APPENDIX A: Modeled Sections for Thermal Analysis

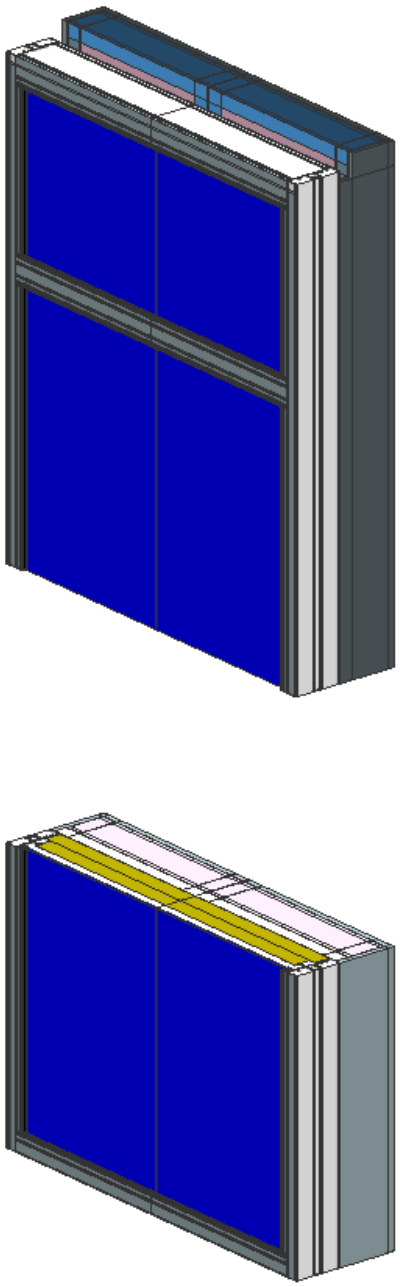


Figure A1: Modeled Spandrel Wall Sections

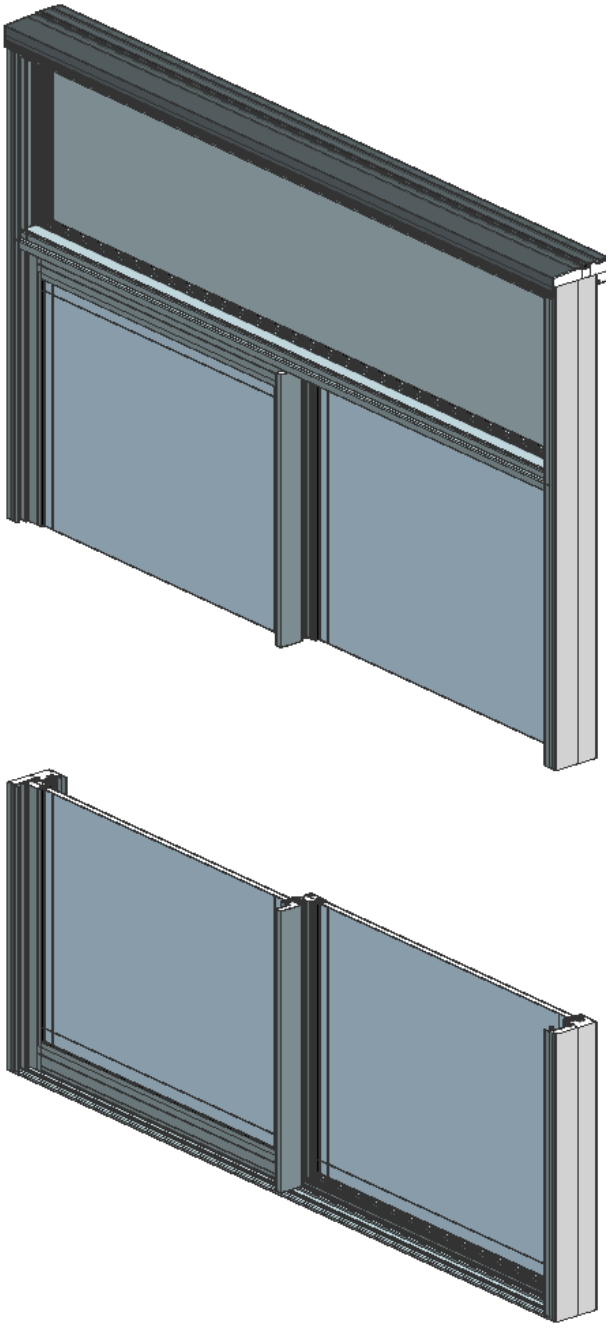


Figure A2: Modeled Sliding Door Sections

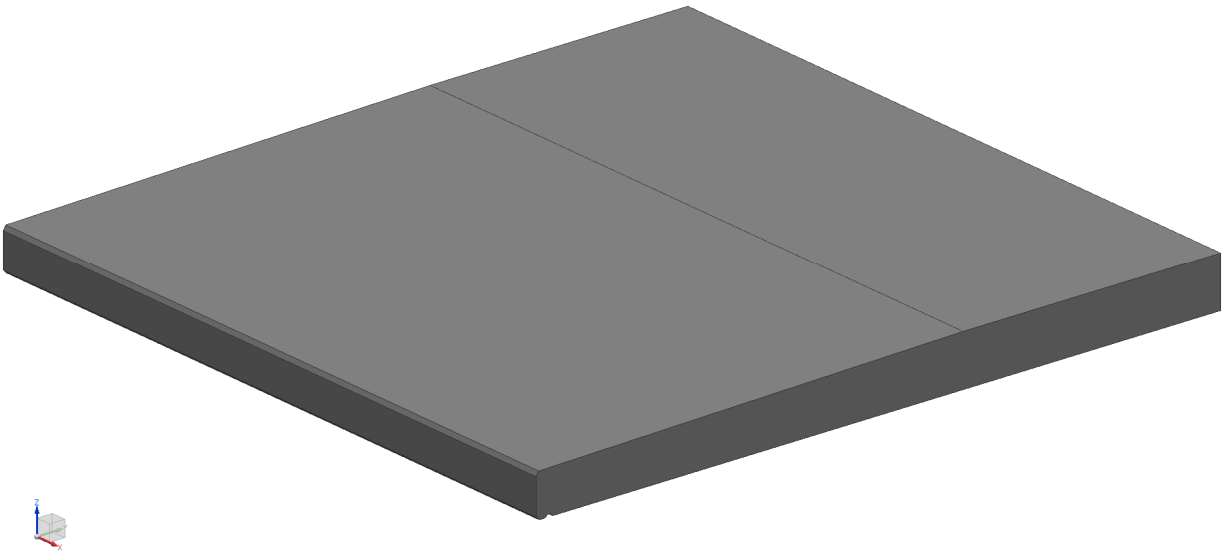


Figure A3: Modeled Continuous Slab

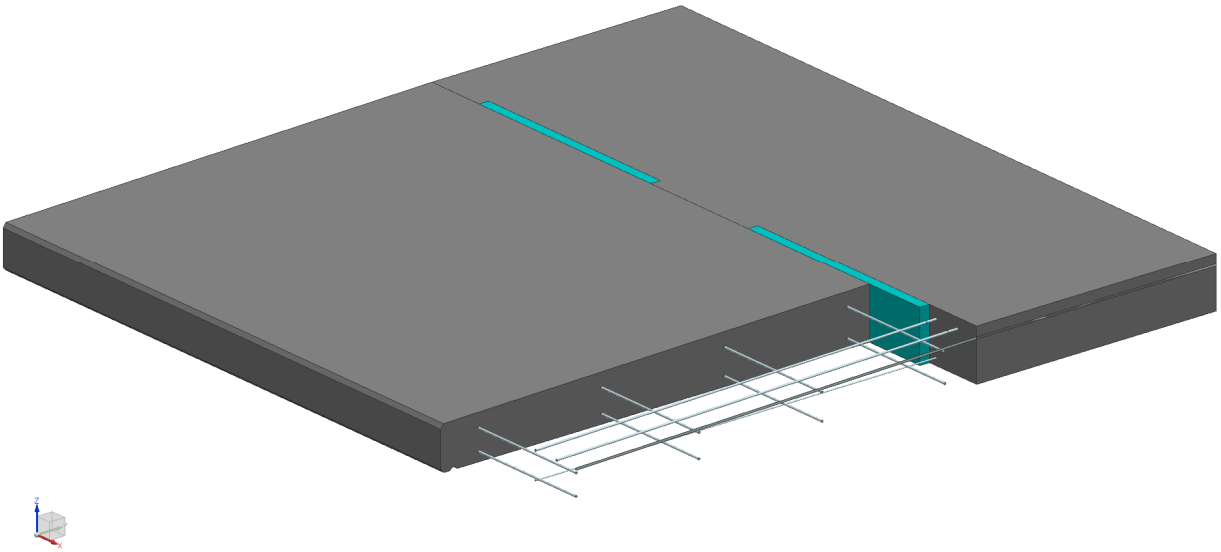


Figure A4: Modeled Site Solution with concrete partially removed to show insulation and rebar

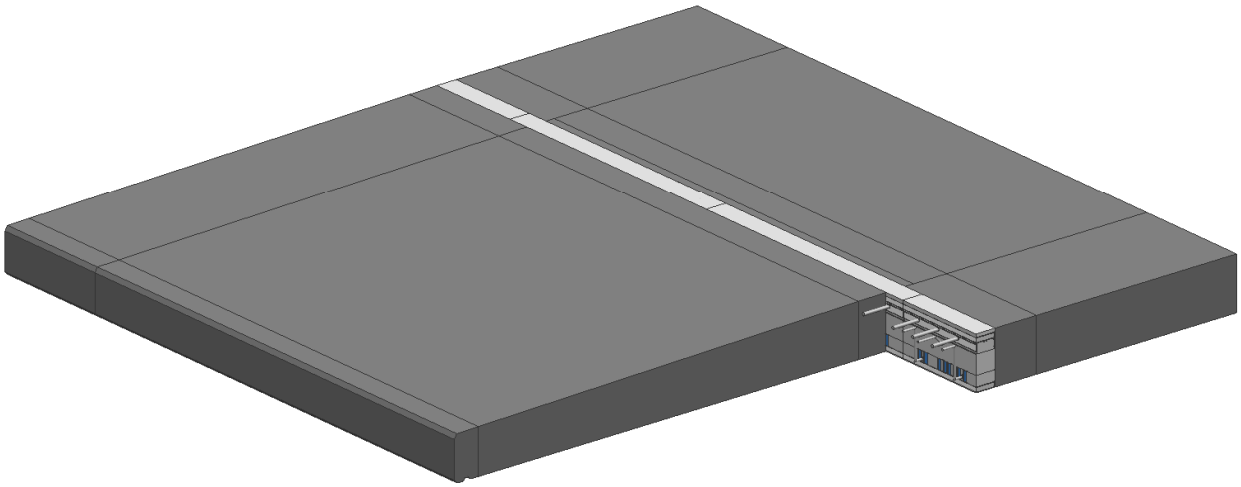


Figure A5: Modeled Schöck Isokorb Slab with concrete partially removed to show Isokorb system

