

May 23th, 2022

Re: Milestone Incentive: Innovation - Embodied Carbon Analysis

Dear: Julie Knorr

The University of Washington Health Science Education Building was analyzed to emit 2,220 tons of carbon in its upfront emissions. The material selection of CLT floors and exterior metal siding reduced upfront emissions by approximately 20% compared to a baseline building of same use, shape, and size.

The majority of these emissions comes from the buildings concrete, steel and insulation. Miller Hull conducted this whole building life cycle (WBLCA) assessment by using software known as Tally. Tally uses industry standard Environmental Product Declarations (EPD's) to calculate the global warming potential of each material shown in our Revit building information models. We leverage these tools during design to spotlight the most impactful materials and find feasible alternatives or compare design iterations to help material selection. At this time, Miller Hull is including substructure, superstructure, envelope, and fixed interior building elements in whole building life cycle assessment studies. These are analyzed in what is knowns as the A1 (raw material supply), A2 (transport) and A3 (manufacturing) product stages.

There are two types of emissions that the building industry is responsible for: operational energy emissions and embodied carbon emissions. The operational emissions result from the energy used by the building to heat and cool and provide electricity for any equipment and lights in the building. Embodied carbon emissions result from the energy used to extract, manufacture and transport building materials and products. Unlike operational emissions that can change over a building's lifetime depending on operation, embodied emissions are set at the time of construction. This means that there is no opportunity to reduce them as with operational emissions when a building can be operated more efficiently over time or receive energy from a cleaner source like an evolving campus utility or a greener regional utility grid. Between now and 2050, embodied emissions will account for almost half of the total climate impact incurred by the new buildings we are designing today. Emissions, like embodied carbon, that are added to the world now are more harmful because they are accumulating at a faster rate and link directly to human health problems and death rates right now. Reducing embodied emissions from our buildings is a critical step to addressing climate change.

The use of mass timber structure has been shown to reduce the embodied carbon of buildings. The majority of embodied emissions from architecture typically stems from a building's primary structural system. Typically, concrete and steel, common materials for building structure, are the highest emitters of embodied carbon emissions. Using a structural system alternative of mass timber like cross laminated timber (CLT), can help to reduce the embodied emissions of a building's structural system. In the UW HSEB project, we have been able to see a reduction in overall embodied carbon emissions because of the use of mass timber. Other benefits include the use of a regionally available, renewable resource and support for smaller economies that harvest and produce timber. The use of exposed CLT also provides an aesthetic benefit and helps to reduce duplicative materials for ceiling finishes. When wood is responsibly harvested, there can be great environmental and economic benefits.

Addressing embodied carbon in every project is a must in order to reach climate targets. Using building materials and products that support reducing these emissions is possible now and projects like the University of Washington's Health Science Education Building exemplify this. By using renewable and regionally-sourced resources like cross

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laminated timber helps the market realize the potential for emissions-reducing buildings. The University of Washington is helping other projects to see the value in wisely choosing building materials.

Attached you will find two life cycle assessments of embodied environmental impacts that include embodied carbon analysis.

- Attachment A Project Design is a report prepared to describe the current project basis of design.
- Attachment B Alternate Baseline Design is a report used to establishing an assumed baseline building where no CLT was used, and the metal panel siding was replaced with glass fiber reinforced concrete panels.

Sincerely,

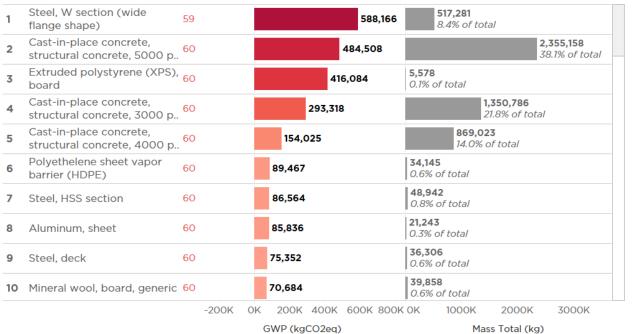
Bradly Gunn Project Architect, The Miller Hull Partnership

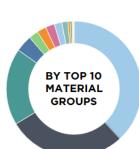
HEALTH SCIENCES EDUCATION BUILDING DESIGN

TOTAL GWP: **2,865 tCO2e** (618.7 passenger vehicles driving for a year*) GWP / AREA: **318 kgCO2e/m2**

Study date:	May 20, 2022
Tally modeler:	Katherine Martin
Tally version:	Null
Project area:	100,000 sf
Reference	60 years
lifespan:	Envelope and Structure
Notes:	

TOP MATERIALS BY GWP (57 materials defined, total)





BY LIFE CYCLE STAGE



LATEST VERSION: 3.1	3.1
[A1-A3] Product	• 75%
[A4] Transportation	1%
[B2-B5] Maintenan	6 5%
[C2-C4] End of Life	17%
[D] Module D	2%

Z 1

Metal	•	39%
Concrete	•	29%
Insulation	•	19%
Vapor barrier	•	4%
Glazing	•	2%
Plaster	•	2%
Metal Coating	•	2%
Ceiling tile	•	2%
Roofing membra	•	1%
Window frame	•	1%
Coating	•	0%
Adhesive / Seala	•	0%
Composite	•	0%
Door	•	0%
Door frame	•	0%
Opening hardwar	•	0%

Structure	٠	28%
Walls	•	26%
Floors	٠	22%
Roofs	٠	12%
Curtainwall Panels	•	4%
Ceilings	•	3%
Curtainwall Mulli	•	3%
Stairs and Railings	•	1%
Doors	•	0%
Windows	•	0%

HEALTH SCIENCES EDUCATION BUILDING

HEALTH SCIENCES EDUCATION BUILDING

Full building summary 5/19/2022



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Report Summary

Created with Tally

Commercial Version 2022.04.08.01

Author Company Date Katherine Martin The Miller Hull Partnership 5/19/2022

Project Location Gross Area Building Life HEALTH SCIENCES EDUCATION BUILDING 1607 NE Pacific Street 100,000 ft² 60 years

Boundaries

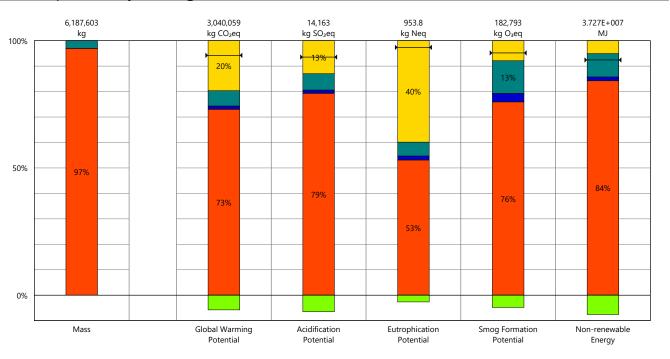
Cradle to grave, inclusive of biogenic carbon; see appendix for a full list of materials and processes

Goal and Scope of Assessment

Complete building envelope and structural elements, including foundations and footings, structural wall assembly (cladding to interior finish), structural floors and ceilings, and roof assemblies.

Environmental Impact Totals	Product Stage [A1-A3]	Construction Stage [A4]	Use Stage [B2-B5]	End of Life Stage [C2-C4]	Module D [D]
Global Warming (kg CO₂eq)	2,220,176	39,688	182,652	597,543	-175,252
Acidification (kg SO ₂ eq)	11,232	183.9	909.3	1,838	-914
Eutrophication (kg Neq)	506.7	14.97	51.89	380.2	-25.1
Smog Formation (kg O₃eq)	138,829	6,077	23,492	14,396	-8,801
Ozone Depletion (kg CFC-11eq)	0.2889	1.359E-009	3.943E-004	4.939E-005	9.009E-004
Primary Energy (MJ)	3.677E+007	577,149	3,703,493	2,025,103	-3,731,000
Non-renewable Energy (MJ)	3.139E+007	563,338	3,416,642	1,894,656	-2,823,543
Renewable Energy (MJ)	5,369,627	13,956	288,480	132,360	-910,462
Environmental Impacts / Area					
Global Warming (kg CO2eq/m²)	239.0	4.272	19.66	64.32	-18.9
Acidification (kg SO ₂ eq/m ²)	1.209	0.0198	0.09787	0.1978	-0.09838
Eutrophication (kg Neq/m ²)	0.05454	0.001612	0.005586	0.04093	-0.002705
Smog Formation (kg O₃eq/m ²)	14.94	0.6541	2.529	1.550	-0.9474
Ozone Depletion (kg CFC-11eq/m ²) 3.110E-005	1.463E-013	4.244E-008	5.316E-009	9.697E-008
Primary Energy (MJ/m ²)	3,957	62.12	398.6	218.0	-402
Non-renewable Energy (MJ/m ²)	3,379	60.64	367.8	203.9	-304
Renewable Energy (MJ/m ²)	578.0	1.502	31.05	14.25	-98.0

Results per Life Cycle Stage

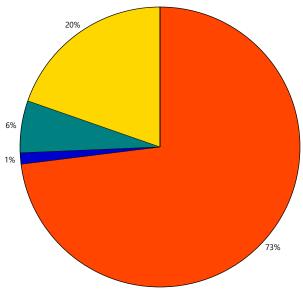


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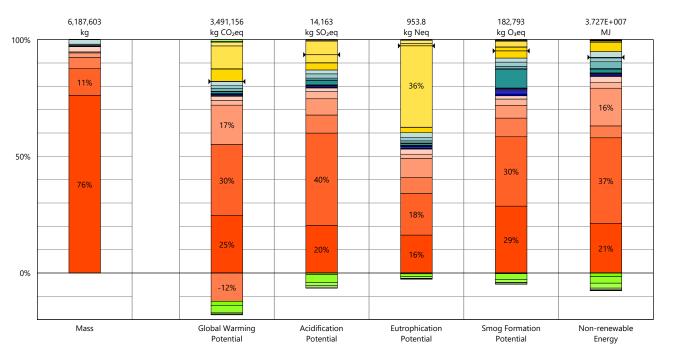
► Net value (impacts + credits)

Life Cycle Stages

Product [A1-A3]
 Transportation [A4]
 Maintenance and Replacement [B2-B5]
 End of Life [C2-C4]
 Module D [D]







Results per Life Cycle Stage, itemized by Division

Legend

► Net value (impacts + credits)

Product [A1-A3]

- 03 Concrete
- 05 Metals
- 06 Wood/Plastics/Composites
- 07 Thermal and Moisture Protection 08 - Openings and Glazing
- 08 Opening 09 - Finishes

Transportation [A4]

- 03 Concrete
- 05 Metals
- 06 Wood/Plastics/Composites
- 07 Thermal and Moisture Protection
- 08 Openings and Glazing
- 09 Finishes

Maintenance and Replacement [B2-B5]

- 03 Concrete
- 05 Metals
- 06 Wood/Plastics/Composites 07 - Thermal and Moisture Protection
- 08 Openings and Glazing
- 09 Finishes

End of Life [C2-C4]

- 03 Concrete
- 05 Metals
- 06 Wood/Plastics/Composites
- 07 Thermal and Moisture Protection 08 - Openings and Glazing
- 08 Openings and G

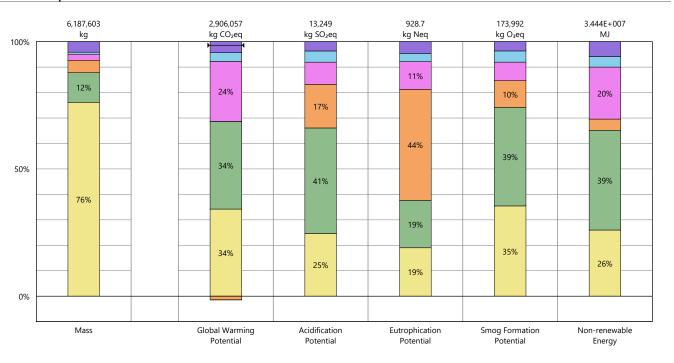
Module D [D]

				-	-	
1	0	3 -	Cc	nc	re	te

05 - Metals

06 - Wood/Plastics/Composites
07 - Thermal and Moisture Protection
08 - Openings and Glazing
09 - Finishes

Results per Division



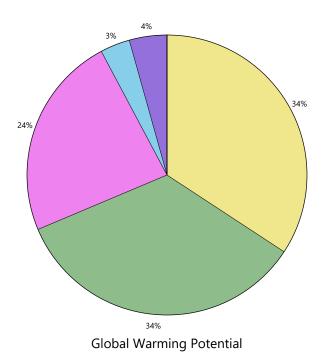
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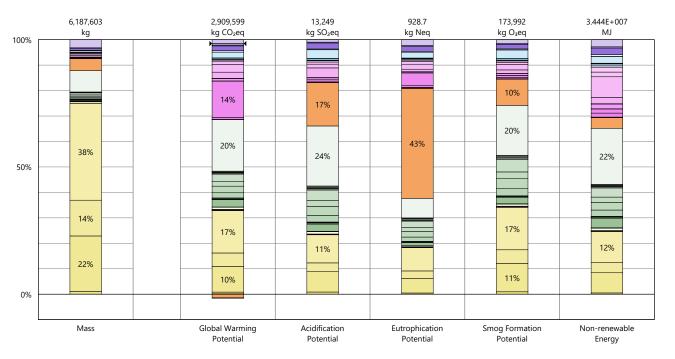
► Net value (impacts + credits)

Divisions

Γ

- 03 Concrete
- 05 Metals
 - 06 Wood/Plastics/Composites
- 07 Thermal and Moisture Protection
- 08 Openings and Glazing
- 09 Finishes



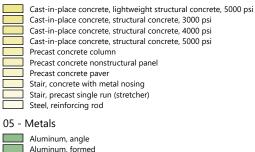


Results per Division, itemized by Tally Entry

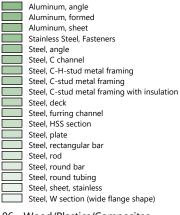
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► Net value (impacts + credits)

03 - Concrete







06 - Wood/Plastics/Composites

Cross laminated timber (CLT)

Domestic hardwood Phenolic resin solid surface, sheet Plywood, interior grade

07 - Thermal and Moisture Protection

EPDM, roofing membrane
Extruded polystyrene (XPS), board
Fiberglass clip system
Fluid applied synthetic polymer air barrier

Metal roofing panels, formed

- Mineral wool, board, generic
- Polyethelene sheet vapor barrier (HDPE)
- Polyisocyanurate (PIR), board
- SBS modified bitumen, sheet
- Self adhering membrane
- Self-adhering sheet waterproofing, modified bituminous sheet Wood siding

08 - Openings and Glazing

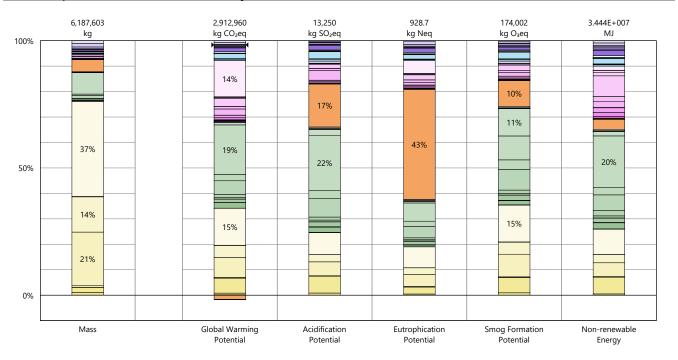
_				
	Aluminum	mullion,	inclusive	of finish

- Door frame, aluminum
- Door frame, steel, galvanized
- Door, exterior, aluminum
- Door, exterior, steel Door, interior, steel
- Glazing, custom IGU
- Glazing, monolithic sheet
- Window frame, vinyl

09 - Finishes

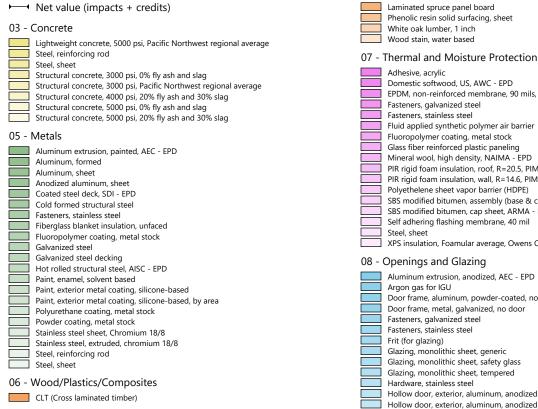


Acoustic ceiling system, mineral fiber board Fiberglass mat gypsum sheathing Wall board, gypsum



Results per Division, itemized by Material

Legend



Laminated spruce panel board

	Adhesive, acrylic
	Domestic softwood, US, AWC - EPD
	EPDM, non-reinforced membrane, 90 mils, SPRI - EPD
	Fasteners, galvanized steel
	Fasteners, stainless steel
	Fluid applied synthetic polymer air barrier
	Fluoropolymer coating, metal stock
	Glass fiber reinforced plastic paneling
	Mineral wool, high density, NAIMA - EPD
	PIR rigid foam insulation, roof, R=20.5, PIMA - EPD
	PIR rigid foam insulation, wall, R=14.6, PIMA - EPD
	Polyethelene sheet vapor barrier (HDPE)
	SBS modified bitumen, assembly (base & cap), ARMA - EPD
	SBS modified bitumen, cap sheet, ARMA - EPD
	Self adhering flashing membrane, 40 mil
	Steel, sheet
	XPS insulation, Foamular average, Owens Corning - EPD
<u> </u>	
8 - I	Openings and Glazing
	Aluminum extrusion, anodized, AEC - EPD

Aluminum extrusion, anodized, AEC - EPD
Argon gas for IGU
Door frame, aluminum, powder-coated, no door
Door frame, metal, galvanized, no door
Fasteners, galvanized steel
Fasteners, stainless steel
Frit (for glazing)
Glazing, monolithic sheet, generic
Glazing, monolithic sheet, safety glass
Glazing, monolithic sheet, tempered
Hardware, stainless steel
Hollow door, exterior, aluminum, anodized
Hollow door ovtorior aluminum apodized large vision p

Results per Division, itemized by Material (continued)

Legend (continued)

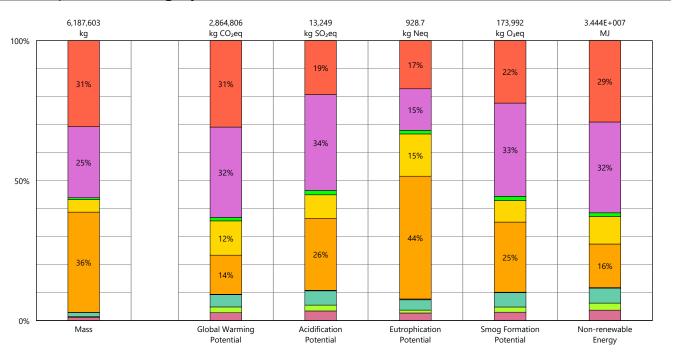


09 - Finishes

Acoustic ceiling tile (ACT), mineral fiber board Fiberglass mat gypsum sheathing board Paint, interior acrylic latex Suspended grid Wall board, gypsum, fire-resistant (Type X) Wall board, gypsum, moisture- and mold-resistant Wall board, gypsum, natural

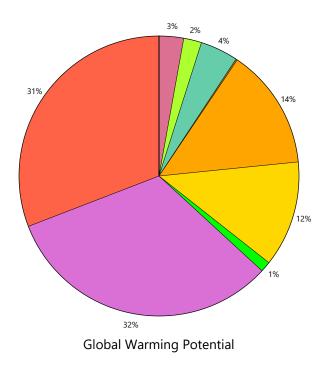
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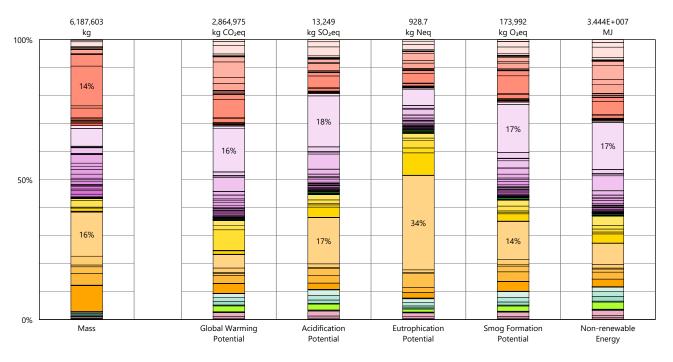
Results per Revit Category



Legend







Results per Revit Category, itemized by Family

Legend

Ceilings

5
1-C2- GWB on Mtl. Stud
2-C2- GWB on Mtl. Stud
ACT 4 AcoustiBuilt Ceiling
C1 - ACT-1 - 2' x 4'
C1 - ACT-2 - 2' x 2' HRC
C1 - ACT-3 - 2' x 2'
C1 - ACT-5 - 2' x 6'
C2- GWB on Mtl. Stud
C7- GWB on Mtl. Stud 2
Linear Wood Ceiling

Curtainwall Mullions

Rectangular Mullion

Curtainwall Panels

cp_HSEB - Base Material Panel_vertical
cp_HSEB - Skin Shingle flashing
cp_HSEB - Skin Shingle Panel_hoz
cp_HSEB - Window at Upper Levels
System Panel

Doors



Floors

 -
(F1) SLAB ON GRADE
(F1) SLAB ON GRADE - 6"
(F1) SLAB ON GRADE - 8"
(F2) CONCRETE METAL DECK

(F3) CONCRETE DECK O/ 3 PLY CLT FLOOR N/W DIRECTION
(F3) CONCRETE METAL DECK (STRUCTURAL ONLY)

- (F3) CONCRETE METAL DECK W/ TOPPING SLAB
- (F4) CONCRETE DECK O/ 3 PLY CLT FLOOR
- 12" Concrete Slab
- 155 1 HR RATED HORIZONTAL DUCT ENCLOSURE
- 3.5" Light Duty Paving Over Sturcture
- 3/16" Aluminum Plate

Roofs

- (R1) CLT ROOF
- (R1) CLT ROOF CLT PATTERN N/S
 (R2) INSULATION O/ ASPHALT MEMBRANE O/ STRUCT
 (R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2
 (R3) SBS OVER METAL DECK
 (R4) SOUTH VEST ROOF
 (R4) SOUTH VEST ROOF (INTERIOR)
 1/4" STEEL PLATE
 3/16" Aluminum Plate

Stairs and Railings

Jun.	s and rainings
	Construction Specialties_Crash Rail_6" ECR-60S
	HSEB - Pipe Guardrail - GDR-2
	HSEB - Pipe Guardrail - GDR-2 without handrail
	HSEB - STR-1 Precast Tread & Riser
	HSEB - STR-2 Precast Tread Steel Riser 2
	HSEB Guardrail - Cable Rail
	HSEB Guardrail - Cable Rail without handrail
	HSEB Handrail - HNDRL-1
	HSEB Handrail - HNDRL-3
	HSEB PIPE Handrail - HNDRL-2
	HSEB ST-11 (CAST IN PLACE)
	HSEB ST-9 (CAST IN PLACE)
	HSEB Type C - STR-4_Conc filled w/ C channel
	HSEB Type C_STR-10_Conc filled w/ C channel
	HSEB Type C_STR-5_Conc filled w/ C channel 2
	HSEB Type C_STR-6_Conc filled w/ Plate Stringer - Roof Access
	HSEB Type C_STR-8_Conc filled w/ Plate

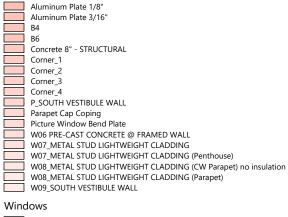
Results per Revit Category, itemized by Family (continued)

Legend (continued)

HSEB_STR-3_Precast Tread Steel Riser HSEB-GDR-4_Canerail

Structure

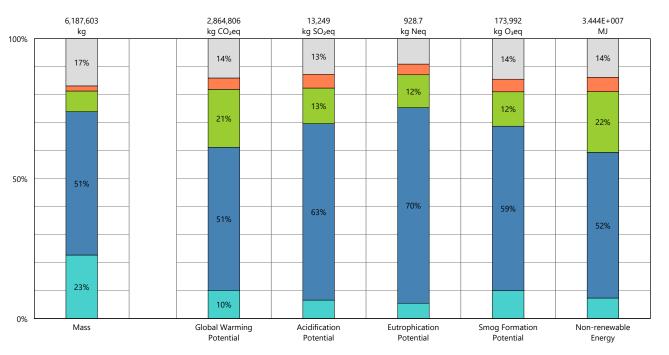
	ture
	04.016_LCL FND Slab_Spread Ftg_F10.0 10x10x3.0d
	04.016_LCL FND Slab_Spread Ftg_F11.0 11x11x3.25d
	04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d
	04.016_LCL FND Slab_Spread Ftg_F12.0 14x14x4.5d
	04.016_LCL FND Slab_Spread Ftg_F2.0 2x2x11"d
	04.016_LCL FND Slab_Spread Ftg_F4.0 4x4x1.5d
	04.016_LCL FND Slab_Spread Ftg_F8.0 8x8x2.5d
	04.016_LCL FND Slab_Spread Ftg_F9.0 9x9x2.75d
	04.016_LCL FND Slab_Spread Ftg_FW6.0 6x8x2.5d
	04.017_LCL FND Slab_Cont. Ftg FW3.0_36wx18d
	04.017_LCL FND Slab_Cont. Ftg FW4.0_48wx18d
	04.017_LCL FND Slab_Cont. Ftg FW4.0_48wx24d
	04.017_LCL FND Slab_Cont. Ftg FW5.0_60wx18d
	04.017_LCL FND Slab_Cont. Ftg FW5.0A_60wx30d
	04.017_LCL FND Slab_Cont. Ftg FW7.0_87wx42d 2
	04.017_LCL FND Slab_Cont. Ftg FW8.0_96wx48d
	04.017_LCL FND Slab_Cont. Ftg_24wx12d
	KPFF - SCOL - Concrete - Round
	KPFF - SCOL - Steel - HSS - Rectangular (C) - TC
	KPFF - SCOL - Steel - HSS - Rectangular (C) - TC- 2x
	KPFF - SCOL - Steel - HSS - Round (C) - TC
	KPFF - SCOL - Steel - W - Wide Flange (C) - TC
	KPFF - SFRM - Steel - BRB - Buckling Restrained Brace
	KPFF - SFRM - Steel - C - Channel (C) - TC
	KPFF - SFRM - Steel - HSS - Rectangular (C) - TC
	KPFF - SFRM - Steel - Kicker Brace - L - Angle - TC
	KPFF - SFRM - Steel - L - Angle (C) - TC
	KPFF - SFRM - Steel - L - Aligie (C) - TC KPFF - SFRM - Steel - W - Wide Flange (C) - TC
	5 ()
	KPFF - SFRM - Steel - WT - Wide Flange Tee - TC
	KPFF - SFRM - Steel - WT - Wide Flange Tee (C) - TC
	LCL_C_Pilaster_Rect_()w()d
	LCL_Embed_2x3-Nelson-Studs_OffSet
Walls	c
vvan.	
	(A1)_Furr Mtl Stud 7/8"_GWB (1-0)
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0)
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(15")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(15")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(15") 04.215_LCL_C_Slab Transition_Wall(4")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(4")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(15") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8")
	 (A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8") 04.225_LCL_C_CURB_Wall(11")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8") 04.225_LCL_C_CUB_Wall(11") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(6")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.225_LCL_C_CURB_Wall(11") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(15") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.230_LCL_C_CURB_Wall(8")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.225_LCL_C_CIRB_Wall(11") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_FOINDATION_Wall(10") 04.310_LCL_C_PIT_Wall(8")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.225_LCL_C_CUB_Wall(1") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_PII_Wall(8") 04.300_LCL_C_PII_Wall(8") 04.380_LCL_C_SHOTCRETE_Wall(16")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.225_LCL_C_CURB_Wall(11") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_Foundation_Wall(10") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Clab Transition_Wall(8") 04.225_LCL_C_CURB_Wall(11") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.230_LCL_C_CURB_Wall(8") 04.300_LCL_C_Foundation_Wall(10") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(12")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_Foundation_Wall(10") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(22")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(8") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_FOUNDAUI(10") 04.300_LCL_C_PIT_Wall(8") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(24")
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_Foundation_Wall(10") 04.300_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-86 1-N8 GFRC @ FRAMED WALL STAGGERED STUD
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_FOUNDATION_Wall(10") 04.300_LCL_C_FIT_Wall(8") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11"
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_Foundation_Wall(10") 04.310_LCL_C_FIT_Wall(8") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11"
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_FOURB_Wall(6") 04.300_LCL_C_PIT_Wall(8") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(2") 04.380_LCL_C_SHOTCRETE_Wall(2") 04.380_LCL_C_SHOTCRETE_Wall(2") 04.380_LCL_C_SHOTCRETE_Wall(2") 04.380_LCL_C_SHOTCRETE_Wall(2") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 8"
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8") 04.225_LCL_C_CUB_Wall(1") 04.225_LCL_C_CUBB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_FOURAMI(8") 04.300_LCL_C_FOURAMI(8") 04.300_LCL_C_SHOTCRETE_Wall(10") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(22") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 8" 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 8"
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_Floundation_Wall(10") 04.300_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 8" 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 22" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(15") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_FOUNDATION_Wall(10") 04.310_LCL_C_FIT_Wall(8") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 8" 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 8" 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 22" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(8") 04.300_LCL_C_FOUNDATION_ 04.300_LCL_C_FOUNDATION_ 04.330_LCL_C_SHOTCRETE_Wall(16") 04.330_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 22" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W07_METAL STUD LIGHTWEIGHT CLADDING
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(8") 04.225_LCL_C_CUB_Wall(1") 04.225_LCL_C_CUBB_Wall(4") 04.225_LCL_C_CUBB_Wall(6") 04.225_LCL_C_CUBB_Wall(6") 04.320_LCL_C_FOURB_Wall(6") 04.300_LCL_C_FOURB_Wall(6") 04.330_LCL_C_FOURB_Wall(10") 04.330_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 22" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W07 METAL STUD LIGHTWEIGHT CLADDING
	 (A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8". GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8") 04.215_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(8") 04.300_LCL_C_Foundation_Wall(10") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 18" 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 22" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 2-A0_FURT HAT Channel 7/8"_GWB (2-0) 2 hour rated 2-A0_GWB Type X (2-0) 2 hour rated
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.320_LCL_C_FOUNDATION 04.300_LCL_C_FOUNDATION 04.300_LCL_C_FIT_Wall(8") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-86 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 18" 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 8" 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 8" 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 22" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 2-A0_GWB Type X (2-0) 2 hour rated 2-A0_GWB Type X (2-0) 2 hour rated 2-A0_GWB Type X (2-0) 2 hour rated 2-A0_GWB Type X (2-0) 2 hour rated
	 (A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8") 04.215_LCL_C_CURB_Wall(11") 04.225_LCL_C_CURB_Wall(11") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_FOUNDATION_Wall(10") 04.300_LCL_C_FOUNDATION_Wall(10") 04.330_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 2" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 2" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W07_METAL STUD LIGHTWEIGHT CLADDING 2-A0_FURT HAT Channel 7/8"_GWB (2-0) 2 hour rated 2-A0_GWB Type X (2-0) 2 hour rated 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_16" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_16"
	 (A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.300_LCL_C_FOURB_Wall(6") 04.300_LCL_C_FOURDAWALI(10") 04.300_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 22" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD 1-W07 METAL STUD LIGHTWEIGHT CLADDING 2-A0_FUIT HAT Channel 7/8"_GWB (2-0) 2 hour rated 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16"
	 (A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8") 04.215_LCL_C_CUB_Wall(1") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(8") 04.300_LCL_C_FOURB_Wall(8") 04.300_LCL_C_SHOTCRETE_Wall(10") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 8" 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 8" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 2-A0_FUR HA CHANNEL 74FRIOR INSULATION 22" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 2-A0_GWB Type X (2-0) 2 hour rated 2-A0_GWB Type X (2-0) 2 hour rated 2-A0_GWB Type X (2-0) 2 hour rated 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_16" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24"
	 (A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8". GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(8") 04.300_LCL_C_Foundation_Wall(10") 04.300_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 12" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 2-A0_FUR HA Channel 7/8"_GWB (2-0) 2 hour rated 2-A0_GWB Type X (2-0) 2 hour rated 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_16" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24" 2-W07_METAL STUD LIGHTWEIGHT CLADDING
	 (A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) (B8)_TYP Mtl Stud 8"_GWB Insulation 04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(8") 04.215_LCL_C_CUB_Wall(1") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(8") 04.300_LCL_C_FOURB_Wall(8") 04.300_LCL_C_SHOTCRETE_Wall(10") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(24") 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 8" 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 8" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 2-A0_FUR HA CHANNEL 74FRIOR INSULATION 22" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 2-A0_GWB Type X (2-0) 2 hour rated 2-A0_GWB Type X (2-0) 2 hour rated 2-A0_GWB Type X (2-0) 2 hour rated 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_16" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24"



LOUVER-parametric

A4_Furr Mtl Stud 4"_GWB (1-0)

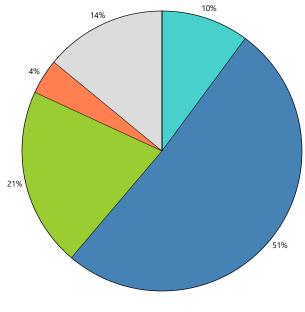




Legend

Building Elements
Substructure
Superstructure
Enclosure
Interiors

Undefined



Calculation Methodology

LIFE CYCLE ASSESSMENT METHODS

The following provides a description of terms and methods associated with the use of Tally to conduct life cycle assessment for construction works and construction products. Tally methodology is consistent with LCA standards ISO 14040-14044, ISO 21930:2017, ISO 21931:2010, EN 15804:2012, and EN 15978:2011. For more information about LCA, please refer to these standards or visit www.choosetally.com.

Studied objects

The life cycle assessment (LCA) results reported represent an analysis of a single building, multiple buildings, or a comparative analysis of two or more building design options. The assessment may represent the complete architectural, structural, and finish systems of the building(s) or a subset of those systems. This may be used to compare the relative environmental impacts associated with building components or for comparative study with one or more reference buildings. Design options may represent a full or partial building across various stages of the design process, or they may represent multiple schemes of a full or partial building that are being compared to one another across a range of evaluation criteria.

Functional unit and reference unit

A functional unit is the quantified performance of a product, building, or system that defines the object of the study. The functional unit of a single building should include the building type (e.g. office, factory), relevant technical and functional requirements (e.g. regulatory requirements, energy performance), pattern of use (e.g. occupancy, usable floor area), and the required service life. For a design option comparison of a partial building, the functional unit is the complete set of building systems or products that perform a given function. It is the responsibility of the modeler to assure that reference buildings or design options are functionally equivalent in terms of scope and relevant performance. The expected life of the building has a default value of 60 years and can be modified by the modeler.

The reference unit is the full collection of processes and materials required to produce a building or portion thereof and is quantified according to the given goal and scope of the assessment over the full life of the building. If construction impacts are included in the assessment, the reference unit also includes the energy, water, and fuel consumed on the building site during construction. If operational energy is included in the assessment, the reference unit includes the electrical and thermal energy consumed on site over the life of the building.

Data source

Tally utilizes a custom designed LCA database that combines material attributes, assembly details, and architectural specifications with environmental impact data resulting from the collaboration between KieranTimberlake and thinkstep. LCA modeling was conducted in GaBi 8.5 using GaBi 2018 databases and in accordance with <u>GaBi databases and modeling principles</u>. The data used are intended to represent the US and the year 2017. Where representative data were unavailable, proxy data were used. The datasets used, their geographic region, and year of reference are listed for each entry. An effort was made to choose proxy datasets that are technologically consistent with the relevant entry.

Data quality and uncertainty

Uncertainty in results can stem from both the data used and their application. Data quality is judged by: its measured, calculated, or estimated precision; its completeness, such as unreported emissions; its consistency, or degree of uniformity of the methodology applied on a study serving as a data source; and geographical, temporal, and technological representativeness. The <u>GaBi LCI databases</u> have been used in LCA models worldwide in both industrial and scientific applications. These LCI databases have additionally been used both as internal and critically reviewed and published studies. Uncertainty introduced by the use of proxy data is reduced by using technologically, geographically, and/or temporally similar data. It is the responsibility of the modeler to appropriately apply the predefined material entries to the building under study.

System boundaries and delimitations

The analysis accounts for the full cradle to grave life cycle of the design options studied across all life cycle stages, including material manufacturing, maintenance and replacement, and eventual end of life. Optionally, the construction impacts and operational energy of the building can be included within the scope. Product stage impacts are excluded for materials and components indicated as existing or salvaged by the modeler. The modeler defines whether the boundary includes or excludes the flow of biogenic carbon, which is the carbon absorbed and generated by biological sources (e.g. trees, algae) rather than from fossil resources.

Architectural materials and assemblies include all materials required for the product's manufacturing and use including hardware, sealants, adhesives, coatings, and finishing. The materials are included up to a 1% cut-off factor by mass except for known materials that have high environmental impacts at low levels. In these cases, a 1% cut-off was implemented by impact.

LIFE CYCLE STAGES

The following describes the scope and system boudaries used to define each stage of the life cycle of a building or building product, from raw material acquisition to final disposal. For products listed in Tally as Environmental Product Declarations (EPD), the full life cycle impacts are included, even if the published EPD only includes the Product stage [A1-A3].

Product [EN 15978 A1 - A3]

This encompasses the full manufacturing stage, including raw material extraction and processing, intermediate transportation, and final manufacturing and assembly. The product stage scope is listed for each entry, detailing any specific inclusions or exclusions that fall outside of the cradle to gate scope. Infrastructure (buildings and machinery) required for the manufacturing and assembly of building materials are not included and are considered outside the scope of assessment.

Transportation [EN 15978 A4]

This counts transportation from the manufacturer to the building site during the construction stage and can be modified by the modeler.

Construction Installation [EN 15978 A5] (Optional)

This includes the anticipated or measured energy and water consumed on-site during the construction installation process, as specified by the modeler.

Maintenance and Replacement [EN 15978 B2-B5]

This encompasses the replacement of materials in accordance with their expected service life. This includes the end of life treatment of the existing products as well as the cradle to gate manufacturing and transportation to site of the replacement products. The service life is specified separately for each product. Refurbishment of materials marked as existing or salvaged by the modeler is also included.

Operational Energy [EN 15978 B6] (Optional)

This is based on the anticipated or measured energy and natural gas consumed at the building site over the lifetime of the building, as indicated by the modeler.

End of Life [EN 15978 C2-C4]

This includes the relevant material collection rates for recycling, processing requirements for recycled materials, incineration rates, and landfilling rates. The impacts associated with landfilling are based on average material properties, such as plastic waste, biodegradable waste, or inert material. Stage C2 encompasses the transport from the construction site to end-of-life treatment based on national averages. Stages C3-C4 account for waste processing and disposal, i.e., impacts associated with landfilling or incineration.

Module D [EN 15978 D]

This accounts for reuse potentials that fall beyond the system boundary, such as energy recovery and recycling of materials. Along with processing requirements, the recycling of materials is modeled using an avoided burden approach, where the burden of primary material production is allocated to the subsequent life cycle based on the quantity of recovered secondary material. Incineration of materials includes credit for average US energy recovery rates.

PRODUCT	CONSTRUCTION	USE	END-OF-LIFE	MODULE D
A1. Extraction A2. Transport (to factory) A3. Manufacturing	A4. Transport (to site) A5. Construction Installation	B1. Use B2. Maintenance B3. Repair B4. Replacement B5. Refurbishment	C1. Demolition C2. Transport (to disposal) C3. Waste processing C4. Disposal	 D. Benefits and loads beyond the system boundary from: 1. Reuse 2. Recycling 3. Energy recovery
		B6. Operational energy B7. Operational water		

Life-Cycle Stages as defined by EN 15978. Processes included in Tally modeling scope are shown in bold. Italics indicate optional processes.

Calculation Methodology

ENVIRONMENTAL IMPACT CATEGORIES

A characterization scheme translates all emissions and fuel use associated with the reference flow into quantities of categorized environmental impact. As the degree that the emissions will result in environmental harm depends on regional ecosystem conditions and the location in which they occur, the results are reported as impact potential. Potential impacts are reported in kilograms of equivalent relative contribution (eq) of an emission commonly associated with that form of environmental impact (e.g. kg CO₂eq).

The following list provides a description of environmental impact categories reported according to the TRACI 2.1 characterization scheme, the environmental impact model developed by the US EPA to quantify environmental impact risk associated with emissions to the environment in the United States. TRACI is the standard environmental impact reporting format for LCA in North America. Impacts associated with land use change and fresh water depletion are not included in TRACI 2.1. For more information on TRACI 2.1, reference Bare 2010, EPA 2012, and Guinée 2001. For further description of measurement of environmental impacts in LCA, see Simonen 2014.

Acidification Potential (AP)

kg SO₂eg

kg Neg

A measure of emissions that cause acidifying effects to the environment. The acidification potential is a measure of a molecule's capacity to increase the hydrogen ion (H^{+}) concentration in the presence of water, thus decreasing the pH value. Potential effects include fish mortality, forest decline, and the deterioration of building materials.

Eutrophication Potential (EP)

A measure of the impacts of excessively high levels of macronutrients, the most important of which are nitrogen (N) and phosphorus (P). Nutrient enrichment may cause an undesirable shift in species composition and elevated biomass production in both aquatic and terrestrial ecosystems. In aquatic ecosystems, increased biomass production may lead to depressed oxygen levels caused by the additional consumption of oxygen in biomass decomposition.

Global Warming Potential (GWP)

kg CO₂eq

kg CFC-11eg

A measure of greenhouse gas emissions, such as carbon dioxide and methane. These emissions are causing an increase in the absorption of radiation emitted by the earth, increasing the natural greenhouse effect. This may, in turn, have adverse impacts on ecosystem health, human health, and material welfare.

Ozone Depletion Potential (ODP)

14

A measure of air emissions that contribute to the depletion of the stratospheric ozone layer. Depletion of the ozone leads to higher levels of UVB ultraviolet rays reaching the earth's surface with detrimental effects on humans and plants. As these impacts tend to be very small, ODP impacts can be difficult to calculate and are prone to a larger margin of error than the other impact categories.

Smog Formation Potential (SFP)

kg O₃eq

A measure of ground level ozone, caused by various chemical reactions between nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in sunlight. Human health effects can result in a variety of respiratory issues, including increasing symptoms of bronchitis, asthma, and emphysema. Permanent lung damage may result from prolonged exposure to ozone. Ecological impacts include damage to various ecosystems and crop damage.

Primary Energy Demand (PED)

MJ (lower heating value)

A measure of the total amount of primary energy extracted from the earth. PED tracks energy resource use, not the environmental impacts associated with the resource use. PED is expressed in energy demand from non-renewable resources and from renewable resources. Efficiencies in energy conversion (e.g. power, heat, steam, etc.) are taken into account when calculating this result.

Non-Renewable Energy Demand

MJ (lower heating value)

A measure of the energy extracted from non-renewable resources (e.g. petroleum, natural gas, etc.) contributing to the PED. Non-renewable resources are those that cannot be regenerated within a human time scale. Efficiencies in energy conversion (e.g. power, heat, steam, etc.) are taken into account when calculating this result.

