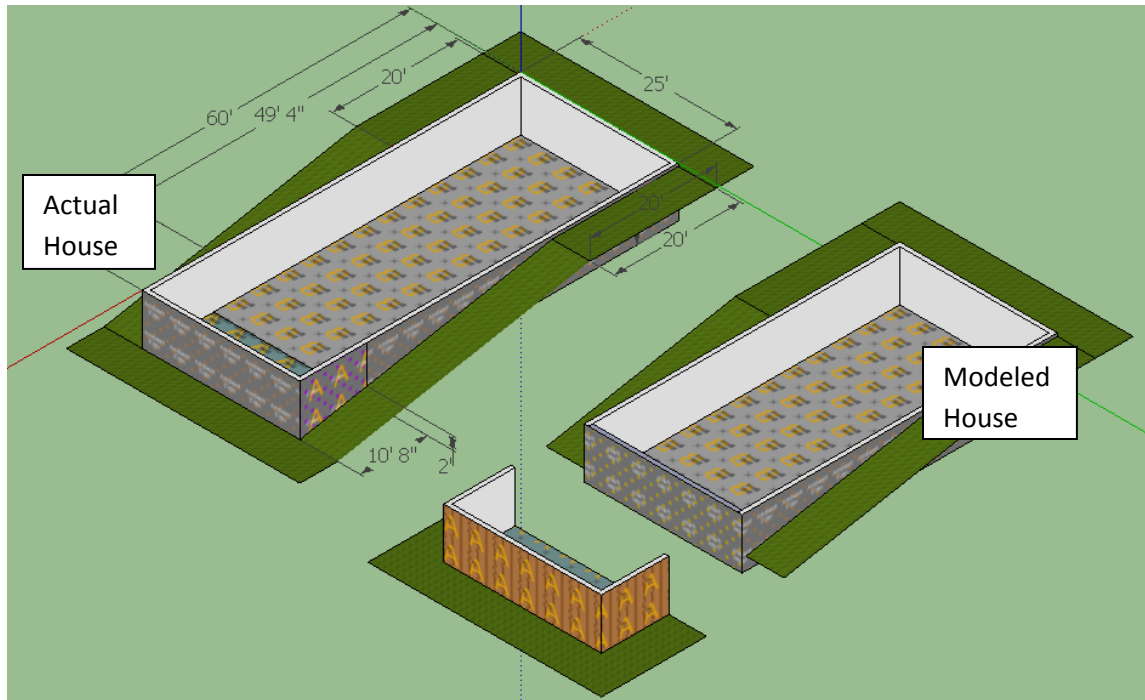


Walk out modeling –

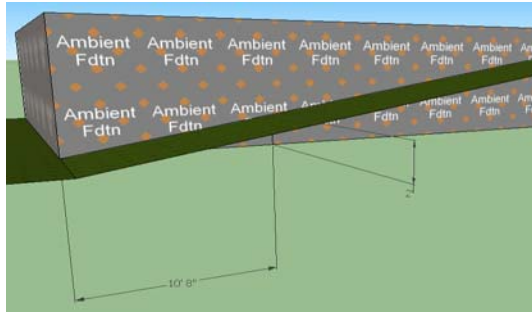
Use the following steps in OptiMiser to correctly model a walk out foundation type. By using these steps OptiMiser will properly calculate heat loss for the different areas and account for the different types of wall and foundation areas.