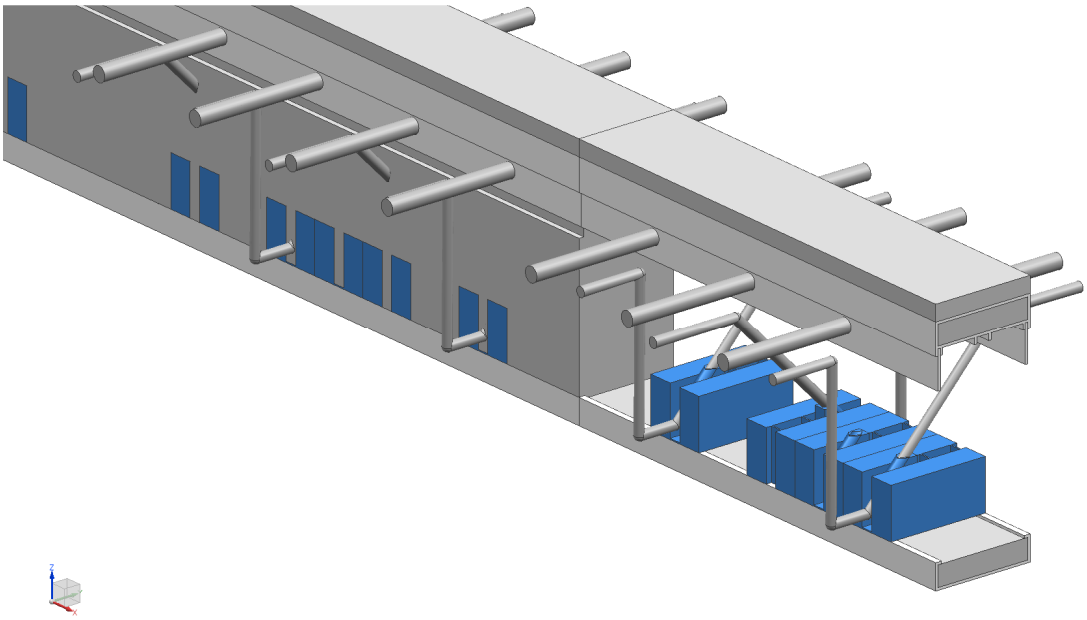


Figure A6: Modeled Schöck Isokorb Closeup View with Insulation partially removed

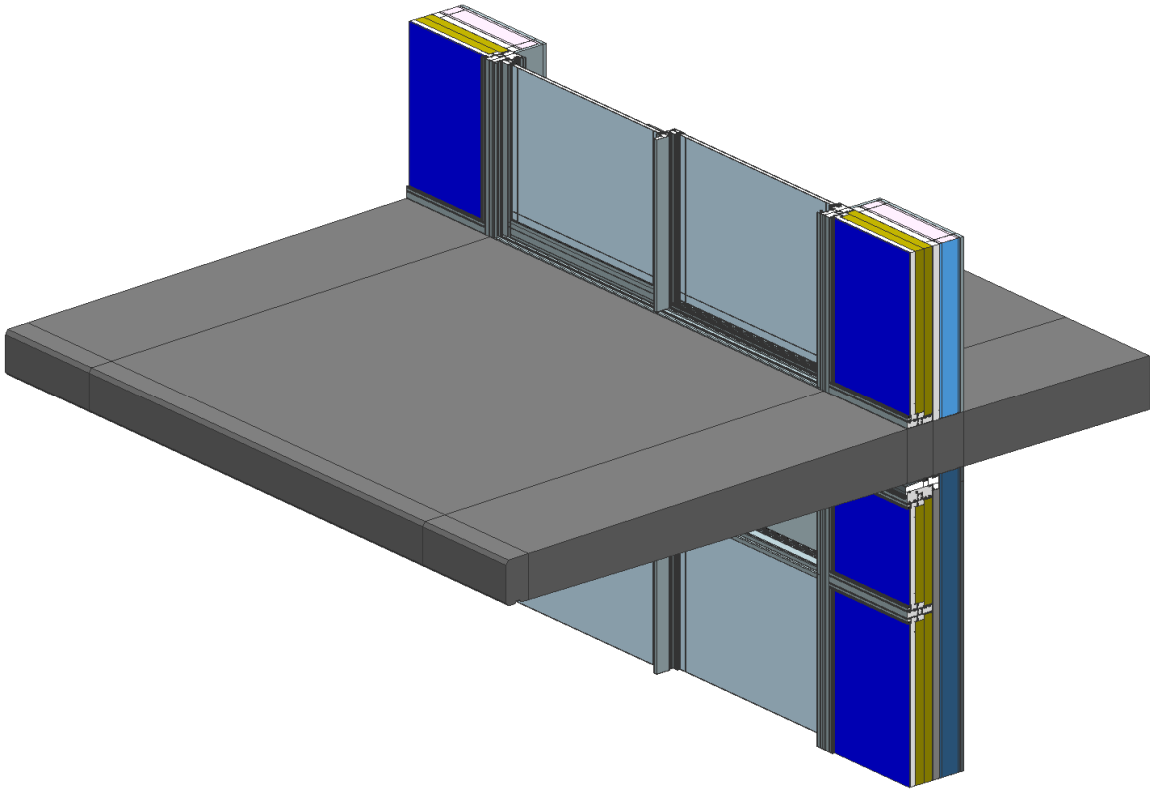


Figure A7: Modeled Assembly for Continuous Slab

