarios. It is the responsibility of the building design professionals, including the project Certifier, to ensure that the details in this Technical Manual are appropriate for the intended application.

For additional information and assistance with the CORIUM system, please contact PGH Bricks & Pavers on CORIUM@pghbricks.com.au

Corium

02 DESIGN AND SELECTION

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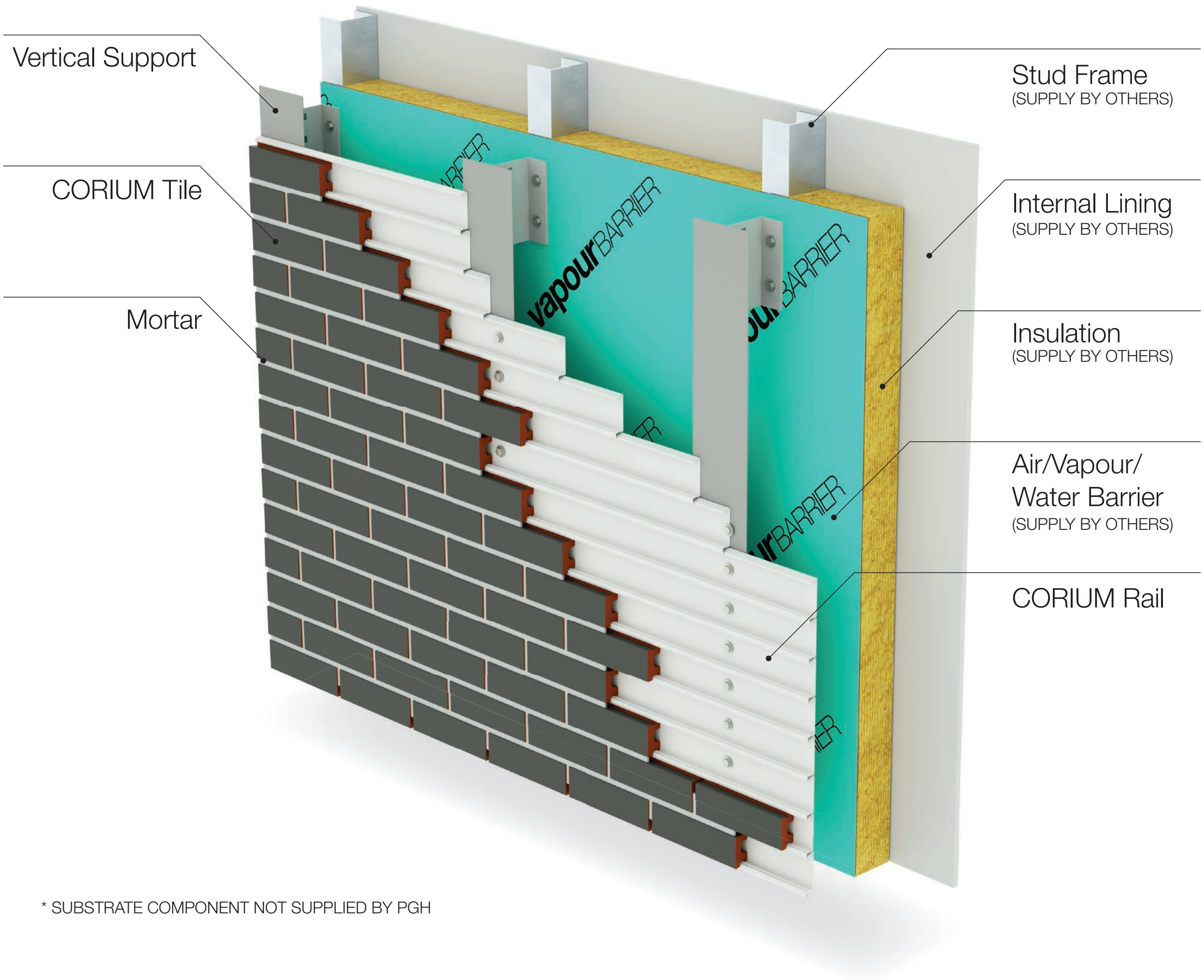
Fig 1: Schematic representation of the CORIUM System used as part of an external wall system.



* SUBSTRATE COMPONENT NOT SUPPLIED BY PGH

2.1 System Description

The CORIUM system comprises extruded thin brick tiles, nominally 32 mm thick. The thin brick tiles are specially manufactured to ensure they mechanically fix into the unique steel backing section, which consists of successive courses of horizontal steel rails, with each course of rail interlocking into the rail above and below. The rail profile is uniquely designed to provide a high strength façade, ensuring superior engagement of both the tiles and mortar. Depending on the corrosivity category of the projects location, the rail can be supplied as galvanised or stainless steel. Each individual row of rails is profiled to house 1 standard brick course.

The CORIUM system is fixed onto a vertical support system (conventionally this is a steel top hat or top hat with cleat system, but other options are available per site location and substrate), incorporating a free draining ventilated cavity of at least 25 mm, which is then fixed to the substrate (concrete, permanent formwork, timber framing, lightweight steel framing, masonry, etc…). The system incorporates weep holes at its base to ensure adequate cavity ventilation and drainage. Mortar is added to the surface using purpose designed tools.

Offering a genuine brick finish, the system can look identical to traditional brick, utilising corner tiles at windows and reveals.

2.2 Benefits of the CORIUM System

- Lightweight –approximately 70 kg/m2, compared to approximately 215 kg/m2 for traditional brick.
- Reduced site space requirements – allows for the brick look where tight boundaries would usually restrict usage.
- Can be used for both internal and external applications.
- On-site flexibility that enables shaping to suit building details and achieve seamless brickwork around corners, windows, and doors.
- Reduced materials handling requirements.
- Reduced waste and mess onsite.
- Strong, durable, and weather resistant.
- Non-combustible.
- Can be fixed onto all common substrates.

- Safe choice with 'brick grip' design.
- Extensive range of colours and textures.
- NCC compliant.
- Low maintenance.
- Backed by CSR –the name behind some of Australia and New Zealand's most trusted building industry brands.

2.3 Applications

PGH's CORIUM system is suitable for all building classes 1 to 10, subjected that the intended location is under non-cyclonic wind load no greater than 4kPa.

The CORIUM system comprises of the brick tile, mortar, rail, and connection to supporting structure. The vertical supporting structure and substrate inboard of the CORIUM rail is not part of the CORIUM system.

The CORIUM system as part of a whole external wall assembly, has been certified as being compliant to the requirements of the NCC for structure, weatherproofing and non-combustibility, however, the system itself does not offer a fire resistance level. Site environmental factors such as wind pressure, corrosivity zones, and climate need to be taken into account when specifying the appropriateness of the system and the components for the intended location.

Contact PGH if you wish to use Corium for applications outside the specified range.

2.4 System Components

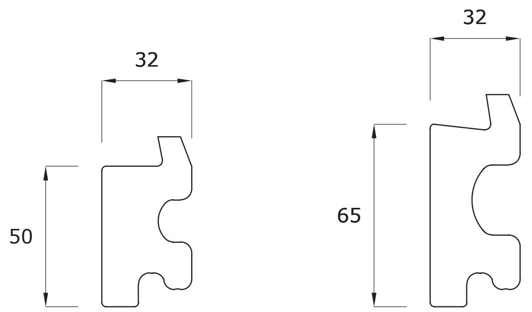
Note: The components used in the CORIUM system will differ depending on class of building, site location, substrate, etc…

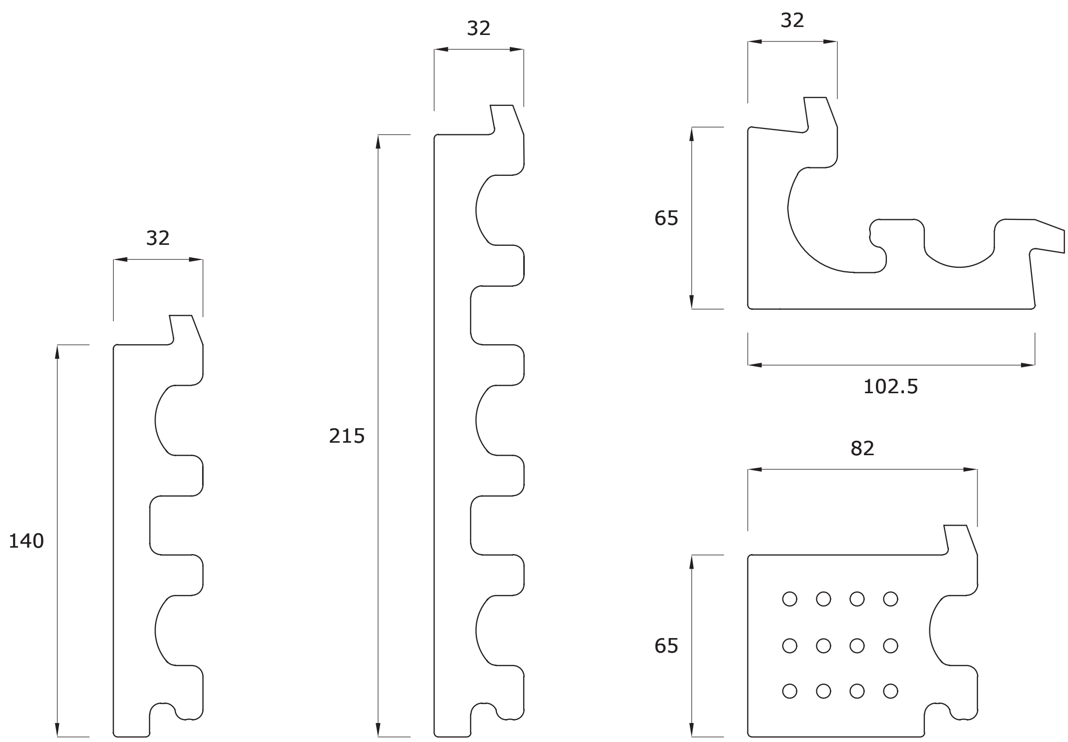
Please consult with section 3 of this manual for correct application of component options, section 4 for system diagrams, and section 5 for the installation process.

2.4.1 Brick facings (fired clay)

CORIUM brick tiles come in a range of sizes and components, including double and triple height, window head/sill tiles, corbels, corner tiles, etc…

Brick tiles for use in the CORIUM system are available in a wide variety of colours and textures. For more information on what is available, please visit corium.pghbricks.com.au





Generic properties of the CORIUM thin brick tiles are summarised in table 1 below:

Table 1: Brick properties and characteristics

Dimensions AS/NZS 4456.3	215 mm (L) x 32 mm (w) x 50 mm (H) 215 mm (L) x 32 mm (w) x 65 mm (H) – standard size 215 mm (L) x 32 mm (w) x 140 mm (H) 215 mm (L) x 32 mm (w) x 215 mm (H) 215 mm (L) x 82 mm (w) x 65 mm (H) – corbelling tile 215 mm (L) x 102 mm (w)/ 215 mm (L) x 65 mm (H) – soffit tile
Breaking load AS/NZS 4456.5	> 1 kN
Coefficient of expansion AS/NZS 4456.11	Less than 0.5 mm/m. Thermal expansion < 0.008 mm/m/°C
Water absorption AS/NZS 4456.14	Less than 3%
Durability Class AS/NZS 4456.10	Exposure Grade
Combustibility	Deemed non-combustible

Note
- Values presented above are nominal values only and may differ. For specific values for the unit intended for your project, please contact PGH.

2.4.2 Mortar Pointing

Alike traditional brickwork, the mortar is mixed onsite. Pre-bagged mortars based on an M3 traditional AS 3700 mortar mix, in a range of colours and designed for use in pumped systems are also available. If using one of these products is chosen, follow the manufacturer's instructions and ensure that it complies with the requirements of this manual (for example, non-combustibility).

The following mortars, which are considered as being non-combustible, are appropriate for use with the CORIUM system:
- M3 (1:5 with a methyl cellulose water thickener), as per AS 3700.
- M4 (1:4 with a methyl cellulose water thickener), as per AS 3700.

Note that pre-bagged Davco Historic KL mortar is the preferred mortar choice for use with CORIUM as this has been developed specifically for CORIUM and suits the brick tile characteristics. The Davco Historic KL mortar is considered as being an M3 mortar.

Refer to section 3.3 for appropriateness of mortar class for corrosivity category.

2.4.3 Sealants

All movement joints, gaps between sections of rail, framing, doors, abutments, and penetrations in the CORIUM system must be filled with an appropriate proprietary filler or sealant that is chemically compatible with the CORIUM system (including non-staining), and it should be accompanied with a backing rod as per the sealant manufacturer's instructions.

Sealants should be designed and installed in accordance with the sealant manufacturer's specifications.

Please see section 3.2 for movement joint spacings, location and width.

2.4.4 Rail

The CORIUM Magnelis® rail has a base metal thickness (BMT) of 0.5mm and is supplied in 2400mm lengths.

The specification for Magnelis® CORIUM rail, is S280GD+ZM310; typically supplied with a Magnelis® zinc-aluminium-magnesium alloy coating in compliance to European Standard EN 10346. Under AS 1397, this is closest to ZMb350, which has a minimum coating thickness of 25µm on each surface. The total thickness of the rail with this coating is nominally 0.7mm.

The CORIUM rail is also available in a grade 304 stainless steel and cold formed steel with Colorcoat HPS200 Ultra coating by TATA Steel Europe.

The CORIUM rail is attached to vertical supports using self-drilling screws, the vertical supports are attached to the substrate – see section 2.4.5 and 2.4.8 for further details on the vertical supports and self-drilling screws respectively. Adjoining rails should be butt jointed over vertical supports. Rails should also be attached to vertical supports such that the vertical joints between successive courses of adjoining rails forms a stretcher bond patten - see section 2.4.8, 4, and 5.7 for further details.

As Magnelis is a metallic coated steel it can be considered Class A1 (non-combustible) in accordance with EN 13501-1, and considered non-combustible as per the NCC Vol. 1 C2D10(5) without the need to test.

2.4.5 Vertical supports

The CORIUM rail is connected to the backing structure/substrate via first attaching it to vertical supports which are then attached to the substrate. Permissible vertical supports include:

Framing	Substrate
Vertical[1] and horizontal top hats[2] (BMT 0.75/1.15)	Steel or timber stud wall
Vertical Top hats (BMT 1.15)[1] + Cleats (BMT 1.9, 100mm long)	Steel or timber stud wall Solid concrete or masonry
Vertical inverted top hats[1] (BMT 1.15)	Steel or timber stud wall
NVELOPE rail and bracket[3]	Steel or timber stud wall Solid concrete or masonry

Note

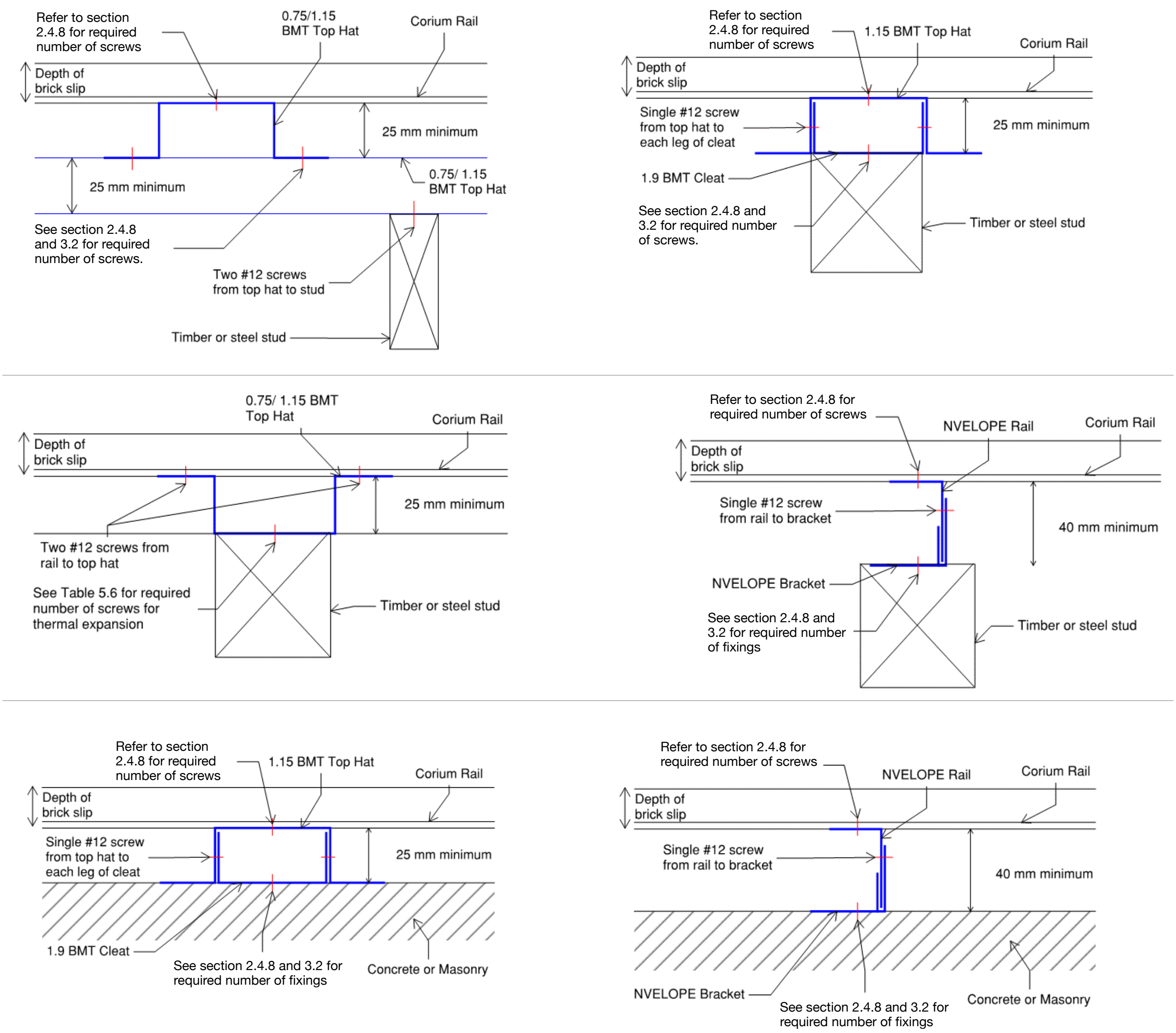
1. Cold formed steel top hats need to be with a height of at least 25 mm with yield stress no less than 270 MPa, tensile strength at least 330 MPa, manufactured to AS 1397 and designed in accordance with AS 4600;

2. Horizontal top hats (of at least 25mm height), first fixed to the studs, then vertical top hats (of at least 25 mm height) placed on top;

3. Aluminium ‘helping-hand’ brackets, with a thickness of at least 2.5 mm, grade 6005-T5, designed in accordance with AS 1664, and provided that they are at least 25 mm in height;

4. Refer to Fig 2 for specification of the above options.

Fig 2: Permitted CORIUM supporting systems



If the stud set out does not align with the vertical support set out, horizontal top hats will have to be first fixed to the studs, and then vertical top hats (of at least 25 mm height) placed on top, connecting to the CORIUM rail. If this method is used, precautions will need to be made for the effect that the weight of the CORIUM system has in compromising the performance of the horizontal top hat. Please consult with the manufacturer of the horizontal top hat for guidance.

Vertical supports should be anchored to the substrate in accordance with section 2.4.8 and/or the instructions of the vertical support manufacturer and/or fastener manufacturer.

The vertical support and rail are connected to each other using self-drilling screws in accordance with section 2.4.8. The spacing of vertical supports is limited to the maximum span of the rail for the site’s wind load. This is generally 600 mm - see section 3.1.1.2 for full details.

The design/compliance of the support system is to be undertaken by the project design professional in conjunction with the support system manufacturer/s.

Always ensure that the intended vertical support is appropriate for the site corrosion category and is compatible with the materials it is being connected to/with. See section 3.3 for details.

2.4.6 Substrate

The CORIUM system is compatible with a variety of substrates, including but not limited to:

- Concrete designed in accordance with AS 3600,
- Permanent formwork such as AFS, designed in accordance with the manufacturer's instructions,
- Timber framing designed in accordance with AS 1720 and/or AS 1684,
- Structural steel in accordance with AS 4100,
- Lightweight steel frames in accordance with AS 4600 and/or the NASH standard,
- Masonry in accordance with AS 3700 and/or AS 4773.

Vertical supports are to be chosen with consideration for the type of substrate (see section 2.4.5) and be fixed onto the substrate as per section 2.4.8.

The substrate must be correctly designed by the project design professional in accordance with the above, and with consideration for the weight that the CORIUM system will place on the substrate.

2.4.7 Air/water/vapour barrier

When a weatherproof external wall is required, especially where the substrate of the main structuer is discrete, an appropriate rigid air barrier, or pliable building membrane manufactured to AS 4200.1 and installed in accordance with AS 4200.2 is required to be fitted over the substrate prior to the CORIUM system being installed.

Ensure that the choice of system considers how the building will be used, and is appropriate for the construction chosen, the site's climate and wind loads.