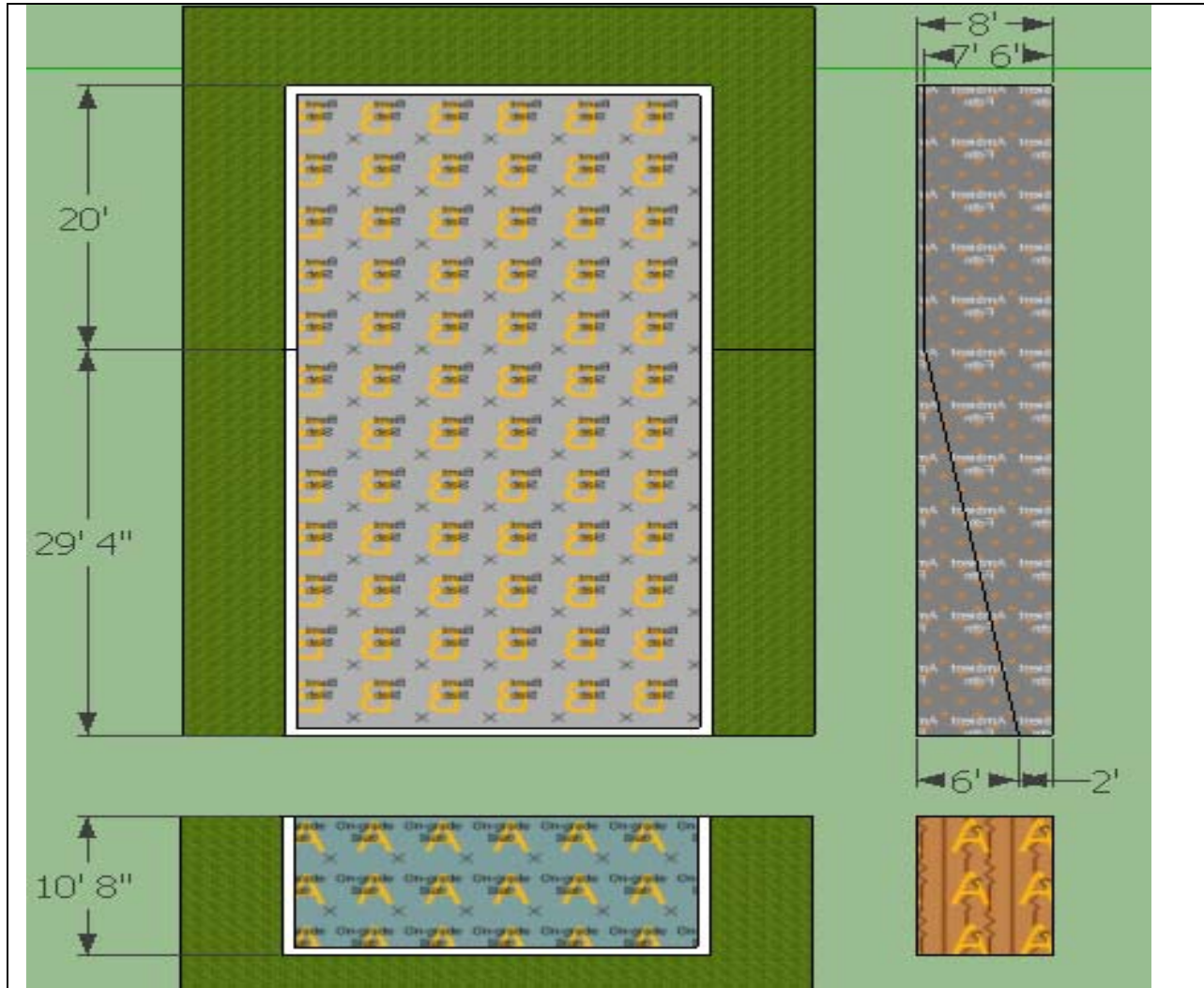
The sample house has a walk out with grade changes equal on both sides, but the same principles can be used on very complex grade lines. To model this building we break the basement into two areas, one where the foundation slab depth is greater than 2' from the exterior grade, and another area that is slab on grade. We will model the common widths of the two areas to account for the adiabatic conditions between the areas. The walls around the slab on grade portion will be modeled in the above grade section by using an equivalent r-value.

