

IAN BENNIE AND ASSOCIATES

TEST REPORT NO. 2017-053-S1

**“SMARTSTONE SYSTEMS” EXTERNAL WALL
CLADDING**

Specimen tests to

**NCC-2016 VERIFICATION METHODS
FV1 AND V2.2.1**

for

Stone Clad Pty Ltd

October 2017



Accredited Laboratory No. 2371
Accredited for compliance with ISO/IEC 17025.



TEST REPORT NUMBER 2017-053-S1

Test Client: **Stone Clad Pty Ltd**
 c/- Bernie Trounce 49-54 Douglas St, Noble Park VIC 3174

Specimen

Identification: A “Smartstone Systems” **External Wall Cladding** test specimen measuring 2000 mm in height x 3300 mm in width was installed on a timber stud wall by the client. The sample consisted of Smartstone panels fixed with aluminium brackets on the studs. The sample included a 600 mm recess, window, meter box, control joints, wall junctions, parapet and balcony drainage conditions. Full details of the cladding system were provided by the Client and are included in Appendix C.

Construction: For the purposes of the NCC the specimen was deemed to be a Cavity Wall utilising appropriate sarking to prevent water ingress to the stud framing. For the purposes of observations during the test, acrylic sheets were used as the internal lining on the stud frame. Holes were introduced through the internal lining to create an air infiltration of 1.6 L/s.m² at 150 Pa of pressure on the sample, being the highest allowable infiltration rate specified in AS/NZS 4284.

Test Method: NCC-2016 Weatherproofing Verification Methods V2.2.1 and FV1 with test procedures in accordance with Australian Standard AS/NZS 4284:2008, Testing of building facades.

Nominated serviceability limit state pressures: + 820 Pa and –1230 Pa

Test Date(s): 28th July 2017.

Requirement: The compliance requirements of the NCC-2016 Weatherproofing Verification Methods V2.2.1 & FV1 are given in Appendix B.

Conclusions: The specimen passed all the compliance requirements of the NCC-2016 Weatherproofing Verification Methods V2.2.1 & FV1 at the nominated test parameters. Complete details of all tests conducted and results are given in the body of this report.

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Derek Dubout 2 October 2017
 Authorised Signatory

TEST METHODS & PARAMETERS

Test Sequence

NCC-2016 Weatherproofing test procedures were conducted in accordance with Australian Standard AS/NZS 4284:2008, Testing of building facades, as detailed in Appendix A in the following sequence:

Static Pressure Wind Load Test.

Positive and negative serviceability limit state pressures were applied to the external face of the specimen for periods of 1 minute each.

Static Pressure Water Test.

A water penetration test was then carried out in accordance with Clause 8.5 of AS/NZS 4284:2008 at a static pressure of 300 for a period of 15 minutes.

Cyclic Pressure Water Test.

A water penetration test was then carried out in accordance with Clause 8.6 of AS/NZS 4284:2008 at the cyclic pressures of 245 - 490 Pa for 5 minutes.

Cyclic Pressure Water Test with 6mm Holes in Cladding.

6mm diameter holes were inserted in the external face of the specimen at the following locations:

- (AA) Wall/window joint at 3/4 height of the window
- (BB) Immediately above the window
- (CC)
- (DD) Above the meter box and the downpipe penetrations.

Water penetration test were then carried out in accordance with Clause 8.6 of AS/NZS 4284:2008 at the Static and Cyclic pressures as detailed above.

Static Pressure Water Test with Internal Lining Removed.

The internal acrylic lining of the sample was removed and a static water penetration test was then carried out in accordance with Clause 8.5 of AS/NZS 4284:2008 at a static pressure of 50Pa for a period of 15 minutes.

Test Equipment

Water was applied via sprays located 300 mm away from the outdoor face of the test specimen. Water flow rate to the sprays was measured with a calibrated pressure gauge to an accuracy of 2% and was maintained at a level of 0.05 l/s.m² over the test area throughout the test. Water application was maintained continuously and water was observed to evenly cover the exterior face of the test specimen. All pressure transducers are calibrated against NATA certified manometers and may be taken to have a measurement accuracy of 1%.

Test Requirement

As per the Compliance requirements of NCC-2016 Weatherproofing Verification Methods V2.2.1 and FV1 that are given in Appendix B.

TEST RESULTS

Static Pressure Wind Load Test

The loads were sustained and there was no visible evidence of any cracking in the cladding.

Static Pressure Water Test

No leakage through the cladding system was observed during the test.

Cyclic Pressure Water Test

No leakage through the cladding system was observed during the test.

Cyclic Pressure Water Test with 6mm Holes in Cladding

No leakage through the cladding system was observed during the test.

Static Pressure Water Test with Lining Removed

No leakage through the cladding system was observed during the test. After the test the building wrap was cut away and there was evidence of minor quantities of water having penetrated the cladding joints however there was no pooling of water on the top of any horizontal surfaces.

APPENDIX A - TEST PROCEDURES FOR AS4284:2008

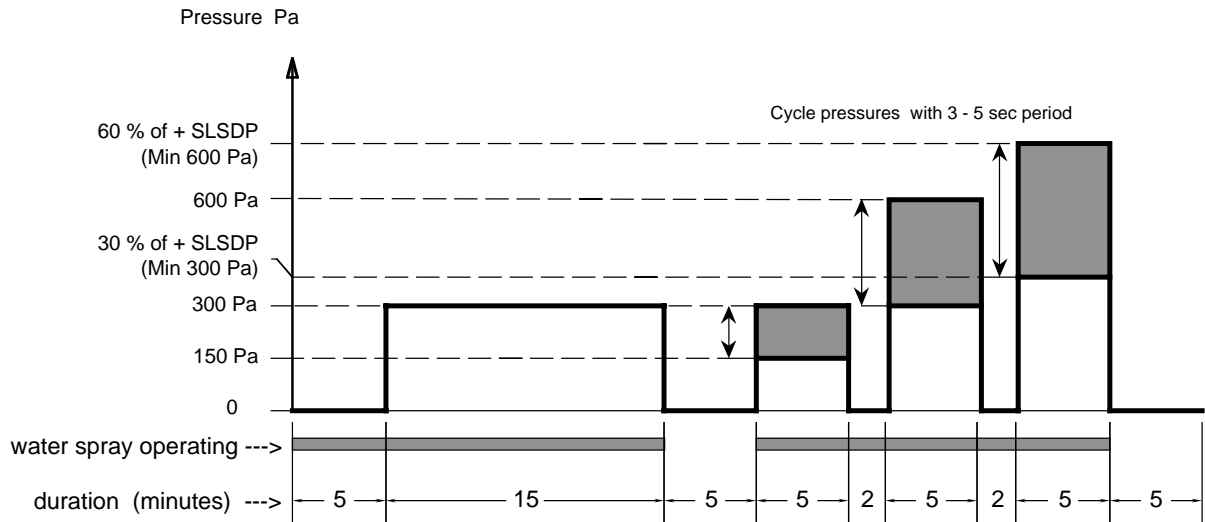
Water Penetration Tests

Test Parameters

Test pressures :	Static	30% of W_s (at least 300 Pa)	duration = 15 minutes
	Cyclic	15% - 30% of W_s	duration = 5 minutes
		20% - 40% of W_s	duration = 5 minutes
		30% - 60% of W_s	duration = 5 minutes

Water application rate : 0.05 L/m².s

Water penetration test sequence



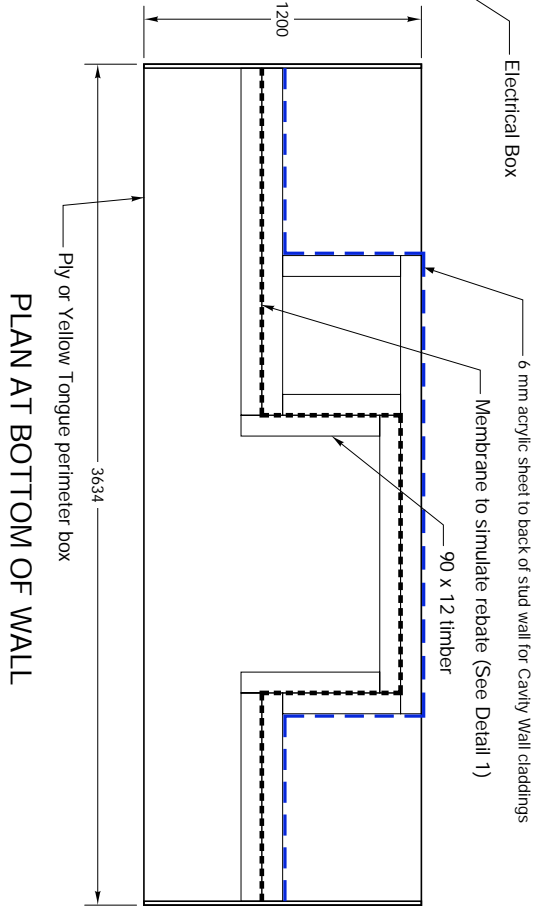
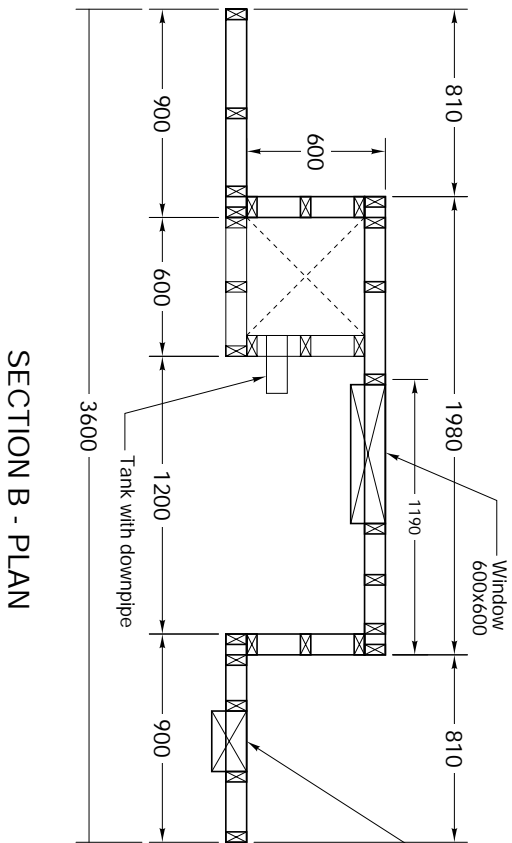
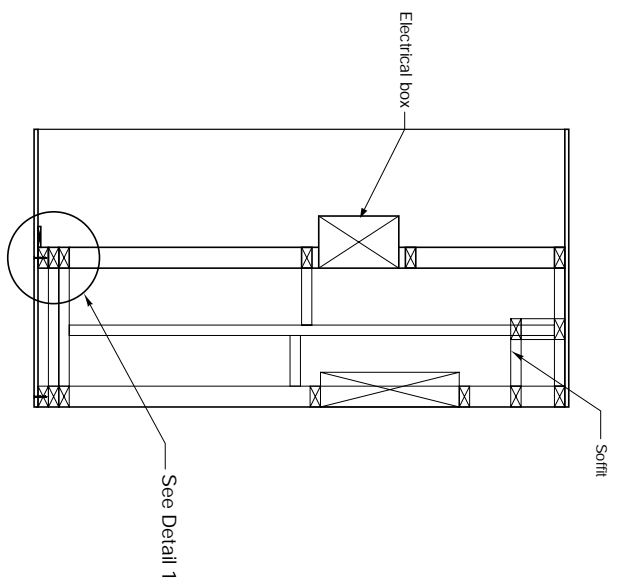
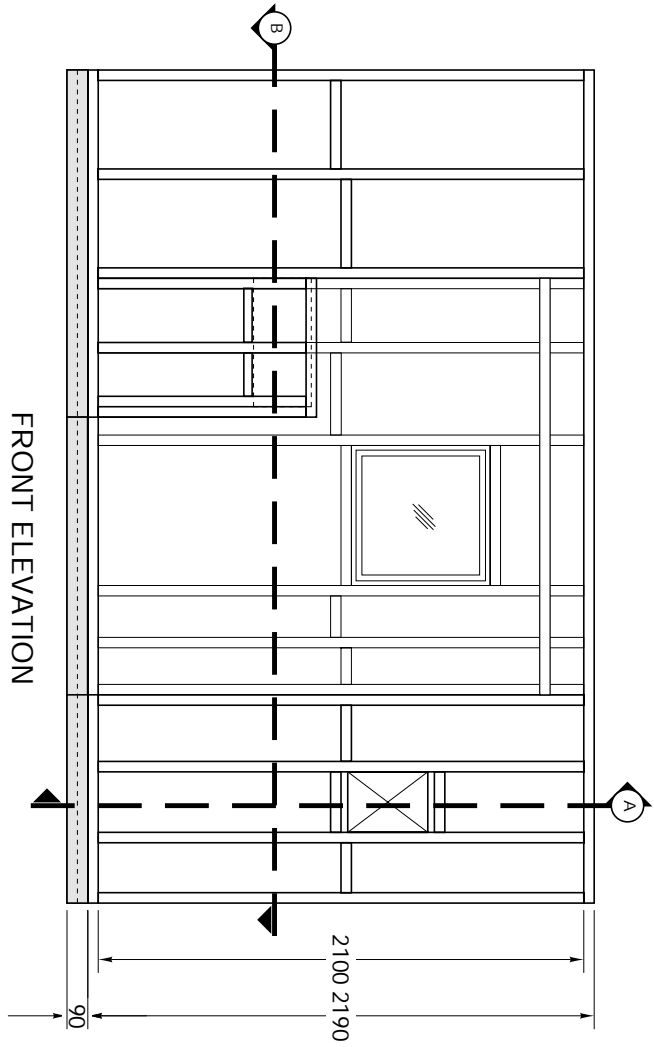
APPENDIX B - COMPLIANCE REQUIREMENTS FOR NCC 2016