Where the substrate of the main structure is discrete, such as a stud wall, an air barrier is required to create a continuous surface.

The detailing of openings and joints in a façade system have a significant impact on its weatherproofing performance, this needs to be designed appropriately. Special considerations should be given where Avante is used in junction with:

- Vertical and horizontal control joints;
- Wall junctions;
- Windows and doors;
- Electrical boxes;
- Balcony drainage and parapet flashings;
- Footer and header termination systems

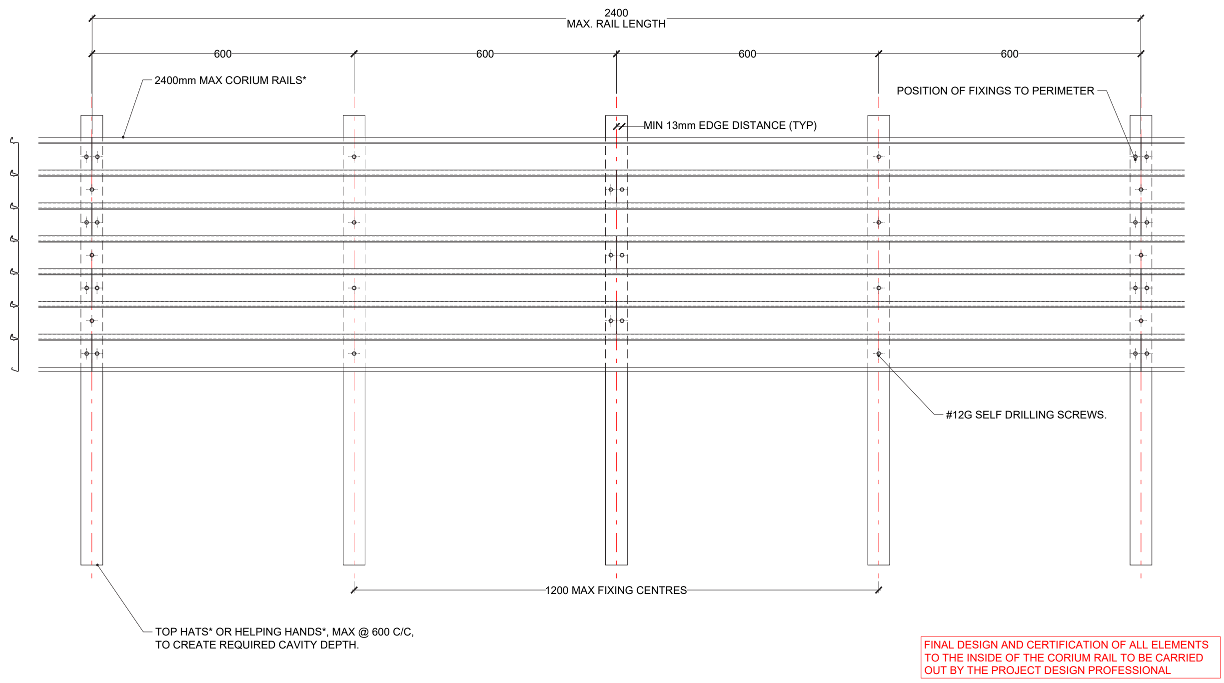
2.4.8 Fixings

Self-drilling screws compliant with AS 3566 are used to fix the CORIUM rail to the vertical supports (and the corner angle trim where required).

In the CORIUM system, the choice of screw/fastener must be compatible with all metals it is being used with. As a general rule of thumb, the material/coating of the screw should be in the same class as that of the metals it is fastening. Galvanised screws are appropriate with galvanised steel rails. Stainless steel screws are appropriate for both galvanised steel rails and stainless-steel rails. When using aluminium helping hand brackets, consult with the manufacturer of the product for appropriate fixing selection.

The fixings head height should be low enough to ensure that it fits underneath the rear face of the CORIUM tile and does not interfere with installation.

Fig 3: Permissible set out for rail and staggered fixings (selected appropriately as above and spaced at 1200 mm c/c) for ultimate wind loads less than 3 kPa



The spacing of vertical supports is limited to the maximum span of the rail for the site's wind load. This is generally 600 mm - see section 3.1.1.2 for full details.

For wind loads up to 3kPa, the following fixing sizes are suitable for fixing rails to the support structure:

- One #10 self-drilling screw every 600 mm c/c; or
- Two #10 self-drilling screws every 1200 mm c/c; or
- One #12 self-drilling screw every 1200 mm c/c.

Where rails are fixed every 1200 mm c/c, screws must be staggered such that at every support, vertically every second rail is fixed to the support, but noting that the rail ends must be fixed to a support, as per Figure 3.

For site wind loads between 3 kPa and 4kPa, the following fixing sizes are suitable for fixing rails to the support structure:

- Two #10 self-drilling screws every 600 mm c/c, or
- One #12 self-drilling screws every 600 mm c/c.

Supporting systems should be fixed to the substrate at maximum 600mm centres. The design/compliance of the support system, attachment to substrate, and the substrate, is to be confirmed by the project design professional in conjunction with the manufacturer of the support system, fixings, and substrate.

When fixing:

- Top hats and 100 mm long cleats, horizontal top hats, or inverted vertical top hats onto steel studs, attach to studs using minimum 2 x #12 Tek screws.
- Top hats and 100 mm long cleats, horizontal top hats, or inverted vertical top-hats onto timber studs, attach to studs using minimum 2 x # 12 timber screws, provided that at least 70mm embedment is achieved.
- Vertical top hats onto horizontal top hats, attach using minimum 2 x # 12 Tek screws.
- Cleats or helping hand brackets onto a concrete or solid masonry substrate, M8 anchors are appropriate, provided that 60 mm embedment is achieved for concrete substrates; and 80mm embedment is achieved for masonry substrates.

Note

- Timber stud: Joint Group J6/JD6 or higher as defined by AS 1720.1.
- Timber screw capacities assume fixing to the side grain of the timber.
- Prior to inserting timber screws, the hole should be pre-bored/pre-drilled as required by AS 1720.1.

It is recommended that the fixings attached to the substrate and through the air/water/vapour barrier incorporate an integral sealing washer (EPDM or similar) under the head.

Required reaction forces of the fixings per substrate are provided in table 2 below.

Always ensure that the intended fixing is appropriate for the site corrosion category. See section 3.3 for details.

Where alternate materials are used to support the rails, the project engineer is to confirm that the supporting material has sufficient capacity to prevent pullout and bearing failure of screws.

For substrates not provided, please contact PGH for guidance.

2.4.9 Trims

Corner angle trim compliant to AS 1397 (BMT approx. 0.55mm) or an appropriately graded stainless steel or aluminium, is required at corner junctions to ensure uniformity of the intersecting rail junctions, stability of the cantilevered section and prevention of moisture penetration.

Corner trim chosen must be compatible with the materials it is fixed to and suitable for the sites corrosivity environment. See section 3.3 for details.

Table 2: Required reaction forces for fixings into different substrates per support system based upon movement joint spacings for thermal movements

	Total reaction forces for fixings into hollow brick or concrete block. 1.15 BMT top hats on 100mm long 1.9BMT cleat spaced @ max 600mm c/c, spanning max 600mm c/c						Total Reaction forces for fixing into hollow brick or concrete block. Helping hand bracket rail spaced @ max 600mm c/c, spanning max 600mm.		Total Reaction forces for fixing into studs (top hat on top hat scenario). 0.75 BMT top hats spaced @ max 600 mm c/c, spanning max 600mm					
Support Depth	25mm		35mm		≥ 45mm		≥ 40mm		25mm		35mm		≥ 45mm	
Joint spacing (m)	shear (kN)	Tension (kN)	shear (kN)	Tension (kN)	shear (kN)	Tension (kN)	shear (kN)	Tension (kN)	shear (kN)	Tension (kN)	shear (kN)	Tension (kN)	shear (kN)	Tension (kN)
4	0.8	1.2	0.5	0.9	0.15	0.5	0.25	0.4	0.24	0.2	0.12	0.14	0.05	0.08
5	1	1.4	0.6	1.1	0.2	0.6	0.3	0.5	0.32	0.24	0.16	0.16	0.07	0.1
6	1.2	1.7	0.7	1.3	0.25	0.7	0.35	0.6	0.38	0.28	0.18	0.2	0.08	0.11
7	1.4	2	0.8	1.5	0.3	0.9	0.4	0.68	0.44	0.32	0.22	0.22	0.09	0.13
8	1.6	2.3	0.9	1.7	0.35	1	0.45	0.78	0.5	0.38	0.24	0.26	0.11	0.15
9	1.8	2.5	1	1.9	0.4	1.1	0.5	0.88	0.56	0.44	0.28	0.28	0.12	0.17
10	2	2.8	1.1	2.1	0.45	1.2	0.55	0.98	0.62	0.46	0.3	0.32	0.13	0.19

2.4.10 Flashing

Flashings used with the CORIUM system should be in accordance with AS/NZS 2904, provided they are appropriate for the location in which they are being specified. It is, however, recommended that a galvanised steel flashing compliant to AS 1397 or stainless-steel flashing be used with the CORIUM system.

Ensure that the flashing material chosen is appropriate for the corrosivity location in which the system is being installed and that it is compatible with the other materials being used, including the rail. See section 3.3 for details.

2.4.11 Weep hole screen

A horizontal weep hole screen should be provided at 1200mm centres at the panels base and at slab/floor edges to ventilate the cavity space and (via the flashing) allow drainage of moisture from the cavity.

Corium

03 SYSTEM PERFORMANCE AND ENGINEERING

3.1 National Construction Code (NCC) Compliance

The CORIUM system includes the brick tiles, mortar, rails, and fixings to the vertical support structure.

The vertical supporting structure and substrate inboard of the CORIUM rail is not part of the CORIUM system. The building design professionals are responsible for the design and NCC compliance of the support structure, substrate, movement joint locations (except as limited by section 3.2), joint sealants, flashings and NCC compliance of the overall wall assembly. These elements, shown on the specification drawings herein (see section 4), are provided for information only and should not be relied upon for final design.

The CORIUM system is intended to be used as part of a compliant non-loadbearing drained and ventilated pressure equalised rain screen façade walling system. The CORIUM system may also be used as an internal lining, or soffit. If CORIUM is being considered for situations outside of this scope, please contact PGH for guidance.

The CORIUM system is subject to the requirements of Volume 1 and 2 of the National Construction Code (NCC). Provided that the instructions within this guide are followed, CORIUM satisfies the relevant performance requirements of the NCC pertaining to:

- Structure: Section B (NCC volume 1) and Section 2.1 (NCC volume 2).
- Fire: Section C1 (NCC volume 1) and Section 2.3 (NCC volume 2).
- Damp and Weatherproofing: Section F1 (NCC volume 1) and Section 2.2 (NCC volume 2)

3.1.1 Structural performance:

The vertical supporting structure and substrate inboard of the CORIUM rail is not part of the CORIUM system. The building design professionals are responsible for the design and NCC compliance of the support structure, substrate, movement joint locations (except as limited by section 3.2), joint sealants, flashings and NCC compliance of the overall wall assembly. These elements, as described and shown on the specification drawings herein (see section 4), are provided for information only and should not be relied upon for final design.

The CORIUM system can be fixed to all common substrates, provided that the appropriate fixings are chosen and used in the required manner for the substrate, intended loads, and corrosivity category of the location. See section 2.4.8 for guidance. The vertical supports must also be appropriate to the substrate and corrosivity category; see section 2.4.5 for guidance. Note that the CORIUM rails require minimum 25mm deep vertical supports selected in accordance with section 2.4.5, fixed in accordance with section 2.4.8, and spaced in accordance with section 3.1.1.2.

3.1.1.1 System Weight:

Design weight of the CORIUM system is nominally 70 kg/m2. Note that the weight of system may vary slightly depending on the materials used.

3.1.1.2 Wind Performance / Span Tables

Provided that the rail is in accordance with section 2.4.4, the vertical supports are in accordance with 2.4.5, and fixings are in accordance with section 2.4.8, based on an allowable system deflection of span/500 (as per AS 3700), the following applies:

Residential buildings (class 1 and 10):
Table 3: Maximum CORIUM rail spans, per wind classification, on residential buildings

Wind Classification (AS 4055)	Maximum rail span between vertical supports		Maximum allowable cantilever span of CORIUM rail, out from the vertical support (mm)*	
	Panel Zone (areas greater than 1200 mm from an external building corner)	Corner Zone (areas within 1200 mm of the external building corner)	Panel Zone (areas greater than 1200 mm from an external building corner)	Corner Zone (areas within 1200mm of the external building corner)
N1	600	600	450	450
N2	600	600	450	400
N3	600	600	400	350
N4	600	600	400	300
N5	600	600	350	NA

* Cantilevered sections of rail should be avoided; however, in certain situations the rail may have to cantilever out from the vertical support such as at corners, openings, control joints, and other abutments. For cantilevered sections of CORIUM rail, there must be a back span (simply supported or continuous) of no more than 600 mm.

Commercial buildings (class 2 – 9):
CORIUM rails must span no more than 600 mm for ultimate AS/NZS 1170.2 site wind pressures up to 4 kPa. The spacing of vertical supports is limited to the maximum span of the rail.

For loads greater, please contact PGH for maximum allowable spans.

For cantilevered sections of the CORIUM rail (such as at corners, openings, control joints, and other abutments), the distance from the vertical support to the end of the cantilevered rail section should be spaced no more than as indicated in Table 4 below. Cantilevered sections of CORIUM rail must have a back span (simply supported or continuous) of no more than 600 mm.

Table 4: Maximum CORIUM rail spans, per ultimate wind load, on commercial buildings

AS/NZS 1170.2 Ultimate Wind Load	Cantilevered Span
4 kPa	300 mm
3 kPa	350 mm
2 kPa	400 mm
1 kPa	450 mm

For site wind loads greater than those listed above, please consult with PGH for guidance.

3.1.2 Earthquake performance

3.1.2.1 Earthquake loads

Generally, earthquake actions do not govern the design of a lightweight rainscreen façade system such as CORIUM as the low self-weight of the façade translates to low equivalent static loads under earthquake conditions that are small compared to the ultimate wind loads experienced by the façade.

According to AS 1170.4, the seismic weight of the CORIUM system is equal to its self-weight, being 70 kg/m2. The magnitude of the horizontal earthquake design load which the façade must cater for depends on the Earthquake design category of the building. Determined in accordance with the provisions of AS 1170.4, the below table summarises the maximum Australian earthquake design loads which CORIUM must be resist.

Table 5: Maximum Earthquake design loads for CORIUM – AS 1170.4

EDC	Earthquake Loads	Relevant AS 1170.4 Clauses
I	Horizontal: 0.07 kPa	Clause 5.3
II	Horizontal: 0.53 kPa	Clauses 5.4.6, 8.1.3, 8.2
III	Horizontal: 0.53 kPa	Clauses 5.5.6, 8.1.3, 8.2

When designed and installed in accordance with this manual, CORIUM is suitable for ultimate wind loads exceeding all horizontal earthquake loads in the table above, and therefore CORIUM is sufficient for the design earthquake loads determined through AS 1170.4.

Where a dynamic analysis is used to determine the earthquake loads on a structure, the project structural engineer is to review the above table and determine if it is consistent with the project's dynamic analysis.

3.1.2.2 Inter-storey drift under earthquake loads

AS 1170.4 requires that buildings designed to EDC II and III have inter-storey drifts limited to 1.5% of the storey height for each level under ultimate earthquake loads. Accordingly, cladding must have sufficient deformation and rotational capacity to accommodate the design storey drift.

When the CORIUM system is subject to in-plane movements due to the inter-storey drift of the structure it is attached to, the rails can slide along each other to allow for in-plane movements. Given the rail height is 75 mm, the relative movement rail to rail is small – less than 1 mm. Similarly, out-of-plane movements are accommodated by the interlock between each rail, which can rotate freely to allow for out-of-plane movements. Modelling of the CORIUM system has found that the stresses and loads on the rails, supporting frame, and fixings resulting from an inter-storey drift of 1.5% are less critical than the stress and loads experienced due to thermal expansion and contraction. Therefore, the fixing requirements provided for each framing option provided is adequate for withstanding an inter-storey drift of 1.5%.

The project engineer must still confirm the location of movement joints, adequacy of the supporting system and substrate, and compliance of the overall walling system.

Where a dynamic analysis, as described in AS 1170.4, is used to determine earthquake loads on a structure, the project structural engineer is to review the above and determine if it is consistent with the project's dynamic analysis.

3.1.3 Fire performance

In accordance with C1.9 of the NCC, in commercial buildings of type A and B construction, internal non-loadbearing walls are required to be fire resisting, and external walls are required to be non-combustible.

The CORIUM tile and mortar have been tested to AS 1530.1 and are deemed non-combustible in accordance with the Standard.

As Magnelis is a metallic coated steel it can be considered Class A1 (non-combustible) in accordance with EN 13501-1, and considered non-combustible as per the NCC without the need to test.

Note that in accordance with C1.9 and C1.14, although proprietary sealants, caulking and flashings are not required to be non-combustible for use in the system, it is recommended.

CORIUM is suitable for use in bushfire prone areas up to a Bushfire Attack Level (BAL) of 19 provided that the CORIUM system is attached to, or part of, a compliant external wall system. CORIUM is not expected to be used in Flame Zones (BAL FZ).

If being used in bushfire prone areas, any openings within the system greater than 3 mm must be protected. The protection could consist of sealing of the openings or protection with mash, a max. aperture of 2mm. Cavity barriers should be installed horizontally at each floor slab and vertically at every party wall or every 6 m (whichever is the lesser distance).

The components used in the CORIUM system (brick tile, mortar, steel rail, steel screws) are not considered to be a fire hazard and are specifically exempt under the NCC Vol 1.

However, pliable building membranes, insulation, and wall lining used in external walls that the CORIUM system is a part of will likely have to comply with the fire hazard properties C1.10(a) via Specification C1.10. Please consult with the manufacturer of these items for advice on the suitability of their product.

In residential applications, the CORIUM system should not be used within 900 mm from the boundary or within 1800 mm from an adjacent building, unless the external wall it is a part of, or the substrate it is being attached to, achieves compliance to NCC on relevant requirements.

Since the CORIUM system does not contribute to the external wall's FRL, the sealants used with the CORIUM system are also not required to be fire rated. Fire rated sealants may, however, be required in the substrate CORIUM is being attached to in order to maintain their FRL. Please consult with your building design professional on these aspects.

Although the CORIUM system is comprised of non-combustible materials and is likely to contribute to a wall's Fire Resistance Level (FRL), the contribution provided by the CORIUM system should be considered as being zero. The FRL of external walls incorporating CORIUM must be provided by the substrate CORIUM is being attached to.

3.1.4 Thermal performance

CORIUM is generally used as part of a well-ventilated wall system. Therefore, when determining the total R-value for external wall systems of commercial buildings (class 2 -9) incorporating CORIUM, the contribution provided by the CORIUM system and cavity is generally ignored in accordance with AS/NZS 4859.2. That is unless a horizontal weep hole screen is provided at 1200 mm centres at slab/floor edge control joints with the sections in between weep hole screens being sealed. In this case, the system may potentially be considered by AS/NZS 4859.2 as being slightly ventilated, in which case some contribution provided by the CORIUM system and cavity may potentially be considered in determining the system's R-value. These aspects should be determined by the building design professional.

3.1.5 Weatherproofing performance

The CORIUM system has been tested and assessed as meeting the performance requirements of NCC Volume 1 FP1.4 and Volume 2 P2.2.2 for weatherproofing.

The CORIUM system forms the outer rainscreen of a pressure equalised ventilated rainscreen façade system. Based on testing to NCC volume 1 FV1.1 and Volume 2 V2.2.1, a weatherproof system is achieved with CORIUM via:

- Draining of the cavities as per section 2.4.11,
- A minimum cavity behind the CORIUM system of 25 mm (typically formed by the 25 mm vertical supports), and
- A fully sealed air/water/vapour barrier sufficiently robust to resist the design wind loads and movements.

Where the substrate of the main structure is discrete, such as a stud wall, an air barrier is required to create a continuous surface.

Note:

- An air/water/vapour barrier in accordance with section 2.4.7 must be used, must be sealed, and suitable for the intended wind loads and installed over the substrate prior to the installation of the CORIUM system.
- Windows must be of a front drainage style and have appropriate flashings to prevent moisture ingress.
- It is also important to seal any cut edges to protect against moisture penetration into the cavity space.
- The system requires a drained horizontal weep screen (or similar drained system) at its base and at slab/floor junctions. See 3.1.2 above for any additional requirements for bush fire resistance.
- Consult with the building design professional for the selection and location of a vapour control layer to manage condensation risk noting that condensation will form on surfaces that are below the dew point temperature.

3.1.6 Movement Joints

Vertical and horizontal movement joints should be provided in the CORIUM system to accommodate thermal expansion/contraction of the materials in the system and possible movement/deflection in the overall structure/substrate that the system is attached to.

