ACOUSTIC LABORATORIES AUSTRALIA PTY LTD

DETERMINATION OF AIRBORNE SOUND INSULATION

Perma Composites
WPC Fence Panel

Report No. ALA 19-081-1

Tested to AS1191

24 January 2019

For

Perma Composites
14 Garino Rise
Wangara WA 6065

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Rev No.	Rev Date	Revision Description	Prep by
initial	24 January 2019	Issued to Client	N Gabriels

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1. TEST OBJECTIVE

Perma Composites commissioned Acoustic Laboratories Australia to measure the sound reduction performance of their 1800mm high WPC Fence Panel with aluminium perimeter trim

The tests were carried out at the Heafod Laboratory facility in Bayswater, Western Australia. The sample under test was mounted in a filler wall constructed within the vertical aperture between two side-by-side reverberant rooms.

The sound pressure level difference between these two rooms when a broadband sound source operates in the source room together with the total acoustic absorption in the receiving room is used to determine the airborne sound reduction of the sample.

The test was carried out to Australian Standard AS1191-2002, *Acoustics - Method for Laboratory Measurement of Airborne Sound Insulation of Building Elements* as described in this report.

The results of the measurements have been rated in accordance with the Australian / International Standard AS / ISO 717-1:2004 *Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne Sound Insulation.*

2. DESCRIPTION

2.1 Filler wall

Because the height of the Fence panel at 1800mm is small in comparison to the 2.67metre high opening between the 'source' and 'receiver' chambers, a filler wall was constructed in the aperture between the two rooms of the test facility. The 'filler wall' was designed so that the sound reduction through the filler wall was 10dB higher than the sound reduction in each of the one third octave band frequencies of the sample under test. The filler wall was constructed as a dual stud frame wall

A dual stud frame filler walls was previously tested within this laboratory and achieved a sound reduction performance of Rw 67, Rw + Ctr 61. (ALA 13-082-1). The construction of the filler wall for this test was:

- 2 layers 13mm fire rated Plasterboard
- 75mm stud frame with 75mm glasswool Insulation
- 110mm gap
- 75mm stud frame with 75mm glasswool Insulation
- 2 layers 13mm Fire rated Plasterboard.
- Perimeter of wall was sealed with a flexible sealant.

The sound reduction for the filler wall used in the calculation are the results of Laboratory Test ALA 13-0982-1.

Sound Reduction of Filler Wall in 1/3 Octave Bands						
Frequency (Hz)	125	250	500	1k	2k	4k
Sound Reduction (R) in dB	42.5	54.8	65.3	71.2	77.1	77.9
	44.8	57.8	67..5	74.5	77.4	80.5
	51.6	61.1	68.9	75.0	75.8	81.6

Table 1 – Sound Reduction of Filler Wall

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To ensure the low frequency performance of the installed filler wall exceeds the levels set out in the Table above, the gap was increased to 140mm, and 3 layers of fire rated plasterboard was installed to both sides of the Filler Wall

2.2 Installation of the Sample:

The installation of the Sample involves the construction of a filler wall in the test aperture between the two chambers. The test sample was installed in the Test Aperture within the filler wall. As the sound reduction performance of the filler wall is known, the performance sample as installed can be determined.

The reveal (opening) in the filler wall for the installation of the window frame was lined with 3 layers 13mm fire rated plasterboard. The sill in the opening was set at 420mm above the laboratory floor. A saw cut was made in the reveal lining to maintain the discontinuous construction of the dual stud filler wall. The fence panel was then installed in the aperture with the frame covering the discontinuous break in the reveal lining.