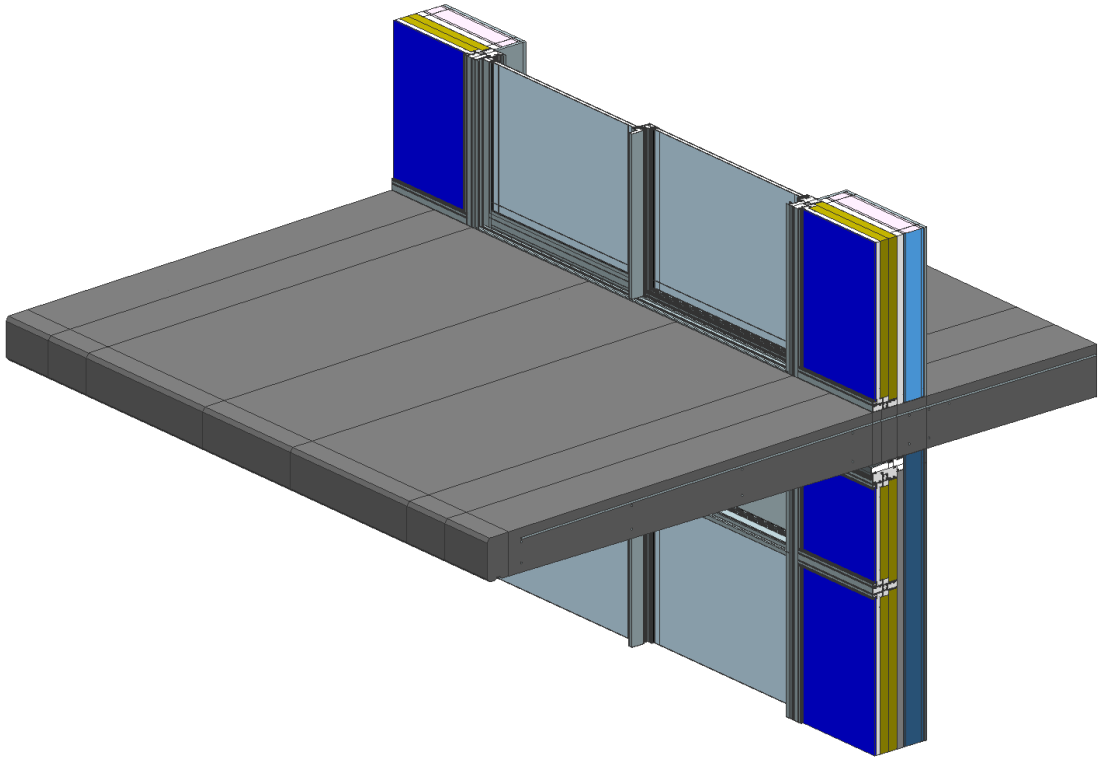


Figure A8: Modeled Assembly for Site Solution

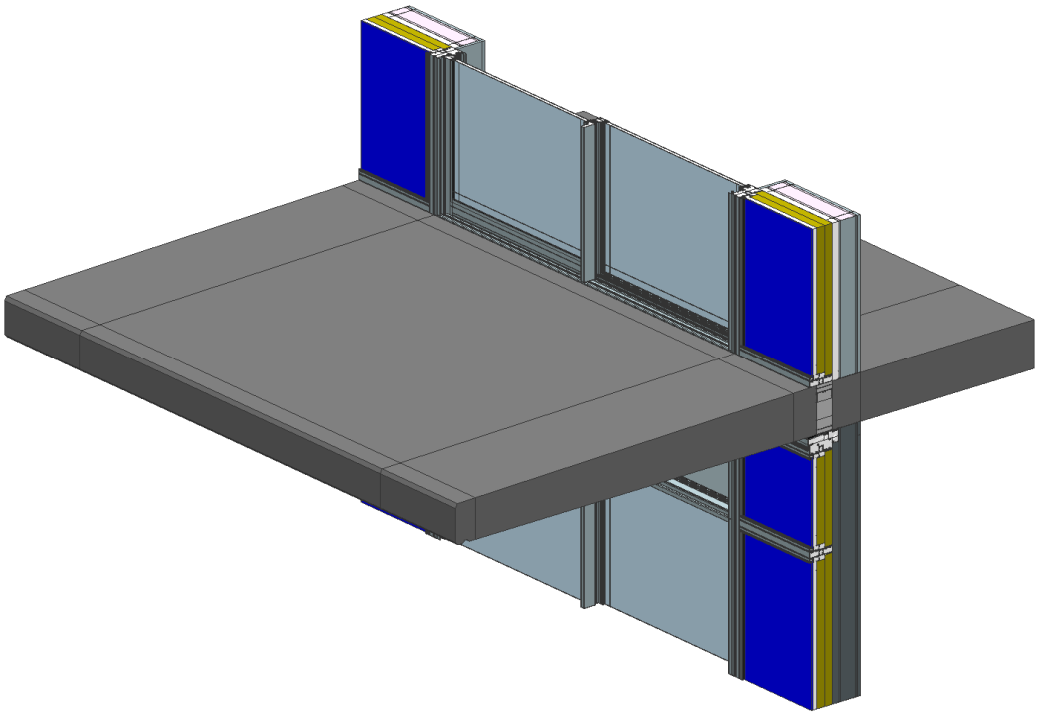
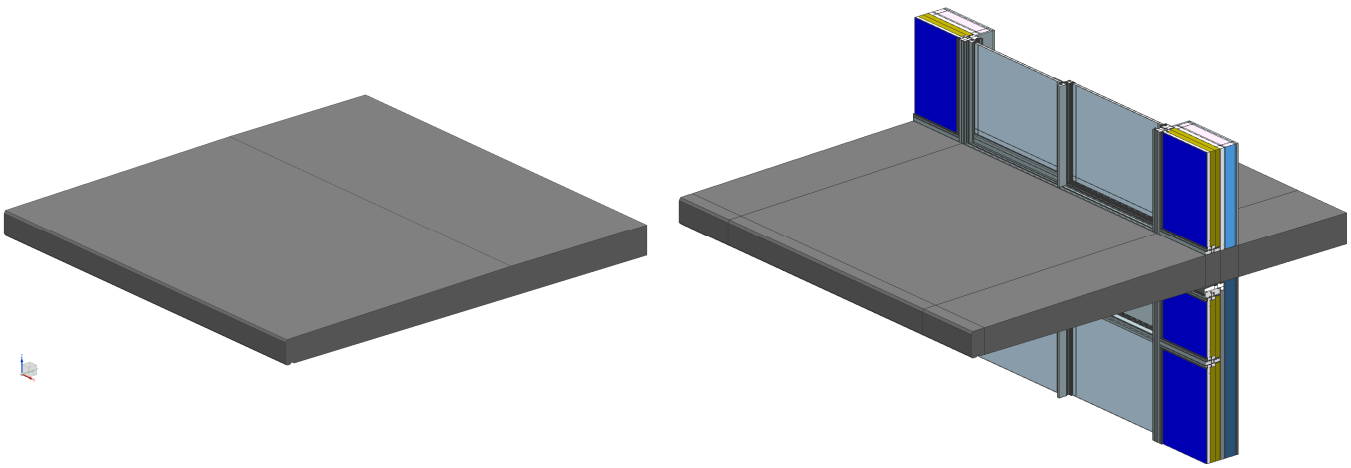