Ideally, movement joints should be located at points of potential weakness in the façade i.e., the corners of openings, at changes in panel height, etc. Movement joints provided in the panel layout should, however, be aligned with movement joints already provided in the supporting structure to match main building movement joints.

To maintain the system's 'brick look', control joints placed in the CORIUM system should be a minimum of 15mm thick and be located where a mortar joint would normally exist. The project engineer must take Table 8 into consideration when determining whether this nominal joint size is sufficient to accommodate expected building movements, thermal expansion/contraction of materials, and any other project-specific movements. When setting out the CORIUM system, design consideration should be given to the location of movement joints to ensure minimal cutting and prevent impractical scenarios with respect to rail and tile lengths.

Supports must be fixed to framed substrates using at least two fixings, and onto concrete/masonry substrates using at least one fixing.

A horizontal control joint is generally required beneath slabs or angles to accommodate any expected slab edge deflection. The magnitude of the deflection must be verified by the building design professional.

Vertical movement joints to accommodate thermal expansion/contraction should be placed in accordance with table 8 below. Vertical movement joints should be placed between vertical supports, with the maximum cantilevered span of the rail being in accordance with section 3.1.1.2. Vertical movement joints should be placed at a maximum of 2400mm from corners.

Vertical movement joints should be placed between vertical supports, and be placed at a maximum of 2400 mm from corners, with the maximum cantilevered span of the rail being in accordance with section 3.1.1.3.

On external corners:

- The intersecting rails should not butt up against each other and touch, and
- The outermost support (top hat, cleat, helping hand) should ideally be stiffened at 300 mm centres (vertically) using a suitable and non-combustible material. This can be achieved via securing a shear block (for example, an upside down and horizontally orientated top hat) within the top hat supporting the system.

Vertical control joint locations to accommodate other building movements (such as slab deflection), should be confirmed by the project design professional.

Table 6: Maximum movement joint spacings for thermal expansion/contraction

		Maximum Vertical movement joint spacing							
	Support system connected to the CORIUM rail, spaced at maximum 600mm c/c, spanning maximum 00mm	0.75 BMT (horizontal & vertical) top hat		1.15 BMT (horizontal & vertical) top hat		0.75 or 1.15 BMT inverted top hat	100mm 1.9 BMT cleat connected to 1.15BMT top hat		Helping hand bracket & rail
	Vertical support system depth	25mm	≥35mm	25mm	≥35mm	≥25mm	25mm	≥35mm	≥40mm
Substrate	Steel stud**	10m	10m	6m	8m	10m	5m	6m	10m
	Timber stud***	8m	10m	4m	8m	10m	6m	10m	10m
	Solid concrete****	Not recommended					10m	10m	10m
	Solid brick*****						8m	10m	8m

** Steel stud: 0.55 - 1.15BMT, fy ≥ 270 MPa, fu ≥ 330 MPa *** Timber stud: Joint Group J6/JD6 or higher as defined by AS 1720.1.
**** Concrete: f'c ≥ 25 MPa ***** Brick: f'uc ≥ 15 MPa, f'cg ≥ 20 MPa (when attaching to grouted concrete masonry).

3.1.7 Corrosivity Categories

The CORIUM system is appropriate for all Australian corrosivity categories, provided that the components used (brick tiles, mortar, rail, fixings, etc.) are chosen in accordance with this section.

Please refer to section 2.4 for details on generic component selection.

ISO 9223 has suggested five corrosion zones based on the first-year corrosion rate of mild steel. Refer to AS 4312 for identifying a site's corrosivity category. The below table summarises guidance provided by AS 4312.

The manufacturer of the fixing must always be consulted to ascertain the correct screw material to use for the site corrosion category and for compatibility with the other materials chosen.

Table 7: AS 4312 corrosivity categories

AS 4312 category	Corrosivity	Steel corrosion rate (µm/y)	Typical Environment
C1	Very low	<1.3	Dry Indoors
C2	Low (most areas of Australia at least 50 km from the coast or at least 1 km from sheltered bays would be in this category)	1.3-25	Arid/urban Inland
C3	Medium (from 1 km to 10-50 km from breaking surf – much of metropolitan Wollongong, Sydney, Newcastle and Gold Coast are in this category)	25-50	Coastal or Industrial
C4	High (primarily coastal areas - from several hundred metres to about 1 km inland from breaking surf or from the shoreline to around 50 m for sheltered bays)	50-80	Sea Shore (calm)
C5	Very high (industrial or marine) – common offshore and on the beachfront in regions of rough seas and surf beaches – can extend inland for several hundred metres (in some areas of Newcastle extends around 500 m)	80-200	Sea shore (surf)

Table 10 and 11 below summarise the coating options for the cold formed steel rails, supporting system, corner trim, mortar pointing, and brick tiles, for a 20 year and 50-year service life.

Please note, it is critical that galvanic corrosion be avoided. Galvanic corrosion occurs when dissimilar metals are in contact, therefore compatible materials must be chosen or if dissimilar materials cannot be avoided, they must be suitably insulated from each other.

In the CORIUM system, the choice of screw/fastener must be compatible with all metals it is being used with.

As a general rule of thumb, the material/coating of the screw should be in the same class as that of the metals it is fastening. For example, if stainless steel rails are used, then stainless steel fasteners and top hats are required. In this scenario, the trim would thus also need to be stainless steel.

3.1.7.1 20 year service life

Table 8: CORIUM material requirements for a 20-year service life

AS 4312 Corrosivity Category	Cold Formed Rail/ Materials/Steel Substructure Coatings as per AS 1397	Aluminium helping hand support coatings as per AAMA 2604, AAMA 2605, or AS 1231	Screw Corrosion Resistance Class as per AS 3566.2	Corner trim coatings/ materials	Mortar Class as per AS 3700	Brick Slip Resistance Grade as per AS 3700
C1, C2	Colorcoat HPS200 Ultra Z275 ZM350 Grade 304, 316 stainless steel	NVELOPE NV1 brackets Powder coat (AAMA 2604 or 2605) AA20, AA25	Class 1 Class 2 Class 3 Grade 304, 316 stainless steel	AM100, AM150* Z275 Grade 304, 316 stainless steel AA20, AA25	M2, M3, M4	General Purpose if subject to non-saline wetting and drying or in contact with non-aggressive soils. Exposure Grade if subject to wetting and drying or in contact with aggressive soils.
C3	Colorcoat HPS200 Ultra Z275 ZM350 Grade 304, 316 stainless steel	NVELOPE NV1 brackets Powder coat (AAMA 2604 or 2605) AA20, AA25	Class 3 Grade 304, 316 stainless steel	Z275 Grade 304, 316 stainless steel. AA20, AA25	M2, M3, M4	
C4	Colorcoat HPS200 Ultra Grade 304, 316 stainless steel	Powder coat (AAMA 2604 or 2605) AA20, AA25	Class 4 Grade 304, 316 stainless steel	Grade 304, 316 stainless steel. AA20, AA25	M3, M4	
C5	Colorcoat HPS200 Ultra ZM350 Grade 304, 316 stainless steel	Powder coat (AAMA 2604 or 2605) AA25	Grade 304, 316 stainless steel	Grade 304, 316 stainless steel	M4	Exposure Grade
T/CX	Grade 304, 316 stainless steel	Powder coat (AAMA 2604 or 2605) AA25	Grade 304, 316 stainless steel	Grade 304, 316 stainless steel	By testing/ experience	By testing/ experience

* AM coatings for the corner trim are appropriate provided that the trim's AM substrate is pre-painted in accordance with AS 2728. Bluescope steel's Colorbond range of products qualify for this requirement, with Colorbond being AM100 and Colorbond Ultra being AM150. Zincalume or other coating systems containing aluminium, is not appropriate for use with the CORIUM system due to adverse reactions with wet cementitious materials such as mortar.

Notes

- Always seek out a warranty from the screw manufacturer to ensure galvanic corrosion is managed and to ensure screws are appropriate if no corrosion resistance class or corrosivity environment is referenced.
- The appropriateness of the AM coatings per corrosivity category has been completed in accordance with Bluescope documents. If intending to use an AM coating from a different manufacturer, please consult with that manufacturer to ensure the coating is appropriate for the intended use. In accordance with Bluescope documents, use class 3 fasteners with Colorbond. Bluescope do not recommend stainless steel fasteners be used with Colorbond.

3.1.7.2 50 year service life

Table 9: CORIUM material Requirements for a 50-year design life

AS 4312 Corrosivity Category	Cold Formed Rail/Materials/ Steel Substructure coatings as per AS 1397	Aluminium helping hand support coatings as per AAMA 2605 or AS 1231	Screw Corrosion Resistance Class as per AS 3566.2	Mortar Class as per AS 3700	Brick Slip Resistance Grade as per AS 3700
C1, C2	Colorcoat HPS200 Ultra Z275 ZM350 Grade 304, 316 stainless steel	Powder coat (AAMA 2605) AA20, AA25	Class 1 Class 2 Class 3	M2, M3, M4	General Purpose if subject to non-saline wetting and drying or in contact with non-aggressive soils Exposure Grade if subject to wetting and drying or in contact with aggressive soils.
C3	Colorcoat HPS200 Ultra ZM350 Grade 304, 316 stainless steel	Powder coat (AAMA 2605) AA20, AA25	Class 3	M2, M3, M4	
C4	Grade 304, 316 stainless steel	Powder coat (AAMA 2605) AA25	Class 4	M3, M4	

Notes

- Always seek out a warranty from the screw manufacturer to ensure galvanic corrosion is managed and to ensure screws are appropriate if no corrosion resistance class or corrosivity environment is referenced.
- The appropriateness of the AM coatings per corrosivity category has been completed in accordance with Bluescope documents. If intending to use an AM coating from a different manufacturer, please consult with that manufacturer to ensure the coating is appropriate for the intended use.

Corium

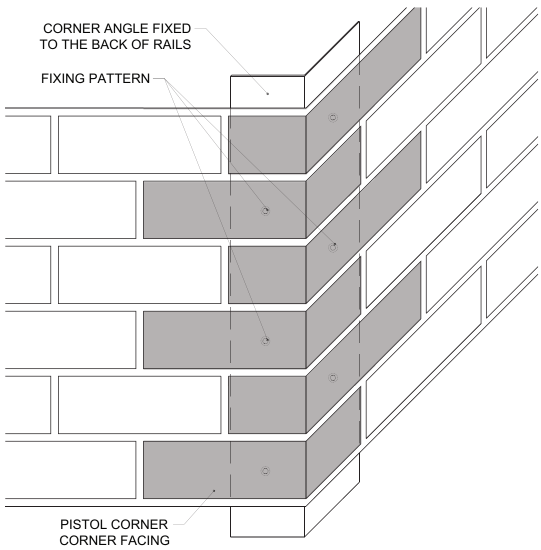
04 SPECIFICATION DRAWINGS

04 SPECIFICATION DRAWINGS

Although the following drawings are a true representation of the CORIUM system, they are provided for information only and should not be relied upon for final design on specific projects. The vertical supporting structure and substrate inboard of the CORIUM rail is not part of the CORIUM system. The building design professionals are responsible for the design and NCC compliance of the support structure, substrate, movement joint locations (except as limited by section 3.2), joint sealants, flashings and NCC compliance of the overall wall assembly. These elements, shown on the specification drawings herein are provided for information only and should not be relied upon for final design on specific projects.

*NOTES:

1. SEE CONSTRUCTION MANUAL FOR MATERIAL SELECTION FOR CORROSIVITY ENVIRONMENT.
2. SEE CONSTRUCTION MANUAL (CANTILEVER SPAN TABLE) FOR MORE INFORMATION ABOUT CORIUM RAIL CANTILEVER SPAN REQUIREMENTS.
3. SEE BELOW FOR CORNER ANGLE FIXING PATTERN



01 CORNER ANGLE FIXING PATTERN
SCALE N/A

FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE CORIUM RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

Corium

SPECIFICATION DRAWINGS 04

Fig 4: Typical Elevation

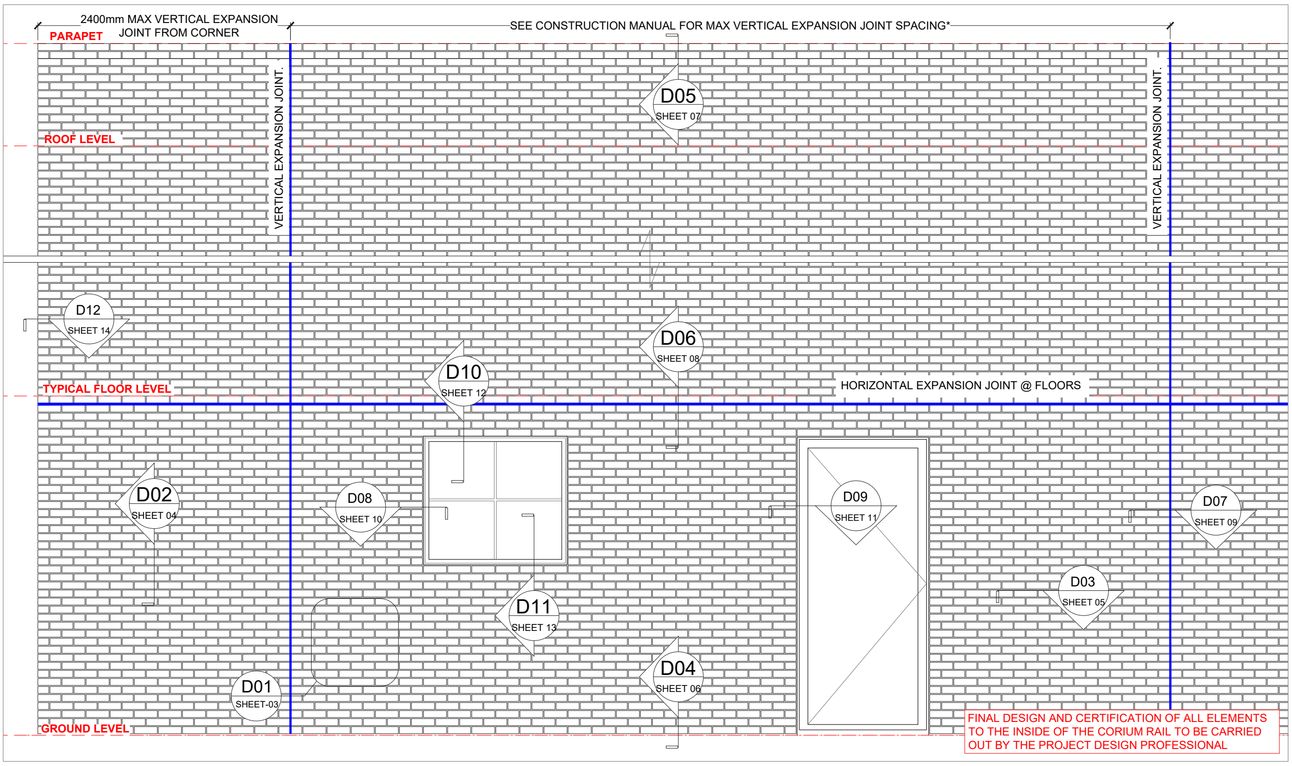
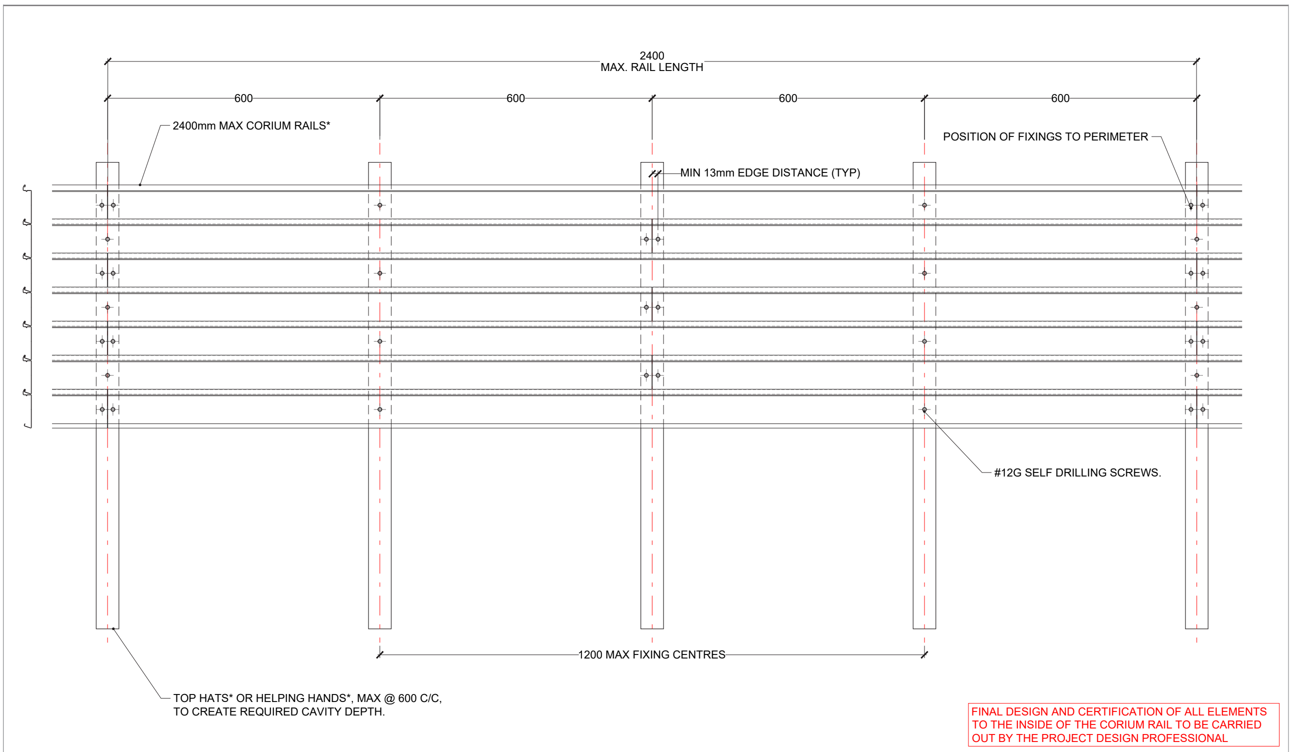


Fig 5: Fixing Pattern – Elevation



FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE CORIUM RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