Compliance requirements:

- (i) A *direct fix cladding wall* and *unique wall* are verified for compliance with **FP1.4** if there is no presence of water on the inside surface of the facade.

- (ii) A *cavity wall* is verified for compliance with **FP1.4** if there is no presence of water on the removed surface of the cavity, except that during the simulation of the failure of the primary weather-defence or sealing, water may—
 - (A) transfer to the removed surface of the cavity due to the introduced defects (6 mm holes); and
 - (B) contact, but not pool on, battens and other cavity surfaces.

NCC Verification Sample - Stud Wall Details



Technical Data Overview for Smartstone Systems

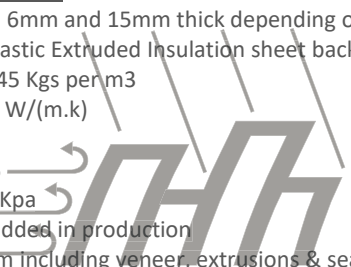
As installed for static & cyclonic wind load testing

Smartstone Systems comprises a natural stone, reconstituted stone, or porcelain veneer of between 6 & 12mm average thickness bonded to a backing panel under controlled conditions using an industrial polyurethane adhesive less than 1mm thick. The system is fixed to a structural wall using a series of continuous rail and clip extrusions made from 6063 grade aluminium that fit into a 4mm wide slot cut into the backing panel.

There are two system variants, Smartstone Systems Residential and Smartstone Systems Commercial. Both have a range of finishes available in all materials, but not all materials are available in both systems. The samples tested were Smartstone Systems Residential with basalt natural stone facing of nominal 8mm thickness.

Smartstone Systems Residential:

Veneer thickness between 6mm and 15mm thick depending on material
50mm thick XPS Thermoplastic Extruded Insulation sheet backing
Density of XPS panel 43 > 45 Kgs per m³
Thermal Conductivity 0.28 W/(m.k)
Flexural Strength 962Kpa
Dimensional Stability 0.7%
Compressive Strength 590Kpa
Fire Retardant chemicals added in production
Maximum weight of system including veneer, extrusions & sealant 42kgs per m²
Maximum size of individual panel 300 high x 1200 wide
Overall system thickness (back of clip to face of veneer) nominally 80mm



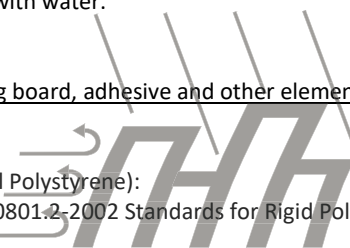
Installation commences with a continuous aluminium L-shaped extrusion with flanges that fit into a 4mm wide and 12mm deep groove cut into the edges of the backing panel on all sides. The centre of the groove is calibrated to 15mm back from the face of the veneer panel. On subsequent courses 74mm wide aluminium clips are fixed back to the structural wall. The clips also have aluminium flanges that fit into the groove in the backing material of the panels. These clips are identical to the Clip Rail, having been cut from the same extrusion.

Between the panels wherever there are not clips or rails a PVC extruded joiner is set into the groove in the backing board. A silicone or polyurethane sealant is applied to all adjoining faces as the panels are assembled to fill gaps between panels, clips, extrusions and joiners as the panels are set in place. This 'tongue and groove' method of inserting the joiners physically lock panels together to prevent movement, help keep the faces of panels in line due to the calibration of the groove from the face, reduce lateral movement of the panel and improve water tightness of the system, but are not considered to bear load vertically.

Reveal & End Cap extrusions are used to provide continuous support to vertical and horizontal boundaries as required at wall junctions, over windows, at soffits, and at the top of the wall. In extremely high wind-load areas continuous clip rail extrusions may be used in horizontal and/or vertical joints rather than individual clips to increase the overall strength of the system. The system was tested using clips only on studs at 600mm centres.

The variety of possible veneer finishes available are too numerous to be described here. For the purposes of calculation a nominal maximum weight of 2,800 kgs per m³ has been specified as this represents the mass of the heaviest veneer material offered when saturated with water.

Technical data on backing board, adhesive and other elements:



XPS (Extruded Closed Cell Polystyrene):
Manufactured to GB/T 10801.2-2002 Standards for Rigid Polystyrene.
Blowing agent HFC 152a
Nominal Density 41kgsM³ > 45KgsM³
Water Absorption by Immersion (28 days) <0.5%
K- Value /Thermal Conductivity, (per 25mm thickness) 0.28
R-Value (per 25mm thickness) 0.9
Fire Resistant to B-1 level

Laminating Adhesive:
Polyurethane (Expanding)
Water Absorption <0.4%
Adhesion Test GB6329 standard - 15Mpa

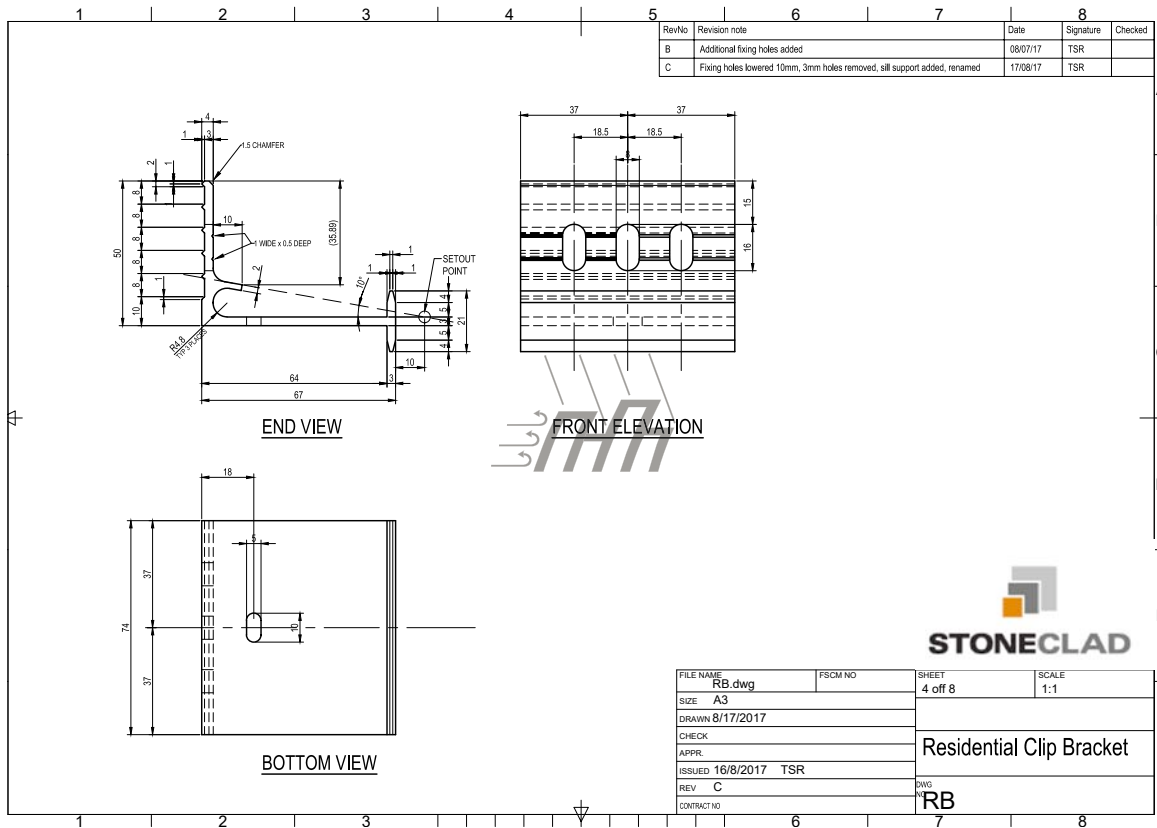
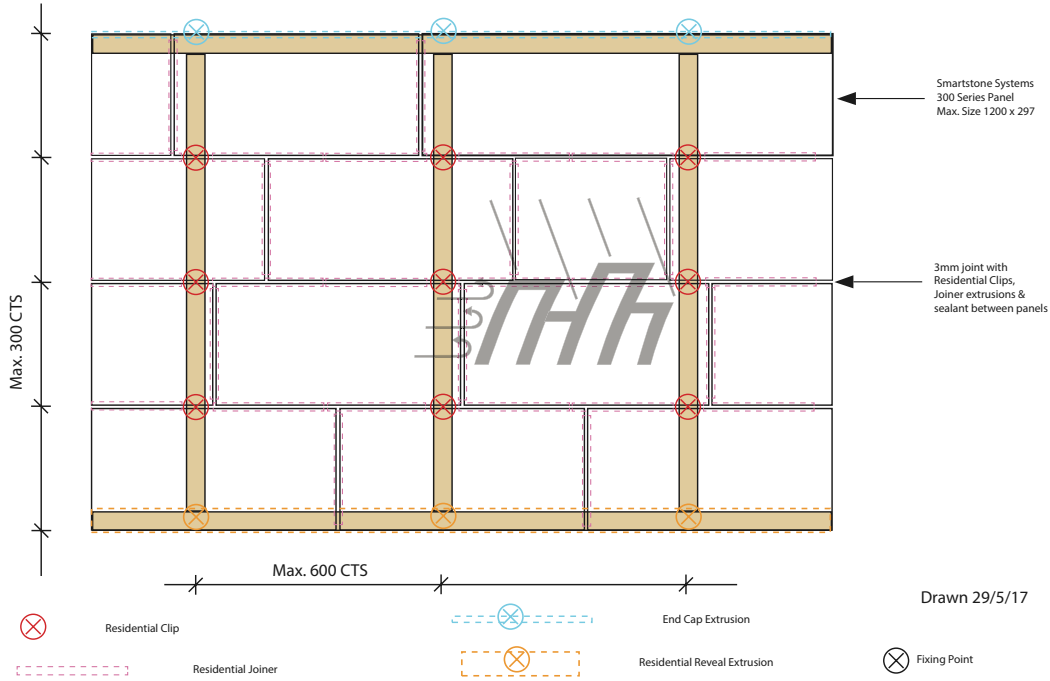
System was fixed to frame using 12g 'Type 17' 65mm roofing screws.