Renewable Energy Demand

MJ (lower heating value)

A measure of the energy extracted from renewable resources (e.g. hydropower, wind energy, solar power, etc.) contributing to the PED. Efficiencies in energy conversion (e.g. power, heat, steam, etc.) are taken into account when calculating this result.

LCI Data

END-OF-LIFE [C2-C4]

A Life Cycle Inventory(LCI) is a compilation and quantification of inputs and outputs for the reference unit.The following LCI provides a summary of all energy, construction, transportation, and material inputs present in the study. Materials are listed in alphabetical order along with a list of all Revit families and Tally entries in which they occur, along with any notes and system boundaries accompanying their database entries. Each entry lists the detailed scope for the LCI data sources used from the GaBi LCI database and identifies the LCI data source.

For LCI data sourced from an Environmental Product Declaration (EPD), the product manufacturer, EPD identification number, and Program Operator are listed. Where the LCI source does not provide data for all life cycle stages, default North American average values are used. This is of particular importance for European EPD sources, as EPD data are generally only provided for the product stage, and North American average values are used for the remaining life cycle stages.

Where specific quantities are associated with a data entry, such as user inputs, energy values, or material mass, the quantity is listed on the same line as the title of the entry.

TRANSPORTATION [A4]

Default transportation values are based on the three-digit material commodity code in the 2012 Commodity Flow Survey by the US Department of Transportation Bureau of Transportation Statistics and the US Department of Commerce where more specific industry-level transportation is not available.

Transportation by Barge

Scope: The data set represents the transportation of 1 kg of material from the manufacturer location to the building site by barge.

LCI Source:

GLO: Average ship, 1500t payload capacity/ canal ts (2017) US: Diesel mix at filling station ts (2014)

Transportation by Container Ship

Scope: The data set represents the transportation of 1 kg of material from the manufacturer location to the building site by container ship.

LCI Source:

GLO: Container ship, 27500 dwt payload capacity, ocean going ts (2017) US: Heavy fuel oil at refinery (0.3wt.% S) ts (2014)

Transportation by Rail

Scope: The data set represents the transportation of 1 kg of material from the manufacturer location to the building site by cargo rail.

LCI Source:

GLO: Rail transport cargo - Diesel, average train, gross tonne weight 1000t / 726t payload capacity ts (2017)

US: Diesel mix at filling station ts (2014)

Transportation by Truck Scope:

The data set represents the transportation of 1 kg of material from the manufacturer location to the building site by diesel truck.

LCI Source:

US: Truck - Trailer, basic enclosed / 45,000 lb payload - 8b ts (2017) US: Diesel mix at filling station ts (2014)

LCI Data (continued)

END-OF-LIFE [C2-C4]

Specific end-of-life scenarios are detailed for each entry based on the US construction and demolition waste treatment methods and rates in the 2016 WARM Model by the US Environmental Protection Agency except where otherwise specified. Heterogeneous assemblies are modeled using the appropriate methodologies for the component materials.

End-of-Life Landfill

Scope:

Materials for which no recycling or incineration rates are known, no recycling occurs within the US at a commercial scale, or which are unable to be recycled are landfilled. This includes glass, drywall, insulation, and plastics. The solids contents of coatings, sealants, and paints are assumed to go to landfill, while the solvents or water evaporate during installation. Where the landfill contains biodegradable material, the energy recovered from landfill gas utilization is reflected as a credit in Module D.

LCI Source:

US: Glass/inert on landfill ts (2017)

US: Biodegradable waste on landfill, post-consumer ts (2017)

US: Plastic waste on landfill, post-consumer ts (2017)

Concrete End-of-Life

Scope:

Concrete (or other masonry products) are recycled into aggregate or general fill material or they are landfilled. It is assumed that 55% of the concrete is recycled. Module D accounts for both the credit associated with off-setting the production aggregate and the burden of the grinding energy required for processing.

LCI Source:

US: Diesel mix at refinery ts (2014) GLO: Fork lifter (diesel consumption) ts (2016) EU - 28 Gravel 2/32 ts (2017) US: Glass/inert on landfill ts (2017)

Metals End-of-Life

Scope:

Metal products are modeled using the avoided burden approach. The recycling rate at end of life is used to determine how much secondary metal can be recovered after having subtracted any scrap input into manufacturing (net scrap). Net scrap results in an environmental credit in Module D for the corresponding share of the primary burden that can be allocated to the subsequent product system using secondary material as an input. If the value in Module D reflects an environmental burden, then the original product (A1-A3) contains more secondary material than is recovered.

LCI Source:

Aluminum - RNA: Primary Aluminum Ingot AA/ts (2010) Aluminum - RNA: Secondary Aluminum Ingot AA/ts (2010) Brass - GLO: Zinc mix ts (2012) Brass - GLO: Copper (99.99% cathode) ICA (2013) Brass - EU-28: Brass (CuZn20) ts (2017) Copper - DE: Recycling potential copper sheet ts (2016) Steel - GLO: Value of scrap worldsteel (2014) Zinc - GLO: Special high grade zinc IZA (2012)

Wood End-of-Life

Scope:

End of Life waste treatment methods and rates for wood are based on the 2014 Municipal Solid Waste and Construction Demolition Wood Waste Generation and Recovery in the United States report by Dovetail Partners, Inc. It is assumed that 63.5% of wood is sent to landfill, 22% to incineration, and 14.5% to recovery.

LCI Source:

US: Untreated wood in waste incineration plant ts (2017)

- US: Wood product (OSB, particle board) waste in waste incineration plant ts (2017)
- US: Wood products (OSB, particle board) on landfill, post-consumer ts (2017)
- US: Untreated wood on landfill, post-consumer ts (2017)
- RNA: Softwood lumber CORRIM (2011)

MODEL ELEMENTS

LCI Data

Revit Categories

Ceilings Curtainwall Mullions Curtainwall Panels Doors Floors Roofs Stairs and Railings Structure Walls Windows

HSEB_ARCH_D_19.rvt

Worksets ARCH_Ceilings ARCH_Exterior Walls ARCH_Floors & Roof ARCH_Vertical Circulation

Phases Base Budget Enabling Scope Existing Value Add Scope

HSEB_STRUCT_DC_19.rvt (Read-only) Worksets

Vorksels L - 04.220 Equipment Pads LCL-SLEEVES-BLOCKOUTS-MISC. S - Structural S - Structural - Baseline

Phases

Existing New Construction

PRODUCT [A1-A3]

Materials and components are listed in alphabetical order along with a list of all Revit families and Tally entries in which they occur. The masses given here refer to the quantity of each material used over the building's life-cycle, which includes both Product [A1-A3] and Use [B2-B5] stages.

Additional provided data describing scope boundaries for each life cycle stage may be useful for interpretation of the impacts associated with the specific material or component. Each material or component is listed with its service life, or period of time after installation it is expected to meet the service requirements prior to replacement or repair. This value is indicated in parentheses next to the mass of the material associated with the listed Revit family. Values for transportation distance or service life shown with an asterisk (*) indicate user-defined changes to default values. Values for service life shown with a dagger (†) indicate materials identified by the modeler as existing or salvaged.

Acoustic ceiling tile (ACT), mineral fiber board Used in the following Revit families:

I	31,086.8 kg
	3,683.4 kg (50 yrs) 7,515.5 kg (50 yrs) 17,510.0 kg (50 yrs) 2,378.0 kg (50 yrs)

Description: Mineral fiber board acoustic ceiling tile, 5/8" thick

Acoustic ceiling system, mineral fiber board

Life Cycle Inventory: 100% Mineral fiber board

C1 - ACT-1 - 2' x 4'

C1 - ACT-3 - 2' x 2'

C1 - ACT-5 - 2' x 6' Used in the following Tally entries:

C1 - ACT-2 - 2' x 2' HRC

Product Scope: Cradle to gate of panel only, excludes suspended grid system and installation hardware

Transportation Distance:

By truck: 172 km

End-of-Life Scope: 100% landfilled (inert waste)

LCI Source:

DE: Mineral fibres ceiling boards (EN15804 A1-A3) ts (2017)

Adhesive, acrylic

2,477.7 kg

Used in the following Revit families:	
(R1) CLT ROOF - CLT PATTERN N/S	361.1 kg (20 yrs)
(R3) SBS OVER METAL DECK	1,540.8 kg (20 yrs)
(R4) SOUTH VEST ROOF	13.5 kg (20 yrs)
W08_METAL STUD LIGHTWEIGHT CLADDING (CW Parap	pet) no insulation26.8 kg (20 yrs)
W08_METAL STUD LIGHTWEIGHT CLADDING (Parapet)	535.4 kg (20 yrs)

Used in the following Tally entries: SBS modified bitumen, sheet

Description:

Generic acrylic construction adhesive

Life Cycle Inventory: 5% Naphtha at refinery 95% Acrylate resin (solvent-systems) 0.5% NMVOC emissions

Product Scope:

Cradle to gate, plus emissions during application

Transportation Distance: By truck: 840 km

End-of-Life Scope:

99.5% solids to landfill (plastic waste)

LCI Source: US: Naphtha at refinery ts (2014) DE: Acrylate resin (solvent-systems) ts (2017)		EPD Expiration: 10/4/2021		
Numinum extrusion, anodized, AEC - EPD	3,507.9 kg	Aluminum, formed Used in the following Revit families:	477.9 k	
Used in the following Revit families: Rectangular Mullion	3,507.9 kg (60 yrs)	Corner_1 Corner_2	265.5 kg (60 yrs 212.4 kg (60 yrs	
Used in the following Tally entries: Aluminum mullion, inclusive of finish		Used in the following Tally entries: Aluminum, formed		
Description: Extruded and anodized aluminum part. Data based on industry-wid Aluminum Extruders Council.	le EPD from the	Description: Formed aluminum member. Data based on industry aluminum from the Aluminum Association (EPD ID 4		
Life Cycle Inventory: For information and quantities, see EPD		Life Cycle Inventory: 100% Aluminum		
Product Scope: Cradle to gate		Product Scope: Cradle to gate		
Transportation Distance: By truck: 663 km		Transportation Distance: By truck: 663 km		
End-of-Life Scope: 95% Recovered 5% Landfilled (inert material)		End-of-Life Scope: 95% Recovered 5% Landfilled (inert material)		
Module D Scope: Product has 34.5% scrap input while remainder is processed and cre burden	edited as avoided	Module D Scope: Product has 65% scrap input while remainder is proc burden	cessed and credited as avoided	
LCI Source: RNA: Aluminum extrusion, anodized - AEC (A1-A3) ts-EPD (2015) RNA: Primary Aluminum Ingot AA/ts (2010) RNA: Secondary Aluminum Ingot AA/ts (2010)		LCI Source: RNA: Cold Rolled Aluminium ts/AA (2010) [EPD] GLO: Steel sheet stamping and bending (5% loss) ts US: Electricity grid mix ts (2014)	(2017)	
EPD Source: <u>11240237.101.1</u>		US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) RNA: Primary Aluminum Ingot AA/ts (2010)		
EPD Designation Holder: Aluminum Extruders Council (AEC)		RNA: Secondary Aluminum Ingot AA/ts (2010)		
EPD Program Operator: UL Environment		Aluminum, sheet Used in the following Revit families:	19,863.4 k	
EPD Expiration: 10/4/2021		(R4) SOUTH VEST ROOF 1/4" STELL PLATE 3/16" Aluminum Plate Aluminum Plate	112.5 kg (60 yrs 543.3 kg (60 yrs 41.7 kg (60 yrs	
luminum extrusion, painted, AEC - EPD	12.0 kg	Aluminum Plate 1/8" Aluminum Plate 3/16"	25.2 kg (60 yrs 221.2 kg (60 yrs	
Used in the following Revit families: Picture Window Bend Plate	12.0 kg (60 yrs)	cp_HSEB - Skin Shingle flashing cp_HSEB - Skin Shingle Panel_hoz	14.7 kg (60 yrs 6,681.8 kg (60 yrs	
Used in the following Tally entries: Aluminum, angle		Parapet Cap Coping Rectangular Mullion	500.6 kg (60 yrs 11,722.4 kg (60 yrs	
Description: Painted aluminum extrusions (not thermally-improved). Industry-wi	ide EPD from the	Used in the following Tally entries: Aluminum, sheet		
Aluminum Extruders Council. EPD representative of conditions in N Life Cycle Inventory:		Description: Aluminum sheet, formed and cut. Data based on industry-wide EPD for cold-rolled aluminum from the Aluminum Association (EPD ID 4786092064.101.1).		
For information and quantities, see EPD Product Scope:		Life Cycle Inventory: 100% Aluminum		
Cradle to gate Transportation Distance:		Product Scope: Cradle to gate		
By truck: 663 km End-of-Life Scope:		Transportation Distance: By truck: 663 km		
95% Recovered 5% Landfilled (inert material) Module D Scope:		End-of-Life Scope: 95% Recovered		
Credit given for the avoided burden associated with recovered mat	erial	5% Landfilled (inert material)		
LCI Source: EPD (US), American Extruders Council (2016)		Module D Scope: Product has 65% scrap input while remainder is proc burden	cessed and credited as avoided	
EPD Source: <u>11240237.101.1</u>		LCI Source: RNA: Cold Rolled Aluminium ts/AA (2010) [EPD]		
EPD Designation Holder: Aluminum Extruders Council (AEC)		GLO: Steel sheet stamping and bending (5% loss) ts US: Electricity grid mix ts (2014)	(2017)	
EPD Program Operator: UL Environment		US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consum RNA: Primary Aluminum Ingot AA/ts (2010)	ption) ts (2014)	

LCI Data (continued)

RNA: Secondary Aluminum Ingot AA/ts (2010)

		Proxied by Glulam
Anodized aluminum, sheet Used in the following Revit families:	56.4 kg	Product Scope: Cradle to gate
3/16" Aluminum Plate LOUVER-parametric	56.4 kg (60 yrs) 0.0 kg (60 yrs)	Transportation Distance: By truck: 468 km
Used in the following Tally entries: Aluminum, sheet Description: Anodized aluminum sheet, formed and cut. Data based on indu		End-of-Life Scope: 14.5% Recovered 22% Incinerated with energy recovery 63.5% Landfilled (wood product waste)
anodized aluminum from the Aluminum Extruders Council (EPE Life Cycle Inventory:	D ID 11240237.101.1).	Module D Scope: Recovered wood products credited as avoided burden.
100% Anodized aluminum Product Scope: Cradle to gate		LCI Source: RNA: Glue laminated timbers CORRIM (2011)
Transportation Distance: By truck: 663 km		Coated steel deck, SDI - EPD Used in the following Revit families: (F3) CONCRETE METAL DECK (STRUCTURAL ONLY)
End-of-Life Scope: 95% Recovered 5% Landfilled (inert material)		Used in the following Tally entries: Steel, deck
Module D Scope: Product has 65% scrap input while remainder is processed and burden	credited as avoided	Description: Coated steel roof and floor deck panels, 1 ½" – 3" in de 22 – 16 gage material. Industry-wide EPD from the Stee
LCI Source: RNA: Cold Rolled Aluminium ts/AA (2010) [EPD]		Life Cycle Inventory: For information and quantities, see EPD
GLO: Steel sheet stamping and bending (5% loss) ts (2017) RNA: Anodization of aluminum extrusion AEC/ts (2015) [EPD] US: Electricity grid mix ts (2014)		Product Scope: Cradle to gate
US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2	014)	Transportation Distance: By truck: 431 km
RNA: Primary Aluminum Ingot AA/ts (2010) [EPD] RNA: Secondary Aluminum Ingot AA/ts (2010) [EPD]		End-of-Life Scope: 98% Recovered 2% Landfilled (inert material)
Argon gas for IGU Used in the following Revit families: (FG2-AL) dr-DBL-A (FG2-CW) dr-DBL-CW	58.5 kg 1.3 kg (40 yrs) 0.2 kg (40 yrs)	Module D Scope: Product has 28% scrap input while remainder is process burden.
cp_HSB - Window at Upper Levels System Panel	23.2 kg (40 yrs) 33.7 kg (40 yrs)	LCI Source: US: Steel deck - Steel deck institute (SDI) (A1-A3) ts (20
Used in the following Tally entries: Glazing, custom IGU		EPD Source: <u>4786052957.101.1</u>
Description: Argon gas in insulating glass unit		EPD Designation Holder: Steel Deck Institute
Life Cycle Inventory: Argon gas		EPD Program Operator: UL Environment
Product Scope: Cradle to gate		EPD Expiration: 12/15/2020
Transportation Distance: By truck: 940 km		Cold formed structural steel
End-of-Life Scope: 100% to landfill (inert waste)		Used in the following Revit families: 1-C2- GWB on Mtl. Stud 1F5 - 1 HR RATED HORIZONTAL DUCT ENCLOSURE
LCI Source: US: Argon (gaseous) ts (2017)		2-C2- GWB on Mtl. Stud C1 - ACT-1 - 2' x 4' C1 - ACT-2 - 2' x 2' HRC
CLT (Cross laminated timber)	294,549.2 kg	C1 - ACT-3 - 2' x 2' C1 - ACT-5 - 2' x 6'
Used in the following Revit families:		C2- GWB on Mtl. Stud
(F3) CONCRETE DECK O/ 3 PLY CLT FLOOR N/W DIRECTION (F4) CONCRETE DECK O/ 3 PLY CLT FLOOR	31,376.8 kg (60 yrs) 207,418.0 kg (60 yrs)	KPFF - SCOL - Steel - HSS - Rectangular (C) - TC
(R1) CLT ROOF	45,307.1 kg (60 yrs)	KPFF - SFRM - Steel - BRB - Buckling Restrained Brace
(R1) CLT ROOF - CLT PATTERN N/S	10,447.4 kg (60 yrs)	Linear Wood Ceiling
Used in the following Tally entries: Cross laminated timber (CLT)		Used in the following Tally entries: Steel, C-H-stud metal framing Steel, C-stud metal framing
Description:		Steel, furring channel
Engineered wood panel made of several layers of kiln-dried lun	nber stacked in	Steel, HSS section

Engineered wood panel made of several layers of kiln-dried lumber stacked in alternating directions, bonded with structural adhesives, and pressed to form a solid rectangular panel.

Life Cycle Inventory: ed by Glub nce: th energy recovery ood product waste) roducts credited as avoided burden. ed timbers CORRIM (2011) - EPD 2,255.5 kg Revit families: TAL DECK (STRUCTURAL ONLY) 2,255.5 kg (60 yrs) Tally entries: nd floor deck panels, $1 \frac{1}{2}$ " – 3" in depth and manufactured from ial. Industry-wide EPD from the Steel Deck Institute. quantities, see EPD nce: material) rap input while remainder is processed and credited as avoided el deck institute (SDI) (A1-A3) ts (2012) der: or: 36,531.0 kg al steel Revit families: Stud 78.7 kg (60 yrs) HORIZONTAL DUCT ENCLOSURE 62.4 kg (60 yrs) Stud 431.1 kg (60 yrs) 2,097.7 kg (60 yrs) HRC 3,757.6 kg (60 yrs) 8,881.3 kg (60 yrs) 1,105.7 kg (60 yrs) 652.6 kg (60 yrs) tud - HSS - Rectangular (C) - TC 6,800.6 kg (60 yrs)

Steel, HSS section

Description: Cold-rolled or formed structural steel, such as used in steel studs. 12,601.9 kg (60 yrs) 61.4 kg (60 yrs)

Life Cycle Inventory: 100% Cold rolled steel		Life Cycle Inventory: 94% Aluminum	
Product Scope: Cradle to gate		6% Powder coat (by weight) Product Scope:	
Transportation Distance: By truck: 431 km		Cradle to gate excludes hardware, casing, sealant	
End-of-Life Scope: 98% Recovered		Transportation Distance: By truck: 568 km	
2% Landfilled (inert material) Module D Scope:		End-of-Life Scope: 95% aluminum recovered 5% aluminum landfilled (inert material)	
Product has 16% scrap input while remainder is processed and burden	d credited as avoided	Module D Scope: Product has 36.4% scrap input while remainder is processed	and credited as avoided
LCI Source: RNA: Steel finished cold rolled coil worldsteel (2007) GLO: Steel sheet stamping and bending (5% loss) ts (2017) US: Electricity grid mix ts (2014)		burden LCI Source: DE: Aluminium frame profile, powder coated (EN15804 A1-A	
US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (GLO: Value of scrap worldsteel (2014)	2014)	modified with: RNA: Aluminum extrusion, mill finish - AEC ts DE: Top coat powder (aluminium) (EN15804 A1-A3) ts (2017 RNA: Secondary Aluminum Ingot AA/ts (2010)	(2015)
	4 000 0 1	RNA: Primary Aluminum Ingot AA/ts (2010)	
Domestic softwood, US, AWC - EPD Used in the following Revit families:	1,096.8 kg	Door frame, metal, galvanized, no door	3.1 k
(R4) SOUTH VEST ROOF (R4) SOUTH VEST ROOF (INTERIOR) Linear Wood Ceiling	141.9 kg (30 yrs) 163.7 kg (30 yrs) 549.3 kg (30 yrs)	Used in the following Revit families: (F1-HMW) dr-SGL-A	3.1 kg (45 yr
P_SOUTH VESTIBULE WALL W09_SOUTH VESTIBULE WALL	135.2 kg (30 yrs) 106.7 kg (30 yrs)	Used in the following Tally entries: Door frame, steel, galvanized	
Used in the following Tally entries: Wood siding		Description: Stainless steel, 18 ga door frame	
Description: Kiln-dried and planed softwood dimensional lumber for stand	lard framing or planking	Life Cycle Inventory: 100% Galvanized steel	
Industry-wide EPD from the American Wood Council.	and manning of planking.	Product Scope: Cradle to gate, excludes hardware, jamb, casing, sealant	
Life Cycle Inventory: For information and quantities, see EPD		Transportation Distance: By truck: 568 km	
Product Scope: Cradle to gate		End-of-Life Scope:	
Transportation Distance: By truck: 383 km		98% recovered 2% landfilled (inert material)	
End-of-Life Scope: 14.5% Recovered 22% Incinerated with energy recovery		Module D Scope: Product has a 44% scrap input while remainder is processed burden.	and credited as avoided
63.5% Landfilled (wood product waste) Module D Scope:		LCI Source: DE: Aluminium wing frame profile, powder coated (2011)	
Recovered wood products credited as avoided burden.		modified with: US: Metal roll forming MCA (2010) GLO: Steel sheet stamping and bending (5% loss) ts (2012) RNA: Steel hot dip galvanized worldsteel (2007)	
RNA: Softwood lumber CORRIM (2011) EPD Source:		EPDM, non-reinforced membrane, 90 mils, SPRI - EPD	7,049.7 k
<u>13CA24184.102.1</u> EPD Designation Holder:		Used in the following Revit families: (R1) CLT ROOF	6,989.4 kg (20 yrs
American Wood Council and Canadian Wood Council		(R4) SOUTH VEST ROOF Used in the following Tally entries:	60.3 kg (20 yrs
EPD Program Operator: UL Environment		EPDM, roofing membrane	
EPD Expiration: 4/16/2019		Description: Non-reinforced ethylene propylene diene terpolymer (EPDN membrane, default thickness of 90 mils (2.5 mm) Industry-w Ply Roofing Industry.	
Door frame, aluminum, powder-coated, no door Used in the following Revit families:	99.2 kg	Life Cycle Inventory: For information and quantities, see EPD	
(F1-HMW) dr-SGL-A (FG1-CW) dr-SGL-CW (FC2-AL) dr DRLA	10.6 kg (50 yrs) 10.6 kg (50 yrs)	Product Scope:	
(FG2-AL) dr-DBL-A (N1-HMW) dr-SGL-A temp-fence	56.0 kg (50 yrs) 10.9 kg (50 yrs) 11.2 kg (50 yrs)	Cradle to gate Transportation Distance:	
Used in the following Tally entries:	11.2 Kg (30 yis)	By truck: 172 km End-of-Life Scope:	
Door frame, aluminum Description:		100% Landfilled (plastic waste) LCI Source:	
Aluminum door frame		US: Non-reinforced EPDM single ply roofing membrane, 90	mils, A1-A3 - SPRI ts (2017

LCI Data (continued)

PD Source: <u>4786842353.103.1</u>		Transportation Distance: By truck: 1001 km	
PD Designation Holder: Single Ply Roofing Industry (SPRI)		End-of-Life Scope: 98% Recovered	
EPD Program Operator: UL Environment		2% Landfilled (inert material) Module D Scope:	
EPD Expiration:		Product has 58% scrap input while remainder is processed and credited burden	as avoided
2/14/2022		LCI Source:	
steners, galvanized steel	459.9 kg	RER: Stainless steel Quarto plate (304) Eurofer (2010)	
Jsed in the following Revit families:	-	GLO: Steel turning ts (2017) US: Electricity grid mix ts (2014)	
(F1-HMW) dr-SGL-A (R1) CLT ROOF	0.2 kg (40 yrs) 455.7 kg (40 yrs)	RER: Stainless steel flat product (304) - value of scrap Eurofer (2010)	
(R4) SOUTH VEST ROOF	3.9 kg (40 yrs)		
lsed in the following Tally entries:		Fiberglass blanket insulation, unfaced	8,304.9 k
Door frame, steel, galvanized		Used in the following Revit families: 1-N8 GFRC @ FRAMED WALL STAGGERED STUD	25.1 kg (60 yrs
EPDM, roofing membrane			63.2 kg (60 yrs
Description:			58.1 kg (60 yrs
Galvanized steel part, appropriate for use as fasteners and specie	alized hardware (bolts,		85.9 kg (60 yrs
rails, clips, etc.).			36.6 kg (60 yrs 20.0 kg (60 yrs
ife Cycle Inventory:			86.0 kg (60 yr
100% Galvanized steel		W07_METAL STUD LIGHTWEIGHT CLADDING 3,3-	42.5 kg (60 yrs
Product Scope:			22.0 kg (60 yrs
Cradle to gate		W08_METAL STUD LIGHTWEIGHT CLADDING (CW Parapet) no insulation W08_METAL STUD LIGHTWEIGHT CLADDING (Parapet) 6	81.2 kg (60 yrs 22.6 kg (60 yrs
ransportation Distance:			11.8 kg (60 yrs
By truck: 1001 km		Used in the following Tally entries:	
nd-of-Life Scope: 70% Recovered		Steel, C-stud metal framing with insulation	
30% Landfilled (inert material)		Description:	
/odule D Scope:		Fiberglass batt	
Product has 16% scrap input while remainder is processed and c	redited as avoided	density varies from 10-14 kg/m ³ .	
burden		Life Cycle Inventory:	
CI Source:		100% Fiberglass	
GLO: Steel wire rod worldsteel (2014)		Product Scope:	
GLO: Steel turning ts (2017)) to (2017)	Cradle to gate	
GLO: Electrolytic galvanisation (1 m ² steel sheet part, electrolytic GLO: Value of scrap worldsteel (2014)) ts (2017)	Transportation Distance: By truck: 172 km	
steners, stainless steel	251.1 kg	End-of-Life Scope:	
Jsed in the following Revit families:	_0	100% Landfilled (inert waste)	
(F1-HMW) dr-SGL-A	0.2 kg (50 yrs)	LCI Source:	
(FG1-CW) dr-SGL-CW	0.2 kg (50 yrs)	US: Fiberglass Batt NAIMA (2007)	
(FG2-AL) dr-DBL-A (N1-HMW) dr-SGL-A	1.2 kg (50 yrs) 0.2 kg (50 yrs)		
(R4) SOUTH VEST ROOF	0.3 kg (50 yrs)	Fiberglass mat gypsum sheathing board	19,777.6 k
(R4) SOUTH VEST ROOF (INTERIOR)	0.4 kg (50 yrs)	Used in the following Revit families: (R1) CLT ROOF 9,4	83.4 kg (60 yrs
Corner_3	7.3 kg (60 yrs)		86.8 kg (60 yr
Corner_4 cp_HSEB - Base Material Panel_vertical	7.2 kg (60 yrs) 24.7 kg (60 yrs*)		65.4 kg (60 yr:
cp_HSEB - Skin Shingle Panel_hoz	189.9 kg (50 yrs)		66.9 kg (60 yr
Linear Wood Ceiling	3.0 kg (50 yrs)		92.5 kg (60 yr:
P_SOUTH VESTIBULE WALL	1.6 kg (50-60 yrs)	W08_METAL STUD LIGHTWEIGHT CLADDING (CW Parapet) no insulation	52.6 kg (60 yrs 80.1 kg (60 yrs
temp-fence	0.2 kg (50 yrs)		50.1 kg (60).
W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse) W09_SOUTH VESTIBULE WALL	13.3 kg (60 yrs) 1.3 kg (50-60 yrs)	Used in the following Tally entries: Fiberglass mat gypsum sheathing	
lsed in the following Tally entries:		Description:	
Door frame, aluminum		Fiberglass treated gypsum sheathing product appropriate for use in high	n-moisture
Metal roofing panels, formed		environments.	
Stainless Steel, Fasteners		Life Cycle Inventory:	
Wood siding		92% Gypsum	
Description: Stainless steel part, appropriate for use as fasteners and speciali:	rad bardwara (balta	8% Fiberglass mat	
rails, clips, etc.). Data based on industry-wide EPDs for primary a		Product Scope:	
from the World Steel Association.	···· , ··· ·	Cradle to gate	
ife Cycle Inventory:		Transportation Distance: By truck: 172 km	
100% Stainless steel			
Product Scope:		End-of-Life Scope: 100% Landfilled (inert waste)	
Cradle to gate			

LCI Data (continued)

LCI Source:

DE: Gypsum plaster board (Moisture resistant) (EN15804 A1-A3) ts (2017) US: Fiberglass Duct Board NAIMA (2007)

Fluid applied synthetic polymer air barrier 16,719.9 kg Used in the following Revit families: 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 59.7 kg (40 yrs) 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 22" 193.9 kg (40 yrs) 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1,929.9 kg (40 yrs) 1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD 614.5 kg (40 yrs) 1-W07_METAL STUD LIGHTWEIGHT CLADDING 5,178.9 kg (40 yrs) 3-W07_METAL STUD LIGHTWEIGHT CLADDING 76.3 kg (40 yrs) W06 PRE-CAST CONCRETE @ FRAMED WALL 1,637.5 kg (40 yrs) W07_METAL STUD LIGHTWEIGHT CLADDING 6,963.6 kg (40 yrs) W09_SOUTH VESTIBULE WALL 65.6 kg (40 yrs) Used in the following Tally entries: Fluid applied synthetic polymer air barrier Description Liquid-applied rubberized membrane Life Cycle Inventory: 34% Calcium carbonate 30% Polymer blend (SBS) 1% Silica 5% Titanium dioxide 30% Water Product Scope: Cradle to gate for materials only, neglects manufacturing requirements Transportation Distance: By truck: 555 km End-of-Life Scope: 70% Landfilled (plastic waste) (excludes water evaporation) LCI Source: US: Styrene-butadiene rubber (SBR) ts (2017) US: Silica sand (flour) ts (2017) US: Tap water from groundwater ts (2017) US: Titanium dioxide pigment ts (2017) US: Limestone flour (5mm) ts (2017) US: Electricity grid mix ts (2014) Fluoropolymer coating, metal stock 1,989.8 kg Used in the following Revit families: 1/4" STEEL PLATE 27.7 kg (60 yrs) 3/16" Aluminum Plate 2.1 kg (60 yrs) Aluminum Plate 1/8" 1.4 kg (60 yrs) Aluminum Plate 3/16' 12.6 kg (60 yrs) Corner_1 19.7 kg (60 yrs) Corner_2 15.8 kg (60 yrs) Corner_3 16.0 kg (60 yrs) 15.8 kg (60 yrs) Corner 4 cp_HSEB - Skin Shingle Panel_hoz 765.5 kg (60 yrs) KPFF - SCOL - Steel - HSS - Rectangular (C) - TC 48.6 kg (60 yrs) KPFF - SCOL - Steel - W - Wide Flange (C) - TC 441.2 kg (60 yrs) KPFF - SFRM - Steel - BRB - Buckling Restrained Brace 0.0 kg (60 yrs) KPFF - SFRM - Steel - HSS - Rectangular (C) - TC 80.5 kg (60 yrs) KPFF - SFRM - Steel - Kicker Brace - L - Angle - TC 11.5 kg (60 yrs) KPFF - SFRM - Steel - L - Angle (C) - TC 1.8 kg (60 yrs) P_SOUTH VESTIBULE WALL 2.6 kg (60 yrs) Parapet Cap Coping 74.3 kg (60 yrs) Rectangular Mullion 421.2 kg (60 yrs) W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse) 29.4 kg (60 yrs) W09_SOUTH VESTIBULE WALL 2.1 kg (60 yrs) Used in the following Tally entries: Aluminum, formed

Aluminum, sheet Metal roofing panels, formed Steel, angle Steel, HSS section

Steel, W section (wide flange shape)

Description:

Standard fluoropolymer coating for metals. This entry is used as a part of the larger MCA EPD for Roll Formed Steel Panels (EPD ID 13CA27321.101.1).

Life Cycle Inventory: 100% Fluoropolymer coating Product Scope: Cradle to gate, including application Transportation Distance: N/A End-of-Life Scope: 100% Landfilled (inert waste) LCI Source: US: Coil coating MCA (2010) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) Frit (for glazing) 2.1 kg Used in the following Revit families: System Panel 2.1 kg (40 yrs) Used in the following Tally entries: Glazing, custom IGU Description: Frit applied at a default density of 0.05 kg/m² gives 100% coverage with 19 micrometers thickness. User to select frit density of 20%, 30%, 40%, 50%, or 60% coverage Life Cycle Inventory: 90.9% Glass granulate 9% Butyl acetate 0.1% Nitrocellulose Product Scope: Cradle to gate Transportation Distance: N/A End-of-Life Scope: 100% Landfilled (inert waste) LCI Source: US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) DE: Butyl acetate ts (2017) DE: Nitrocellulose (cellulose nitrate) ts (2017) DE: Expanded glass granulate ts (2017) IT: Flat-screen printing ENEA (2002) US: Tap water from groundwater ts (2017) 73,359.3 kg Galvanized steel Used in the following Revit families: (A1)_Furr Mtl Stud 7/8"_GWB (1-0) 51.0 kg (60 yrs) (A3)_Furr Mtl Stud 3-5/8"_GWB (1-0) 72.0 kg (60 yrs) (B8)_TYP Mtl Stud 8"_GWB Insulation 36.9 kg (60 yrs) (R4) SOUTH VEST ROOF 131.4 kg (60 yrs) (R4) SOUTH VEST ROOF (INTERIOR) 1,189.5 kg (60 yrs) 9.7 kg (60 yrs) 1-B6 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 52.1 kg (60 yrs) 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1,269.2 kg (60 yrs) 1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD 380.2 kg (60 yrs) 1 MOT METAL STUD LICUTWEICUT C

I-WU/_METAL STUD LIGHTWEIGHT CLADDING	5,461.7 Kg (60 yrs)
2-A0_Furr Hat Channel 7/8"_GWB (2-0) 2 hour rated	14.0 kg (60 yrs)
3-W07_METAL STUD LIGHTWEIGHT CLADDING	124.5 kg (60 yrs)
6" Axiom Trim Piece	185.6 kg (60 yrs)
A4_Furr Mtl Stud 4"_GWB (1-0)	157.9 kg (60 yrs)
ACT 4 AcoustiBuilt Ceiling	630.0 kg (60 yrs)
B4	90.4 kg (60 yrs)
B6	68.7 kg (60 yrs)
C7- GWB on Mtl. Stud 2	226.3 kg (60 yrs)
HSEB - Pipe Guardrail - GDR-2	1,171.6 kg (60 yrs)
HSEB - Pipe Guardrail - GDR-2 without handrail	1,048.1 kg (60 yrs)
HSEB Guardrail - Cable Rail	626.0 kg (60 yrs)
HSEB Guardrail - Cable Rail without handrail	1,105.3 kg (60 yrs)
HSEB Handrail - HNDRL-1	1,445.7 kg (60 yrs)
HSEB Handrail - HNDRL-3	46.3 kg (60 yrs)
HSEB PIPE Handrail - HNDRL-2	205.4 kg (60 yrs)
HSEB-GDR-4_Canerail	24.5 kg (60 yrs)
KPFF - SCOL - Steel - HSS - Rectangular (C) - TC	12,562.2 kg (60 yrs)

LCI Source:

RNA: Steel hot dip galvanized worldsteel (2007)

1-N8 GFRC @ FRAMED WALL STAGGERED STUD

1-W06 PRE-CAST CONCRETE @ FRAMED WALL

W06 PRE-CAST CONCRETE @ FRAMED WALL

1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 22"

US: Electricity grid mix ts (2014)

US: Lubricants at refinery ts (2014)

US: Metal roll forming M CA (2010)

Glass fiber reinforced plastic paneling

Used in the following Revit families:

Used in the following Tally entries:

Fiberglass clip system

Life Cycle Inventory:

50% Glass fibers

Product Scope:

Cradle to gate

50% Polyester resin

Transportation Distance:

100% landfilled (plastic waste)

US: Electricity grid mix ts (2014)

Glazing, monolithic sheet, generic

Used in the following Revit families: cp_HSEB - Window at Upper Levels

Used in the following Tally entries:

Default thickness is 3 mm.

US: Lubricants at refinery ts (2014)

US: Glass fibres ts (2017)

DE: Polyester Resin unsaturated (UP) ts (2017)

US: Thermal energy from natural gas ts (2014)

GLO: Plastic extrusion profile (unspecific) ts (2017)

GLO: Compressed air 7 bar (medium power consumption) ts (2014)

Standard float glass, uncoated. Note: this entry is appropriate for clear or tinted glass.

By truck: 172 km

End-of-Life Scope:

System Panel

Description:

Glazing

Product Scope:

Cradle to gate

By truck: 940 km

End-of-Life Scope:

LCI Source

Description:

or tinted glass.