Step 1

Get basic data for the house, including foundation perimeter length, height and where the slab becomes slab on grade. ***Please note: OptiMiser considers an area as slab on grade when it is within 2 feet of the average grade level***



This example has the following dimensions:



Width: 25'
 Length: 60'
 Total slab area: 1,500 sq ft
 Slab on grade area: 266.75 sq ft
 Slab at basement depth :1233.25 sq ft

Foundation height: 8 '
 Grade transition start: 20 ' from the top wall
 Foundation perimeter: 170'
 Foundation area: 1,360 sq ft

Step 2:

With the dimensions shown above we will need to calculate the average height of the foundation above grade for the basement area. Simplify this process by combining the like areas and calculating the height above grade for each area. Start with the 6" above grade portion which is $20' + 25' + 20' = 65'$. The next area is the transition area where the foundation height above grade changes from 6" to 4' using the slab on grade portion as the stopping point. The length of each of the transition areas is $60' - 20' - 10'8'' = 30'4''$ for a combined length of $60'8''$. The foundation height above grade ranges from 6" to 4' so the average height would be $2'3''$. We then need to find the combined average foundation height above grade. To do make this calculation we will use a weighted average, weighting the height of the section by the length.

$$\text{Average Height} = \frac{[65*0.5+60.6*2.25]}{65+60.6} = \frac{32.5+136.35}{125.6} \cong 1.34 \cong 1.3'$$

Step 3:

Calculate the area of the slab that is on grade.

The point at which the slab is no longer considered on grade is approximately 10 feet 8 inches from the bottom wall. The slab width is 25' therefore the slab on grade area is $25' \times 10.67' = 266.75$ sq ft.

Step 4:

Calculate the slab on grade wall area. There are three sections of wall area that abut the slab on grade area. The total wall perimeter length is $10'8'' + 25' + 10'8'' = 46'4''$ and the wall height is 8' which results in 370 sq ft.

Step 5:

Now that the data is collected we need to input the dimensions into OptiMiser.

- On the Envelope/Dimensions sub-tab input the correct length and width of the basement section (Length 49.3' Width 25')
- Change the basement foundation height above grade (1.3')
- OptiMiser will automatically put the remaining basement area into the crawl space field, be sure to zero it out

- Then input the correct dimensions for the slab on grade section (Length 10.7' Width 25')
- The basement and slab on grade areas share a common wall on the width of the basement (25'). Check the Common Wall check box for the width dimension on both the Basement and Slab on Grade sections.
- Add the walk out wall area to the Wall Area section on the same tab

Owner Envelope Systems Appl. & DHW Optimize Estimate Calibrate Setup CHN Tab

Dimensions Walls Doors Windows Attic Vault/Flat Floor Crawl Basement Slab Blower Door

Work Flow Navigation << >> Done Photo... Report... Note... Calc...

Above-Grade

Cond Area (Sq Ft) 3000 Incl Bsmt Wall Area (Sq Ft) 1801

Floors 1.0

Length (Ft.) 60.0 Cond Volume (Cu Ft) 24000

Width (Ft.) 29.5 Area/Volume estimated

Wall Height (Ft.) 8.00

Basement

Area (Sq Ft) 1233 Wall Height (Ft.) 8

Length (Ft.) 49.3 Comm Wall Above Grd (Ft.) 1.3

Width (Ft.) 25.0 Comm Wall

Crawl Space

Area (Sq Ft) 0 Wall Height (Ft.) 4

Length (Ft.) 0.0 Comm Wall Above Grd (Ft.) 1.0

Width (Ft.) 0.0 Comm Wall

Slab On Grade

Area (Sq Ft) 268

Length (Ft.) 10.7 Comm Wall

Width (Ft.) 25.0 Comm Wall

Step 6:

Specify the basement characteristics on the basement tab as normal.