Figure A9: Modeled Assembly for Schöck Isokorb Solution

Conventional Construction

Window-Wall /w Sliding Door and Insulated Spandrel Section – Concrete Floor Slab Intersection



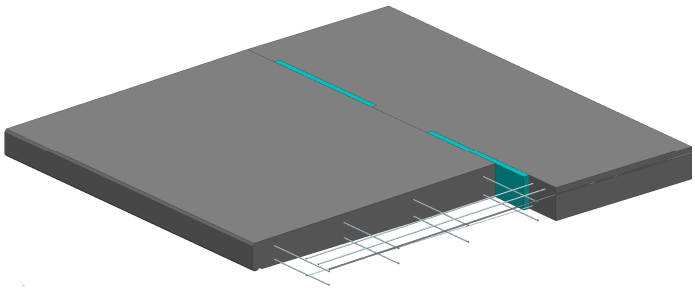
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft^2·hr·^{o}F (W/m K)	Nominal Resistance hr·ft^2·^{o}F/Btu (m^{2}K/W)	Density lb/ft^3 (kg/m^3)	Specific Heat Btu/lb·^{o}F (J/kg K)
1	Interior Films (right side)[1]	-	-	R-0.6 (0.11 RSI) to R-0.9 (0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Interior Fiberglass Batt Insulation	3 5/8" (92)	0.29 (0.042)	R-12.0 (2.1 RSI)	0.9 (14)	0.17 (710)
5	Spandrel Back-pan Insulation	3" (75)	-	R-12.6 (2.2 RSI)	4 (64)	0.29 (1220)
6	Window-wall system with sliding door and insulated spandrel section (Sliding Door U = 0.6 Btu/h ft^2 ^{o}F)[2]					
7	Concrete Slab	8" (203)	12 (1.8)	-	140 (2250)	0.20 (850)
8	Reinforcing Steel	Varies	347 (50)	-	489 (7830)	0.12 (500)
9	Wood Sill	2" (50)	0.63 (0.09)	-	1.8 (28)	0.29 (1220)
10	Exterior Film (left side)[1]	-	-	R-0.2 (0.03 RSI)	-	-

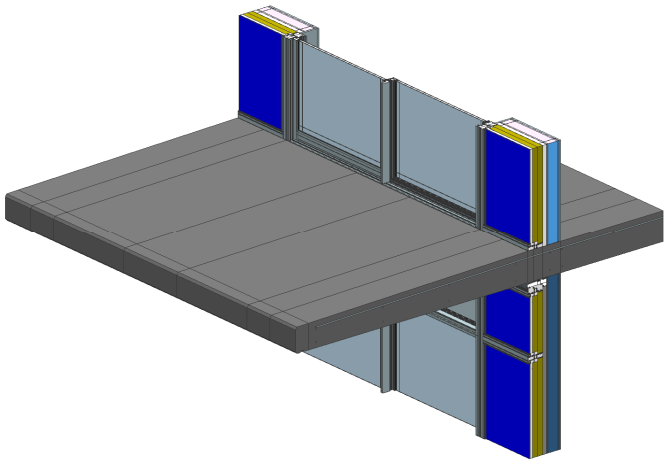
[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation and surface emissivity

[2] The thermal conductivity of air spaces within the sliding door and window framing was found using ISO 10077-2

Site Solution

Window-Wall /w Sliding Door and Insulated Spandrel Section – Partially Insulated Concrete Floor Slab Intersection





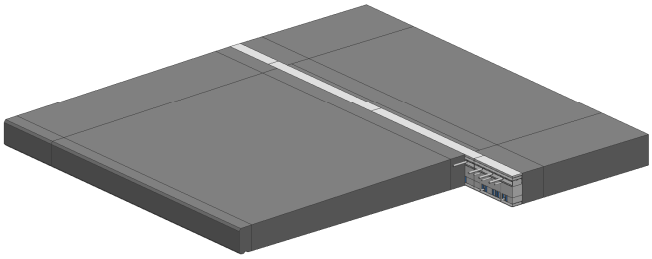
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft^2·hr·^{o}F (W/m K)	Nominal Resistance hr·ft^2·^{o}F/Btu (m^{2}K/W)	Density lb/ft^3 (kg/m^3)	Specific Heat Btu/lb·^{o}F (J/kg K)
1	Interior Films (right side)[1]	-	-	R-0.6 (0.11 RSI) to R-0.9 (0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Interior Fiberglass Batt Insulation	3 5/8” (92)	0.29 (0.042)	R-12.0 (2.1 RSI)	0.9 (14)	0.17 (710)
5	Spandrel Back-pan Insulation	3” (75)	-	R-12.6 (2.2 RSI)	4 (64)	0.29 (1220)
6	Slab Insulation	1 ½” (40)	-	R-7.5 (1.3 RSI)	1.8 (28)	0.29 (1220)
7	Window-wall system with sliding door and insulated spandrel section (Sliding Door U = 0.6 Btu/h ft^2 ^{o}F)[2]					
8	Concrete Slab	8” (203)	12 (1.8)	-	140 (2250)	0.20 (850)
9	Reinforcing Steel	Varies	347 (50)	-	489 (7830)	0.12 (500)
10	Wood Sill	2” (50)	0.63 (0.09)	-	1.8 (28)	0.29 (1220)
11	Exterior Film (left side)[1]	-	-	R-0.2 (0.03 RSI)	-	-

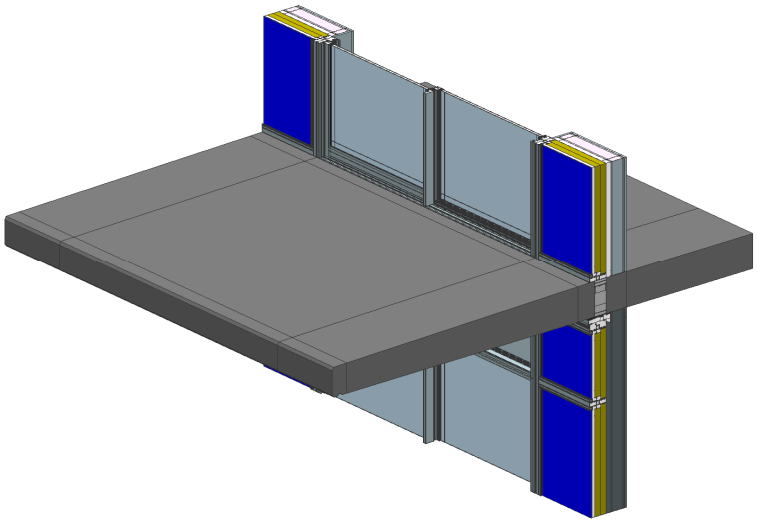
[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation and surface emissivity

[2] The thermal conductivity of air spaces within the sliding door and window framing was found using ISO 10077-2

Schoeck Solution

Window-Wall /w Sliding Door and Insulated Spandrel Section – Concrete Floor Slab Intersection with Shöck Isokorb CM20





ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft^2·hr·^{o}F (W/m K)	Nominal Resistance hr·ft^2·^{o}F/Btu (m^{2}K/W)	Density lb/ft^3 (kg/m^3)	Specific Heat Btu/lb·^{o}F (J/kg K)
1	Interior Films (right side)[1]	-	-	R-0.6 (0.11 RSI) to R-0.9 (0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Interior Fiberglass Batt Insulation	3 5/8” (92)	0.29 (0.042)	R-12.0 (2.1 RSI)	0.9 (14)	0.17 (710)
5	Spandrel Back-pan Insulation	3” (75)	-	R-12.6 (2.2 RSI)	4 (64)	0.29 (1220)
6	Window-wall system with sliding door and insulated spandrel section (Sliding Door U = 0.6 Btu/h ft^2 ^{o}F)[2]					
7	Concrete Slab	8” (203)	12 (1.8)	-	140 (2250)	0.20 (850)
8	Steel Reinforcing	-	347 (50)	-	489 (7830)	0.12 (500)
9	Stainless Steel Reinforcing	-	118 (17)	-	500 (8000)	0.12 (500)
10	HDPE Plastic Sleeve	-	3.5 (0.5)	-	59 (950)	0.48 (2000)
11	Polystyrene Hard Foam Insulation	3” (76)	0.24 (0.035)	R-12 (2.1 RSI)	66 (1060)	0.35 (1500)
12	Cement Board	1” (25)	1.7 (0.25)	-	72 (1150)	0.20 (850)
13	Wood Sill	2” (50)	0.63 (0.09)	-	1.8 (28)	0.29 (1220)
14	Exterior Film (left side)[1]	-	-	R-0.2 (0.03 RSI)	-	-

[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation and surface emissivity

[2] The thermal conductivity of air spaces within the sliding door and window framing was found using ISO 10077-2

APPENDIX B: Thermal Profiles for Modeled 3D Sections

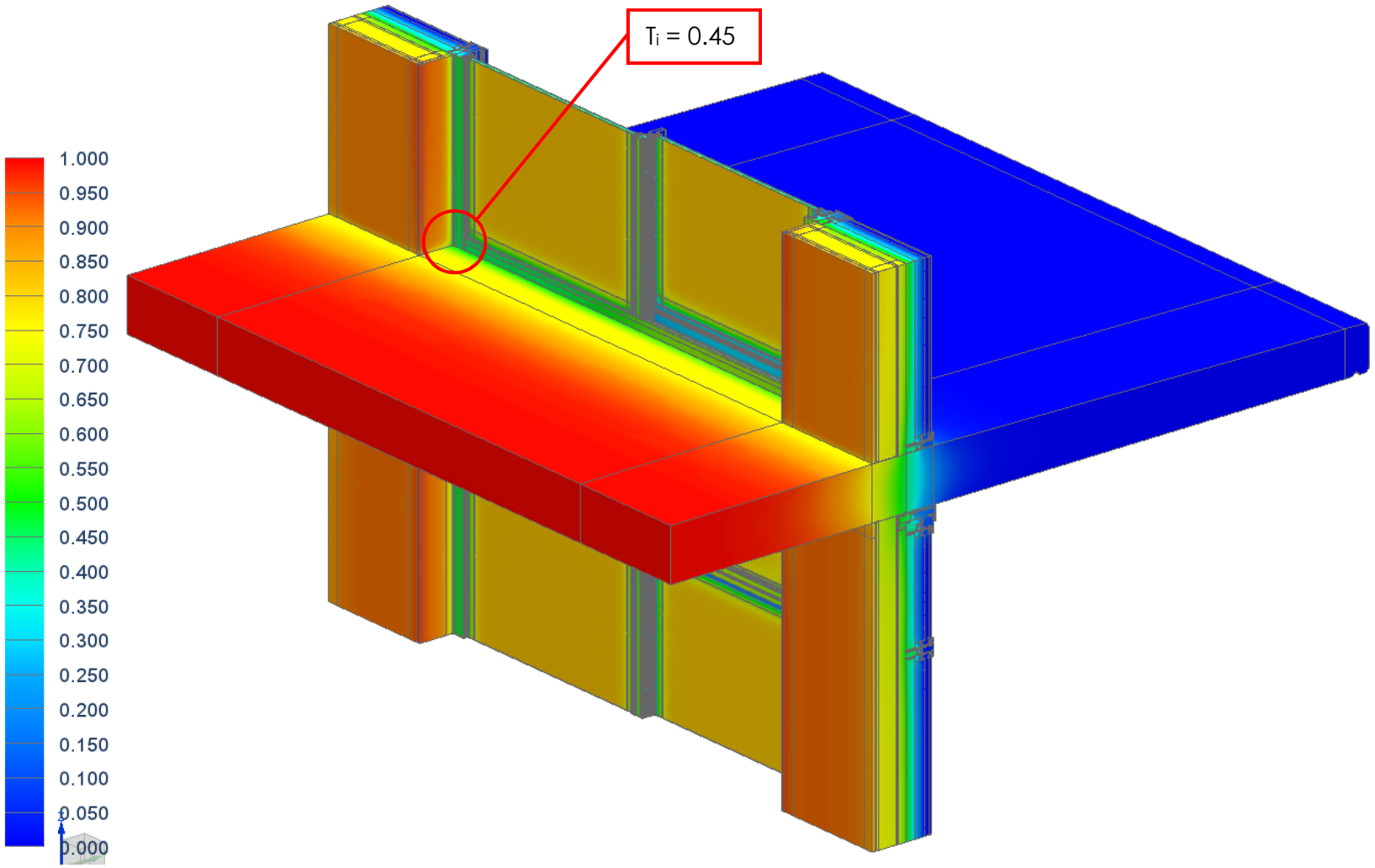


Figure B1: Interior Temperature Profile for Modeled Assembly with Continuous Slab (Conventional Solution). Lowest temperature index on concrete floor indicated with location