The full perimeter of the frame was silicone sealed to the reveal lining in the filler wall on both sides of the frame

Time of Installation and Test

Filler wall was constructed:	November 20, 2018
Filler wall was modified	January 22, 2019
Fence panel installed and tested	January 23, 2019

2.3 Test Sample

Details of the sample as advised by Perma composites are:

Product Name:	WPC fence Panel
Sample Size:	1,800 mm high, 1,800 mm wide
Material:	Wood Plastic Composite
Sample Description:	Fence Panel 51mm thick overall, consisting of • 31mm vertical ribs • Spaced 35mm apart • 20mm deep, with • 7mm thick web

Detail Drawings attached

Thermal Conditions during Tests	Temperature	Relative Humidity
	==========	==========
Source Room	25°C	41%
Receiver Room	25°C	40%
Atmospheric Pressure:	1007 hPa	

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3. TEST FACILITIES

3.1 Size of test Rooms

The test facilities are constructed of reinforced concrete and are structurally isolated from each other. The rooms are parallelepiped with a reverberant source room volume 81m^3 and a reverberant receiver room volume of 208m^3. In accordance with clause 5.2.2 of AS1191, an adequate number of room modes exist above 126 Hz for the Source room and 92 Hz for the Receiver room.

3.2 Aperture between Rooms

The size of the opening between the rooms is 3.73m x 2.64 metres, 9.85m^2.

3.3 Acoustic Diffusion

Sound diffusion is achieved by the location of large 19mm structural ply panels randomly oriented and freely suspended.

Acoustic diffusion is provided in the Receiving Room by 6 panels of 1.44 m^2 each, and 5 panels of 2.88m^2 each. Total area (two sided) of panels is 46 m^2, being 22% of the of the total surface area of the room.

The Source Room has acoustic diffusion provided by 6 panels of 1.44 m^2. Total area (two sided) of panels is 17.3m^2, being 15.5% of the total surface area of the room.

3.4 Acoustic Absorption

The average absorption coefficients of the diffusers and the internal surfaces of the room is less than 0.06 in each test frequency band.

4. TEST PROCEDURE

The test procedure involves a noise source fed to loudspeakers in the Source room. The sound pressure levels in both the Source and Receiver rooms were measured. In addition, the Reverberation Times in the Receiver room was measured.

4.1 Noise Source

Two wide band random noise generators were connected via a two channel amplifier to two loudspeakers. The loud speakers were positioned in the trihedral corners of the room opposite the specimen under test.

The noise level of the source was adjusted so that the sound levels in the Receiving room were at least 10 dB above the Background noise level in all relevant frequency bands.

4.2 Microphone Positions

A single microphone was used for the measurement in both the Source and Receiver rooms. A total of 7 microphone positions in the source room were used, and 12 microphone positions in the receiving room. Microphone positions were selected to comply3.6 with requirements of AS 1191.

4.3 Reverberation Time Measurements

The Reverberation Time in the Receiving room was measured using 2 source positions and 6 microphone positions, providing 12 independent source / microphone positions. 6 decays at each measurement position were measured, a total of 72 reverberant decays.

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The 6 decays at each measurement position were first ensemble averaged, and then the results at each of the 12 measurement positions were arithmetically averaged.

4.4 Test Equipment

- NTI Minirator PRO MR1 – Serial No. G2P-RAEXX-G0 and G2P-RAFE0-GO.
- Yamaha Power Amp. P5000S Serial ACQX01003 390W - 8 Ω / channel
- Behringer Xenyx Q802 Serial S14211325ALM
- B&K Analyser Type 2270 Serial No 2644641 (Cal: 4/4/18)
- B&K Microphone Type 4189 Serial No 3100167 (Cal: 4/04/18)
- Rion NC73 Sound Level Calibrator Serial No 1030728– (Cal: 24/10/18)
- Lorantz Speakers
- Vaisla HM34C Humidity & Temperature Meter Serial No: V2910014

5. RESULTS

5.1 Airborne Sound Reduction

The sound reduction of the test sample was calculated in accordance with procedures set out in Appendix D of AS 1191. The airborne Sound Reduction (R dB) of the Test Sample was determined at each one third octave band with centre frequencies between 100 and 5000 Hertz.