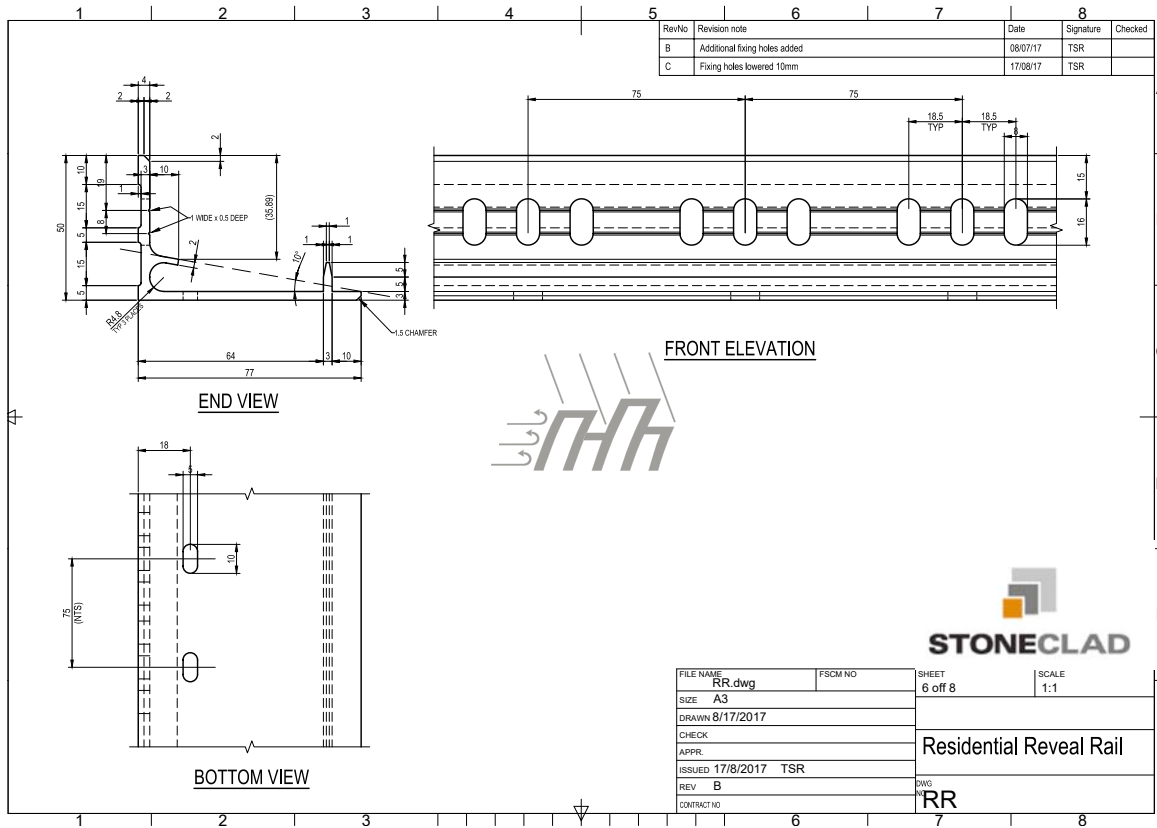
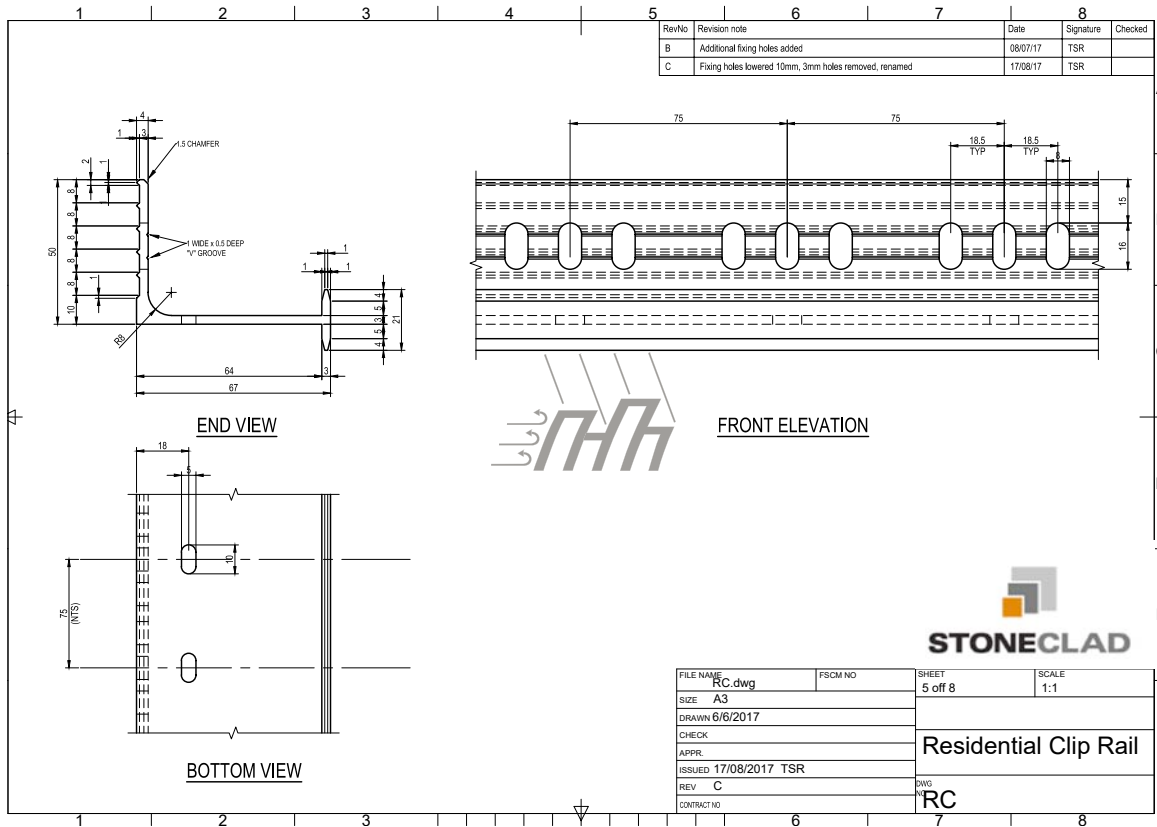
Sealant used was neutral cure silicone.

Ametalin Silverwrap medium duty breather wall wrap reflective insulation was used as sarking on the frame.

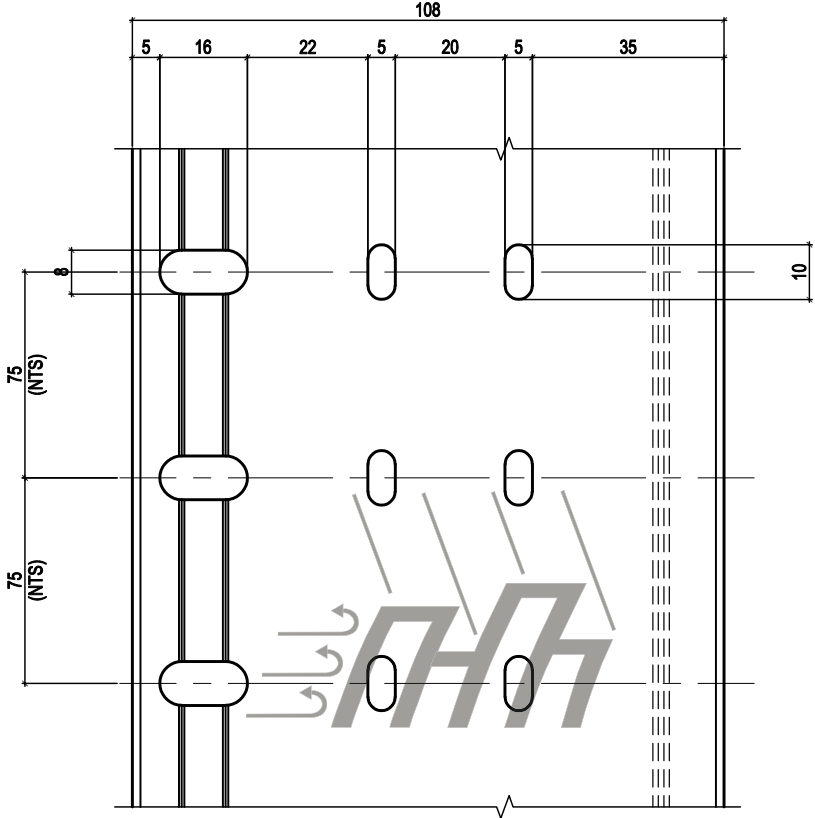
Smartstone Systems
Typical Fixings Layout
Fixings @ 600 Centres

Maximum System weight of 42kgs per m2

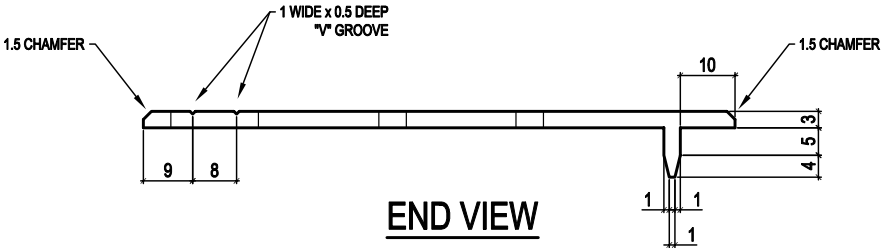




Smartstone Systems
End Cap Extrusion

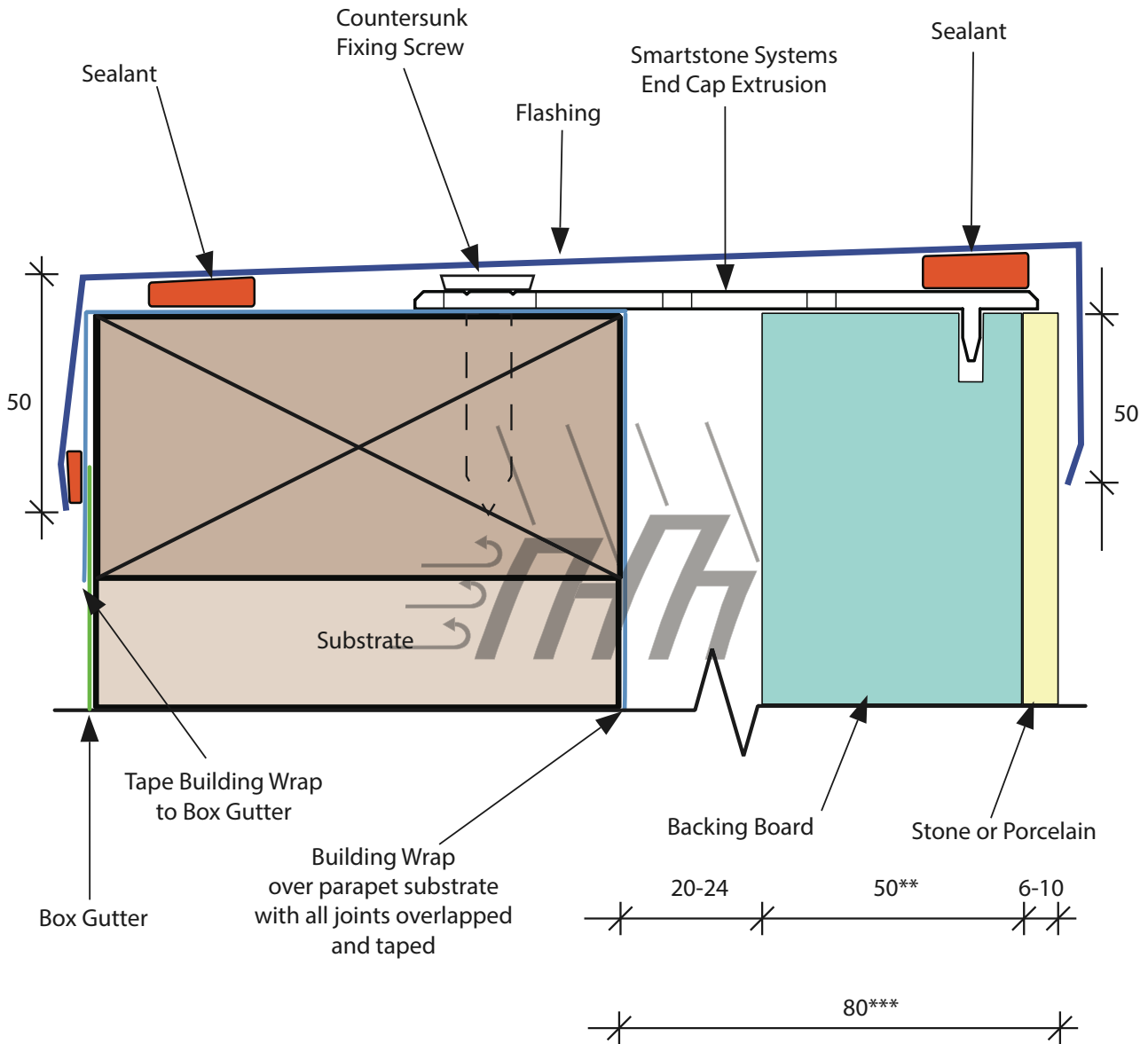


PLAN VIEW



END VIEW

Smartstone Systems Parapet Detail - Section View



NOTES:

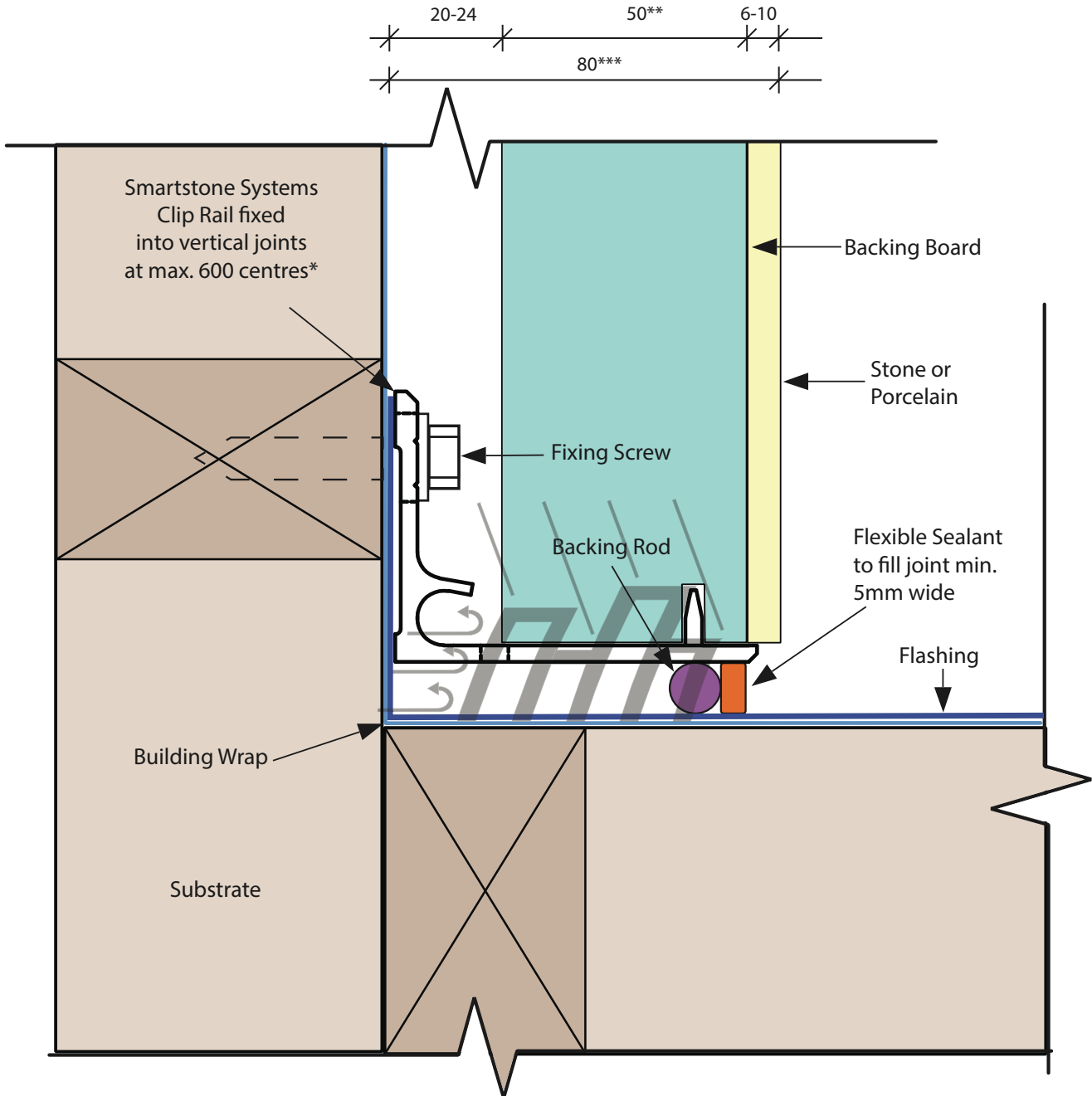
**Thickness of backing may vary between 20 and 50mm.

*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17
Not to Scale



Smartstone Systems Typical Parapet to Wall Detail - Section View



NOTES:

* Maximum space between joiners or joiners & clips to be 20mm. Care must be taken to ensure sealant is applied along all extrusions and clips, and that particular care is taken to ensure adequate sealant applied to ensure spaces are filled.

**Thickness of backing may vary between 20 and 50mm.

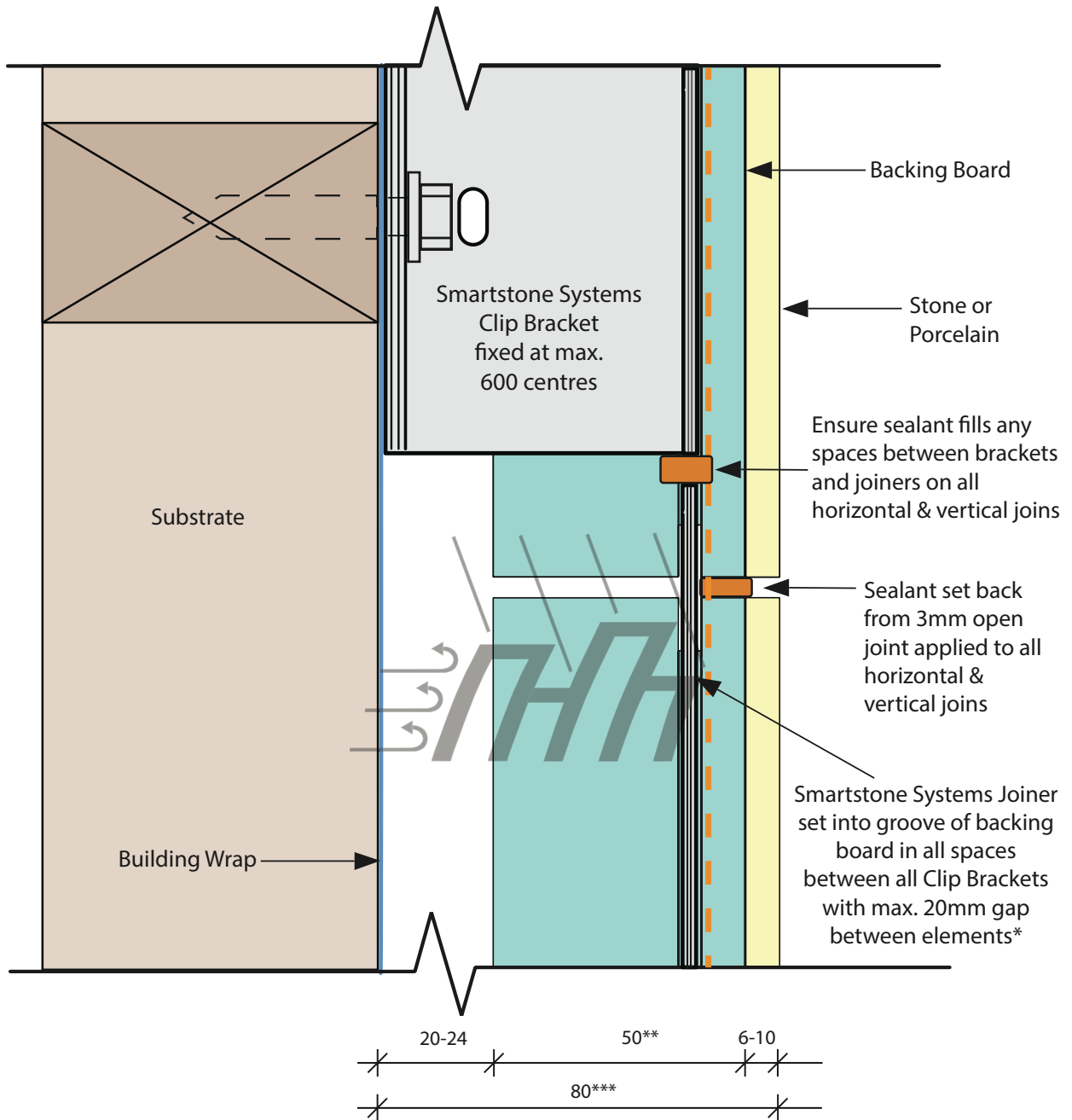
*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

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Not to Scale



Smartstone Systems Typical Horizontal Joint Detail showing Bracket & Joiner - Plan View