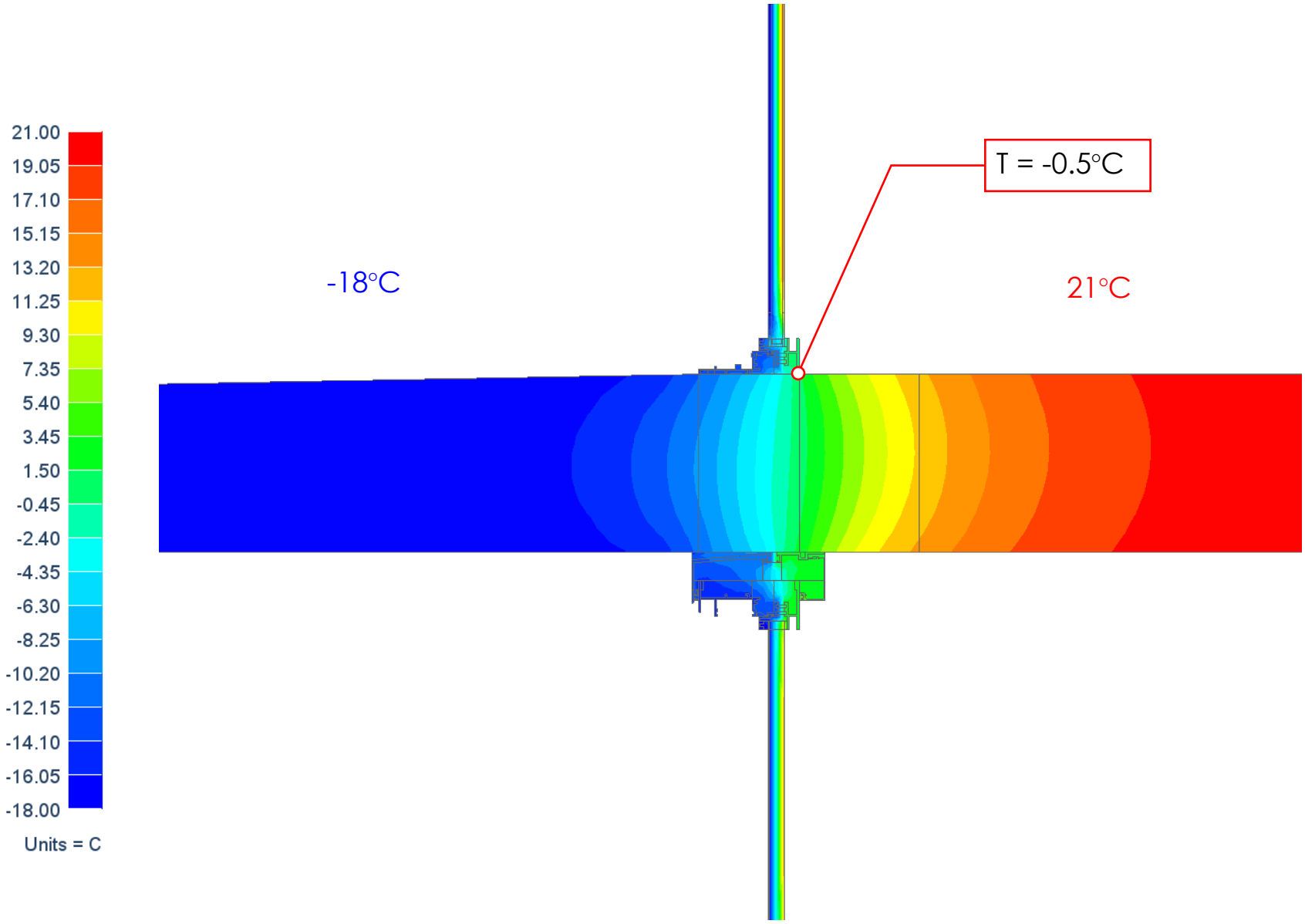


Figure B2: Side Profile for Continuous Slab (Conventional Solution) for a set temperature difference between T_{ext} = -18°C and T_{int} = 21°C, with minimum temperature on concrete surface

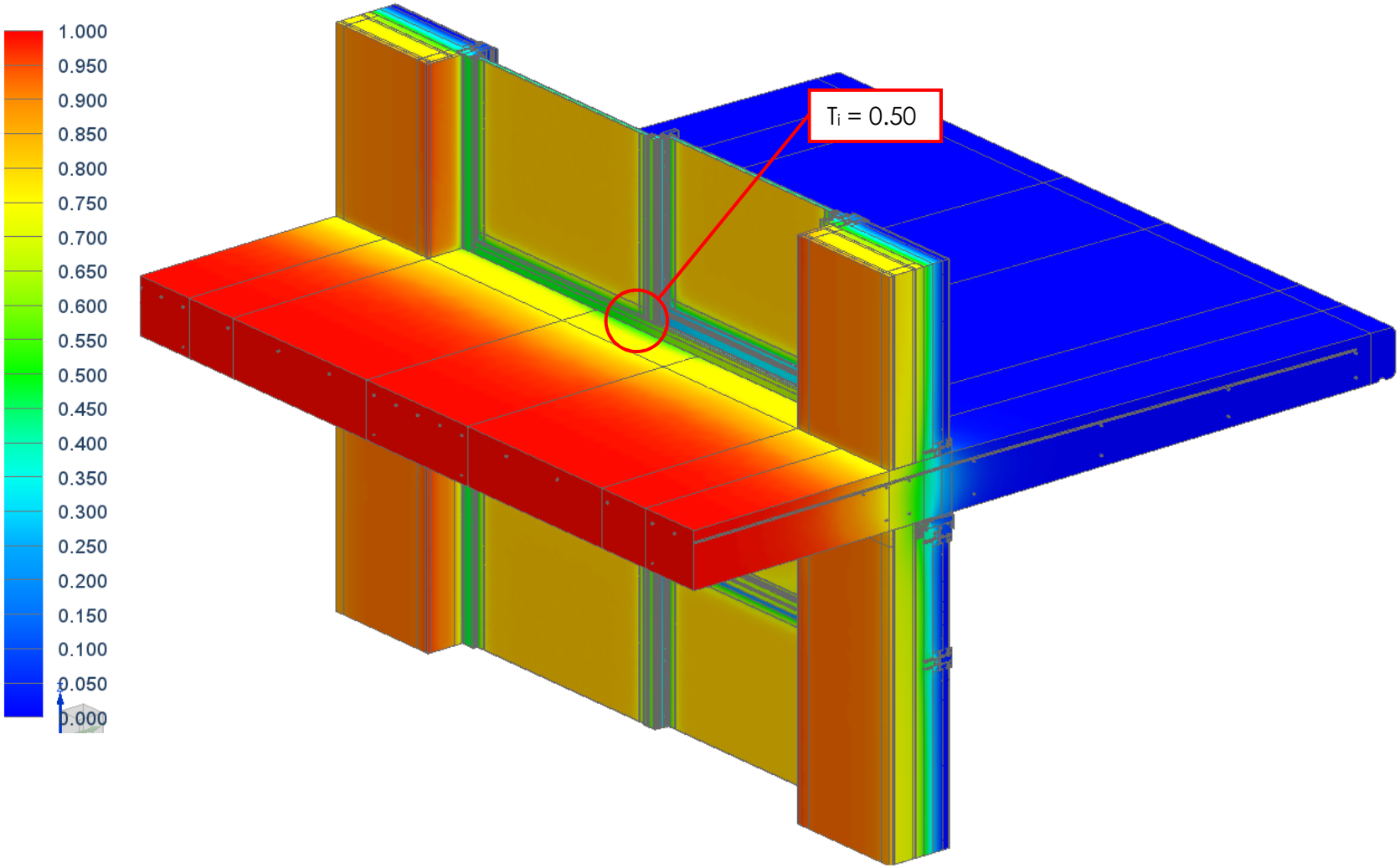


Figure B3: Interior Temperature Profile for Modeled Assembly with Slab w/ Intermittent concrete (Site Solution). Lowest temperature index on concrete floor indicated with location