5.2 Weighted Sound Reduction Index Rw *of* Test Sample

The Weighted Sound Reduction Index R_W for the sample has been determined in accordance with AS/NZS-ISO 717.1 *Acoustics – Rating of Sound Insulation in Buildings and of Building Elements Part 1: Airborne Sound Insulation*. The value of the spectrum adaptation terms C, and C_{tr} have been determined and are added to the R_w value. The spectrum adaptation term "C" is used for broad band – pink noise type sources, and C_{tr} is used for traffic noise sources. . The weighted sound reduction determined for this sample is:

Rw,(C, Ctr) 22 (-1, -2) Rw 22 Rw + Ctr 21

5.3 Detailed Sound Reduction Performance of Test Sample

1/3 Octave Band Data: The sound reduction index of the window in 1/3 octave bands as set out in the attached Data Sheet is tabulated below.

Sound Reduction Performance - 1/3 Octave Band						
Frequency (Hz)	125	250	500	1k	2k	4k
Sound Reduction (R) in dB	22.4	15.8	20.5	19.9	23.0	23.3
	20.4	22.1	21.1	2.3.5	20.0	23.5
	17.7	24.7	23.9	20.2	20.5	22.8

Table 2– Sound Reduction Performance in 1/3 Octave Bands

Octave Band Data: The sound reduction index of the window in full octave bands has been determined from the 1/3 octave data and is tabulated below

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Calculated Sound Reduction in Octave Bands						
Frequency (Hz)	125	250	500	1k	2k	4k
Sound Reduction (R) in dB	20	19	22	21	21	23

Table 3 - Calculated Octave Band Sound Reduction

5.4 Precision

Estimate of Precision The precision in the results is expressed as the 95% confidence interval in the transmission loss. This interval is estimated from the 95% confidence interval in each of the source room average level, receiver room average level, and the receiver room absorption / surface area of sample component. The precision in terms of the maximum standard deviation in sound transmission values for each of the one third octave bands in all cases is within the recommended upper limit for 95% confidence limit, outlined in Table B1 of AS1191-2002.

Frequency (Hz)	δ dB	Upper Limit AS 1191	Frequency (Hz)	δ dB	Upper Limit AS 1191
100	2.1	3.7	**630**	0.4	1.1
125	2.0	3.5	**800**	0.7	1.1
160	1.4	3.3	**1.00k**	0.6	1.1
200	1.0	3.0	**1.25k**	0.5	1.1
250	1.2	2.5	**1.60k**	0.5	1.1
315	0.7	2.0	**2.00k**	0.6	1.1
00	0.6	1.6	**2.50k**	0.5	1.1
500	0.3	1.3	**3.15k**	0.5	1.1

Table 4 - 95% confidence Interval, δ dB

Test & Report by:

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6. PHOTOS

Perma Composites - WPC Fence Panel - within Filler Wall

Perma Composites - WPC Fence Panel – Corner detail

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AIRBORNE SOUND TRANSMISSION LOSS

ALA Test No.: ALA 19-081-1
Client: Perma Composites
Project: WPC Fence Panel
Detail:

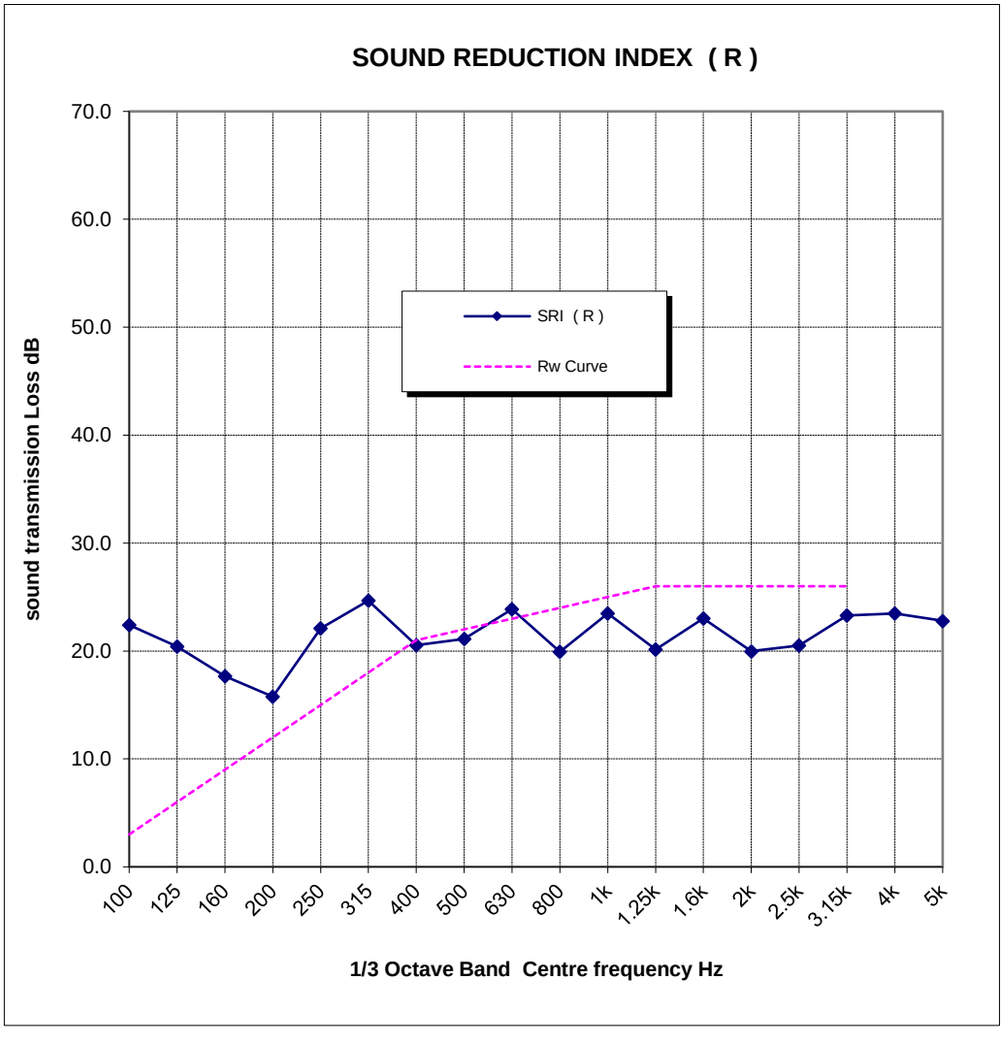
Description of Specimen:

