Delivering A Healthier Building – Cost Effectively

Learning Objectives

1. Improve the built environment through Design & Construction
2. Find Solutions through Building Science
3. Identify Chemicals of Concern
4. Recognize best Heating, Ventilation and Cooling strategies
5. Make an Impact using Quantitative Research

Karla Butterfield

Sustainability Director

Steven Winter Associates, Inc.
61 Washington Street, Norwalk, CT 06854
203.857.0200 x3030 (w) | 203.246.2880 (c)

kbutterfield@swinter.com

www.swinter.com + LinkedIN | @_SWinter | Facebook

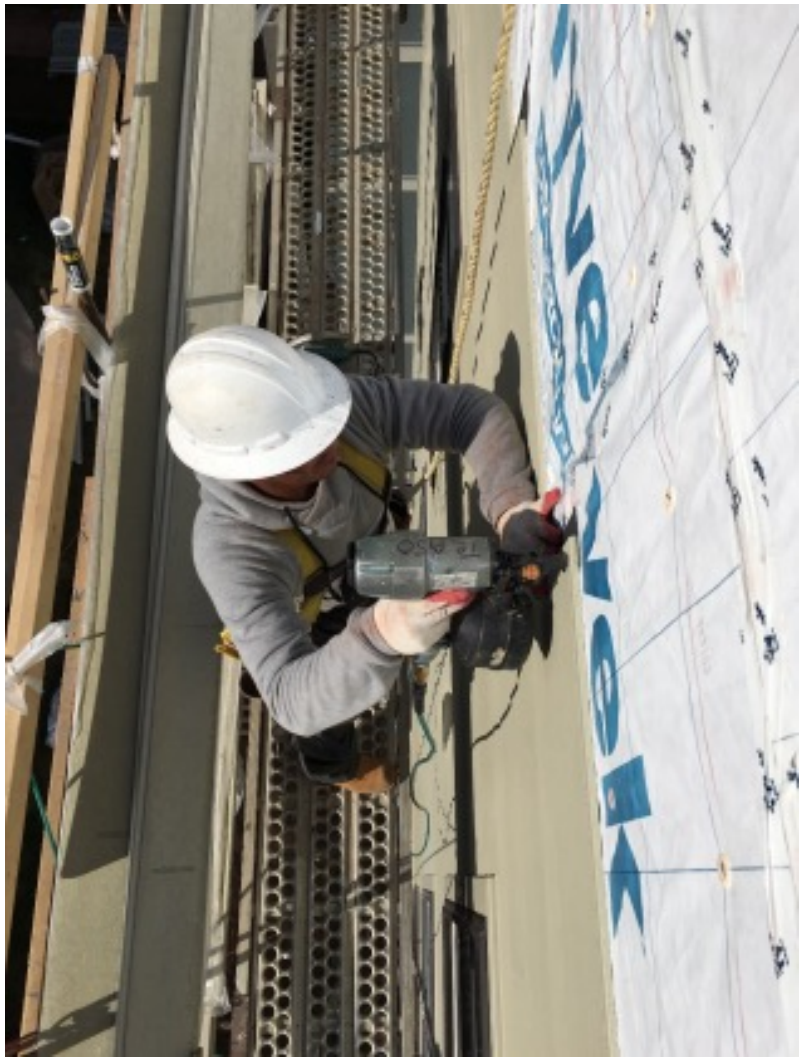
BUILDING SCIENCE IS FREE

Control layers

1. **Rainscreen** – Sheds the Majority of Water
2. **Drainage Plane** – Water Resistive Barrier (WRB), moves water away from substrates (flashing, weeps)
3. **Air Barrier** – Prevent Air Leakage
4. **Thermal** – Prevent Conductive Energy Loss
5. **Vapor Control** – Prevents Warm Humid Air from reaching a Cold Surface and Condensing

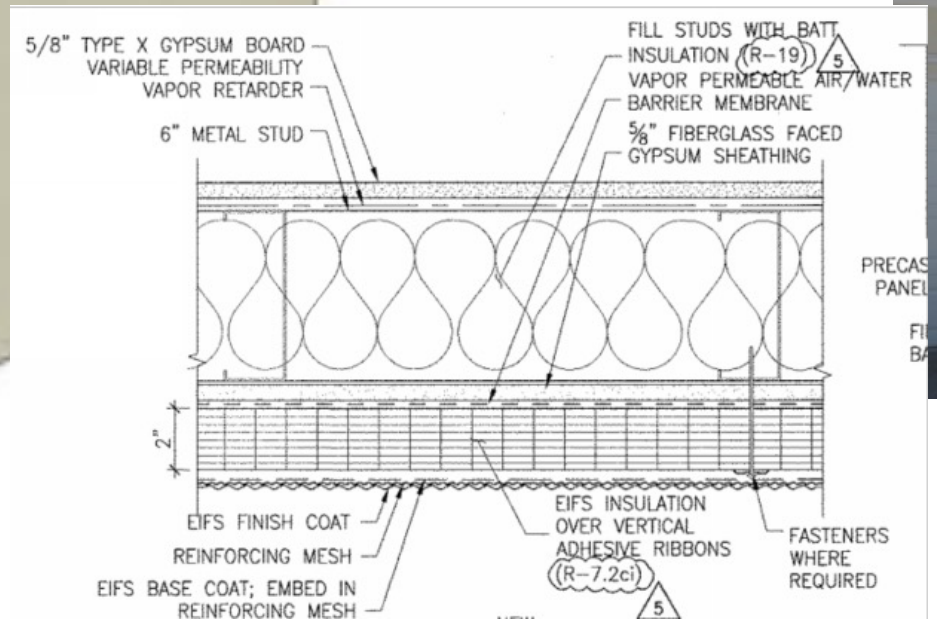
Rainscreen – Cladding

Panels•Siding•Trim – Directly Attached



Panels•Siding•Trim – Sub Framing Attached

Exterior Insulation Finish System – Cement/Plaster



Drainage Plane

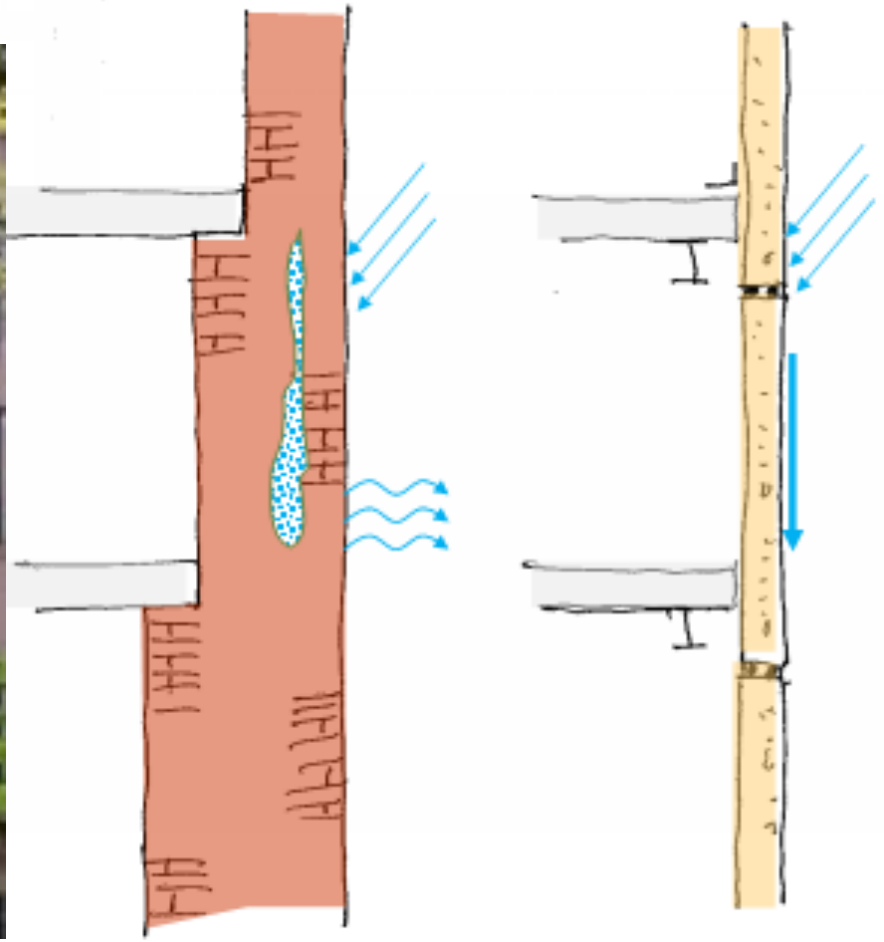


Image credit: Jeffrey D. Kerr, P.E.

Drainage Plane

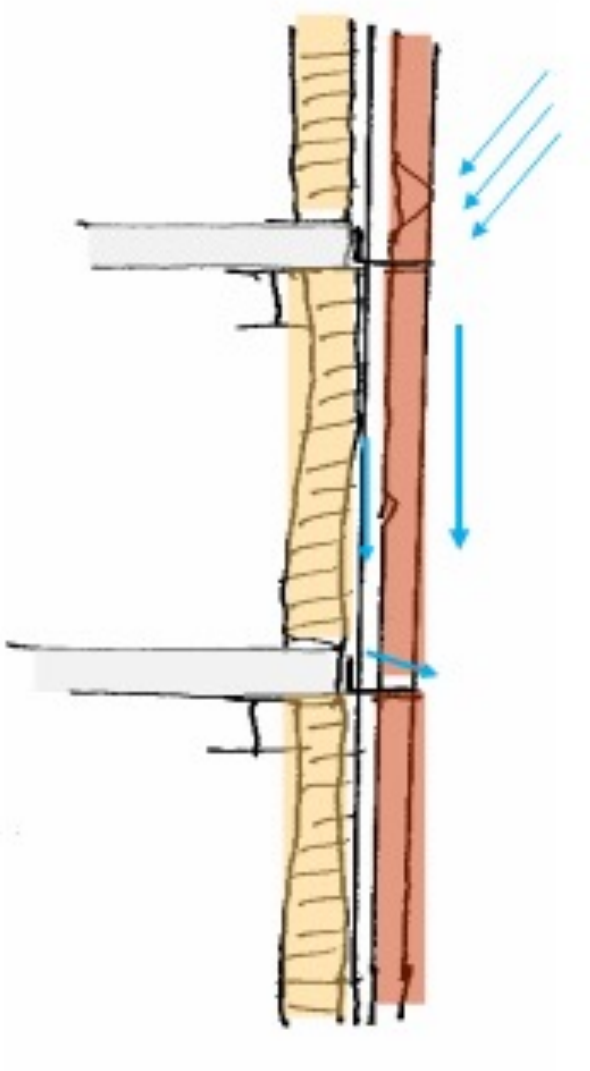
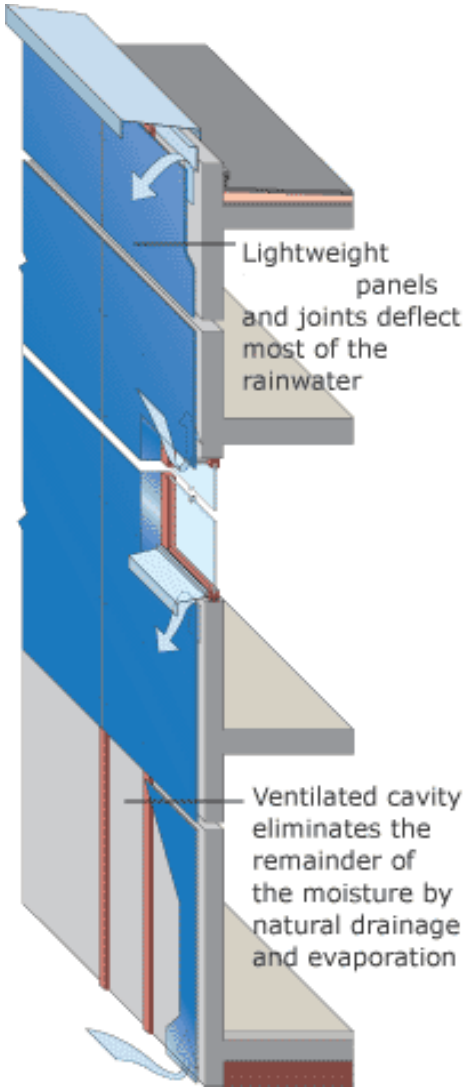