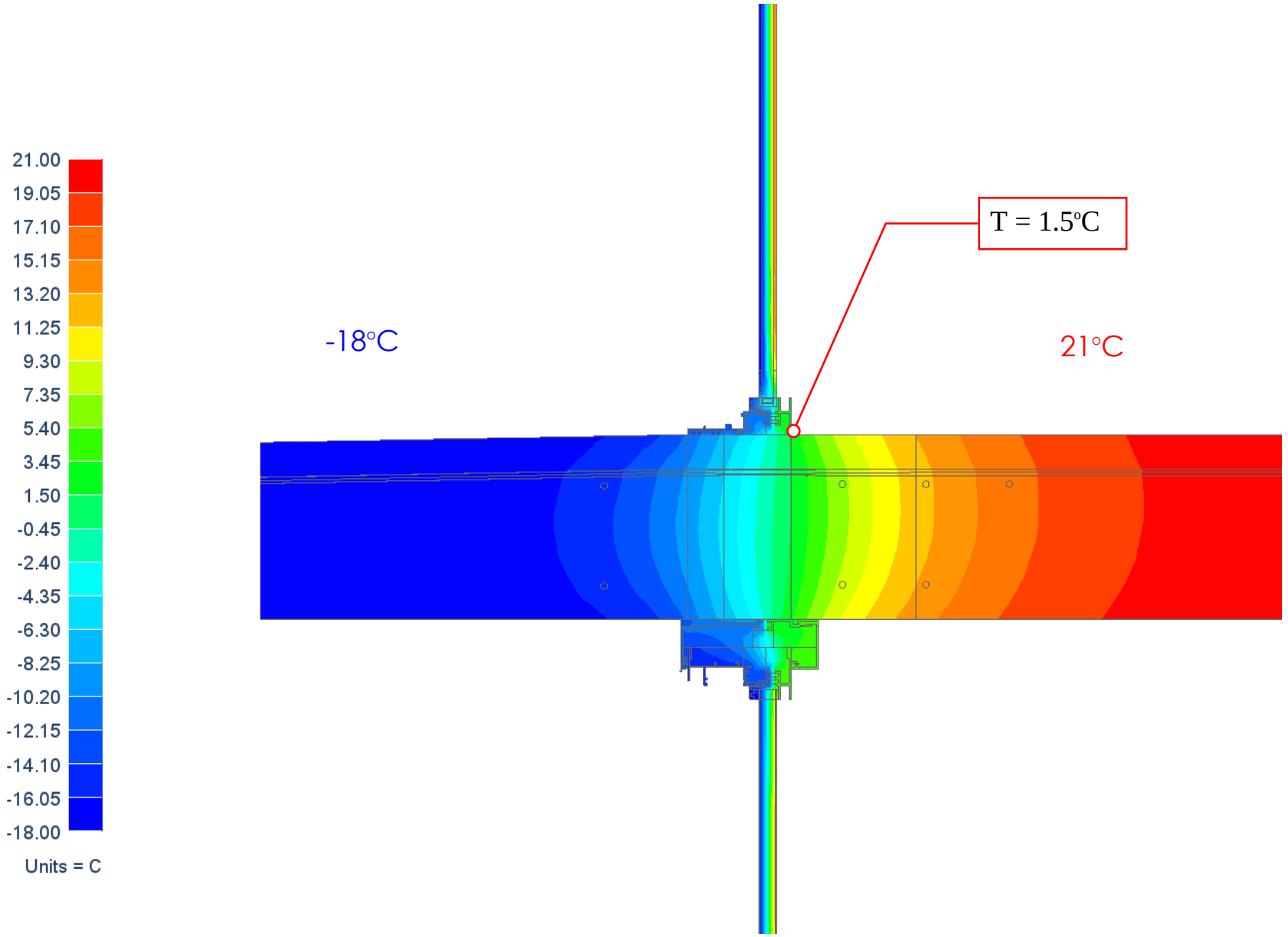


Figure B4: Side Profile for Intermittent concrete (Site Solution) for a set temperature difference between T_{ext} = -18°C and T_{int} = 21°C, with minimum temperature on concrete surface

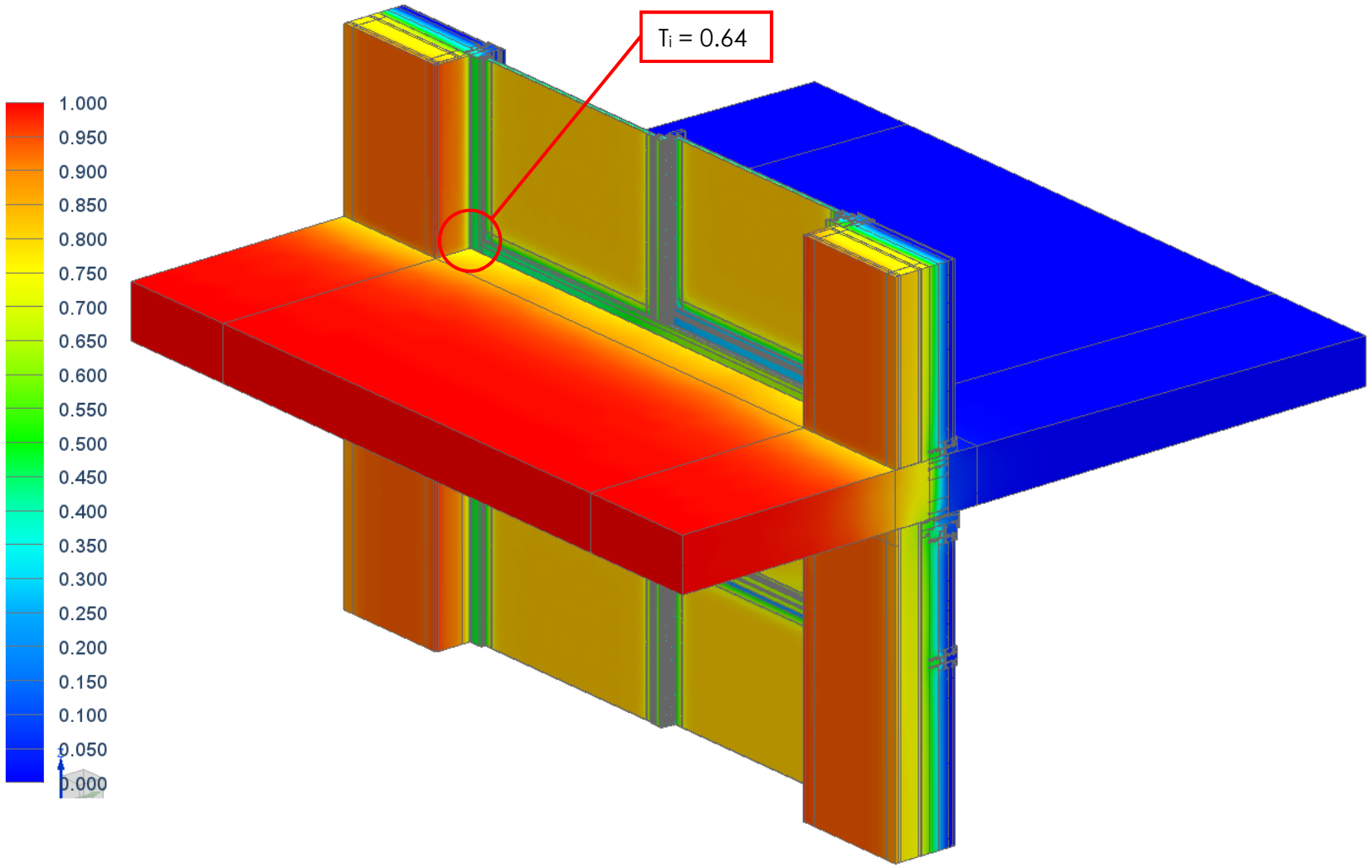


Figure B5: Interior Temperature Profile for Modeled Assembly with Slab with Isokorb (Schöck Solution). Lowest temperature index on concrete floor indicated with location