Transportation Distance:

100% Landfilled (inert waste)

Glazing, monolithic sheet, safety glass

Used in the following Revit families:

Used in the following Tally entries:

Glazing, monolithic sheet

(N1-HMW) dr-SGL-A

DE: Window glass simple (EN15804 A1-A3) ts (2017

Standard safety glass, default thickness is 3mm. No

Glazing, custom IGU

Life Cycle Inventory

LCI Source:

Description:

GLO: Value of scrap worldsteel (2014)

GLO: Steel sheet stamping and bending (5% loss) ts (2014)

GLO: Compressed air 7 bar (medium power consumption) ts (2014)

1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD

Glass fibers with polyester resin formed into solid sheet stock

Full building summary

LCI Data (continued)

KPFF - SCOL - Steel - HSS - Rectangular (C) - TC- 2x 567.7 kg (60 yrs) KPFF - SCOL - Steel - HSS - Round (C) - TC 221.2 kg (60 yrs) KPFF - SFRM - Steel - HSS - Rectangular (C) - TC 15,577.6 kg (60 yrs) LCL_Embed_2x3-Nelson-Studs_OffSet 165.4 kg (45 yrs) 62.1 kg (60 yrs) P_SOUTH VESTIBULE WALL W06 PRE-CAST CONCRETE @ FRAMED WALL 2,026.0 kg (60 yrs) W07_METAL STUD LIGHTWEIGHT CLADDING 7,767.5 kg (60 yrs) W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse) 16,481.0 kg (60 yrs) W08_METAL STUD LIGHTWEIGHT CLADDING (CW Parapet) no insulation18.8 kg (60 yrs) 1,934.1 kg (60 yrs) W08_METAL STUD LIGHTWEIGHT CLADDING (Parapet) W09_SOUTH VESTIBULE WALL 51.6 kg (60 yrs) Used in the following Tally entries: Steel, C-stud metal framing Steel, C-stud metal framing with insulation Steel, furring channel Steel, HSS section Steel, plate Steel, rectangular bar Steel, round tubing Description: Hot dipped galvanized steel profile, for use with cladding systems. Life Cycle Inventory: 100% Steel, hot dip galvanized Product Scope: Cradle to gate Transportation Distance: By truck: 431 km End-of-Life Scope 98% Recovered 2% Landfilled (inert material) Module D Scope Product has 44% scrap input while remainder is processed and credited as avoided burden LCI Source: RNA: Steel hot dip galvanized worldsteel (2007) GLO: Steel sheet stamping and bending (5% loss) ts (2014) US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) US: Metal roll forming M CA (2010) GLO: Value of scrap worldsteel (2014) Galvanized steel decking 33,605.6 kg Used in the following Revit families: 12,079.3 kg (60 yrs) (F2) CONCRETE METAL DECK (F3) CONCRETE METAL DECK W/ TOPPING SLAB 3,185.1 kg (60 yrs) (R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2 7,867.3 kg (60 yrs) (R3) SBS OVER METAL DECK 10,403.8 kg (60 yrs) (R4) SOUTH VEST ROOF (INTERIOR) 70.0 kg (60 yrs) Used in the following Tally entries: Steel, deck Description Hot dip galvanized steel roof decking, corrugated profile. Default roof decking is galvanized to G90 standards, coated on both sides of 20 gauge steel deck, roll formed and precut. Life Cycle Inventory: 100% Steel, hot dip galvanized Product Scope: Cradle to gate for deck only Transportation Distance: By truck: 431 km End-of-Life Scope: 98% Recovered 2% Landfilled (inert material) Module D Scope Product has 44% scrap input while remainder is processed and credited as avoided burden

)	
	68.3 kg
	68.3 kg (30 yrs)
te: this entry is appro	opriate for clear
	t <i>ally</i> 。

318.0 kg

3.1 kg (60 yrs*)

10.2 kg (60 yrs*)

101.0 kg (60 yrs*)

32.2 kg (60 yrs*) 171.5 kg (60 yrs*)

4,667.0 kg

3,859.1 kg (40 yrs)

807.9 kg (40 yrs)

LCI Data (continued)

Life Cycle Inventory: Sodium sulphate		Product has 58% scrap input while remainder is processed and oburden	credited as avoided
Soda (Na2CO3) Silica sand Calcium hydroxida		LCI Source: RER: Stainless steel Quarto plate (304) Eurofer (2010)	
Calcium hydroxide Lime		DE: Steel cast part machining ts (2017)	
Tin		US: Electricity grid mix ts (2014)	010)
Dolomite		RER: Stainless steel flat product (304) - value of scrap Eurofer (20	010)
Product Scope:		Hollow door, exterior, aluminum, anodized	86.2 k
Cradle to gate		Used in the following Revit families:	
Transportation Distance: By truck: 940 km		(F2) dr-Double-Flush-with 4 sided jambs	86.2 kg (30 yrs
		Used in the following Tally entries:	
End-of-Life Scope: 100% Landfilled (inert waste)		Door, exterior, aluminum	
LCI Source:		Description:	aluurathana faam
DE: Window glass simple (EN15804 A1-A3) ts (2017)		Anodized aluminum, exterior, with interior steel supports and po insulation	olyurethane toam
		Life Cycle Inventory:	
Glazing, monolithic sheet, tempered	34,096.8 kg	3% Steel	
Used in the following Revit families: (FG1-CW) dr-SGL-CW	61.9 kg (40 yrs)	71% Anodized aluminum 25% Polyurethane foam	
(FG2-AL) dr-DBL-A	862.9 kg (40 yrs)		
(FG2-CW) dr-DBL-CW	208.5 kg (40 yrs)	Product Scope:	100
cp_HSEB - Window at Upper Levels	10,856.3 kg (40 yrs)	Cradle to gate, excludes assembly, frame, hardware, and adhesiv	ves
System Panel	22,107.2 kg (40 yrs)	Transportation Distance:	
Used in the following Tally entries:		By truck: 568 km	
Glazing, custom IGU		End-of-Life Scope:	
Description:		70% Steel recovered 30% Steel landfilled (inert material)	
Tempered float glass. Note: this entry is appropriate for cle	ar or tinted glass. Default	95% Aluminum recovered (includes processing and avoided but	rden credit)
thickness is 3 mm.		5% Aluminum is landfilled (inert material)	,
Life Cycle Inventory:		100% Insulation landfilled (plastic material)	
Tempered glazing		Module D Scope:	
Product Scope: Cradle to gate		Product has 50% aluminum scrap input and 1% steel scrap inpu processed and credited as avoided burden.	t while remainder is
Transportation Distance:		LCI Source:	
By truck: 940 km		DE: Polyurethane foam (PUR) ts (2017) RNA: Anodization of aluminium (EN15804 A1-A3) ts (2015)	
End-of-Life Scope: 100% Landfilled (inert waste)		RNA: Cold Rolled Aluminum AA/ts (2010)	
		GLO: Steel sheet stamping and bending (5% loss) ts (2017)	
LCI Source:		US: Electricity grid mix ts (2014)	
DE: Window glass simple (EN15804 A1-A3) ts (2017) US: Electricity grid mix ts (2014)		US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (20)14)
US: Thermal energy from natural gas ts (2014)		RNA: Steel hot dip galvanized worldsteel (2007)	,
		RNA: Secondary Aluminum Ingot AA/ts (2010)	
Hardware, stainless steel	45.2 kg	RNA: Primary Aluminum Ingot AA/ts (2010)	
Used in the following Revit families:			
(F1-HMW) dr-SGL-A (F2) dr-Double-Flush-with 4 sided jambs	7.0 kg (60 yrs)	Hollow door, exterior, aluminum, anodized, large vision panel Used in the following Revit families:	236.9 k
(F2) dr-Double-Flush-with 4 sided Jambs (FG2-AL) dr-DBL-A	7.5 kg (60 yrs) 10.3 kg (60 yrs)	(FG2-AL) dr-DBL-A	118.4 kg (30 yrs
(FG2-CW) dr-DBL-CW	10.3 kg (60 yrs)	(FG2-CW) dr-DBL-CW	118.4 kg (30 yrs
(N1-HMW) dr-SGL-A	5.3 kg (60 yrs)	Used in the following Tally entries:	
temp-fence	4.7 kg (60 yrs)	Door, exterior, aluminum	
Used in the following Tally entries:		Description:	
Door, exterior, aluminum		Hollow, anodized aluminum exterior door inclusive of large visio	on panel (>50% door
Door, exterior, steel Door, interior, steel		area), polyurethane foam insulation, no frame	
		Life Cycle Inventory:	
Description: Finished, cast stainless steel, applicable for door, window c	r other accessory hardware	47% Glass	
	rother accessory hardware	3% Steel	
Life Cycle Inventory: 100% Stainless steel		37% Anodized aluminum 13% Polyurethane foam	
Product Scope:		Product Scope:	
Cradle to gate		Cradle to gate, excludes assembly, frame, hardware, and adhesiv	ves
		Transportation Distance:	
Transportation Distance: By truck: 1001 km		By truck: 568 km	
By truck: 1001 km End-of-Life Scope:		End-of-Life Scope:	
By truck: 1001 km End-of-Life Scope: 98% Recovered		End-of-Life Scope: 70% Steel recovered	
By truck: 1001 km End-of-Life Scope:		End-of-Life Scope:	rden credit)

86.2 kg 86.2 kg (30 yrs)

236.9 kg

118.4 kg (30 yrs) 118.4 kg (30 yrs)

HEALTH SCIENCES EDUCATION

Full building summary

LCI Data (continued)

100% Insulation landfilled (plastic material) 100% Glass landfilled (inert material)	
Module D Scope: Product has 26% aluminum scrap input and 1% steel scrap input while processed and credited as avoided burden.	remainder is
LCI Source: DE: Polyurethane foam (PUR) ts (2017) RNA: Anodization of aluminium (EN15804 A1-A3) ts (2015) RNA: Cold Rolled Aluminum AA/ts (2010)	
GLO: Steel sheet stamping and bending (5% loss) ts (2017) US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014)	
GLO: Compressed air 7 bar (medium power consumption) ts (2014) RNA: Steel hot dip galvanized worldsteel (2007) RNA: Secondary Aluminum Ingot AA/ts (2010) RNA: Primary Aluminum Ingot AA/ts (2010)	
DE: Window glass simple (EN15804) ts (2017)	
Hollow door, exterior, steel, galvanized Used in the following Revit families: (N1-HMW) dr-SGL-A	96.7 kg 96.7 kg (30 yrs)
Used in the following Tally entries: Door, exterior, steel	
Description: Hollow door, exterior, steel, 18 ga. inclusive of EPS insulation, no frame	
Life Cycle Inventory: 5% Extruded polystyrene 95% Galvanized steel	
Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesives	
Transportation Distance: By truck: 568 km	
End-of-Life Scope: 70% Steel recovered 30% Steel landfilled (inert material) 100% Core landfilled (biodegradable material)	
Module D Scope: Product has 44% scrap input while remainder is processed and credited burden.	d as avoided
LCI Source: DE: Expanded Polystyrene (PS 25) (EN15804 A1-A3) ts (2017) GLO: Steel sheet stamping and bending (5% loss) ts (2017) GLO: Value of scrap worldsteel (2014) US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) RNA: Steel hot dip galvanized worldsteel (2007)	
Hollow door, interior, steel, fire-rated	81.8 kg
Used in the following Revit families: (F1-HMW) dr-SGL-A	81.8 kg (50 yrs)
Used in the following Tally entries: Door, interior, steel	
Description: Fire-rated door, interior, steel, inclusive of mineral fiber insulation, no fi	rame
Life Cycle Inventory: 72% Steel 28% Mineral wool	
Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesives	
Transportation Distance: By truck: 568 km	
End-of-Life Scope: 70% Steel recovered 30% Steel landfilled (inert material) 100% Insulation landfilled (plastic material)	

Module D Scope: Product has 12% scrap input while remainder is processed and credited as avoided burden. LCI Source: DE: Expanded Polystyrene (PS 30) (EN15804 A1-A3) ts (2017) GLO: Steel sheet stamping and bending (5% loss) ts (2017) GLO: Value of scrap worldsteel (2014) US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) RNA: Steel finsihed cold rolled coil worldsteel (2007) DE: Mineral fibres ceiling boards (EN15804 A1-A3) ts (2017) Hollow door, interior, steel, galvanized 157.1 kg Used in the following Revit families: (F1-HMW) dr-SGL-A 67.3 kg (50 yrs) temp-fence 89.7 kg (50 yrs) Used in the following Tally entries: Door, interior, steel Description: Hollow, galvanized steel interior door inclusive of honeycomb kraft paper, no frame Life Cycle Inventory: 12% Kraft core 88% Galvanized steel Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesives Transportation Distance: By truck: 568 km End-of-Life Scope: 70% Steel recovered 30% Steel landfilled (inert material) 100% Core landfilled (biodegradable material) Module D Scope Product has 41% scrap input while remainder is processed and credited as avoided burden LCI Source: DE: Kraft paper ts (2017) GLO: Steel sheet stamping and bending (5% loss) ts (2017) GLO: Value of scrap worldsteel (2014) US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) RNA: Steel hot dip galvanized worldsteel (2007) Hot rolled structural steel, AISC - EPD 518,506.5 kg Used in the following Revit families: HSEB Type C - STR-4_Conc filled w/ C channel 1,158.0 kg (60 yrs) HSEB Type C_STR-10_Conc filled w/ C channel 332.8 kg (60 yrs) HSEB Type C_STR-5_Conc filled w/ C channel 2 3,047.8 kg (60 yrs) KPFF - SCOL - Steel - W - Wide Flange (C) - TC 122,740.2 kg (60 yrs) KPFF - SFRM - Steel - C - Channel (C) - TC 4,966.2 kg (60 yrs) KPFF - SFRM - Steel - Kicker Brace - L - Angle - TC 976.4 kg (60 yrs) KPFF - SFRM - Steel - L - Angle (C) - TC 264.1 kg (60 yrs) KPFF - SFRM - Steel - W - Wide Flange (C) - TC 384,876.4 kg (60 yrs) KPFF - SFRM - Steel - WT - Wide Flange Tee - TC 40.7 kg (60 yrs) KPFF - SFRM - Steel - WT - Wide Flange Tee (C) - TC 104.0 kg (60 yrs) Used in the following Tally entries: Steel, angle Steel, C channel Steel, W section (wide flange shape) Description: Hot rolled structural steel. Industry-wide EPD from the American Institute of Steel Construction. Life Cycle Inventory: For information and quantities, see EPD Product Scope:

Cradle to gate Transportation Distance: By truck: 431 km

End-of-Life Scope: 98% Recovered	Laminating (for glazing) 58.5 Used in the following Revit families:
2% Landfilled (inert material) Module D Scope:	System Panel 58.5 kg (40) Used in the following Tally entries:
Product has 100% scrap input, burden reflects difference between recovered material and scrap input	Glazing, custom IGU
LCI Source:	Glazing lamination using PVB film
RNA: Hot rolled structural steel sections AISC (2010) EPD Source: <u>4786979051.102.1</u>	Life Cycle Inventory: 3% PVB film (30% adipic acid 70% PVB)
EPD Designation Holder: American Institute of Steel Construction	97% Glass Product Scope:
EPD Program Operator: UL Environment	Cradle to gate Transportation Distance:
EPD Expiration: 3/31/2021	N/A End-of-Life Scope: 100% Landfilled (inert waste)
IGU spacer 283.4 kg	LCI Source:
Used in the following Revit families: 6.3 kg (40 yrs) (FG2-AL) dr-DBL-A 6.3 kg (40 yrs) (FG2-CW) dr-DBL-CW 1.2 kg (40 yrs) cp_HSEB - Window at Upper Levels 112.7 kg (40 yrs) System Panel 163.2 kg (40 yrs)	DE: Adipic acid from cyclohexane ts (2017) DE: Polyvinyl Butyral Granulate (PVB) ts (2017) GLO: Plastic film (PE, PP, PVC) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) US: Lubricants at refinery ts (2014)
Used in the following Tally entries: Glazing, custom IGU	
Description: Insulating glass unit (IGU) spacer and gasket used to separate two or more plies of glass. Density value assumes a 1/2" (13/2 mm) spacer.	Lightweight concrete, 5000 psi, Pacific Northwest regional average 65,224.5 Used in the following Revit families: HSEB Type C - STR-4_Conc filled w/ C channel 1,437.3 kg (60 y HSEB Type C_STR-10_Conc filled w/ C channel 552.8 kg (60 y
Life Cycle Inventory: 70% Polybutadiene rubber spacer 30% Nitrile rubber spacer	HSEB Type C_STR-5_Conc filled w/ C channel 2 2,234.5 kg (60) HSEB Type C_STR-6_Conc filled w/ Plate Stringer - Roof Access 413.5 kg (60) HSEB Type C_STR-8_Conc filled w/ Plate 318.4 kg (60)
Product Scope: Cradle to gate	KPFF - SCOL - Concrete - Round 1,268.3 kg (60 y LCL_C_Pilaster_Rect_()w()d 58,999.5 kg (60 y
Transportation Distance: By truck: 940 km	Used in the following Tally entries: Cast-in-place concrete, lightweight structural concrete, 5000 psi
End-of-Life Scope: 100% Landfilled (inert waste)	Description: Lightweight concrete, 5000 psi, Pacific Northwest regional average. Mix design matches National Ready-Mix Concrete Association (NRMCA) Industry-wide EPD.
LCI Source: DE: Polybutadiene rubber ts (2017) DE: Nitrile butadiene rubber, incl. MMA (NBR-speciality) ts (2017)	Life Cycle Inventory: Expanded shale: 34%, Sand: 32%, Portland cement PCA - EPD: 19%, Water: 10%, Fly ash: 5%, Expanded slag: 1%, Admixture: <1%
Laminated spruce panel board 278.9 kg Used in the following Revit families: C7- GWB on Mtl. Stud 2 278.9 kg (30 yrs)	Product Scope: Cradle to gate Anchors, ties, and metal accessories outside of scope (<1% mass)
C7- GWB on Mtl. Stud 2 278.9 kg (30 yrs) Used in the following Tally entries: Plywood, interior grade	Transportation Distance: By truck: 24 km
Description: Laminated spruce woodboard (Duo-/Trio boards) consists of layers of spruce bonded with phenolic resin-based adhesive. Laminated woodboards in comparison to	End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material)
laminated timber are thicker (45mm). Appropriate for use in interior applications.	Module D Scope: Avoided burden credit for coarse aggregate, includes grinding energy
Life Cycle Inventory: 100% Laminated wood board	LCI Source:
Product Scope: Cradle to gate, excludes finishes laminate as proxy for glue and adhesives during installation	US: Portland cement PCA/ts (2014) DE: Puruice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017)
Transportation Distance: By truck: 383 km	DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Expanded clay (EN15804 A1-A3) ts (2017)
End-of-Life Scope: 14.5% Recovered 22% Incinerated with energy recovery 63.5% Landfilled (wood product waste)	DE: alcium nitrate ts (2017) DE: Sodium ligninsulfonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017)
Module D Scope:	US: Colophony (rosin, refined) from CN pine gum rosin ts (2017) US: Tap water from groundwater ts (2017) US: Electricity grid mix s (2014)
Recovered wood products credited as avoided burden.	

30% utane) ts (2014)		Overhead door closer, aluminum	26.1 kg
US: Light fuel oil at refinery ts (2014)		Used in the following Revit families: (F1-HMW) dr-SGL-A	4.7 kg (30 yrs
		(FG2-AL) dr-DBL-A	4.7 kg (30 yr 10.7 kg (30 yr
ow-e coating (for glazing)	312.7 kg	(FG2-CW) dr-DBL-CW	10.7 kg (30 yr
Used in the following Revit families:			· • · · · · · · · · · · · · · · · · · ·
(FG2-AL) dr-DBL-A	7.1 kg (40 yrs)	Used in the following Tally entries:	
(FG2-CW) dr-DBL-CW	1.3 kg (40 yrs)	Door, exterior, aluminum	
cp_HSEB - Window at Upper Levels	126.8 kg (40 yrs)	Door, interior, steel	
System Panel	177.5 kg (40 yrs)	Description:	
Used in the following Tally entries:		Aluminum overhead door closer. Data based on product-speci	fic EPD from FV S+B.
Glazing, custom IGU		Life Cycle Inventory:	
Description:		See EPD	
Low-e coating for application to glazing lite			
Life Cycle Inventory:		Product Scope: Cradle to gate	
Ferro chrome mix		5	
Nickel mix		Transportation Distance:	
Tin		By truck: 1001 km	
Silver mix		End-of-Life Scope:	
Product Scoper		95% Recovered	
Product Scope: Cradle to gate		5% Landfilled (inert material)	
Cradie to gate		Module D Scope:	
Transportation Distance:		Product has 0% scrap input, burden reflects difference between	n recovered material an
N/A		scrap input	
End-of-Life Scope:			
100% Landfilled (inert waste)		LCI Source: DE: Overhead door closer aluminum - FV S+B PE-EPD (2009)	
LCI Source:		RNA: Secondary Aluminum Ingot AA/ts (2010)	
Low-e coating from DE: Double glazing unit (EN15804 A1-A3) ts (2017)	RNA: Primary Aluminium Ingot AA/ts (2010)	
in and word high density MAIMA FDD	20.050.1 hr	EPD Source:	
ineral wool, high density, NAIMA - EPD Used in the following Revit families:	39,858.1 kg	EPD-ARG-20160183-IBG1-EN	
1-N8 GFRC @ FRAMED WALL STAGGERED STUD	38.2 kg (60 yrs)	EPD Designation Holder:	
1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 22"	248.2 kg (60 yrs)	European Federation of Associations of Lock and Builders Hard	ware Manufacturers
1-W06 PRE-CAST CONCRETE @ FRAMED WALL	1,235.2 kg (60 yrs)	(ARGE)	
1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STU	D 393.3 kg (60 yrs)	EPD Program Operator:	
1-W07_METAL STUD LIGHTWEIGHT CLADDING	13,257.9 kg (60 yrs)	Institut Bauen and Umwelt (IBU)	
3-W07_METAL STUD LIGHTWEIGHT CLADDING	195.3 kg (60 yrs)	EPD Expiration:	
W06 PRE-CAST CONCRETE @ FRAMED WALL	2,096.0 kg (60 yrs)	9/13/2021	
W07_METAL STUD LIGHTWEIGHT CLADDING	17,826.7 kg (60 yrs)	5,15,2021	
W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse)	1,184.1 kg (60 yrs)	Belief and and a state of	0.640.71
W08_METAL STUD LIGHTWEIGHT CLADDING (Parapet) W09_SOUTH VESTIBULE WALL	3,320.3 kg (60 yrs)	Paint, enamel, solvent based	9,648.7 k
W09_SOUTH VESTIBULE WALL	63.0 kg (60 yrs)	Used in the following Revit families: 3/16" Aluminum Plate	5.0 kg (15 yr
Jsed in the following Tally entries:		KPFF - SCOL - Steel - HSS - Rectangular (C) - TC	255.3 kg (15 yr
Mineral wool, board, generic		KPFF - SCOL - Steel - HSS - Rectangular (C) - TC- 2x	23.1 kg (15 yr
Description:		KPFF - SCOL - Steel - HSS - Round (C) - TC	10.3 kg (15 yr
Rock board, heavy density. Industry-wide EPD from the North Am	erica Insulation	KPFF - SFRM - Steel - C - Channel (C) - TC	94.7 kg (15 yr
Manufacturers Association. EPD representative of conditions in N	orth America.	KPFF - SFRM - Steel - HSS - Rectangular (C) - TC	182.2 kg (15 yr
Life Cycle Inventory:		KPFF - SFRM - Steel - W - Wide Flange (C) - TC	9,069.8 kg (15 yr
For information and quantities, see EPD		KPFF - SFRM - Steel - WT - Wide Flange Tee - TC	1.9 kg (15 yr
		KPFF - SFRM - Steel - WT - Wide Flange Tee (C) - TC	6.4 kg (15 yr
Product Scope:		Used in the following Tally entries:	
Cradle to gate		Aluminum, sheet	
Transportation Distance:		Steel, C channel	
By truck: 172 km		Steel, HSS section	
End-of-Life Scope:		Steel, W section (wide flange shape)	
100% Landfilled (inert waste)		Description:	
LCI Source:		Solvent-based enamel paint, appropriate for use on metals	
US: Rock board insulation (heavy density) NAIMA (2007)		Life Cycle Inventory:	
		17% Binding agent	
EPD Source:		16% Pigments and fillers	
<u>4786060412.102.1</u>		67% Solvent	
		Product Scope:	
5		Cradle to gate, including emissions during application	
EPD Designation Holder: North American Insulation Manufacturer's Association (NAIMA) EPD Program Operator:			
North American Insulation Manufacturer's Association (NAIMA) EPD Program Operator: UL Environment		Transportation Distance: By truck: 642 km	
North American Insulation Manufacturer's Association (NAIMA) EPD Program Operator:		By truck: 642 km End-of-Life Scope:	
North American Insulation Manufacturer's Association (NAIMA) EPD Program Operator: UL Environment EPD Expiration:		By truck: 642 km	

Paint, exterior metal coating, silicone-based	493.4 kg
Used in the following Revit families: (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) (R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2 (R3) SBS OVER METAL DECK (R4) SOUTH VEST ROOF cp_HSEB - Skin Shingle flashing HSEB - STR-2_Precast Tread Steel Riser 2 HSEB Type C - STR-4_Conc filled w/ C channel HSEB Type C_STR-10_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel 2 HSEB Type C_STR-6_Conc filled w/ Plate Stringer - Roof Access HSEB STR-2_Precast Tread Steel Riser LOUVER-parametric Used in the following Tally entries:	60.0 kg (30 yrs) 165.6 kg (30 yrs) 219.0 kg (30 yrs) 1.2 kg (30 yrs) 1.3 kg (30 yrs) 10.2 kg (30 yrs) 5.1 kg (30 yrs) 1.9 kg (30 yrs) 1.2 kg (30 yrs) 3.8 kg (30 yrs) 0.8 kg (30 yrs) 1.1 kg (30 yrs)
Aluminum, sheet Steel, deck Steel, plate	
Description: Silicone-based metal paint, with a default coating thickness of 100 n	nicrons
Life Cycle Inventory: 23% Binding agent 35% Pigments and fillers 40% Water 1.5% Organic solvents Product Scope:	
Cradle to gate, including emissions during application Transportation Distance:	
By truck: 642 km End-of-Life Scope:	
100% to landfill (plastic waste)	
LCI Source: DE: Application coating silicone (building, exterior, white) ts (2017)	
Paint, exterior metal coating, silicone-based, by area	18.2 kg
Used in the following Revit families: HSEB Type C - STR-4_Conc filled w/ C channel HSEB Type C_STR-10_Conc filled w/ C channel HSEB Type C STR-5 Conc filled w/ C channel 2	5.1 kg (30 yrs) 1.9 kg (30 yrs)
HSEB Type C - STR-4_Conc filled w/ C channel	5.1 kg (30 yrs)
HSEB Type C - STR-4_Conc filled w/ C channel HSEB Type C_STR-10_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel 2 Used in the following Tally entries:	5.1 kg (30 yrs) 1.9 kg (30 yrs) 11.2 kg (30 yrs)
HSEB Type C - STR-4_Conc filled w/ C channel HSEB Type C_STR-10_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel 2 Used in the following Tally entries: Steel, C channel Description:	5.1 kg (30 yrs) 1.9 kg (30 yrs) 11.2 kg (30 yrs)
HSEB Type C - STR-4_Conc filled w/ C channel HSEB Type C_STR-10_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel 2 Used in the following Tally entries: Steel, C channel Description: Silicone-based metal paint, with a default coating thickness of 100 n Life Cycle Inventory: 23% Binding agent 35% Pigments and fillers 40% Water	5.1 kg (30 yrs) 1.9 kg (30 yrs) 11.2 kg (30 yrs)
HSEB Type C - STR-4_Conc filled w/ C channel HSEB Type C_STR-10_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel 2 Used in the following Tally entries: Steel, C channel Description: Silicone-based metal paint, with a default coating thickness of 100 n Life Cycle Inventory: 23% Binding agent 35% Pigments and fillers 40% Water 1.5% Organic solvents Product Scope:	5.1 kg (30 yrs) 1.9 kg (30 yrs) 11.2 kg (30 yrs)
HSEB Type C - STR-4_Conc filled w/ C channel HSEB Type C_STR-10_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel 2 Used in the following Tally entries: Steel, C channel Description: Silicone-based metal paint, with a default coating thickness of 100 n Life Cycle Inventory: 23% Binding agent 35% Pigments and fillers 40% Water 1.5% Organic solvents Product Scope: Cradle to gate, including emissions during application Transportation Distance:	5.1 kg (30 yrs) 1.9 kg (30 yrs) 11.2 kg (30 yrs)
HSEB Type C - STR-4_Conc filled w/ C channel HSEB Type C_STR-10_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel 2 Used in the following Tally entries: Steel, C channel Description: Silicone-based metal paint, with a default coating thickness of 100 n Life Cycle Inventory: 23% Binding agent 35% Pigments and fillers 40% Water 1.5% Organic solvents Product Scope: Cradle to gate, including emissions during application Transportation Distance: By truck: 642 km End-of-Life Scope:	5.1 kg (30 yrs) 1.9 kg (30 yrs) 11.2 kg (30 yrs)

W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse) 160.0 kg (7 yr) Used in the following Tally entries: Acoustic celling system, mineral fiber board Wall board, gypsum Description: Acrystic-based paint for interior applications Life Cycle Inventory; 21% Binding agent 35% Pigments and fillers 42% Water 2% Organic solvents Product Scope: Cradie to gate, including emissions during application Transportation Distance: By truck: 642 km End-of-Life Scope: 2,684.0 kg (20 yr) Used in the following Revit families: 2,684.0 kg (20 yr) Used in the following Revit families: 2,684.0 kg (20 yr) Used in the following Tally entries: Phenolic resin solid surface, sheet 2,684.0 kg (20 yr) Used in the following Tally entries: Phenolic resin saturated kraft paper formed into solid sheet stock Life Cycle Inventory; 85% Kraft paper 15% Phenolic resin 2,684.0 kg (20 yr) 90% landfilled (plastic waste) LCI Source: 2,684.0 kg (20 yr) Used in the following Tally entries: Phenolic resin saturated kraft paper formed into solid sheet stock Life Cycle Inventory; 85% Kraft paper 15% Phenolic resin 4,739.8 kg (60 yr)		
A coustic ceiling system, mineral fiber board Wall board, gypsum Description: Acrylic-based paint for interior applications Life Cycle Inventory: 21% Binding agent 35% Pigments and fillers 42% Water 2% Organic solvents Product Scope: Cradle to gate, including emissions during application Transportation Distance: By truck: 642 km End-of-Life Scope: 100% to landfill (plastic waste) LCI Source: DE: Application paint emulsion (building, interior, white, wear resistant) ts (2017) Phenolic resin solid surfacing, sheet Led Source: Description: Phenolic resin solid surface, sheet Description: Phenolic resin solid surface, sheet Description: Phenolic resin solid surface, sheet Description: Phenolic resin solid surfaces, sheet Description: Phenolic resin Solid surfaces sheet Description: Phenolic resin Product Scope: Cradle to gate Transportation Distance: By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin 2.684.0 kg (20 yr Used in the following Revit families: Cradle to gate Transportation Distance: By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin 2.684.0 kg (20 yr US: Electricity grid mix ts (2014) US: Electricity grid mix ts (2014)		26.8 kg (7 yrs) 160.0 kg (7 yrs)
Acrylic-based paint for interior applications Life Cycle Inventory; 21% Binding agent 35% Pigments and fillers 42% Water 2% Organic solvents Product Scope: Cradle to gate, including emissions during application Transportation Distance: By truck: 642 km End-of-Life Scope: 100% to landfill (plastic waste) LCI Source: DE: Application paint emulsion (building, interior, white, wear resistant) ts (2017) Phenolic resin solid surfacing, sheet 2,684.0 kg (20 yr) Used in the following Revit families: 2,684.0 kg (20 yr) Used in the following Tally entries: Phenolic resin solid surface, sheet Description: Phenolic resin solid surface, sheet Description: Phenolic resin Product Scope: Cradle to gate Transportation Distance: By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GL: Coppressed ar 7 for (matural gas ts (2014) US: Thernolic resin (45% concentration) ts (2017) GL: Copressed ar 7 for (motural gas ts (2014) US: Lubricants at refinery ts (2014)	Acoustic ceiling system, mineral fiber board	
21% Binding agent 35% Pigments and fillers 42% Water 2% Organic solvents Product Scope: Cradle to gate, including emissions during application Transportation Distance: By truck: 642 km End-of-Life Scope: 100% to landfill (plastic waste) LCI Source: DE: Application paint emulsion (building, interior, white, wear resistant) ts (2017) Phenolic resin solid surfacing, sheet 2,684.0 lg Used in the following Revit families: 2,684.0 kg (20 yr) Used in the following Tally entries: 2,684.0 kg (20 yr) Phenolic resin solid surface, sheet 2,684.0 kg (20 yr) Description: Phenolic resin saturated kraft paper formed into solid sheet stock Life Cycle Inventory: 85% Kraft paper 15% Phenolic resin 15% Phenolic resin Product Scope: Cradle to gate Transportation Distance: By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GLO: Compressed air 7 bar (medium power consumption) ts (2014) EU: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (m		
Cradle to gate, including emissions during application Transportation Distance: By truck 642 km End-of-Life Scope: 100% to landfill (plastic waste) LCI Source: DE: Application paint emulsion (building, interior, white, wear resistant) ts (2017) Phenolic resin solid surfacing, sheet 2,684.0 I Used in the following Revit families: cp_HSEB - Base Material Panel_vertical 2,684.0 kg (20 yr Used in the following Tally entries: Phenolic resin solid surface, sheet Description: Phenolic resin sturated kraft paper formed into solid sheet stock Life Cycle Inventory: 85% Kraft paper 15% Phenolic resin Product Scope: Cradle to gate Transportation Distance: By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014) US: Corgneressed air 7 bar (medium power consumption) ts (2014) EU-28: Kraft paper ts (2017) PIR rigid foam insulation, roof, R=20.5, PIMA - EPD 11,174.71 Used in the following Revit families: (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60) yr (R3) SBS OVER METAL DECK 5,330.3 kg (60) yr (R4) SUFH YEST ROOF 11.7 kg (60 yr Used in the following Tally entries: Polyisocyanurate (PIR), board Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5* thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association.	21% Binding agent 35% Pigments and fillers 42% Water	
Transportation Distance: By truck: 642 km End-of-Life Scope: 100% to landfill (plastic waste) LCI Source: DE: Application paint emulsion (building, interior, white, wear resistant) ts (2017) Phenolic resin solid surfacing, sheet 2,684.0 kg (20 yr) Used in the following Revit families: 2,684.0 kg (20 yr) Used in the following Tally entries: Phenolic resin solid surface, sheet Description: Phenolic resin surated kraft paper formed into solid sheet stock Life Cycle Inventory: 85% Kraft paper 15% Phenolic resin Product Scope: Cradle to gate Transportation Distance: By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) EU-28: Kraft paper ts (2017) (R) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr) (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr) 11.7 kg (60 yr) Used in the following Revit families: R) (CLT ROOF - CLT PATTERN N/S	•	
End-of-Life Scope: 100% to landfill (plastic waste) LCI Source: DE: Application paint emulsion (building, interior, white, wear resistant) ts (2017) Phenolic resin solid surfacing, sheet 2,684.0 l Used in the following Revit families: cp_HSEB - Base Material Panel_vertical 2,684.0 kg (20 yr Used in the following Tally entries: Phenolic resin solid surface, sheet 2,684.0 kg (20 yr Description: Phenolic resin saturated kraft paper formed into solid sheet stock Life Cycle Inventory: 85% Kraft paper 15% Phenolic resin Product Scope: Cradle to gate Transportation Distance: By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GLO: Phastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Libricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) EU-28: Kraft paper ts (2017) 11,174.7 L Used in the following Revit families: (R1) CLT ROOF 4,739.8 kg (60 yr 1,093.0 kg (60 yr (R1) CLT ROOF 1,093.0 kg (60 yr 1,093.0 kg (60 yr (R4) SOUTH VEST ROOF Used in the following Tally entries: Polyisocyanurate (PIR), board 11.7 kg (60 yr 11.7 k	Transportation Distance:	
LCI Source: DE: Application paint emulsion (building, interior, white, wear resistant) ts (2017) Phenolic resin solid surfacing, sheet 2,684.0 I Used in the following Revit families: 2,684.0 kg (20 yr) Used in the following Tally entries: Phenolic resin solid surface, sheet Description: Phenolic resin saturated kraft paper formed into solid sheet stock Life Cycle Inventory: 85% Kraft paper 15% Phenolic resin 15% Phenolic resin Product Scope: Cradle to gate Transportation Distance: By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014) US: Lubricants at refinery ts (2017) 1,174.71 Used in the following Revit families: (R1) CLT ROOF (R1) CLT ROOF 4,739.8 kg (60 yr) (R1) CLT ROOF 1,739.8 kg (60 yr) (R3) SBS OVER METAL DECK 5,330.3 kg (60 yr) (R4) SOUTH VEST ROOF 1.17. kg (60 yr) Used in the following Tally entries: Polyisocya	End-of-Life Scope:	
Used in the following Revit Tamilies: cp_HSEB - Base Material Panel_vertical 2,684.0 kg (20 yr Used in the following Tally entries: Phenolic resin solid surface, sheet Description: Phenolic resin saturated kraft paper formed into solid sheet stock Life Cycle Inventory: 85% Kraft paper 15% Phenolic resin Product Scope: Cradle to gate Transportation Distance: By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) EU-28: Kraft paper ts (2017) PIR rigid foam insulation, roof, R=20.5, PIMA - EPD 11,174.71 Used in the following Revit families: (R1) CLT ROOF - CLT PATTERN N/S (R3) SBS OVER METAL DECK SJ30.3 kg (60 yr (R4) SOUTH VEST ROOF 11.7 kg (60 yr Used in the following Tally entries: Polyisocyanurate (PIR), board Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association.	LCI Source:	nt) ts (2017)
Used in the following Revit Tamilies: cp_HSEB - Base Material Panel_vertical 2,684.0 kg (20 yr Used in the following Tally entries: Phenolic resin solid surface, sheet Description: Phenolic resin saturated kraft paper formed into solid sheet stock Life Cycle Inventory: 85% Kraft paper 15% Phenolic resin Product Scope: Cradle to gate Transportation Distance: By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) EU-28: Kraft paper ts (2017) PIR rigid foam insulation, roof, R=20.5, PIMA - EPD 11,174.71 Used in the following Revit families: (R1) CLT ROOF - CLT PATTERN N/S (R3) SBS OVER METAL DECK SJ30.3 kg (60 yr (R4) SOUTH VEST ROOF 11.7 kg (60 yr Used in the following Tally entries: Polyisocyanurate (PIR), board Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association.	Phenolic resin solid surfacing sheet	2 684 0 kg
Phenolic resin solid surface, sheet Description: Phenolic resin saturated kraft paper formed into solid sheet stock Life Cycle Inventory: 85% Kraft paper 15% Phenolic resin Product Scope: Cradle to gate Transportation Distance: By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Elubricants at refinery ts (2014) US: Lubricants at refinery ts (2014) US: Lubricants at refinery ts (2017) Used in the following Revit families: (R1) CLT ROOF 4,739.8 kg (60 yr (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr (R4) SOUTH VEST ROOF 11.7 kg (60 yr Used in the following Tally entries: Polyisocyanurate (PIR), board Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association. </td <td>Used in the following Revit families:</td> <td>2,684.0 kg (20 yrs)</td>	Used in the following Revit families:	2,684.0 kg (20 yrs)
Phenolic resin saturated kraft paper formed into solid sheet stock Life Cycle Inventory: 85% Kraft paper 15% Phenolic resin Product Scope: Cradle to gate Transportation Distance: By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GL: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014) GL: Compressed air 7 bar (medium power consumption) ts (2014) EU-28: Kraft paper ts (2017) Used in the following Revit families: (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr) (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr) (R3) SBS OVER METAL DECK 5,33.0.3 kg (60 yr) (R4) SOUTH VEST ROOF 11.7 kg (60 yr) Used in the following Tally entries: Polyisocyanurate (PIR), board Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association.		
85% Kraft paper 15% Phenolic resin Product Scope: Cradle to gate Transportation Distance: By truck 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) EU-28: Kraft paper ts (2017) Vised in the following Revit families: (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr) (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr) (R4) SOUTH VEST ROOF 1.1.7 kg (60 yr) Used in the following Tally entries: Polyisocyanurate (PIR), board Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association.		
Cradle to gate Transportation Distance: By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) EU-28: Kraft paper ts (2017) USE Elevative trainilies: (R1) CLT ROOF CLT PATTERN N/S (R1) SOUF ACT PATTERN N/S (R3) SBS OVER METAL DECK (R4) SOUTH VEST ROOF Used in the following Tally entries: Polyisocyanurate (PIR), board Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association.	85% Kraft paper	
By truck: 640 km End-of-Life Scope: 100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) EU-28: Kraft paper ts (2017) PIR rigid foam insulation, roof, R=20.5, PIMA - EPD 11,174.7 L Used in the following Revit families: (R1) CLT ROOF 4,739.8 kg (60 yr (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr (R1) SBS OVER METAL DECK 5,330.3 kg (60 yr (R4) SOUTH VEST ROOF 11.7 kg (60 yr Used in the following Tally entries: Polyisocyanurate (PIR), board Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association.		
100% landfilled (plastic waste) LCI Source: US: Phenolic resin (45% concentration) ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) EU-28: Kraft paper ts (2017) PIR rigid foam insulation, roof, R=20.5, PIMA - EPD 11,174.7 I Used in the following Revit families: (R1) CLT ROOF 4,739.8 kg (60 yr) (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr) (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr) (R4) SOUTH VEST ROOF 11.7 kg (60 yr) Used in the following Tally entries: Polyisocyanurate (PIR), board Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association.		
US: Phenolic resin (45% concentration) ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) EU-28: Kraft paper ts (2017) PIR rigid foam insulation, roof, R=20.5, PIMA - EPD 11,174.7 I Used in the following Revit families: (R1) CLT ROOF 4,739.8 kg (60 yr (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr (R3) SBS OVER METAL DECK 5,330.3 kg (60 yr (R4) SOUTH VEST ROOF 11.7 kg (60 yr Used in the following Tally entries: Polyisocyanurate (PIR), board Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association.		
Used in the following Revit families: (R1) CLT ROOF 4,739.8 kg (60 yr (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr (R3) SBS OVER METAL DECK 5,330.3 kg (60 yr (R4) SOUTH VEST ROOF 11.7 kg (60 yr Used in the following Tally entries: Polyisocyanurate (PIR), board Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association.	US: Phenolic resin (45% concentration) ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014)	
(R1) CLT ROOF 4,739.8 kg (60 yr (R1) CLT ROOF - CLT PATTERN N/S 1,093.0 kg (60 yr (R3) SBS OVER METAL DECK 5,330.3 kg (60 yr (R4) SOUTH VEST ROOF 11.7 kg (60 yr Used in the following Tally entries: Polyisocyanurate (PIR), board Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association.	-	11,174.7 kg
Polyisocyanurate (PIR), board Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association.	(R1) CLT ROOF (R1) CLT ROOF - CLT PATTERN N/S (R3) SBS OVER METAL DECK	4,739.8 kg (60 yrs) 1,093.0 kg (60 yrs) 5,330.3 kg (60 yrs) 11.7 kg (60 yrs)
Polyisocyanurate rigid foam roof insulation with glass-fiber reinforced facers, R-value of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisocyanurate Insulation Manufacturers Association.		
Life Cycle Inventory:	Polyisocyanurate rigid foam roof insulation with glass-fiber reinforce of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Polyisoc	
For information and quantities, see EPD	Life Cycle Inventory: For information and quantities, see EPD	
Product Scope: Cradle to gate	•	
Transportation Distance: By truck: 250 km		
End-of-Life Scope: 100% Landfilled (plastic waste)		

LCI Data (continued)

LCI Source: RNA: Polyisocyanurate rigid foam board roof insulaton, R=20.5	(A1-A3) ts-EPD (2013)
EPD Source: EPD10043	. , . ,
EPD Designation Holder: Polyisocyanurate Insulation Manufacturers Association	
EPD Program Operator: NSF International	
EPD Expiration: 2/6/2020	
PIR rigid foam insulation, wall, R=14.6, PIMA - EPD Used in the following Revit families: cp_HSEB - Skin Shingle flashing	9.8 kg 9.8 kg (60 yrs)
Used in the following Tally entries: Polyisocyanurate (PIR), board	
Description: Polyisocyanurate rigid foam wall insulation with aluminum foil of R-value of 14.6, 2.25" thickness (57.2 mm). Industry-wide EPD fi Polyisocyanurate Insulation Manufacturers Association.	
Life Cycle Inventory: For information and quantities, see EPD	
Product Scope: Cradle to gate	
Transportation Distance: By truck: 250 km	
End-of-Life Scope: 100% Landfilled (plastic waste)	
LCI Source: RNA: Polyisocyanurate rigid foam board wall insulation, R=14.6	i (A1-A3) ts-EPD (2013)
EPD Source: EPD10042	
EPD Designation Holder: Polyisocyanurate Insulation Manufacturers Association	
EPD Program Operator: NSF International	
EPD Expiration: 2/6/2020	
Polyethelene sheet vapor barrier (HDPE) Used in the following Revit families:	34,144.9 kg
(F1) SLAB ON GRADE	570.6 kg (60 yrs)
(F1) SLAB ON GRADE - 6"	0.4 kg (60 yrs)
(F1) SLAB ON GRADE - 8" (R1) CLT ROOF	5.3 kg (60 yrs) 421.6 kg (60 yrs)
(R1) CLT ROOF - CLT PATTERN N/S	97.2 kg (60 yrs)
(R2) INSULATION O/ ASPHALT MEMBRANE O/ STRUCT (R3) SBS OVER METAL DECK	143.4 kg (60 yrs) 414.9 kg (60 yrs)
(R4) SOUTH VEST ROOF	3.6 kg (60 yrs)
(R4) SOUTH VEST ROOF (INTERIOR)	4.2 kg (60 yrs)
1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16"	590.2 kg (60 yrs) 193.7 kg (60 yrs)
1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 10	1,865.2 kg (60 yrs)
2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_16"	6,745.6 kg (60 yrs)
2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24"	17,358.2 kg (60 yrs) 5,580.5 kg (60 yrs)
2-W01 CONCRETE WALL WITHOUT CONC	150.2 kg (60 yrs)
Used in the following Tally entries: Polyethelene sheet vapor barrier (HDPE)	
Description: Polyethelene sheet vapor barrier (HDPE) membrane entry exclusive of adhesive or other co-products	
Life Cycle Inventory: 100% Polyethylene film	
Product Scope: Cradle to gate	
-	

Transportation Distance: By truck: 1299 km	
End-of-Life Scope: 10.5% Recycled into HDPE 89.5% Landiflled (plastic waste)	
Module D Scope: Avoided burden credit includes processing	
LCI Source: US: Polyethylene High Density Granulate (PE-HD) ts (2017) GLO: Plastic Film (PE, PP, PVC) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) US: Lubricants at refinery ts (2014)	
Polyurethane coating, metal stock Used in the following Revit families: KPFF - SCOL - Steel - HSS - Rectangular (C) - TC	10.7 kg 10.7 kg (50 yrs)
Used in the following Tally entries: Steel, HSS section	
Description: Polyurethane coating, for metal stock	
Life Cycle Inventory: 100% Polyurethane coating	
Product Scope: Cradle to gate, includes installation	
Transportation Distance: N/A	
End-of-Life Scope: 100% Landfilled (inert waste)	
LCI Source: DE: Application base coat (automobile) ts (2017) DE: Polyurethane (copolymer-component) (estimation from TPL	J adhesive) ts (2017)
Powder coating, metal stock Used in the following Revit families: Picture Window Bend Plate	1.7 kg 1.7 kg (50 yrs)
Used in the following Tally entries: Aluminum, angle	
Description: Powder coating, for metal stock	
Life Cycle Inventory: 100% Powder coating	
Product Scope: Cradle to gate, including application	
Transportation Distance: N/A	
End-of-Life Scope: 100% Landfilled (inert waste)	
LCI Source: DE: Application top coat powder (aluminium) ts (2017) DE: Coating powder (industry, outside, red) ts (2017)	
SBS modified bitumen, assembly (base & cap), ARMA - EPD Used in the following Revit families:	18,668.2 kg
(R1) CLT ROOF - CLT PATTERN N/S (R3) SBS OVER METAL DECK (R4) SOUTH VEST ROOF W08_METAL STUD LIGHTWEIGHT CLADDING (CW Parapet) no ii W08_METAL STUD LIGHTWEIGHT CLADDING (Parapet)	2,720.6 kg (40 yrs) 11,609.5 kg (40 yrs) 101.8 kg (40 yrs) nsulatiœ02.3 kg (40 yrs) 4,034.0 kg (40 yrs)
Used in the following Tally entries: SBS modified bitumen, sheet	
Description:	

Styrene-butadiene-styrene (SBS)-modified bituminous roofing consisting of a base sheet and cap sheet. Industry-wide EPD from the Asphalt Roofing Manufacturers Association.

