



REPORT –  
FR<sub>SI</sub> – MINIMUM INTERNAL SURFACE TEMPERATURE  
10211;2016

JOB NO 1128  
JOB TITLE MBSS Waffle FRSI  
ADDRESS New Zealand

REPORT NO 01  
DATE 25/02/2020

CLIENT MBSS Ltd

REPORT Denise Martin  
PREPARED BY Director | Building Analyst

OVERVIEW:

WORK REVIEWED AND EXECUTIVE SUMMARY

1.0 DETAIL ANALYSIS

1.1 ISOTHERMAL ANALYSIS;

MAXRaft waffle slab and 90mm Standard Framing R2.6

2.0 REFERENCE DOCUMENTS

3.0 APPENDICES

PSI-THERM REPORT

WORK REVIEWED:

Isothermal analysis with PSiTherm® to determine minimum internal surface temperature and temperature factor fRsi, to DIN EN ISO 10211;2016.

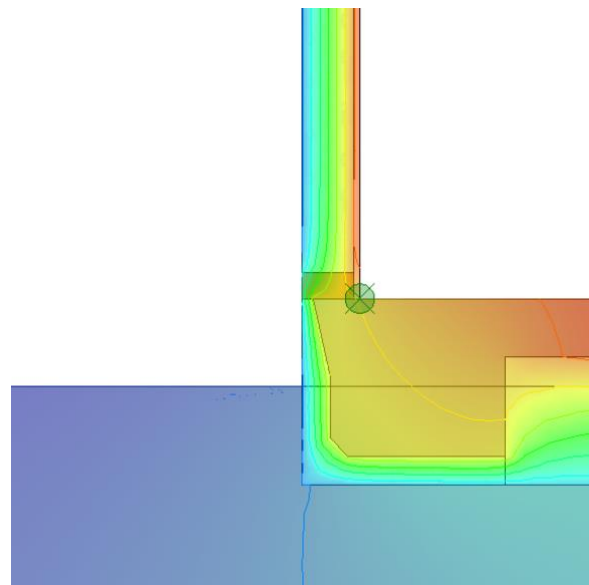
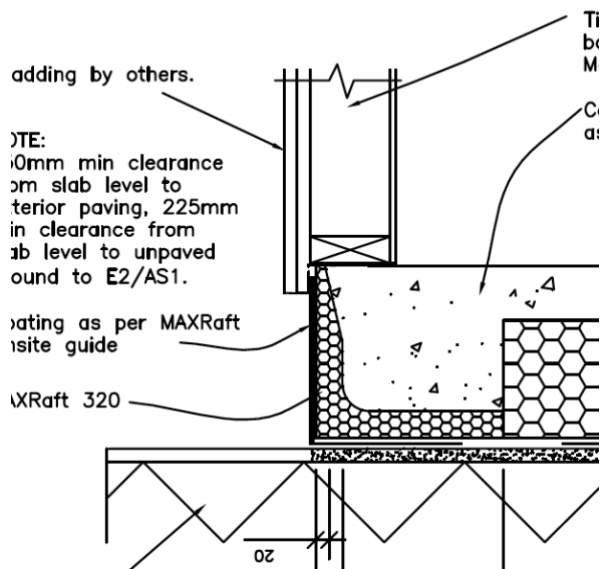
EXECUTIVE SUMMARY

We determined the minimum surface temperature of the MAXRaft Waffle slab to be 15.15°C, with a fRSI factor of 0.76.

1.0 ISOTHERMAL ANALYSIS;

As Proposed

Isotherm



## 2.0 Reference Documents

DIN EN ISO 10211;10211-06 Thermal Bridges in Buildings- Heat flows and surface temperatures – detailed calculations