Section	Parameter	Value
Area and Improvement Cost	Area	1233
	Water Table (Ft.)	30
Select Configuration	Insulation Loc	None
	Insul Overlap (Ft.)	2
Insulation	Wall Framing	No Fran
	Framing Depth (in)	3.5
	Cav Insulation	None
	Cav Insul Depth (in)	0.0
	Cont Insulation	None
	Cont Insul Depth (in)	0.0
	Est Assembly R	0.0
Improved	SIR / MIRR	1.6 / 7%
	% Improved	100
	Simple/Detailed	Detailed
	Total \$	5645
Improved	Insulation Loc	Interior Wall Only
	Insul Overlap (Ft.)	2
Improved	Wall Framing	24" oc
	Framing Depth (in)	3.5
	Cav Insulation	Blown Cellulose (Dens)
	Cav Insul Depth (in)	3.5
	Cont Insulation	None
	Cont Insul Depth (in)	0.0
	Est Assembly R	9.9

Step 7:

Next, click on the Walls sub-tab.

1. Input 370 sq ft in the Wall Area 2 section (slab on grade wall area)
2. Click on the Wall 2 button
3. Look up the Effective R-Value from the tables in Appendix A (see below)
4. Input the effective R-Value in the Est. Assembly R (for this example we used an un-insulated mass wall with no framing and R-11 drape R-11.5)

Owner Envelope Systems Appl. & DHW Optimize Estimate Calibrate Setup CH

Dimensions Walls Doors Windows Attic Vault/Flat Floor Crawl Basement

Work Flow Navigation

Chart Contents Base Heat & Cool Usage vs. Utilities (MBtu)

Wall Areas and Improvement Costs - Base

Gross Area 1,801 Area >

Area 1 (Sq Ft) 1431 Net Areas...

Area 2 (Sq Ft) 370 Wall 2...

Walls 2

Net Wall Areas and Improvement Cost - Base

Gross Area 1,801 Area >

Area 1 (Sq Ft) 1431 Net Areas...

Area 2 (Sq Ft) 370

Improved

SIR / MIRR 2.7 10% Hide Use Imp

% Improved 100 \$ (/Sq Ft) 1.18 Cost \$ 0.00

% Improved 100 \$ (/Sq Ft) 1.18 Cost \$ 0.00

Simple/Detailed Change Detailed> Update Total \$ 3981

Wall R-Value - Base

Wall Framing Standard 8ft @16" o.c.

Framing Depth (in) 3.5

Fill Insulation Lo-Den. FG/Rock Batt

Fill Depth (in) 0.0 Est R 0.0

Rigid Insulation None

Rigid Depth (in) 0.0 Est R 0.0

Set Assembly R 11.5 Path... Solar...

Improved

Fill Insulation Blown Cellulose (Dens) Add

Fill Depth (in) 3.5 Est R 12.9

Rigid Insulation None Add

Rigid Depth (in) 0.0 Est R 0.0

Est. Assembly R 12.6 Path... Solar...