Fig 6: Typical Wall – CORIUM Section Detail

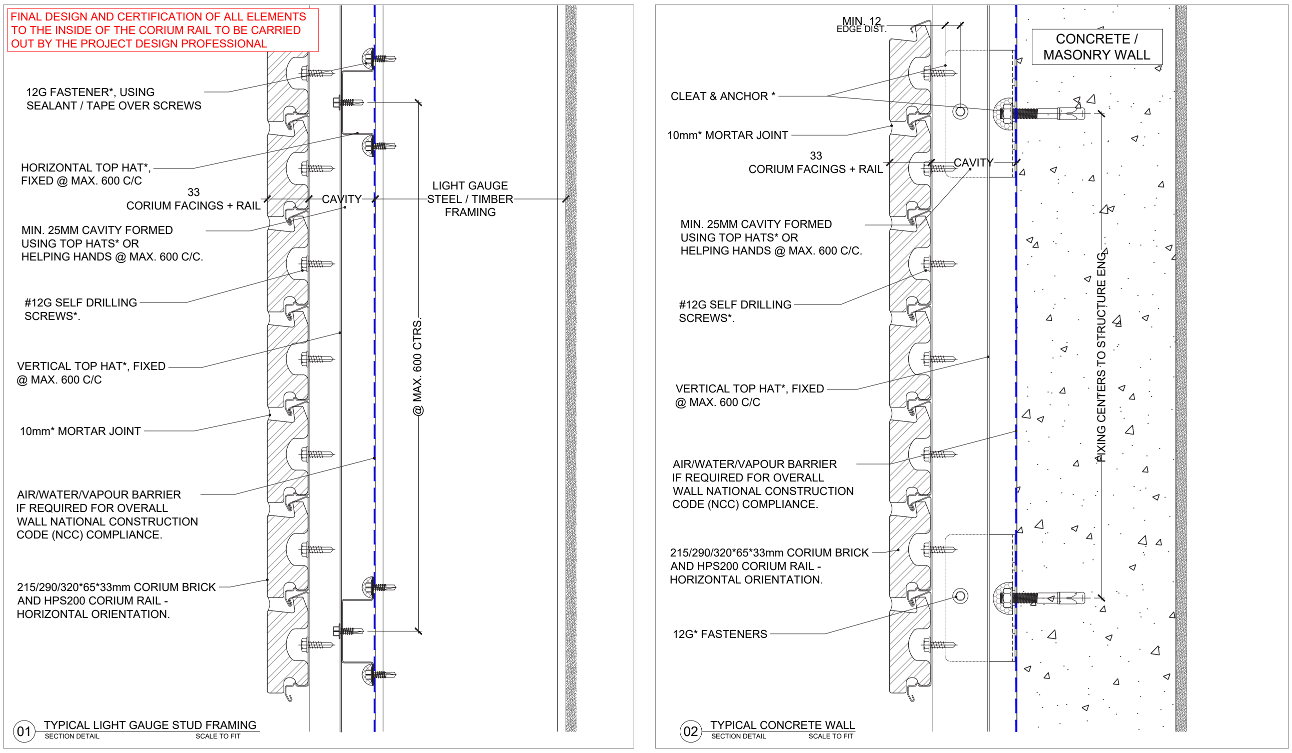
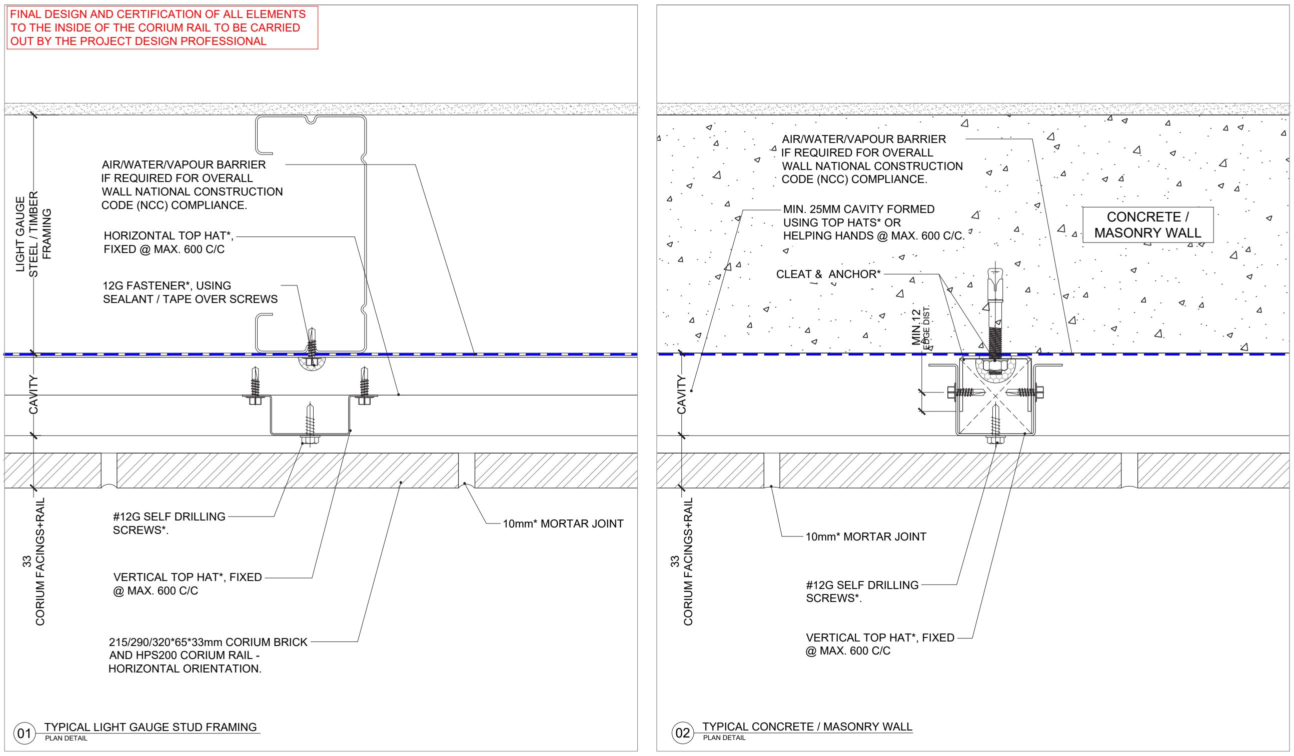
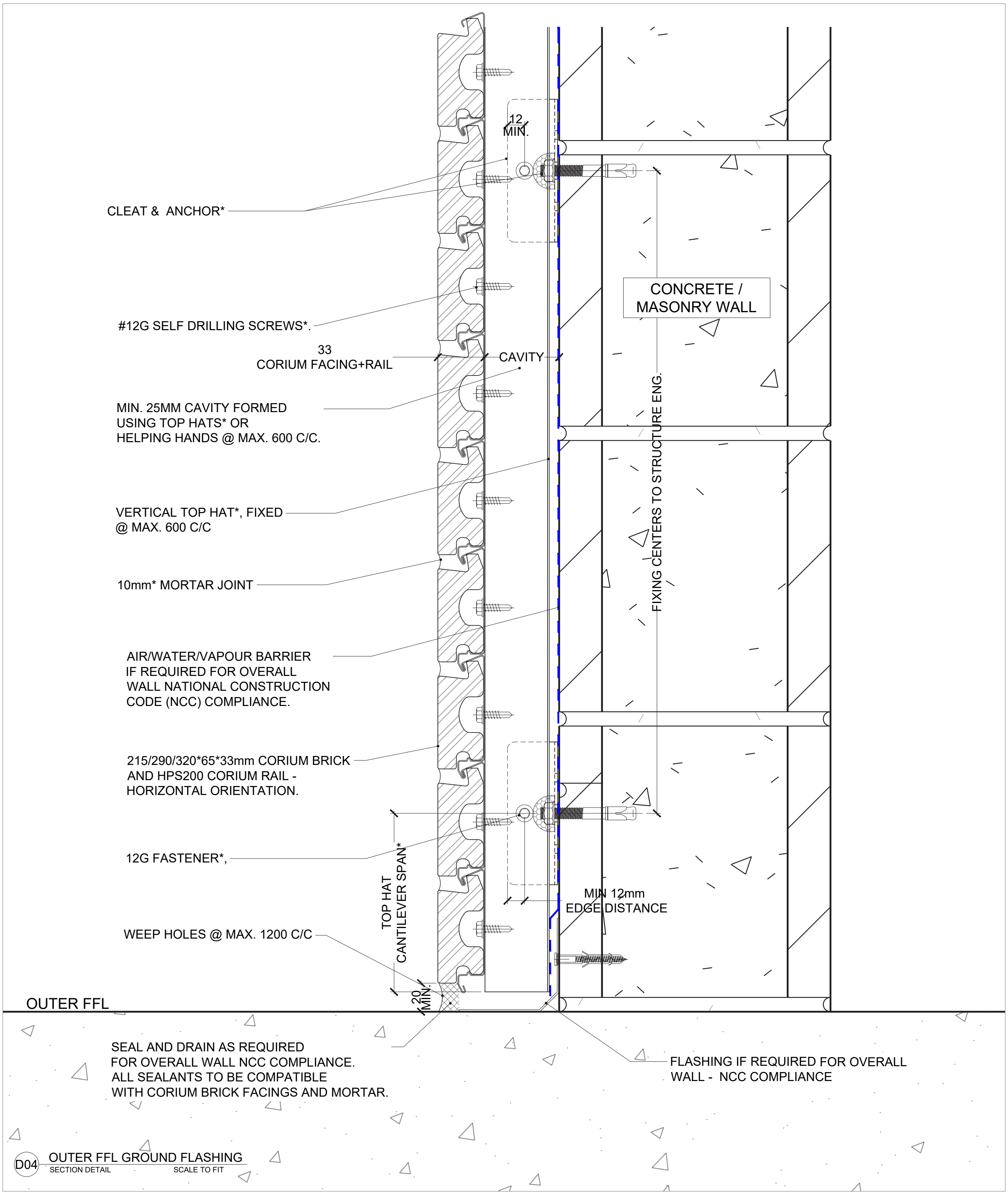


Fig 7: Typical Wall – CORIUM Plan Detail



FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE CORIUM RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

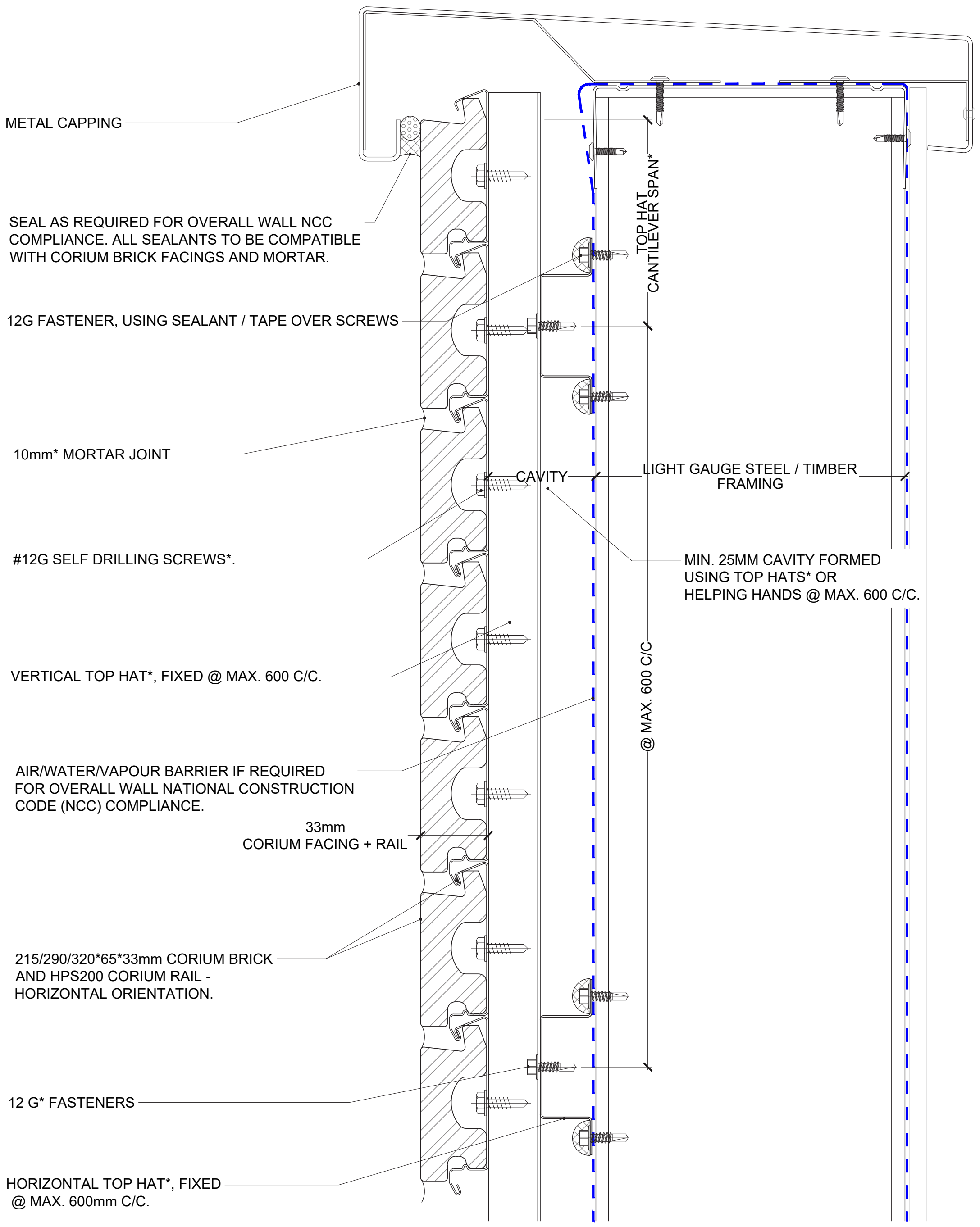
Fig 8: Outer Ffl Floor Flashing – CORIUM Section Detail



FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE CORIUM RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

Fig 9: Roof Capping – CORIUM Section Detail

FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE CORIUM RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL



D05 ROOF CAPPING
SECTION DETAIL

Fig 10: Typical Slab Edge – CORIUM Section Detail

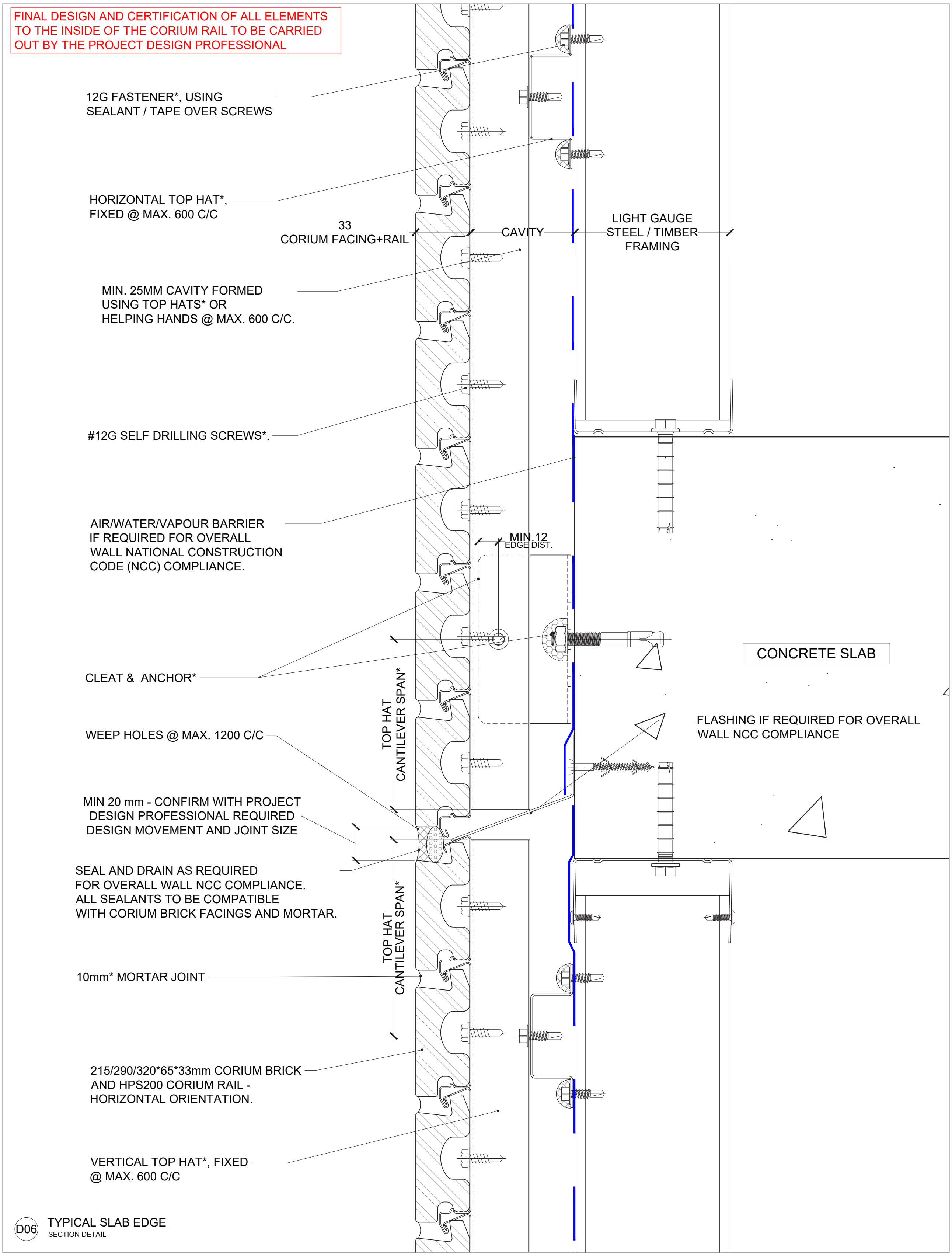


Fig 11: Vertical Expansion Joint – CORIUM Plan Detail

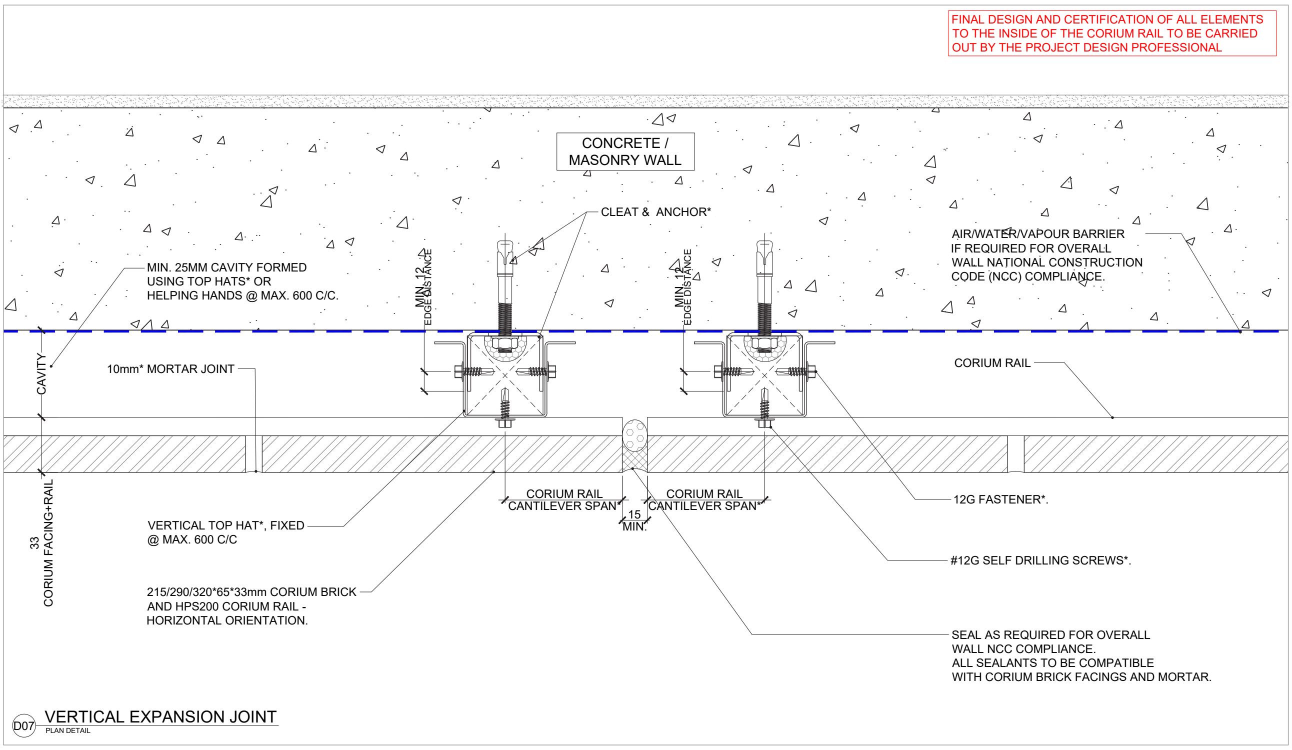
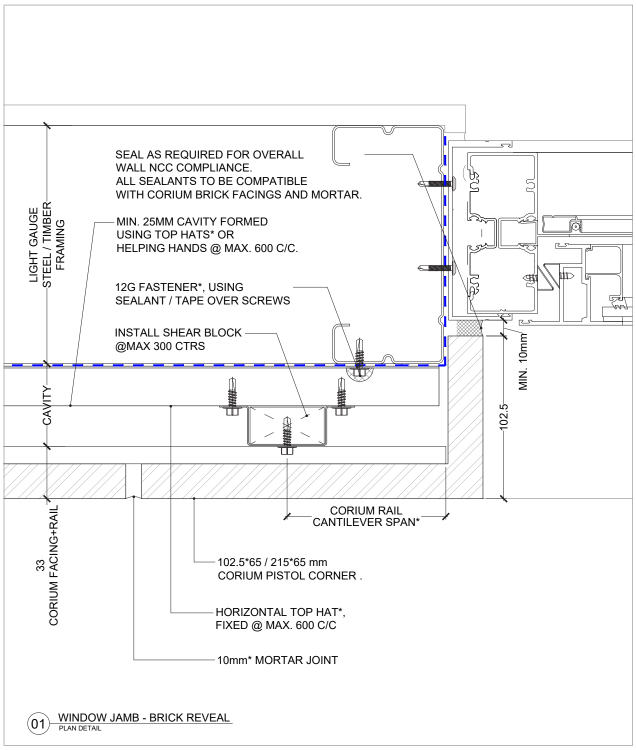