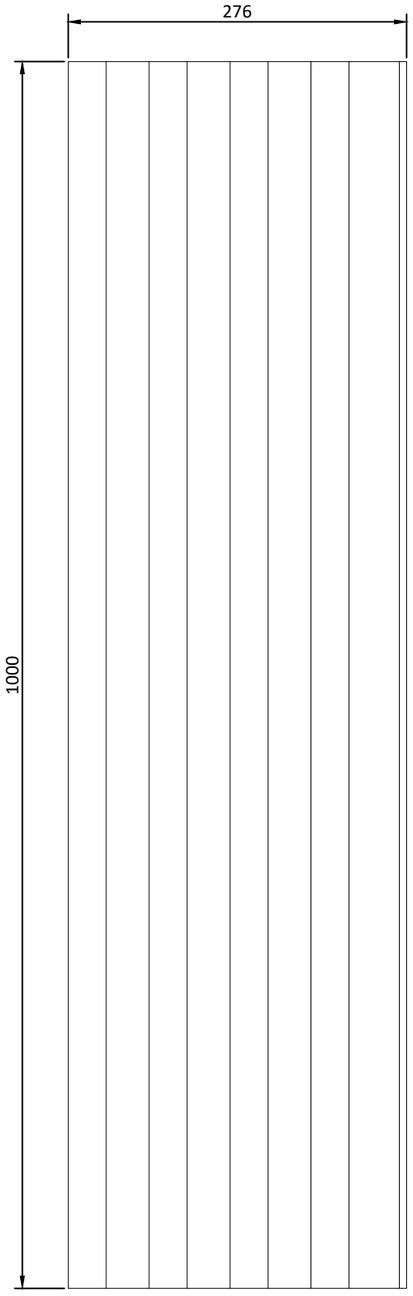
Meas. Date: 23-Jan-19

Product Name: WPC FFence Panel
Material: Wood Plastic Composite
Sample Description: 51 mm thick overall, consisting of
- 31 mm vertical ribs
- Spaced 35 mm apart
- 20 mm deep
- Both sides of 7 mm web

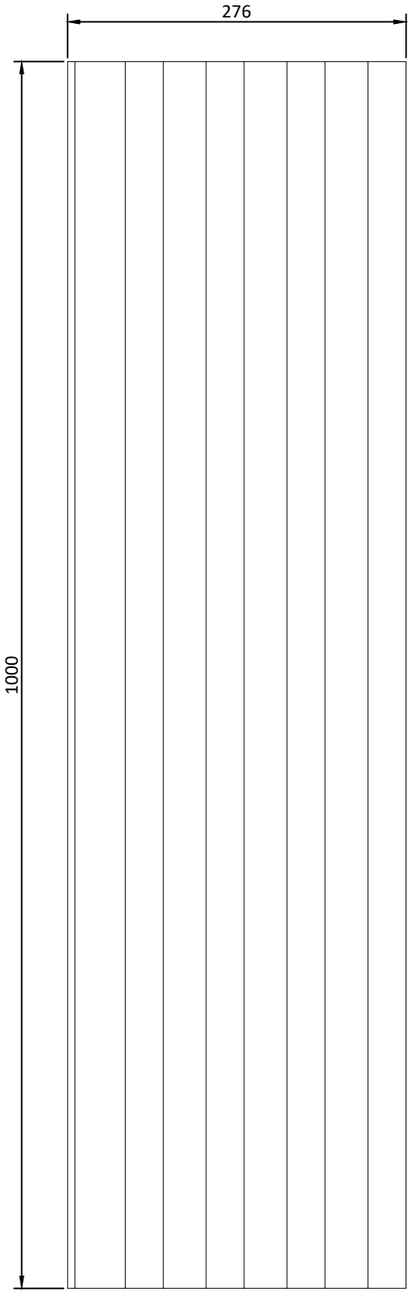
	Rw	C	Ctr	Tested to
Weighted Sound Reduction Index	**22**	**-1**	**-1**	AS1191

Centre Frequency	SRI (R)	Rw Curve	Deficiencies
Hz	dB	dB	dB
100	22.4	3	
125	20.4	6	
160	17.7	9	
200	15.8	12	
250	22.1	15	
315	24.7	18	
400	20.5	21	0.5
500	21.1	22	0.9
630	23.9	23	
800	19.9	24	4.1
1k	23.5	25	1.5
1.25k	20.2	26	5.8
1.6k	23.0	26	3.0
2k	20.0	26	6.0
2.5k	20.5	26	5.5
3.15k	23.3	26	2.7
4k	23.5		
5k	22.8		
			Total
Rw	22		30.0