Appendix A

Assembly U-Factors for Above-Grade Concrete Walls and Masonry Walls

Framing Type and Depth	Rated R-Value of Insulation Alone	Assembly U-Factors for 8 in. Normal Weight 145 lb/ft ³ Solid Concrete Walls	Assembly U-Factors for 8 in. Medium Weight 115 lb/ft ³ Concrete Block Walls: Solid Grouted	Assembly U-Factors for 8 in. Medium Weight 115 lb/ft ³ Concrete Block Walls: Partially Grouted (cores uninsulated except where specified)
No Framing	R-0	U-0.740	U-0.580	U-0.480
	UngROUTED Cores Filled with Loose-Fill Insulation	N.A.	N.A.	U-0.350
Continuous metal framing at 24 in. on center horizontally				
3.5 in.	R-11.0	U-0.168	U-0.158	U-0.149
3.5 in.	R-13.0	U-0.161	U-0.152	U-0.144
3.5 in.	R-15.0	U-0.155	U-0.147	U-0.140
4.5 in.	R-17.1	U-0.133	U-0.126	U-0.121
4.5 in.	R-22.5	U-0.124	U-0.119	U-0.114
4.5 in.	R-25.2	U-0.122	U-0.116	U-0.112
5.0 in.	R-19.0	U-0.122	U-0.117	U-0.112
5.0 in.	R-25.0	U-0.115	U-0.110	U-0.106
5.0 in.	R-28.0	U-0.112	U-0.107	U-0.103
5.5 in.	R-19.0	U-0.118	U-0.113	U-0.109
5.5 in.	R-20.9	U-0.114	U-0.109	U-0.105
5.5 in.	R-21.0	U-0.113	U-0.109	U-0.105
5.5 in.	R-27.5	U-0.106	U-0.102	U-0.099
5.5 in.	R-30.8	U-0.104	U-0.100	U-0.096
6.0 in.	R-22.8	U-0.106	U-0.102	U-0.098
6.0 in.	R-30.0	U-0.099	U-0.095	U-0.092
6.0 in.	R-33.6	U-0.096	U-0.093	U-0.090
6.5 in.	R-24.7	U-0.099	U-0.096	U-0.092
7.0 in.	R-26.6	U-0.093	U-0.090	U-0.087
7.5 in.	R-28.5	U-0.088	U-0.085	U-0.083
8.0 in.	R-30.4	U-0.083	U-0.081	U-0.079
1 in. metal clips at 24 in. on center horizontally and 16 in. vertically				
1.0 in.	R-3.8	U-0.210	U-0.195	U-0.182
1.0 in.	R-5.0	U-0.184	U-0.172	U-0.162
1.0 in.	R-5.6	U-0.174	U-0.163	U-0.154
1.5 in.	R-5.7	U-0.160	U-0.151	U-0.143
1.5 in.	R-7.5	U-0.138	U-0.131	U-0.125
1.5 in.	R-8.4	U-0.129	U-0.123	U-0.118
2.0 in.	R-7.6	U-0.129	U-0.123	U-0.118
2.0 in.	R-10.0	U-0.110	U-0.106	U-0.102
2.0 in.	R-11.2	U-0.103	U-0.099	U-0.096
2.5 in.	R-9.5	U-0.109	U-0.104	U-0.101
2.5 in.	R-12.5	U-0.092	U-0.089	U-0.086
2.5 in.	R-14.0	U-0.086	U-0.083	U-0.080
3.0 in.	R-11.4	U-0.094	U-0.090	U-0.088
3.0 in.	R-15.0	U-0.078	U-0.076	U-0.074
3.0 in.	R-16.8	U-0.073	U-0.071	U-0.069
3.5 in.	R-13.3	U-0.082	U-0.080	U-0.077
3.5 in.	R-17.5	U-0.069	U-0.067	U-0.065
3.5 in.	R-19.6	U-0.064	U-0.062	U-0.061

TABLE A-5 (Section A3.1) (Continued)
Assembly U-Factors for Above-Grade Concrete Walls and Masonry Walls