Image credit: Jeffrey D. Kerr, P.E.

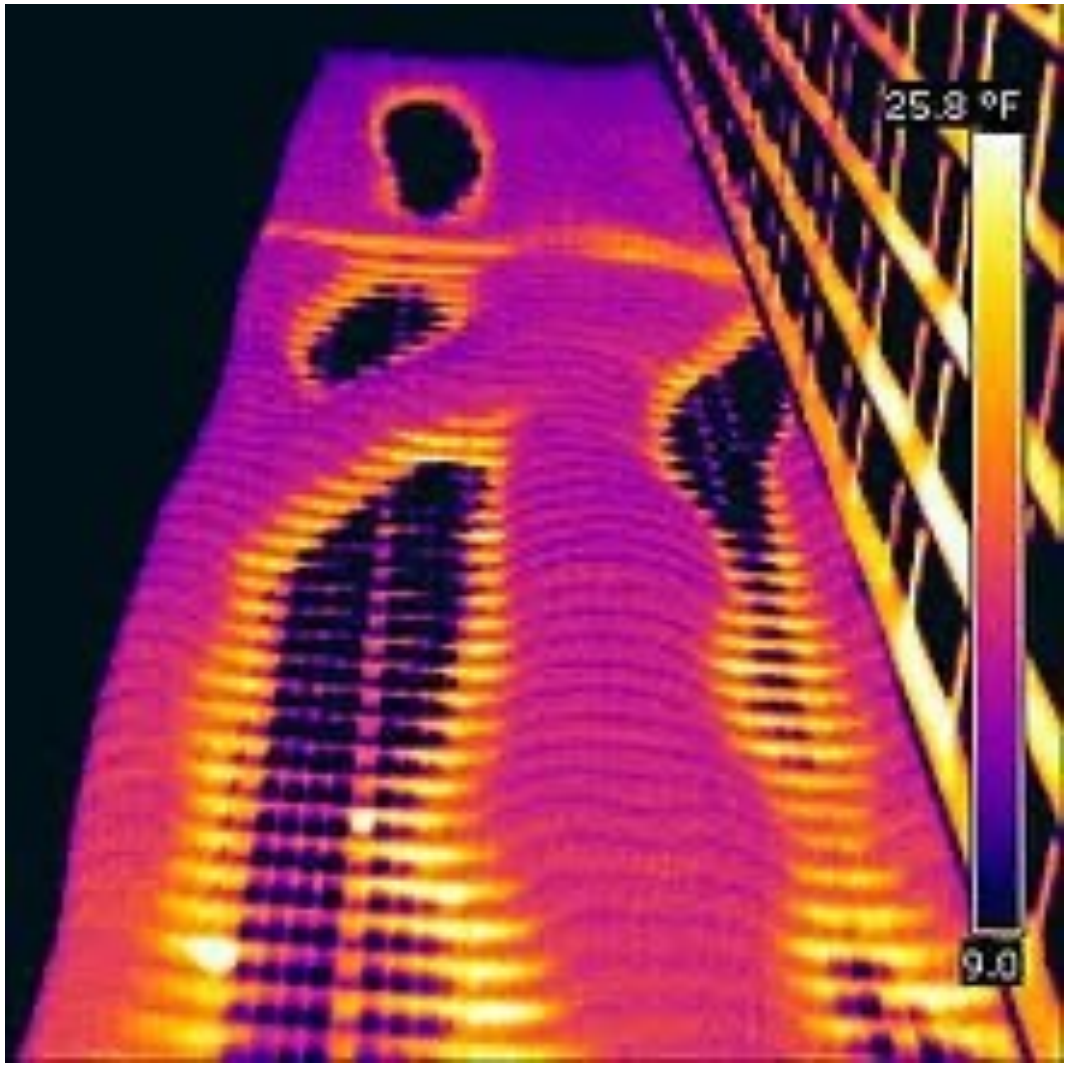
Rainscreen Systems



Rainscreen Systems

Rainscreen Systems

Attachment Design



Attachment Design

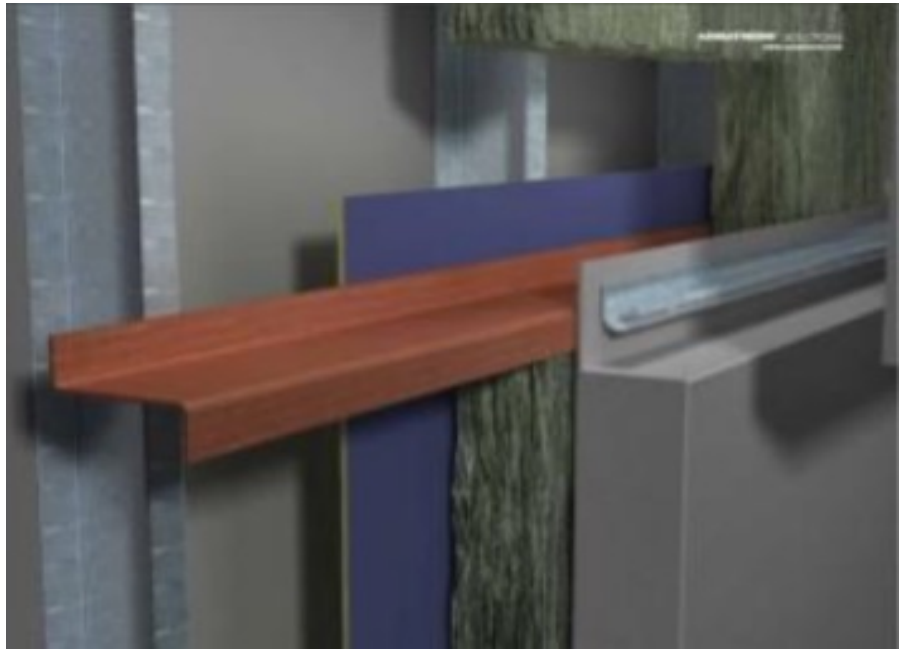
Discrete Anchor Systems

- Masonry Veneer/Siding/EIFS
- Limited thermal bridging
- Consider fastener penetration through water/air barrier
- Ties

Attachment Design

Girt Systems

- Panel Systems
- Some thermal bridging
- Provide improved detailing at penetrations
- Combining clips and girts can improve thermal performance



Attachment Design

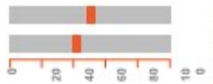
For Cladding Finish Systems: Girts

Galvanized Girts

Description

Typical z-girts are usually galvanized steel. Most projects use these to support their cladding systems.

Thermal efficiency per SWA: **43%-53%**



53% for Steel backup
43% for CMU backup

Standard Product

Fiberglass Girts

Description

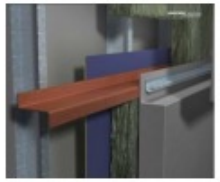
Fiberglass girts are installed and used the same way as typical metal z-girt. The fiberglass material reduces thermal bridging.

Thermal efficiency per SWA: **91%-95%**

91% for Steel backup
95% for CMU backup

Example Products:
Green Girt- Simple Z

Thermoset Resin Girts



Description

These girts have a low thermal conductivity. Made of fire resistant resin material. Can be spaced 16" or 24" o.c. and is very strong.

Thermal efficiency per SWA: **96%**

96% for Steel backup
96% for CMU backup

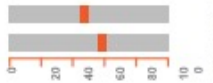
Example Products:
Armatherm Z Girt

Galvanized Metal Clips

Description

These clips are usually galvanized steel and are used to support rainscreen and panel cladding systems.

Thermal efficiency per SWA: **46-59%**



46% for Steel backup
59% for CMU backup

Standard Product

For Cladding Finish Systems: Clips

Stainless Steel Clips

Description

Replacing galvanized steel clips with stainless steel ones can greatly reduce the thermal conductivity.

Thermal efficiency per SWA: **63-74%**

63% for Steel backup
74% for CMU backup

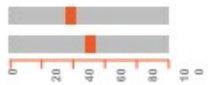
Example Products:
A-Clip, MFSSCHAN

Aluminum Clips

Description

Aluminum clips are light weight and strong. They are a more elastic and non corrosive alternative to traditional metal clips.

Thermal efficiency per SWA: **38-52%**



38% for Steel backup
52% for CMU backup

Example Products:
Alpha Brackets

Fiberglass Clips

Description

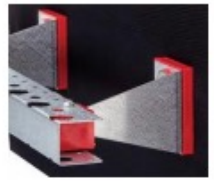
Fiberglass clips have a much lower thermal transmittance coefficient than any metal equivalent.

Thermal efficiency per SWA: **64-79%**

64% for Steel backup
79% for CMU backup

Example Products:
Cascada Clip

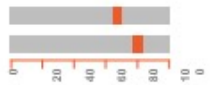
Thermal Stop Clips



Description

This clip has a plastic thermal stop at the base and head to help mitigate thermal bridging.

Thermal efficiency per SWA: **67-80%**



67% for Steel backup
80% for CMU backup

Example Products:
Pos-I-Tie Thermal Clip, Nvelope NV1 Thermal Clip

Attachment Design

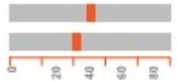
For Cladding Finish Systems: Girts

Galvanized Girts

Description

Typical z-girts are usually galvanized steel. Most projects use these to support their cladding systems.