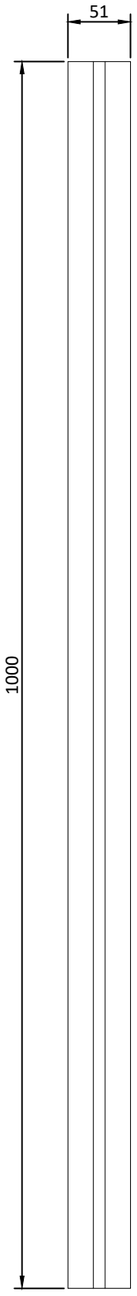




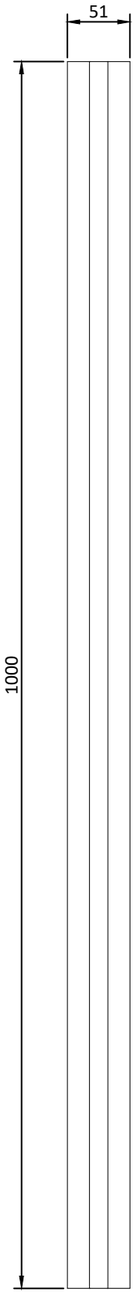
FRONT VIEW



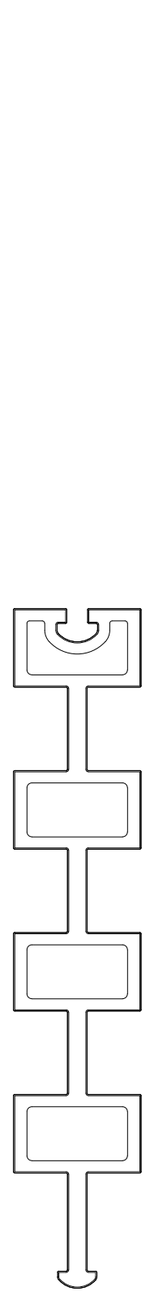
REAR VIEW



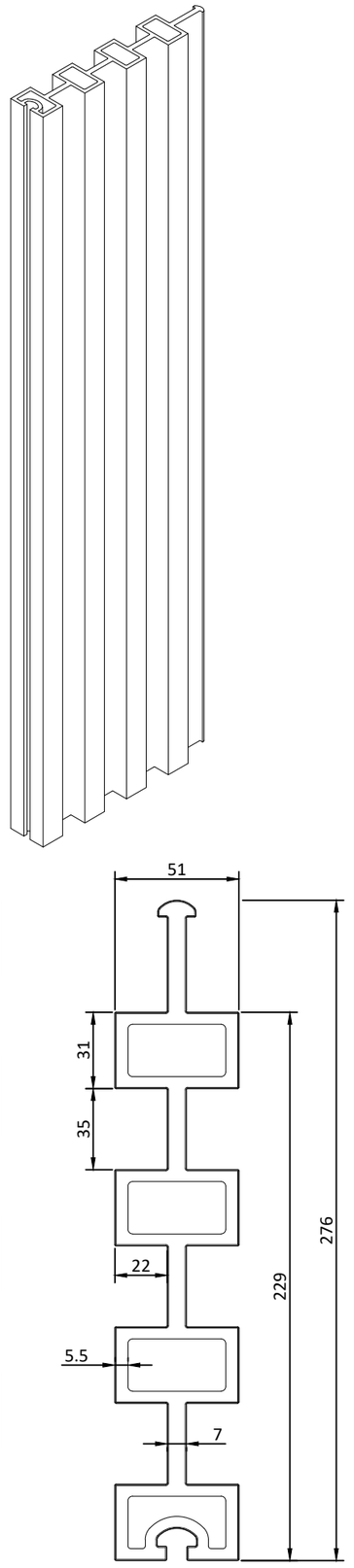
LEFT VIEW



RIGHT VIEW



BOTTOM VIEW



TOP VIEW

General Notes

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Project
Fence Profile

Date
10th April 2018

Scale
Do Not Scale

Drawn By