## 3.0 APPENDICES

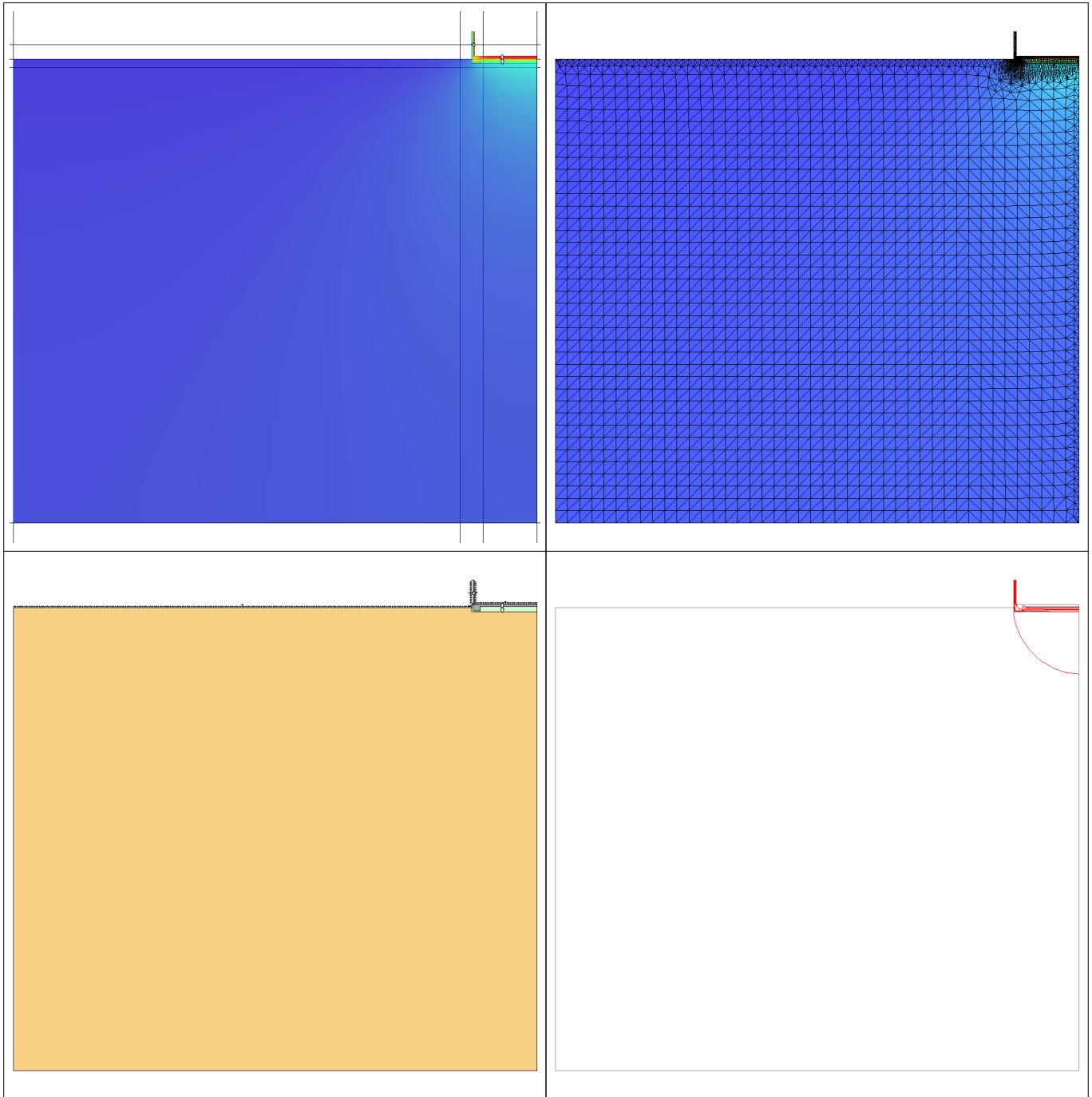
Psi Therm Report

Project:

# Psi-Therm 2D

Date: 25.2.2020

Temperature factor calculation ( $f$ -value)



Temperature factor calculation ( $f$ -value)

Nr.	Name	Length	U-value	Correction factor
U1	U1	1.365 m	0.47 W/(m <sup>2</sup> K)	F_e (1.00)
U2	U2	2.850 m	0.17 W/(m <sup>2</sup> K)	F_bf (0.60)

$$f_{RSI} = 0.76 > 0.70$$

**Project:**

# Psi-Therm 2D

**Date: 25.2.2020**

**Material key:**

	Name	Thermal conductivity
	Normal concrete (2400)	2.100 W/(mK)
	Extruder polystyrene foam VH Grade (035)	0.035 W/(mK)
	Extruder polystyrene foam S Grade (040)	0.040 W/(mK)
	Spruce, FIR, pine	0.130 W/(mK)
	Mineral and vegetable fiber insulation products (WLG 050)	0.050 W/(mK)
	Beiblatt 2 - Erdreich	2.100 W/(mK)
	Gypsum board up to 15 mm	0.210 W/(mK)

**Boundary conditions & Heat flows:**

Nr	Temp	Rsi/Rse	Length	Heat flow
R 1	--	--	63.44 m	--
R 2	20.00 °C	0.25	1.05 m	9.168 W/m
R 3	20.00 °C	0.25	2.75 m	12.718 W/m
R 4	0.00 °C	0.25	1.05 m	-9.741 W/m
R 5	0.00 °C	0.25	0.15 m	-1.793 W/m
R 6	0.00 °C	0.25	20.00 m	-10.352 W/m