Thermal efficiency per SWA: **43%-53%**



53% for Steel backup
43% for CMU backup

Standard Product

Fiberglass Girts

Description

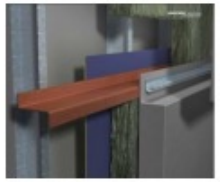
Fiberglass girts are installed and used the same way as typical metal z-girt. The fiberglass material reduces thermal bridging.

Thermal efficiency per SWA: **91%-95%**

91% for Steel backup
95% for CMU backup

Example Products:
Green Girt- Simple Z

Thermoset Resin Girts



Description

These girts have a low thermal conductivity. Made of fire resistant resin material. Can be spaced 16" or 24" o.c. and is very strong.

Thermal efficiency per SWA: **96%**

96% for Steel backup
96% for CMU backup

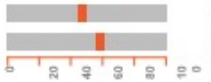
Example Products:
Armatherm Z Girt

Galvanized Metal Clips

Description

These clips are usually galvanized steel and are used to support rainscreen and panel cladding systems.

Thermal efficiency per SWA: **46-59%**



46% for Steel backup
59% for CMU backup

Standard Product

For Cladding Finish Systems: Clips

Stainless Steel Clips

Description

Replacing galvanized steel clips with stainless steel ones can greatly reduce the thermal conductivity.

Thermal efficiency per SWA: **63-74%**

63% for Steel backup
74% for CMU backup

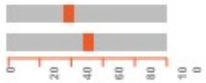
Example Products:
A-Clip, MFSSCHAN

Aluminum Clips

Description

Aluminum clips are light weight and strong. They are a more elastic and non corrosive alternative to traditional metal clips.

Thermal efficiency per SWA: **38-52%**



38% for Steel backup
52% for CMU backup

Example Products:
Alpha Brackets

Fiberglass Clips

Description

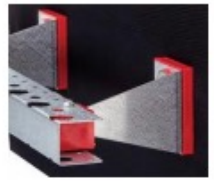
Fiberglass clips have a much lower thermal transmittance coefficient than any metal equivalent.

Thermal efficiency per SWA: **64-79%**

64% for Steel backup
79% for CMU backup

Example Products:
Cascada Clip

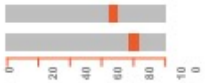
Thermal Stop Clips



Description

This clip has a plastic thermal stop at the base and head to help mitigate thermal bridging.

Thermal efficiency per SWA: **67-80%**



67% for Steel backup
80% for CMU backup

Example Products:
Pos-I-Tie Thermal Clip, Nvelope NV1 Thermal Clip

FROM DESIGN THROUGH CONSTRUCTION

Detailing the Control Layers

Continuity of Control Layers

Readability – clearly communicate the intent

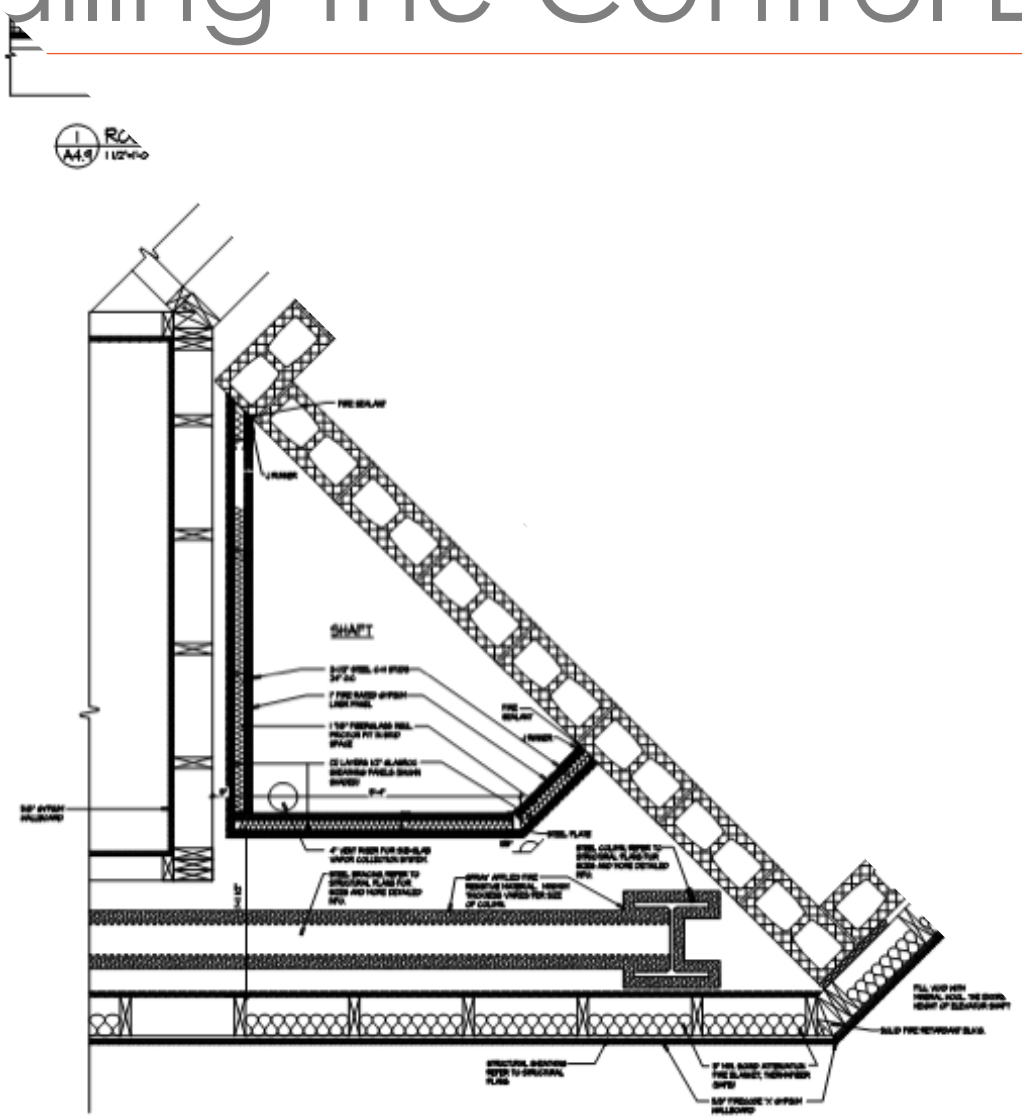
Durability – select materials appropriate for the life of the building

Maintainability – consider frequency and effort of maintenance

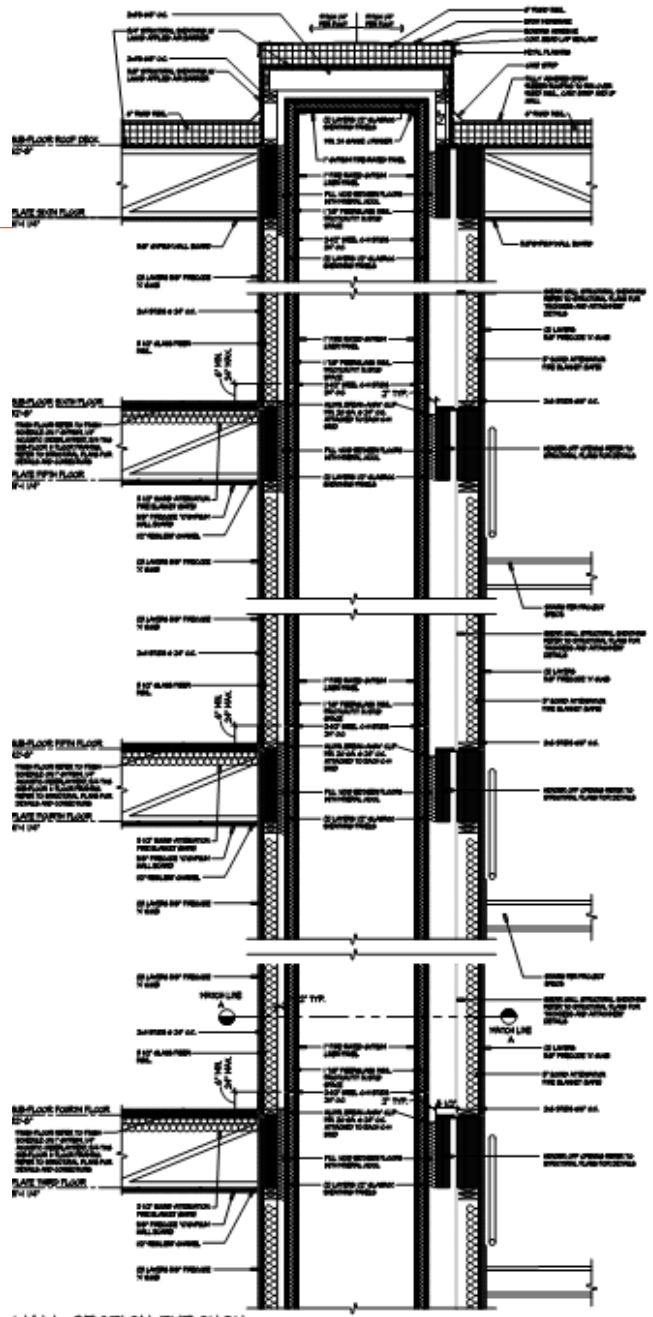
Sustainability – consider impact on the environment