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LCI Data (continued)

Life Cycle Inventory: For information and quantities, see EPD		Life Cycle Inventory: 82% Rubberized asphalt (25% SBS)	
Product Scope: Cradle to gate, accounts for product overlap when installing		18% Polyethylene HD Product Scope:	
Transportation Distance:		Cradle to gate for materials only, neglects manufacturing rec	quirements
By truck: 172 km End-of-Life Scope:		Transportation Distance: By truck: 172 km	
100% Landfilled (plastic waste)		End-of-Life Scope: 100% Landfilled (plastic waste)	
LCI Source: RNA: Atactic-polypropylene (APP)-modified bitumen (asphalt) I ARMA (A1-A3) (2012) RNA: Atactic-polypropylene (APP)-modified bitumen (asphalt) I ARMA (A1-A3) (2012)	5	LCI Source: US: Styrene-butadiene rubber (SBR) ts (2017) DE: Bitumen cold adhesive (EN15804 A1-A3) ts (2017) US: Polyethylene High Density Granulate (PE-HD) ts (2017)	
EPD Source: 4787168709.105.1		GLO: Plastic Film (PE, PP, PVC) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014)	
EPD Designation Holder: Asphalt Roofing Manufacturers Association (ARMA)		US: Lubricants at refinery ts (2014)	
EPD Program Operator:		Stainless steel door hinge	52.5 kg
UL Environment		Used in the following Revit families: (F1-HMW) dr-SGL-A	9.8 kg (30 yrs
EPD Expiration:		(F2) dr-Double-Flush-with 4 sided jambs	8.1 kg (30 yrs
10/28/2021		(FG2-AL) dr-DBL-A	11.2 kg (30 yrs
DC and ified hitsurger and shart ADMA FDD	0.400.0 hrs	(FG2-CW) dr-DBL-CW	11.2 kg (30 yrs
BS modified bitumen, cap sheet, ARMA - EPD Used in the following Revit families:	8,400.9 kg	(N1-HMW) dr-SGL-A temp-fence	5.7 kg (30 yrs 6.5 kg (30 yrs
(R2) INSULATION O/ ASPHALT MEMBRANE O/ STRUCT	2,285.1 kg (60 yrs)	•	0.5 kg (50) i
1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11"	111.1 kg (60 yrs)	Used in the following Tally entries: Door, exterior, aluminum	
1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16"	36.5 kg (60 yrs)	Door, exterior, steel	
1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 8" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_16"	351.2 kg (60 yrs) 1,270.0 kg (60 yrs)	Door, interior, steel	
2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22"	3,268.1 kg (60 yrs)	Description:	
2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24" 2-W01 CONCRETE WALL WITHOUT CONC	1,050.7 kg (60 yrs) 28.3 kg (60 yrs)	Stainless steel and aluminum door and window hinge. Data l EPD from FSB.	based on product-specifc
Used in the following Tally entries: Self-adhering sheet waterproofing, modified bituminous sheet		Life Cycle Inventory: See EPD	
Description:		Product Scope:	
Styrene-butadiene-styrene (SBS)-modified bituminous cap she		Cradle to gate	
from the Asphalt Roofing Manufacturers Association. EPD repre	esentative of conditions	Transportation Distance:	
in North America.		By truck: 1001 km	
Life Cycle Inventory: For information and quantities, see EPD		End-of-Life Scope: 98% Recovered	
Product Scope:		2% Landfilled (inert material)	
Cradle to gate		Module D Scope:	
Transportation Distance: By truck: 172 km		Product has a 0% scrap input while remainder is processed a burden.	nd credited as avoided
End-of-Life Scope:		LCI Source:	
100% Landfilled (plastic waste) LCI Source:		DE: Door and window hinge - FV S+B PE-EPD (2009) RER: Stainless steel flat product (304) - value of scrap Eurofer	r (2010)
RNA: Atactic-polypropylene (APP)-modified bitumen (asphalt) i ARMA (A1-A3) (2012)	roofing cap sheet -	EPD Source: EPD-FSB-2010111-D	
EPD Source: <u>4787168709.105.1</u>		EPD Designation Holder: Franz Schneider	
EPD Designation Holder: Asphalt Roofing Manufacturers Association (ARMA)		EPD Program Operator: Institut Bauen and Umwelt (IBU)	
EPD Program Operator: UL Environment		EPD Expiration: 1/14/2016	
EPD Expiration: 10/28/2021		Stainless steel sheet, Chromium 18/8 Used in the following Revit families:	43.4 kg
	45.41	Construction Specialties_Crash Rail_6" ECR-60S	43.4 kg (45 yrs
elf adhering flashing membrane, 40 mil Used in the following Revit families: (R4) SOUTH VEST ROOF	13.1 kg 13.1 kg (40 yrs)	Used in the following Tally entries: Steel, sheet, stainless	
Used in the following Tally entries: Self adhering membrane		Description: Stainless steel sheet, Type 304 (Chromium 18/8)	
-		Life Cycle Inventory:	
Description:			

Product Scope:		04.017_LCL FND Slab_Cont. Ftg FW5.0A_60wx30d	6,269.2 kg (60 yrs)
Cradle to gate		04.017_LCL FND Slab_Cont. Ftg FW7.0_87wx42d 2	987.7 kg (60 yrs)
Transportation Distance:		04.017_LCL FND Slab_Cont. Ftg FW8.0_96wx48d	3,053.2 kg (60 yrs)
By truck: 418 km		04.017_LCL FND Slab_Cont. Ftg_24wx12d 04.215_LCL_C_Slab Transition_Wall(12")	135.9 kg (60 yrs) 1,889.4 kg (60 yrs)
End-of-Life Scope:		04.215_LCL_C_Slab Transition_Wall(15")	882.7 kg (60 yrs)
98% Recovered		04.215_LCL_C_Slab Transition_Wall(4")	111.7 kg (60 yrs)
2% Landfilled (inert material)		04.215_LCL_C_Slab Transition_Wall(6")	58.6 kg (60 yrs)
Module D Scope:		04.215_LCL_C_Slab Transition_Wall(8")	831.3 kg (60 yrs)
Product has 52% scrap input while remainder is processed and credite	ed as avoided	04.225_LCL_C_CURB_Wall(11")	640.6 kg (60 yrs)
burden		04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(6")	8.9 kg (60 yrs) 272.4 kg (60 yrs)
LCI Source:		04.225_LCL_C_CURB_Wall(8")	21.6 kg (60 yrs)
RER: Stainless steel cold rolled coil (304) Eurofer (2010)		04.300_LCL_C_Foundation_Wall(10")	803.5 kg (60 yrs)
GLO: Steel sheet stamping and bending (5% loss) ts (2017)		04.310_LCL_C_PIT_Wall(8")	174.5 kg (60 yrs)
US: Electricity grid mix ts (2014)		04.380_LCL_C_SHOTCRETE_Wall(16")	2,833.9 kg (60 yrs)
US: Lubricants at refinery ts (2014)		04.380_LCL_C_SHOTCRETE_Wall(19")	1,384.2 kg (60 yrs)
GLO: Compressed air 7 bar (medium power consumption) ts (2014) RER: Stainless steel flat product (304) - value of scrap Eurofer (2010)		04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(24")	17,844.2 kg (60 yrs) 4,729.3 kg (60 yrs)
		12" Concrete Slab	60.7 kg (60 yrs)
Control on the day of the 10/0	600.2.1	Concrete 8" - STRUCTURAL	566.3 kg (60 yrs)
Stainless steel, extruded, chromium 18/8 Used in the following Revit families:	690.3 kg	HSEB - STR-1 _Precast Tread & Riser	175.4 kg (60 yrs)
HSEB Guardrail - Cable Rail	176.3 kg (60 yrs)	HSEB - STR-2 Precast Tread Steel Riser 2	892.2 kg (60 yrs)
HSEB Guardrail - Cable Rail without handrail	514.0 kg (60 yrs)	HSEB ST-11 (CAST IN PLACE)	38.4 kg (60 yrs)
Used in the following Tally entries:		HSEB ST-9 (CAST IN PLACE)	112.6 kg (60 yrs)
Steel, round bar		HSEB_STR-3_Precast Tread Steel Riser KPFF - SCOL - Concrete - Round	216.9 kg (60 yrs) 0.0 kg (60 yrs)
		KPFF - SFRM - Steel - BRB - Buckling Restrained Brace	329.3 kg (60 yrs)
Description: Stainless steel, extruded, Type 304 (Chromium 18/8)		LCL_C_Pilaster_Rect_()w()d	0.0 kg (60 yrs)
		Used in the following Tally entries:	
Life Cycle Inventory:		Cast-in-place concrete, lightweight structural concrete, 5000 psi	
100% Stainless steel		Cast-in-place concrete, structural concrete, 3000 psi	
Product Scope:		Cast-in-place concrete, structural concrete, 4000 psi	
Cradle to gate		Cast-in-place concrete, structural concrete, 5000 psi	
Transportation Distance:		Precast concrete column Stair, concrete with metal nosing	
By truck: 431 km		Stair, concrete with metal hosing Stair, precast single run (stretcher)	
End-of-Life Scope:		Steel, reinforcing rod	
98% Recovered		Steel, rod	
2% Landfilled (inert material)		Description:	
Module D Scope:		Common unfinished tempered steel rod suitable for structural re	inforcement (rebar)
Product has 52% scrap input while remainder is processed and credite	ed as avoided	Life Cycle Inventory:	
burden		100% Steel rebar	
LCI Source:			
RER: Stainless steel cold rolled coil (304) Eurofer (2010)		Product Scope: Cradle to gate	
GLO: Steel sheet stamping and bending (5% loss) ts (2017)		-	
US: Electricity grid mix ts (2014)		Transportation Distance:	
US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014)		By truck: 431 km	
RER: Stainless steel flat product (304) - value of scrap Eurofer (2010)		End-of-Life Scope:	
······································			
Steel, reinforcing rod		70% Recovered	
Used in the following Revit families:	128 247 9 kg	70% Recovered 30% Landfilled (inert material)	
(F1) SLAB ON GRADE	128,247.9 kg	30% Landfilled (inert material) Module D Scope:	
(F1) SLAB ON GRADE - 6"	128,247.9 kg 5,757.9 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar	d credited as avoided
	-	30% Landfilled (inert material) Module D Scope:	d credited as avoided
(F1) SLAB ON GRADE - 8"	5,757.9 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar	ld credited as avoided
(F2) CONCRETE METAL DECK	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 53.4 kg (60 yrs) 3,992.2 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden.	d credited as avoided
(F2) CONCRETE METAL DECK (F3) CONCRETE DECK O/ 3 PLY CLT FLOOR N/W DIRECTION	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 53.4 kg (60 yrs) 8,992.2 kg (60 yrs) 4,255.8 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source:	d credited as avoided
(F2) CONCRETE METAL DECK (F3) CONCRETE DECK O/ 3 PLY CLT FLOOR N/W DIRECTION (F3) CONCRETE METAL DECK (STRUCTURAL ONLY)	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 53.4 kg (60 yrs) 3,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 1,397.0 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source:	
(F2) CONCRETE METAL DECK (F3) CONCRETE DECK O/ 3 PLY CLT FLOOR N/W DIRECTION (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) (F3) CONCRETE METAL DECK W/ TOPPING SLAB	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 53.4 kg (60 yrs) 8,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 1,397.0 kg (60 yrs) 3,921.8 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source: GLO: Steel rebar worldsteel (2014) Steel, sheet Used in the following Revit families:	9,279.6 kg
(F2) CONCRETE METAL DECK 4 (F3) CONCRETE DECK (0/ 3 PLY CLT FLOOR N/W DIRECTION 4 (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) 6 (F3) CONCRETE METAL DECK (W/ TOPPING SLAB 5 (F4) CONCRETE DECK (0/ 3 PLY CLT FLOOR 22	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 5.3.4 kg (60 yrs) 8,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 4,255.8 kg (60 yrs) 3,921.8 kg (60 yrs) 7,656.3 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source: GLO: Steel rebar worldsteel (2014) Steel, sheet Used in the following Revit families: Corner_3	9,279.6 kg 188.4 kg (60 yrs)
(F2) CONCRETE METAL DECK 4 (F3) CONCRETE DECK (0/ 3 PLY CLT FLOOR N/W DIRECTION 4 (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) 6 (F3) CONCRETE METAL DECK (W/ TOPPING SLAB 5 (F4) CONCRETE DECK (0/ 3 PLY CLT FLOOR 22	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 53.4 kg (60 yrs) 8,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 1,397.0 kg (60 yrs) 3,921.8 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source: GLO: Steel rebar worldsteel (2014) Steel, sheet Used in the following Revit families: Corner_3 Corner_4	9,279.6 kg 188.4 kg (60 yrs) 239.6 kg (60 yrs)
(F2) CONCRETE METAL DECK 4 (F3) CONCRETE DECK O/ 3 PLY CLT FLOOR N/W DIRECTION 4 (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) 5 (F3) CONCRETE METAL DECK W/ TOPPING SLAB 5 (F4) CONCRETE DECK O/ 3 PLY CLT FLOOR 2 (R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2 5 04.016_LCL FND Slab_Spread Ftg_F10.0 10x10x3.0d 04.016_LCL FND Slab_Spread Ftg_F11.0 11x11x3.25d	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 53.4 kg (60 yrs) 3,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 1,397.0 kg (60 yrs) 7,656.3 kg (60 yrs) 1,384.9 kg (60 yrs) 705.8 kg (60 yrs) 705.8 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source: GLO: Steel rebar worldsteel (2014) Steel, sheet Used in the following Revit families: Corner_3 Corner_4 HSEB - STR-2_Precast Tread Steel Riser 2	9,279.6 kg 188.4 kg (60 yrs) 239.6 kg (60 yrs) 5,384.4 kg (45-60 yrs)
(F2) CONCRETE METAL DECK 4 (F3) CONCRETE DECK O/ 3 PLY CLT FLOOR N/W DIRECTION 4 (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) 5 (F3) CONCRETE METAL DECK W/ TOPPING SLAB 5 (F4) CONCRETE DECK O/ 3 PLY CLT FLOOR 2 (F4) CONCRETE DECK O/ 3 PLY CLT FLOOR 2 (F4) CONCRETE DECK O/ 3 PLY CLT FLOOR 2 (F4) CONCRETE DECK O/ 3 PLY CLT FLOOR 2 (R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2 04.016_LCL FND Slab_Spread Ftg_F10.0 10x10x3.0d 04.016_LCL FND Slab_Spread Ftg_F11.0 11x11x3.25d 04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 53.4 kg (60 yrs) 3,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 1,397.0 kg (60 yrs) 3,921.8 kg (60 yrs) 7,656.3 kg (60 yrs) 1,384.9 kg (60 yrs) 705.8 kg (60 yrs) 828.1 kg (60 yrs) 3,444.6 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source: GLO: Steel rebar worldsteel (2014) Steel, sheet Used in the following Revit families: Corner_3 Corner_4 HSEB - STR-2_Precast Tread Steel Riser 2 HSEB Type C - STR-4_Conc filled w/ C channel	9,279.6 kg 188.4 kg (60 yrs) 239.6 kg (60 yrs) 5,384.4 kg (45-60 yrs) 623.5 kg (45 yrs)
(F2) CONCRETE METAL DECK 4 (F3) CONCRETE DECK (0/ 3 PLY CLT FLOOR N/W DIRECTION 4 (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) 6 (F4) CONCRETE METAL DECK (W/ TOPPING SLAB 5 (F4) CONCRETE DECK (0/ 3 PLY CLT FLOOR 2 (R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2 6 04.016_LCL FND Slab_Spread Ftg_F10.0 10x10x3.0d 04.016_LCL FND Slab_Spread Ftg_F11.0 11x11x3.25d 04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d 5 04.016_LCL FND Slab_Spread Ftg_F12.0 14x14x4.5d 4	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 5.34 kg (60 yrs) 8,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 1,397.0 kg (60 yrs) 3,921.8 kg (60 yrs) 7,056.3 kg (60 yrs) 7,058 kg (60 yrs) 828.1 kg (60 yrs) 84,44.6 kg (60 yrs) 4,666.0 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source: GLO: Steel rebar worldsteel (2014) Steel, sheet Used in the following Revit families: Corner_3 Corner_4 HSEB - STR-2_Precast Tread Steel Riser 2	9,279.6 kg 188.4 kg (60 yrs) 239.6 kg (60 yrs) 5,384.4 kg (45-60 yrs) 623.5 kg (45 yrs) 242.9 kg (45 yrs)
(F2) CONCRETE METAL DECK 4 (F3) CONCRETE DECK (/) 3 PLY CLT FLOOR N/W DIRECTION 4 (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) 6 (F3) CONCRETE METAL DECK (V TOPPING SLAB 5 (F4) CONCRETE DECK (/) 3 PLY CLT FLOOR 2 (R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2 04.016_LCL FND Slab_Spread Ftg_F10.0 10x10x3.0d 04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d 5 04.016_LCL FND Slab_Spread Ftg_F12.0 14x14x4.5d 04.016_LCL FND Slab_Spread Ftg_F2.0 2x2x11"d	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 5.3.4 kg (60 yrs) 8,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 1,397.0 kg (60 yrs) 3,921.8 kg (60 yrs) 7,056.3 kg (60 yrs) 705.8 kg (60 yrs) 8,2444.6 kg (60 yrs) 3,4444.6 kg (60 yrs) 7,666.0 kg (60 yrs) 7,68 kg (60 yrs)	 30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source: GLO: Steel rebar worldsteel (2014) Steel, sheet Used in the following Revit families: Corner_3 Corner_4 HSEB - STR-2 _Precast Tread Steel Riser 2 HSEB Type C _ STR-4_Conc filled w/ C channel HSEB Type C_STR-10_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel 2 HSEB Type C_STR-6_Conc filled w/ Plate Stringer - Roof Access 	9,279.6 kg 188.4 kg (60 yrs)
(F2) CONCRETE METAL DECK 4 (F3) CONCRETE DECK O/ 3 PLY CLT FLOOR N/W DIRECTION 4 (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) 5 (F3) CONCRETE METAL DECK (W/ TOPPING SLAB 5 (F4) CONCRETE DECK O/ 3 PLY CLT FLOOR 27 (R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2 04.016_LCL FND Slab_Spread Ftg_F10.0 10x10x3.0d 04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d 5 04.016_LCL FND Slab_Spread Ftg_F12.0 14x14x4.5d 4 04.016_LCL FND Slab_Spread Ftg_F12.0 14x14x4.5d 4 04.016_LCL FND Slab_Spread Ftg_F2.0 2x2x11"d 04.016_LCL FND Slab_Spread Ftg_F4.0 4x4x1.5d	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 5.3.4 kg (60 yrs) 3,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 1,397.0 kg (60 yrs) 3,921.8 kg (60 yrs) 7,656.3 kg (60 yrs) 7,656.3 kg (60 yrs) 705.8 kg (60 yrs) 8,244.6 kg (60 yrs) 4,666.0 kg (60 yrs) 7,68 kg (60 yrs) 19.8 kg (60 yrs)	 30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source: GLO: Steel rebar worldsteel (2014) Steel, sheet Used in the following Revit families: Corner_3 Corner_4 HSEB - STR-2_Precast Tread Steel Riser 2 HSEB Type C_STR-4_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel HSEB Type C_STR-6_Conc filled w/ Plate 	9,279.6 kg 188.4 kg (60 yrs) 239.6 kg (60 yrs) 5,384.4 kg (45-60 yrs) 623.5 kg (45 yrs) 242.9 kg (45 yrs) 994.2 kg (45 yrs) 170.0 kg (45 yrs) 133.4 kg (45 yrs)
(F2) CONCRETE METAL DECK 4 (F3) CONCRETE DECK (/) 3 PLY CLT FLOOR N/W DIRECTION 4 (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) 6 (F3) CONCRETE METAL DECK (V TOPPING SLAB 5 (F4) CONCRETE DECK (/) 3 PLY CLT FLOOR 2 (R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2 04.016_LCL FND Slab_Spread Ftg_F10.0 10x10x3.0d 04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d 5 04.016_LCL FND Slab_Spread Ftg_F12.0 14x14x4.5d 04.016_LCL FND Slab_Spread Ftg_F2.0 2x2x11"d	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 5.3.4 kg (60 yrs) 8,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 1,397.0 kg (60 yrs) 3,921.8 kg (60 yrs) 7,056.3 kg (60 yrs) 705.8 kg (60 yrs) 8,2444.6 kg (60 yrs) 3,4444.6 kg (60 yrs) 7,666.0 kg (60 yrs) 7,68 kg (60 yrs)	 30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source: GLO: Steel rebar worldsteel (2014) Steel, sheet Used in the following Revit families: Corner_3 Corner_4 HSEB - STR-2_Precast Tread Steel Riser 2 HSEB Type C_STR-4_Conc filled w/ C channel HSEB Type C_STR-6_Conc filled w/ C channel 2 HSEB Type C_STR-6_Conc filled w/ Plate HSEB_STR-3_Precast Tread Steel Riser 	9,279.6 kg 188.4 kg (60 yrs) 239.6 kg (60 yrs) 5,384.4 kg (45-60 yrs) 623.5 kg (45 yrs) 242.9 kg (45 yrs) 994.2 kg (45 yrs) 170.0 kg (45 yrs) 133.4 kg (45 yrs) 852.8 kg (45-60 yrs)
(F2) CONCRETE METAL DECK 14 (F3) CONCRETE DECK (J 3 PLY CLT FLOOR N/W DIRECTION 15 (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) 16 (F3) CONCRETE METAL DECK (VT OPPING SLAB 16 (F4) CONCRETE DECK (J 3 PLY CLT FLOOR 22 (R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2 17 04.016_LCL FND Slab_Spread Ftg_F10.0 10x10x3.0d 04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d 04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d 16 04.016_LCL FND Slab_Spread Ftg_F2.0 2x2x11"d 04.016_LCL FND Slab_Spread Ftg_F4.0 4x4x1.5d 04.016_LCL FND Slab_Spread Ftg_F4.0 4x8x2.5d 04.016_LCL FND Slab_Spread Ftg_F4.0 9x8x2.5d 04.016_LCL FND Slab_Spread Ftg_F9.0 9x9x2.75d 12x12x44	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 5.3.4 kg (60 yrs) 3,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 1,397.0 kg (60 yrs) 3,921.8 kg (60 yrs) 7,656.3 kg (60 yrs) 1,384.9 kg (60 yrs) 8,281.1 kg (60 yrs) 8,444.6 kg (60 yrs) 4,666.0 kg (60 yrs) 7,6.8 kg (60 yrs) 1,98 kg (60 yrs)	 30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source: GLO: Steel rebar worldsteel (2014) Steel, sheet Used in the following Revit families: Corner_3 Corner_4 HSEB - STR-2_Precast Tread Steel Riser 2 HSEB Type C - STR-4_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel HSEB Type C_STR-6_Conc filled w/ Plate Stringer - Roof Access HSEB Type C_STR-8_Conc filled w/ Plate HSEB Type C_STR-8_CONC filled wide HSEB Type C_STR-8_CONC filled w/ Plate HSEB Type C_STR-8_CONC filled wide HSEB Type Type Type Type Type Type Type Type	9,279.6 kg 188.4 kg (60 yrs) 239.6 kg (60 yrs) 5,38.4.4 kg (45-60 yrs) 623.5 kg (45 yrs) 242.9 kg (45 yrs) 170.0 kg (45 yrs) 133.4 kg (45 yrs) 852.8 kg (45-60 yrs) 58.4 kg (60 yrs)
(F2) CONCRETE METAL DECK F3 (F3) CONCRETE DECK (J 3 PLY CLT FLOOR N/W DIRECTION F3 (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) F3 (F3) CONCRETE METAL DECK (W TOPPING SLAB F4 (F4) CONCRETE DECK (J 3 PLY CLT FLOOR F2 (R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2 04.016_LCL FND Slab_Spread Ftg_F10.0 10x10x3.0d 04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d 50 04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d 50 04.016_LCL FND Slab_Spread Ftg_F12.0 14x14x4.5d 64 04.016_LCL FND Slab_Spread Ftg_F2.0 2x2x11"d 04.016_LCL FND Slab_Spread Ftg_F3.0 8x82.5d 04.016_LCL FND Slab_Spread Ftg_F4.0 4x4x1.5d 04.016_LCL FND Slab_Spread Ftg_F4.0 8x82.5d 04.016_LCL FND Slab_Spread Ftg_F3.0 8x82.5d 04.016_LCL FND Slab_Spread Ftg_F3.0 8x82.5d 04.016_LCL FND Slab_Spread Ftg_FW3.0 6x8x2.5d 04.017_LCL FND Slab_Spread Ftg_FW3.0_36wx18d	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 5.3.4 kg (60 yrs) 3,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 4,255.8 kg (60 yrs) 3,921.8 kg (60 yrs) 7,056.3 kg (60 yrs) 7,058.4 kg (60 yrs) 8,244.6 kg (60 yrs) 1,9.8 kg (60 yrs) 1,9.8 kg (60 yrs) 1,9.8 kg (60 yrs) 1,9.8 kg (60 yrs) 1,52.9 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source: GLO: Steel rebar worldsteel (2014) Steel, sheet Used in the following Revit families: Corner_3 Corner_4 HSEB - STR-2_Precast Tread Steel Riser 2 HSEB Type C_STR-4_Conc filled w/ C channel HSEB Type C_STR-10_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel HSEB Type C_STR-6_Conc filled w/ Plate HSEB Type C_STR-8_Conc filled w/ Plate HSEB STR-3_Precast Tread Steel Riser P_SOUTH VESTIBULE WALL W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse)	9,279.6 kg 188.4 kg (60 yrs) 239.6 kg (60 yrs) 5,384.4 kg (45-60 yrs) 623.5 kg (45 yrs) 242.9 kg (45 yrs) 994.2 kg (45 yrs) 170.0 kg (45 yrs) 133.4 kg (45 yrs) 852.8 kg (45-60 yrs) 58.4 kg (60 yrs) 346.1 kg (60 yrs)
(F2) CONCRETE METAL DECK F3 (F3) CONCRETE DECK (J 3 PLY CLT FLOOR N/W DIRECTION F3 (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) F3 (F3) CONCRETE METAL DECK (W/ TOPPING SLAB F3 (F4) CONCRETE DECK (J 3 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 3 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 3 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 3 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 3 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 5 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 5 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 5 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 7 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 7 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 7 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 7 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 7 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 7 PLY CLT FLOOR F3 (F4) CONCRETE DECK (J 7 PLY CLT FLOOR F3 (F4) CL FND Slab_Spread Ftg_F12.0 12x12x4d F4 (F4) CL FND Slab_Spread Ftg_F2.0 2x2x11"d F4 (F4) CL FND Slab_Spread Ftg_F4.0 4x4x1.5d F4 (F4) CL FND	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 5.3.4 kg (60 yrs) 3,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 4,255.8 kg (60 yrs) 7,556.3 kg (60 yrs) 7,656.3 kg (60 yrs) 7,656.3 kg (60 yrs) 8,28.1 kg (60 yrs) 8,244.6 kg (60 yrs) 19.8 kg (60 yrs) 19.8 kg (60 yrs) 19.8 kg (60 yrs) 19.7 6 kg (60 yrs) 19.7 6 kg (60 yrs) 1,525.9 kg (60 yrs) 8,28.3 kg (60 yrs) 8,28.3 kg (60 yrs) 8,28.3 kg (60 yrs) 9,45.8 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source: GLO: Steel rebar worldsteel (2014) Steel, sheet Used in the following Revit families: Corner_3 Corner_4 HSEB - STR-2_Precast Tread Steel Riser 2 HSEB Type C_STR-4_Conc filled w/ C channel HSEB Type C_STR-4_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel HSEB Type C_STR-6_Conc filled w/ C channel HSEB Type C_STR-6_Conc filled w/ Plate Stringer - Roof Access HSEB Type C_STR-8_Conc filled w/ Plate HSEB Type C_STR-8_CONC filled W/ Plat	9,279.6 kg 188.4 kg (60 yrs) 239.6 kg (60 yrs) 5,384.4 kg (45-60 yrs) 623.5 kg (45 yrs) 242.9 kg (45 yrs) 170.0 kg (45 yrs) 133.4 kg (45 yrs) 852.8 kg (45-60 yrs)
(F2) CONCRETE METAL DECK 14 (F3) CONCRETE DECK (J) 3 PLY CLT FLOOR N/W DIRECTION 15 (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) 16 (F3) CONCRETE METAL DECK (W) TOPPING SLAB 16 (F4) CONCRETE METAL DECK (W) TOPPING SLAB 17 (F4) CONCRETE DECK (J) 3 PLY CLT FLOOR 22 (F4) CONCRETE DECK (J) 3 PLY CLT FLOOR 22 (F4) CONCRETE DECK (J) 3 PLY CLT FLOOR 22 (F4) CONCRETE DECK (J) 3 PLY CLT FLOOR 22 (F4) CONCRETE DECK (J) 3 PLY CLT FLOOR 22 (F4) CONCRETE DECK (J) 3 PLY CLT FLOOR 22 (F4) CONCRETE DECK (J) 3 PLY CLT FLOOR 22 (F4) CONCRETE DECK (J) 3 PLY CLT FLOOR 22 (F4) CONCRETE DECK (J) 1 PLY CLT FLOOR 22 (F4) CL CL FND Slab_Spread Ftg_F12.0 10/10/3.0d 04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d (J4) 016_LCL FND Slab_Spread Ftg_F4.0 4x4x1.5d 04.016_LCL FND Slab_Spread Ftg_F2.0 2x2x11"d (J4) 016_LCL FND Slab_Spread Ftg_F2.0 2x2x11"d 04.016_LCL FND Slab_Spread Ftg_F3.0 3x8x2.5d (J4) 016_LCL FND Slab_Spread Ftg_F9.0 9x9x2.75d 04.016_LCL FND Slab_Spread Ftg_F9.0 9x9x2.75d (J4) 016_LCL FND Slab_Cont. Ftg FW4.0_48wx18d 04.017_LCL FND Slab_Cont. Ftg FW4.0_48wx24d	5,757.9 kg (60 yrs) 4.0 kg (60 yrs) 5.3.4 kg (60 yrs) 3,992.2 kg (60 yrs) 4,255.8 kg (60 yrs) 4,255.8 kg (60 yrs) 3,921.8 kg (60 yrs) 7,056.3 kg (60 yrs) 7,058.4 kg (60 yrs) 8,244.6 kg (60 yrs) 1,9.8 kg (60 yrs) 1,9.8 kg (60 yrs) 1,9.8 kg (60 yrs) 1,9.8 kg (60 yrs) 1,52.9 kg (60 yrs)	30% Landfilled (inert material) Module D Scope: Product has a 16.4% scrap input while remainder is processed ar burden. LCI Source: GLO: Steel rebar worldsteel (2014) Steel, sheet Used in the following Revit families: Corner_3 Corner_4 HSEB - STR-2_Precast Tread Steel Riser 2 HSEB Type C_STR-4_Conc filled w/ C channel HSEB Type C_STR-10_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel HSEB Type C_STR-6_Conc filled w/ Plate HSEB Type C_STR-8_Conc filled w/ Plate HSEB STR-3_Precast Tread Steel Riser P_SOUTH VESTIBULE WALL W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse)	9,279.6 kg 188.4 kg (60 yrs) 239.6 kg (60 yrs) 5,384.4 kg (45-60 yrs) 623.5 kg (45 yrs) 242.9 kg (45 yrs) 994.2 kg (45 yrs) 170.0 kg (45 yrs) 133.4 kg (45 yrs) 852.8 kg (45-60 yrs) 584.4 kg (60 yrs) 346.1 kg (60 yrs)

LCI Data (continued)

Stair, concrete with metal nosing Steel, plate		Structural concrete, 3000 psi, Pacific Northwest regional averag Used in the following Revit families:	
Description: Steel sheet		(F2) CONCRETE METAL DECK (F3) CONCRETE DECK (/ 3 PLY CLT FLOOR N/W DIRECTION (F3) CONCRETE METAL DECK (CTRUCTURAL ONLY)	236,435.8 kg (60 yrs 110,972.3 kg (60 yrs
Life Cycle Inventory: 100% Steel sheet		(F3) CONCRETE METAL DECK (STRUCTURAL ONLY) (F3) CONCRETE METAL DECK W/ TOPPING SLAB (F4) CONCRETE DECK O/ 3 PLY CLT FLOOR	36,533.6 kg (60 yrs 187,033.1 kg (60 yrs 733,587.9 kg (60 yrs
Product Scope: Cradle to gate		Used in the following Tally entries: Cast-in-place concrete, structural concrete, 3000 psi	
Transportation Distance: By truck: 418 km		Description: Structural concrete, 3000 psi, Pacific Northwest regional average	
End-of-Life Scope: 98% Recovered 2% Landfilled (inert material)		National Ready-Mix Concrete Association (NRMCA) Industry-wic Life Cycle Inventory: Coarse aggregate: 45%, Sand: 35%, Portland cement PCA - EPD:	
Module D Scope:		ash: 3%, Expanded slag: <1%, Admixture: <1%	-
Product has 16% scrap input while remainder is processed burden	and credited as avoided	Product Scope: Cradle to gate	
LCI Source:		Anchors, ties, and metal accessories outside of scope (<1% mass	s)
RNA: Steel finished cold rolled coil worldsteel (2007) GLO: Steel sheet stamping and bending (5% loss) ts (2017)		Transportation Distance: By truck: 24 km	
US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) t	rs (2014)	End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material)	
GLO: Value of scrap worldsteel (2014)	42,250,1 km	Module D Scope: Avoided burden credit for coarse aggregate, includes grinding e	energy
ructural concrete, 3000 psi, 0% fly ash and slag Used in the following Revit families:	42,359.1 kg	LCI Source:	
3.5" Light Duty Paving Over Sturcture	7,088.3 kg (30 yrs)	US: Portland cement PCA/ts (2014)	
cp_HSEB - Base Material Panel_vertical	35,270.7 kg (60 yrs)	DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017)	
Jsed in the following Tally entries:		DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017)	
Precast concrete nonstructural panel		DE: Fly ash (EN15804 A1-A3) ts (2017)	
Precast concrete paver		DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Expanded clay (EN15804 A1-A3) ts (2017)	
Description:		DE: alcium nitrate ts (2017)	
Structural concrete, 3000 psi, 0% fly ash and slag. Mix desig	n matches National	DE: Sodium ligninsulfonate ts (2017)	
Ready-Mix Concrete Association (NRMCA) Industry-wide El		DE: Sodium naphtalene sulfonate [estimated] ts (2017)	
ife Cycle Inventory:		US: Sodium hydroxide (caustic soda) ix (100%) ts (2017)	
Coarse aggregate: 44%, Sand: 36%, Portland cement PCA - Admixture: <1%	EPD: 13%, Water: 7%,	US: Colophony (rosin, refined) from CN pine gum rosin ts (2017) US: Tap water from groundwater ts (2017) US: Electricity grid mix s (2014))
Product Scope:		US: Natural gas mix ts (2014)	
Cradle to gate		US: Diesel mix at filling station (100% fossil) ts (2014)	
Anchors, ties, and metal accessories outside of scope (<1%	mass)	US: Liquefied Petroleum Gas (LPG) (70% propane	
Transportation Distance: By truck: 24 km		30% utane) ts (2014) US: Light fuel oil at refinery ts (2014)	
End-of-Life Scope:		Structural concrete, 4000 psi, 20% fly ash and 30% slag	856,960.1 k
55% Recycled into coarse aggregate		Used in the following Revit families:	050,500.1 K
45% Landfilled (inert material)		(F1) SLAB ON GRADE	567,361.6 kg (60 yr
Aodule D Scope:		(F1) SLAB ON GRADE - 6"	468.0 kg (60 yr
Avoided burden credit for coarse aggregate, includes grind	ing energy	(F1) SLAB ON GRADE - 8"	8,422.4 kg (60 yr
LCI Source:		(R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2 04.016_LCL FND Slab_Spread Ftg_F2.0 2x2x11"d	140,358.3 kg (60 yr 3,728.8 kg (60 yr
US: Portland cement PCA/ts (2014)		04.215 LCL C Slab Transition Wall(12")	48,061.4 kg (60 yr
DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (20)	17)	04.215_LCL_C_Slab Transition_Wall(15")	22,454.6 kg (60 yr
DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017)		04.215_LCL_C_Slab Transition_Wall(4")	2,842.4 kg (60 yr
DE: Slag-tap granulate (EN15804 A1-A3) ts (2017)		04.215_LCL_C_Slab Transition_Wall(6")	1,489.9 kg (60 yr
DE: Expanded clay (EN15804 A1-A3) ts (2017)		04.215_LCL_C_Slab Transition_Wall(8") 04.225_LCL_C_CURB_Wall(11")	21,146.0 kg (60 yr
DE: alcium nitrate ts (2017)		04.225_LCL_C_CURB_Wall(4")	16,294.9 kg (60 yr 227.3 kg (60 yr
DE: Sodium ligninsulfonate ts (2017)		04.225_LCL_C_CURB_Wall(6")	6,929.8 kg (60 yr
DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017)		04.225_LCL_C_CURB_Wall(8")	549.0 kg (60 yr
US: Sodium hydroxide (caustic soda) ix (100%) ts (2017) US: Colophony (rosin, refined) from CN pine gum rosin ts (2	2017)	12" Concrete Slab	16,414.9 kg (60 yr
US: Tap water from groundwater ts (2017)		HSEB ST-11 (CAST IN PLACE)	210.9 kg (60 yr
US: Electricity grid mix s (2014)		Used in the following Tally entries:	
US: Natural gas mix ts (2014)		Cast-in-place concrete, structural concrete, 4000 psi	
US: Diesel mix at filling station (100% fossil) ts (2014)		Description:	
US: Liquefied Petroleum Gas (LPG) (70% propane		Structural concrete, 4000 psi, 20% fly ash and 30% slag. Mix des	ign matches National
30% utane) ts (2014) US: Light fuel oil at refinend ts (2014)		Ready-Mix Concrete Association (NRMCA) Industry-wide EPD.	
US: Light fuel oil at refinery ts (2014)		Life Cycle Inventory:	
		Coarse aggregate: 45%, Sand: 31%, Portland cement PCA - EPD:	9%, Water: 7%.