Fig 12: Window Jamb – CORIUM Plan Detail



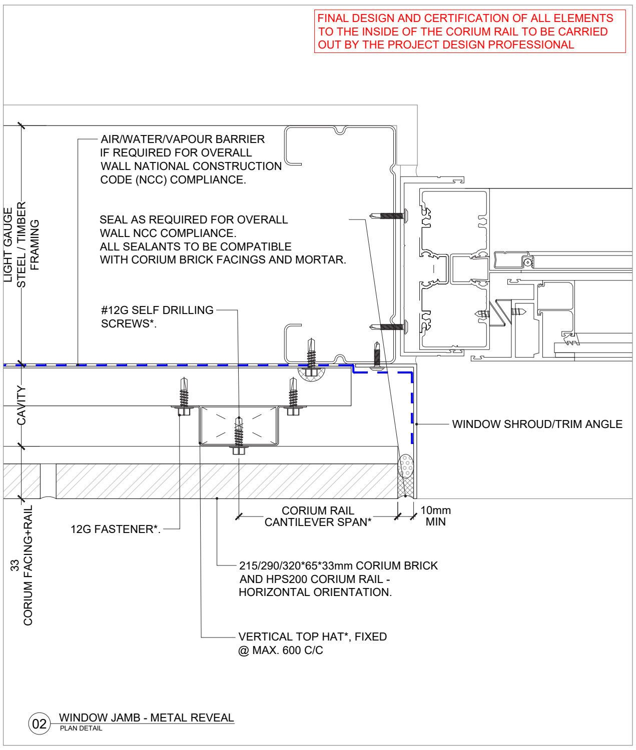


Fig 13: Door Jamb – CORIUM Plan Detail

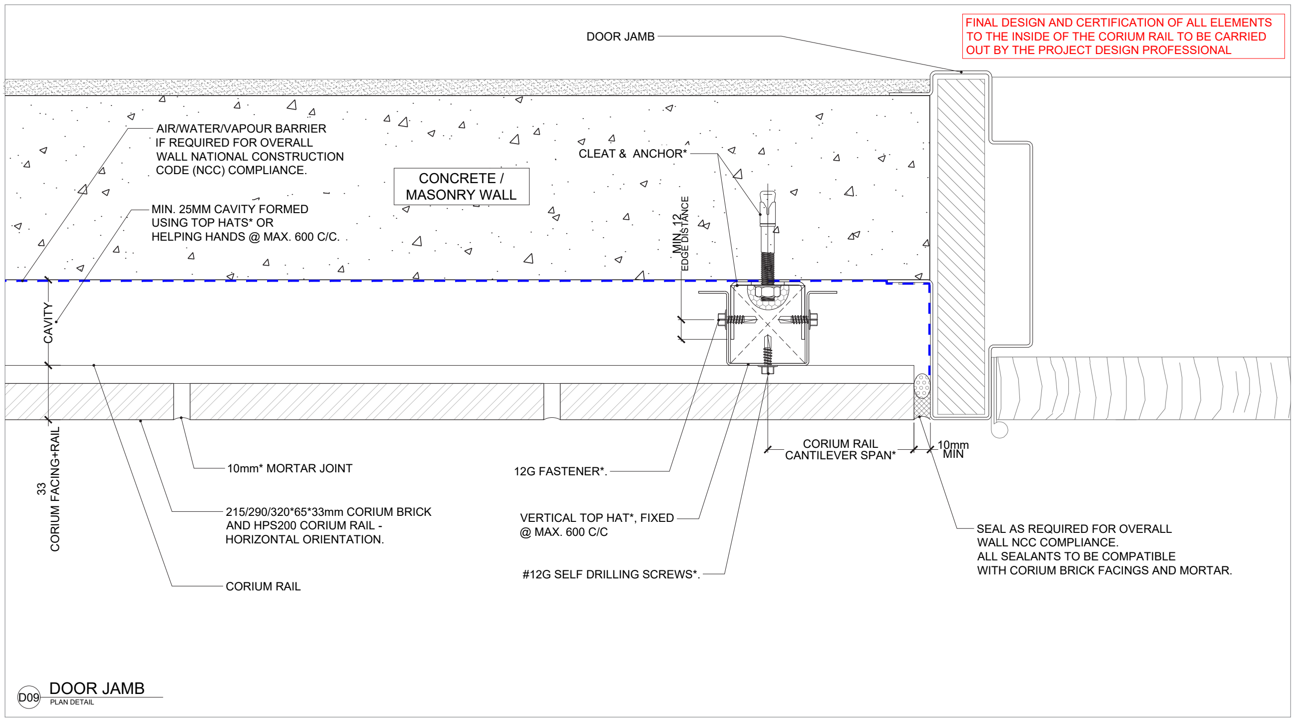
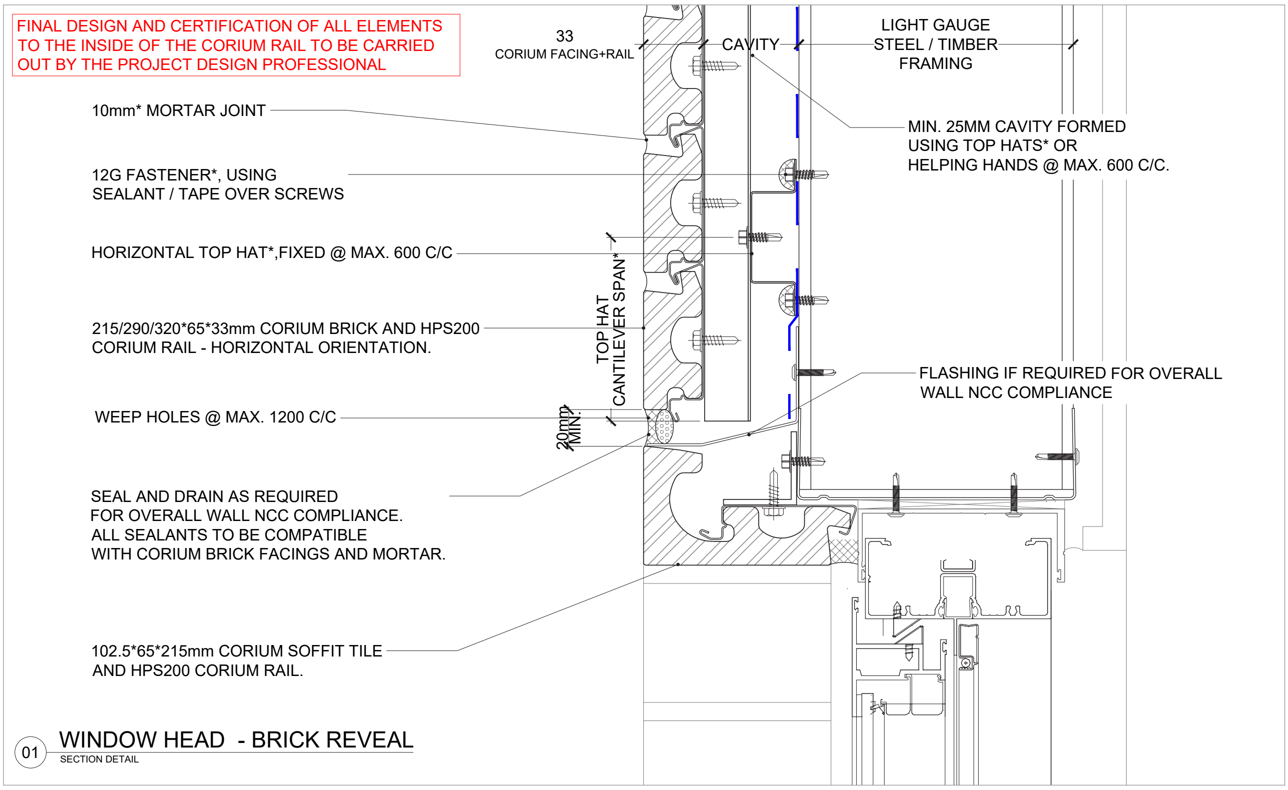


Fig 14: Window Brick Reveal – CORIUM Section Detail



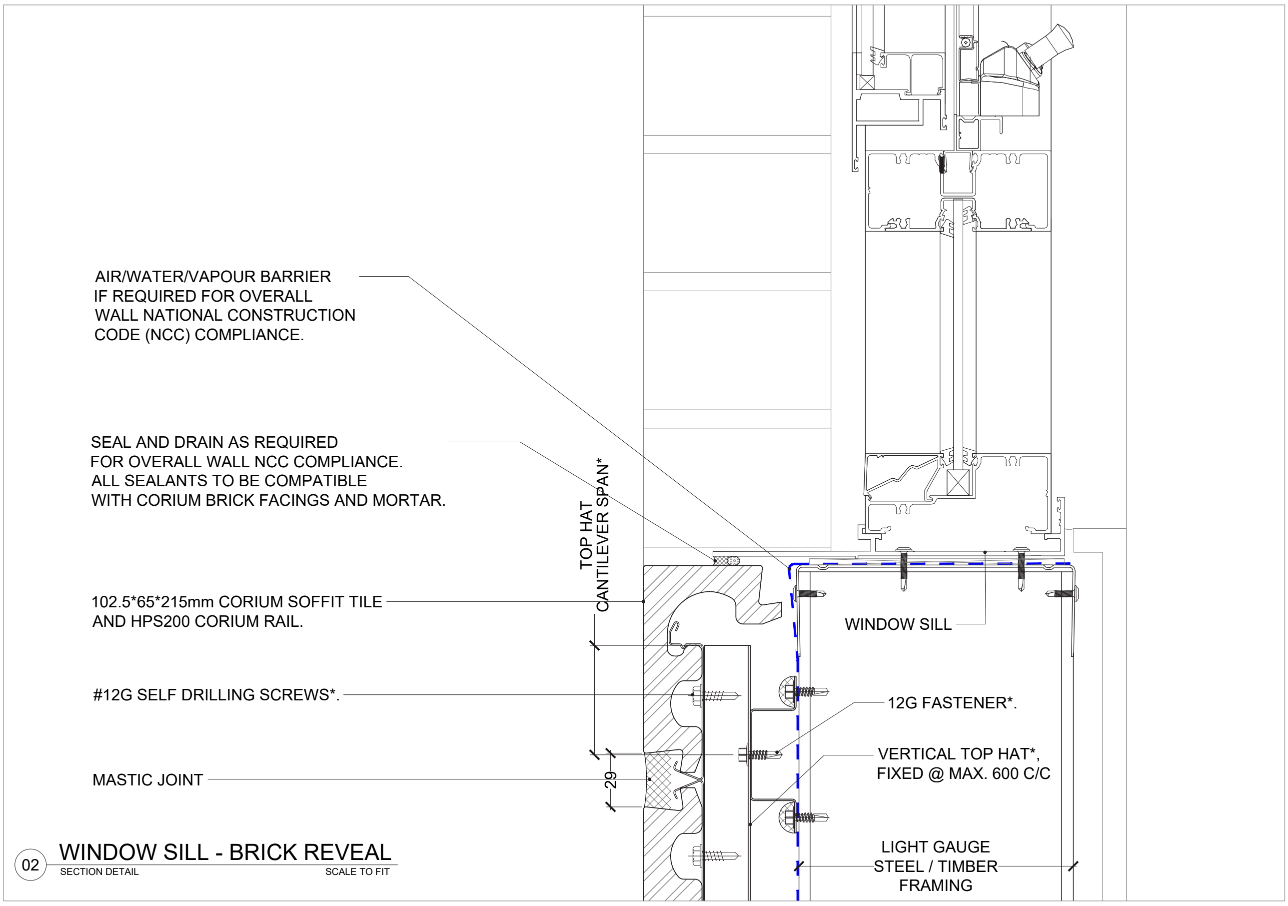
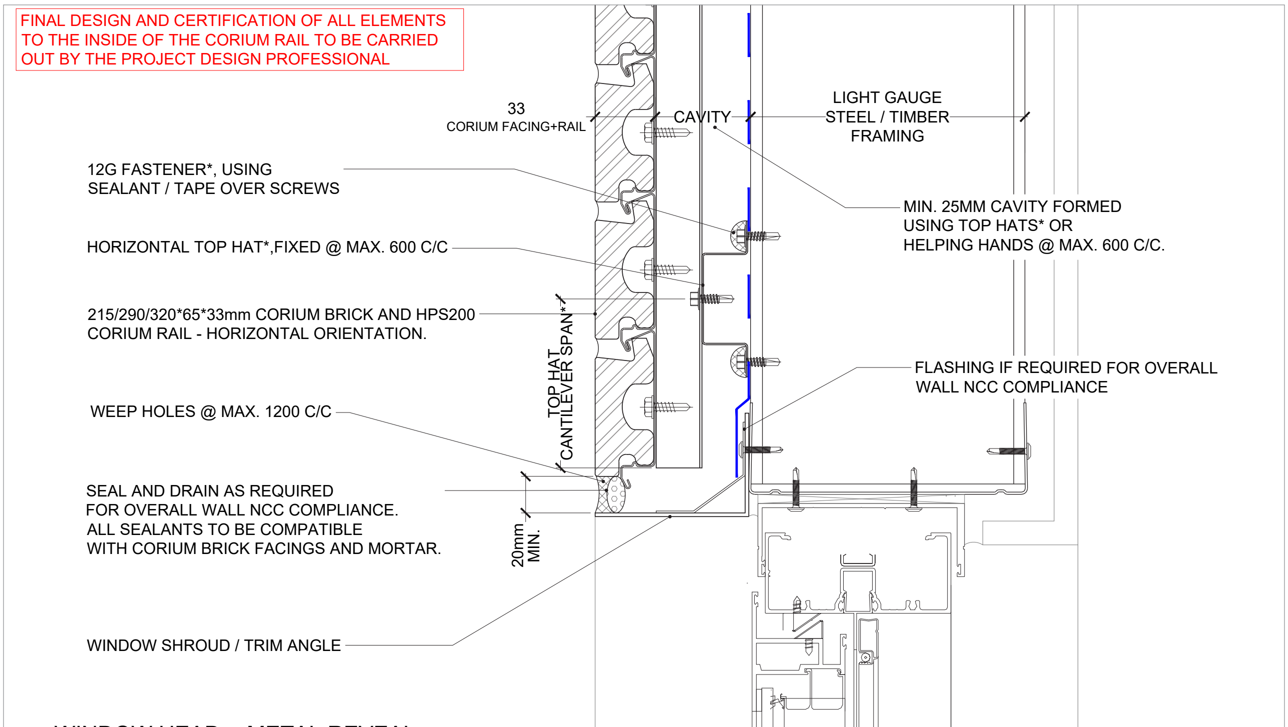
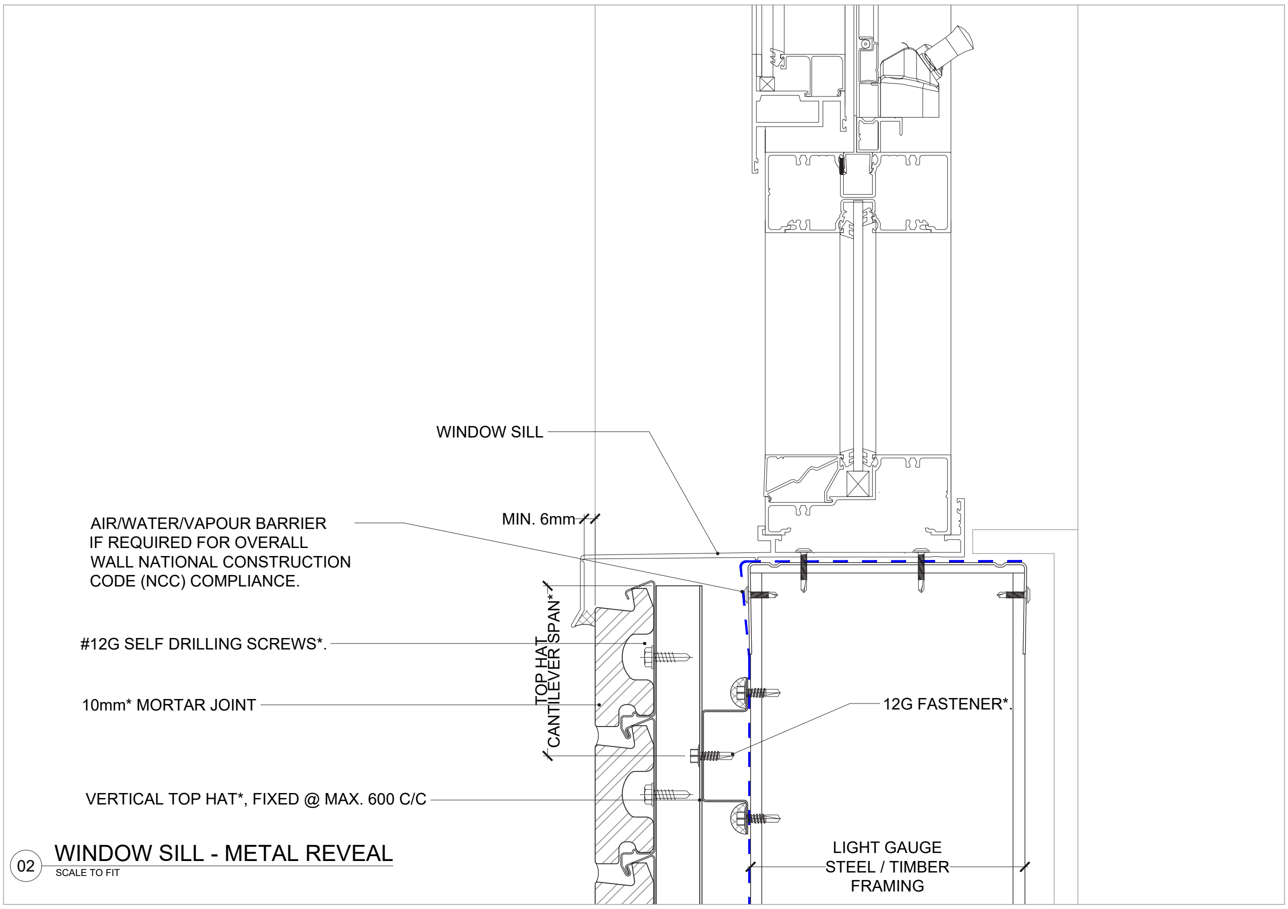


Fig 15: Window Metal Reveal – CORIUM Section Detail



01 WINDOW HEAD - METAL REVEAL
SECTION DETAIL SCALE TO FIT

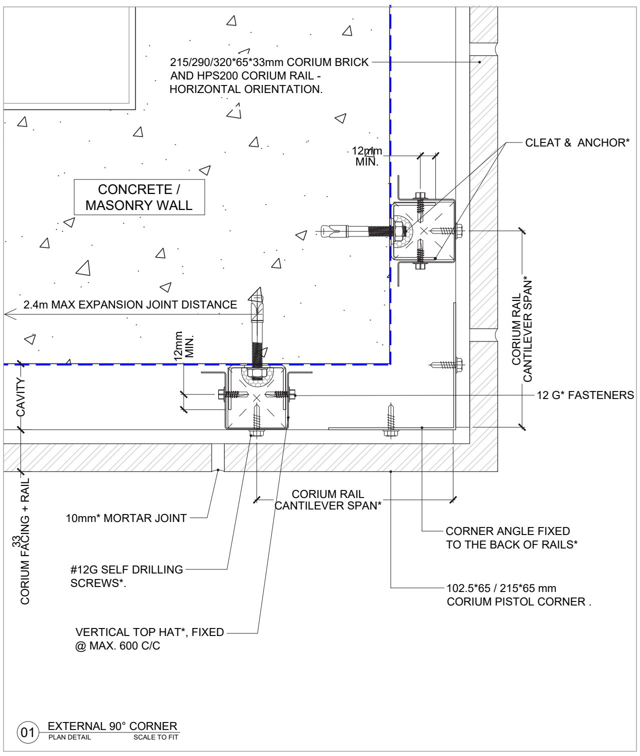


02 WINDOW SILL - METAL REVEAL
SCALE TO FIT

04 SPECIFICATION DRAWINGS

Corium

Fig 16: Corner – CORIUM Plan Detail



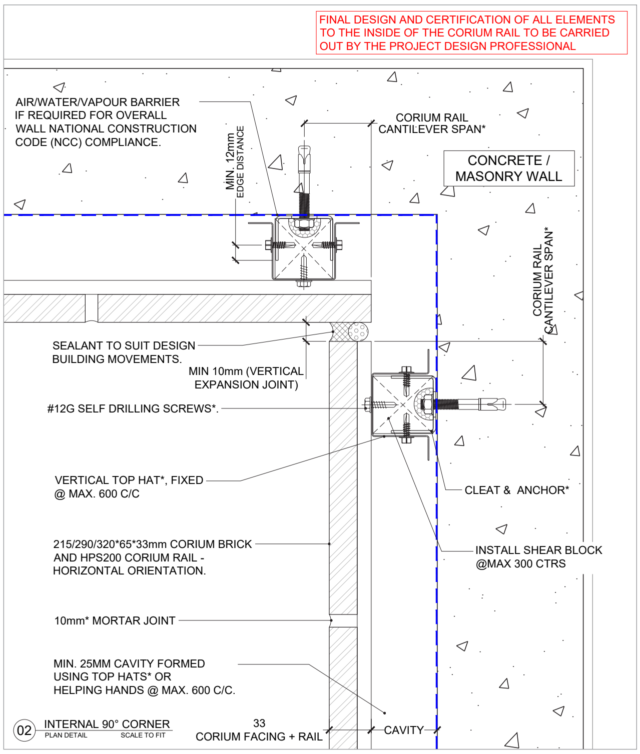
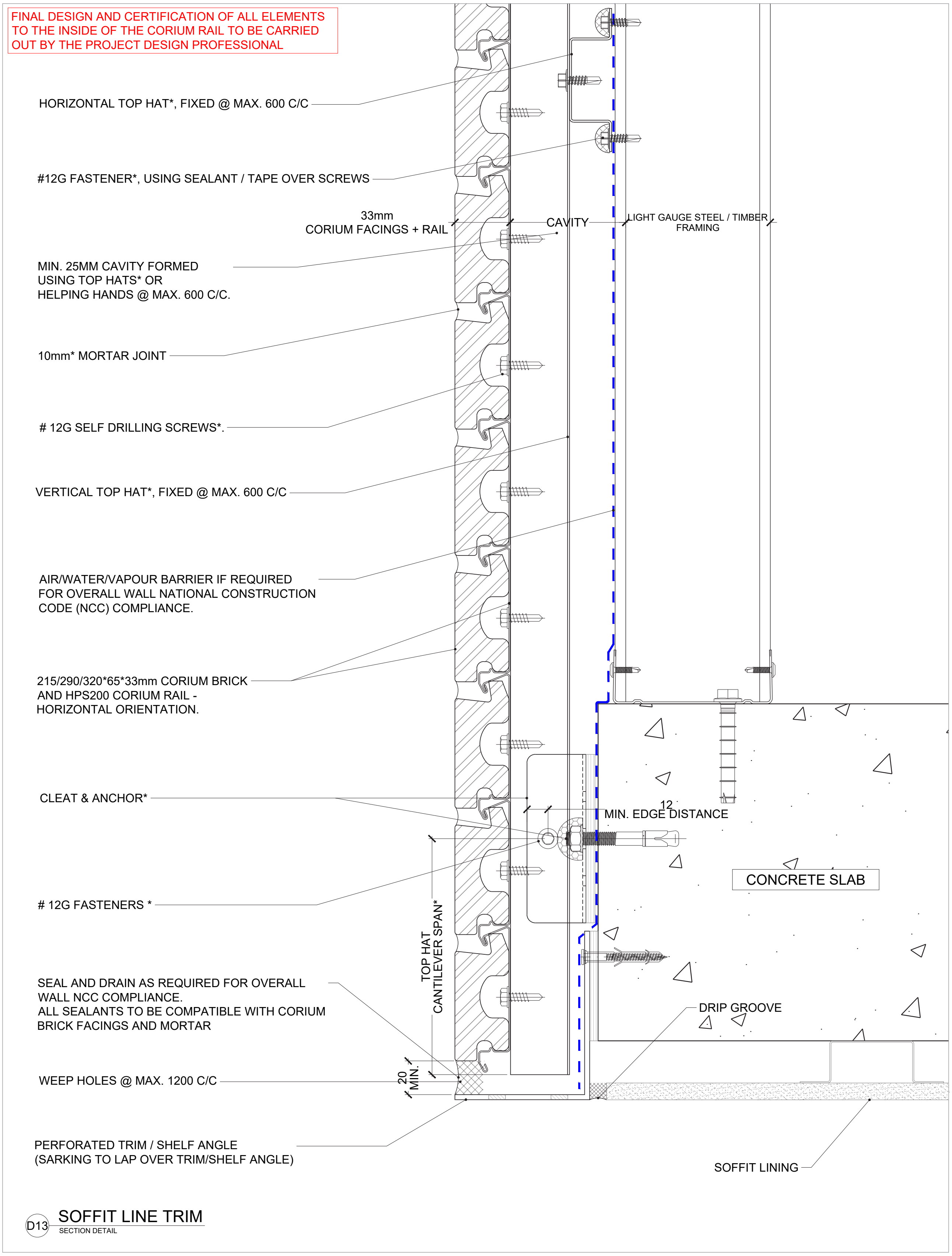