Liability – shortcomings in the above can contribute to costly remediation

Detailing the Control Layers

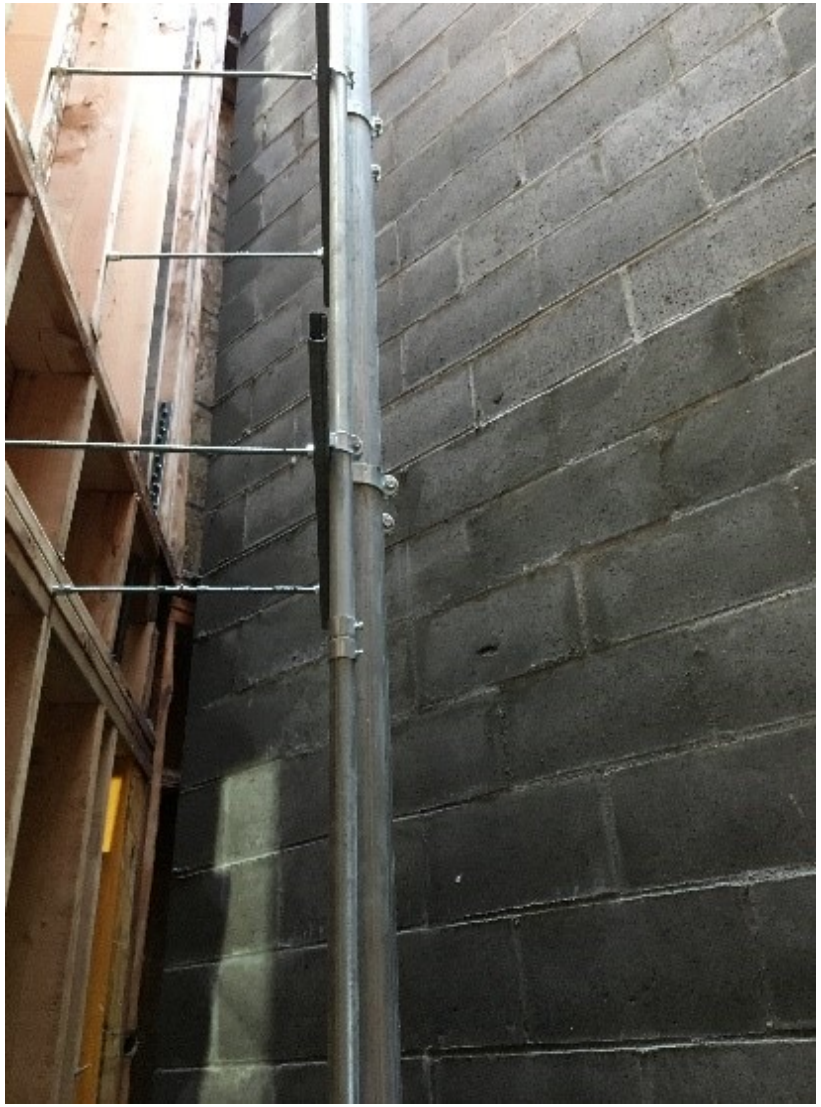


FIRST FLOOR SHAFT FRAMING DETAIL
@ ELEVATORS



WALL SECTION THROUGH
6 STORY SHAFT (UNITS 201-601)