James Greathead

DATE	DRAWING NUMBER	PAGE	REV
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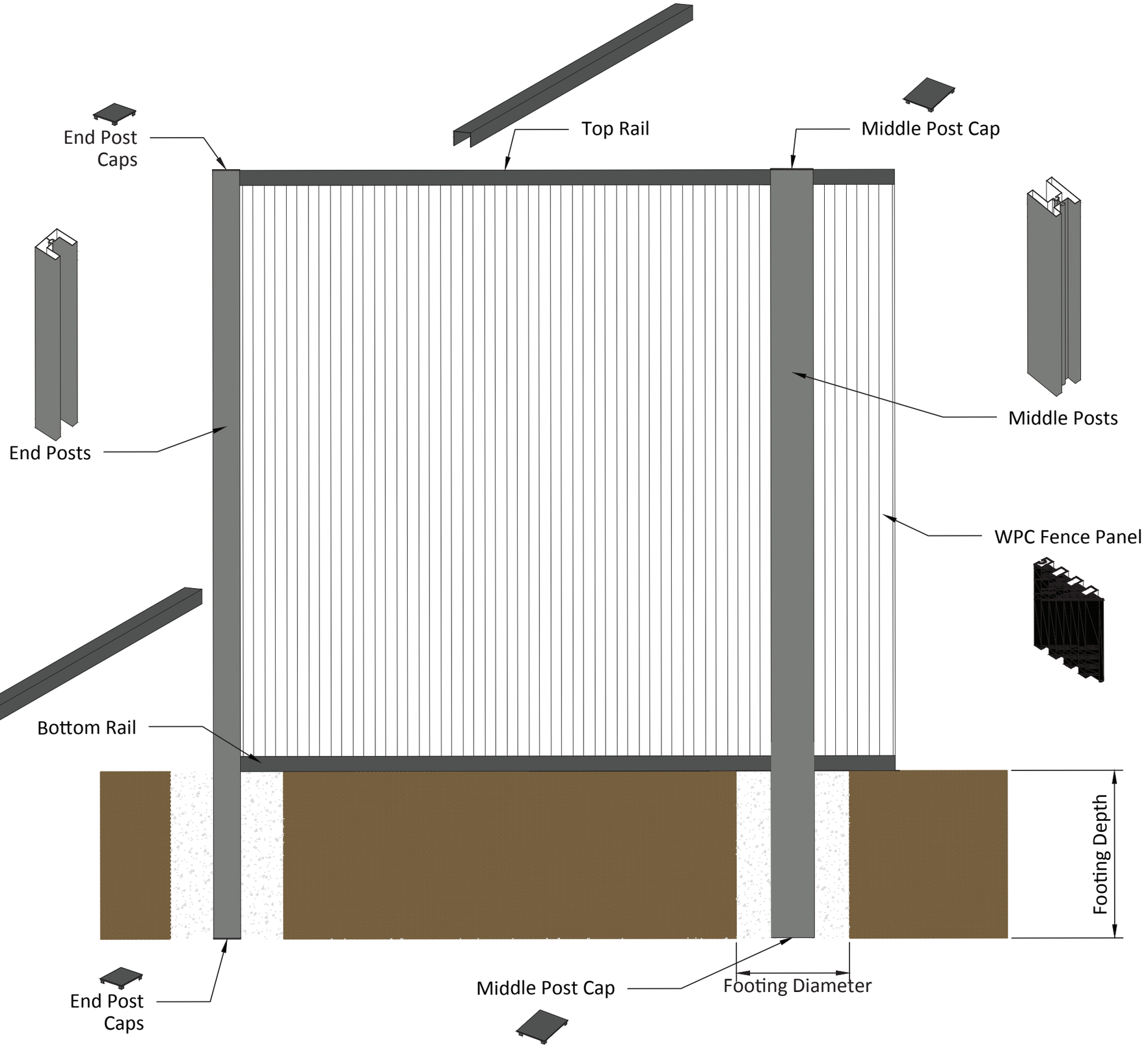

General Notes

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Project	Fence Assembly (Middle Posts)
Date	07 / 12 / 2018
Scale	Do Not Scale
Drawn By	Mansour Ahamed

DATE	DRAWING NUMBER	PAGE
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