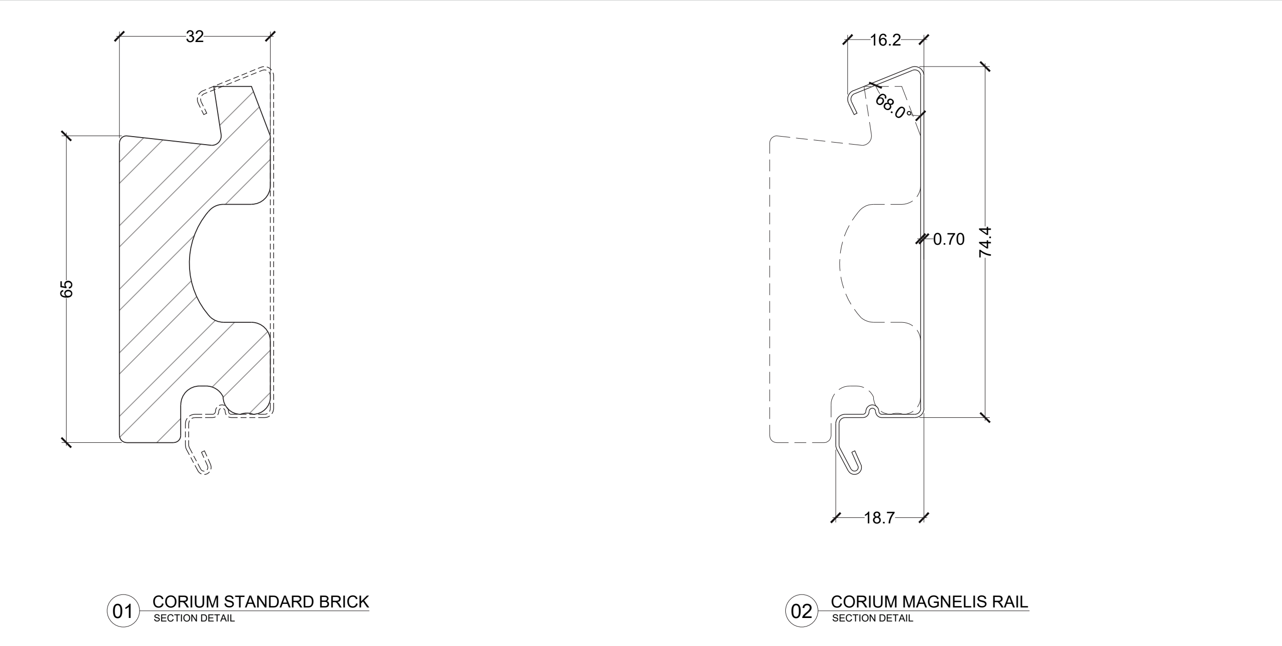
Fig 17: Soffit Line Trim – CORIUM Section Detail



04 SPECIFICATION DRAWINGS

Corium

FIG 18: CORIUM Brick + Magnelis Rail CORIUM Section Detail



FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE CORIUM RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

05 INSTALLATION

Follow the key steps below for Corium facade installation:

1. Rows of profiled steel sections are fixed to the backing structure.
2. Corium extruded fired clay brick tiles are simply clipped into place by hitting the brick tile with a rubber mallet. The clipping process ensures that consistent horizontal joints are achieved, whilst vertical joint spacing can be adjusted to suit design requirements.
3. Once all the Corium brick cladding tiles are installed and the quality approved, mortar is applied to vertical and horizontal joints between the tiles to provide a brickwork finish.

For detailed steps and notes to be aware when installed please refer to the following sections.

5.1 Job Safety

Local Work Health and Safety regulations appropriate to building construction (particularly handling and cutting of masonry and steel) must be adhered to when installing the CORIUM system.

Caution: Product contains Crystalline Silica. Refer to: Management of Silica Dust Onsite by Think Brick Australia.

5.2 Required tools

- **Drop Saw** – A good quality drop saw is required for cutting CORIUM steel rails. A cold cut blade is recommended to assist in preventing damage to the Colorcoat HPS 200 Ultra coating.
- **Jig Saw** – A good quality jig saw with an 18-point metal cutting blade will be required to make any CORIUM steel rail horizontal or pattern cuts.
- **Mitre Saw or Masonry Wet Saw** – A mitre saw with a masonry blade or masonry wet saw may be used to cut CORIUM tiles and special shapes.

  Note: A brick guillotine cutter may also be used. This is available from a masonry supply dealer or equipment rental centre. A brick guillotine cutter works well for CORIUM tile straight cuts.
- **Screw Gun** – Battery powered screw guns will be required to install CORIUM steel rail using CORIUM screw fasteners. Ensure drill bits are fitted with a torque head to prevent over/under tightening.
- **Electric Drill and Mortar Paddles** – To adequately mix the mortar.
- **Pointing Gun** – We recommend using a Mortar Pointing Gun for grouting your CORIUM project.
- **Miscellaneous Hand Tools** – White Headed Rubber Mallet, Hammer, Nail Punch, Tape Measure, Long Spirit Level, Laser Level, Tin Snips, Utility Knife, Carpenter Pencil, Chalk Line, Caulk Gun, Slap Stapler, Mason's Pointing Trowel, Garden Trowel, Mason's Soft Bristle Brush.

When a tile cut is required for a specific length or specialshape, a wet diamond-tipped masonry saw should be used and appropriate PPE worn. Please consult with PGH Bricks before doing so.

5.3 Preparation

The supporting face/substrate to which the CORIUM system is to be fixed to should be flat, vertical and capable of supporting the identified loads. This should be confirmed by the project design professional.

Please consult with your project state's Guide to Standards and Tolerances Guide or the requirements of the National Construction Code (NCC):

- Timber framed housing should be designed and constructed in accordance with AS 1720 or AS 1684 (for residential builds).
- Steel framed housing should be designed and constructed in accordance with AS 4600 and/or the NASH Standard.
- Masonry substrates should be designed and constructed in accordance with AS 3700 or AS 4773 (for residential builds).
- Concrete substrates should be designed and constructed in accordance with AS 3600.
- Permanent formwork systems (such as CSR's AFS), and linings should be in accordance with the manufacturer's instructions.
- Rigid air barriers and pliable building membranes should be installed in accordance with AS 4200.2 and fitted over the substrate prior to the CORIUM system being installed.

Do not proceed with installing the CORIUM system until the substrate, windows, doors, and openings are covered fully with an appropriate air/water/vapour barrier in accordance with section 2.4.7. Flashings should comply with section 2.4.9 and 4.

5.4 Quality

Quality check and inspection of all components before installation is critical to ensure that no damaged products is used.

Check to ensure that the brick tiles supplied sufficiently match the dimensions as specified.

The final brickwork resulting from the CORIUM system install should comply with the tolerances applicable to conventional masonry under AS 3700 and as detailed in the table below.

Fig 19: Conventional masonry construction tolerances (AS 3700 or Guide to Standards and Tolerances)

Item		Column 2 (Non-structural tolerance)
A	Horizontal position of any masonry element documented or shown in plan at its base or at each storey level	15mm
B	Relative displacement between loadbearing walls in adjacent stories intended to be in vertical alignment	10mm
C	Maximum deviation from plumb within a storey from a vertical line through the base of the member	10mm
D	Maximum deviation from plumb in total height of the building (from the base)	25mm
E	Maximum horizontal or vertical deviation of a surface from a plane surface (bow) in any 2m length	3mm
F	Deviation (step) of any exposed masonry surface from any adjacent exposed masonry surface. The bow provision of item E above also applies	2mm*
G	Deviation of bed joint from horizontal, or from the level documented or shown in elevation	10mm in any 10m length, 15mm in total
H	Deviation from documented thickness of bed joint	3mm
I	Minimum perpend thickness	5mm
J	Deviation from documented thickness of perpend	5mm
K	Maximum difference in perpend thickness in any wall	8mm
L	Deviation from documented width of cavity minimum width as required by the Building Code of Australia	15mm

*Unlike conventional masonry units, the tolerances allowed for Corium units are different, hence tolerance F may change in extreme cases.

Note

- Bed and perpend joints are to be 10 mm subject to the tolerance detailed above.
- Certain product ranges may have intentionally erratic surface deviation and may make it difficult to comply with item F above. It is the responsibility of the installer to ensure that tiles are installed in a coordinated manner such that adjacent tiles do not deviate too much from one another, and don’t compromise the aesthetic of the wall.

5.5 Vertical Supports

The CORIUM system is fixed to vertical supports (steel top hats, top hats, and cleats, helping hand brackets, etc.) Guidance on permitted fixings, vertical supports and their use is provided in section 2.4.8 and 2.4.5 respectively. Supports are firstly fixed to the substrate at maximum 600 mm spacings.

The vertical supporting structure and substrate inboard of the CORIUM rail is not part of the CORIUM system. The building design professionals are responsible for the design and NCC compliance of the support structure (spans, spacings, etc.), and substrate.

The vertical supports must allow for a cavity (between substrate and the CORIUM system) of at least 25 mm.

The manufacturer of the vertical supports and fasteners should be consulted for selection of parts and correct install.

Note: From the back of the rail to the face of the brick is approx. 35mm. This needs to be considered when maintaining a cavity depth to ensure the surface interfaces level with other surfaces in the build.

5.6 Flashings

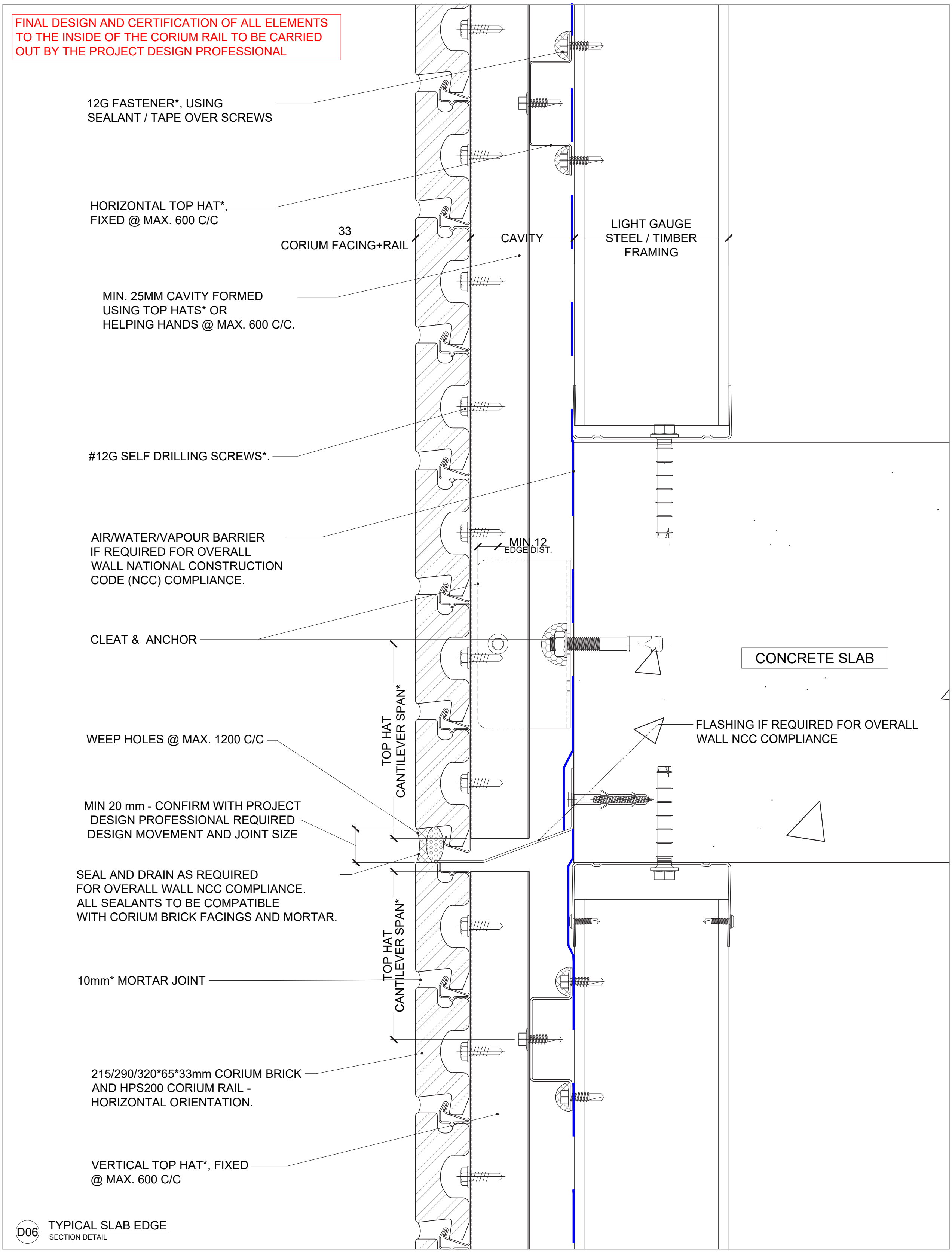
Flashings should be installed to control moisture. Flashings should be located at the panels base, all floor edges and at all points where the cavity is interrupted by an element i.e., windows and doors.

Fix the base flashing to the substrate (over the pliable building membrane), a minimum of 150mm from the footing, and at maximum 600 mm centres along the substrate.

Corners and joints should be lapped by a minimum 150 mm.

Please refer to section 4 for detailed drawings.

Fig 20: CORIUM Slab flashing detail



FINAL DESIGN AND CERTIFICATION OF ALL ELEMENTS TO THE INSIDE OF THE CORIUM RAIL TO BE CARRIED OUT BY THE PROJECT DESIGN PROFESSIONAL

5.7 Rail set out

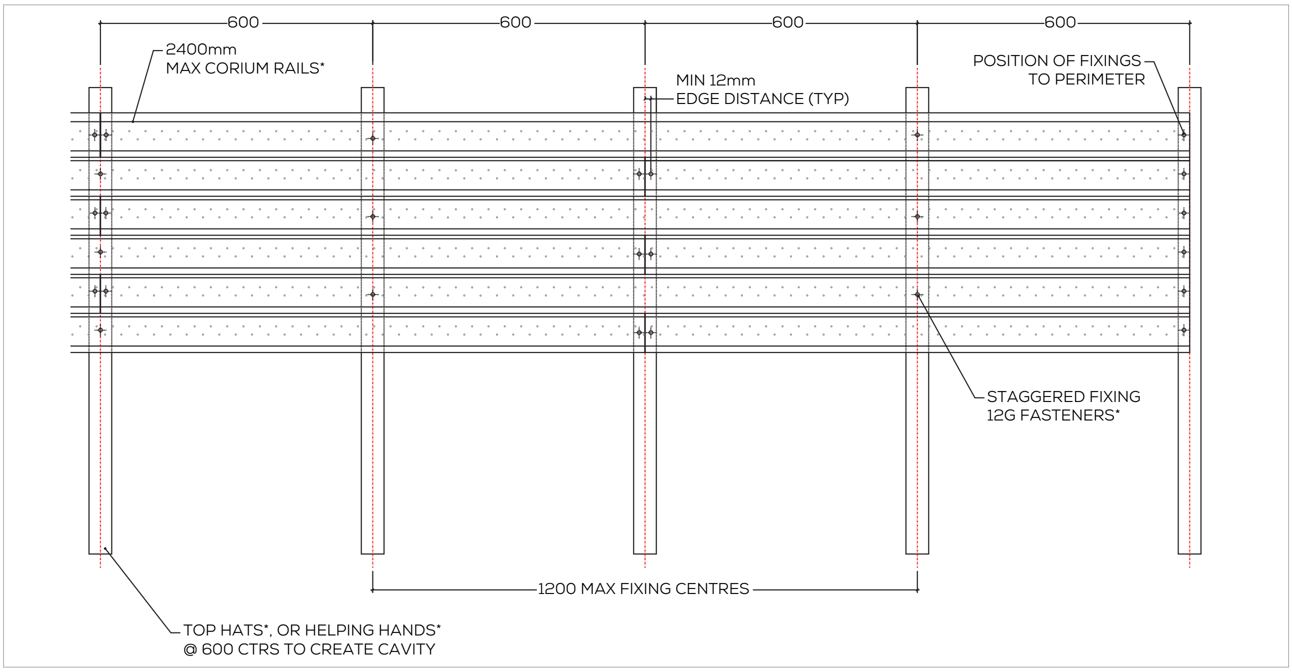
The CORIUM rails are installed from the bottom working up a wall.

The CORIUM rails are installed from the top down, from datums such as the tops of walls, tops of doors and window heads.

The CORIUM rails are generally supplied in 2400 mm lengths and are butt jointed over the vertical supports using an appropriate fastener (see section 2.4.8 in conjunction with section 3.3).

The joint between rails should occur at a vertical support, and joints between adjacent courses should be staggered as per figure 6 below. Permissible fixings and their arrangement depend on the site wind load, see section 2.4.8 for guidance.

Fig 21: CORIUM rail fixing pattern.



When required, lengths of rail can be cut to size using the required tools. Do not use methods which may generate high temperatures such as abrasive disc cutters as this damages the rails coating.

Note: the set out of the rail course is nominally a 75 mm gauge.

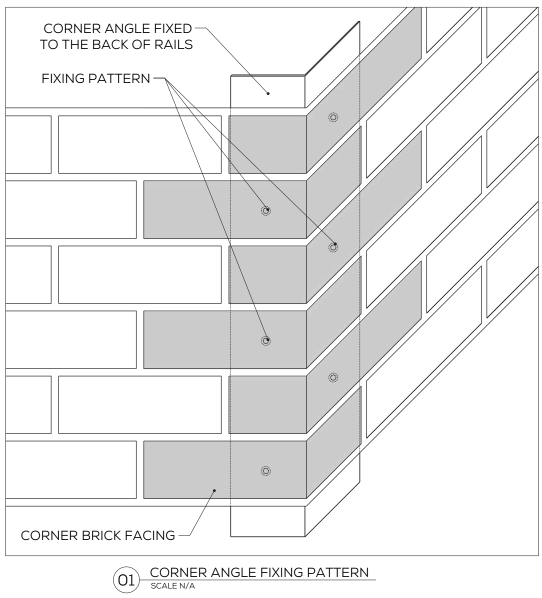
Once a starting datum point has been determined, the rails are to be installed level and to align at each corner. The datum point should be chosen on the basis that it allows you to easily refer back to it to keep the rails level and do uninterrupted runs of rail easily.