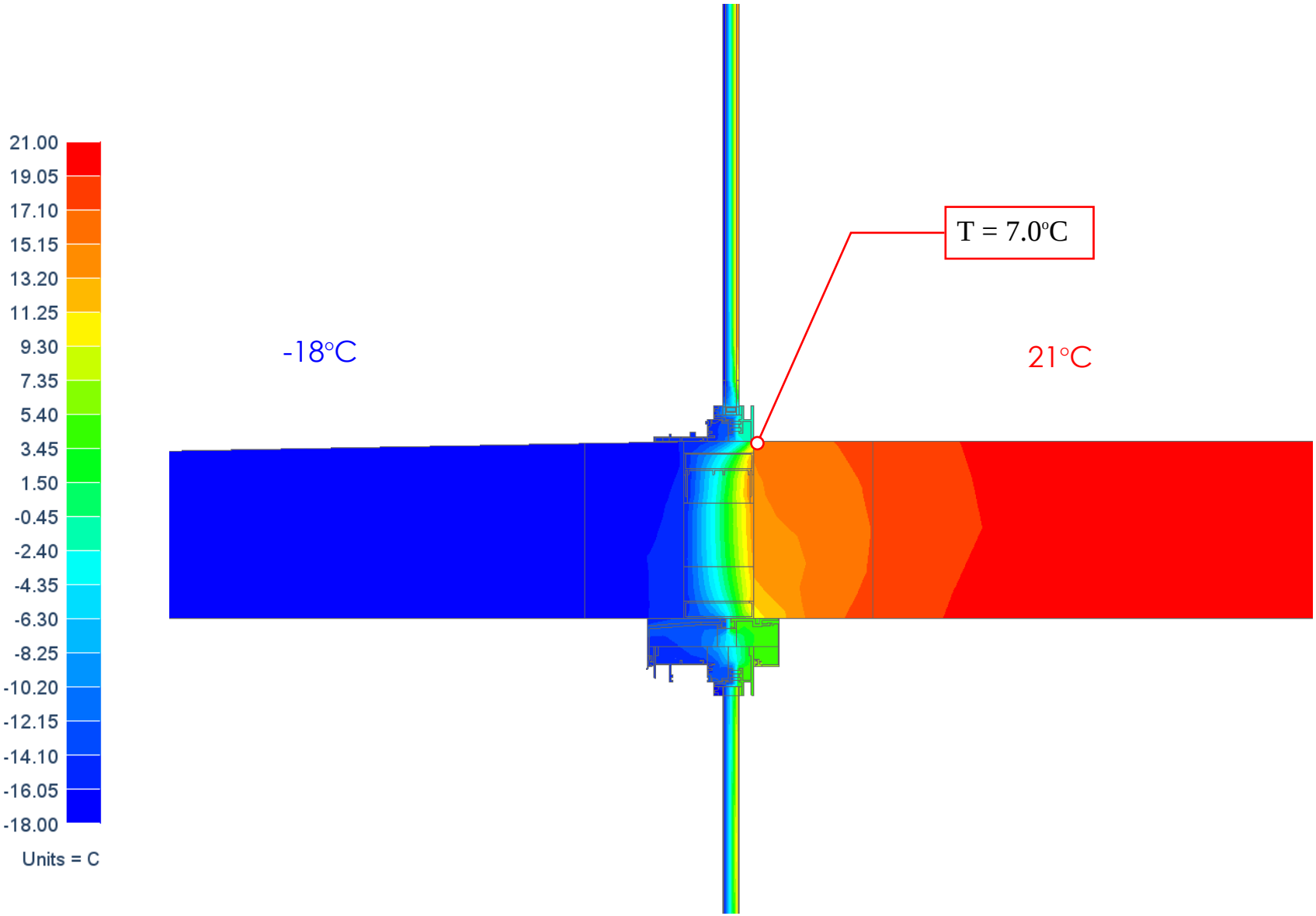


Figure B6: Side Profile for Isokorb (Schöck Solution) for a set temperature difference between T_{ext} = -18°C and T_{int} = 21°C with minimum temperature on concrete surface

APPENDIX C: Whole Building Energy Analysis Assumptions

Opaque Envelope Systems	USI (W/m^2K)	RSI (m^2K/W)	U ($Btu/hrft^2F$)	R ($hrft^2F/Btu$)	Other	Details
Roof	0.275	3.64	0.048	20.6	Reflectance: 0.3	
Slab-on-grade	2.88	0.35	0.507	2.0		Uninsulated, in contact with ground
Spandrel Panels	0.8	1.25	0.141	7.1		All wall areas assumed as spandrel panels
Conventional Solution Slab Edge	4.9	0.20	0.863	1.2		Applied over 0.21m height at balconies
Site Solution Slab Edge	3.846	0.26	0.677	1.5		Applied over 0.21m height at balconies
Schoeck Solution Slab Edge	1.208	0.83	0.213	4.7		Applied over 0.21m height at balconies

Glazing Systems	USI (W/m^2K)	RSI (m^2K/W)	U ($Btu/hrft^2F$)	R ($hrft^2F/Btu$)	Other Properties	Details
Casement 1	2.28	0.439	0.402	2.49	SHGC: 0.45	Based on $0.4m^2$ operable, $1.6m^2$ fixed
Casement 2	2.26	0.443	0.397	2.52	SHGC: 0.45	Based on $0.8m^2$ operable, $5.2m^2$ fixed
Casement and Fixed 1	2.25	0.445	0.395	2.53	SHGC: 0.45	Based on $0.4m^2$ operable, $3.6m^2$ fixed
Casement and Fixed 2	2.23	0.448	0.393	2.54	SHGC: 0.45	Based on $0.4m^2$ operable, $5.6m^2$ fixed
Casement and Fixed 3	2.23	0.449	0.392	2.55	SHGC: 0.45	Based on $0.4m^2$ operable, $7.6m^2$ fixed
Door	2.58	0.388	0.454	2.20	SHGC: 0.45	Based on $3m^2$ door, $1m^2$ fixed
Door and Casement 1	2.31	0.433	0.407	2.46	SHGC: 0.45	Based on $0.4m^2$ op, $3m^2$ door, $12.6m^2$ fixed
Door and Fixed 1	2.46	0.407	0.432	2.31	SHGC: 0.45	Based on $3m^2$ door, $3m^2$ fixed
Door and Fixed 2	2.39	0.418	0.422	2.37	SHGC: 0.45	Based on $3m^2$ door, $5m^2$ fixed
Fixed	2.21	0.452	0.389	2.57	SHGC: 0.45	
Operable	2.56	0.39	0.451	2.2	SHGC: 0.45	
Door	2.70	0.37	0.476	2.1	SHGC: 0.45	

Space Loads	Occupant Density (m2/person)	Receptacle Power (W/m2)	Minimum OA (L/s/m2)	Operating Schedules	Lighting Power Density (W/m2)	Notes
Suites	60	5.0	0.25	G	9	Air Infiltration: 0.25 L/s/m2 ext wall area
Corridors	100	0.0	0.25	G	8.6	Air Infiltration: 0.25 L/s/m2 ext wall area
Stairs and Elevators	100	0.0	0.25	G	6.5	Air Infiltration: 0.25 L/s/m2 ext wall area
Office	25	7.5	0.40	A	18	Air Infiltration: 0.25 L/s/m2 ext wall area
Lobby	5	1.0	1.00	C	10.85	Air Infiltration: 0.25 L/s/m2 ext wall area
Locker Rooms	10	2.5	2.50	G	8.6	Air Infiltration: 0.25 L/s/m2 ext wall area
Other Common Areas	10	1.0	3.00	B	7.5	Air Infiltration: 0.25 L/s/m2 ext wall area
Mechanical Penthouse	200	1.0	0.25	G	7.5	Air Infiltration: 0.25 L/s/m2 ext wall area

Mechanical Systems		Description
System Name	Unit HVAC	One unit modelled per zone
System Type	Four Pipe Fan Coil With	
Cooling Capacity Sizing Factor	1.15	
Heating Capacity Sizing Factor	1.25	
Cooling Supply Air Flow (L/s)	From Software Sizing,	
Cooling Supply Air Temperature (°C)	13	
Heating Supply Air Flow (L/s)	From Software Sizing,	
Heating Supply Air Temperature	33	
OA Fraction	Varies	
Heat Recovery - Y or N?	Y	50% sensible recovery
Heating Plant	Natural Gas HW Boiler	
Number of Boilers	1	
Heating Plant Sizing Factor	1.25	
Nominal Capacity (kW)	2031.7	From Software Sizing
Heating Plant Efficiency	0.85	
Heating Supply Temp (°C)	81	
Pump Type	Variable Speed	
Design Water Flow Rate (m3/s)	0.043975	From Software Sizing
Effective Head (kPa)	329	From Provident Estimates
Pump Efficiency	0.85	From Provident Estimates
Cooling Plant	Electric Chiller	
Cooling Plant Sizing Factor	1.15	
Nominal Capacity (kW)	1151.2	From Software Sizing
Chiller Efficiency (COP)	6.1	From Provident Estimates
Cooling Supply Temp (°C)	7.22	
Pump Type	Variable Speed	
Pump Water Flow Rate (m3/s)	0.044	From Software Sizing
Pump Power Consumption (kW)	22.8	From Software Sizing
Effective Head (kPa)	389	From Provident Estimates
Pump Efficiency	0.9	
Cooling Tower	Tower	
Nominal Capacity (kW)	1332	
Pump Type	Variable Speed	
Pump Water Flow Rate (m3/s)	0.0573	From Software Sizing
Pump Power Consumption (kW)	14.6	From Software Sizing
Effective Head (kPa)	179.352	
Pump Efficiency	0.9	