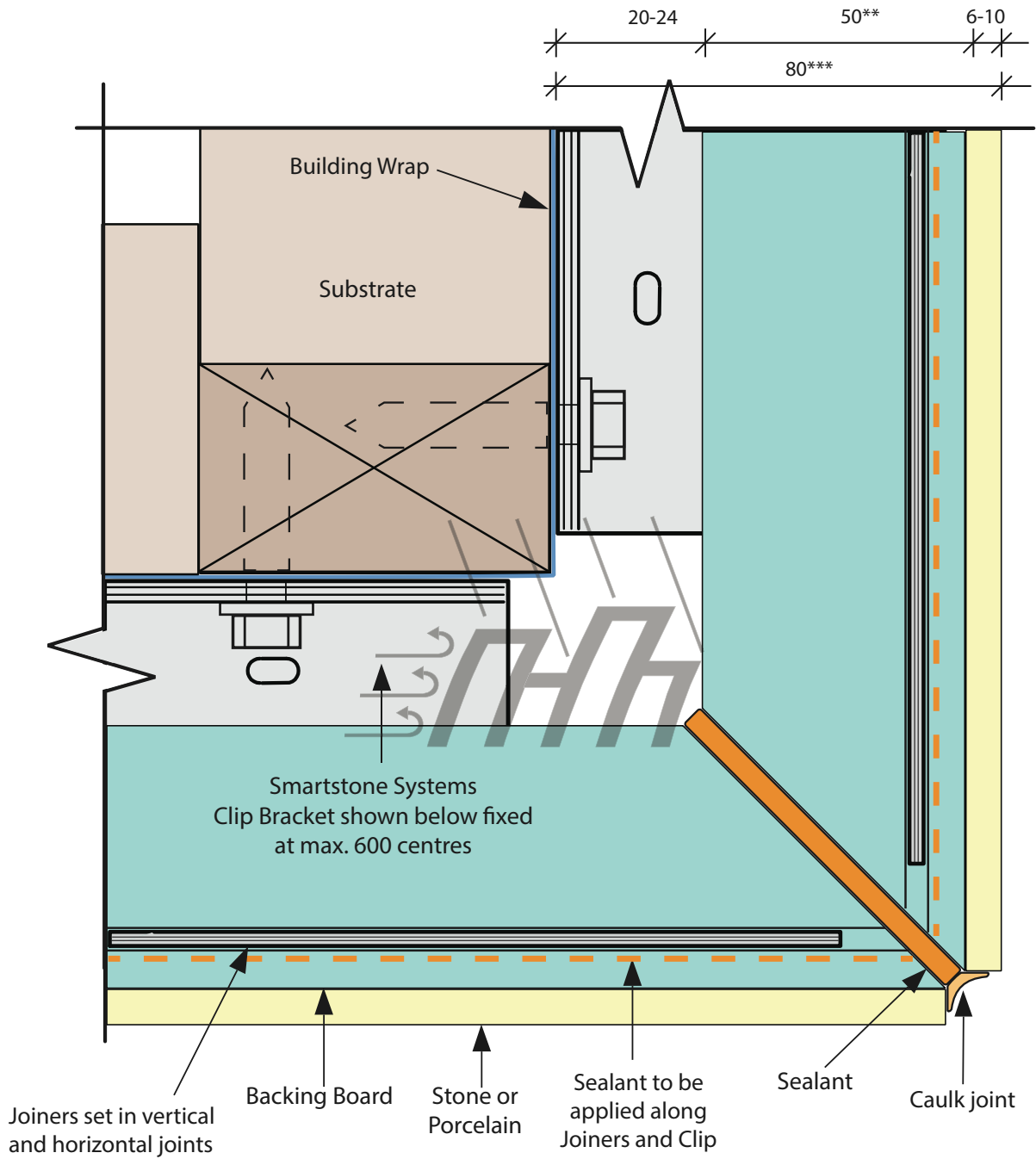


NOTES:
 * Maximum space between joiners or joiners & clips set in grooves to be 20mm. Care must be taken to ensure sealant is applied along all extrusions and clips, and that particular care is taken to ensure adequate sealant applied to ensure spaces are filled.
 **Thickness of backing may vary between 20 and 50mm.
 *** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17
 Not to Scale



Smartstone Systems Quirk Mitre / Birdsmouth Detail - Plan View



NOTES:

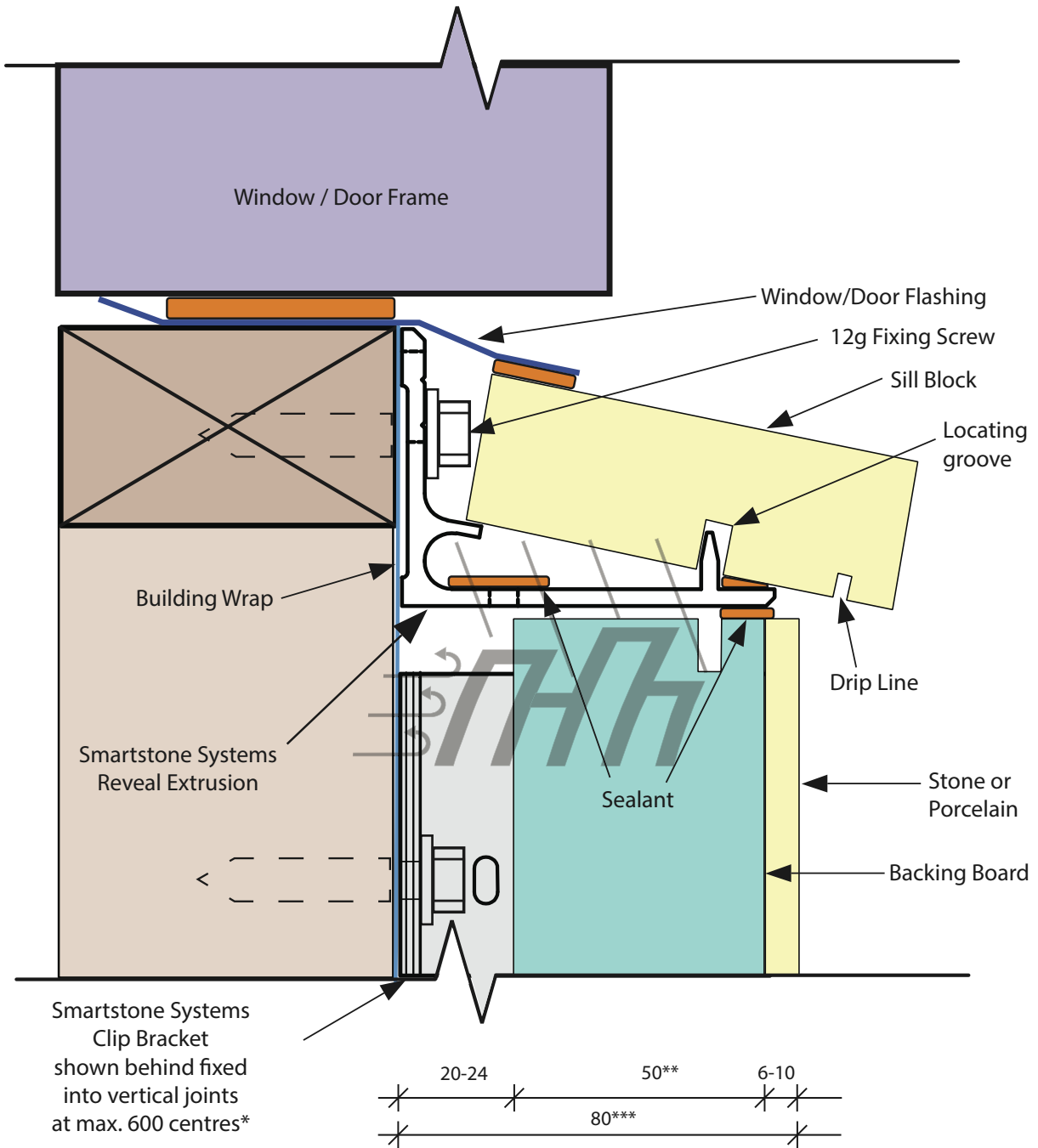
**Thickness shown for Smartstone Systems XPS Backing. MPS Backing may be between 25 and 50mm.

*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17
Not to Scale



Smartstone Systems Sill Detail - Section View



NOTES:

* Maximum space between joiners or joiners & clips to be 20mm. Care must be taken to ensure sealant is applied along all extrusions and clips, and that particular care is taken to ensure adequate sealant applied to ensure spaces are filled.

**Thickness shown for Smartstone Systems XPS Backing. MPS Backing may be between 25 and 50mm.

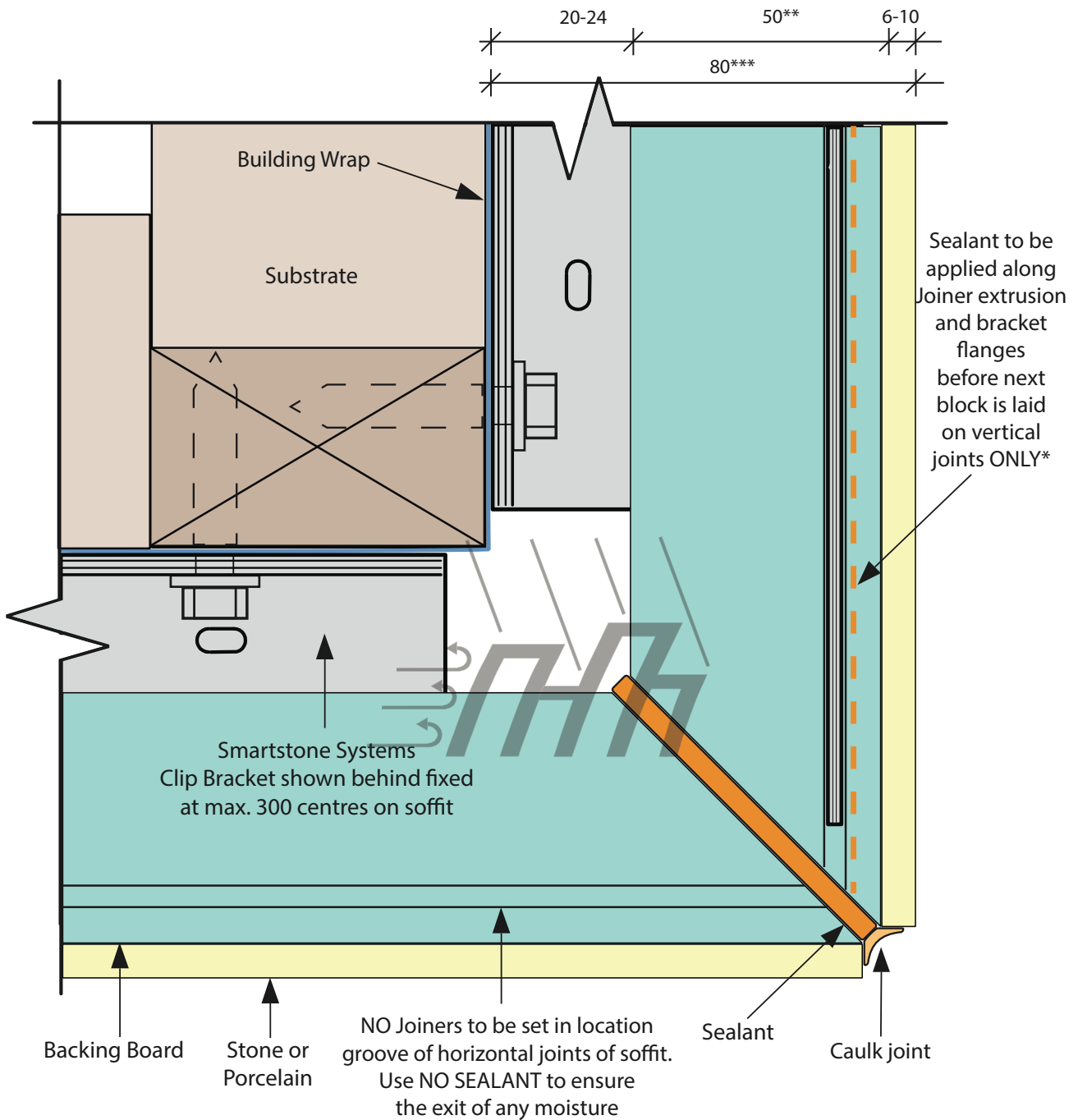
*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17

Not to Scale



Smartstone Systems Soffit Detail - Section View



NOTES:

* Maximum space between joiners or joiners & clips to be 20mm. Care must be taken to ensure sealant is applied along all extrusions and clips, and that particular care is taken to ensure adequate sealant applied to ensure spaces are filled.