Coarse aggregate: 45%, Sand: 31%, Portland cement PCA - EPD: 9%, Water: 7%, Expanded slag: 5%, Fly ash: 3%, Admixture: <1%

LCI Data (continued)

Cradle to gate Anchors, ties, and metal accessories outside of scope (<1% n	nass)	US: Liquefied Petroleum Gas (LPG) (70% propane 30% utane) ts (2014) US: Light fuel oil at refinery ts (2014)	
Transportation Distance:			
By truck: 24 km		Structural concrete, 5000 psi, 20% fly ash and 30% slag Used in the following Revit families:	2,312,934.3 kg
End-of-Life Scope:		04.016_LCL FND Slab_Spread Ftg_F10.0 10x10x3.0d	56,528.9 kg (60 yrs)
55% Recycled into coarse aggregate		04.016_LCL FND Slab_Spread Ftg_F11.0 11x11x3.25d	74,100.0 kg (60 yrs)
45% Landfilled (inert material)		04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d	36,178.5 kg (60 yrs)
Module D Scope:		04.016_LCL FND Slab_Spread Ftg_F12.0 14x14x4.5d	55,398.3 kg (60 yrs)
Avoided burden credit for coarse aggregate, includes grindir	ig energy	04.016_LCL FND Slab_Spread Ftg_F4.0 4x4x1.5d	3,014.9 kg (60 yrs)
	5 57	04.016_LCL FND Slab_Spread Ftg_F8.0 8x8x2.5d	20,099.2 kg (60 yrs)
LCI Source: US: Portland cement PCA/ts (2014)		04.016_LCL FND Slab_Spread Ftg_F9.0 9x9x2.75d	13,990.9 kg (60 yrs)
DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017	0	04.016_LCL FND Slab_Spread Ftg_FW6.0 6x8x2.5d	69,640.5 kg (60 yrs)
DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017))	04.017_LCL FND Slab_Cont. Ftg FW3.0_36wx18d	31,217.6 kg (60 yrs)
DE: Fly ash (EN15804 A1-A3) ts (2017)		04.017_LCL FND Slab_Cont. Ftg FW4.0_48wx18d	33,450.2 kg (60 yrs)
DE: Slag-tap granulate (EN15804 A1-A3) ts (2017)		04.017_LCL FND Slab_Cont. Ftg FW4.0_48wx24d	86,718.6 kg (60 yrs)
DE: Expanded clay (EN15804 A1-A3) ts (2017)		04.017_LCL FND Slab_Cont. Ftg FW5.0_60wx18d	89,913.9 kg (60 yrs)
DE: alcium nitrate ts (2017)		04.017_LCL FND Slab_Cont. Ftg FW5.0A_60wx30d	64,658.2 kg (60 yrs)
DE: Sodium ligninsulfonate ts (2017)		04.017_LCL FND Slab_Cont. Ftg FW7.0_87wx42d 2	66,939.6 kg (60 yrs)
DE: Sodium naphtalene sulfonate [estimated] ts (2017)		04.017_LCL FND Slab_Cont. Ftg FW8.0_96wx48d 04.017_LCL FND Slab_Cont. Ftg_24wx12d	188,932.2 kg (60 yrs) 1,847.0 kg (60 yrs)
US: Sodium hydroxide (caustic soda) ix (100%) ts (2017)		04.300_LCL_C_Foundation_Wall(10")	36,007.1 kg (60 yrs)
US: Colophony (rosin, refined) from CN pine gum rosin ts (20	117)	04.310_LCL_C_PIT_Wall(8")	11,479.1 kg (60 yrs)
US: Tap water from groundwater ts (2017)		04.380_LCL_C_SHOTCRETE_Wall(16")	210,675.0 kg (60 yrs)
US: Electricity grid mix s (2014)		04.380_LCL_C_SHOTCRETE_Wall(19")	49,101.7 kg (60 yrs)
US: Natural gas mix ts (2014)		04.380_LCL_C_SHOTCRETE_Wall(22")	859,916.8 kg (60 yrs)
US: Diesel mix at filling station (100% fossil) ts (2014)		04.380_LCL_C_SHOTCRETE_Wall(24")	247,805.7 kg (60 yrs)
US: Liquefied Petroleum Gas (LPG) (70% propane		HSEB ST-11 (CAST IN PLACE)	752.2 kg (60 yrs)
30% utane) ts (2014) US: Light fuel oil at refinery ts (2014)		HSEB ST-9 (CAST IN PLACE)	2,812.3 kg (60 yrs)
03. Light fuel of at rennery is (2014)		KPFF - SFRM - Steel - BRB - Buckling Restrained Brace	1,755.9 kg (60 yrs)
		Used in the following Tally entries:	
tructural concrete, 5000 psi, 0% fly ash and slag	8,728.6 kg	Cast-in-place concrete, structural concrete, 5000 psi	
Used in the following Revit families:	2 5 20 4 1 - (60)	Precast concrete column	
HSEB - STR-1 _Precast Tread & Riser HSEB - STR-2 _Precast Tread Steel Riser 2	2,539.4 kg (60 yrs) 4,844.9 kg (60 yrs)	Description:	
HSEB_STR-3_Precast Tread Steel Riser	1,344.3 kg (60 yrs)	Structural concrete, 5000 psi, 20% fly ash and 30% slag. Mix	design matches National
	1,5 1 1.5 kg (66 yrs)	Ready-Mix Concrete Association (NRMCA) Industry-wide EPI	
Used in the following Tally entries:			
Stair, concrete with metal nosing		Life Cycle Inventory:	DD: 119/ Water: 70/
Stair, precast single run (stretcher)		Coarse aggregate: 41%, Sand: 30%, Portland cement PCA - E Expanded slag: 6%, Fly ash: 4%, Admixture: <1%	PD: 11%, Water: 7%,
Description:			
Structural concrete, 5000 psi, 0% fly ash and slag. Mix design		Product Scope:	
Ready-Mix Concrete Association (NRMCA) Industry-wide EPE).	Cradle to gate Anchors, ties, and metal accessories outside of scope (<1% r	nacc)
Life Cycle Inventory:			1055)
Coarse aggregate: 40%, Sand: 33%, Portland cement PCA - E	PD: 20%, Water: 7%,	Transportation Distance:	
Admixture: <1%		By truck: 24 km	
Product Scope:		End-of-Life Scope:	
Cradle to gate		55% Recycled into coarse aggregate	
Anchors, ties, and metal accessories outside of scope (<1% n	nass)	45% Landfilled (inert material)	
Anchors, ties, and metal accessories outside of scope (< 1% h			
		Module D Scope:	
		Module D Scope: Avoided burden credit for coarse aggregate, includes grindir	ng energy
Transportation Distance: By truck: 24 km		Avoided burden credit for coarse aggregate, includes grindir	ng energy
Transportation Distance: By truck: 24 km End-of-Life Scope:		Avoided burden credit for coarse aggregate, includes grindir LCI Source:	ng energy
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate		Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014)	
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material)		Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017	
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope:		Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017)	
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material)	ıg energy	Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017)	
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope:	ig energy	Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017)	
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope: Avoided burden credit for coarse aggregate, includes grindir	ıg energy	Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017)	
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope: Avoided burden credit for coarse aggregate, includes grindir LCI Source:		Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Expanded clay (EN15804 A1-A3) ts (2017)	
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope: Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017)		Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Expanded clay (EN15804 A1-A3) ts (2017) DE: alcium nitrate ts (2017) DE: alcium nitrate ts (2017) DE: Sodium ligninsulfonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017)	
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope: Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Portland cement PCA/ts (2014) DE: Panel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017)		Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Expanded clay (EN15804 A1-A3) ts (2017) DE: alcium nitrate ts (2017) DE: Sodium nigninsulfonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017)	7)
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope: Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017)		Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Expanded clay (EN15804 A1-A3) ts (2017) DE: alcium nitrate ts (2017) DE: Sodium ligninsulfonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017) US: Colophony (rosin, refined) from CN pine gum rosin ts (20	7)
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope: Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Stag-tap dranulate (EN15804 A1-A3) ts (2017)		Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: alcium nitrate ts (2017) DE: Sodium ligninsulfonate ts (2017) DE: Sodium nydroxide (caustic soda) ix (100%) ts (2017) US: Colophony (rosin, refined) from CN pine gum rosin ts (20 US: Tap water from groundwater ts (2017)	7)
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope: Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Stag-tap clay (EN15804 A1-A3) ts (2017) DE: Stag-tap clay (EN15804 A1-A3) ts (2017) DE: Stag-tap clay (EN15804 A1-A3) ts (2017) DE: alcium nitrate ts (2017)		Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: action nitrate (EN15804 A1-A3) ts (2017) DE: Sodium ligninsulfonate ts (2017) DE: Sodium nigninsulfonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017) US: Tap water from groundwater ts (2017) US: Electricity grid mix s (2014)	7)
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope: Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Slag-tap (2017) DE: Jalcium nitrate ts (2017) DE: Sodium ligninsulfonate ts (2017)		Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Sodium nitrate ts (2017) DE: Sodium nigninsulfonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017) US: Colophony (rosin, refined) from CN pine gum rosin ts (20 US: Tap water from groundwater ts (2017) US: Electricity grid mix s (2014) US: Natural gas mix ts (2014)	7)
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope: Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Salg-tap granulate (EN15804 A1-A3) ts (2017) DE: alcium nitrate ts (2017) DE: Sodium ligninsulfonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017)		Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Sodium nitrate ts (2017) DE: Sodium nigninsulfonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017) US: Colophony (rosin, refined) from CN pine gum rosin ts (20 US: Tap water from groundwater ts (2017) US: Natural gas mix ts (2014) US: Natural gas mix ts (2014)	7)
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope: Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Soliaun nitrate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017))	Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Solium nitrate ts (2017) DE: Sodium ligninsuffonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium nydroxide (caustic soda) ix (100%) ts (2017) US: Colophony (rosin, refined) from CN pine gum rosin ts (20 US: Tap water from groundwater ts (2017) US: Electricity grid mix s (2014) US: Natural gas mix ts (2014) US: Diesel mix at filling station (100% fossil) ts (2014) US: Liquefied Petroleum Gas (LPG) (70% propane	7)
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope: Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: algutan nitrate ts (2017) DE: algutan nitrate ts (2017) DE: Sodium nigninsulfonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017) US: Colophony (rosin, refined) from CN pine gum rosin ts (20)	Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Sug-tap granulate (EN15804 A1-A3) ts (2017) DE: Sodium nitrate ts (2017) DE: Sodium ligninsulfonate ts (2017) DE: Sodium niphtalene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017) US: Colophony (rosin, refined) from CN pine gum rosin ts (20 US: Tap water from groundwater ts (2017) US: Natural gas mix ts (2014) US: Natural gas mix ts (2014) US: Liesel mix at filling station (100% fossil) ts (2014) US: Liquefied Petroleum Gas (LPG) (70% propane 30% utane) ts (2014)	7)
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope: Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Jag-tap granulate (EN15804 A1-A3) ts (2017) DE: Solium nitrate ts (2017) DE: Sodium ligninsulfonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium naphtalene sulfonate (sulfonate (2017) US: Colophony (rosin, refined) from CN pine gum rosin ts (20 US: Tap water from groundwater ts (2017))	Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Solium nitrate ts (2017) DE: Sodium ligninsuffonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium nydroxide (caustic soda) ix (100%) ts (2017) US: Colophony (rosin, refined) from CN pine gum rosin ts (20 US: Tap water from groundwater ts (2017) US: Electricity grid mix s (2014) US: Natural gas mix ts (2014) US: Diesel mix at filling station (100% fossil) ts (2014) US: Liquefied Petroleum Gas (LPG) (70% propane	7)
Transportation Distance: By truck: 24 km End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material) Module D Scope: Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Soligum nitrate ts (2017) DE: Sodium nightlene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017) US: Colophony (rosin, refined) from CN pine gum rosin ts (20)	Avoided burden credit for coarse aggregate, includes grindir LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Sug-tap granulate (EN15804 A1-A3) ts (2017) DE: Sodium nitrate ts (2017) DE: Sodium ligninsulfonate ts (2017) DE: Sodium niphtalene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017) US: Colophony (rosin, refined) from CN pine gum rosin ts (20 US: Tap water from groundwater ts (2017) US: Natural gas mix ts (2014) US: Natural gas mix ts (2014) US: Liesel mix at filling station (100% fossil) ts (2014) US: Liquefied Petroleum Gas (LPG) (70% propane 30% utane) ts (2014)	7)

Suspended grid	6,606.7 kg	Used in the following Tally entries:	
Used in the following Revit families: C1 - ACT-1 - 2' x 4'	782.8 kg (50 yrs)	Wall board, gypsum	
C1 - ACT-2 - 2' x 2' HRC	1,597.2 kg (50 yrs)	Description:	
C1 - ACT-3 - 2' x 2'	3,721.3 kg (50 yrs)	Moisture- and mold-resistant gypsum board	
C1 - ACT-5 - 2' x 6'	505.4 kg (50 yrs)	Life Cycle Inventory:	
Used in the following Tally entries:		100% Moisture-resistant gypsum wallboard (Gypsum, Boric acid, Ce	ment, Sodium
Acoustic ceiling system, mineral fiber board		lignin sulfonate, Glass fibres, Silane, Polyglucose, Perlite, Paper, Case	ein glue)
		Product Scope:	
Description: Cold-rolled galvanized steel for lightweight ceiling grid		Cradle to gate	
5 5 5 55		Transportation Distance:	
Life Cycle Inventory:		By truck: 172 km	
100% HDG steel		End-of-Life Scope:	
Product Scope:		100% Landfilled (inert waste)	
Cradle to gate		LCI Source:	
Transportation Distance:		DE:Gypsum plaster board (Moisture resistant) (EN15804 A1-A3) ts (2	2017)
By truck: 431 km			
End-of-Life Scope:		Well beaution actival	65 417 5 h
98% recovered		Wall board, gypsum, natural Used in the following Revit families:	65,417.5 kg
2% landfilled (inert material)		(A1)_Furr Mtl Stud 7/8"_GWB (1-0)	353.7 kg (30 yrs
Module D Scope:		(A3)_Furr Mtl Stud 7/8"_GWB (1-0)	395.3 kg (30 yrs
Product has 44% scrap input while remainder is processed and cr	edited as avoided	(B8)_TYP Mtl Stud 8"_GWB Insulation	156.0 kg (30 yrs
burden		1-B6	37.8 kg (30 yrs
		1-C2- GWB on Mtl. Stud	203.7 kg (30 yrs
LCI Source:		1-N8 GFRC @ FRAMED WALL STAGGERED STUD	149.4 kg (30 yrs
RNA: Steel hot dip galvanized worldsteel (2007)		1-W06 PRE-CAST CONCRETE @ FRAMED WALL	4,824.8 kg (30 yrs
US: Metal roll forming (MCA) (2010)		1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD	1,536.4 kg (30 yrs
US: Electricity grid mix ts (2014)		2-A0_Furr Hat Channel 7/8"_GWB (2-0) 2 hour rated	118.0 kg (30 yrs
US: Thermal energy from natural gas ts (2014)		2-A0_GWB Type X (2-0) 2 hour rated	169.4 kg (30 yrs
GLO: Value of scrap worldsteel (2014)		2-C2- GWB on Mtl. Stud	1,397.2 kg (30 yrs
		3-W07_METAL STUD LIGHTWEIGHT CLADDING	915.4 kg (30 yrs
Nall board, gypsum, fire-resistant (Type X)	43,127.3 kg	ACT 4 AcoustiBuilt Ceiling	1,078.1 kg (30 yrs
Used in the following Revit families:		B4	924.8 kg (30 yrs
1-C2- GWB on Mtl. Stud	444.9 kg (30 yrs)	B6	488.7 kg (30 yrs
1F5 - 1 HR RATED HORIZONTAL DUCT ENCLOSURE	761.0 kg (30 yrs)	C2- GWB on Mtl. Stud	6,591.9 kg (30 yrs
1-W07_METAL STUD LIGHTWEIGHT CLADDING	35,345.8 kg (30 yrs)	C7- GWB on Mtl. Stud 2	387.3 kg (30 yrs
2-C2- GWB on Mtl. Stud	4,958.8 kg (30 yrs)	P_SOUTH VESTIBULE WALL	207.9 kg (30 yrs
3-W07_METAL STUD LIGHTWEIGHT CLADDING	416.5 kg (30 yrs)	W06 PRE-CAST CONCRETE @ FRAMED WALL	8,187.4 kg (30 yrs
A4_Furr Mtl Stud 4"_GWB (1-0)	1,200.2 kg (30 yrs)		34,817.8 kg (30 yrs
Used in the following Tally entries:		W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse) W09_SOUTH VESTIBULE WALL	2,312.6 kg (30 yrs 164.0 kg (30 yrs
Wall board, gypsum			104.0 kg (50 yrs
Description:		Used in the following Tally entries:	
Fire-resistant gypsum board		Wall board, gypsum	
		Description:	
Life Cycle Inventory: 100% Fire-resistant gypsum wallboard (Gypsum, Boric acid, Ceme	ent Sodium lianin	Natural gypsum board	
sulfonate, Glass fibres, Silane, Polyglucose, Perlite, Paper, Casein g		Life Cycle Inventory:	
	jiuc)	100% Gypsum wallboard (Gypsum, Boric acid, Cement, Glass fibres,	
Product Scope:		Ferrochrome-lignine sulfonate, Silane, Polyglucose, Perlite, Paper, C	asein glue)
Cradle to gate			5,
Transportation Distance:		Product Scope: Cradle to gate	
By truck: 172 km		-	
End-of-Life Scope:		Transportation Distance:	
100% Landfilled (inert waste)		By truck: 172 km	
LCI Source:		End-of-Life Scope:	
DE: Gypsum plaster board (Fire protection) (EN15804 A1-A3)PE (2	2017)	100% Landfilled (inert waste)	
		LCI Source:	
		DE: Gypsum wallboard (EN15804 A1-A3) ts (2017)	
Wall board, gypsum, moisture- and mold-resistant	86,468.2 kg		
Used in the following Revit families: (R4) SOUTH VEST ROOF	122.7 kg (20 vm)	White oak lumber, 1 inch	1 400 E ka
1-N8 GFRC @ FRAMED WALL STAGGERED STUD	123.7 kg (30 yrs) 141.1 kg (30 yrs)	Used in the following Revit families:	1,400.5 kg
1-W06 PRE-CAST CONCRETE @ FRAMED WALL	4,559.5 kg (30 yrs)	(R4) SOUTH VEST ROOF	188.8 kg (50 yrs
1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUI		(R4) SOUTH VEST ROOF (INTERIOR)	217.7 kg (50 yrs
1-W07_METAL STUD LIGHTWEIGHT CLADDING	24,470.2 kg (30 yrs)	Rectangular Mullion	993.9 kg (50 yrs
3-W07_METAL STUD LIGHTWEIGHT CLADDING	288.3 kg (30 yrs)	-	555.5 kg (50) is
P_SOUTH VESTIBULE WALL	196.5 kg (30 yrs)	Used in the following Tally entries:	
W06 PRE-CAST CONCRETE @ FRAMED WALL	7,737.1 kg (30 yrs)	Domestic hardwood	
W07_METAL STUD LIGHTWEIGHT CLADDING	32,902.8 kg (30 yrs)	Description:	
W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse)	2,185.4 kg (30 yrs)		
W08_METAL STUD LIGHTWEIGHT CLADDING (Parapet)	12,256.7 kg (30 yrs)		

Kiln-dried American White Oak hardwood lumber of 1" nominal in the eastern United States, focusing on the main production ter		End-of-Life Scope: 38.7% solids to landfill (plastic waste)	
region-specific characteristics. White oak is frequently used for mouldings, flooring, furniture, doors, and millwork. Link for interactive LCA data tool is provided at the link listed as "EPD Information" full LCA report is available at http://naturespackaging.org/wp-content/uploads/2016/02/LifeCycleAssessment-Lumber.pdf.		LCI Source: US: Tap water from groundwater ts (2017) US: Acrylate resin (solvent-systems) ts (2017) DE: Acrylate (emulsion) ts (2017)	
Life Cycle Inventory: 100% White Oak		US: Dipropylene glycol by product propylene glycol via PO hyd	
Product Scope: Cradle to gate, uncoated		XPS insulation, Foamular average, Owens Corning - EPD Used in the following Revit families: (R2) INSULATION O/ ASPHALT MEMBRANE O/ STRUCT	5,577.8 kg 2,783.8 kg (60 yrs)
Transportation Distance: By truck: 383 km		1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 8"	50.8 kg (60 yrs) 16.7 kg (60 yrs)
End-of-Life Scope: 14.5% Recovered 22% Incinerated with energy recovery 63.5% Landfilled (wood product waste)		2-W01 CONCRETE WALL W/ EXTERIOR INSULATION 8 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_16" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24" 2-W01 CONCRETE WALL WITHOUT CONC	160.4 kg (60 yrs) 580.2 kg (60 yrs) 1,493.0 kg (60 yrs) 480.0 kg (60 yrs) 12.9 kg (60 yrs)
Module D Scope: Recovered wood products credited as avoided burden.		Used in the following Tally entries: Extruded polystyrene (XPS), board	
LCI Source: US: White Oak lumber, 1 inch (769 kg/m ³), kiln-dried ts/AHEC (20 EPD Source:	017)	Description: FOAMULAR XPS (polystyrene) insulation board, HFC foaming a representative of US manufacturing condition. FOAMULAR insu with a variety of R-values and compressive strengths. The defat	lation board is available
Information EPD Designation Holder: American Hardwood Export Council (AHEC)		thermal resistance of RSI 1 and a compressive strength of 30 p: R-value and compressive strength of the assembly is known, us to designate a specific product.	si. If the intended
Window frame, vinyl, fixed Used in the following Revit families: cp_HSEB - Window at Upper Levels	5,801.7 kg 5,801.7 kg (30 yrs)	Note: This temporary entry is sourced directly from third-party replaces a Tally entry that is undergoing a quality assurance rev developed using data from ecoinvent and modeled in SimaPro	view. This entry
Use in the following Tally entries: Window frame, vinyl		Life Cycle Inventory: For information and quantities, see EPD.	
Description: Vinyl fixed window frame inclusive of steel bracing Life Cycle Inventory: 46% PVC part		Product Scope: Cradle to gate. Note: Product stage expanded to include blowing agent emissi and installation, and diffusion from product over service life (B1 make a significant contribution to GWP they have been include). As these impacts
54% metal reinforcement (Zinc-coated steel) Product Scope:		Transportation Distance: By truck: 1190 km	a in the product stage.
Cradle to gate, excludes hardware, casing, sealant Transportation Distance: By truck: 496 km		End-of-Life Scope: 100% Landfilled (plastic waste), includes blowing agent emissio disposal	ns released during
End-of-Life Scope: 100% Landfilled (plastic waste)		LCI Source: US: Extruded polystyrene (XPS) insulation board, FOAMULAR - (2018), modeled with Simapro 8, source for secondary data is e	-
LCI Source: DE: Window frame PVC-U (EN15804 A1-A3) ts (2017)		EPD Source: 4788721182.101.1	
Wood stain, water based Used in the following Revit families:	2,753.0 kg	EPD Designation Holder: Owens Corning	
(F4) CONCRETE DECK O/ 3 PLY CLT FLOOR (R4) SOUTH VEST ROOF (R4) SOUTH VEST ROOF (INTERIOR)	2,676.2 kg (10 yrs) 4.3 kg (10 yrs) 4.9 kg (10 yrs)	EPD Program Operator: UL Environment	
Rectangular Mullion Used in the following Tally entries: Cross laminated timber (CLT) Domestic hardwood	67.6 kg (10 yrs)	EPD Expiration: 1/1/2024	
Description: Semi-transparent stain for interior and exterior wood surfaces			
Life Cycle Inventory: 60% Water 28% Acrylate resin 7% Acrylate emulsion 5% Dipropylene glycol 1.3% NMVOC emissions			
Product Scope: Cradle to gate, including emissions during application			
Transportation Distance: By truck: 642 km			

HEALTH SCIENCES EDUCATION BUILDING

Full building summary 5/19/2022

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Report Summary

Created with Tally

Commercial Version 2022.04.08.01

Author Company Date Katherine Martin The Miller Hull Partnership 5/19/2022

Project Location Gross Area Building Life HEALTH SCIENCES EDUCATION BUILDING 1607 NE Pacific Street 100,000 ft² 60 years

Boundaries

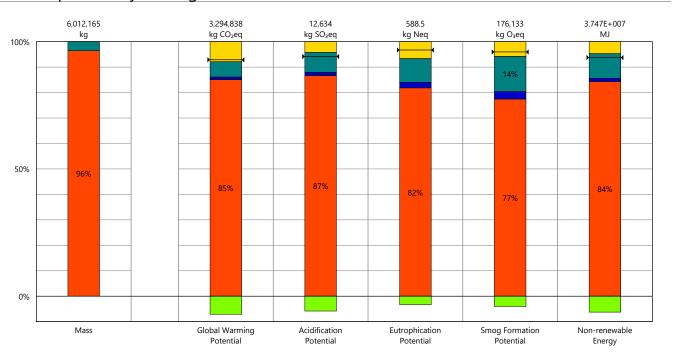
Cradle to grave, inclusive of biogenic carbon; see appendix for a full list of materials and processes

Goal and Scope of Assessment

Complete building envelope and structural elements, including foundations and footings, structural wall assembly (cladding to interior finish), structural floors and ceilings, and roof assemblies.

Environmental Impact Totals	Product Stage [A1-A3]	Construction Stage [A4]	Use Stage [B2-B5]	End of Life Stage [C2-C4]	Module D [D]
Global Warming (kg CO₂eq)	2,803,595	33,934	 198,521	258,788	-234,238
Acidification (kg SO ₂ eq)	10,952	157.2	989.9	534.3	-736
Eutrophication (kg Neq)	481.7	12.80	55.05	38.92	-19.3
Smog Formation (kg O₃eq)	136,435	5,196	24,342	10,160	-7,105
Ozone Depletion (kg CFC-11eq)	0.2672	1.162E-009	4.665E-004	4.938E-005	0.001196
Primary Energy (MJ)	3.348E+007	493,475	3,968,178	1,871,516	-2,608,063
Non-renewable Energy (MJ)	3.160E+007	481,667	3,641,479	1,750,090	-2,340,270
Renewable Energy (MJ)	1,880,759	11,933	328,624	123,439	-267,817
Environmental Impacts / Area					
Global Warming (kg CO2eq/m ²)	301.8	3.653	21.37	27.86	-25.2
Acidification (kg SO ₂ eq/m ²)	1.179	0.01693	0.1066	0.05751	-0.07927
Eutrophication (kg Neq/m ²)	0.05185	0.001378	0.005926	0.004189	-0.002078
Smog Formation (kg O₃eq/m ²)	14.69	0.5593	2.620	1.094	-0.7648
Ozone Depletion (kg CFC-11eq/m ²) 2.876E-005	1.251E-013	5.021E-008	5.316E-009	1.287E-007
Primary Energy (MJ/m ²)	3,604	53.12	427.1	201.4	-281
Non-renewable Energy (MJ/m ²)	3,401	51.85	392.0	188.4	-252
Renewable Energy (MJ/m ²)	202.4	1.284	35.37	13.29	-28.8

Results per Life Cycle Stage

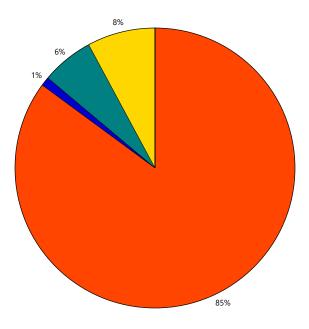


Legend

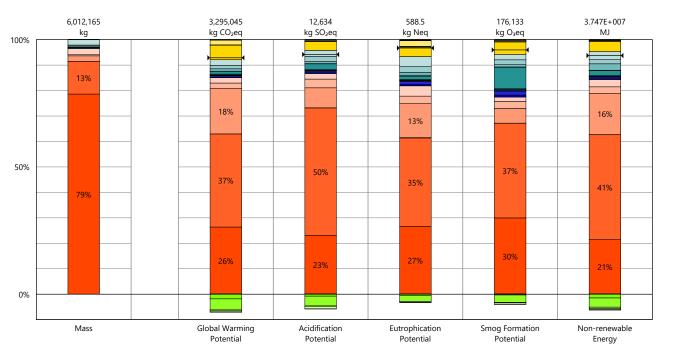
► Net value (impacts + credits)

Life Cycle Stages

Product [A1-A3] Transportation [A4] Maintenance and Replacement [B2-B5] End of Life [C2-C4] Module D [D]



Global Warming Potential



Results per Life Cycle Stage, itemized by Division

Legend

► Net value (impacts + credits)

Product [A1-A3]

- 03 Concrete
- 05 Metals
- 06 Wood/Plastics/Composites
- 07 Thermal and Moisture Protection 08 - Openings and Glazing
- 09 Finishes

Transportation [A4]

- 03 Concrete
- 05 Metals
- 06 Wood/Plastics/Composites
- 07 Thermal and Moisture Protection
- 08 Openings and Glazing 09 - Finishes

Maintenance and Replacement [B2-B5]

- 03 Concrete
- 05 Metals
- 06 Wood/Plastics/Composites
- 07 Thermal and Moisture Protection 08 - Openings and Glazing
- 09 Finishes

End of Life [C2-C4]

- 03 Concrete
 - 05 Metals
 - 06 Wood/Plastics/Composites 07 - Thermal and Moisture Protection
- 07 Thermal and Moisture 08 - Openings and Glazing
- 09 Finishes

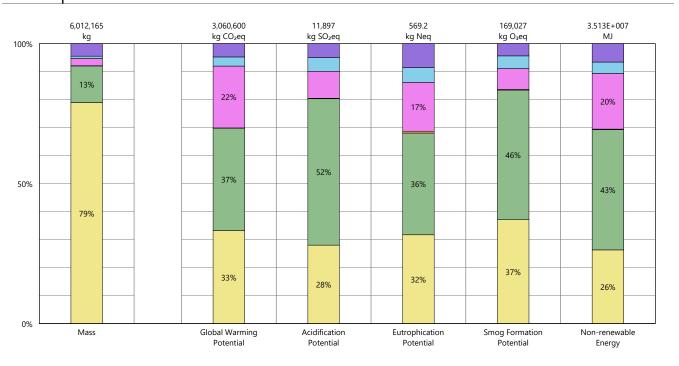
Module D [D]

 		-	-
0	3 - (Conc	rete

05 - Metals

06 - Wood/Plastics/Composites
07 - Thermal and Moisture Protection
08 - Openings and Glazing
09 - Finishes

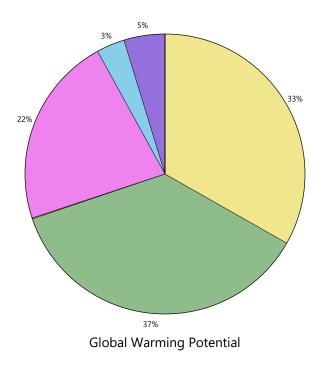
Results per Division

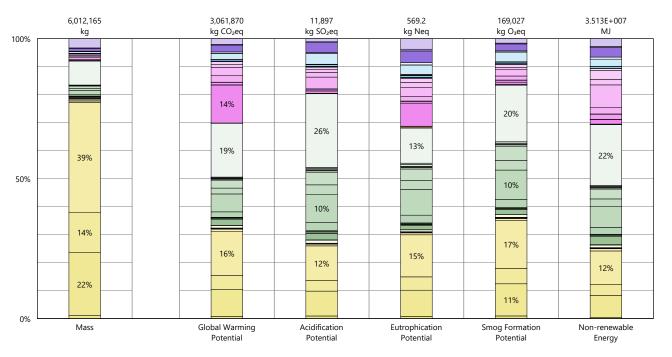


Legend

Divisions

03 - Concrete
05 - Metals
06 - Wood/Plastics/Composites
07 - Thermal and Moisture Protection
08 - Openings and Glazing
09 - Finishes





Results per Division, itemized by Tally Entry

Legend

03 - Concrete

- Cast-in-place concrete, lightweight structural concrete, 5000 psi Cast-in-place concrete, structural concrete, 3000 psi Cast-in-place concrete, structural concrete, 4000 psi Cast-in-place concrete, structural concrete, 5000 psi Glass fiber reinforced concrete, spray coating Precast concrete column Precast concrete nonstructural panel Precast concrete paver Stair, concrete with metal nosing Stair, precast single run (stretcher) Steel, reinforcing rod 05 - Metals Aluminum, angle Aluminum, formed Aluminum, sheet Stainless Steel, Fasteners Steel, angle Steel, C channel Steel, C-H-stud metal framing Steel, C-stud metal framing Steel, C-stud metal framing with insulation Steel, deck Steel, furring channel
- Steel, HSS section Steel, plate Steel, rectangular bar
- Steel, rod Steel, round bar
- Steel, round tubing
- Steel, sheet, stainless Steel, W section (wide flange shape)

06 - Wood/Plastics/Composites

Domestic hardwood



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Phenolic resin solid surface, sheet
Plywood, interior grade
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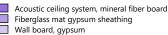
07 - Thermal and Moisture Protection

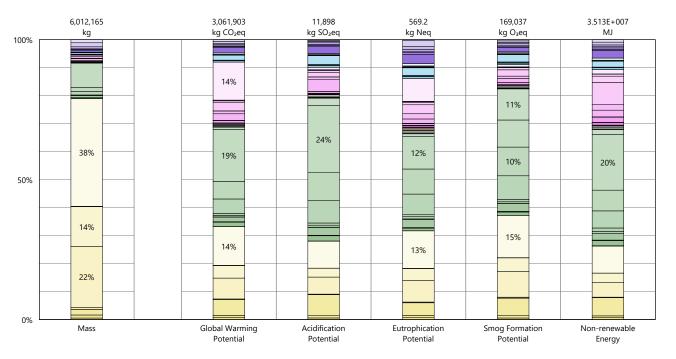
- EPDM, roofing membrane
- Extruded polystyrene (XPS), board
- Fiberglass clip system Fluid applied synthetic polymer air barrier
- Metal roofing panels, formed
- Mineral wool, board, generic
- Polyethelene sheet vapor barrier (HDPE)
- Polyisocyanurate (PIR), board SBS modified bitumen, sheet
- Self adhering membrane
- Self-adhering sheet waterproofing, modified bituminous sheet Wood siding

08 - Openings and Glazing

- Aluminum mullion, inclusive of finish Door frame, aluminum Door frame, steel, galvanized Door, exterior, aluminum Door, exterior, steel Door, interior, steel Glazing, custom IGU
- Glazing, monolithic sheet
- Window frame, vinyl

09 - Finishes





Results per Division, itemized by Material

Legend

03 - Concrete

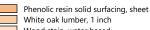
- GFRC, spray coating Lightweight concrete, 5000 psi, Pacific Northwest regional average Steel, reinforcing rod
- Steel, sheet
- Structural concrete, 3000 psi, 0% fly ash and slag
- Structural concrete, 3000 psi, Pacific Northwest regional average
- Structural concrete, 4000 psi, 20% fly ash and 30% slag
- Structural concrete, 5000 psi, 0% fly ash and slag
- Structural concrete, 5000 psi, 20% fly ash and 30% slag

05 - Metals

	Aluminum extrusion, painted, AEC - EPD
	Aluminum, formed
	Aluminum, sheet
	Anodized aluminum, sheet
	Coated steel deck, SDI - EPD
	Cold formed structural steel
	Fasteners, stainless steel
	Fiberglass blanket insulation, unfaced
	Fluoropolymer coating, metal stock
	Galvanized steel
	Galvanized steel decking
	Hot rolled structural steel, AISC - EPD
	Paint, enamel, solvent based
	Paint, exterior metal coating, silicone-based
	Paint, exterior metal coating, silicone-based, by area
	Polyurethane coating, metal stock
	Powder coating, metal stock
	Stainless steel sheet, Chromium 18/8
	Stainless steel, extruded, chromium 18/8
	Steel, reinforcing rod
	Steel, sheet
06	Mood/Plastics/Compositor

06 - Wood/Plastics/Composites

Laminated spruce panel board



White oak lumber, 1 inch Wood stain, water based

07 - Thermal and Moisture Protection

Adhesive, acrylic

- Domestic softwood, US, AWC EPD EPDM, non-reinforced membrane, 90 mils, SPRI - EPD
- Fasteners, galvanized steel
- Fasteners, stainless steel
 - Fluid applied synthetic polymer air barrier
- Fluoropolymer coating, metal stock
- Glass fiber reinforced plastic paneling
- Mineral wool, high density, NAIMA EPD
- PIR rigid foam insulation, roof, R=20.5, PIMA EPD
- PIR rigid foam insulation, wall, R=14.6, PIMA EPD
- Polyethelene sheet vapor barrier (HDPE)
- SBS modified bitumen, assembly (base & cap), ARMA EPD
- SBS modified bitumen, cap sheet, ARMA EPD
- Self adhering flashing membrane, 40 mil Steel, sheet
- XPS insulation, Foamular average, Owens Corning EPD

08 - Openings and Glazing

Aluminum extrusion, anodized, AEC - EPD Argon gas for IGU Door frame, aluminum, powder-coated, no door Door frame, metal, galvanized, no door Fasteners, galvanized steel Fasteners, stainless steel Frit (for glazing) Glazing, monolithic sheet, generic Glazing, monolithic sheet, safety glass Glazing, monolithic sheet, tempered Hardware, stainless steel Hollow door, exterior, aluminum, anodized Hollow door, exterior, aluminum, anodized, large vision panel Hollow door, exterior, steel, galvanized

Results per Division, itemized by Material (continued)

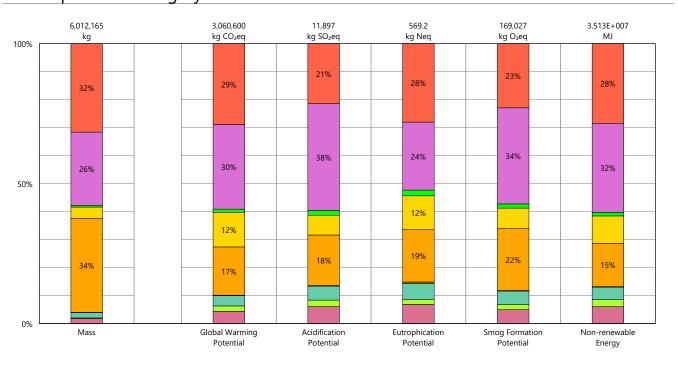
Legend (continued)



Low-e coating (for glazing) Overhead door closer, aluminum Stainless steel door hinge Window frame, vinyl, fixed 09 - Finishes

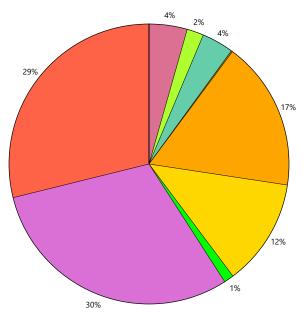
Acoustic ceiling tile (ACT), mineral fiber board Fiberglass mat gypsum sheathing board Paint, interior acrylic latex Paint, interior acryine races
 Suspended grid
 Wall board, gypsum, fire-resistant (Type X)
 Wall board, gypsum, moisture- and mold-resistant
 Wall board, gypsum, moisture- and mold-resistant Wall board, gypsum, natural

Results per Revit Category

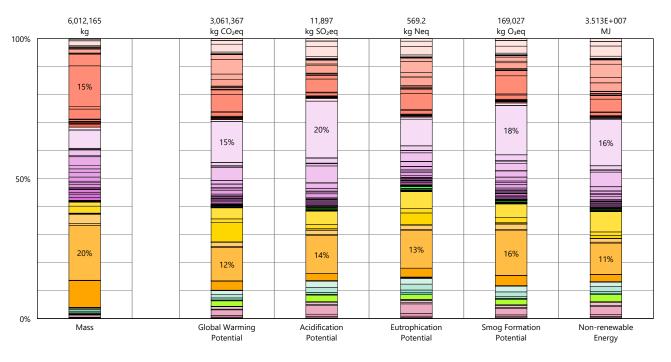


Legend





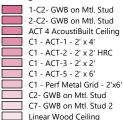
Global Warming Potential



Results per Revit Category, itemized by Family

Legend

Ceilings



Curtainwall Mullions

Rectangular Mullion

Curtainwall Panels

Curta	
	cp_HSEB - Base Material Panel_vertical
	cp_HSEB - Skin Shingle flashing
	cp_HSEB - Skin Shingle Panel_hoz
	cp_HSEB - Window at Upper Levels
	System Panel

Doors



Floors

 5
(F1) SLAB ON GRADE
(F1) SLAB ON GRADE - 6"
(F1) SLAB ON GRADE - 8"

(F2) CONCRETE METAL DECK
(F3) CONCRETE METAL DECK (STRUCTURAL ONLY)
(F3) CONCRETE METAL DECK W/ TOPPING SLAB
12" Concrete Slab
1F5 - 1 HR RATED HORIZONTAL DUCT ENCLOSURE
3.5" Light Duty Paving Over Sturcture
3/16" Aluminum Plate

Roofs

(R2) INSULATION O/ ASPHALT MEMBRANE O/ STRUCT
(R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2
(R3) SBS OVER METAL DECK
(R4) SOUTH VEST ROOF
(R4) SOUTH VEST ROOF (INTERIOR)
1/4" STEEL PLATE
3/16" Aluminum Plate

Stairs and Railings

Stans and Kanings
Construction Specialties_Crash Rail_6" ECR-60S
HSEB - Pipe Guardrail - GDR-2
HSEB - Pipe Guardrail - GDR-2 without handrail
HSEB - STR-1 _Precast Tread & Riser
HSEB - STR-2 Precast Tread Steel Riser 2
HSEB Guardrail - Cable Rail
HSEB Guardrail - Cable Rail without handrail
HSEB Handrail - HNDRL-1
HSEB Handrail - HNDRL-3
HSEB PIPE Handrail - HNDRL-2
HSEB ST-11 (CAST IN PLACE)
HSEB ST-9 (CAST IN PLACE)
HSEB Type C - STR-4_Conc filled w/ C channel
HSEB Type C_STR-10_Conc filled w/ C channel
HSEB Type C_STR-5_Conc filled w/ C channel 2
HSEB Type C_STR-6_Conc filled w/ Plate Stringer - Roof Access
HSEB Type C_STR-8_Conc filled w/ Plate
HSEB_STR-3_Precast Tread Steel Riser
HSEB-GDR-4_Canerail

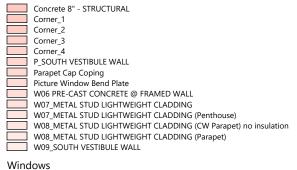
Results per Revit Category, itemized by Family (continued)

Legend (continued)

Structure

00.00	
	04.016_LCL FND Slab_Spread Ftg_F10.0 10x10x3.0d
	04.016_LCL FND Slab_Spread Ftg_F11.0 11x11x3.25d
	04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d
	04.016_LCL FND Slab_Spread Ftg_F12.0 14x14x4.5d
	04.016_LCL FND Slab_Spread Ftg_F2.0 2x2x11"d
	04.016_LCL FND Slab_Spread Ftg_F4.0 4x4x1.5d
	04.016_LCL FND Slab_Spread Ftg_F8.0 8x8x2.5d
	04.016_LCL FND Slab_Spread Ftg_F9.0 9x9x2.75d
	04.016_LCL FND Slab_Spread Ftg_FW6.0 6x8x2.5d
	04.017_LCL FND Slab_Cont. Ftg FW3.0_36wx18d
	04.017_LCL FND Slab_Cont. Ftg FW4.0_48wx18d
	04.017_LCL FND Slab_Cont. Ftg FW4.0_48wx18d 04.017_LCL FND Slab_Cont. Ftg FW4.0_48wx24d
	04.017_LCL FND Slab_Cont. Ftg FW5.0_60wx18d
	04.017_LCL FND Slab_Cont. Ftg FW5.0A_60wx30d
	04.017_LCL FND Slab_Cont. Ftg FW7.0_87wx42d 2
	04.017_LCL FND Slab_Cont. Ftg FW8.0_96wx48d
	04.017_LCL FND Slab_Cont. Ftg_24wx12d
	KPFF - SCOL - Concrete - Round
	KPFF - SCOL - Steel - HSS - Rectangular (C) - TC
	KPFF - SCOL - Steel - HSS - Rectangular (C) - TC- 2x
	KPFF - SCOL - Steel - HSS - Round (C) - TC
	KPFF - SCOL - Steel - W - Wide Flange (C) - TC
	KPFF - SFRM - Steel - BRB - Buckling Restrained Brace
	KPFF - SFRM - Steel - C - Channel (C) - TC
	KPFF - SFRM - Steel - HSS - Rectangular (C) - TC
	KPFF - SFRM - Steel - Kicker Brace - L - Angle - TC
	KPFF - SFRM - Steel - L - Angle (C) - TC
	KPFF - SFRM - Steel - W - Wide Flange (C) - TC
	KPFF - SFRM - Steel - WT - Wide Flange Tee - TC
	KPFF - SFRM - Steel - WT - Wide Flange Tee (C) - TC
	LCL_C_Pilaster_Rect_()w()d
	LCL_Embed_2x3-Nelson-Studs_OffSet
Walls	
	(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0)
	(B8)_TYP Mtl Stud 8"_GWB Insulation
	04.215_LCL_C_Slab Transition_Wall(12")
	04.215_LCL_C_Slab Transition_Wall(15")
	04.215_LCL_C_Slab Transition_Wall(4")
	04.215_LCL_C_Slab Transition_Wall(6")
	04.215_LCL_C_Slab Transition_Wall(8")
	04.225_LCL_C_CURB_Wall(11")
	04.225_LCL_C_CURB_Wall(4")
	04.225_LCL_C_CURB_Wall(6")
	04.225_LCL_C_CURB_Wall(8")
	04.225_LCL_C_Foundation_Wall(10")
	UH.SUU_LCL_C_FUUHUALIUH_WAII(TU)

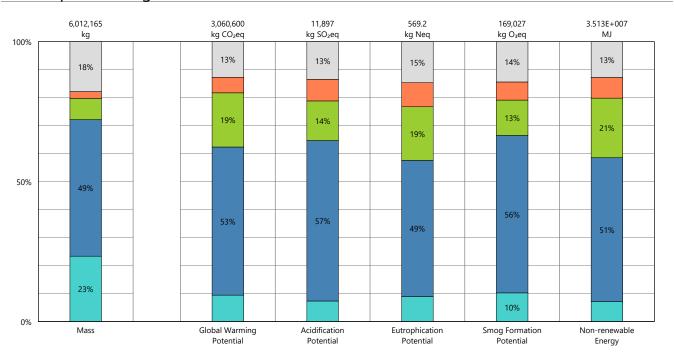
	04.225_LCL_C_CURB_Wall(4")
	04.225_LCL_C_CURB_Wall(6")
	04.225_LCL_C_CURB_Wall(8")
	04.300_LCL_C_Foundation_Wall(10")
	04.310_LCL_C_PIT_Wall(8")
	04.380_LCL_C_SHOTCRETE_Wall(16")
	04.380_LCL_C_SHOTCRETE_Wall(19")
	04.380_LCL_C_SHOTCRETE_Wall(22")
	04.380_LCL_C_SHOTCRETE_Wall(24")
	1-B6
	1-N8 GFRC @ FRAMED WALL STAGGERED STUD
	1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11"
	1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16"
	1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 8"
	1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 22"
	1-W06 PRE-CAST CONCRETE @ FRAMED WALL
	1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD
	1-W07_METAL STUD LIGHTWEIGHT CLADDING
	2-A0_Furr Hat Channel 7/8"_GWB (2-0) 2 hour rated
	2-A0_GWB Type X (2-0) 2 hour rated
	2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_16"
	2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22"
	2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24"
	2-W01 CONCRETE WALL WITHOUT CONC
	3-W07_METAL STUD LIGHTWEIGHT CLADDING
	A4_Furr Mtl Stud 4"_GWB (1-0)
	Aluminum Plate 1/8"
	Aluminum Plate 3/16"
	B4
	B6



window

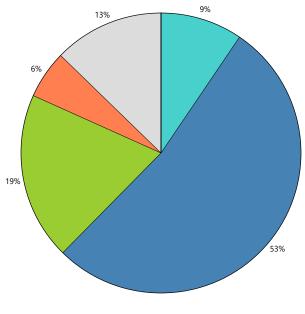
LOUVER-parametric

Results per Building Element



Legend

Building Elements
Substructure
Superstructure
Enclosure
Interiors
Undefined



Global Warming Potential

Calculation Methodology

LIFE CYCLE ASSESSMENT METHODS

The following provides a description of terms and methods associated with the use of Tally to conduct life cycle assessment for construction works and construction products. Tally methodology is consistent with LCA standards ISO 14040-14044, ISO 21930:2017, ISO 21931:2010, EN 15804:2012, and EN 15978:2011. For more information about LCA, please refer to these standards or visit www.choosetally.com.

