Building Sustainable Information Models

in collaboration with: EMPOWERHOUSE | Solar Decathlon 2011



research team:

Jason Andersen, Case Design Inc. Christopher Steffens, Adjunct Faculty, School of Constructed Environments Steve Sanderson, Adjunct Faculty, School of Constructed Environments Our objective was to assist students in leveraging their existing use of the Solar Decathlon's Revit Model for Environmental Analysis. This was achieved through creating a better workflow from the model to the Passive House Planning Package The challenge was how to design a system to expedite the extraction of useful data to inform the performance of multiple design iterations.



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The Potential:



The Need:

Passive House Planning

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Information Filling out the PHPP is the first step to Designing to the standard and then to Certification

The alignment of the Building Information Models, which are rich with data, to PHPP that requires data provides an opportunity for the designer to organize and output information in a way that is helpful to a larger process.

	Ar	eas					
	<u> </u>	8		Lo	cation	PHPP-RefDims TFA	Desimator
Walls	e Dims TFA		Primary Spaces Primary Spaces Primary Spaces Primary Spaces Primary Spaces Secondary 50% Secondary 50% Secondary 50% Secondary 60%	LOFT BATHROOM BEDROOM KITCHEN LIVING ROOM Bedroom Closet MECH Storage Under Stair LAUNDRY ENTRYWAY	T.O. Loft 8-0" A2G T.O. FIRST FLOOR GROUND LEVEL GROUND LEVEL GROUND LEVEL T.O. FIRST FLOOR GROUND LEVEL GROUND LEVEL GROUND LEVEL GROUND LEVEL	9-7 3/16" 9-7 3/16" 8-11 1/4" 9-0 7/16" 8-11 1/16" 8-11 1/16" 8-11 3/16" 4-9 11/16" 8-11 3/14"	29'-11 1/4" 28'-5 15/16" 40'-4 5/16" 45'-8" 78'-7 7/8" 22'-5 5/8" 26'-8 7/16" 43'-3 1/4" 9'-9 1/2" 36'-2 7/16"
				uee Wall			
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			PHPP-R	Values Wall						
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Area Group		Туре	Material: Name	Area	Material: Thic	Material: R Value per Inch				
		1								
8	+SD 1	1 7/8 I Joist	+SD 5/8 Gypsum - Wall Board	330.96 SF	0' - 0 5/8"	1	0.63			
8	+SD 1	1 7/8 I Joist	+SD 1/2 Wood - Sheating Plywood	330.96 SF	0' - 0 1/2"	1	0.5			
8	+SD 1	1 7/8 I Joist	+SD 11 7/8 Stud Layer 01	330.96 SF	0' - 11 7/8"	3	35.63			
8	+SD 1	1 7/8 I Joist	+SD 5/8 Wood - Sheating OSB	330.96 SF	0' - 0 5/8"	1	0.63			
8	+SD 1	1 7/8 I Joist	+01 Generic Membrane	330.96 SF	0' - 0 1/32"	0	0			
			· · · · ·	· · · ·			37.38			
8	+SD 1	1 7/8 I Joist	+SD 5/8 Gypsum - Wall Board	210.00 SF	0' - 0 5/8"	1	0.63			
8	+SD 1	1 7/8 I Joist	+SD 1/2 Wood - Sheating Plywood	210.00 SF	0' - 0 1/2"	1	0.5			
8	+SD 1	1 7/8 I Joist	+SD 11 7/8 Stud Layer 01	210.00 SF	0' - 11 7/8"	3	35.63			
8	+SD 1	1 7/8 I Joist	+SD 5/8 Wood - Sheating OSB	210.00 SF	0' - 0 5/8"	1	0.63			
8	+SD 1	1 7/8 I Joist	+01 Generic Membrane	210.00 SF	0' - 0 1/32"	0	0			
	:		;				37.38			
							3			

While aligning the information is important it is also required to embed information into the model geometry.



We worked closely with the team to strategically model and associate data in order to facilitate information transfer to PHPP



Calculated Values Parameter

We created calculated values in Revit to be able to determine the Rough Opening required by PHPP.

Window Frame PSI Parameter

This data was added as a Material in the model that carried the PHPP values and appeared in schedules only when used. In addition as the project progressed the materials library became more comprehensive.

Window Glazing U-values

Multiple window glazing types were made through creating different material properties.

PHPP Windows [WinType]

Type Mark

20 21

20

23

23

Generic PHPPFI

Window Rotah Openings

Helght Width

3-2

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8.7

90

270

4-3

3-2

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6 - 5

8.5

Window Size

Helght Width

¢-П

¢ - П

6-2

6.7

6 - 7

3-0

6-7

С - П

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20



21

5

Grand total: 6

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1.11 m

2.29 m

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Glazing Calculations

2.09 m*

0.57 m*

2.29 m^s

2.29 m^s

2.29 m^s

+08 Glazing Triple 4/1+08 air/4/1+08 air/4

2.000

1.000

1.000

+DS Frame Passive House frame, good thermal qualit

Window Area Frame Area Total Glazing Area

0.20 m*

0.54 m*

0.00 m 5

0.00 m 4

0.00 m 4

Wholew Glazing Area

0 - 1 1/4*

0-5

0-0

0-0

0-0

0-5

Window Frame Dimensions

Width Left | Width Right | Width Below | Width Aboue

0' - 1.1/4'

0-5

0 - 0

0-0

0-0





For future studies the exchange of data from one context / discipline / software to another will happen with increasing speed. There is an immense need for people to be facile with multiple tools to expedite this process.

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Learning

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