**Thickness shown for Smartstone Systems XPS Backing. MPS Backing may be between 25 and 50mm.

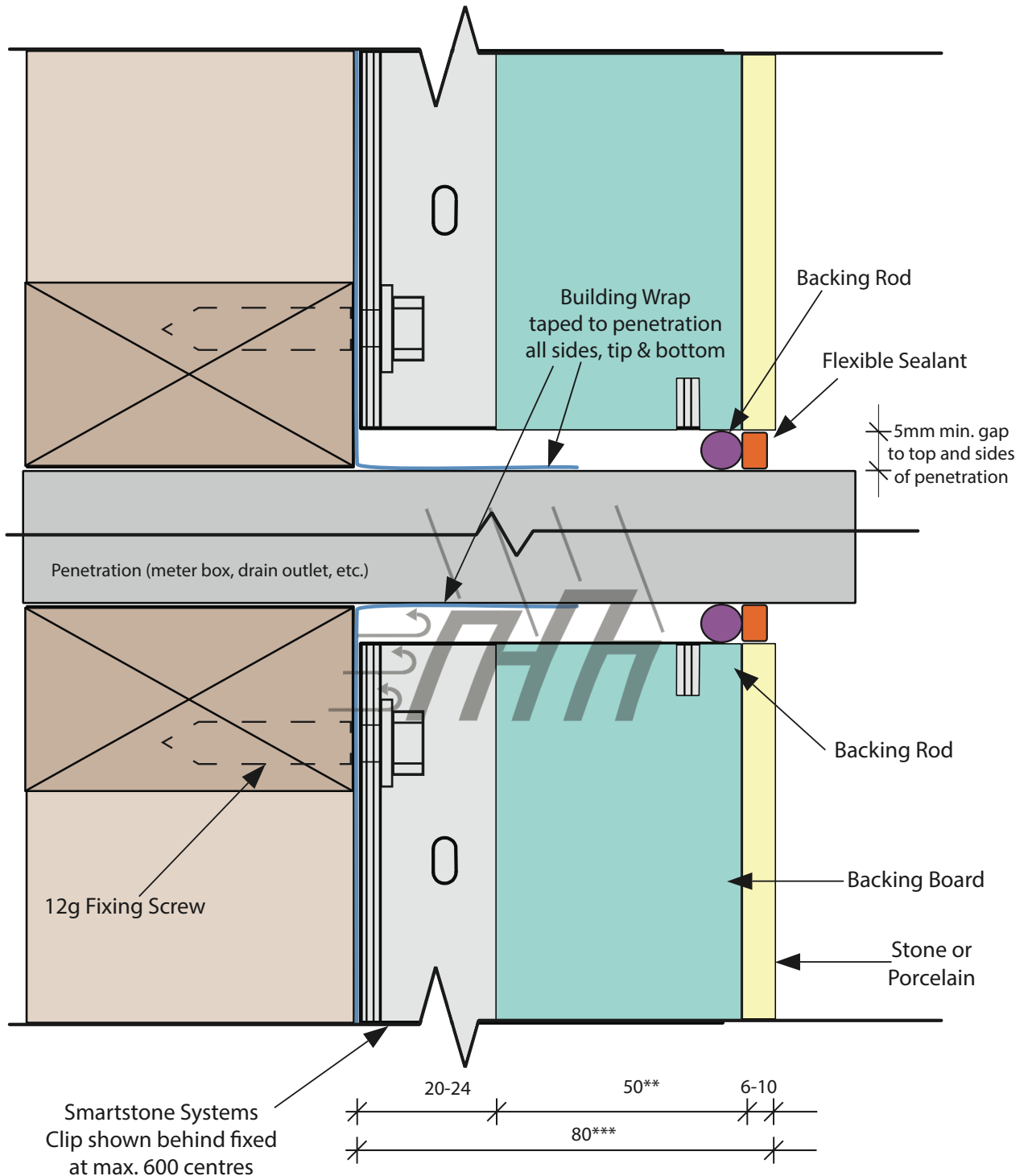
*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17

Not to Scale



Smartstone Systems Typical Penetration Detail - Plan View



NOTES:

**Thickness of backing may vary between 20 and 50mm.

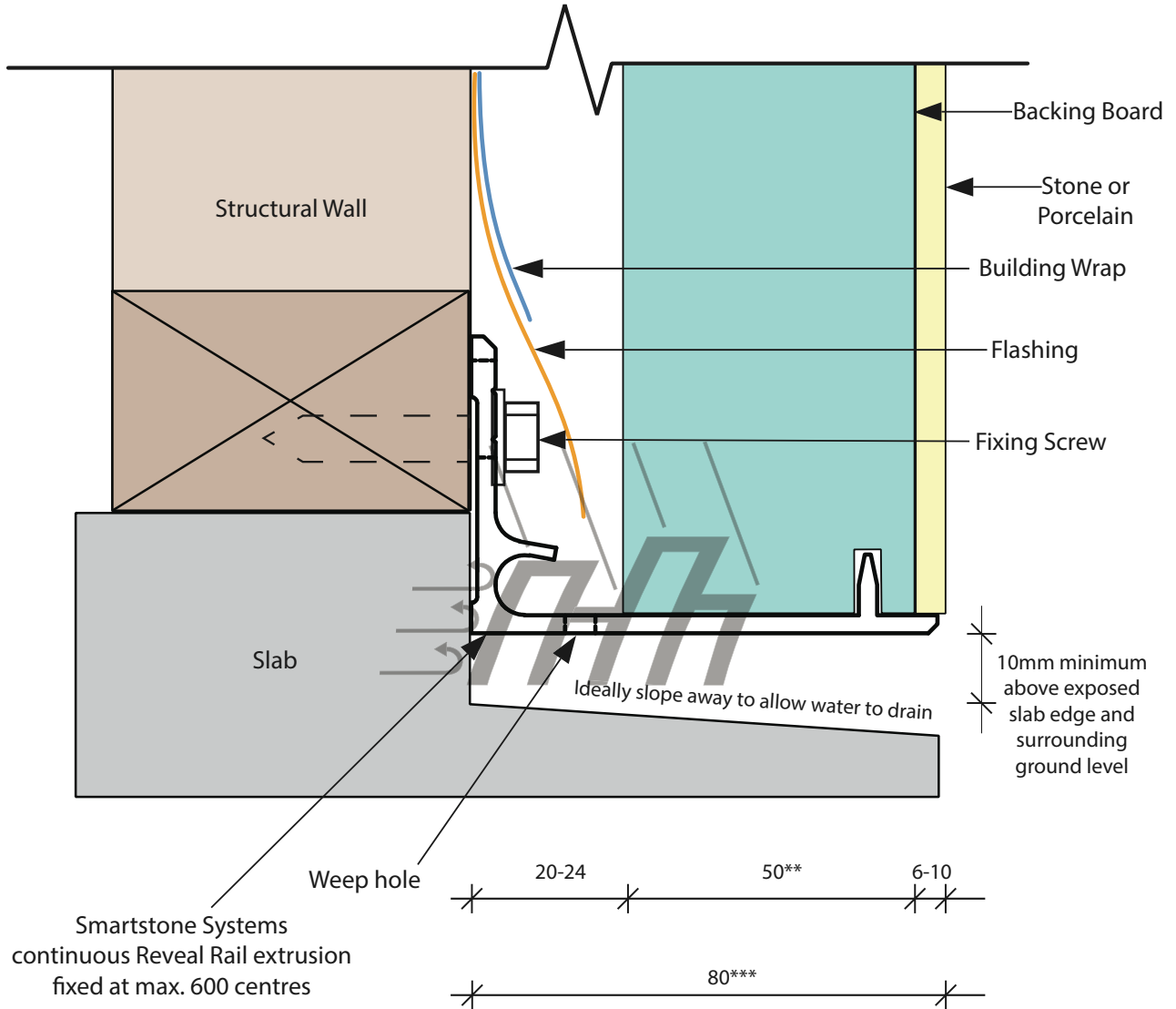
*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17
Not to Scale



Smartstone Systems

Typical Starting Detail - Section View



NOTES:

**Thickness shown for Smartstone Systems XPS Backing. MPS Backing may be between 25 and 50mm.

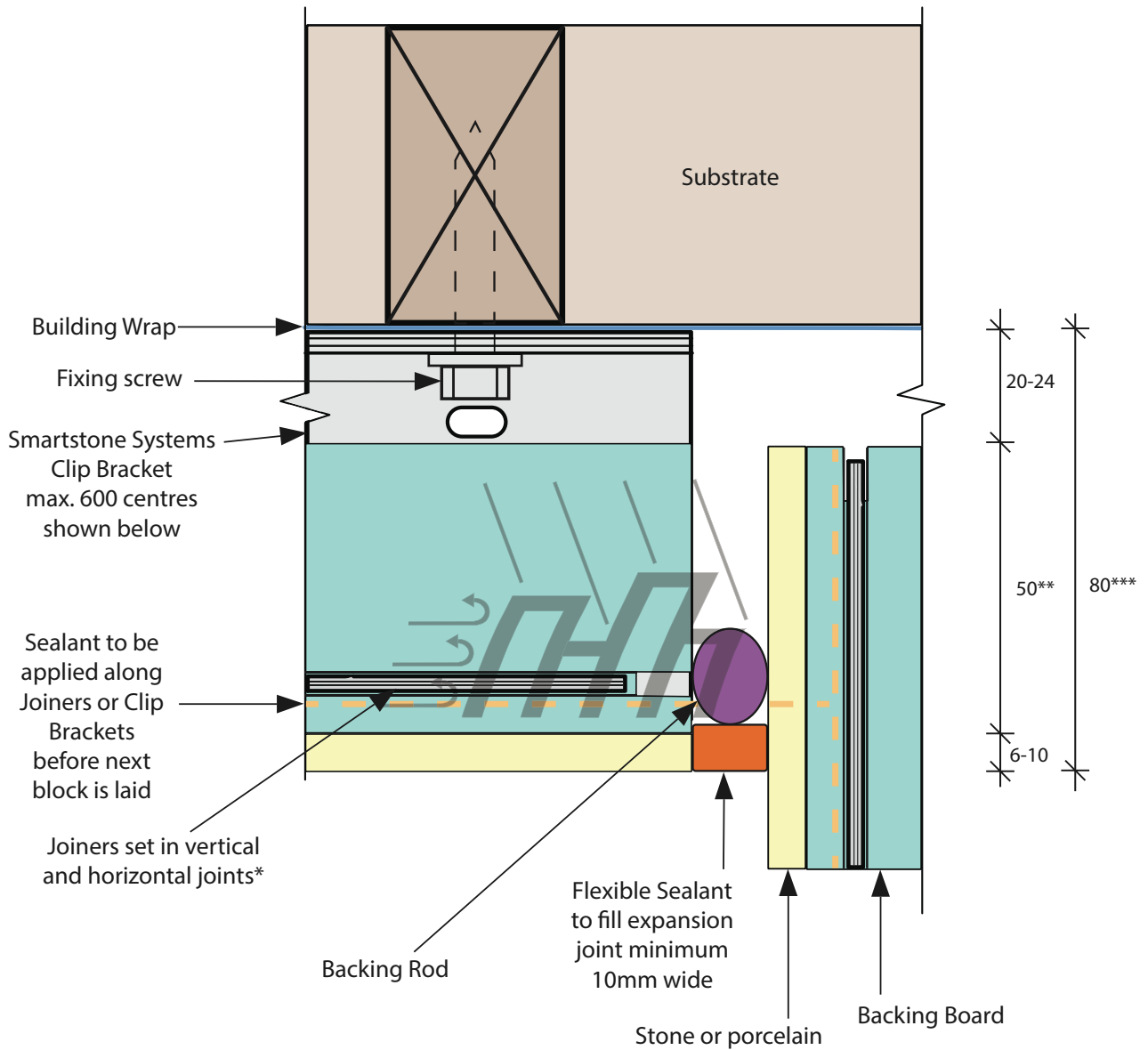
*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17

Not to Scale



Smartstone Systems Vertical Expansion Joint Detail - Plan View



NOTES:

* Maximum space between joiners or joiners & clips to be 20mm. Care must be taken to ensure sealant is applied along all extrusions and clips, and that particular care is taken to ensure adequate sealant applied to ensure spaces are filled.