Framing Type and Depth	Rated R-Value of Insulation Alone	Assembly U-Factors for 8 in. Normal Weight 145 lb/ft³ Solid Concrete Walls	Assembly U-Factors for 8 in. Medium Weight 115 lb/ft³ Concrete Block Walls: Solid Grouted	Assembly U-Factors for 8 in. Medium Weight 115 lb/ft³ Concrete Block Walls: Partially Grouted (cores uninsulated except where specified)
No Framing	R-0	U-0.740	U-0.580	U-0.480
	UngROUTed Cores Filled with Loose-Fill Insulation	N.A.	N.A.	U-0.350
4.0 in.	R-15.2	U-0.073	U-0.071	U-0.070
4.0 in.	R-20.0	U-0.061	U-0.060	U-0.058
4.0 in.	R-22.4	U-0.057	U-0.056	U-0.054
5.0 in.	R-28.0	U-0.046	U-0.046	U-0.045
6.0 in.	R-33.6	U-0.039	U-0.039	U-0.038
7.0 in.	R-39.2	U-0.034	U-0.034	U-0.033
8.0 in.	R-44.8	U-0.030	U-0.030	U-0.029
9.0 in.	R-50.4	U-0.027	U-0.027	U-0.026
10.0 in.	R-56.0	U-0.024	U-0.024	U-0.024
11.0 in.	R-61.6	U-0.022	U-0.022	U-0.022
Continuous insulation uninterrupted by framing				
No Framing	R-1.0	U-0.425	U-0.367	U-0.324
No Framing	R-2.0	U-0.298	U-0.269	U-0.245
No Framing	R-3.0	U-0.230	U-0.212	U-0.197
No Framing	R-4.0	U-0.187	U-0.175	U-0.164
No Framing	R-5.0	U-0.157	U-0.149	U-0.141
No Framing	R-6.0	U-0.136	U-0.129	U-0.124
No Framing	R-7.0	U-0.120	U-0.115	U-0.110
No Framing	R-8.0	U-0.107	U-0.103	U-0.099
No Framing	R-9.0	U-0.097	U-0.093	U-0.090
No Framing	R-10.0	U-0.088	U-0.085	U-0.083
No Framing	R-11.0	U-0.081	U-0.079	U-0.076
No Framing	R-12.0	U-0.075	U-0.073	U-0.071
No Framing	R-13.0	U-0.070	U-0.068	U-0.066
No Framing	R-14.0	U-0.065	U-0.064	U-0.062
No Framing	R-15.0	U-0.061	U-0.060	U-0.059
No Framing	R-16.0	U-0.058	U-0.056	U-0.055
No Framing	R-17.0	U-0.054	U-0.053	U-0.052
No Framing	R-18.0	U-0.052	U-0.051	U-0.050
No Framing	R-19.0	U-0.049	U-0.048	U-0.047
No Framing	R-20.0	U-0.047	U-0.046	U-0.045
No Framing	R-21.0	U-0.045	U-0.044	U-0.043
No Framing	R-22.0	U-0.043	U-0.042	U-0.042
No Framing	R-23.0	U-0.041	U-0.040	U-0.040
No Framing	R-24.0	U-0.039	U-0.039	U-0.038
No Framing	R-25.0	U-0.038	U-0.037	U-0.037
No Framing	R-30.0	U-0.032	U-0.032	U-0.031
No Framing	R-35.0	U-0.028	U-0.027	U-0.027
No Framing	R-40.0	U-0.024	U-0.024	U-0.024
No Framing	R-45.0	U-0.022	U-0.021	U-0.021
No Framing	R-50.0	U-0.019	U-0.019	U-0.019
No Framing	R-55.0	U-0.018	U-0.018	U-0.018
No Framing	R-60.0	U-0.016	U-0.016	U-0.016

TABLE A-8 (Sections A3.1.2 and A4.1.3)
Effective R-Values for Insulation/Framing Layers Added to Above-Grade Mass Walls and Below-Grade Walls