Studied objects

The life cycle assessment (LCA) results reported represent an analysis of a single building, multiple buildings, or a comparative analysis of two or more building design options. The assessment may represent the complete architectural, structural, and finish systems of the building(s) or a subset of those systems. This may be used to compare the relative environmental impacts associated with building components or for comparative study with one or more reference buildings. Design options may represent a full or partial building across various stages of the design process, or they may represent multiple schemes of a full or partial building that are being compared to one another across a range of evaluation criteria.

Functional unit and reference unit

A functional unit is the quantified performance of a product, building, or system that defines the object of the study. The functional unit of a single building should include the building type (e.g. office, factory), relevant technical and functional requirements (e.g. regulatory requirements, energy performance), pattern of use (e.g. occupancy, usable floor area), and the required service life. For a design option comparison of a partial building, the functional unit is the complete set of building systems or products that perform a given function. It is the responsibility of the modeler to assure that reference buildings or design options are functionally equivalent in terms of scope and relevant performance. The expected life of the building has a default value of 60 years and can be modified by the modeler.

The reference unit is the full collection of processes and materials required to produce a building or portion thereof and is quantified according to the given goal and scope of the assessment over the full life of the building. If construction impacts are included in the assessment, the reference unit also includes the energy, water, and fuel consumed on the building site during construction. If operational energy is included in the assessment, the reference unit includes the electrical and thermal energy consumed on site over the life of the building.

Data source

Tally utilizes a custom designed LCA database that combines material attributes, assembly details, and architectural specifications with environmental impact data resulting from the collaboration between KieranTimberlake and thinkstep. LCA modeling was conducted in GaBi 8.5 using GaBi 2018 databases and in accordance with <u>GaBi databases and modeling principles</u>. The data used are intended to represent the US and the year 2017. Where representative data were unavailable, proxy data were used. The datasets used, their geographic region, and year of reference are listed for each entry. An effort was made to choose proxy datasets that are technologically consistent with the relevant entry.

Data quality and uncertainty

Uncertainty in results can stem from both the data used and their application. Data quality is judged by: its measured, calculated, or estimated precision; its completeness, such as unreported emissions; its consistency, or degree of uniformity of the methodology applied on a study serving as a data source; and geographical, temporal, and technological representativeness. The <u>GaBi LCI databases</u> have been used in LCA models worldwide in both industrial and scientific applications. These LCI databases have additionally been used both as internal and critically reviewed and published studies. Uncertainty introduced by the use of proxy data is reduced by using technologically, geographically, and/or temporally similar data. It is the responsibility of the modeler to appropriately apply the predefined material entries to the building under study.

System boundaries and delimitations

The analysis accounts for the full cradle to grave life cycle of the design options studied across all life cycle stages, including material manufacturing, maintenance and replacement, and eventual end of life. Optionally, the construction impacts and operational energy of the building can be included within the scope. Product stage impacts are excluded for materials and components indicated as existing or salvaged by the modeler. The modeler defines whether the boundary includes or excludes the flow of biogenic carbon, which is the carbon absorbed and generated by biological sources (e.g. trees, algae) rather than from fossil resources.

Architectural materials and assemblies include all materials required for the product's manufacturing and use including hardware, sealants, adhesives, coatings, and finishing. The materials are included up to a 1% cut-off factor by mass except for known materials that have high environmental impacts at low levels. In these cases, a 1% cut-off was implemented by impact.

5/19/2022

Calculation Methodology

LIFE CYCLE STAGES

The following describes the scope and system boudaries used to define each stage of the life cycle of a building or building product, from raw material acquisition to final disposal. For products listed in Tally as Environmental Product Declarations (EPD), the full life cycle impacts are included, even if the published EPD only includes the Product stage [A1-A3].

Product [EN 15978 A1 - A3]

This encompasses the full manufacturing stage, including raw material extraction and processing, intermediate transportation, and final manufacturing and assembly. The product stage scope is listed for each entry, detailing any specific inclusions or exclusions that fall outside of the cradle to gate scope. Infrastructure (buildings and machinery) required for the manufacturing and assembly of building materials are not included and are considered outside the scope of assessment.

Transportation [EN 15978 A4]

This counts transportation from the manufacturer to the building site during the construction stage and can be modified by the modeler.

Construction Installation [EN 15978 A5] (Optional)

This includes the anticipated or measured energy and water consumed on-site during the construction installation process, as specified by the modeler.

Maintenance and Replacement [EN 15978 B2-B5]

This encompasses the replacement of materials in accordance with their expected service life. This includes the end of life treatment of the existing products as well as the cradle to gate manufacturing and transportation to site of the replacement products. The service life is specified separately for each product. Refurbishment of materials marked as existing or salvaged by the modeler is also included.

Operational Energy [EN 15978 B6] (Optional)

This is based on the anticipated or measured energy and natural gas consumed at the building site over the lifetime of the building, as indicated by the modeler.

End of Life [EN 15978 C2-C4]

This includes the relevant material collection rates for recycling, processing requirements for recycled materials, incineration rates, and landfilling rates. The impacts associated with landfilling are based on average material properties, such as plastic waste, biodegradable waste, or inert material. Stage C2 encompasses the transport from the construction site to end-of-life treatment based on national averages. Stages C3-C4 account for waste processing and disposal, i.e., impacts associated with landfilling or incineration.

Module D [EN 15978 D]

This accounts for reuse potentials that fall beyond the system boundary, such as energy recovery and recycling of materials. Along with processing requirements, the recycling of materials is modeled using an avoided burden approach, where the burden of primary material production is allocated to the subsequent life cycle based on the quantity of recovered secondary material. Incineration of materials includes credit for average US energy recovery rates.

PRODUCT	CONSTRUCTION	USE	END-OF-LIFE	MODULE D
A1. Extraction A2. Transport (to factory) A3. Manufacturing	A4. Transport (to site) A5. Construction Installation	B1. Use B2. Maintenance B3. Repair B4. Replacement B5. Refurbishment	C1. Demolition C2. Transport (to disposal) C3. Waste processing C4. Disposal	 D. Benefits and loads beyond the system boundary from: 1. Reuse 2. Recycling 3. Energy recovery
		B6. Operational energy B7. Operational water		

Life-Cycle Stages as defined by EN 15978. Processes included in Tally modeling scope are shown in bold. Italics indicate optional processes.

Calculation Methodology

ENVIRONMENTAL IMPACT CATEGORIES

A characterization scheme translates all emissions and fuel use associated with the reference flow into quantities of categorized environmental impact. As the degree that the emissions will result in environmental harm depends on regional ecosystem conditions and the location in which they occur, the results are reported as impact potential. Potential impacts are reported in kilograms of equivalent relative contribution (eq) of an emission commonly associated with that form of environmental impact (e.g. kg CO₂eq).

The following list provides a description of environmental impact categories reported according to the TRACI 2.1 characterization scheme, the environmental impact model developed by the US EPA to quantify environmental impact risk associated with emissions to the environment in the United States. TRACI is the standard environmental impact reporting format for LCA in North America. Impacts associated with land use change and fresh water depletion are not included in TRACI 2.1. For more information on TRACI 2.1, reference Bare 2010, EPA 2012, and Guinée 2001. For further description of measurement of environmental impacts in LCA, see Simonen 2014.

Acidification Potential (AP)

ka SO₂ea

kg Neg

A measure of emissions that cause acidifying effects to the environment. The acidification potential is a measure of a molecule's capacity to increase the hydrogen ion (H^+) concentration in the presence of water, thus decreasing the pH value. Potential effects include fish mortality, forest decline, and the deterioration of building materials.

Eutrophication Potential (EP)

A measure of the impacts of excessively high levels of macronutrients, the most important of which are nitrogen (N) and phosphorus (P). Nutrient enrichment may cause an undesirable shift in species composition and elevated biomass production in both aquatic and terrestrial ecosystems. In aquatic ecosystems, increased biomass production may lead to depressed oxygen levels caused by the additional consumption of oxygen in biomass decomposition.

Global Warming Potential (GWP)

kg CO₂eq

kg CFC-11eg

A measure of greenhouse gas emissions, such as carbon dioxide and methane. These emissions are causing an increase in the absorption of radiation emitted by the earth, increasing the natural greenhouse effect. This may, in turn, have adverse impacts on ecosystem health, human health, and material welfare.

Ozone Depletion Potential (ODP)

A measure of air emissions that contribute to the depletion of the stratospheric ozone layer. Depletion of the ozone leads to higher levels of UVB ultraviolet rays reaching the earth's surface with detrimental effects on humans and plants. As these impacts tend to be very small, ODP impacts can be difficult to calculate and are prone to a larger margin of error than the other impact categories.

Smog Formation Potential (SFP)

kg O₃eq

A measure of ground level ozone, caused by various chemical reactions between nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in sunlight. Human health effects can result in a variety of respiratory issues, including increasing symptoms of bronchitis, asthma, and emphysema. Permanent lung damage may result from prolonged exposure to ozone. Ecological impacts include damage to various ecosystems and crop damage.

Primary Energy Demand (PED)

MJ (lower heating value)

A measure of the total amount of primary energy extracted from the earth. PED tracks energy resource use, not the environmental impacts associated with the resource use. PED is expressed in energy demand from non-renewable resources and from renewable resources. Efficiencies in energy conversion (e.g. power, heat, steam, etc.) are taken into account when calculating this result.

Non-Renewable Energy Demand

MJ (lower heating value)

A measure of the energy extracted from non-renewable resources (e.g. petroleum, natural gas, etc.) contributing to the PED. Non-renewable resources are those that cannot be regenerated within a human time scale. Efficiencies in energy conversion (e.g. power, heat, steam, etc.) are taken into account when calculating this result.

Renewable Energy Demand

MJ (lower heating value)

A measure of the energy extracted from renewable resources (e.g. hydropower, wind energy, solar power, etc.) contributing to the PED. Efficiencies in energy conversion (e.g. power, heat, steam, etc.) are taken into account when calculating this result.

LCI Data

END-OF-LIFE [C2-C4]

A Life Cycle Inventory(LCI) is a compilation and quantification of inputs and outputs for the reference unit.The following LCI provides a summary of all energy, construction, transportation, and material inputs present in the study. Materials are listed in alphabetical order along with a list of all Revit families and Tally entries in which they occur, along with any notes and system boundaries accompanying their database entries. Each entry lists the detailed scope for the LCI data sources used from the GaBi LCI database and identifies the LCI data source.

For LCI data sourced from an Environmental Product Declaration (EPD), the product manufacturer, EPD identification number, and Program Operator are listed. Where the LCI source does not provide data for all life cycle stages, default North American average values are used. This is of particular importance for European EPD sources, as EPD data are generally only provided for the product stage, and North American average values are used for the remaining life cycle stages.

Where specific quantities are associated with a data entry, such as user inputs, energy values, or material mass, the quantity is listed on the same line as the title of the entry.

TRANSPORTATION [A4]

Default transportation values are based on the three-digit material commodity code in the 2012 Commodity Flow Survey by the US Department of Transportation Bureau of Transportation Statistics and the US Department of Commerce where more specific industry-level transportation is not available.

Transportation by Barge

Scope: The data set represents the transportation of 1 kg of material from the manufacturer location to the building site by barge.

LCI Source:

GLO: Average ship, 1500t payload capacity/ canal ts (2017) US: Diesel mix at filling station ts (2014)

Transportation by Container Ship

Scope: The data set represents the transportation of 1 kg of material from the manufacturer location to the building site by container ship.

LCI Source:

GLO: Container ship, 27500 dwt payload capacity, ocean going ts (2017) US: Heavy fuel oil at refinery (0.3wt.% S) ts (2014)

Transportation by Rail

Scope: The data set represents the transportation of 1 kg of material from the manufacturer location to the building site by cargo rail.

LCI Source:

GLO: Rail transport cargo - Diesel, average train, gross tonne weight 1000t / 726t payload capacity ts (2017)

US: Diesel mix at filling station ts (2014)

Transportation by Truck Scope:

The data set represents the transportation of 1 kg of material from the manufacturer location to the building site by diesel truck.

LCI Source:

US: Truck - Trailer, basic enclosed / 45,000 lb payload - 8b ts (2017) US: Diesel mix at filling station ts (2014)

LCI Data (continued)

END-OF-LIFE [C2-C4]

Specific end-of-life scenarios are detailed for each entry based on the US construction and demolition waste treatment methods and rates in the 2016 WARM Model by the US Environmental Protection Agency except where otherwise specified. Heterogeneous assemblies are modeled using the appropriate methodologies for the component materials.

End-of-Life Landfill

Scope:

Materials for which no recycling or incineration rates are known, no recycling occurs within the US at a commercial scale, or which are unable to be recycled are landfilled. This includes glass, drywall, insulation, and plastics. The solids contents of coatings, sealants, and paints are assumed to go to landfill, while the solvents or water evaporate during installation. Where the landfill contains biodegradable material, the energy recovered from landfill gas utilization is reflected as a credit in Module D.

LCI Source:

US: Glass/inert on landfill ts (2017)

US: Biodegradable waste on landfill, post-consumer ts (2017)

US: Plastic waste on landfill, post-consumer ts (2017)

Concrete End-of-Life

Scope:

Concrete (or other masonry products) are recycled into aggregate or general fill material or they are landfilled. It is assumed that 55% of the concrete is recycled. Module D accounts for both the credit associated with off-setting the production aggregate and the burden of the grinding energy required for processing.

LCI Source:

US: Diesel mix at refinery ts (2014) GLO: Fork lifter (diesel consumption) ts (2016) EU - 28 Gravel 2/32 ts (2017) US: Glass/inert on landfill ts (2017)

Metals End-of-Life

Scope:

Metal products are modeled using the avoided burden approach. The recycling rate at end of life is used to determine how much secondary metal can be recovered after having subtracted any scrap input into manufacturing (net scrap). Net scrap results in an environmental credit in Module D for the corresponding share of the primary burden that can be allocated to the subsequent product system using secondary material as an input. If the value in Module D reflects an environmental burden, then the original product (A1-A3) contains more secondary material than is recovered.

LCI Source:

Aluminum - RNA: Primary Aluminum Ingot AA/ts (2010) Aluminum - RNA: Secondary Aluminum Ingot AA/ts (2010) Brass - GLO: Zinc mix ts (2012) Brass - GLO: Copper (99.99% cathode) ICA (2013) Brass - EU-28: Brass (CuZn20) ts (2017) Copper - DE: Recycling potential copper sheet ts (2016) Steel - GLO: Value of scrap worldsteel (2014) Zinc - GLO: Special high grade zinc IZA (2012)

Wood End-of-Life

Scope:

End of Life waste treatment methods and rates for wood are based on the 2014 Municipal Solid Waste and Construction Demolition Wood Waste Generation and Recovery in the United States report by Dovetail Partners, Inc. It is assumed that 63.5% of wood is sent to landfill, 22% to incineration, and 14.5% to recovery.

LCI Source:

US: Untreated wood in waste incineration plant ts (2017)

US: Wood product (OSB, particle board) waste in waste incineration plant ts (2017)

- US: Wood products (OSB, particle board) on landfill, post-consumer ts (2017)
- US: Untreated wood on landfill, post-consumer ts (2017)

RNA: Softwood lumber CORRIM (2011)

LCI Data

MODEL ELEMENTS

Revit Categories

Ceilings Curtainwall Mullions Curtainwall Panels Doors Floors Roofs Stairs and Railings Structure Walls Windows

HSEB_ARCH_D_19_Baseline_with ceilings.rvt

Worksets ARCH_Ceilings ARCH_Exterior Walls ARCH_Floors & Roof ARCH_Vertical Circulation

Phases Base Budget Enabling Scope Existing Value Add Scope

HSEB_STRUCT_DC_19.rvt (Read-only)

Worksets L - 04.220 Equipment Pads LCL-SLEEVES-BLOCKOUTS-MISC. S - Structural S - Structural - Baseline

Phases

Existing New Construction

PRODUCT [A1-A3]

Materials and components are listed in alphabetical order along with a list of all Revit families and Tally entries in which they occur. The masses given here refer to the quantity of each material used over the building's life-cycle, which includes both Product [A1-A3] and Use [B2-B5] stages.

Additional provided data describing scope boundaries for each life cycle stage may be useful for interpretation of the impacts associated with the specific material or component. Each material or component is listed with its service life, or period of time after installation it is expected to meet the service requirements prior to replacement or repair. This value is indicated in parentheses next to the mass of the material associated with the listed Revit family. Values for transportation distance or service life shown with an asterisk (*) indicate user-defined changes to default values. Values for service life shown with a dagger (†) indicate materials identified by the modeler as existing or salvaged.

Acoustic ceiling tile (ACT), mineral fiber board Used in the following Revit families:

3,770.1 kg (50 yrs 7,515.5 kg (50 yrs 27,390.4 kg (50 yrs 3,623.4 kg (50 yrs	-	-,-		
27,390.4 kg (50 yrs				
	7,515.5	kg	(50	yrs)
3,623.4 kg (50 yrs				
	3,623.4	kg	(50	yrs

42.299.4 ka

Used in the following Tally entries:

Acoustic ceiling system, mineral fiber board

Description: Mineral fiber board acoustic ceiling tile, 5/8" thick

Life Cycle Inventory: 100% Mineral fiber board

C1 - ACT-1 - 2' x 4'

C1 - ACT-3 - 2' x 2'

C1 - ACT-5 - 2' x 6'

C1 - ACT-2 - 2' x 2' HRC

Product Scope: Cradle to gate of panel only, excludes suspended grid system and installation hardware

Transportation Distance:

By truck: 172 km

End-of-Life Scope: 100% landfilled (inert waste)

LCI Source:

DE: Mineral fibres ceiling boards (EN15804 A1-A3) ts (2017)

Adhesive, acrylic

4,043.6 kg

Jsed in the following Revit families:	
(R3) SBS OVER METAL DECK	3,467.8 kg (20 yrs)
(R4) SOUTH VEST ROOF	13.5 kg (20 yrs)
W08_METAL STUD LIGHTWEIGHT CLADDING (CW Parapet) no	insulation26.8 kg (20 yrs)
W08_METAL STUD LIGHTWEIGHT CLADDING (Parapet)	535.4 kg (20 yrs)

Used in the following Tally entries: SBS modified bitumen, sheet

Description:

Generic acrylic construction adhesive

Life Cycle Inventory:

5% Naphtha at refinery 95% Acrylate resin (solvent-systems) 0.5% NMVOC emissions

Product Scope:

Cradle to gate, plus emissions during application

Transportation Distance: By truck: 840 km

End-of-Life Scope:

99.5% solids to landfill (plastic waste)

LCI Source: US: Naphtha at refinery ts (2014)

tally

LCI Data (continued)

DE: Acrylate resin (solvent-systems) ts (2017)

		U
Aluminum extrusion, anodized, AEC - EPD Used in the following Revit families: Rectangular Mullion	3,507.9 kg 3,507.9 kg (60 yrs)	U
Used in the following Tally entries: Aluminum mullion, inclusive of finish	-,	D
Description: Extruded and anodized aluminum part. Data based on ind Aluminum Extruders Council.	lustry-wide EPD from the	Li
Life Cycle Inventory: For information and quantities, see EPD		Р
Product Scope: Cradle to gate		Т
Transportation Distance: By truck: 663 km		E
End-of-Life Scope: 95% Recovered 5% Landfilled (inert material)		M
Module D Scope: Product has 34.5% scrap input while remainder is process burden	ed and credited as avoided	L
LCI Source: RNA: Aluminum extrusion, anodized - AEC (A1-A3) ts-EPD RNA: Primary Aluminum Ingot AA/ts (2010) RNA: Secondary Aluminum Ingot AA/ts (2010)	(2015)	
EPD Source: <u>11240237.101.1</u>		
EPD Designation Holder: Aluminum Extruders Council (AEC)		Alu
EPD Program Operator: UL Environment		U
EPD Expiration: 10/4/2021		
Aluminum extrusion, painted, AEC - EPD	12.0 kg	
Used in the following Revit families:		
Picture Window Bend Plate	12.0 kg (60 yrs)	
Picture Window Bend Plate Used in the following Tally entries: Aluminum, angle	12.0 kg (60 yrs)	U
Used in the following Tally entries:	dustry-wide EPD from the	
Used in the following Tally entries: Aluminum, angle Description: Painted aluminum extrusions (not thermally-improved). In	dustry-wide EPD from the	U D
Used in the following Tally entries: Aluminum, angle Description: Painted aluminum extrusions (not thermally-improved). In Aluminum Extruders Council. EPD representative of condit Life Cycle Inventory:	dustry-wide EPD from the	D
Used in the following Tally entries: Aluminum, angle Description: Painted aluminum extrusions (not thermally-improved). In Aluminum Extruders Council. EPD representative of condit Life Cycle Inventory: For information and quantities, see EPD Product Scope:	dustry-wide EPD from the	D
Used in the following Tally entries: Aluminum, angle Description: Painted aluminum extrusions (not thermally-improved). In Aluminum Extruders Council. EPD representative of condit Life Cycle Inventory: For information and quantities, see EPD Product Scope: Cradle to gate Transportation Distance:	dustry-wide EPD from the	D Li P T
Used in the following Tally entries: Aluminum, angle Description: Painted aluminum extrusions (not thermally-improved). In Aluminum Extruders Council. EPD representative of condit Life Cycle Inventory: For information and quantities, see EPD Product Scope: Cradle to gate Transportation Distance: By truck: 663 km End-of-Life Scope: 95% Recovered	dustry-wide EPD from the tions in North America.	D Li P T E
Used in the following Tally entries: Aluminum, angle Description: Painted aluminum extrusions (not thermally-improved). In Aluminum Extruders Council. EPD representative of condit Life Cycle Inventory: For information and quantities, see EPD Product Scope: Cradle to gate Transportation Distance: By truck: 663 km End-of-Life Scope: 95% Recovered 5% Landfilled (inert material) Module D Scope:	dustry-wide EPD from the tions in North America.	D Li P T E
Used in the following Tally entries: Aluminum, angle Description: Painted aluminum extrusions (not thermally-improved). In Aluminum Extruders Council. EPD representative of condit Life Cycle Inventory: For information and quantities, see EPD Product Scope: Cradle to gate Transportation Distance: By truck: 663 km End-of-Life Scope: 95% Recovered 5% Landfilled (inert material) Module D Scope: Credit given for the avoided burden associated with recov LCI Source:	dustry-wide EPD from the tions in North America.	D
Used in the following Tally entries: Aluminum, angle Description: Painted aluminum extrusions (not thermally-improved). In Aluminum Extruders Council. EPD representative of condit Life Cycle Inventory: For information and quantities, see EPD Product Scope: Cradle to gate Transportation Distance: By truck: 663 km End-of-Life Scope: 95% Recovered 5% Landfilled (inert material) Module D Scope: Credit given for the avoided burden associated with recov LCI Source: EPD (US), American Extruders Council (2016) EPD Source:	dustry-wide EPD from the tions in North America.	D Li P T E
Used in the following Tally entries: Aluminum, angle Description: Painted aluminum extrusions (not thermally-improved). In Aluminum Extruders Council. EPD representative of condit Life Cycle Inventory: For information and quantities, see EPD Product Scope: Cradle to gate Transportation Distance: By truck: 663 km End-of-Life Scope: 95% Recovered 5% Landfilled (inert material) Module D Scope: Credit given for the avoided burden associated with recov LCI Source: EPD (US), American Extruders Council (2016) EPD Source: 11240237.101.1 EPD Designation Holder:	dustry-wide EPD from the tions in North America.	D Li P T E
Used in the following Tally entries: Aluminum, angle Description: Painted aluminum extrusions (not thermally-improved). In Aluminum Extruders Council. EPD representative of condit Life Cycle Inventory: For information and quantities, see EPD Product Scope: Cradle to gate Transportation Distance: By truck: 663 km End-of-Life Scope: 95% Recovered 5% Landfilled (inert material) Module D Scope: Credit given for the avoided burden associated with recov LCI Source: EPD (US), American Extruders Council (2016) EPD Source: 11240237.101.1 EPD Designation Holder: Aluminum Extruders Council (AEC) EPD Program Operator:	dustry-wide EPD from the tions in North America.	D Li P T E

Aluminum, formed	477.9 kg
Used in the following Revit families: Corner 1	265.5 kg (60 yrs)
Corner_2	212.4 kg (60 yrs)
Used in the following Tally entries: Aluminum, formed	
Description: Formed aluminum member. Data based on industr aluminum from the Aluminum Association (EPD ID	
Life Cycle Inventory: 100% Aluminum	
Product Scope: Cradle to gate	
Transportation Distance: By truck: 663 km	
End-of-Life Scope: 95% Recovered 5% Landfilled (inert material)	
Module D Scope: Product has 65% scrap input while remainder is pro burden	ocessed and credited as avoided
LCI Source: RNA: Cold Rolled Aluminium ts/AA (2010) [EPD] GLO: Steel sheet stamping and bending (5% loss) t US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consun RNA: Primary Aluminum Ingot AA/ts (2010) RNA: Secondary Aluminum Ingot AA/ts (2010)	
Aluminum, sheet	16,028.6 kg
Used in the following Revit families:	
(R4) SOUTH VEST ROOF 1/4" STEEL PLATE	112.5 kg (60 yrs) 543.3 kg (60 yrs)
3/16" Aluminum Plate	41.7 kg (60 yrs)
Aluminum Plate 1/8"	25.2 kg (60 yrs)
Aluminum Plate 3/16"	221.2 kg (60 yrs)
C1 - Perf Metal Grid - 2'x6'	2,847.0 kg (60 yrs)
cp_HSEB - Skin Shingle flashing	14.7 kg (60 yrs)
Parapet Cap Coping Rectangular Mullion	500.6 kg (60 yrs) 11,722.4 kg (60 yrs)
Used in the following Tally entries: Aluminum, sheet	
Description: Aluminum sheet, formed and cut. Data based on in aluminum from the Aluminum Association (EPD ID	
Life Cycle Inventory: 100% Aluminum	
Product Scope: Cradle to gate	
Transportation Distance:	
By truck: 663 km	
By truck: 663 km End-of-Life Scope: 95% Recovered 5% Landfilled (inert material)	
End-of-Life Scope: 95% Recovered	ocessed and credited as avoided

RNA: Cold Rolled Aluminium ts/AA (2010) [EPD]

GLO: Steel sheet stamping and bending (5% loss) ts (2017)

US: Electricity grid mix ts (2014)

US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014) RNA: Primary Aluminum Ingot AA/ts (2010) RNA: Secondary Aluminum Ingot AA/ts (2010)

LCI Data (continued)

nodized aluminum, sheet Jsed in the following Revit families:	56.4 kg	End-of-Life Scope: 98% Recovered	
3/16" Aluminum Plate	56.4 kg (60 yrs)	2% Landfilled (inert material)	
LOUVER-parametric	0.0 kg (60 yrs)	Module D Scope:	
Jsed in the following Tally entries: Aluminum, sheet		Product has 28% scrap input while remainder is processed a burden.	nd credited as avoided
Description:		LCI Source:	
Anodized aluminum sheet, formed and cut. Data based on inc		US: Steel deck - Steel deck institute (SDI) (A1-A3) ts (2012)	
anodized aluminum from the Aluminum Extruders Council (EP	D ID 11240237.101.1).	EPD Source:	
ife Cycle Inventory: 100% Anodized aluminum		<u>4786052957.101.1</u>	
		EPD Designation Holder:	
Product Scope: Cradle to gate		Steel Deck Institute	
Fransportation Distance:		EPD Program Operator: UL Environment	
By truck: 663 km		EPD Expiration:	
End-of-Life Scope:		12/15/2020	
95% Recovered			
5% Landfilled (inert material)		Cold formed structural steel	48,358.5 k
Module D Scope: Product has 65% scrap input while remainder is processed and	d craditad as avaidad	Used in the following Revit families:	79.7 kg (60 vm
Product has 65% scrap input while remainder is processed and burden	l credited as avoided	1-C2- GWB on Mtl. Stud 1F5 - 1 HR RATED HORIZONTAL DUCT ENCLOSURE	78.7 kg (60 yrs 62.4 kg (60 yrs
		2-C2- GWB on Mtl. Stud	431.1 kg (60 yr
.Cl Source: RNA: Cold Rolled Aluminium ts/AA (2010) [EPD]		C1 - ACT-1 - 2' x 4'	2,136.8 kg (60 yrs
GLO: Steel sheet stamping and bending (5% loss) ts (2017)		C1 - ACT-2 - 2' x 2' HRC	3,757.6 kg (60 yr
RNA: Anodization of aluminum extrusion AEC/ts (2015) [EPD]		C1 - ACT-3 - 2' x 2' C1 - ACT-5 - 2' x 6'	13,343.2 kg (60 yr 1,655.2 kg (60 yr
US: Electricity grid mix ts (2014)		C1 - Perf Metal Grid - 2'x6'	6,591.0 kg (60 yr
US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014)	C2- GWB on Mtl. Stud	652.6 kg (60 yr
RNA: Primary Aluminum Ingot AA/ts (2010) [EPD]		KPFF - SCOL - Steel - HSS - Rectangular (C) - TC	6,800.6 kg (60 yr
RNA: Secondary Aluminum Ingot AA/ts (2010) [EPD]		KPFF - SFRM - Steel - BRB - Buckling Restrained Brace Linear Wood Ceiling	12,601.9 kg (60 yr 247.5 kg (60 yr
	50 5 km	Used in the following Tally entries:	
gon gas for IGU Jsed in the following Revit families:	58.5 kg	Steel, C-H-stud metal framing	
(FG2-AL) dr-DBL-A	1.3 kg (40 yrs)	Steel, C-stud metal framing Steel, furring channel	
(FG2-CW) dr-DBL-CW	0.2 kg (40 yrs)	Steel, HSS section	
cp_HSEB - Window at Upper Levels System Panel	23.2 kg (40 yrs) 33.7 kg (40 yrs)	Description:	
,	55.7 kg (40 yrs)	Cold-rolled or formed structural steel, such as used in steel	studs.
Jsed in the following Tally entries: Glazing, custom IGU		Life Cycle Inventory: 100% Cold rolled steel	
Description:			
Argon gas in insulating glass unit		Product Scope: Cradle to gate	
ife Cycle Inventory: Argon gas		Transportation Distance:	
5 5		By truck: 431 km	
Product Scope: Cradle to gate		End-of-Life Scope:	
-		98% Recovered	
ransportation Distance: By truck: 940 km		2% Landfilled (inert material)	
ind-of-Life Scope:		Module D Scope:	
100% to landfill (inert waste)		Product has 16% scrap input while remainder is processed a burden	nd credited as avoided
.CI Source:			
US: Argon (gaseous) ts (2017)		LCI Source: RNA: Steel finished cold rolled coil worldsteel (2007)	
		GLO: Steel sheet stamping and bending (5% loss) ts (2017)	
ated steel deck, SDI - EPD	2,255.5 kg	US: Electricity grid mix ts (2014)	
Jsed in the following Revit families:		US: Lubricants at refinery ts (2014)	(2014)
(F3) CONCRETE METAL DECK (STRUCTURAL ONLY)	2,255.5 kg (60 yrs)	GLO: Compressed air 7 bar (medium power consumption) ts GLO: Value of scrap worldsteel (2014)	s (2014)
Jsed in the following Tally entries: Steel, deck			
Description:		Domestic softwood, US, AWC - EPD	2,968.3 k
Coated steel roof and floor deck panels, $1 \frac{1}{2}$ – 3" in depth at	nd manufactured from	Used in the following Revit families: (R4) SOUTH VEST ROOF	141.9 kg (30 yrs
22 – 16 gage material. Industry-wide EPD from the Steel Deck	Institute.	(R4) SOUTH VEST ROOF (INTERIOR)	163.7 kg (30 yrs
ife Cycle Inventory:		Linear Wood Ceiling	2,420.8 kg (30 yrs
For information and quantities, see EPD		P_SOUTH VESTIBULE WALL	135.2 kg (30 yrs
Product Scope:		W09_SOUTH VESTIBULE WALL	106.7 kg (30 yrs
Cradle to gate		Used in the following Tally entries:	
		Wood siding	
Fransportation Distance:		5	

tally.

LCI Data (continued)

Description: Kiln-dried and planed softwood dimensional lumber for standard framing or planking. Industry-wide EPD from the American Wood Council Product Scope: Life Cycle Inventory: For information and quantities, see EPD Product Scope: By truck: 568 km Cradle to gate End-of-Life Scope: Transportation Distance: 98% recovered By truck: 383 km End-of-Life Scope: Module D Scope: 14.5% Recovered 22% Incinerated with energy recovery burden. 63.5% Landfilled (wood product waste) LCI Source: Module D Scope Recovered wood products credited as avoided burden. I CL Source RNA: Softwood lumber CORRIM (2011) EPD Source: 13CA24184.102.1 EPD Designation Holder: American Wood Council and Canadian Wood Council EPD Program Operator: **UL Environment** Description: EPD Expiration: 4/16/2019 99.2 ka Door frame, aluminum, powder-coated, no door Used in the following Revit families: (F1-HMW) dr-SGL-A 10.6 kg (50 vrs) Product Scope (FG1-CW) dr-SGL-CW 10.6 kg (50 yrs) Cradle to gate (FG2-AL) dr-DBL-A 56.0 kg (50 yrs) (N1-HMW) dr-SGL-A 10.9 kg (50 yrs) temp-fence 11.2 kg (50 yrs) By truck: 172 km Used in the following Tally entries: End-of-Life Scope: Door frame, aluminum Description[.] I CL Source Aluminum door frame Life Cycle Inventory: EPD Source: 94% Aluminum 6% Powder coat (by weight) Product Scope: Cradle to gate excludes hardware, casing, sealant **UL Environment** Transportation Distance EPD Expiration: By truck: 568 km 2/14/2022 End-of-Life Scope: 95% aluminum recovered 5% aluminum landfilled (inert material) Module D Scope Product has 36.4% scrap input while remainder is processed and credited as avoided burden LCI Source: DE: Aluminium frame profile, powder coated (EN15804 A1-A3) ts (2017) modified with: RNA: Aluminum extrusion, mill finish - AEC ts (2015) Description: DE: Top coat powder (aluminium) (EN15804 A1-A3) ts (2017) RNA: Secondary Aluminum Ingot AA/ts (2010) rails, clips, etc.) RNA: Primary Aluminum Ingot AA/ts (2010) Door frame, metal, galvanized, no door 3.1 kg Used in the following Revit families: Product Scope: (F1-HMW) dr-SGL-A 3.1 kg (45 yrs) Cradle to gate Used in the following Tally entries: Door frame, steel, galvanized

Description: Stainless steel, 18 ga door frame

Life Cycle Inventory: 100% Galvanized steel Cradle to gate, excludes hardware, jamb, casing, sealant Transportation Distance: 2% landfilled (inert material) Product has a 44% scrap input while remainder is processed and credited as avoided DE: Aluminium wing frame profile, powder coated (2011) modified with: US: Metal roll forming MCA (2010) GLO: Steel sheet stamping and bending (5% loss) ts (2012) RNA: Steel hot dip galvanized worldsteel (2007) EPDM, non-reinforced membrane, 90 mils, SPRI - EPD 60.3 kg Used in the following Revit families (R4) SOUTH VEST ROOF 60.3 kg (20 yrs) Used in the following Tally entries: EPDM, roofing membrane Non-reinforced ethylene propylene diene terpolymer (EPDM) synthetic rubber roofing membrane, default thickness of 90 mils (2.5 mm) Industry-wide EPD from the Single Ply Roofing Industry Life Cycle Inventory: For information and quantities, see EPD Transportation Distance: 100% Landfilled (plastic waste) US: Non-reinforced EPDM single ply roofing membrane, 90 mils, A1-A3 - SPRI ts (2017) 4786842353.103.1 EPD Designation Holder: Single Ply Roofing Industry (SPRI) EPD Program Operator: Fasteners, galvanized steel 4.2 ka Used in the following Revit families: (F1-HMW) dr-SGL-A 0.2 kg (40 yrs) (R4) SOUTH VEST ROOF 3.9 kg (40 yrs) Used in the following Tally entries: Door frame, steel, galvanized EPDM, roofing membrane Galvanized steel part, appropriate for use as fasteners and specialized hardware (bolts, Life Cycle Inventory: 100% Galvanized steel Transportation Distance: By truck: 1001 km End-of-Life Scope: 70% Recovered 30% Landfilled (inert material)

LCI Data (continued)

Module D Scope:

Product has 16% scrap input while remainder is processed and credited as avoided burden

- LCI Source:
- GLO: Steel wire rod worldsteel (2014)
- GLO: Steel turning ts (2017)
- GLO: Electrolytic galvanisation (1 m² steel sheet part, electrolytic) ts (2017) GLO: Value of scrap worldsteel (2014)

Fasteners, stainless steel	261.2 kg
Used in the following Revit families:	
(F1-HMW) dr-SGL-A	0.2 kg (50 yrs)
(FG1-CW) dr-SGL-CW	0.2 kg (50 yrs)
(FG2-AL) dr-DBL-A	1.2 kg (50 yrs)
(N1-HMW) dr-SGL-A	0.2 kg (50 yrs)
(R4) SOUTH VEST ROOF	0.3 kg (50 yrs)
(R4) SOUTH VEST ROOF (INTERIOR)	0.4 kg (50 yrs)
Corner_3	7.3 kg (60 yrs)
Corner_4	7.2 kg (60 yrs)
cp_HSEB - Base Material Panel_vertical	24.7 kg (60 yrs*)
cp_HSEB - Skin Shingle Panel_hoz	189.9 kg (50 yrs)
Linear Wood Ceiling	13.1 kg (50 yrs)
P_SOUTH VESTIBULE WALL	1.6 kg (50-60 yrs)
temp-fence	0.2 kg (50 yrs)
W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse)	13.3 kg (60 yrs)
W09_SOUTH VESTIBULE WALL	1.3 kg (50-60 yrs)
Used in the following Tally entries: Door frame, aluminum Metal roofing panels, formed Stainless Steel, Fasteners Wood siding	
Description: Stainless steel part, appropriate for use as fasteners and speciali rails, clips, etc.). Data based on industry-wide EPDs for primary a from the World Steel Association.	
Life Cycle Inventory: 100% Stainless steel	
Product Scope: Cradle to gate	
Transportation Distance:	

Transportation Distance: By truck: 1001 km

End-of-Life Scope: 98% Recovered 2% Landfilled (inert material)

Module D Scope:

Product has 58% scrap input while remainder is processed and credited as avoided burden

LCI Source:

RER: Stainless steel Quarto plate (304) Eurofer (2010) GLO: Steel turning ts (2017) US: Electricity grid mix ts (2014) RER: Stainless steel flat product (304) - value of scrap Eurofer (2010)

Fiberglass blanket insulation, unfaced

Used in the following Revit families:	
1-N8 GFRC @ FRAMED WALL STAGGERED STUD	25.1 kg (60 yrs)
1-W06 PRE-CAST CONCRETE @ FRAMED WALL	463.2 kg (60 yrs)
1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD	258.1 kg (60 yrs)
1-W07_METAL STUD LIGHTWEIGHT CLADDING	2,485.9 kg (60 yrs)
3-W07_METAL STUD LIGHTWEIGHT CLADDING	36.6 kg (60 yrs)
P_SOUTH VESTIBULE WALL	20.0 kg (60 yrs)
W06 PRE-CAST CONCRETE @ FRAMED WALL	786.0 kg (60 yrs)
W07_METAL STUD LIGHTWEIGHT CLADDING	3,342.5 kg (60 yrs)
W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse)	222.0 kg (60 yrs)
W08_METAL STUD LIGHTWEIGHT CLADDING (CW Parapet) no insu	lation81.2 kg (60 yrs)
W08_METAL STUD LIGHTWEIGHT CLADDING (Parapet)	622.6 kg (60 yrs)
W09_SOUTH VESTIBULE WALL	11.8 kg (60 yrs)
Used in the following Tally entries:	

Steel, C-stud metal framing with insulation

Fiberglass batt density varies from 10-14 kg/m³. Life Cycle Inventory: 100% Fiberglass Product Scope: Cradle to gate Transportation Distance: By truck: 172 km End-of-Life Scope: 100% Landfilled (inert waste) LCI Source: US: Fiberglass Batt NAIMA (2007) 17,443.5 kg Fiberglass mat gypsum sheathing board Used in the following Revit families (R3) SBS OVER METAL DECK 16,801.5 kg (60 yrs) (R4) SOUTH VEST ROOF 166.9 kg (60 yrs) (R4) SOUTH VEST ROOF (INTERIOR) 192.5 kg (60 yrs) 3-W07 METAL STUD LIGHTWEIGHT CLADDING 152.6 kg (60 yrs) W08_METAL STUD LIGHTWEIGHT CLADDING (CW Parapet) no insulation 80.1 kg (60 yrs) Used in the following Tally entries: Fiberglass mat gypsum sheathing Description: Fiberglass treated gypsum sheathing product appropriate for use in high-moisture environments Life Cycle Inventory: 92% Gypsum 8% Fiberglass mat Product Scope: Cradle to gate Transportation Distance: By truck: 172 km End-of-Life Scope: 100% Landfilled (inert waste) I CI Source DE: Gypsum plaster board (Moisture resistant) (EN15804 A1-A3) ts (2017) US: Fiberglass Duct Board NAIMA (2007) 16,719.9 kg Fluid applied synthetic polymer air barrier Used in the following Revit families: 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 59.7 kg (40 yrs) 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 22" 193.9 kg (40 yrs) 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1,929.9 kg (40 yrs) 614.5 kg (40 yrs) 1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD 1-W07_METAL STUD LIGHTWEIGHT CLADDING 5,178.9 kg (40 yrs) 3-W07 METAL STUD LIGHTWEIGHT CLADDING 76.3 kg (40 yrs) W06 PRE-CAST CONCRETE @ FRAMED WALL 1,637.5 kg (40 yrs) W07 METAL STUD LIGHTWEIGHT CLADDING 6,963.6 kg (40 yrs) W09 SOUTH VESTIBULE WALL 65.6 kg (40 yrs) Used in the following Tally entries: Fluid applied synthetic polymer air barrier Description: Liquid-applied rubberized membrane Life Cycle Inventory: 34% Calcium carbonate 30% Polymer blend (SBS) 1% Silica 5% Titanium dioxide 30% Water Product Scope: Cradle to gate for materials only, neglects manufacturing requirements Transportation Distance:

By truck: 555 km End-of-Life Scope:

8,304.9 kg

Description:

70% Landfilled (plastic waste) (excludes water evaporation)

1,224.3 kg

Full building summary

LCI Data (continued)

LCI Source:

- US: Styrene-butadiene rubber (SBR) ts (2017) US: Silica sand (flour) ts (2017)
- US: Tap water from groundwater ts (2017)
- US: Titanium dioxide pigment ts (2017) US: Limestone flour (5mm) ts (2017)
- US: Electricity grid mix ts (2014)
- Fluoropolymer coating, metal stock

Used in the following Revit families:	
1/4" STEEL PLATE	27.7 kg (60 yrs)
3/16" Aluminum Plate	2.1 kg (60 yrs)
Aluminum Plate 1/8"	1.4 kg (60 yrs)
Aluminum Plate 3/16"	12.6 kg (60 yrs)
Corner_1	19.7 kg (60 yrs)
Corner_2	15.8 kg (60 yrs)
Corner_3	16.0 kg (60 yrs)
Corner_4	15.8 kg (60 yrs)
KPFF - SCOL - Steel - HSS - Rectangular (C) - TC	48.6 kg (60 yrs)
KPFF - SCOL - Steel - W - Wide Flange (C) - TC	441.2 kg (60 yrs)
KPFF - SFRM - Steel - BRB - Buckling Restrained Brace	0.0 kg (60 yrs)
KPFF - SFRM - Steel - HSS - Rectangular (C) - TC KPFF - SFRM - Steel - Kicker Brace - L - Angle - TC	80.5 kg (60 yrs) 11.5 kg (60 yrs)
KPFF - SFRM - Steel - L - Angle (C) - TC	1.8 kg (60 yrs)
P_SOUTH VESTIBULE WALL	2.6 kg (60 yrs)
Parapet Cap Coping	74.3 kg (60 yrs)
Rectangular Mullion	421.2 kg (60 yrs)
W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse)	29.4 kg (60 yrs)
W09_SOUTH VESTIBULE WALL	2.1 kg (60 yrs)
Used in the following Tally entries:	
Aluminum, formed	
Aluminum, sheet	
Metal roofing panels, formed Steel, angle	
Steel, HSS section	
Steel, W section (wide flange shape)	
Description:	
Standard fluoropolymer coating for metals. This entry is used a	
MCA EPD for Roll Formed Steel Panels (EPD ID 13CA27321.101	.1).
Life Cycle Inventory:	
100% Fluoropolymer coating	
Product Scope:	
Cradle to gate, including application	
Transportation Distance:	
N/A	
End-of-Life Scope:	
100% Landfilled (inert waste)	
LCI Source:	
US: Coil coating MCA (2010)	
US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014)	
03. Merinai energy non natural gas is (2014)	
Frit (for glazing)	2.1 kg
Used in the following Revit families:	
System Panel	2.1 kg (40 yrs)
Used in the following Tally entries:	
Glazing, custom IGU	
-	
Description: Frit applied at a default density of 0.05 kg/m ² gives 100% cover	rado with 19
micrometers thickness. User to select frit density of 20%, 30%, 4	
coverage.	+070, 5070, 01 0070
5	
Life Cycle Inventory:	

Life Cycle Inventory: 90.9% Glass granulate 9% Butyl acetate 0.1% Nitrocellulose

Product Scope: Cradle to gate

Transportation Distance: N/A

End-of-Life Scope: 100% Landfilled (inert waste)	
LCI Source: US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014)	
DE: Butyl acetate ts (2017) DE: Nitrocellulose (cellulose nitrate) ts (2017) DE: Expanded glass granulate ts (2017)	
IT: Flat-screen printing ENEA (2002) US: Tap water from groundwater ts (2017)	
Galvanized steel Used in the following Revit families:	74,032.5 kg
(A3)_Furr Mtl Stud 3-5/8"_GWB (1-0)	72.0 kg (60 yrs)
(B8)_TYP Mtl Stud 8"_GWB Insulation	36.9 kg (60 yrs)
(R4) SOUTH VEST ROOF (R4) SOUTH VEST ROOF (INTERIOR)	131.4 kg (60 yrs) 1,189.5 kg (60 yrs)
1-B6	9.7 kg (60 yrs)
1-N8 GFRC @ FRAMED WALL STAGGERED STUD	52.1 kg (60 yrs)
1-W06 PRE-CAST CONCRETE @ FRAMED WALL	1,269.2 kg (60 yrs)
1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD 1-W07_METAL STUD LIGHTWEIGHT CLADDING	380.2 kg (60 yrs)
2-A0_Furr Hat Channel 7/8"_GWB (2-0) 2 hour rated	5,461.7 kg (60 yrs) 14.0 kg (60 yrs)
3-W07_METAL STUD LIGHTWEIGHT CLADDING	124.5 kg (60 yrs)
A4_Furr Mtl Stud 4"_GWB (1-0)	157.9 kg (60 yrs)
ACT 4 AcoustiBuilt Ceiling	1,539.8 kg (60 yrs)
B4 B6	90.4 kg (60 yrs) 68.7 kg (60 yrs)
C7- GWB on Mtl. Stud 2	226.3 kg (60 yrs)
HSEB - Pipe Guardrail - GDR-2	1,171.6 kg (60 yrs)
HSEB - Pipe Guardrail - GDR-2 without handrail	1,048.1 kg (60 yrs)
HSEB Guardrail - Cable Rail	626.0 kg (60 yrs)
HSEB Guardrail - Cable Rail without handrail HSEB Handrail - HNDRL-1	1,105.3 kg (60 yrs) 1,445.7 kg (60 yrs)
HSEB Handrail - HNDRL-3	46.3 kg (60 yrs)
HSEB PIPE Handrail - HNDRL-2	205.4 kg (60 yrs)
HSEB-GDR-4_Canerail	24.5 kg (60 yrs)
KPFF - SCOL - Steel - HSS - Rectangular (C) - TC	12,562.2 kg (60 yrs)
KPFF - SCOL - Steel - HSS - Rectangular (C) - TC- 2x KPFF - SCOL - Steel - HSS - Round (C) - TC	567.7 kg (60 yrs) 221.2 kg (60 yrs)
KPFF - SFRM - Steel - HSS - Rectangular (C) - TC	15,577.6 kg (60 yrs)
LCL_Embed_2x3-Nelson-Studs_OffSet	165.4 kg (45 yrs)
P_SOUTH VESTIBULE WALL	62.1 kg (60 yrs)
W06 PRE-CAST CONCRETE @ FRAMED WALL W07_METAL STUD LIGHTWEIGHT CLADDING	2,026.0 kg (60 yrs) 7,767.5 kg (60 yrs)
W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse)	16,481.0 kg (60 yrs)
W08_METAL STUD LIGHTWEIGHT CLADDING (CW Parapet) no insu	
W08_METAL STUD LIGHTWEIGHT CLADDING (Parapet)	1,934.1 kg (60 yrs)
W09_SOUTH VESTIBULE WALL	51.6 kg (60 yrs)
Used in the following Tally entries:	
Steel, C-stud metal framing	
Steel, C-stud metal framing with insulation Steel, furring channel	
Steel, HSS section	
Steel, plate	
Steel, rectangular bar	
Steel, round tubing	
Description: Hot dipped galvanized steel profile, for use with cladding systems.	
Life Cycle Inventory: 100% Steel, hot dip galvanized	
Product Scope: Cradle to gate	
Transportation Distance: By truck: 431 km	
End-of-Life Scope: 98% Recovered	

98% Recovered 2% Landfilled (inert material)

Module D Scope: Product has 44% scrap input while remainder is processed and credited as avoided burden

HEALTH SCIENCES EDUCATION BOTMENING Alternate baseline design

Full building summary

LCI Source: RNA: Steel hot dip galvanized worldsteel (2007) GLO: Steel sheet stamping and bending (5% loss) ts (2014) US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (201 US: Metal roll forming M CA (2010)	4)	Glass fiber reinforced plastic paneling Used in the following Revit families: 1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 22" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD W06 PRE-CAST CONCRETE @ FRAMED WALL	318.0 kg 3.1 kg (60 yrs* 10.2 kg (60 yrs* 101.0 kg (60 yrs* 32.2 kg (60 yrs* 171.5 kg (60 yrs*
GLO: Value of scrap worldsteel (2014)		Used in the following Tally entries: Fiberglass clip system	
Salvanized steel decking Used in the following Revit families: (F2) CONCRETE METAL DECK (F3) CONCRETE METAL DECK W/ TOPPING SLAB (R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2 (R3) SBS OVER METAL DECK (R4) SOUTH VEST ROOF (INTERIOR)	89,764.5 kg 55,227.3 kg (60 yrs) 3,185.1 kg (60 yrs) 7,867.3 kg (60 yrs) 23,414.7 kg (60 yrs) 70.0 kg (60 yrs)	Description: Glass fibers with polyester resin formed into solid sheet stock Life Cycle Inventory: 50% Glass fibers 50% Polyester resin	
Used in the following Tally entries:		Product Scope: Cradle to gate	
Steel, deck Description:		Transportation Distance: By truck: 172 km	
Hot dip galvanized steel roof decking, corrugated profile. Default galvanized to G90 standards, coated on both sides of 20 gauge s and precut.		End-of-Life Scope: 100% landfilled (plastic waste)	
Life Cycle Inventory: 100% Steel, hot dip galvanized Product Scope: Cradle to gate for deck only. Transportation Distance:		LCI Source: DE: Polyester Resin unsaturated (UP) ts (2017) US: Glass fibres ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) US: Lubricants at refinery ts (2014)	
By truck: 431 km End-of-Life Scope: 98% Recovered		GLO: Compressed air 7 bar (medium power consumption) ts (2014)	
2% Landfilled (inert material)		Glazing, monolithic sheet, generic Used in the following Revit families:	4,667.0 kg
Module D Scope: Product has 44% scrap input while remainder is processed and cr burden	edited as avoided	cp_HSEB - Window at Upper Levels System Panel	3,859.1 kg (40 yrs 807.9 kg (40 yrs
LCI Source: RNA: Steel hot dip galvanized worldsteel (2007) GLO: Steel sheet stamping and bending (5% loss) ts (2014) US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (201 US: Metal roll forming M CA (2010)	4)	Used in the following Tally entries: Glazing, custom IGU Description: Standard float glass, uncoated. Note: this entry is appropriate for cle Default thickness is 3 mm. Life Cycle Inventory: Glazing	ear or tinted glass.
GLO: Value of scrap worldsteel (2014)		Product Scope: Cradle to gate	
FRC, spray coating Used in the following Revit families: cp_HSEB - Skin Shingle Panel_hoz	35,240.5 kg 35,240.5 kg (50 yrs)	Transportation Distance: By truck: 940 km	
Used in the following Tally entries: Glass fiber reinforced concrete, spray coating		End-of-Life Scope: 100% Landfilled (inert waste)	
Description: Glass fiber reinforced concrete (GFRC) used in spray-up process, propulsion agent.	inclusive of	LCI Source: DE: Window glass simple (EN15804 A1-A3) ts (2017)	
Life Cycle Inventory: 21% Cement		Glazing, monolithic sheet, safety glass Used in the following Revit families: (N1-HMW) dr-SGL-A	68.3 kg (30 yrs
63% Sand 16% Water 3% Acrylate resin		Used in the following Tally entries: Glazing, monolithic sheet	
Product Scope: Cradle to gate, includes propulsion agent, excludes all other insta	illation impacts	Description: Standard safety glass, default thickness is 3mm. Note: this entry is a	ppropriate for clear
Transportation Distance: By truck: 172 km		or tinted glass. Life Cycle Inventory:	
End-of-Life Scope: 100% Landfilled		Sodium sulphate Soda (Na2CO3) Silica sand	
LCI Source: US: Portland cement PCA/ts (2014) US: Tap water from groundwater ts (2017) US: Silica sand (Excavation and processing) ts (2017) US: Glass fibres ts (2017)		Calcium hydroxide Lime Tin Dolomite	
DE: Acrylate resin (epoxy-functional) ts (2017)		Product Scope: Cradle to gate	

Transportation Distance: By truck: 940 km		Hollow door, exterior, aluminum, anodized Used in the following Revit families:	86.2
End-of-Life Scope:		(F2) dr-Double-Flush-with 4 sided jambs	86.2 kg (30 yı
100% Landfilled (inert waste) LCI Source:		Used in the following Tally entries: Door, exterior, aluminum	
DE: Window glass simple (EN15804 A1-A3) ts (2017)		Description: Anodized aluminum, exterior, with interior steel supports and polyu	urethane foam
lazing, monolithic sheet, tempered	34,096.8 kg	insulation	
Used in the following Revit families:	(101-(40)	Life Cycle Inventory:	
(FG1-CW) dr-SGL-CW (FG2-AL) dr-DBL-A	61.9 kg (40 yrs) 862.9 kg (40 yrs)	3% Steel 71% Anodized aluminum	
(FG2-CW) dr-DBL-CW	208.5 kg (40 yrs)	25% Polyurethane foam	
cp_HSEB - Window at Upper Levels	10,856.3 kg (40 yrs)		
System Panel	22,107.2 kg (40 yrs)	Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesives	
Used in the following Tally entries:		Transportation Distance:	
Glazing, custom IGU		By truck: 568 km	
Description:	and the state of t	End-of-Life Scope:	
Tempered float glass. Note: this entry is appropriate for cl thickness is 3 mm.	ear or tinted glass. Default	70% Steel recovered	
		30% Steel landfilled (inert material)	
Life Cycle Inventory: Tempered glazing		95% Aluminum recovered (includes processing and avoided burder 5% Aluminum is landfilled (inert material)	h credit)
		100% Insulation landfilled (plastic material)	
Product Scope: Cradle to gate		Module D Scope:	
-		Product has 50% aluminum scrap input and 1% steel scrap input w	hile remainder is
Transportation Distance: By truck: 940 km		processed and credited as avoided burden.	
		LCI Source:	
End-of-Life Scope: 100% Landfilled (inert waste)		DE: Polyurethane foam (PUR) ts (2017)	
		RNA: Anodization of aluminium (EN15804 A1-A3) ts (2015)	
LCI Source:		RNA: Cold Rolled Aluminum AA/ts (2010)	
DE: Window glass simple (EN15804 A1-A3) ts (2017) US: Electricity grid mix ts (2014)		GLO: Steel sheet stamping and bending (5% loss) ts (2017) US: Electricity grid mix ts (2014)	
US: Thermal energy from natural gas ts (2014)		US: Lubricants at refinery ts (2014)	
		GLO: Compressed air 7 bar (medium power consumption) ts (2014)	
ardware, stainless steel	45.2 kg	RNA: Steel hot dip galvanized worldsteel (2007)	
Used in the following Revit families:	2	RNA: Secondary Aluminum Ingot AA/ts (2010) RNA: Primary Aluminum Ingot AA/ts (2010)	
(F1-HMW) dr-SGL-A	7.0 kg (60 yrs)	KNA. Filmary Aluminum ingot AA/IS (2010)	
(F2) dr-Double-Flush-with 4 sided jambs	7.5 kg (60 yrs)	Hellen, deer, enterier, eluminum, enediered leves vision nevel	226.0
(FG2-AL) dr-DBL-A (FG2-CW) dr-DBL-CW	10.3 kg (60 yrs) 10.3 kg (60 yrs)	Hollow door, exterior, aluminum, anodized, large vision panel Used in the following Revit families:	236.9
(N1-HMW) dr-SGL-A	5.3 kg (60 yrs)	(FG2-AL) dr-DBL-A	118.4 kg (30 y
temp-fence	4.7 kg (60 yrs)	(FG2-CW) dr-DBL-CW	118.4 kg (30 y
Used in the following Tally entries:		Used in the following Tally entries:	
Door, exterior, aluminum		Door, exterior, aluminum	
Door, exterior, steel Door, interior, steel		Description:	
		Hollow, anodized aluminum exterior door inclusive of large vision p	oanel (>50% door
Description: Finished, cast stainless steel, applicable for door, window	or other accessory bardware	area), polyurethane foam insulation, no frame	
	of other accessory naruware	Life Cycle Inventory:	
Life Cycle Inventory: 100% Stainless steel		47% Glass 3% Steel	
		37% Anodized aluminum	
Product Scope:		13% Polyurethane foam	
Cradle to gate		Product Scope:	
Transportation Distance: By truck: 1001 km		Cradle to gate, excludes assembly, frame, hardware, and adhesives	
•		Transportation Distance:	
End-of-Life Scope: 98% Recovered		By truck: 568 km	
2% Landfilled (inert material)		End-of-Life Scope:	
		70% Steel recovered	
Module D Scope:	and credited as avoided	30% Steel landfilled (inert material)	
•		95% Aluminum recovered (includes processing and avoided burder 5% Aluminum is landfilled (inert material)	n credit)
Module D Scope: Product has 58% scrap input while remainder is processed burden		100% Insulation landfilled (plastic material)	
Product has 58% scrap input while remainder is processed burden		(Provide matching)	
Product has 58% scrap input while remainder is processed burden		100% Glass landfilled (inert material)	
Product has 58% scrap input while remainder is processed burden LCI Source: RER: Stainless steel Quarto plate (304) Eurofer (2010) DE: Steel cast part machining ts (2017)			
burden LCI Source: RER: Stainless steel Quarto plate (304) Eurofer (2010) DE: Steel cast part machining ts (2017) US: Electricity grid mix ts (2014)	fer (2010)	100% Glass landfilled (inert material) Module D Scope: Product has 26% aluminum scrap input and 1% steel scrap input w	hile remainder is
Product has 58% scrap input while remainder is processed burden LCI Source: RER: Stainless steel Quarto plate (304) Eurofer (2010) DE: Steel cast part machining ts (2017)	fer (2010)	Module D Scope:	hile remainder is
Product has 58% scrap input while remainder is processed burden LCI Source: RER: Stainless steel Quarto plate (304) Eurofer (2010) DE: Steel cast part machining ts (2017) US: Electricity grid mix ts (2014)	fer (2010)	Module D Scope: Product has 26% aluminum scrap input and 1% steel scrap input w	hile remainder is
Product has 58% scrap input while remainder is processed burden LCI Source: RER: Stainless steel Quarto plate (304) Eurofer (2010) DE: Steel cast part machining ts (2017) US: Electricity grid mix ts (2014)	fer (2010)	Module D Scope: Product has 26% aluminum scrap input and 1% steel scrap input w processed and credited as avoided burden.	hile remainder is

LCI Data (continued)

RNA: Cold Rolled Aluminum AA/ts (2010) GLO: Steel sheet stamping and bending (5% loss) ts (2017) US: Electricity grid mix ts (2014)		RNA: Steel finsihed cold rolled coil worldsteel (2007) DE: Mineral fibres ceiling boards (EN15804 A1-A3) ts (2017)	
US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (2014	1)	Hollow door, interior, steel, galvanized	157.1 k
RNA: Steel hot dip galvanized worldsteel (2007)		Used in the following Revit families: (F1-HMW) dr-SGL-A	67.3 kg (50 yrs
RNA: Secondary Aluminum Ingot AA/ts (2010) RNA: Primary Aluminum Ingot AA/ts (2010)		temp-fence	89.7 kg (50 yrs
DE: Window glass simple (EN15804) ts (2017)		Used in the following Tally entries: Door, interior, steel	
lollow door, exterior, steel, galvanized	96.7 kg	Description:	
Used in the following Revit families: (N1-HMW) dr-SGL-A	96.7 kg (30 yrs)	Hollow, galvanized steel interior door inclusive of honeycon	no kran paper, no trame
Used in the following Tally entries:		Life Cycle Inventory: 12% Kraft core	
Door, exterior, steel		88% Galvanized steel	
Description: Hollow door, exterior, steel, 18 ga. inclusive of EPS insulation, no f	rame	Product Scope: Cradle to gate, excludes assembly, frame, hardware, and ad	hesives
Life Cycle Inventory: 5% Extruded polystyrene		Transportation Distance: By truck: 568 km	
95% Galvanized steel		End-of-Life Scope:	
Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesive:	5	70% Steel recovered 30% Steel landfilled (inert material)	
Transportation Distance:		100% Core landfilled (biodegradable material)	
By truck: 568 km		Module D Scope:	
End-of-Life Scope:		Product has 41% scrap input while remainder is processed a burden.	and credited as avoided
70% Steel recovered 30% Steel landfilled (inert material)		LCI Source:	
100% Core landfilled (biodegradable material)		DE: Kraft paper ts (2017)	
Module D Scope:		GLO: Steel sheet stamping and bending (5% loss) ts (2017) GLO: Value of scrap worldsteel (2014)	
Product has 44% scrap input while remainder is processed and cre burden.	edited as avoided	US: Electricity grid mix ts (2014)	
LCI Source:		US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) t:	s (2014)
DE: Expanded Polystyrene (PS 25) (EN15804 A1-A3) ts (2017) GLO: Steel sheet stamping and bending (5% loss) ts (2017)		RNA: Steel hot dip galvanized worldsteel (2007)	
GLO: Value of scrap worldsteel (2014) US: Electricity grid mix ts (2014)		Hot rolled structural steel, AISC - EPD	518,506.5 k
US: Lubricants at refinery ts (2014)	•	Used in the following Revit families: HSEB Type C - STR-4_Conc filled w/ C channel	1,158.0 kg (60 yrs
GLO: Compressed air 7 bar (medium power consumption) ts (2014 RNA: Steel hot dip galvanized worldsteel (2007)	+)	HSEB Type C_STR-10_Conc filled w/ C channel	332.8 kg (60 yrs
		HSEB Type C_STR-5_Conc filled w/ C channel 2 KPFF - SCOL - Steel - W - Wide Flange (C) - TC	3,047.8 kg (60 yr: 122,740.2 kg (60 yr:
ollow door, interior, steel, fire-rated	81.8 kg	KPFF - SFRM - Steel - C - Channel (C) - TC	4,966.2 kg (60 yrs
Used in the following Revit families: (F1-HMW) dr-SGL-A	81.8 kg (50 yrs)	KPFF - SFRM - Steel - Kicker Brace - L - Angle - TC KPFF - SFRM - Steel - L - Angle (C) - TC	976.4 kg (60 yrs 264.1 kg (60 yrs
Used in the following Tally entries:	5. 5.	KPFF - SFRM - Steel - W - Wide Flange (C) - TC	384,876.4 kg (60 yrs
Door, interior, steel		KPFF - SFRM - Steel - WT - Wide Flange Tee - TC KPFF - SFRM - Steel - WT - Wide Flange Tee (C) - TC	40.7 kg (60 yrs 104.0 kg (60 yrs
Description: Fire-rated door, interior, steel, inclusive of mineral fiber insulation,	no frame	Used in the following Tally entries: Steel, angle	
Life Cycle Inventory:		Steel, C channel	
72% Steel 28% Mineral wool		Steel, W section (wide flange shape)	
		Description:	rican Institute of Steel
Product Scope:	s	Hot rolled structural steel. Industry-wide EPD from the Ame Construction	
Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesive: Transportation Distance:	5	Construction. Life Cycle Inventory:	
Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesive: Transportation Distance: By truck: 568 km	5	Construction. Life Cycle Inventory: For information and quantities, see EPD	
Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesive: Transportation Distance: By truck: 568 km End-of-Life Scope: 70% Steel recovered	s	Construction. Life Cycle Inventory:	
Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesive: Transportation Distance: By truck: 568 km End-of-Life Scope:	5	Construction. Life Cycle Inventory: For information and quantities, see EPD Product Scope:	
Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesive: Transportation Distance: By truck: 568 km End-of-Life Scope: 70% Steel recovered 30% Steel landfilled (inert material) 100% Insulation landfilled (plastic material) Module D Scope:		Construction. Life Cycle Inventory: For information and quantities, see EPD Product Scope: Cradle to gate Transportation Distance:	
Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesive: Transportation Distance: By truck: 568 km End-of-Life Scope: 70% Steel recovered 30% Steel landfilled (inert material) 100% Insulation landfilled (plastic material)		Construction. Life Cycle Inventory: For information and quantities, see EPD Product Scope: Cradle to gate Transportation Distance: By truck: 431 km End-of-Life Scope: 98% Recovered	
Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesive: Transportation Distance: By truck: 568 km End-of-Life Scope: 70% Steel recovered 30% Steel recovered 30% Steel landfilled (inert material) 100% Insulation landfilled (plastic material) Module D Scope: Product has 12% scrap input while remainder is processed and cre burden.		Construction. Life Cycle Inventory: For information and quantities, see EPD Product Scope: Cradle to gate Transportation Distance: By truck: 431 km End-of-Life Scope: 98% Recovered 2% Landfilled (inert material)	
Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesive: Transportation Distance: By truck: 568 km End-of-Life Scope: 70% Steel recovered 30% Steel landfilled (inert material) 100% Insulation landfilled (plastic material) 100% Insulation landfilled (plastic material) Module D Scope: Product has 12% scrap input while remainder is processed and cre burden. LCI Source: DE: Expanded Polystyrene (PS 30) (EN15804 A1-A3) ts (2017)		Construction. Life Cycle Inventory: For information and quantities, see EPD Product Scope: Cradle to gate Transportation Distance: By truck: 431 km End-of-Life Scope: 98% Recovered	tween recovered material
Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesive: Transportation Distance: By truck: 568 km End-of-Life Scope: 70% Steel recovered 30% Steel landfilled (inert material) 100% Insulation landfilled (plastic material) 100% Insulation landfilled (plastic material) Module D Scope: Product has 12% scrap input while remainder is processed and cre burden. LCI Source:		Construction. Life Cycle Inventory: For information and quantities, see EPD Product Scope: Cradle to gate Transportation Distance: By truck: 431 km End-of-Life Scope: 98% Recovered 2% Landfilled (inert material) Module D Scope:	tween recovered material
Product Scope: Cradle to gate, excludes assembly, frame, hardware, and adhesive: Transportation Distance: By truck: 568 km End-of-Life Scope: 70% Steel recovered 30% Steel landfilled (inert material) 100% Insulation landfilled (plastic material) Module D Scope: Product has 12% scrap input while remainder is processed and cre burden. LCI Source: DE: Expanded Polystyrene (PS 30) (EN15804 A1-A3) ts (2017) GLO: Steel sheet stamping and bending (5% loss) ts (2017)		Construction. Life Cycle Inventory: For information and quantities, see EPD Product Scope: Cradle to gate Transportation Distance: By truck: 431 km End-of-Life Scope: 98% Recovered 2% Landfilled (inert material) Module D Scope: Product has 100% scrap input, burden reflects difference be	tween recovered material

157.1 kg 67.3 kg (50 yrs) 89.7 kg (50 yrs)

me, hardware, and adhesives material) mainder is processed and credited as avoided ng (5% loss) ts (2017) power consumption) ts (2014) eel (2007) 518,506.5 kg channel 1,158.0 kg (60 yrs) channel 332.8 kg (60 yrs) hannel 2 3,047.8 kg (60 yrs) (C) - TC 122,740.2 kg (60 yrs) 4,966.2 kg (60 yrs) 976.4 kg (60 yrs) TC Angle - TC 264.1 kg (60 yrs) 384,876.4 kg (60 yrs) 40.7 kg (60 yrs) e (C) - TC ge Tee - TC ge Tee (C) - TC 104.0 kg (60 yrs) ide EPD from the American Institute of Steel D reflects difference between recovered material ns AISC (2010)

EPD Source: <u>4786979051.102.1</u> EPD Designation Holder:		Life Cycle Inventory: 3% PVB film (30% adipic acid 70% PVB)
American Institute of Steel Construction EPD Program Operator:		97% Glass Product Scope: Cradle to gate
UL Environment EPD Expiration:		Transportation Distance: N/A
3/31/2021		End-of-Life Scope:
IGU spacer Used in the following Revit families:	283.4 kg	100% Landfilled (inert waste) LCI Source:
(FG2-AL) dr-DBL-A (FG2-CW) dr-DBL-CW cp_HSEB - Window at Upper Levels System Panel	6.3 kg (40 yrs) 1.2 kg (40 yrs) 112.7 kg (40 yrs) 163.2 kg (40 yrs)	DE: Adipic acid from cyclohexane ts (2017) DE: Polyvinyl Butyral Granulate (PVB) ts (2017) GLO: Plastic film (PE, PP, PVC) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014)
Used in the following Tally entries: Glazing, custom IGU		US: Lubricants at refinery ts (2014)
Description: Insulating glass unit (IGU) spacer and gasket used to separate two glass. Density value assumes a 1/2" (13/2 mm) spacer. Life Cycle Inventory: 70% Polybutadiene rubber spacer	or more plies of	Lightweight concrete, 5000 psi, Pacific Northwest regional average 65,224.5 kg Used in the following Revit families: 1,437.3 kg (60 yrs) HSEB Type C - STR-4_Conc filled w/ C channel 552.8 kg (60 yrs) HSEB Type C_STR-5_Conc filled w/ C channel 2 2,234.5 kg (60 yrs)
30% Nitrile rubber spacer Product Scope: Cradle to gate		HSEB Type C_STR-6_Conc filled w/ Plate Stringer - Roof Access 413.5 kg (60 yrs; HSEB Type C_STR-8_Conc filled w/ Plate 318.4 kg (60 yrs; KPFF - SCOL - Concrete - Round 1.268.3 kg (60 yrs; LCL_C_Pilaster_Rect_0w)d 58,999.5 kg (60 yrs;
Transportation Distance: By truck: 940 km		Used in the following Tally entries: Cast-in-place concrete, lightweight structural concrete, 5000 psi
End-of-Life Scope: 100% Landfilled (inert waste)		Description: Lightweight concrete, 5000 psi, Pacific Northwest regional average. Mix design
LCI Source: DE: Polybutadiene rubber ts (2017) DE: Nitrile butadiene rubber, incl. MMA (NBR-speciality) ts (2017)		matches National Ready-Mix Concrete Association (NRMCA) Industry-wide EPD. Life Cycle Inventory: Expanded shale: 34%, Sand: 32%, Portland cement PCA - EPD: 19%, Water: 10%, Fly ash: 5%, Expanded slag: 1%, Admixture: <1%
Laminated spruce panel board Used in the following Revit families: C7- GWB on Mtl. Stud 2	278.9 kg 278.9 kg (30 yrs)	Product Scope: Cradle to gate Anchors, ties, and metal accessories outside of scope (<1% mass)
Used in the following Tally entries: Plywood, interior grade		Transportation Distance: By truck: 24 km
Description: Laminated spruce woodboard (Duo-/Trio boards) consists of layers with phenolic resin-based adhesive. Laminated woodboards in com laminated timber are thicker (45mm). Appropriate for use in interio	nparison to	End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material)
Life Cycle Inventory: 100% Laminated wood board		Module D Scope: Avoided burden credit for coarse aggregate, includes grinding energy
Product Scope: Cradle to gate, excludes finishes laminate as proxy for glue and adhesives during installation Transportation Distance: By truck: 383 km End-of-Life Scope: 14.5% Recovered		LCI Source: US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017) DE: Gravel (Grain size 2/32) (EN15804 A1-A3) ts (2017) DE: Fly ash (EN15804 A1-A3) ts (2017) DE: Slag-tap granulate (EN15804 A1-A3) ts (2017) DE: Expanded clay (EN15804 A1-A3) ts (2017) DE: alcium nitrate ts (2017)
22% Incinerated with energy recovery 63.5% Landfilled (wood product waste)		DE: Sodium ligninsulfonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017)
Module D Scope: Recovered wood products credited as avoided burden.		US: Colophony (rosin, refined) from CN pine gum rosin ts (2017) US: Tap water from groundwater ts (2017) US: Electricity grid mix s (2014)
LCI Source:		US: Natural gas mix ts (2014) US: Diesel mix at filling station (100% fossil) ts (2014)
DE: Laminated wood panel board ts (2017)		
	58.5 kg 58.5 kg (40 yrs)	US: Liquefied Petroleum Gas (LPG) (70% propane 30% utane) ts (2014) US: Light fuel oil at refinery ts (2014)
DE: Laminated wood panel board ts (2017) Laminating (for glazing) Used in the following Revit families:	-	30% utane) ts (2014)

Low-e coating (for glazing) Used in the following Revit families:	312.7 kg	Overhead door closer, aluminum Used in the following Revit families:	26.1 kg
(FG2-AL) dr-DBL-A (FG2-CW) dr-DBL-CW	7.1 kg (40 yrs) 1.3 kg (40 yrs)	(F1-HMW) dr-SGL [–] A (FG2-AL) dr-DBL-A	4.7 kg (30 yrs 10.7 kg (30 yrs
cp_HSEB - Window at Upper Levels System Panel	126.8 kg (40 yrs) 177.5 kg (40 yrs)	(FG2-CW) dr-DBL-CW	10.7 kg (30 yrs
Used in the following Tally entries: Glazing, custom IGU		Used in the following Tally entries: Door, exterior, aluminum Door, interior, steel	
Description: Low-e coating for application to glazing lite		Description: Aluminum overhead door closer. Data based on product-speci	fic EPD from FV S+B.
Life Cycle Inventory: Ferro chrome mix		Life Cycle Inventory: See EPD	
Nickel mix Tin Silver mix		Product Scope: Cradle to gate	
Product Scope: Cradle to gate		Transportation Distance: By truck: 1001 km	
Transportation Distance: N/A		End-of-Life Scope: 95% Recovered 5% Landfilled (inert material)	
End-of-Life Scope: 100% Landfilled (inert waste) LCI Source:		Module D Scope: Product has 0% scrap input, burden reflects difference betweer	n recovered material and
Low-e coating from DE: Double glazing unit (EN15804 A1-A3) ts (20	017)	scrap input LCI Source: DE: Overhead door closer aluminum - FV S+B PE-EPD (2009)	
Mineral wool, high density, NAIMA - EPD Used in the following Revit families:	39,858.1 kg	RNA: Secondary Aluminum Ingot AA/ts (2010) RNA: Primary Aluminium Ingot AA/ts (2010)	
1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W05 CONCRETE WALL W/ EXTERIOR INSULATION 22" 1-W06 PRE-CAST CONCRETE @ FRAMED WALL	38.2 kg (60 yrs) 248.2 kg (60 yrs) 1,235.2 kg (60 yrs)	EPD Source: EPD-ARG-20160183-IBG1-EN	
1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD 1-W07_METAL STUD LIGHTWEIGHT CLADDING	393.3 kg (60 yrs) 13,257.9 kg (60 yrs)	EPD Designation Holder: European Federation of Associations of Lock and Builders Hard	lware Manufacturers
3-W07_METAL STUD LIGHTWEIGHT CLADDING W06 PRE-CAST CONCRETE @ FRAMED WALL	195.3 kg (60 yrs) 2,096.0 kg (60 yrs)	(ARGE)	
W07_METAL STUD LIGHTWEIGHT CLADDING W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse)	17,826.7 kg (60 yrs) 1,184.1 kg (60 yrs)	EPD Program Operator: Institut Bauen and Umwelt (IBU)	
W08_METAL STUD LIGHTWEIGHT CLADDING (Parapet) W09_SOUTH VESTIBULE WALL	3,320.3 kg (60 yrs) 63.0 kg (60 yrs)	EPD Expiration: 9/13/2021	
Used in the following Tally entries: Mineral wool, board, generic		Paint, enamel, solvent based	9,648.7 kg
Description: Rock board, heavy density. Industry-wide EPD from the North Ame Manufacturers Association. EPD representative of conditions in Nor		Used in the following Revit families: 3/16" Aluminum Plate KPFF - SCOL - Steel - HSS - Rectangular (C) - TC	5.0 kg (15 yrs 255.3 kg (15 yrs
Life Cycle Inventory: For information and quantities, see EPD		KPFF - SCOL - Steel - HSS - Rectangular (C) - TC- 2x KPFF - SCOL - Steel - HSS - Round (C) - TC KPFF - SFRM - Steel - C - Channel (C) - TC	23.1 kg (15 yrs 10.3 kg (15 yrs 94.7 kg (15 yrs
Product Scope: Cradle to gate		KPFF - SFRM - Steel - HSS - Rectangular (C) - TC KPFF - SFRM - Steel - W - Wide Flange (C) - TC	182.2 kg (15 yrs) 9,069.8 kg (15 yrs)
Transportation Distance: By truck: 172 km		KPFF - SFRM - Steel - WT - Wide Flange Tee - TC KPFF - SFRM - Steel - WT - Wide Flange Tee (C) - TC	1.9 kg (15 yrs) 6.4 kg (15 yrs)
End-of-Life Scope: 100% Landfilled (inert waste)		Used in the following Tally entries: Aluminum, sheet Steel. C channel	
LCI Source: US: Rock board insulation (heavy density) NAIMA (2007)		Steel, HSS section Steel, W section (wide flange shape)	
EPD Source: 4786060412.102.1		Description: Solvent-based enamel paint, appropriate for use on metals	
- D Designation Holder: North American Insulation Manufacturer's Association (NAIMA)		Life Cycle Inventory: 17% Binding agent	
EPD Program Operator: UL Environment		16% Pigments and fillers 67% Solvent	
EPD Expiration: 11/8/2018		Product Scope: Cradle to gate, including emissions during application Transportation Distance:	
		Transportation Distance: By truck: 642 km	
		End-of-Life Scope: 33% Solids landfilled (plastic waste)	
		LCI Source: DE: Solvent paint white (EN15804 A1-A3) ts (2017)	

Paint, exterior metal coating, silicone-based	767.3 kg
Used in the following Revit families: (F3) CONCRETE METAL DECK (STRUCTURAL ONLY) (R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2 (R3) SBS OVER METAL DECK (R4) SOUTH VEST ROOF cp_HSEB - Skin Shingle flashing HSEB - STR-2_Precast Tread Steel Riser 2 HSEB Type C_STR-4_Conc filled w/ C channel HSEB Type C_STR-10_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel 2 HSEB Type C_STR-6_Conc filled w/ Plate Stringer - Roof Access HSEB Type C_STR-8_Conc filled w/ Plate HSEB_TR-9_Precast Tread Steel Riser LOUVER-parametric	60.0 kg (30 yrs) 165.6 kg (30 yrs) 492.8 kg (30 yrs) 1.2 kg (30 yrs) 10.2 kg (30 yrs) 10.2 kg (30 yrs) 5.1 kg (30 yrs) 1.9 kg (30 yrs) 11.2 kg (30 yrs) 3.8 kg (30 yrs) 0.8 kg (30 yrs) 2.5 kg (30 yrs) 11.1 kg (30 yrs)
Used in the following Tally entries: Aluminum, sheet Steel, deck Steel, plate	
Description: Silicone-based metal paint, with a default coating thickness of 100 m	icrons
Life Cycle Inventory: 23% Binding agent 35% Pigments and fillers 40% Water 1.5% Organic solvents Product Scope: Cradle to gate, including emissions during application	
Transportation Distance: By truck: 642 km	
End-of-Life Scope: 100% to landfill (plastic waste)	
LCI Source: DE: Application coating silicone (building, exterior, white) ts (2017)	
Paint, exterior metal coating, silicone-based, by area Used in the following Revit families: HSEB Type C - STR-4_Conc filled w/ C channel HSEB Type C_STR-10_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel 2	18.2 kg 5.1 kg (30 yrs) 1.9 kg (30 yrs) 11.2 kg (30 yrs)
Used in the following Tally entries: Steel, C channel	
Description: Silicone-based metal paint, with a default coating thickness of 100 m	icrons
Life Cycle Inventory: 23% Binding agent 35% Pigments and fillers 40% Water 1.5% Organic solvents	
Product Scope: Cradle to gate, including emissions during application	
Transportation Distance: By truck: 642 km	
End-of-Life Scope: 100% to landfill (plastic waste)	
LCI Source: DE: Application coating silicone (building, exterior, white) ts (2017)	
Paint, interior acrylic latex Used in the following Revit families: 1-C2- GWB on Mtl. Stud 1-W07_METAL STUD LIGHTWEIGHT CLADDING 2-A0_Furr Hat Channel 7/8"_GWB (2-0) 2 hour rated 2-C2- GWB on Mtl. Stud 3-W07_METAL STUD LIGHTWEIGHT CLADDING A4_Furr Mtl Stud 4"_GWB (1-0) ACT 4 AcoustiBuilt Ceiling C1 - ACT-1 - 2' x 4' C2- GWB on Mtl. Stud	3,448.0 kg 14.1 kg (7 yrs) 1,791.9 kg (7 yrs) 4.1 kg (7 yrs) 96.7 kg (7 yrs) 26.4 kg (7 yrs) 60.8 kg (7 yrs) 182.3 kg (7 yrs) 628.7 kg (7 yrs) 456.2 kg (7 yrs)

C7- GWB on Mtl. Stud 2 W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse)	26.8 kg (7 yrs) 160.0 kg (7 yrs)
Used in the following Tally entries: Acoustic ceiling system, mineral fiber board Wall board, gypsum	
Description: Acrylic-based paint for interior applications	
Life Cycle Inventory: 21% Binding agent 35% Pigments and fillers 42% Water 2% Organic solvents	
Product Scope: Cradle to gate, including emissions during application	
Transportation Distance: By truck: 642 km	
End-of-Life Scope: 100% to landfill (plastic waste)	
LCI Source: DE: Application paint emulsion (building, interior, white, wear re	esistant) ts (2017)
Phenolic resin solid surfacing, sheet	2,684.0 kg
Used in the following Revit families: cp_HSEB - Base Material Panel_vertical	2,684.0 kg (20 yrs)
Used in the following Tally entries: Phenolic resin solid surface, sheet	
Description: Phenolic resin saturated kraft paper formed into solid sheet sto	ck
Life Cycle Inventory: 85% Kraft paper 15% Phenolic resin	
Product Scope: Cradle to gate	
Transportation Distance: By truck: 640 km	
End-of-Life Scope: 100% landfilled (plastic waste)	
LCI Source: US: Phenolic resin (45% concentration) ts (2017) GLO: Plastic extrusion profile (unspecific) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts (20 EU-28: Kraft paper ts (2017)	014)
PIR rigid foam insulation, roof, R=20.5, PIMA - EPD	12,008.0 kg
Used in the following Revit families: (R3) SBS OVER METAL DECK (R4) SOUTH VEST ROOF	11,996.3 kg (60 yrs) 11.7 kg (60 yrs)
Used in the following Tally entries: Polyisocyanurate (PIR), board	
Description: Polyisocyanurate rigid foam roof insulation with glass-fiber reir of 20.5, 3.5" thickness (89 mm). Industry-wide EPD from the Pol Insulation Manufacturers Association.	
Life Cycle Inventory: For information and quantities, see EPD	
Product Scope: Cradle to gate	
Transportation Distance: By truck: 250 km	
End-of-Life Scope:	