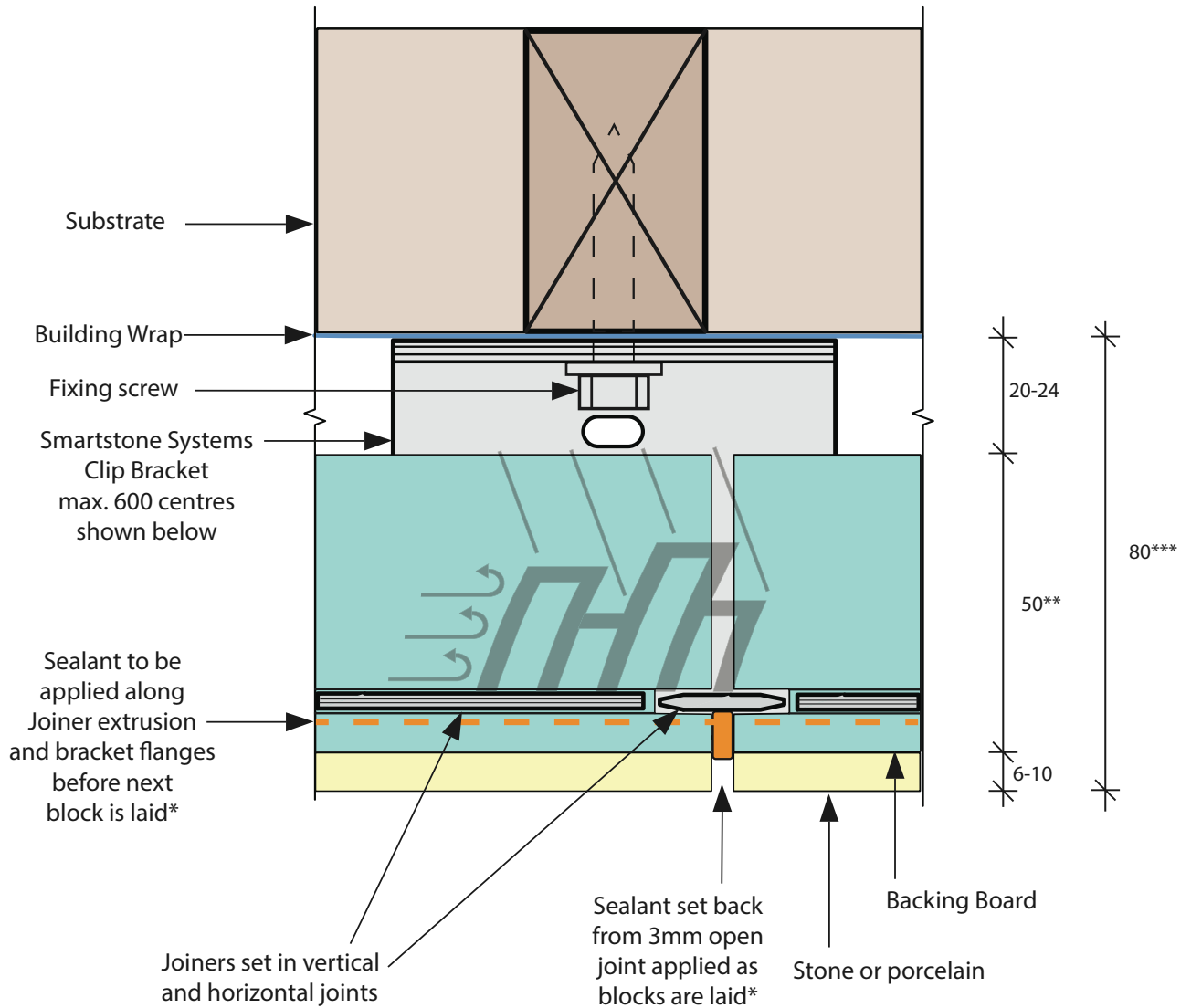
**Thickness shown for Smartstone Systems XPS Backing. MPS Backing may be between 25 and 50mm.

*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17
Not to Scale



Smartstone Systems Vertical Joint Detail - Plan View



NOTES:

* Maximum space between joiners or joiners & clips to be 20mm. Care must be taken to ensure sealant is applied along all extrusions and clips, and that particular care is taken to ensure adequate sealant applied to ensure spaces are filled.

**Thickness shown for Smartstone Systems XPS Backing. MPS Backing may be between 25 and 50mm.

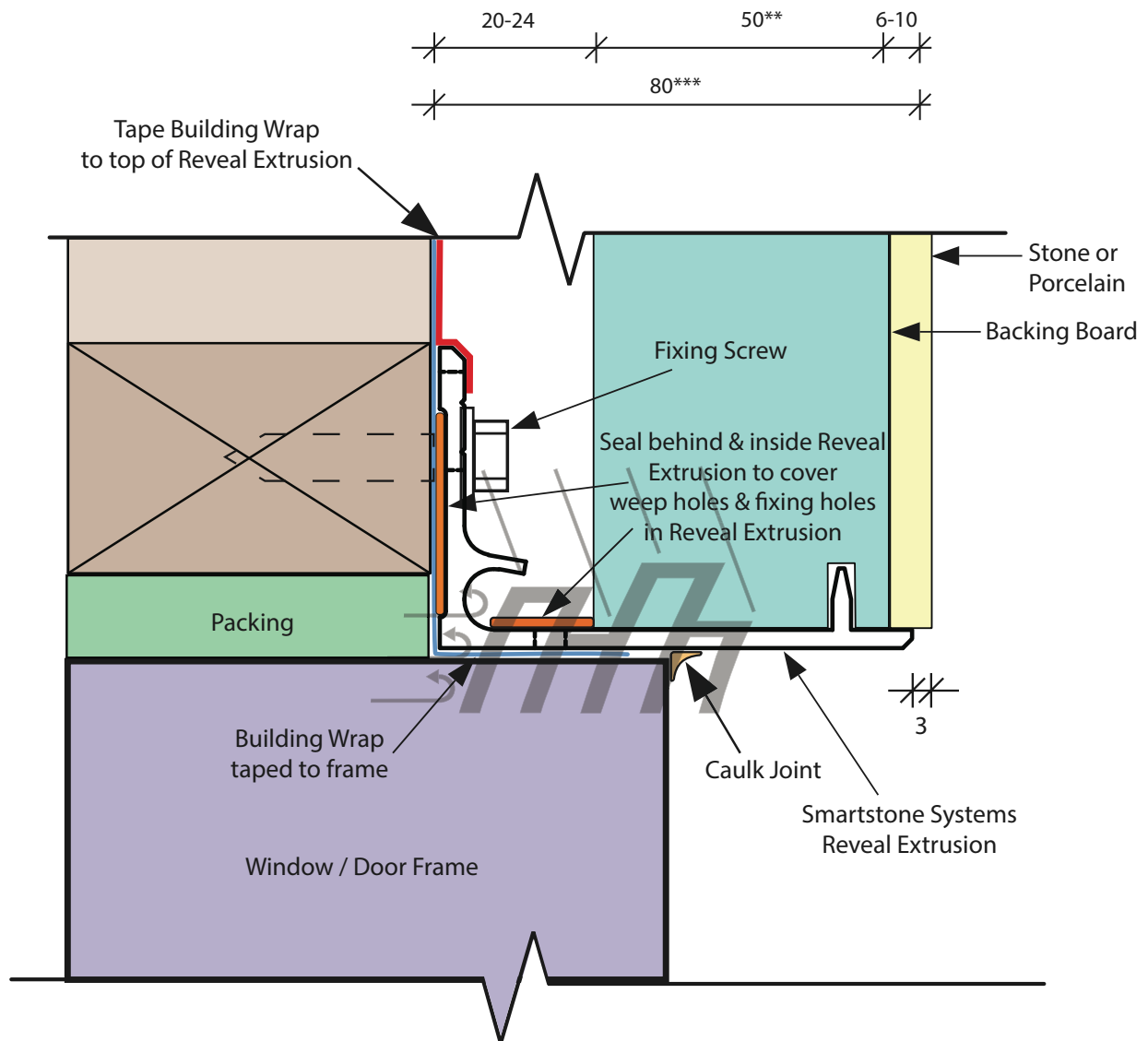
*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17

Not to Scale



Smartstone Systems Typical Window Head Detail - Section View



NOTES:

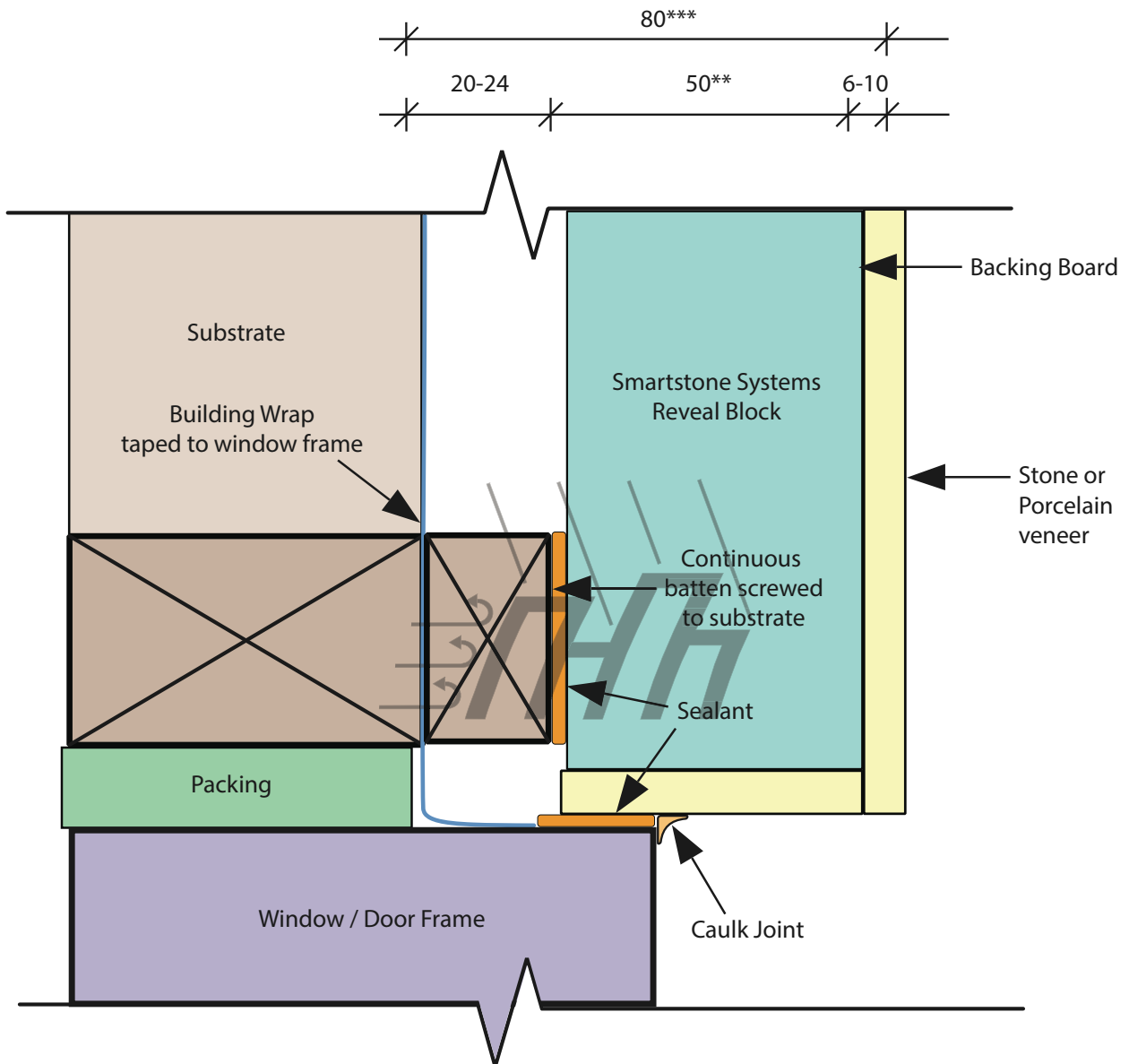
**Thickness shown for Smartstone Systems XPS Backing. MPS Backing may be between 25 and 50mm.