Detailing the Control Layers

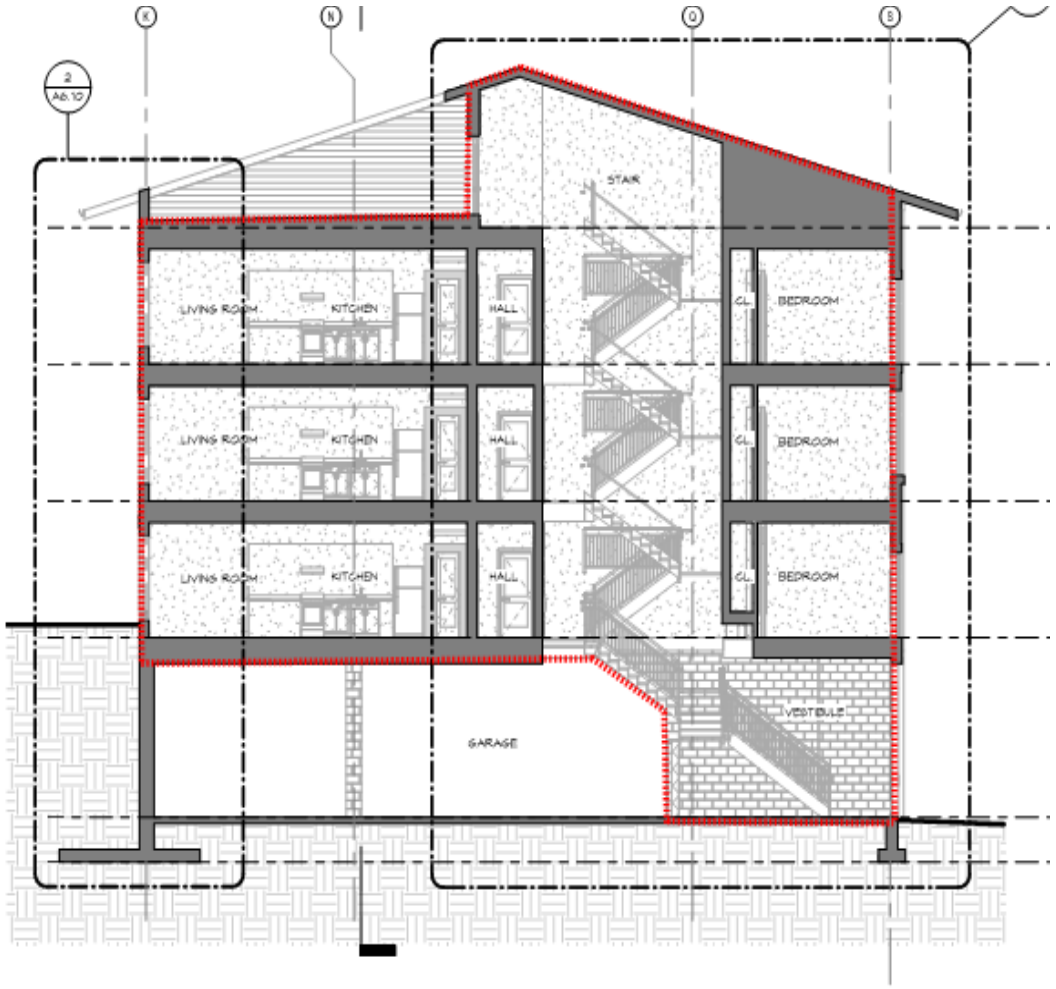


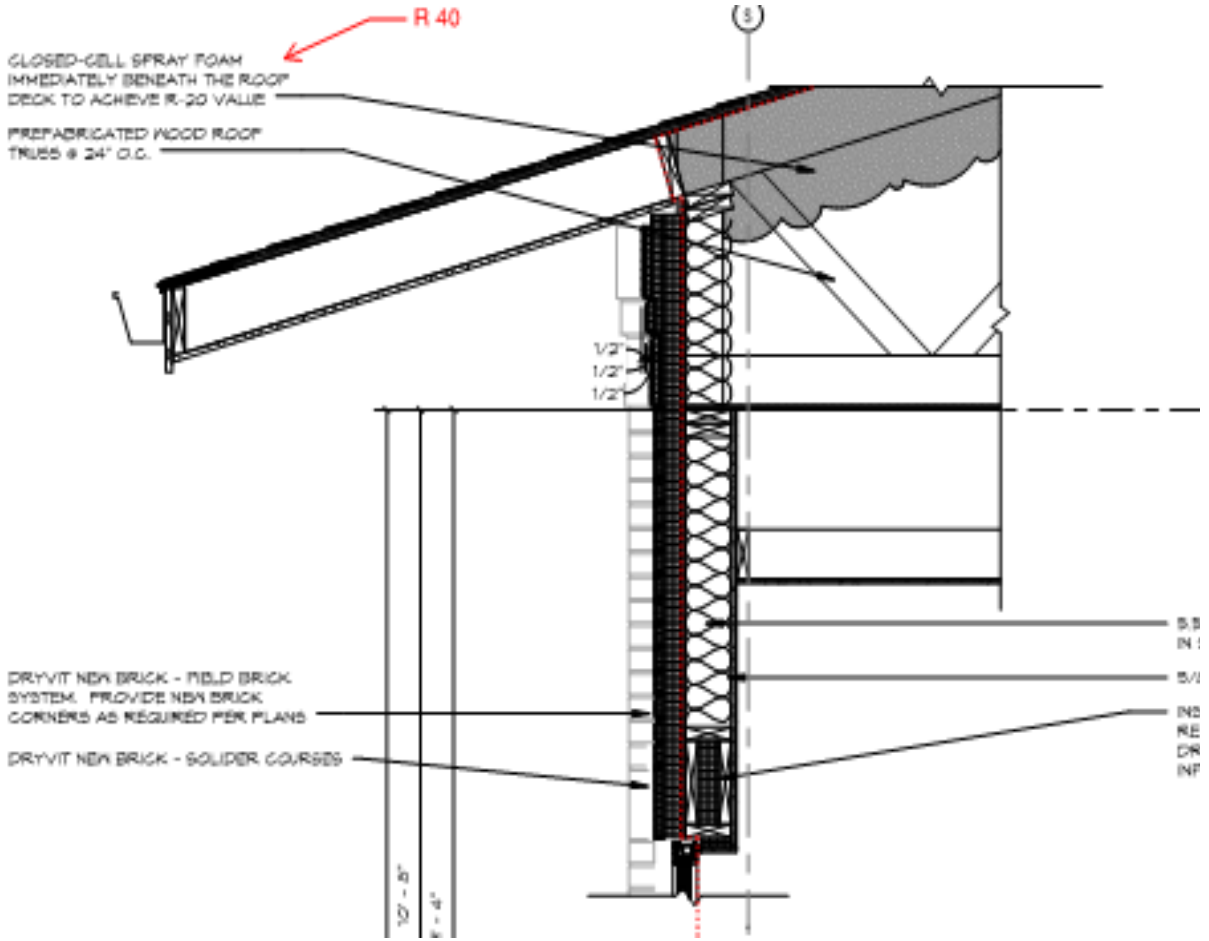
Detailing the Control Layers

Image credit: Loom City Lofts, LLC

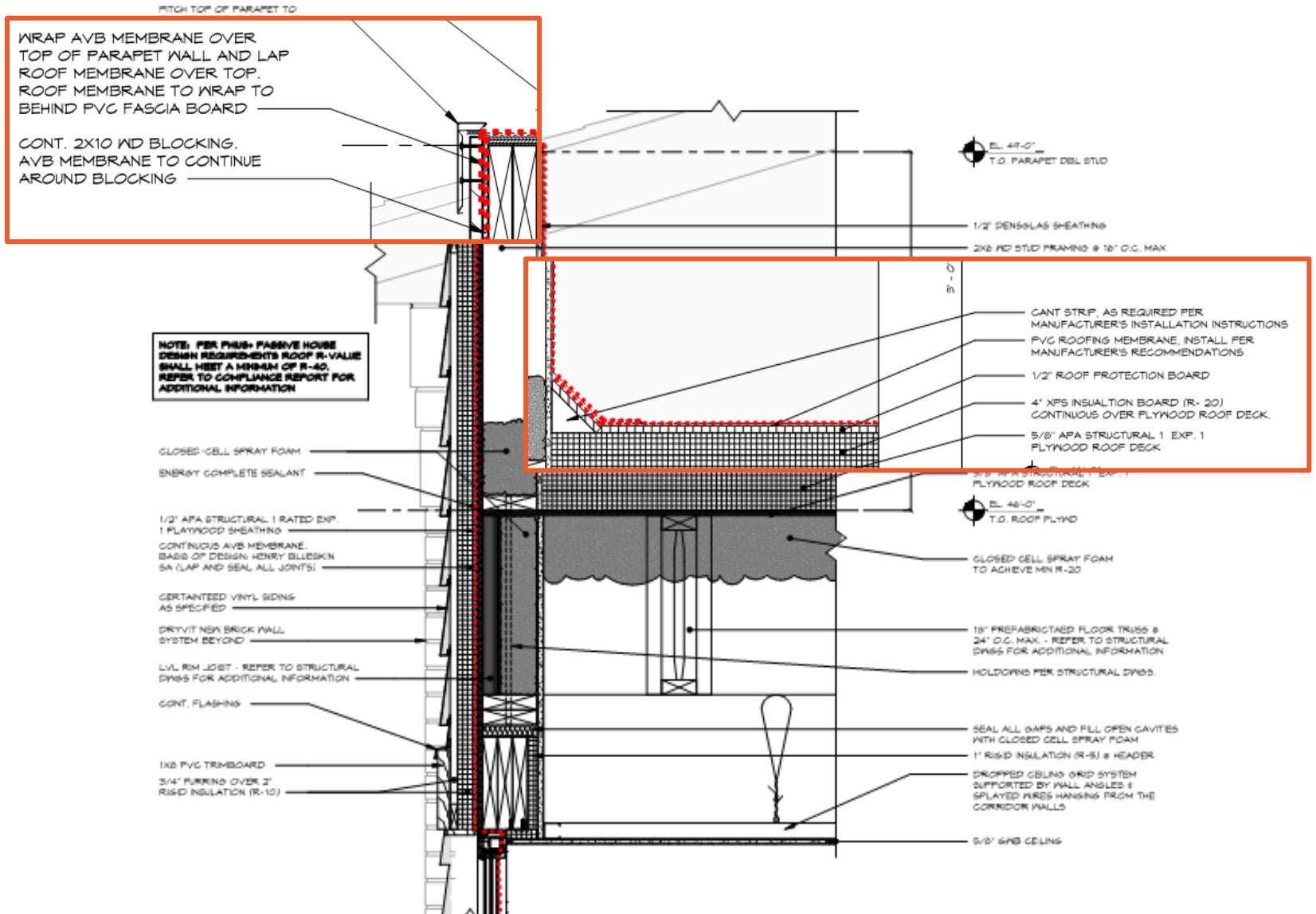
Detailing the Control Layers

Air Barrier

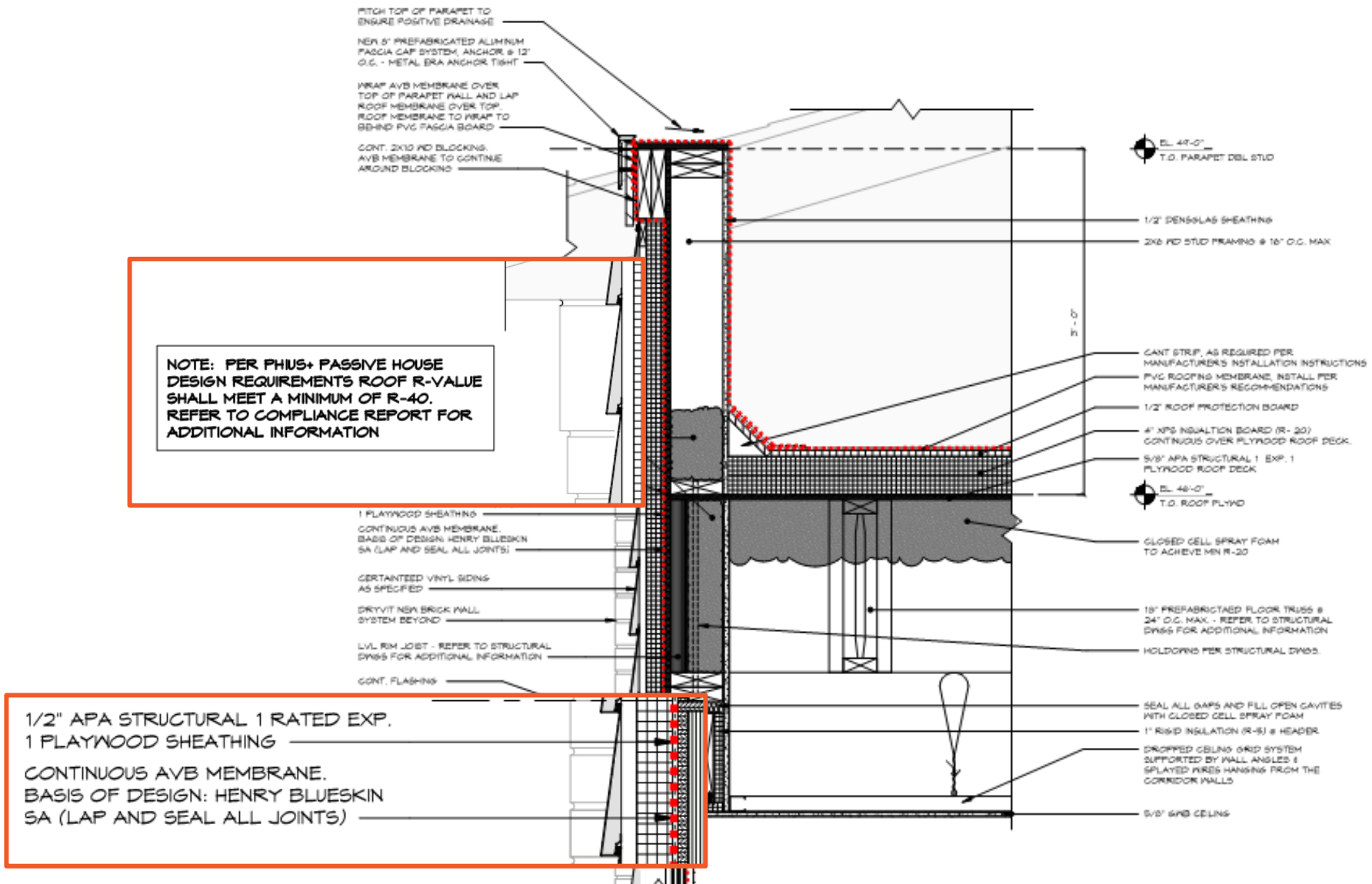

K
N
Q
S
2
A6.10
STAIR
LIVING ROOM
KITCHEN
HALL
CL.
BEDROOM
LIVING ROOM
KITCHEN
HALL
CL.
BEDROOM
LIVING ROOM
KITCHEN
HALL
CL.
BEDROOM
VESTIBULE
GARAGE


R 40
CLOSED-CELL SPRAY FOAM IMMEDIATELY BENEATH THE ROOF DECK TO ACHIEVE R-20 VALUE
PREFABRICATED WOOD ROOF TRUSS @ 24" O.C.
1/2"
1/2"
1/2"
DRYVIT NEW BRICK - FIELD BRICK SYSTEM. PROVIDE NEW BRICK CORNERS AS REQUIRED PER PLANS
DRYVIT NEW BRICK - SOLDIER COURSES

Air Barrier


PITCH TOP OF PARAPET TO
WRAP AVB MEMBRANE OVER TOP OF PARAPET WALL AND LAP ROOF MEMBRANE OVER TOP. ROOF MEMBRANE TO WRAP TO BEHIND PVC FASCIA BOARD
CONT. 2X10 ND BLOCKING. AVB MEMBRANE TO CONTINUE AROUND BLOCKING
NOTE: PER PHIUS+ PASSIVE HOUSE DESIGN REQUIREMENTS ROOF R-VALUE SHALL MEET A MINIMUM OF R-40. REFER TO COMPLIANCE REPORT FOR ADDITIONAL INFORMATION
EL. 47'-0" T.O. PARAPET DBL STUD
1/2" DENSGLAS SHEATHING
2X6 ND STUD FRAMING @ 16" O.C. MAX
CANT STRIP, AS REQUIRED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS
PVC ROOFING MEMBRANE, INSTALL PER MANUFACTURER'S RECOMMENDATIONS
1/2" ROOF PROTECTION BOARD
4" XPS INSUALTION BOARD (R- 20) CONTINUOUS OVER PLYWOOD ROOF DECK.
5/8" APA STRUCTURAL 1 EXP. 1 PLYWOOD ROOF DECK
EL. 46'-0" T.O. ROOF PLYWD
CLOSED CELL SPRAY FOAM TO ACHIEVE MIN R-20
CLOSED-CELL SPRAY FOAM
ENERGY COMPLETE SEALANT
1/2" APA STRUCTURAL 1 RATED EXP. 1 PLAYWOOD SHEATHING
CONTINUOUS AVB MEMBRANE. BASIS OF DESIGN: HENRY BLUESKIN SA (LAP AND SEAL ALL JOINTS)
CERTAINTEED VINYL SIDING AS SPECIFIED
DRYVIT NEW BRICK WALL SYSTEM BEYOND
LVL RIM JOIST - REFER TO STRUCTURAL DWGS FOR ADDITIONAL INFORMATION
CONT. FLASHING
1X8 PVC TRIMBOARD
3/4" FURRING OVER 2" RIGID INSULATION (R-10)
19" PREFABRICTAED FLOOR TRUSS @ 24" O.C. MAX. - REFER TO STRUCTURAL DWGS FOR ADDITIONAL INFORMATION
HOLDOWNS PER STRUCTURAL DWGS.
SEAL ALL GAPS AND FILL OPEN CAVITES WITH CLOSED CELL SPRAY FOAM
1" RIGID INSULATION (R-5) @ HEADER
DROPPED CEILING GRID SYSTEM SUPPORTED BY WALL ANGLES & SPLAYED WIRES HANGING FROM THE CORRIDOR WALLS
5/8" GWB CEILING