Depth (in.)	Framing Type	Rated R-Value of Insulation																									
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
None		0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	19.5	20.5	21.5	22.5	23.5	24.5	25.5
		<i>Effective R-value if continuous insulation uninterrupted by framing (includes gypsum board)</i>																									
		<i>Effective R-value if insulation is installed in cavity between framing (includes gypsum board)</i>																									
0.5	Wood	1.3	1.3	1.9	2.4	2.7	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	Metal	0.9	0.9	1.1	1.1	1.2	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
0.75	Wood	1.4	1.4	2.1	2.7	3.1	3.5	3.8	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	Metal	1.0	1.0	1.3	1.4	1.5	1.6	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
1.0	Wood	1.3	1.5	2.2	2.9	3.4	3.9	4.3	4.6	4.9	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	Metal	1.0	1.1	1.4	1.6	1.7	1.8	1.8	1.9	1.9	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
1.5	Wood	1.3	1.5	2.4	3.1	3.8	4.4	4.9	5.4	5.8	6.2	6.5	6.8	7.1	na	na	na	na	na	na	na	na	na	na	na	na	na
	Metal	1.1	1.2	1.6	1.9	2.1	2.2	2.3	2.4	2.5	2.5	2.6	2.6	2.7	na	na	na	na	na	na	na	na	na	na	na	na	na
2.0	Wood	1.4	1.5	2.5	3.3	4.0	4.7	5.3	5.9	6.4	6.9	7.3	7.7	8.1	8.4	8.7	9.0	9.3	na	na	na	na	na	na	na	na	na
	Metal	1.1	1.2	1.7	2.1	2.3	2.5	2.7	2.8	2.9	3.0	3.1	3.2	3.2	3.3	3.3	3.4	3.4	na	na	na	na	na	na	na	na	na
2.5	Wood	1.4	1.5	2.5	3.4	4.2	4.9	5.6	6.3	6.8	7.4	7.9	8.4	8.8	9.2	9.6	10.0	10.3	10.6	10.9	11.2	11.5	na	na	na	na	na
	Metal	1.2	1.3	1.8	2.3	2.6	2.8	3.0	3.2	3.3	3.3	3.6	3.6	3.7	3.8	3.9	3.9	4.0	4.0	4.1	4.1	4.1	na	na	na	na	na
3.0	Wood	1.4	1.5	2.5	3.5	4.3	5.1	5.8	6.5	7.2	7.8	8.3	8.9	9.4	9.9	10.3	10.7	11.1	11.5	11.9	12.2	12.5	12.9	na	na	na	na
	Metal	1.2	1.3	1.9	2.4	2.8	3.1	3.3	3.5	3.7	3.8	4.0	4.1	4.2	4.3	4.4	4.4	4.5	4.6	4.6	4.7	4.7	4.8	na	na	na	na
3.5	Wood	1.4	1.5	2.6	3.5	4.4	5.2	6.0	6.7	7.4	8.1	8.7	9.3	9.8	10.4	10.9	11.3	11.8	12.2	12.6	13.0	13.4	13.8	14.1	14.5	14.8	15.1
	Metal	1.2	1.3	2.0	2.5	2.9	3.2	3.5	3.8	4.0	4.2	4.3	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.1	5.2	5.2	5.3	5.4	5.4	5.4	5.5
4.0	Wood	1.4	1.6	2.6	3.6	4.5	5.3	6.1	6.9	7.6	8.3	9.0	9.6	10.2	10.8	11.3	11.9	12.4	12.8	13.3	13.7	14.2	14.6	14.9	15.3	15.7	16.0
	Metal	1.2	1.3	2.0	2.6	3.0	3.4	3.7	4.0	4.2	4.5	4.6	4.8	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.8	5.9	5.9	6.0	6.0
4.5	Wood	1.4	1.6	2.6	3.6	4.5	5.4	6.2	7.1	7.8	8.5	9.2	9.9	10.5	11.2	11.7	12.3	12.8	13.3	13.8	14.3	14.8	15.2	15.7	16.1	16.5	16.9
	Metal	1.2	1.3	2.1	2.6	3.1	3.5	3.9	4.2	4.5	4.7	4.9	5.1	5.3	5.4	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.4	6.5	6.6
5.0	Wood	1.4	1.6	2.6	3.6	4.6	5.5	6.3	7.2	8.0	8.7	9.4	10.1	10.8	11.5	12.1	12.7	13.2	13.8	14.3	14.8	15.3	15.8	16.3	16.7	17.2	17.6
	Metal	1.2	1.4	2.1	2.7	3.2	3.7	4.1	4.4	4.7	5.0	5.2	5.4	5.6	5.8	5.9	6.1	6.2	6.3	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.1
5.5	Wood	1.4	1.6	2.6	3.6	4.6	5.5	6.4	7.3	8.1	8.9	9.6	10.3	11.0	11.7	12.4	13.0	13.6	14.2	14.7	15.3	15.8	16.3	16.8	17.3	17.8	18.2
	Metal	1.3	1.4	2.1	2.8	3.3	3.8	4.2	4.6	4.9	5.2	5.4	5.7	5.9	6.1	6.3	6.4	6.6	6.7	6.8	7.0	7.1	7.2	7.3	7.4	7.5	7.6