*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17
Not to Scale



Smartstone Systems Typical Window Reveal Detail using Reveal Block - Plan View



NOTES:

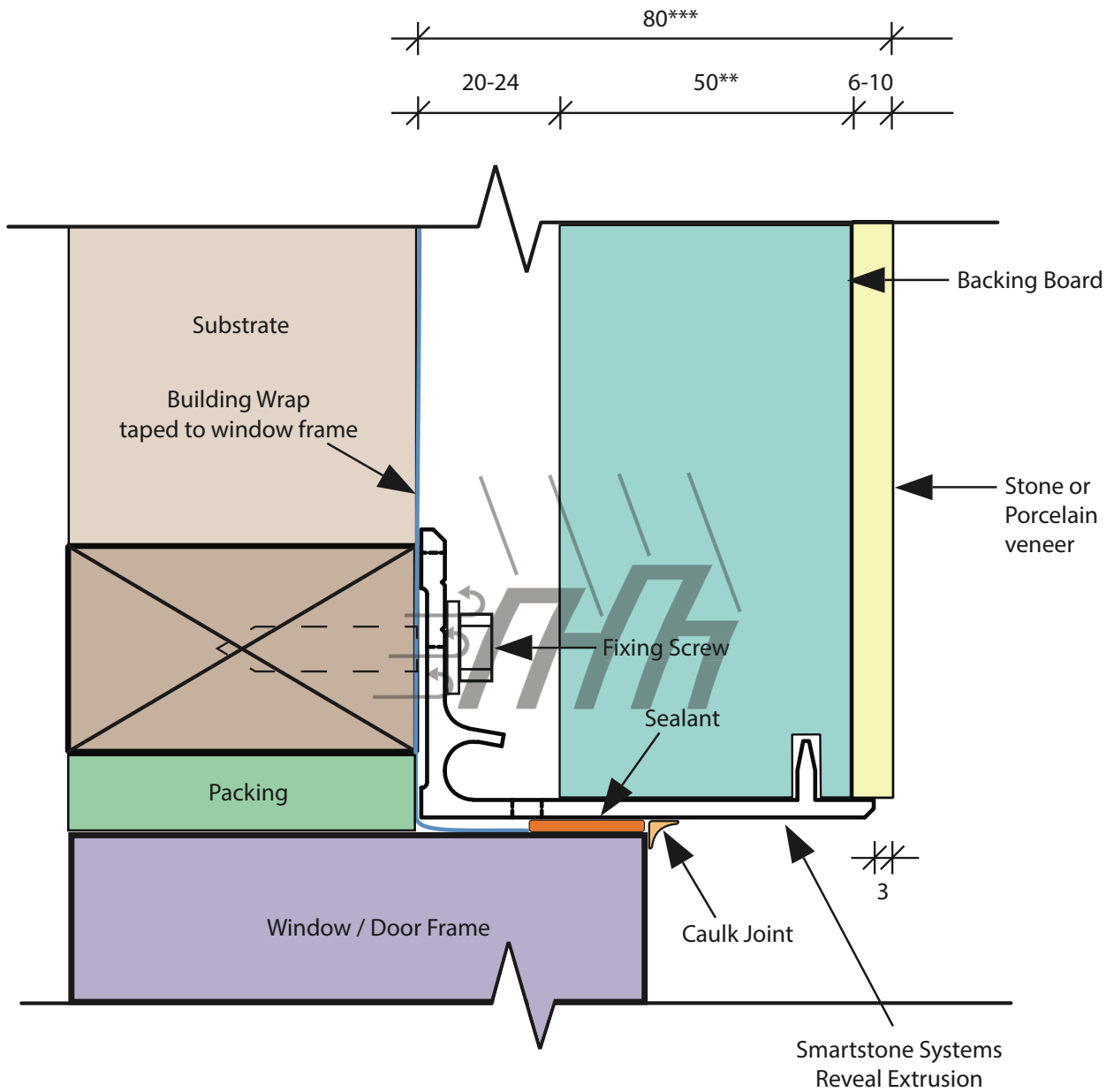
**Thickness shown for Smartstone Systems XPS Backing.
MPS Backing may be between 25 and 50mm.

*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17
Not to Scale



Smartstone Systems Typical Window Reveal Extrusion Detail - Plan View



NOTES:

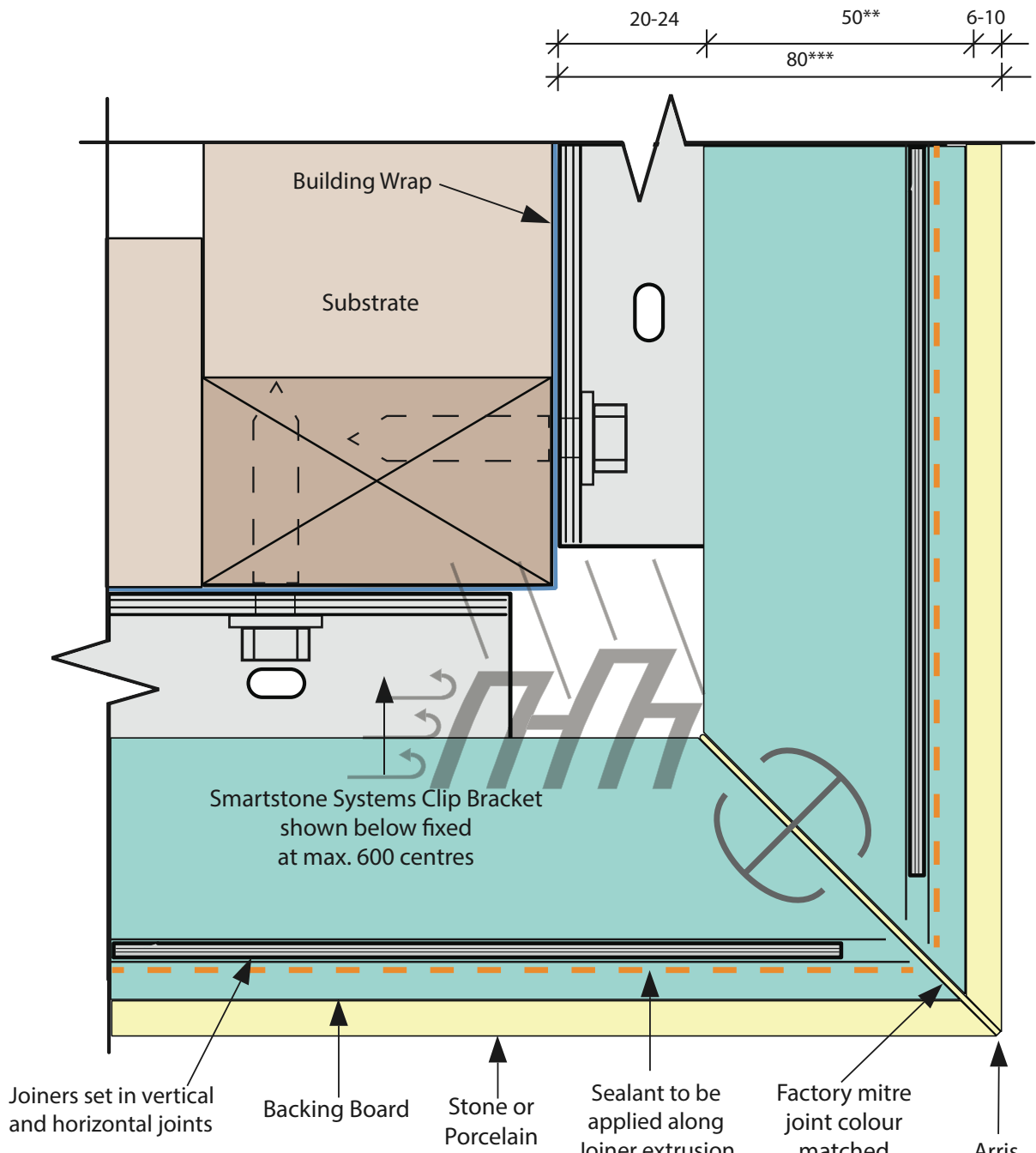
**Thickness shown for Smartstone Systems XPS Backing.
MPS Backing may be between 25 and 50mm.

*** Overall thickness of systems using Smartstone
Systems Commercial extrusions is 50mm

19/8/17
Not to Scale



Smartstone Systems Corner Block Detail - Plan View



NOTES:

* Maximum space between joiners or joiners & clips to be 20mm. Care must be taken to ensure sealant is applied along all extrusions and clips, and that particular care is taken to ensure adequate sealant applied to ensure spaces are filled.

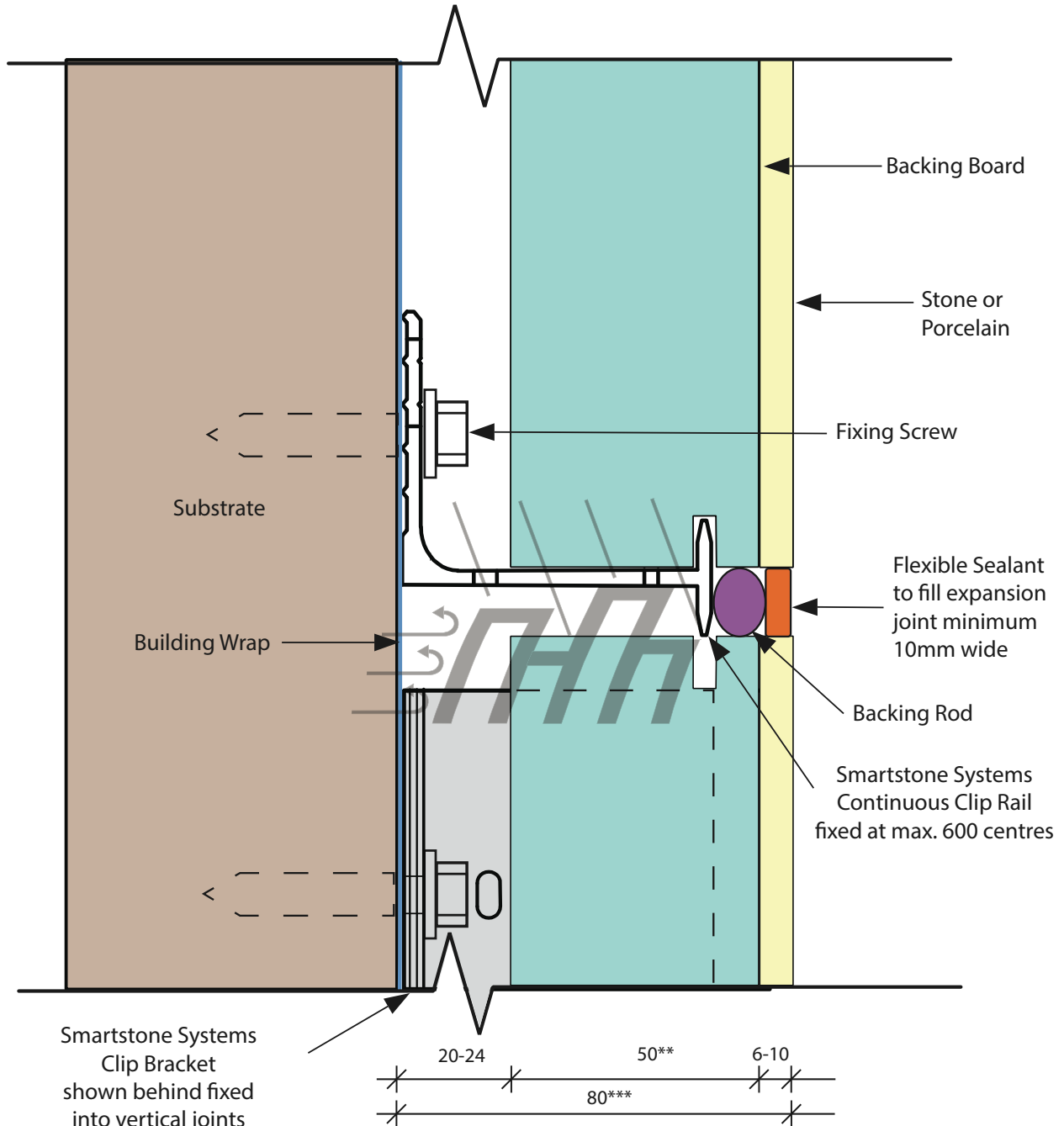
**Thickness of backing may vary between 20 and 50mm.

*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17
Not to Scale



Smartstone Systems Typical Horizontal Expansion Joint Detail - Section View



Smartstone Systems
Clip Bracket
shown behind fixed
into vertical joints
at max. 600 centres*

NOTES:

* Maximum space between joiners or joiners & clips to be 20mm. Care must be taken to ensure sealant is applied along all extrusions and clips, and that particular care is taken to ensure adequate sealant applied to ensure spaces are filled.

**Thickness shown for Smartstone Systems XPS Backing. MPS Backing may be between 25 and 50mm.

*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17

Not to Scale