**Minimum temperature factor**


Lowest internal surface temperature (Tsi)	+15.16 °C
Frsi value	0.76


**Project:**


# Psi-Therm 2D


**Date: 25.2.2020****Input data - materials**

		Name	Thermal conductivity	
	M1	Normal concrete (2400)	2.100 W/(mK)	
Name		Nr	X	Y
Contour		1	-0.03 m	+0.00 m
		2	+0.00 m	-0.14 m
		3	+0.00 m	-0.24 m
		4	+0.03 m	-0.27 m
		5	+0.30 m	-0.27 m
		6	+0.30 m	-0.10 m
		7	+2.80 m	-0.10 m
		8	+2.80 m	+0.00 m

		Name	Thermal conductivity	
	M2	Extruder polystyrene foam VH Grade (035)	0.035 W/(mK)	
Name		Nr	X	Y
Contour		1	-0.03 m	+0.00 m
		2	-0.05 m	+0.00 m
		3	-0.05 m	-0.32 m
		4	+0.30 m	-0.32 m
		5	+0.30 m	-0.27 m
		6	+0.03 m	-0.27 m
		7	+0.00 m	-0.24 m
		8	+0.00 m	-0.14 m

		Name	Thermal conductivity	
	M3	Extruder polystyrene foam S Grade (040)	0.040 W/(mK)	
Name		Nr	X	Y
Contour		1	+0.30 m	-0.10 m
		2	+0.30 m	-0.32 m
		3	+2.80 m	-0.32 m
		4	+2.80 m	-0.10 m

		Name	Thermal conductivity	
	M4	Spruce, FIR, pine	0.130 W/(mK)	
Name		Nr	X	Y
Contour		1	+0.04 m	+0.05 m
		2	-0.05 m	+0.05 m
		3	-0.05 m	+0.00 m
		4	+0.04 m	+0.00 m

		Name	Thermal conductivity	
	M5	Mineral and vegetable fiber insulation products (WLG 050)	0.050 W/(mK)	
Name		Nr	X	Y
Contour		1	+0.04 m	+1.05 m

Project:

# Psi-Therm 2D

Date: 25.2.2020

Name	Nr	X	Y
	2	-0.05 m	+1.05 m
	3	-0.05 m	+0.05 m
	4	+0.04 m	+0.05 m

Name	Thermal conductivity
M6 Beiblatt 2 - Erdreich	2.100 W/(mK)

Name	Nr	X	Y
Contour	1	-0.05 m	-0.15 m
	2	-20.05 m	-0.15 m
	3	-20.05 m	-20.32 m
	4	+2.80 m	-20.32 m
	5	+2.80 m	-0.32 m
	6	-0.05 m	-0.32 m

Name	Thermal conductivity
M7 Gypsum board up to 15 mm	0.210 W/(mK)

Name	Nr	X	Y
Contour	1	+0.05 m	+1.05 m
	2	+0.04 m	+1.05 m
	3	+0.04 m	+0.00 m
	4	+0.05 m	+0.00 m

## Input data - perimeter areas

Name	Temperature	Rsi/Rse	Length
R2	+20.00 °C	0.25	1.05 m
	X	Y	
Starting point	+0.05 m		+0.00 m
Endpoint	+0.05 m		+1.05 m

Name	Temperature	Rsi/Rse	Length
R3	+20.00 °C	0.25	2.75 m
	X	Y	
Starting point	+2.80 m		+0.00 m
Endpoint	+0.05 m		+0.00 m

Name	Temperature	Rsi/Rse	Length
R4	+0.00 °C	0.25	1.05 m
	X	Y	
Starting point	-0.05 m		+1.05 m
Endpoint	-0.05 m		+0.00 m

Name	Temperature	Rsi/Rse	Length
R5	+0.00 °C	0.25	0.15 m
	X	Y	
Starting point	-0.05 m		+0.00 m
Endpoint	-0.05 m		-0.15 m

Name	Temperature	Rsi/Rse	Length
R6	+0.00 °C	0.25	20.00 m
	X	Y	
Starting point	-0.05 m		-0.15 m



**Project:**

# Psi-Therm 2D

**Date: 25.2.2020**

	X	Y
Endpoint	-20.05 m	-0.15 m

## Input data - U-values

	Name	U-value	Fx
U1	U1	0.47	1.00
	X	Y	Orientation
	+0.05 m	+0.50 m	180 °

	Name	U-value	Fx
U2	U2	0.17	0.60
	X	Y	Orientation
	+1.28 m	+0.00 m	90 °