Analyse all openings to choose a starting point that will minimize course adjustments. Proceed to fix the rail to the vertical supports.

Ensure all rails are being clipped together using the interlock action. Ensure that the rails are properly interlocked to ensure that the resulting bed joint is 10 mm +/- 3 mm.

At corners, the rails are butt jointed over a corner angle (see section 2.4.9 in conjunction with section 3.3) which supports the rail. Please see figure 7 and 8 below, as well as section 4 for more details.

Fig 22: Corner Angle detail



5.8 Brick Tiles

The installer should double check each consignment prior to installation, to ensure no defected tiles are installed.

Plain tiles should be taken from a minimum of three packs simultaneously to ensure good color blending.

5.9 Fitting

Prior to installation of the tiles, the rails should be cleaned to remove any debris and moisture, and individual tiles should be checked in accordance with 5.4 prior to permitting their install.

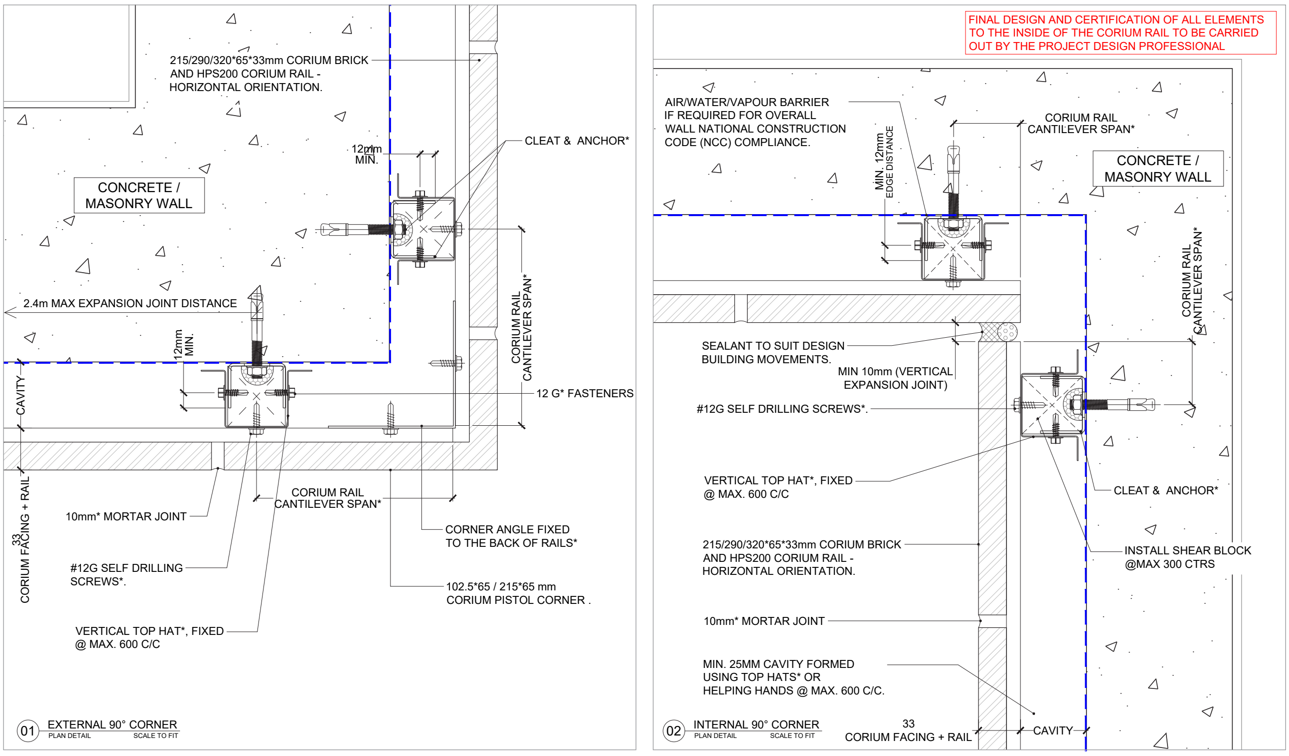
Tiles are simply inserted into the steel rail with the top of the tile first, feeding the tile's top into the up most rail section, and resting the tile's lower edge on the lower rail section. Using a rubber mallet, apply a slight cushioned blow to the tiles bottom, allowing the tile's lower edge to slide into the rail and the tile's top to engage in the rail.

If necessary, tiles can be shifted into their final place using a rubber mallet or timber offcut once tiles are secured in the rail. Care must be taken to minimise the risk of abrasion to the rails and tile. The position of tiles should be set out from the corners, inwards on each elevation, adjusting the vertical joint width to suit variations in tile lengths – min joint width 7 mm, max 13 mm.

Corium tiles are tightly fit into the rail to ensure adequate engagement between brick tile units and rails. Tiles installed should not be taken out by force and clipped back in excessively as this may reduce the engagement of tiles.

For internal corners, traditional tiles should be used and on alternate courses, cut to size to represent a return header, and to achieve the appearance of traditional brickwork. A gap (later to be sealed) should be left at the corner as a movement joint. See figure 8 below. For external corners, the pistol tile comes with a mechanical backing which simply slides into the rail.

Fig 23: Corium Plan Detail



5.10 Mortar

For the recommended ratio for mixing mortar, please refer to project specification for which to follow:

- M3 (1.5 with a methyl cellulose water thickener), as per AS3700.
- M4 (1:4 with a methyl cellulose water thickener), as per AS 3700.

The mortar is applied using manual, mechanical or compressed air-based pumps with controlled nozzle applicators.

Mortar should be in accordance with section 2.4.2, and section 3.3 for appropriateness of mortar class for the site's corrosivity classification.

When mixing the constituents, gradually add water while mixing with a slow speed drill and blender until a consistency similar to stiff cream is achieved. After mixing, allow the mortar to stand for approximately 5 minutes and briefly remix. Consistency can be checked by filling a tube. The mortar should not run out but should fall out in "drops" when the tube is shaken.

Fill the mortar pointing gun to within 20 mm of the top and shake to dispel air pockets. Full tubes may be stored upright in a bucket with 20 mm of water in the bottom to prevent the mortar in the nozzle from stiffening. In hot weather the bucket and tubes should be covered.

When applying the mortar using the manual method, the gun works by fingertip pressure on the trigger. If greater pressure is needed, then the gun may be blocked, or the washer may be too tight, requiring adjusting or cleaning.

The gun works by fingertip pressure on the trigger. If greater pressure is needed, then the gun may be blocked, or the washer may be too tight, requiring adjusting or cleaning.

Surfaces to be pointed should be clean and dry.

Work should not commence at temperatures below 5 °C. Setting time will be directly affected by temperature.

Pointing should commence at the highest part of one end of the wall and proceed in horizontal bands downwards.

The horizontal bands should be completed in areas approximating to the extent of the joint that can be filled with one tube. The depth of the horizontal band should relate to comfortable working heights and convenient scaffolding lifts, say about 1 m.

Start each area by filling vertical joints from the lowest course to the highest. Fill each joint from the bottom of the joint to the top. When the joint is full, tilt the barrel of the gun down below the nozzle and 'cut' the mortar from the nozzle on the underside of the brick above.

Fill the bed joints by drawing the gun along the joint. The gun should be kept at a constant angle to the joint to promote an even fill. The trigger should be squeezed with confidence so that mortar is injected to the back of the joint and slightly overfilled rather than under filled.

Attention should be given to ensuring that complete and continuous filling of the joints at corners is achieved so that weak points and cracks are avoided. It is recommended that the joint is filled by running the nozzle around the corner rather than up to and away from the corner at each side.

The mortar joint should be tooled to ensure an ironed or weather-struck joint. Flush joints can be achieved, provided the pointing is compacted to ensure engagement in the system and sealing of the edges. Raked joints should not be used with the CORIUM system.

Curing time for mortar to reach adequate strength is nominally 7 days.

5.11 Holes/Penetrations

Holes made in the brick tiles which are less than 12 mm diameter should be formed with a ceramic or masonry drill bit. Hammer action is not advised to reduce the risk of breaking the tile. It is recommended that the hole be centered on the horizontal center line of the tile. After penetrating the tile, the steel backing section can be cut with a conventional high-speed drill. Seal around the penetration, rail and tile with polyurethane foam or an alternate suitable sealant.

Holes larger than 12 mm should be formed by first removing tiles in the area of the hole and cutting through the steel with a conventional hole saw. It is recommended that a 20 mm deep piece of plywood or timber is screw-fixed to the face of the steel to facilitate centering of the drill. Tiles should then be pieced around the penetration after sealing with polyurethane foam or an alternate suitable sealant.

Care should be taken to ensure the building structure, or services within the structure, are not damaged when drilling such holes.

Care should be taken to ensure the building structure or services within the structure are not damaged in drilling such holes.

When wanting to attach items to the external wall (such as power boxes, signs, etc.), these items should be appropriately fixed to the substrate, such that no dead load is carried by the CORIUM system or the CORIUM system's vertical supports. Consider installing horizontal noggins in steel or timber framed substrates to align and accommodate the fixing of the attachment. When the item is to be recessed into the cavity, the opening should be treated like a window and be appropriately flashed and sealed. When the item is to sit on the surface of the CORIUM system, penetrations will need to be made and appropriate supports (such as noggins in steel/timber framing, and additional top-hats capable of carrying the load of the item) fixed to the substrate to accommodate fixing the item just proud of the CORIUM system. Seal around the penetration with a suitable sealant. To ensure unity of brick courses and look, tiles can continue behind the item and abut the penetration.

For other situations, please contact PGH.

5.12 Openings (doors, windows, etc…)

All windows, doors and openings should be flashed off fully over the top, both sides and the bottom with flashing material compliant with section 2.4.10 to ensure that no water can penetrate.

Rails should be installed as per section 5.7. Tiles should be butt jointed up against the architrave of the opening. If required, tiles should be cut in accordance with section 5.8.

Control joint to accomodate movements around openings should follow project design specifications.

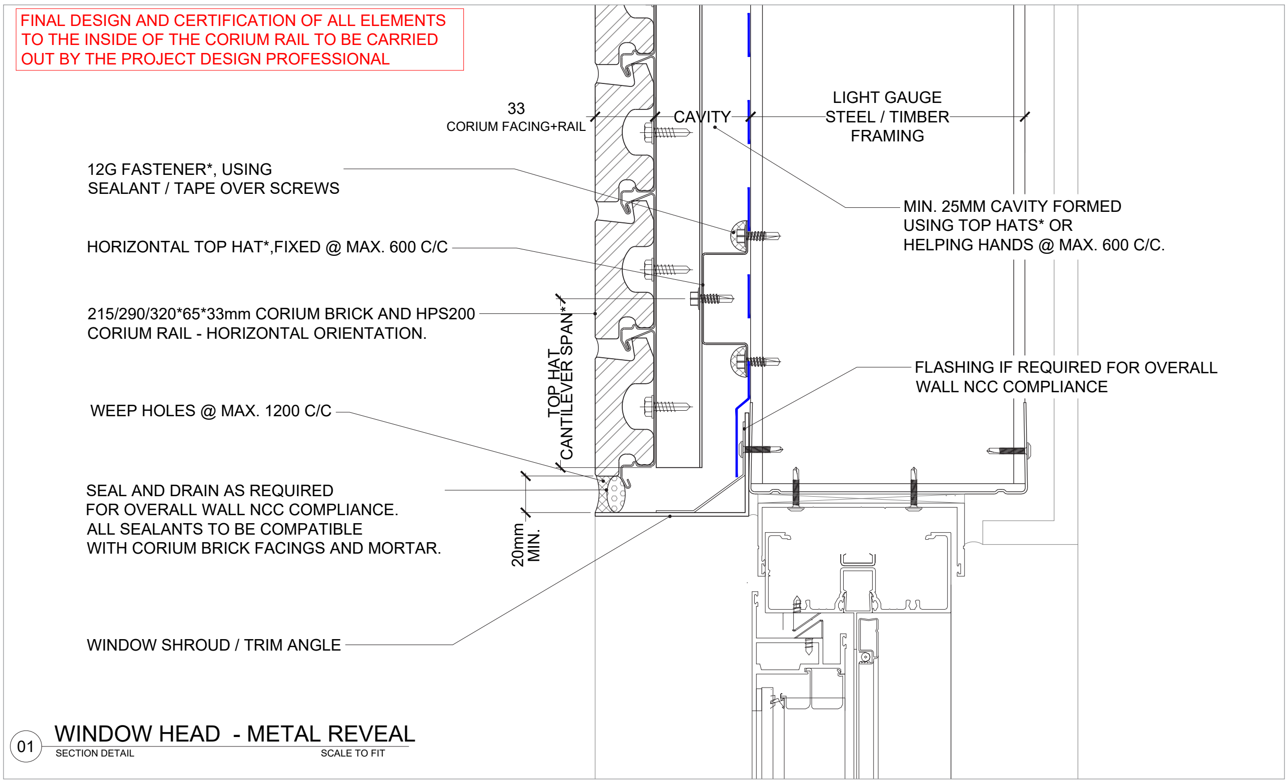
For headers and sills, stretcher bond is easily achieved provided the set out has been done with this intention.

At sill junctions, a windowsill flashing should extend over the top course of the CORIUM system, to prevent excessive water getting in behind.

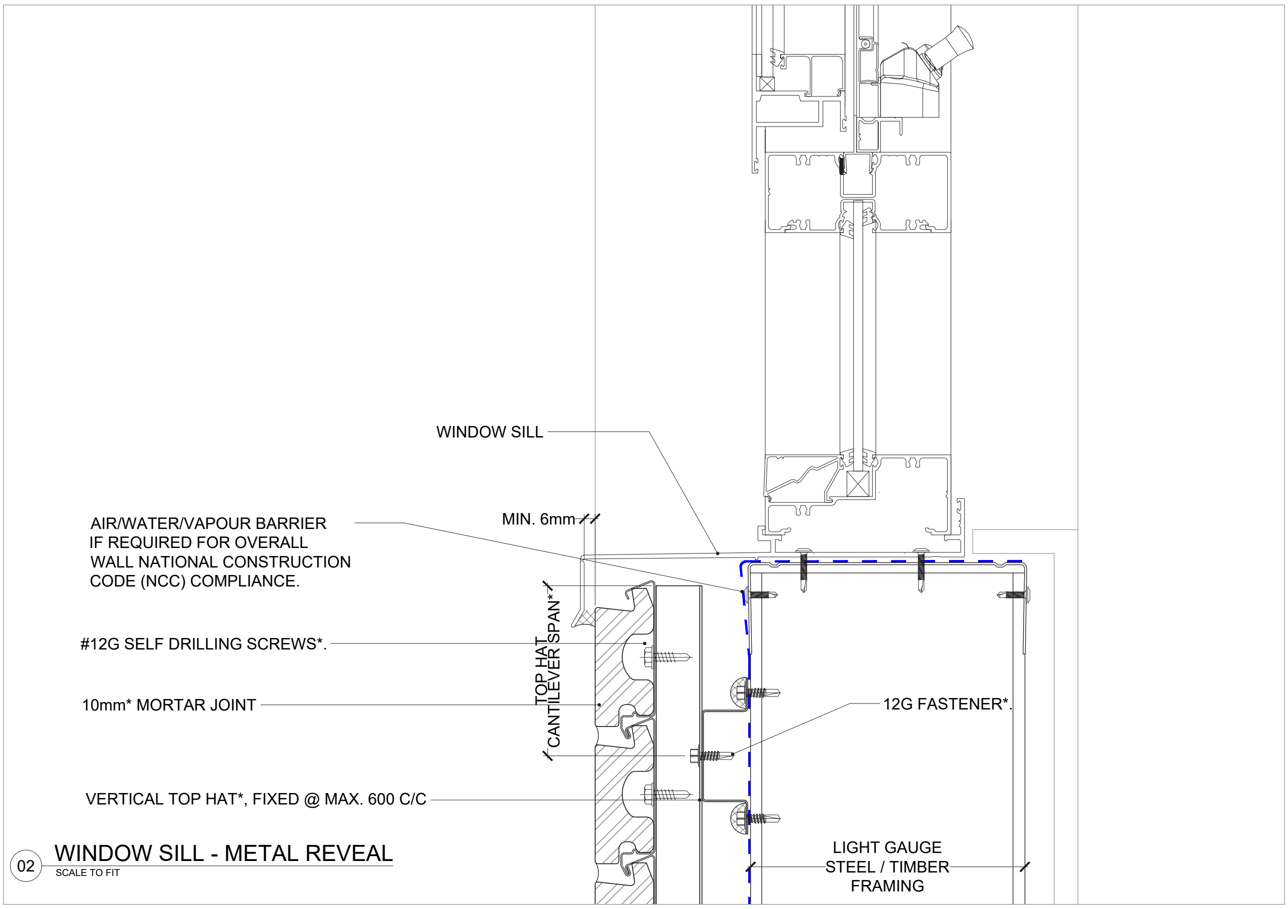
At header junctions, an angle trim should be fixed to the substrate, and placed on top of the window/door.
The CORIUM system should abut down to this trim, with the bottom junction sealed with a sealant.

The gap created by abutting the CORIUM system with openings should be sealed in accordance with 2.4.3.

Please refer to figure 9-11 below and section 4 for detailed drawings.