Air Barrier

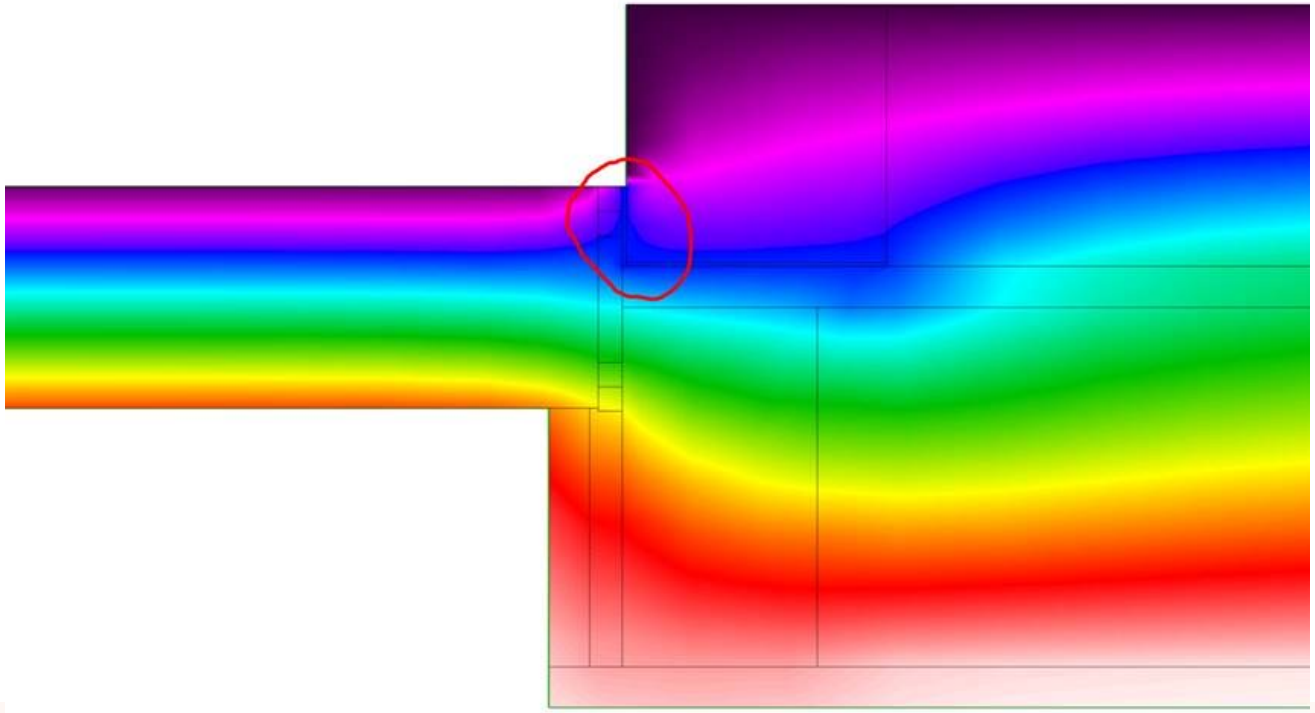

NOTE: PER PHIUS+ PASSIVE HOUSE DESIGN REQUIREMENTS ROOF R-VALUE SHALL MEET A MINIMUM OF R-40. REFER TO COMPLIANCE REPORT FOR ADDITIONAL INFORMATION
1/2" APA STRUCTURAL 1 RATED EXP. 1 PLAYWOOD SHEATHING
CONTINUOUS AVB MEMBRANE. BASIS OF DESIGN: HENRY BLUESKIN SA (LAP AND SEAL ALL JOINTS)
PITCH TOP OF PARAPET TO ENSURE POSITIVE DRAINAGE
NEW 6" PREFABRICATED ALUMINUM FASCIA CAP SYSTEM, ANCHOR @ 12" O.C. - METAL ERA ANCHOR TIGHT
WRAP AVB MEMBRANE OVER TOP OF PARAPET WALL AND LAP ROOF MEMBRANE OVER TOP. ROOF MEMBRANE TO WRAP TO BEHIND PVC FASCIA BOARD
CONT. 2X10 PID BLOCKING. AVB MEMBRANE TO CONTINUE AROUND BLOCKING
EL. 47'-0" T.O. PARAPET DBL STUD
1/2" DENSGLAS SHEATHING
2X6 PID STUD FRAMING @ 16" O.C. MAX
9' - 0"
CANT STRIP, AS REQUIRED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS
PVC ROOFING MEMBRANE, INSTALL PER MANUFACTURER'S RECOMMENDATIONS
1/2" ROOF PROTECTION BOARD
4" XPS INSULATION BOARD (R- 20) CONTINUOUS OVER PLYWOOD ROOF DECK.
5/8" APA STRUCTURAL 1 EXP. 1 PLYWOOD ROOF DECK
EL. 46'-0" T.O. ROOF PLYWD
CLOSED CELL SPRAY FOAM TO ACHIEVE MIN R-20
1 PLAYWOOD SHEATHING
CONTINUOUS AVB MEMBRANE. BASIS OF DESIGN: HENRY BLUESKIN SA (LAP AND SEAL ALL JOINTS)
CERTAINTEED VINYL SIDING AS SPECIFIED
DRYVIT NEW BRICK WALL SYSTEM BEYOND
LVL RIM JOIST - REFER TO STRUCTURAL DWGS FOR ADDITIONAL INFORMATION
CONT. FLASHING
19" PREFABRICTAED FLOOR TRUSS @ 24" O.C. MAX. - REFER TO STRUCTURAL DWGS FOR ADDITIONAL INFORMATION
HOLDOWNS PER STRUCTURAL DWGS.
SEAL ALL GAPS AND FILL OPEN CAVITES WITH CLOSED CELL SPRAY FOAM
1" RIGID INSULATION (R-5) @ HEADER
DROPPED CEILING GRID SYSTEM SUPPORTED BY WALL ANGLES & SPLAYED WIRES HANGING FROM THE CORRIDOR WALLS
5/8" GWB CEILING

Air Barrier & Thermal Barrier

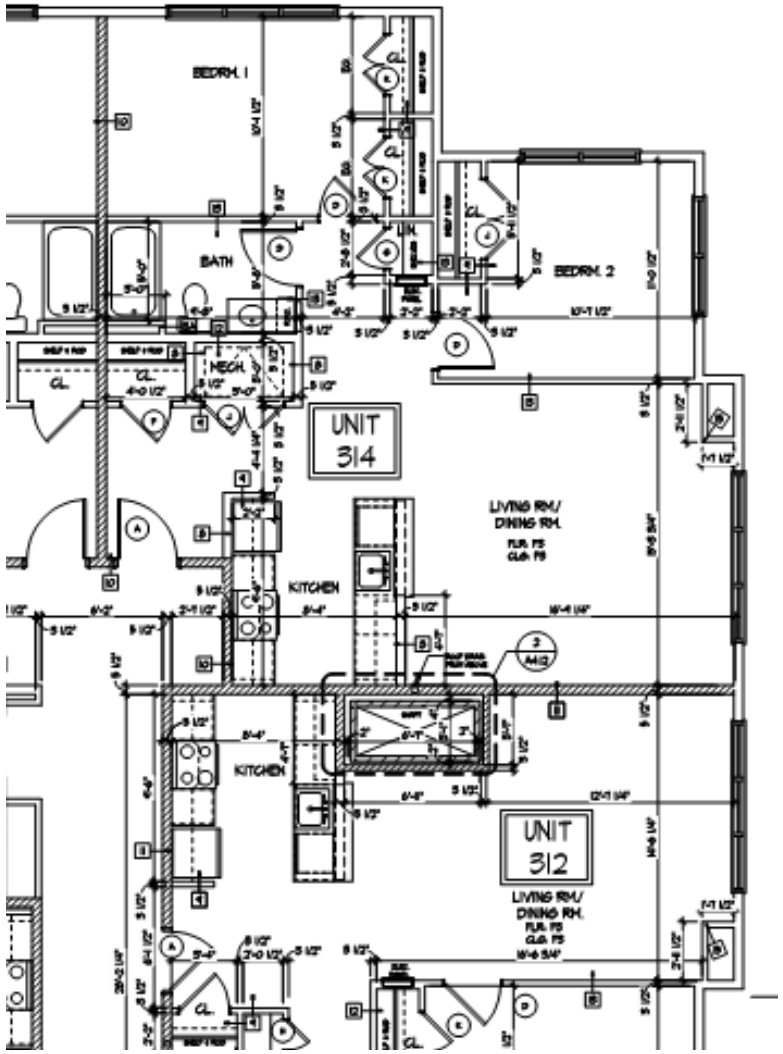
Air Barrier & Thermal Barrier

Heat Transfer

Conductio

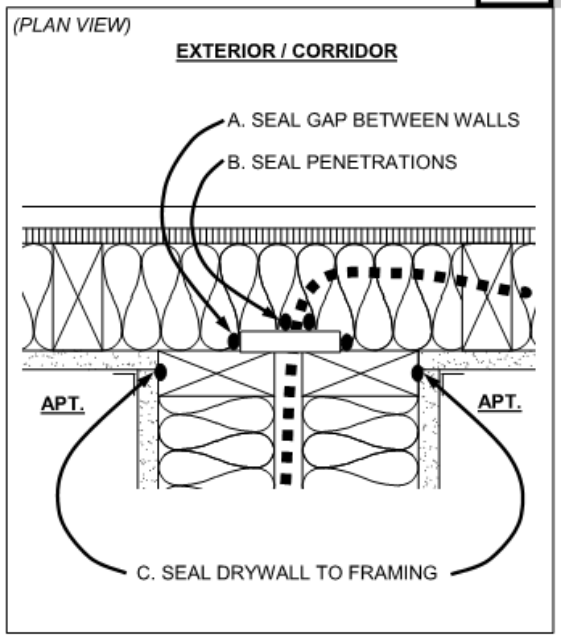


Air Barrier & Thermal Barrier



Air Barrier & Thermal Barrier

7 DEMISING DOUBLE WALL AT EXTERIOR / CORRIDOR WALL



Notes:

A, B, C. Intent: reduce leakage between exterior / corridor wall and demising wall / interior partition

A. Options:
- Expanding foam
- Plywood, drywall or rigid foam board with edges caulked

A. Mineral wool or fiberglass batts are NOT acceptable as an air barrier

C. Option: apply drywall adhesive to framing BEFORE installing drywall

Responsibilities:

Drywall: C
Mech/Elec/Plumb: A, B

Air Barrier & Thermal Barrier

Air Barrier

Air Barrier

DURABILITY & COMFORT

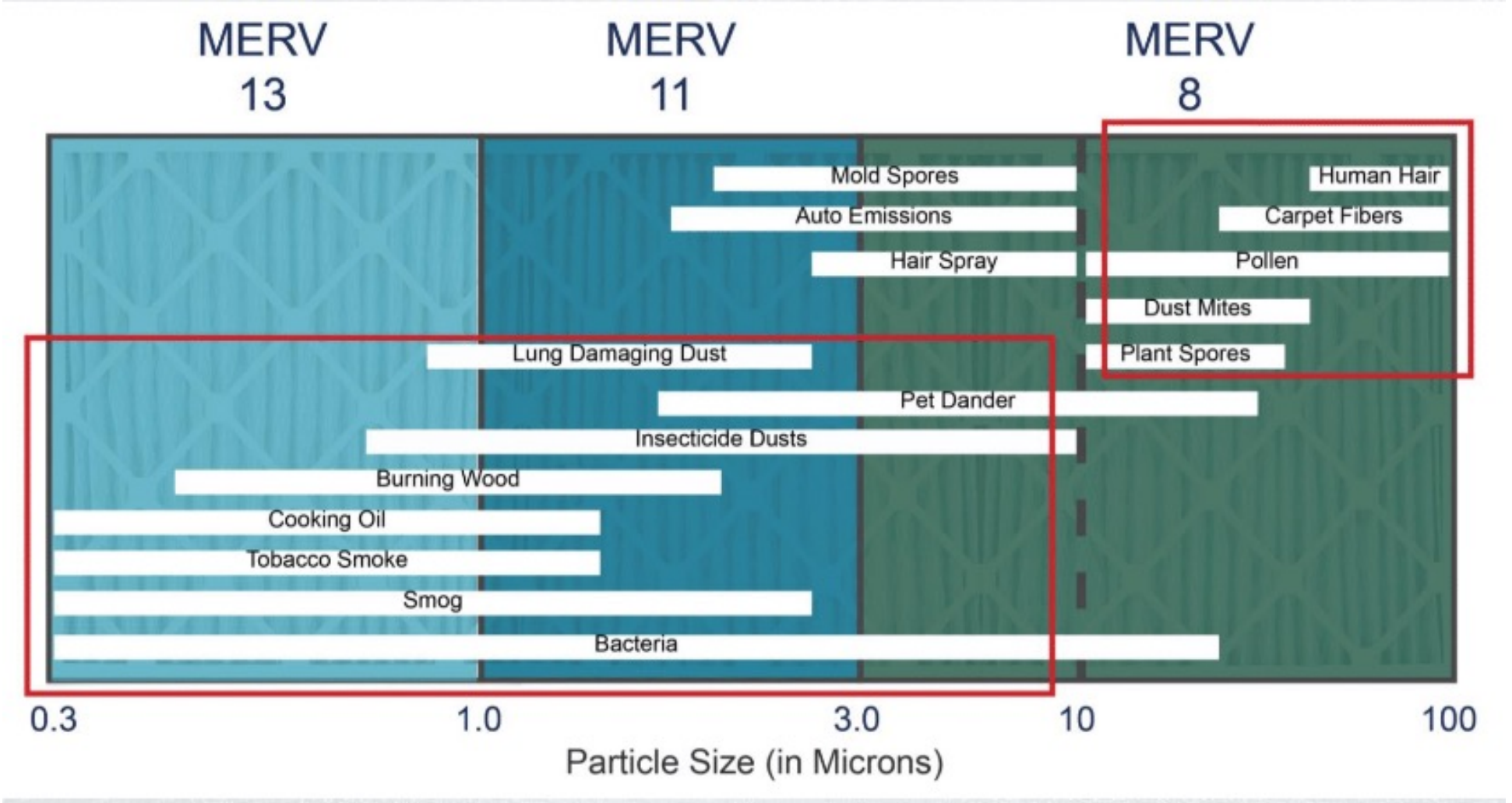
Ventilation & Filtration

Ventilation & Filtration

MERV Rating Chart

14	90-95%	>98%	Most Tobacco Smoke	Smoking Lounges	synthetic media, 12-36 in. deep, 6-12 pockets **Box Filter**- Rigid Style Cartridge
13	89-90%	>98%	Proplet Nuceli (Sneeze)	Superior Commercial Buildings	Filters 6 to 12" deep m ay use lofted or paper media.
12	70-75%	>95%	1.0-3.0 pm Particle Size Legionella	Superior Residential	**Bag Filter**- Nonsupported microfine fiberglass or synthetic media, 12-36 in. deep, 6-12 pockets **Box Filter**- Rigid Style Cartridge Filters 6 to 12" deep m ay use lofted or paper media.
11	60-65%	>95%	Humidifier Dust Lead Dust	Better Commercial Buildings	
10	50-55%	>95%	Milled Flour Auto Emissions	Hospital Laboratories	
9	40-45%	>90%	Welding Fumes		
8	30-35%	>90%	3.0-10.0 pm Particle Size	Commercial Buildings	**Pleated Filters**- Disposable, extended surface area, thick with cotton-polyester blend media

Ventilation & Filtration



Air Quality is Impactful

When all the doors and windows are closed, where does the air we breath come from?

Slide credit: Bill Hayward

Air Quality is Impactful

EMOTIONAL CHANGES

- Mood changes, feeling agitated or depressed

RESPIRATORY CHANGES

- Sinus congestion
- Coughing or shortness
- of breath
- Increases use of asthma inhaler or other medications

COGNITIVE CHANGES

- Frequent headaches
- Foggy thinking, difficulty making
- decisions
- Sleep disturbance (can't sleep, can't wake up)
- Short term memory loss

OTHER PHYSICAL ISSUES

- Stomach discomfort
- Muscle and joints hurt, making
- exercise difficult
- Extreme fatigue, feeling lethargic
- Always feeling sick (too many colds)
- Skin rashes
- Night sweats
- Heart racing or palpitations

Slide credit: Bill Hayward

Air Quality is Impactful

- There are 130 million homes in America with 2.9 living in each
- 46% of the homes have an indoor air quality issue affecting at least 1 family member
- 65,000,000 people
  - Suffering
  - Missing work
  - Missing school
  - Visiting emergency rooms

Air Quality is Impactful

Good (CHFA Required)	Better (Labeled/Certified/Commissioned)	Best (Labeled/Zero Energy/ Zero Carbon)
Quiet	Quieter Don't Feel Allergies	Peacefully Quiet Don't Feel Allergies
Much Less Dirt/Dust Low Odors	Nearly Dust Free No Odors Few Bugs & Spiders	Nearly Dust Free No Odors No Bugs & Spiders
Fewer Sick Days Sleep Better Cognitive Improvement +	Fewer Sick Days+ Sleep Better ++ Cognitive Improvement +	Fewer Sick Days++ Sleep Better +++ Cognitive Improvement ++
Health Savings $ Energy Savings $$	Health Savings $$ Energy Savings $$$	Health Savings $$$ Energy Savings $$$$

Determining Health Outcomes

It's NOT your genetic code…

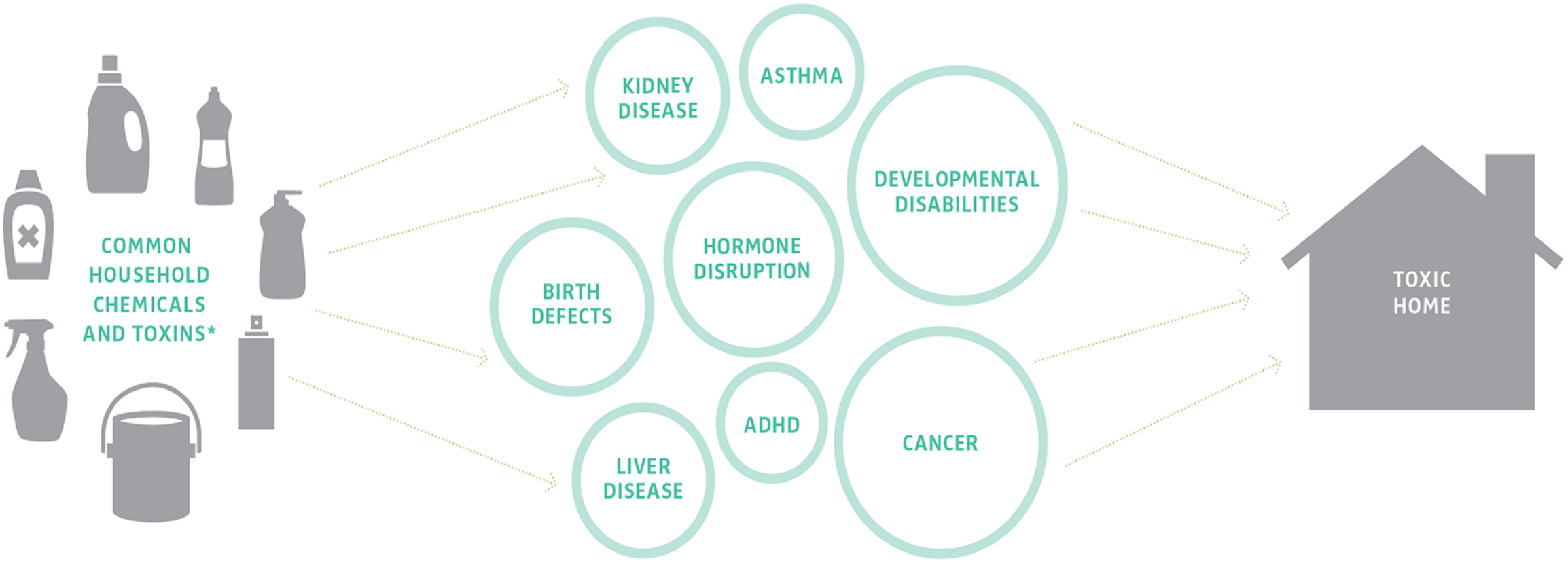
Source: https://www.cdc.gov/nchhstp/socialdeterminants/faq.html

<5%	Genetics/biology
~20%	Lifestyle/behavior
~20%	Medical care
~55%	Physical & social environment

Determining Health Outcomes

Determining Health Outcomes

Avoid Toxins & Chemicals of Concern



Avoid Toxins & Chemicals of Concern

• Tobacco smoke	Cancer · Heart Disease · Respiratory Illness
• Biological contaminants	Respiratory Illness · Lung Disease · Stress
• Combustion by-products	Cancer · Respiratory Illness · Lung Disease
• Household products	Cancer · Respiratory Illness · Neurological Issues
• Toxic materials	Cancer · Respiratory Illness · Neurological Issues
• Radon	Cancer
• Safety & security	Stress
• Diet & Exercise	Cancer · Heart Disease · Respiratory Illness