LCI Data (continued)

LCI Source: RNA: Polyisocyanurate rigid foam board roof insulaton, R=20.5 (A1-A3) ts-EPD (2013)
EPD Source: EPD10043	
EPD Designation Holder: Polyisocyanurate Insulation Manufacturers Association	
EPD Program Operator: NSF International	
EPD Expiration: 2/6/2020	
PIR rigid foam insulation, wall, R=14.6, PIMA - EPD Used in the following Revit families: cp_HSEB - Skin Shingle flashing	9.8 kg 9.8 kg (60 yrs)
Used in the following Tally entries: Polyisocyanurate (PIR), board	
Description: Polyisocyanurate rigid foam wall insulation with aluminum foil o R-value of 14.6, 2.25" thickness (57.2 mm). Industry-wide EPD fro Polyisocyanurate Insulation Manufacturers Association.	
Life Cycle Inventory: For information and quantities, see EPD	
Product Scope: Cradle to gate	
Transportation Distance: By truck: 250 km	
End-of-Life Scope: 100% Landfilled (plastic waste)	
LCI Source: RNA: Polyisocyanurate rigid foam board wall insulation, R=14.6	(A1-A3) ts-EPD (2013)
EPD Source: EPD10042	
EPD Designation Holder: Polyisocyanurate Insulation Manufacturers Association	
EPD Program Operator: NSF International	
EPD Expiration: 2/6/2020	
	24.144.0 hr
Polyethelene sheet vapor barrier (HDPE) Used in the following Revit families:	34,144.9 kg
(F1) SLAB ON GRADE	570.6 kg (60 yrs)
(F1) SLAB ON GRADE - 6"	0.4 kg (60 yrs)
(F1) SLAB ON GRADE - 8"	5.3 kg (60 yrs)
(R2) INSULATION O/ ASPHALT MEMBRANE O/ STRUCT (R3) SBS OVER METAL DECK	143.4 kg (60 yrs) 933.7 kg (60 yrs)
(R4) SOUTH VEST ROOF	3.6 kg (60 yrs)
(R4) SOUTH VEST ROOF (INTERIOR)	4.2 kg (60 yrs)
1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11"	590.2 kg (60 yrs)
1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16"	193.7 kg (60 yrs)
1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 8" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16"	1,865.2 kg (60 yrs)
2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_18 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22"	6,745.6 kg (60 yrs) 17,358.2 kg (60 yrs)
2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24"	5,580.5 kg (60 yrs)
2-W01 CONCRETE WALL WITHOUT CONC	150.2 kg (60 yrs)
Used in the following Tally entries: Polyethelene sheet vapor barrier (HDPE)	
Description:	
Polyethelene sheet vapor barrier (HDPE) membrane entry exclusive of adhesive or other co-products	
Life Cycle Inventory: 100% Polyethylene film	
Product Scope: Cradle to gate	
Transvertetion Distances	

Transportation Distance: By truck: 1299 km

End-of-Life Scope:	
10.5% Recycled into HDPE 89.5% Landiflled (plastic waste)	
Module D Scope:	
Avoided burden credit includes processing LCI Source: US: Polyethylene High Density Granulate (PE-HD) ts (2017)	
GLO: Plastic Film (PE, PP, PVC) ts (2017) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) US: Lubricants at refinery ts (2014)	
Polyurethane coating, metal stock	10.7
Used in the following Revit families: KPFF - SCOL - Steel - HSS - Rectangular (C) - TC	10.7 kg (50 y
Used in the following Tally entries: Steel, HSS section	
Description: Polyurethane coating, for metal stock	
Life Cycle Inventory: 100% Polyurethane coating	
Product Scope: Cradle to gate, includes installation	
Transportation Distance: N/A	
End-of-Life Scope: 100% Landfilled (inert waste)	
LCI Source: DE: Application base coat (automobile) ts (2017) DE: Polyurethane (copolymer-component) (estimation from TPL	J adhesive) ts (2017)
Powder coating, metal stock	995.2
Used in the following Revit families: C1 - Perf Metal Grid - 2'x6' Picture Window Bend Plate	993.5 kg (50 y 1.7 kg (50 y
Used in the following Tally entries: Aluminum, angle Aluminum, sheet	
Description: Powder coating, for metal stock	
Life Cycle Inventory: 100% Powder coating	
100% Powder coating Product Scope:	
100% Powder coating Product Scope: Cradle to gate, including application Transportation Distance:	
100% Powder coating Product Scope: Cradle to gate, including application Transportation Distance: N/A End-of-Life Scope:	
100% Powder coating Product Scope: Cradle to gate, including application Transportation Distance: N/A End-of-Life Scope: 100% Landfilled (inert waste) LCI Source: DE: Application top coat powder (aluminium) ts (2017) DE: Coating powder (industry, outside, red) ts (2017) SBS modified bitumen, assembly (base & cap), ARMA - EPD	30,466.4
100% Powder coating Product Scope: Cradle to gate, including application Transportation Distance: N/A End-of-Life Scope: 100% Landfilled (inert waste) LCI Source: DE: Application top coat powder (aluminium) ts (2017) DE: Coating powder (industry, outside, red) ts (2017)	26,128.4 kg (40 y 101.8 kg (40 y
100% Powder coating Product Scope: Cradle to gate, including application Transportation Distance: N/A End-of-Life Scope: 100% Landfilled (inert waste) LCI Source: DE: Application top coat powder (aluminium) ts (2017) DE: Coating powder (industry, outside, red) ts (2017) SBS modified bitumen, assembly (base & cap), ARMA - EPD Used in the following Revit families: (R3) SBS OVER METAL DECK (R4) SOUTH VEST ROOF	26,128.4 kg (40 y 101.8 kg (40 y nsulatio202.3 kg (40 y
100% Powder coating Product Scope: Cradle to gate, including application Transportation Distance: N/A End-of-Life Scope: 100% Landfilled (inert waste) LCI Source: DE: Application top coat powder (aluminium) ts (2017) DE: Coating powder (industry, outside, red) ts (2017) SBS modified bitumen, assembly (base & cap), ARMA - EPD Used in the following Revit families: (R3) SBS OVER METAL DECK (R4) SOUTH VEST ROOF W08_METAL STUD LIGHTWEIGHT CLADDING (CW Parapet) no i W08_METAL STUD LIGHTWEIGHT CLADDING (Parapet) Used in the following Tally entries: SBS modified bitumen, sheet	26,128.4 kg (40 y 101.8 kg (40 y
100% Powder coating Product Scope: Cradle to gate, including application Transportation Distance: N/A End-of-Life Scope: 100% Landfilled (inert waste) LCI Source: DE: Application top coat powder (aluminium) ts (2017) DE: Coating powder (industry, outside, red) ts (2017) SBS modified bitumen, assembly (base & cap), ARMA - EPD Used in the following Revit families: (R3) SBS OVER METAL DECK (R4) SOUTH VEST ROOF W08_METAL STUD LIGHTWEIGHT CLADDING (CW Parapet) no i W08_METAL STUD LIGHTWEIGHT CLADDING (Parapet) Used in the following Tally entries:	26,128.4 kg (40 y 101.8 kg (40 y 101.8 kg (40 y 4,034.0 kg (40 y 4,034.0 kg (40 y

LCI Data (continued)

Product Scope: 18% Polyethylene HD Cradle to gate, accounts for product overlap when installing Product Scope: Transportation Distance: Cradle to gate for materials only, neglects manufacturing requirements By truck: 172 km Transportation Distance: End-of-Life Scope: By truck: 172 km 100% Landfilled (plastic waste) End-of-Life Scope: LCI Source: 100% Landfilled (plastic waste) RNA: Atactic-polypropylene (APP)-modified bitumen (asphalt) roofing base sheet -LCI Source: ARMA (A1-A3) (2012) US: Styrene-butadiene rubber (SBR) ts (2017) RNA: Atactic-polypropylene (APP)-modified bitumen (asphalt) roofing cap sheet -DE: Bitumen cold adhesive (EN15804 A1-A3) ts (2017) ARMA (A1-A3) (2012) US: Polyethylene High Density Granulate (PE-HD) ts (2017) GLO: Plastic Film (PE, PP, PVC) ts (2017) EPD Source: <u>4787168709.105</u>.1 US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) EPD Designation Holder: US: Lubricants at refinery ts (2014) Asphalt Roofing Manufacturers Association (ARMA) EPD Program Operator: Stainless steel door hinge **UL Environment** Used in the following Revit families: EPD Expiration: (F1-HMW) dr-SGL-A (F2) dr-Double-Flush-with 4 sided jambs 10/28/2021 (FG2-AL) dr-DBL-A (FG2-CW) dr-DBL-CW SBS modified bitumen, cap sheet, ARMA - EPD 8,400.9 kg (N1-HMW) dr-SGL-A Used in the following Revit families: temp-fence (R2) INSULATION O/ ASPHALT MEMBRANE O/ STRUCT 2,285.1 kg (60 yrs) 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 111.1 kg (60 yrs) Used in the following Tally entries: 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 36.5 kg (60 yrs) Door, exterior, aluminum 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 8" 351.2 kg (60 yrs) Door, exterior, steel 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_16" 1,270.0 kg (60 yrs) Door, interior, steel 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22" 3,268.1 kg (60 yrs) Description: 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24" 1,050.7 kg (60 yrs) Stainless steel and aluminum door and window hinge. Data based on product-specifc 2-W01 CONCRETE WALL WITHOUT CONC 28.3 kg (60 yrs) EPD from FSB Used in the following Tally entries: Life Cycle Inventory: Self-adhering sheet waterproofing, modified bituminous sheet See EPD Description Product Scope: Styrene-butadiene-styrene (SBS)-modified bituminous cap sheet. Industry-wide EPD Cradle to gate from the Asphalt Roofing Manufacturers Association. EPD representative of conditions in North America. Transportation Distance: By truck: 1001 km Life Cycle Inventory For information and quantities, see EPD End-of-Life Scope: 98% Recovered Product Scope: 2% Landfilled (inert material) Cradle to gate Module D Scope Transportation Distance: Product has a 0% scrap input while remainder is processed and credited as avoided By truck: 172 km burden End-of-Life Scope: LCI Source: 100% Landfilled (plastic waste) DE: Door and window hinge - FV S+B PE-EPD (2009) LCI Source: RER: Stainless steel flat product (304) - value of scrap Eurofer (2010) RNA: Atactic-polypropylene (APP)-modified bitumen (asphalt) roofing cap sheet -EPD Source: ARMA (A1-A3) (2012) EPD-FSB-2010111-D EPD Source: EPD Designation Holder: 4787168709.105.1 Franz Schneider EPD Designation Holder: EPD Program Operator: Asphalt Roofing Manufacturers Association (ARMA) Institut Bauen and Umwelt (IBU) EPD Program Operator: EPD Expiration: **UL Environment** 1/14/2016 EPD Expiration: 10/28/2021 Stainless steel sheet, Chromium 18/8 Used in the following Revit families Self adhering flashing membrane, 40 mil 13.1 kg Construction Specialties_Crash Rail_6" ECR-60S Used in the following Revit families: Used in the following Tally entries: (R4) SOUTH VEST ROOF 13.1 kg (40 yrs) Steel, sheet, stainless Used in the following Tally entries: Description: Self adhering membrane Stainless steel sheet, Type 304 (Chromium 18/8) Description: Life Cycle Inventory: 40 mil (1 mm) Asphalt rubber sheet inclusive of polyethelyne backing 100% Stainless steel plate Life Cycle Inventory: Product Scope: 82% Rubberized asphalt (25% SBS) Cradle to gate

52.5 kg

9.8 kg (30 yrs)

8.1 kg (30 yrs)

11.2 kg (30 yrs)

11.2 kg (30 yrs)

5.7 kg (30 yrs)

6.5 kg (30 yrs)

43.4 kg

43.4 kg (45 yrs)

Transportation Distance: By truck: 418 km		
End-of-Life Scope: 98% Recovered 2% Landfilled (inert material)		
Module D Scope: Product has 52% scrap input while remainder is processed a burden	nd credited as avoided	
LCI Source: RER: Stainless steel cold rolled coil (304) Eurofer (2010) GLO: Steel sheet stamping and bending (5% loss) ts (2017) US: Electricity grid mix ts (2014)		
US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts RER: Stainless steel flat product (304) - value of scrap Eurofe		
Stainless steel, extruded, chromium 18/8	690.3 kg	
Used in the following Revit families: HSEB Guardrail - Cable Rail HSEB Guardrail - Cable Rail without handrail	176.3 kg (60 yrs) 514.0 kg (60 yrs)	
Used in the following Tally entries: Steel, round bar		
Description: Stainless steel, extruded, Type 304 (Chromium 18/8)		U
Life Cycle Inventory: 100% Stainless steel		
Product Scope: Cradle to gate		
Transportation Distance: By truck: 431 km		
End-of-Life Scope: 98% Recovered 2% Landfilled (inert material)		D
Module D Scope: Product has 52% scrap input while remainder is processed a burden	nd credited as avoided	Li Pi
LCI Source: RER: Stainless steel cold rolled coil (304) Eurofer (2010) GLO: Steel sheet stamping and bending (5% loss) ts (2017)		Ti
US: Electricity grid mix ts (2014) US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) ts	; (2014)	E
RER: Stainless steel flat product (304) - value of scrap Eurofe	r (2010)	
Steel, reinforcing rod Used in the following Revit families:	128,247.9 kg	N
(F1) SLAB ON GRADE (F1) SLAB ON GRADE - 6"	5,757.9 kg (60 yrs) 4.0 kg (60 yrs)	LO
(F1) SLAB ON GRADE - 8"	53.4 kg (60 yrs)	
(F2) CONCRETE METAL DECK	40,904.3 kg (60 yrs)	~
(F3) CONCRETE METAL DECK (STRUCTURAL ONLY) (F3) CONCRETE METAL DECK W/ TOPPING SLAB	1,397.0 kg (60 yrs) 3,921.8 kg (60 yrs)	Ste U
(R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2	1,384.9 kg (60 yrs)	0
04.016_LCL FND Slab_Spread Ftg_F10.0 10x10x3.0d	705.8 kg (60 yrs)	
04.016_LCL FND Slab_Spread Ftg_F11.0 11x11x3.25d	828.1 kg (60 yrs)	
04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d	3,444.6 kg (60 yrs)	
04.016_LCL FND Slab_Spread Ftg_F12.0 14x14x4.5d 04.016 LCL FND Slab Spread Ftg F2.0 2x2x11"d	4,666.0 kg (60 yrs) 76.8 kg (60 yrs)	
04.016_LCL FND Slab_Spread Ftg_F4.0 4x4x1.5d	19.8 kg (60 yrs)	
04.016_LCL FND Slab_Spread Ftg_F8.0 8x8x2.5d	202.9 kg (60 yrs)	
04.016_LCL FND Slab_Spread Ftg_F9.0 9x9x2.75d	197.6 kg (60 yrs)	
04.016_LCL FND Slab_Spread Ftg_FW6.0 6x8x2.5d	1,525.9 kg (60 yrs)	
04.017_LCL FND Slab_Cont. Ftg FW3.0_36wx18d 04.017_LCL FND Slab_Cont. Ftg FW4.0_48wx18d	828.3 kg (60 yrs) 945.8 kg (60 yrs)	
04.017_LCL FND Slab_Cont. Ftg FW4.0_46wx180 04.017_LCL FND Slab_Cont. Ftg FW4.0_48wx24d	1,920.7 kg (60 yrs)	
04.017_LCL FND Slab_Cont. Ftg FW5.0_60wx18d	14,137.7 kg (60 yrs)	U
04.017_LCL FND Slab_Cont. Ftg FW5.0A_60wx30d	6,269.2 kg (60 yrs)	
04.017_LCL FND Slab_Cont. Ftg FW7.0_87wx42d 2	987.7 kg (60 yrs)	
04.017_LCL FND Slab_Cont. Ftg FW8.0_96wx48d 04.017_LCL FND Slab_Cont. Ftg_24wx12d	3,053.2 kg (60 yrs) 135.9 kg (60 yrs)	

04.215_LCL_C_Slab Transition_Wall(12") 04.215_LCL_C_Slab Transition_Wall(4") 04.215_LCL_C_Slab Transition_Wall(6") 04.215_LCL_C_Slab Transition_Wall(6") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(1") 04.225_LCL_C_CURB_Wall(4") 04.225_LCL_C_CURB_Wall(6") 04.225_LCL_C_CURB_Wall(6") 04.320_LCL_C_FOUNDATION_Wall(10") 04.330_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(16") 04.380_LCL_C_SHOTCRETE_Wall(19") 04.380_LCL_C_SHOTCRETE_Wall(22") 04.380_LCL_C_SHOTCRETE_Wall(24") 12" Concrete Slab Concrete Slab Concrete 8" - STRUCTURAL HSEB - STR-1_Precast Tread & Riser HSEB - STR-2_Precast Tread & Riser HSEB STR-9 (CAST IN PLACE) HSEB ST-9 (CAST IN PLACE) HSEB ST-9 (CAST IN PLACE) HSEB_STR-3_PRecast Tread Steel Riser KPFF - SCOL - Concrete - Round KPFF - SFRM - Steel - BRB - Buckling Restrained Brace LCL_C_Pilaster_Rect_()w()d	1,889.4 kg (60 yrs) 882.7 kg (60 yrs) 111.7 kg (60 yrs) 58.6 kg (60 yrs) 831.3 kg (60 yrs) 8.9 kg (60 yrs) 212.4 kg (60 yrs) 212.4 kg (60 yrs) 213.5 kg (60 yrs) 174.5 kg (60 yrs) 1,384.2 kg (60 yrs) 1,384.2 kg (60 yrs) 60.7 kg (60 yrs) 5566.3 kg (60 yrs) 175.4 kg (60 yrs) 382.4 kg (60 yrs) 112.6 kg (60 yrs) 112.6 kg (60 yrs) 112.6 kg (60 yrs) 216.9 kg (60 yrs) 213.9 kg (60 yrs)
Used in the following Tally entries: Cast-in-place concrete, lightweight structural concrete, 5000 psi Cast-in-place concrete, structural concrete, 3000 psi Cast-in-place concrete, structural concrete, 4000 psi Cast-in-place concrete, structural concrete, 5000 psi Precast concrete column Stair, concrete with metal nosing Stair, precast single run (stretcher) Steel, reinforcing rod Steel, rod	
Description: Common unfinished tempered steel rod suitable for structural re Life Cycle Inventory:	inforcement (rebar)
100% Steel rebar	
Product Scope: Cradle to gate	
Transportation Distance: By truck: 431 km	
End-of-Life Scope: 70% Recovered 30% Landfilled (inert material)	
Module D Scope: Product has a 16.4% scrap input while remainder is processed an burden.	nd credited as avoided
LCI Source: GLO: Steel rebar worldsteel (2014)	
iteel, sheet	9,279.6 kg
Used in the following Revit families: Corner_3 Corner_4 HSEB - STR-2_Precast Tread Steel Riser 2 HSEB Type C - STR-4_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ C channel HSEB Type C_STR-5_Conc filled w/ Plate Stringer - Roof Access HSEB Type C_STR-6_Conc filled w/ Plate HSEB_STR-3_Precast Tread Steel Riser P_SOUTH VESTIBULE WALL W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse) W09_SOUTH VESTIBULE WALL W05_SUTH VESTIBULE WALL	188.4 kg (60 yrs) 239.6 kg (60 yrs) 5,384.4 kg (45-60 yrs) 623.5 kg (45 yrs) 242.9 kg (45 yrs) 170.0 kg (45 yrs) 133.4 kg (45 yrs) 852.8 kg (45-60 yrs) 58.4 kg (60 yrs) 346.1 kg (60 yrs)
Used in the following Tally entries: Metal roofing panels, formed Stair, concrete with metal nosing Steel, plate	

Description: Steel sheet Life Cycle Inventory:		Structural concrete, 3000 psi, Pacific Northwest regional ave Used in the following Revit families: (F2) CONCRETE METAL DECK (F3) CONCRETE METAL DECK (STRUCTURAL ONLY)	rage 1,304,562.7 kg 1,080,996.0 kg (60 yrs 36,533.6 kg (60 yrs	
100% Steel sheet Product Scope:		(F3) CONCRETE METAL DECK W/ TOPPING SLAB Used in the following Tally entries:	187,033.1 kg (60 yrs	
Cradle to gate		Cast-in-place concrete, structural concrete, 3000 psi		
Transportation Distance: By truck: 418 km		Description: Structural concrete, 3000 psi, Pacific Northwest regional aver		
End-of-Life Scope: 98% Recovered		National Ready-Mix Concrete Association (NRMCA) Industry-wide EPD.		
2% Landfilled (inert material) Module D Scope:		Life Cycle Inventory: Coarse aggregate: 45%, Sand: 35%, Portland cement PCA - EPD: 10%, Water: 8%, Fly ash: 3%, Expanded slag: <1%, Admixture: <1%		
Product has 16% scrap input while remainder is processed a	and credited as avoided	Product Scope:		
burden		Cradle to gate		
LCI Source:		Anchors, ties, and metal accessories outside of scope (<1% n	nass)	
RNA: Steel finished cold rolled coil worldsteel (2007) GLO: Steel sheet stamping and bending (5% loss) ts (2017) US: Electricity grid mix ts (2014)		Transportation Distance: By truck: 24 km		
US: Lubricants at refinery ts (2014) GLO: Compressed air 7 bar (medium power consumption) t GLO: Value of scrap worldsteel (2014)	s (2014)	End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material)		
tructural concrete, 3000 psi, 0% fly ash and slag	42,359.1 kg	Module D Scope: Avoided burden credit for coarse aggregate, includes grindin	ig energy	
Used in the following Revit families: 3.5" Light Duty Paving Over Sturcture	7,088.3 kg (30 yrs)	LCI Source:		
cp_HSEB - Base Material Panel_vertical	35,270.7 kg (60 yrs)	US: Portland cement PCA/ts (2014)	n	
Used in the following Tally entries:	5	DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (2017 DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017))	
Precast concrete nonstructural panel		DE: Fly ash (EN15804 A1-A3) ts (2017)		
Precast concrete paver		DE: Slag-tap granulate (EN15804 A1-A3) ts (2017)		
Description:		DE: Expanded clay (EN15804 A1-A3) ts (2017)		
Structural concrete, 3000 psi, 0% fly ash and slag. Mix design matches National Ready-Mix Concrete Association (NRMCA) Industry-wide EPD. Life Cycle Inventory: Coarse aggregate: 44%, Sand: 36%, Portland cement PCA - EPD: 13%, Water: 7%, Admixture: <1%		DE: alcium nitrate ts (2017) DE: Sodium ligninsulfonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017) US: Sodium hydroxide (caustic soda) ix (100%) ts (2017) US: Colophony (rosin, refined) from CN pine gum rosin ts (2017) US: Tap water from groundwater ts (2017)		
Product Scope: Cradle to gate		US: Natural gas mix ts (2014)		
Anchors, ties, and metal accessories outside of scope (<1%	mass)	US: Diesel mix at filling station (100% fossil) ts (2014)		
Transportation Distance:		US: Liquefied Petroleum Gas (LPG) (70% propane 30% utane) ts (2014)		
By truck: 24 km		US: Light fuel oil at refinery ts (2014)		
End-of-Life Scope: 55% Recycled into coarse aggregate 45% Landfilled (inert material)		Structural concrete, 4000 psi, 20% fly ash and 30% slag Used in the following Revit families:	856,960.1 k	
		(F1) SLAB ON GRADE	567,361.6 kg (60 yrs	
Module D Scope: Avoided burden credit for coarse aggregate, includes grind		(F1) SLAB ON GRADE - 6"	468.0 kg (60 yr	
55 5 5	ing energy	(F1) SLAB ON GRADE - 8"	8,422.4 kg (60 yr	
.Cl Source:		(R2) STRUCTURAL SLAB LAYER OF ASSEMBLY R2	140,358.3 kg (60 yr 3,728.8 kg (60 yr	
US: Portland cement PCA/ts (2014) DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (201	7)	04.016_LCL FND Slab_Spread Ftg_F2.0 2x2x11"d 04.215_LCL_C_Slab Transition_Wall(12")	48,061.4 kg (60 yr	
DE: Gravel (Grain size 2/32) (EN15804 A1-A3) s (2017)	.,	04.215_LCL_C_Slab Transition_Wall(15")	22,454.6 kg (60 yr	
DE: Fly ash (EN15804 A1-A3) ts (2017)		04.215_LCL_C_Slab Transition_Wall(4")	2,842.4 kg (60 yr	
DE: Slag-tap granulate (EN15804 A1-A3) ts (2017)		04.215_LCL_C_Slab Transition_Wall(6")	1,489.9 kg (60 yr	
DE: Expanded clay (EN15804 A1-A3) ts (2017)		04.215_LCL_C_Slab Transition_Wall(8")	21,146.0 kg (60 yr	
DE: alcium nitrate ts (2017) DE: Sodium ligninsulfonate ts (2017) DE: Sodium naphtalene sulfonate [estimated] ts (2017)		04.225_LCL_C_CURB_Wall(11") 04.225_LCL_C_CURB_Wall(4")	16,294.9 kg (60 yr 227.3 kg (60 yr	
		04.225_LCL_C_CURB_Wall(6")	6,929.8 kg (60 yr	
US: Sodium hydroxide (caustic soda) ix (100%) ts (2017)		04.225_LCL_C_CURB_Wall(8")	549.0 kg (60 yr	
US: Colophony (rosin, refined) from CN pine gum rosin ts (2017)		12" Concrete Slab	16,414.9 kg (60 yr	
US: Tap water from groundwater ts (2017)		HSEB ST-11 (CAST IN PLACE)	210.9 kg (60 yr	
US: Electricity grid mix s (2014) US: Natural gas mix ts (2014)		Used in the following Tally entries:		
US: Diesel mix at filling station (100% fossil) ts (2014)		Cast-in-place concrete, structural concrete, 4000 psi		
US: Liquefied Petroleum Gas (LPG) (70% propane		Description:		
30% utane) ts (2014) US: Light fuel oil at refinery ts (2014)		Structural concrete, 4000 psi, 20% fly ash and 30% slag. Mix o Ready-Mix Concrete Association (NRMCA) Industry-wide EPE		
		Life Cycle Inventory: Coarse aggregate: 45%, Sand: 31%, Portland cement PCA - El Expanded slag: 5%, Fly ash: 3%, Admixture: <1%	PD: 9%, Water: 7%,	

LCI Data (continued)

	US: Liquefied Petroleum Gas (LPG) (70% propane 30% utane) ts (2014) US: Light fuel oil at refinery ts (2014)	
	-	
		2,312,934.3 kg
		56,528.9 kg (60 yrs)
	04.016_LCL FND Slab_Spread Ftg_F11.0 11x11x3.25d	74,100.0 kg (60 yrs)
	04.016_LCL FND Slab_Spread Ftg_F12.0 12x12x4d	36,178.5 kg (60 yrs)
	· -	55,398.3 kg (60 yrs)
ergy		3,014.9 kg (60 yrs) 20,099.2 kg (60 yrs)
		13,990.9 kg (60 yrs)
		69,640.5 kg (60 yrs)
	04.017_LCL FND Slab_Cont. Ftg FW3.0_36wx18d	31,217.6 kg (60 yrs)
	04.017_LCL FND Slab_Cont. Ftg FW4.0_48wx18d	33,450.2 kg (60 yrs)
	=	86,718.6 kg (60 yrs)
		89,913.9 kg (60 yrs)
		64,658.2 kg (60 yrs) 66,939.6 kg (60 yrs)
	=	188,932.2 kg (60 yrs)
	04.017_LCL FND Slab_Cont. Ftg_24wx12d	1,847.0 kg (60 yrs)
	04.300_LCL_C_Foundation_Wall(10")	36,007.1 kg (60 yrs)
	04.310_LCL_C_PIT_Wall(8")	11,479.1 kg (60 yrs)
		210,675.0 kg (60 yrs)
		49,101.7 kg (60 yrs)
		859,916.8 kg (60 yrs) 247,805.7 kg (60 yrs)
		752.2 kg (60 yrs)
	HSEB ST-9 (CAST IN PLACE)	2,812.3 kg (60 yrs)
	KPFF - SFRM - Steel - BRB - Buckling Restrained Brace	1,755.9 kg (60 yrs)
0 700 6 1	Used in the following Tally entries:	
8,728.6 Kg	Cast-in-place concrete, structural concrete, 5000 psi	
2,539.4 kg (60 yrs)	Precast concrete column	
4,844.9 kg (60 yrs)	Description:	
1,344.3 kg (60 yrs)	Structural concrete, 5000 psi, 20% fly ash and 30% slag. Mix	
	Ready-Mix Concrete Association (NRMCA) Industry-wide EP	D.
	Life Cycle Inventory:	
	Coarse aggregate: 41%, Sand: 30%, Portland cement PCA - E	PD: 11%, Water: 7%,
	Expanded slag: 6%, Fly ash: 4%, Admixture: <1%	
ches National	Product Scope:	
	Anchors, ties, and metal accessories outside of scope (<1%)	mass)
0%, Water: 7%,	Transportation Distance:	
	By truck: 24 km	
	End-of-Life Scope:	
	55% Recycled into coarse aggregate	
	45% Landfilled (inert material)	
	Module D Scope:	
	Avoided burden credit for coarse aggregate, includes grindi	ng energy
	LCI Source:	
	US: Portland cement PCA/ts (2014)	
	DE: Pumice gravel (grain size 4/16) (EN15804 A1-A3) ts (201	7)
ergy		
	DE: Sodium ligninsulfonate ts (2017)	
	DE: Sodium naphtalene sulfonate [estimated] ts (2017)	
	US: Sodium hydroxide (caustic soda) ix (100%) ts (2017)	
	US: Colophony (rosin, refined) from CN pine gum rosin ts (2)	017)
	US: Tap water from groundwater ts (2017)	
	US: Electricity grid mix s (2014)	
	US: Electricity grid mix s (2014) US: Natural gas mix ts (2014)	
	US: Electricity grid mix s (2014) US: Natural gas mix ts (2014) US: Diesel mix at filling station (100% fossil) ts (2014) US: Liquefied Petroleum Gas (LPG) (70% propane 30% utane) ts (2014)	
	US: Electricity grid mix s (2014) US: Natural gas mix ts (2014) US: Diesel mix at filling station (100% fossil) ts (2014) US: Liquefied Petroleum Gas (LPG) (70% propane	
	US: Electricity grid mix s (2014) US: Natural gas mix ts (2014) US: Diesel mix at filling station (100% fossil) ts (2014) US: Liquefied Petroleum Gas (LPG) (70% propane 30% utane) ts (2014)	
		8,728.6 kg 2,539.4 kg (60 yrs) 2,539.4 kg (60 yrs) 1,344.3 kg (60 yrs) 2,539.4 kg (60 yrs) 2,539.4 kg (60 yrs) 1,344.3 kg (60 yrs) 2,539.4 kg (60 yrs) 2,539.4 kg (60 yrs) 2,539.4 kg (60 yrs) 2,539.4 kg (60 yrs) 1,344.3 kg (60 yrs) 2,539.4 kg (60 yrs) 1,344.3 kg (60 yrs) 2,539.4 kg (60 yrs) 2,539.4 kg (60 yrs) 1,344.3 kg (60 yrs) 1,344.3 kg (60 yrs) 2,539.4 kg (60 yrs) 1,344.3 kg (60 yrs) 2,539.4 kg (60 yrs) 1,344.3 kg (60 yrs) 1,344.3 kg (60 yrs) 2,539.4 kg (60 yrs) 1,344.3 kg (60 yrs) 2,539.4 kg (60 yrs) 1,344.3 kg (60 yrs) 2,539.4 kg (41,43) kg (41,53) kg (41,53) kg (21,71) 2, kg kg manutate (1,41,580 kg (41,43) kg (21,71) 2, kg kg manut

Suspended grid Used in the following Revit families:	8,989.6 kg	Used in the following Tally entries: Wall board, gypsum	
C1 - ACT-1 - 2' x 4' C1 - ACT-2 - 2' x 2' HRC C1 - ACT-3 - 2' x 2'	801.2 kg (50 yrs) 1,597.2 kg (50 yrs) 5,821.1 kg (50 yrs)	Description: Moisture- and mold-resistant gypsum board	
C1 - ACT-5 - 2' x 6' Used in the following Tally entries:	770.1 kg (50 yrs)	Life Cycle Inventory: 100% Moisture-resistant gypsum wallboard (Gypsum, Boric acid, Cement, Sodium lignin sulfonate, Glass fibres, Silane, Polyglucose, Perlite, Paper, Casein glue)	
Acoustic ceiling system, mineral fiber board Description: Cold-rolled galvanized steel for lightweight ceiling grid		Product Scope: Cradle to gate	
Life Cycle Inventory: 100% HDG steel		Transportation Distance: By truck: 172 km	
Product Scope: Cradle to gate		End-of-Life Scope: 100% Landfilled (inert waste)	
Transportation Distance: By truck: 431 km		LCI Source: DE:Gypsum plaster board (Moisture resistant) (EN15804 A1-A3) ts (2	2017)
98% recovered 2% landfilled (inert material)		Wall board, gypsum, natural Used in the following Revit families: (A3)_Furr Mtl Stud 3-5/8"_GWB (1-0)	66,620.6 kg 395.1 kg (30 yrs)
Module D Scope: Product has 44% scrap input while remainder is processed and credi burden	ited as avoided	(B8)_TYP Mtl Stud 8"_GWB Insulation 1-B6 1-C2- GWB on Mtl. Stud	156.0 kg (30 yrs) 37.8 kg (30 yrs) 203.7 kg (30 yrs)
LCI Source: RNA: Steel hot dip galvanized worldsteel (2007) US: Metal roll forming (MCA) (2010) US: Electricity grid mix ts (2014) US: Thermal energy from natural gas ts (2014) GLO: Value of scrap worldsteel (2014)		1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD 2-A0_Furr Hat Channel 7/8"_GWB (2-0) 2 hour rated 2-A0_GWB Type X (2-0) 2 hour rated 2-C2- GWB on Mtl. Stud 3-W07_METAL STUD LIGHTWEIGHT CLADDING 4-CT 4_0exput/Disting	149.4 kg (30 yrs) 4,824.8 kg (30 yrs) 1,536.4 kg (30 yrs) 118.0 kg (30 yrs) 169.4 kg (30 yrs) 1,397.2 kg (30 yrs) 915.4 kg (30 yrs) 2,635.1 kg (30 yrs)
Wall board, gypsum, fire-resistant (Type X) Used in the following Revit families: 1-C2- GWB on Mtl. Stud 1F5 - 1 HR RATED HORIZONTAL DUCT ENCLOSURE 1-W07_METAL STUD LIGHTWEIGHT CLADDING 2-C2- GWB on Mtl. Stud 3-W07_METAL STUD LIGHTWEIGHT CLADDING A4_Furr Mtl Stud 4"_GWB (1-0) Used in the following Tally entries:	43,127.3 kg 444.9 kg (30 yrs) 761.0 kg (30 yrs) 35,345.8 kg (30 yrs) 4,958.8 kg (30 yrs) 416.5 kg (30 yrs) 1,200.2 kg (30 yrs)	ACT 4 AcoustiBuilt Ceiling B4 B6 C2- GWB on Mtl. Stud C7- GWB on Mtl. Stud 2 P_SOUTH VESTIBULE WALL W06 PRE-CAST CONCRETE @ FRAMED WALL W07_METAL STUD LIGHTWEIGHT CLADDING W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse) W09_SOUTH VESTIBULE WALL	2,031, kg (30 yrs) 924.8 kg (30 yrs) 488.7 kg (30 yrs) 6,591.9 kg (30 yrs) 387.3 kg (30 yrs) 207.9 kg (30 yrs) 34,817.4 kg (30 yrs) 2,312.6 kg (30 yrs) 164.0 kg (30 yrs)
Wall board, gypsum Description:		Used in the following Tally entries: Wall board, gypsum	
Fire-resistant gypsum board		Description: Natural gypsum board	
Life Cycle Inventory: 100% Fire-resistant gypsum wallboard (Gypsum, Boric acid, Cement, Sodium lignin sulfonate, Glass fibres, Silane, Polyglucose, Perlite, Paper, Casein glue) Product Scope:		Life Cycle Inventory: 100% Gypsum wallboard (Gypsum, Boric acid, Cement, Glass fibres, Ferrochrome-lignine sulfonate, Silane, Polyglucose, Perlite, Paper, Casein glue)	
Cradle to gate Transportation Distance:		Product Scope: Cradle to gate	
By truck: 172 km End-of-Life Scope:		Transportation Distance: By truck: 172 km	
100% Landfilled (inert waste) LCI Source:		End-of-Life Scope: 100% Landfilled (inert waste)	
DE: Gypsum plaster board (Fire protection) (EN15804 A1-A3)PE (201	7)	LCI Source: DE: Gypsum wallboard (EN15804 A1-A3) ts (2017)	
Wall board, gypsum, moisture- and mold-resistant Used in the following Revit families: (R4) SOUTH VEST ROOF	86,468.2 kg 123.7 kg (30 yrs)	White oak lumber, 1 inch Used in the following Revit families:	1,400.5 kg
1-N8 GFRC @ FRAMED WALL STAGGERED STUD 1-W06 PRE-CAST CONCRETE @ FRAMED WALL 1-W06 PRE-CAST CONCRETE @ FRAMED WALL STAGGERED STUD	141.1 kg (30 yrs) 4,559.5 kg (30 yrs) 1,451.9 kg (30 yrs) 24,470.2 kg (30 yrs) 288.3 kg (30 yrs) 196.5 kg (30 yrs)	(R4) SOUTH VEST ROOF (R4) SOUTH VEST ROOF (INTERIOR) Rectangular Mullion Used in the following Tally entries: Domestic hardwood	188.8 kg (50 yrs) 217.7 kg (50 yrs) 993.9 kg (50 yrs)
W06 PRE-CAST CONCRETE @ FRAMED WALL W07_METAL STUD LIGHTWEIGHT CLADDING W07_METAL STUD LIGHTWEIGHT CLADDING (Penthouse)	7,737.1 kg (30 yrs) 32,902.8 kg (30 yrs) 2,185.4 kg (30 yrs) 12,256.7 kg (30 yrs) 155.0 kg (30 yrs)	Description: Kiln-dried American White Oak hardwood lumber of 1" nominal thickness as produce in the eastern United States, focusing on the main production technologies and region-specific characteristics. White oak is frequently used for mouldings, flooring, furniture, doors, and millwork. Link for interactive LCA data tool is provided at the link listed as "EPD Information"	

LCI Data (continued)

full LCA report is available at http://naturespackaging.org/wp-content/uploads/2016/02/LifeCy	cleAssessment-Lumber.pdf.	US: Dipropylene glycol by product propylene glycol via PO hyd	rogenation ts (2017)
Life Cycle Inventory: 100% White Oak		XPS insulation, Foamular average, Owens Corning - EPD Used in the following Revit families:	5,577.8 kg
Product Scope: Cradle to gate, uncoated Transportation Distance: By truck: 383 km		(R2) INSULATION O/ ASPHALT MEMBRANE O/ STRUCT 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 11" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 16" 1-W01 CONCRETE WALL W/ EXTERIOR INSULATION 8" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_16"	2,783.8 kg (60 yrs 50.8 kg (60 yrs 16.7 kg (60 yrs 160.4 kg (60 yrs 580.2 kg (60 yrs
End-of-Life Scope: 14.5% Recovered 22% Incinerated with energy recovery		2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_22" 2-W01 CONCRETE WALL W/ EXTERIOR INSULATION_24" 2-W01 CONCRETE WALL WITHOUT CONC	1,493.0 kg (60 yrs) 480.0 kg (60 yrs) 12.9 kg (60 yrs)
63.5% Landfilled (wood product waste) Module D Scope:		Used in the following Tally entries: Extruded polystyrene (XPS), board	
Recovered wood products credited as avoided burden. CI Source: US: White Oak lumber, 1 inch (769 kg/m ³), kiln-dried ts/AHEC (2017)		Description: FOAMULAR XPS (polystyrene) insulation board, HFC foaming agent. EPD representative of US manufacturing condition. FOAMULAR insulation board is available	
EPD Source: Information		with a variety of R-values and compressive strengths. The defau thermal resistance of RSI 1 and a compressive strength of 30 ps R-value and compressive strength of the assembly is known, us to decignate a coeffic product.	i. If the intended
EPD Designation Holder: American Hardwood Export Council (AHEC)		to designate a specific product.	
Window frame, vinyl, fixed	5,801.7 kg	Note: This temporary entry is sourced directly from third-party verified EP replaces a Tally entry that is undergoing a quality assurance review. This e developed using data from ecoinvent and modeled in SimaPro but adher	view. This entry
Used in the following Revit families: cp_HSEB - Window at Upper Levels	5,801.7 kg (30 yrs)	Life Cycle Inventory: For information and quantities, see EPD.	
Used in the following Tally entries: Window frame, vinyl		Product Scope: Cradle to gate.	
Description: Vinyl fixed window frame inclusive of steel bracing		Note: Product stage expanded to include blowing agent emissi and installation, and diffusion from product over service life (B1 make a significant contribution to GWP they have been include). As these impacts
Life Cycle Inventory: 46% PVC part 54% metal reinforcement (Zinc-coated steel)		Transportation Distance: By truck: 1190 km	a in the product stage.
Product Scope: Cradle to gate, excludes hardware, casing, sealant		End-of-Life Scope: 100% Landfilled (plastic waste), includes blowing agent emissio	ns released during
Transportation Distance: By truck: 496 km		disposal LCI Source:	
End-of-Life Scope: 100% Landfilled (plastic waste)		US: Extruded polystyrene (XPS) insulation board, FOAMULAR - (2018), modeled with Simapro 8, source for secondary data is e	
LCI Source: DE: Window frame PVC-U (EN15804 A1-A3) ts (2017)		EPD Source: <u>4788721182,101.1</u>	
Wood stain, water based	76.8 kg	EPD Designation Holder: Owens Corning	
Used in the following Revit families: (R4) SOUTH VEST ROOF	4.3 kg (10 yrs)	EPD Program Operator: UL Environment	
(R4) SOUTH VEST ROOF (INTERIOR) Rectangular Mullion	4.9 kg (10 yrs) 67.6 kg (10 yrs)	EPD Expiration: 1/1/2024	
Used in the following Tally entries: Domestic hardwood			
Description: Semi-transparent stain for interior and exterior wood surfaces			
Life Cycle Inventory: 60% Water 28% Acrylate resin 7% Acrylate emulsion 5% Dipropylene glycol 1.3% NMVOC emissions			
Product Scope: Cradle to gate, including emissions during application			
Transportation Distance: By truck: 642 km			
End-of-Life Scope: 38.7% solids to landfill (plastic waste)			
LCI Source: US: Tap water from groundwater ts (2017) US: Acrylate resin (solvent-systems) ts (2017) DE: Acrylate (emulsion) ts (2017)			

5/19/2022