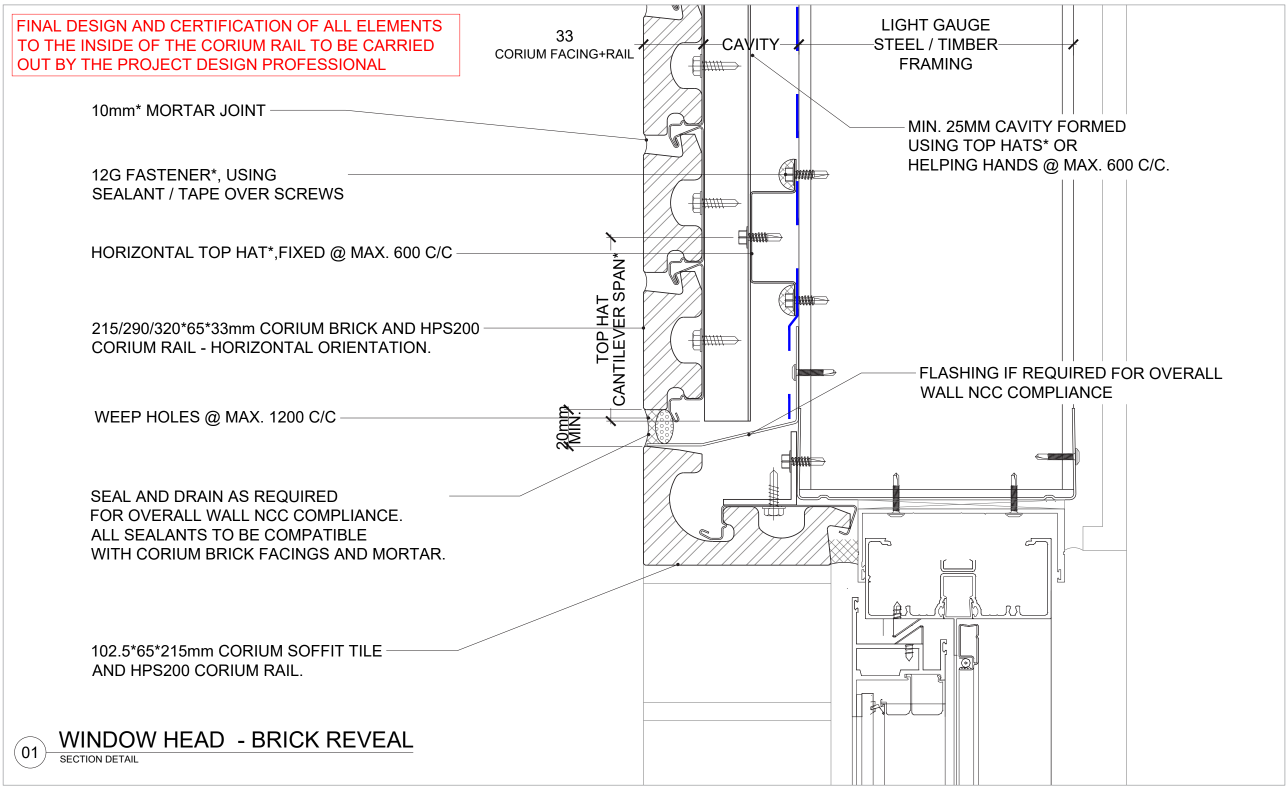


01 WINDOW HEAD - METAL REVEAL
SECTION DETAIL SCALE TO FIT

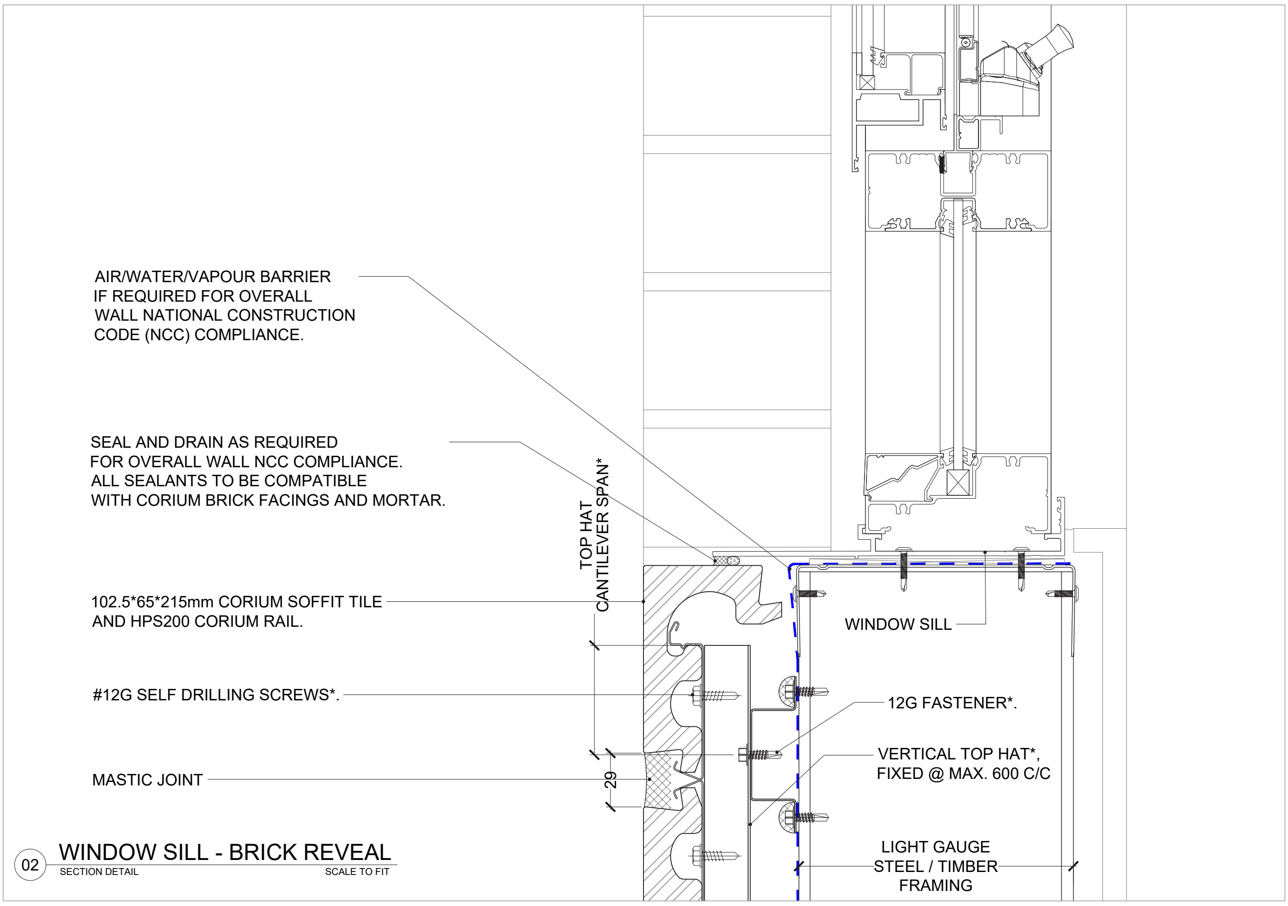


02 WINDOW SILL - METAL REVEAL
SCALE TO FIT

Fig 24: Appropriate CORIUM window head and sill details. The detail for concrete/masonry substrates should be near identical except that the vertical supports must be selected accordingly in accordance with section 2.4.5.



01 WINDOW HEAD - BRICK REVEAL
SECTION DETAIL



02 WINDOW SILL - BRICK REVEAL
SECTION DETAIL
SCALE TO FIT

Fig 25: Appropriate CORIUM window jamb details. The detail for concrete/masonry substrates should be near identical except that the vertical supports must be selected accordingly in accordance with section 2.4.5.

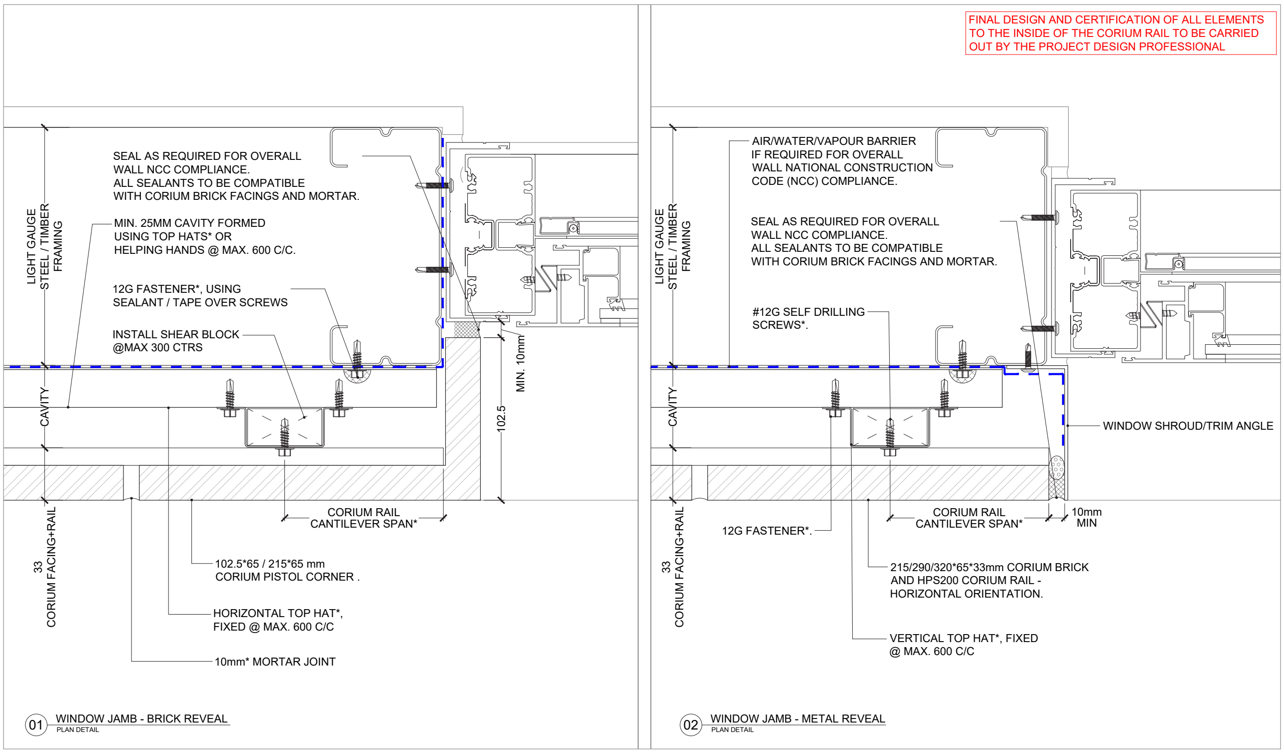
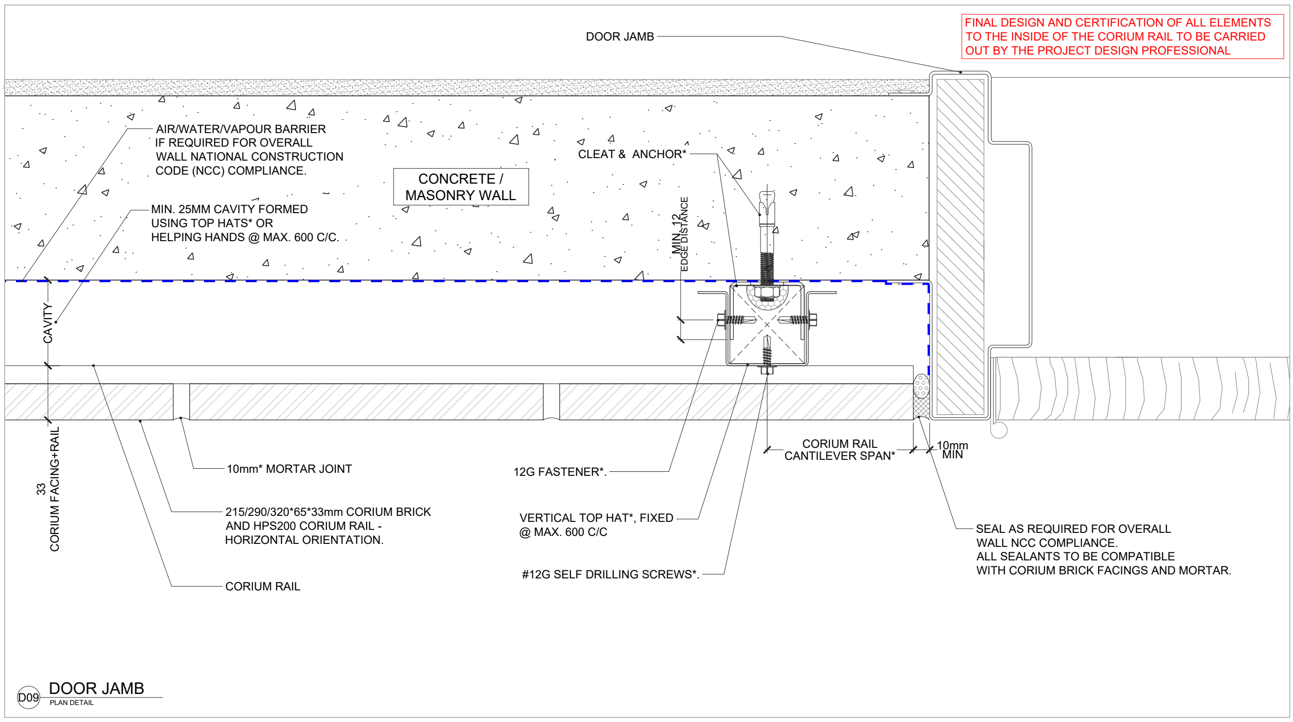


Fig 26: CORIUM door jamb detail. The detail for steel/timber framed substrates will be near identical except that the vertical supports must be selected accordingly in accordance with section 2.4.5.



5.13 Movement Joints

Movement joints in the CORIUM system should be in accordance with section 2.4.3 and placed in accordance with 3.2. The location of movement joints on a project is the responsibility of the building design professional and must be confirmed before proceeding with installation.

To maintain the system's 'brick look', control joints placed in the CORIUM system should be a minimum of 15mm thick and be located where a mortar joint would normally exist. When setting out the CORIUM system, design consideration should be given to the location of movement joints to ensure minimal cutting and prevent impractical scenarios with respect to rail and tile lengths.

Vertical movement joints must extend the full height of a continuous CORIUM section. Vertical movement joints are formed by separating horizontally abutting sections rail, leaving a gap equivalent to the required movement joint width. Consideration must be made to ensure that the cantilevered span of rail (from the vertical support to the movement joint) is in accordance with 3.1.1.2.

Horizontal movement joints are created by separating vertical sections of rail, and supports, leaving a horizontal gap equivalent to the required movement joint width. Supports must discontinue at horizontal control joints. For horizontal control joints located at slab edges:

- Supports located above the control joint must be connected to the slab edge and/or substrate the floor level/above. See Figure 12.
- Supports located below the control joint must be connected to the substrate the floor below. See Figure 12.

Proceeding installation of the CORIUM system for the section, the gap is then sealed with a proprietary sealant that is chemically compatible with the system (including non-staining) and accompanied with a backing rod as per the sealant manufacturer's instructions.

Fig 27: CORIUM Horizontal control joint located at slab edge detail.

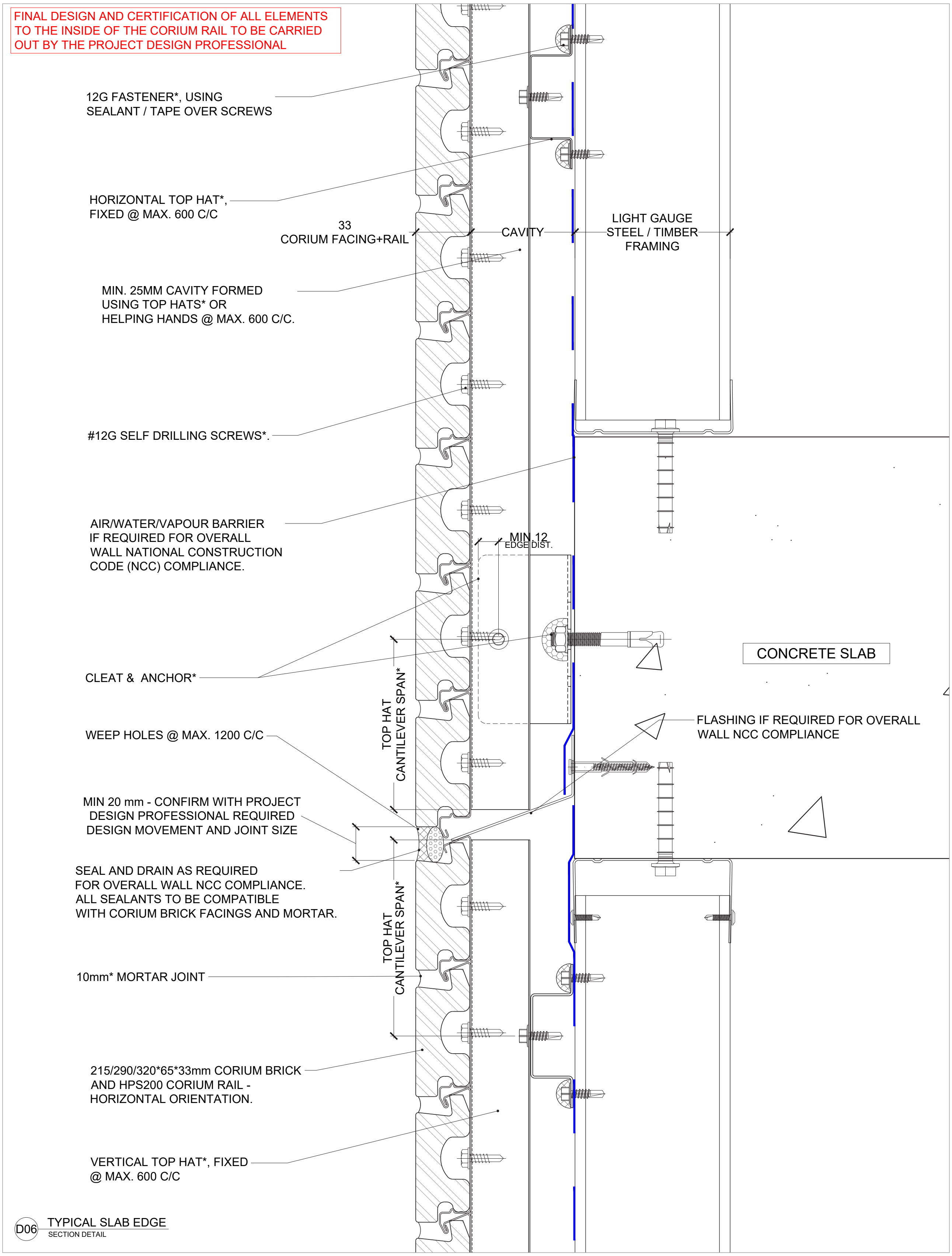
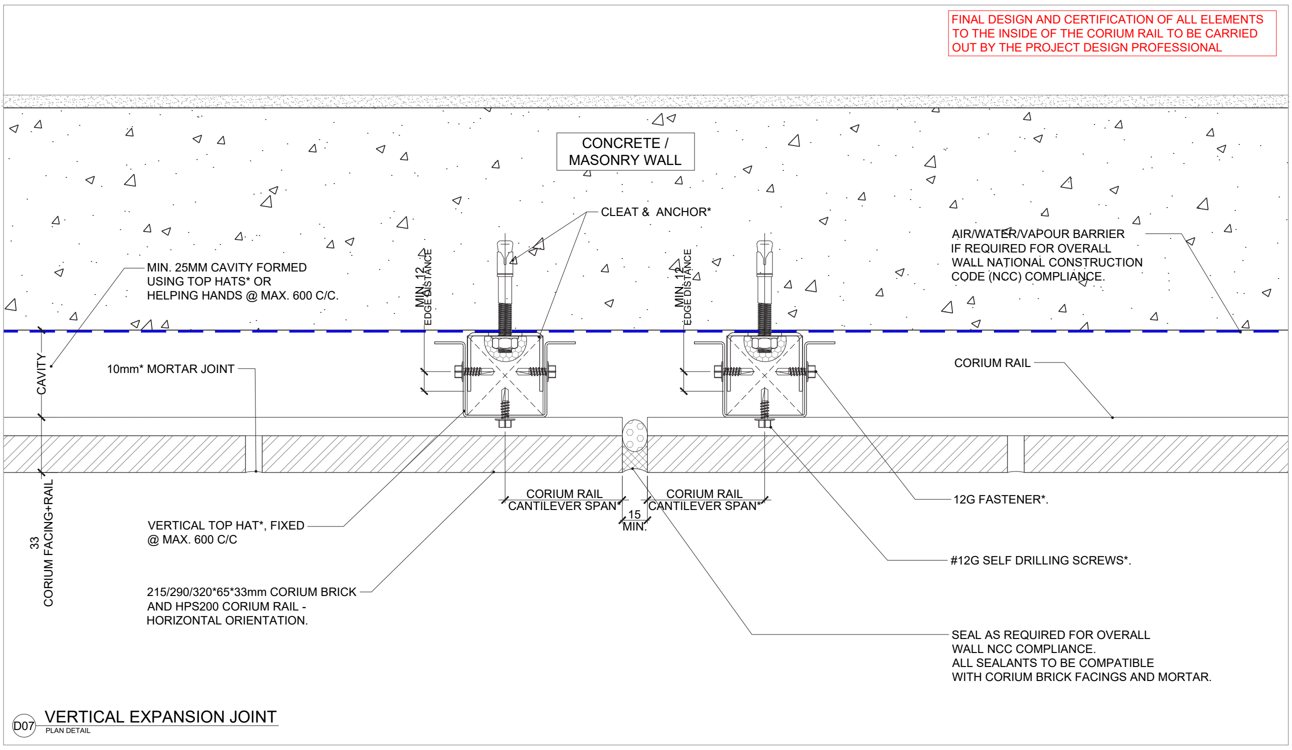


Fig 28: CORIUM vertical control joint detail



5.14 Cleaning

Efflorescence from the mortar may occur as is normal with all cementitious materials during early life. Any such efflorescence should be allowed to naturally dissipate or can be scrubbed off with a thick bristled brush if desired.

Cleaning should not proceed until the mortar has hardened, which is at least 3 days after the mortar has been applied.

All mortar debris should be removed with hand tools before applying water to the brickwork. Where possible, it is recommended that this is completed before the mortar has cured, as removing dry mortar with hand tools increases the risk of damage to the face of the masonry tiles.

It is essential to pre-wet any areas to be cleaned with potable water to prevent absorption of the cleaning agent into the mortar or tiles. Pre-wetting limits the cleaning action to the surface where it is required.

Wash the wall with high pressure water from top to bottom so all dissolved mortar particles will be completely flushed from wall surfaces. The maximum pressure at the pump should be kept low, below 7000 kPa (1000 psi), to prevent damage to either the masonry tiles or the mortar. Any remaining particles should be scrubbed off using a thick bristled brush.

Any cleaning must only be done with non-acid based cleaners.

Further guidance on brick cleaning is contained within the Think Brick Australia cleaning manual. Contact PGH for further suggestions on cleaning products. When using proprietary cleaning products, follow the manufacturer’s guidance for its correct use on CORIUM.

06 MAINTENANCE

Regular inspections must be made of the condition of the CORIUM cladding to ensure its integrity and weather resistance.

Inspections are to look for visible signs of problems such as cracking of the brick-slips or mortar joints, or rust staining. Minor damage may require mortar and tile removal and replacement in a limited area only. More serious damage may involve tile and mortar removal, together with brick-slip and support structure replacement. Cracks in the mortar joints are to be repaired to maintain weather resistance and prevent water from entering behind the brick-slips and impacting the channels.

The durability options assume the external face of the system is maintained and cleaned with potable water at regular intervals. Where the project is located in corrosivity category C1 or C2, this process is to be undertaken every 12 months. Where the project is located in corrosivity C3 and C4, this process is to be undertaken on a 6 monthly basis and for C5 on a 3-monthly basis.

If signs of problems are identified during the regular inspection regime, notify PGH Bricks and Pavers in writing for further advice. Signs of problems may require the interval between inspections to be reduced.

For more information contact

corium.pghbricks.com.au | **brickfacadesystems@csr.com.au**

1300 313 382

* Images used show the possibilities of using CORIUM in the design and construction of buildings and are not actual buildings built using the CORIUM system.

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