Avoid Toxins & Chemicals of Concern

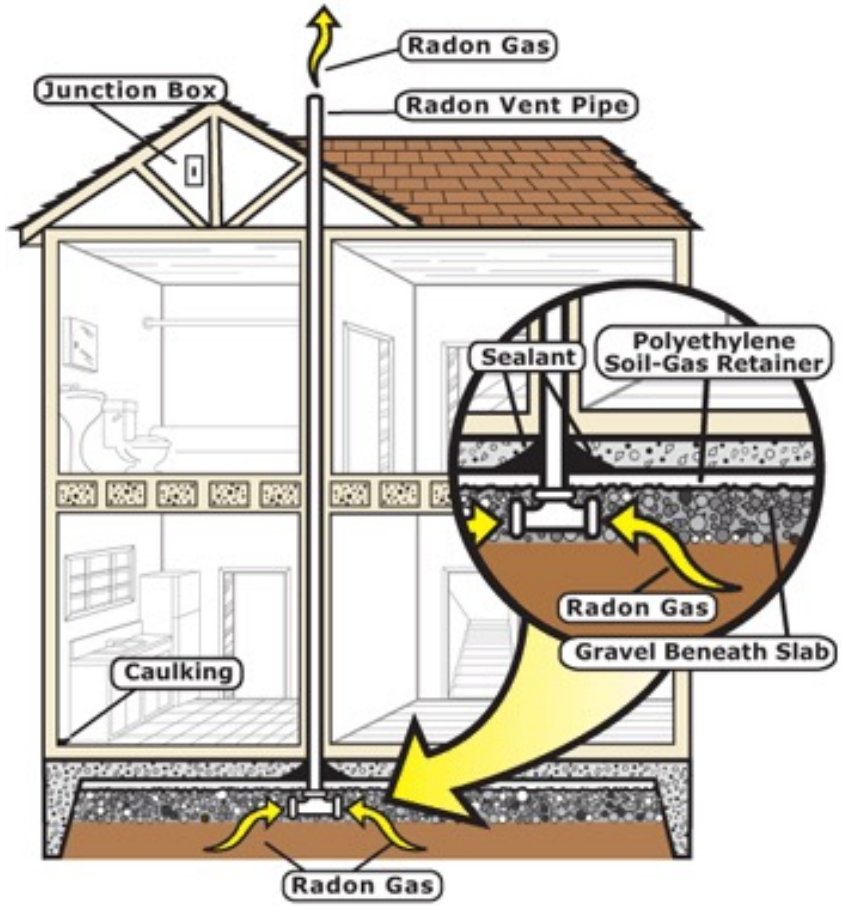


Image Credit: EPA

Avoid Toxins & Chemicals of Concern

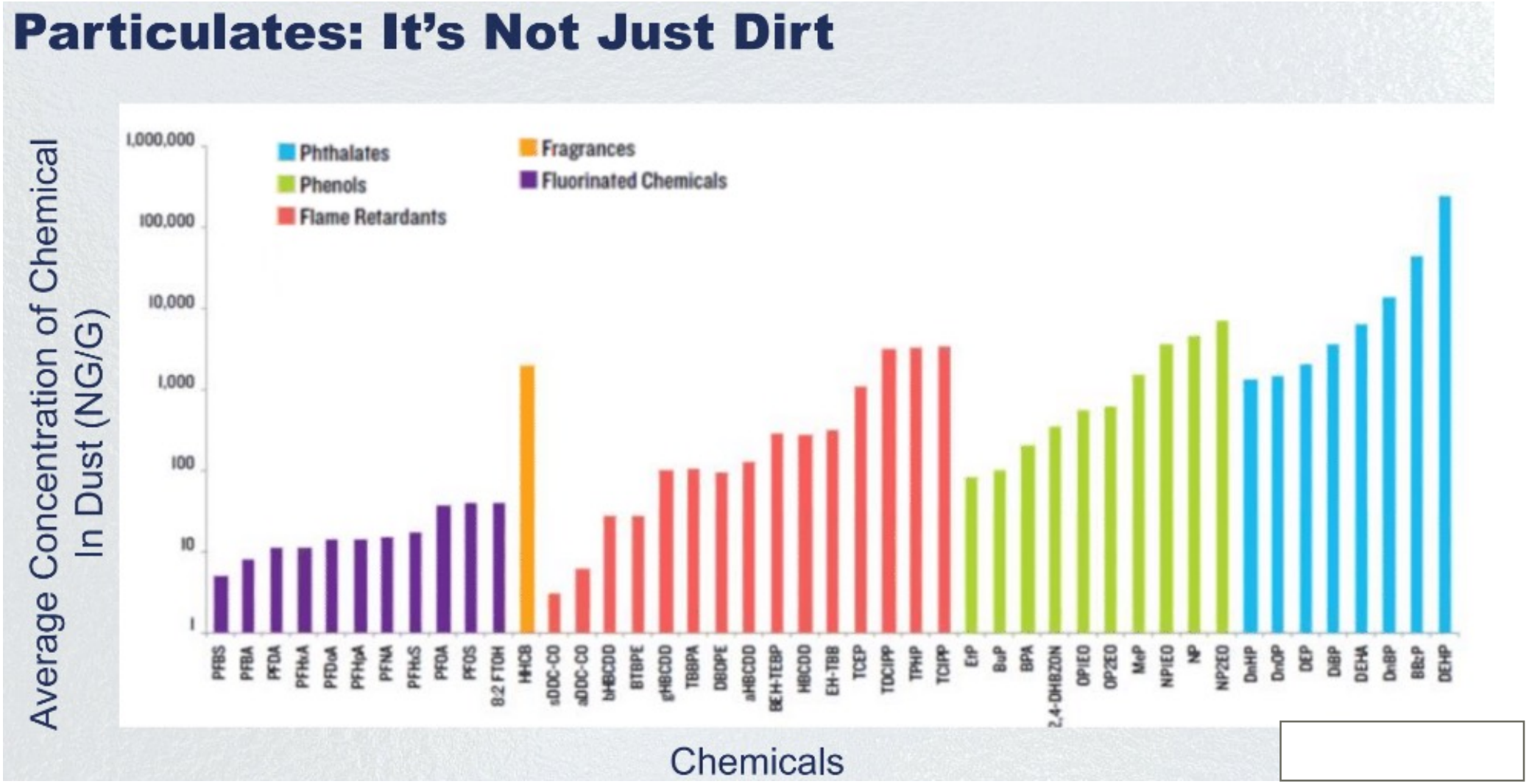
- Nonylphenol Ethoxylates (NPE)
- Phthalates
- Antimicrobials
- Flame Retardants
- Perfluorinated Chemicals (PFC)

Slide credit: Bill Hayward

Avoid Toxins & Chemicals of Concern

Assembly	Component	Location	Occupant Exposure	Materials to Avoid	Concerns	Alternatives	Brand
Foundation	Concrete	Exterior	Negligable		Cement: C02 & heavy metal emissions, airborne pollution, quarrying	Superior Wall (extruded polystyrene foam insulation)	
	Waterproofing	Exterior	Negligible		Styrene-butadiene (possble carcinogen)	Drainage Boards/Mats	
	Drainage Mat	Exterior	Negligible				
	PVC Drainage	Exterior	Negligible	Polyvinyl Chloride (PVC)	Manufacturing Concerns		
	Masonry	Exterior	Negligible				
	Masonry Ties	Exterior	Negligible				
	Slab Insulation	Interior	Negligible	EPS, XPS, Polyiso	(MDI) methylene diphenyl diisocyanate	Cellular Glass Insulation	FoamGlas
BG Walls	Studs	Interior	Moderate				
	Insulation	Interior	Moderate	Spray Foam Insulation	Isocyanates, MDI, polyols (catalysts)	mineral wool	
	Drywall	Interior	Certain	paper faced	mold/moisture	paper-less board	Dense Shield
	Drywall Sealant	Interior	Certain		toluene diisocyanates (TDIs)	California Air Resources Board (CARB) compliant	

Avoid Toxins & Chemicals of Concern



Avoid Toxins & Chemicals of Concern








Avoid Toxins & Chemicals of Concern

Building Materials

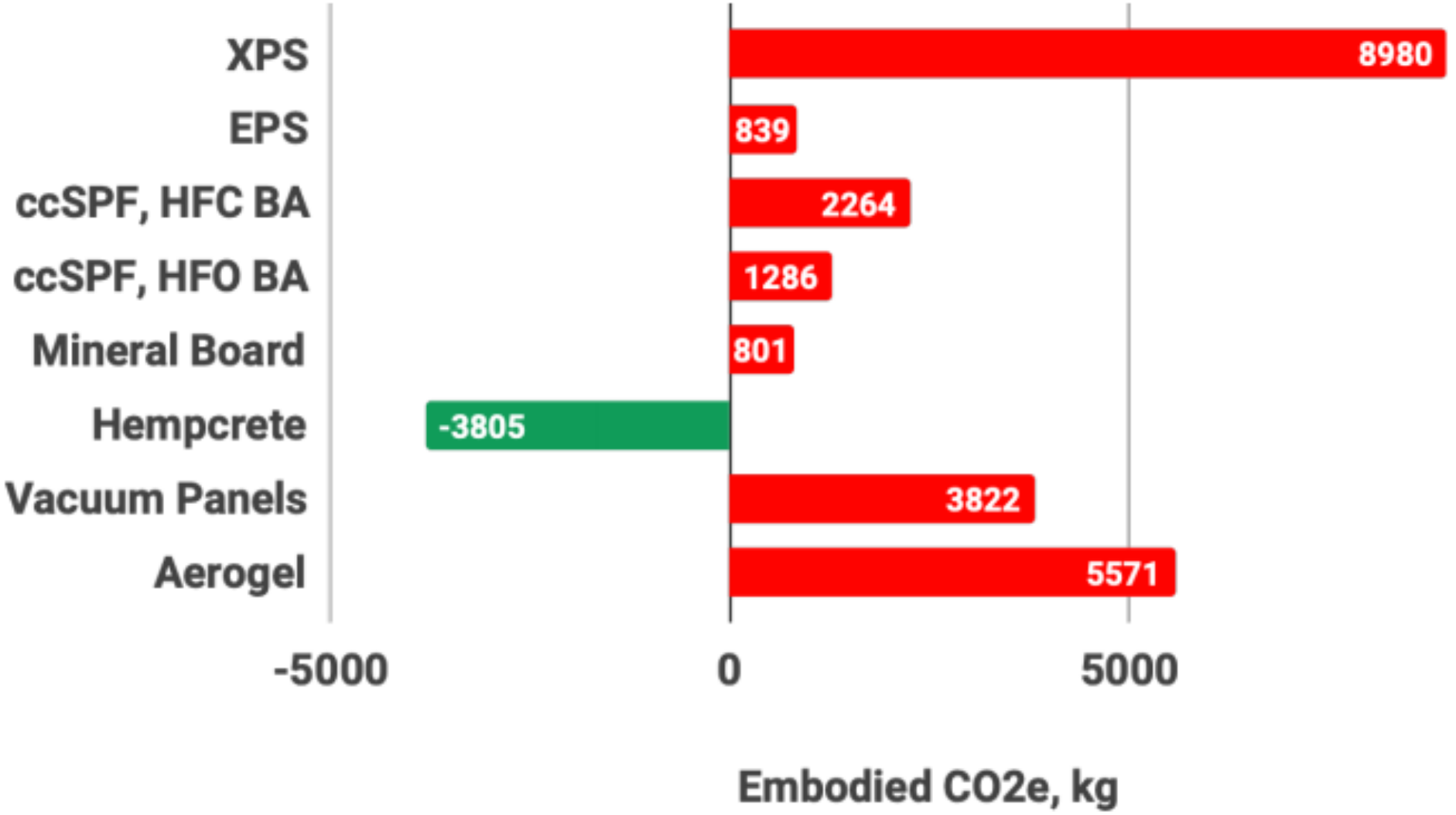
- Global Warming Potential (GWP)
- Embodied Carbon
- Life Cycle Analysis (LCA)

Building Materials

- Closed Cell Foam in 2010 had a GWP of about 1,000
- Today some blowing agents have GWP as low as 1
- R410a GWP is 2088
- CO_2 is 1

Building Materials

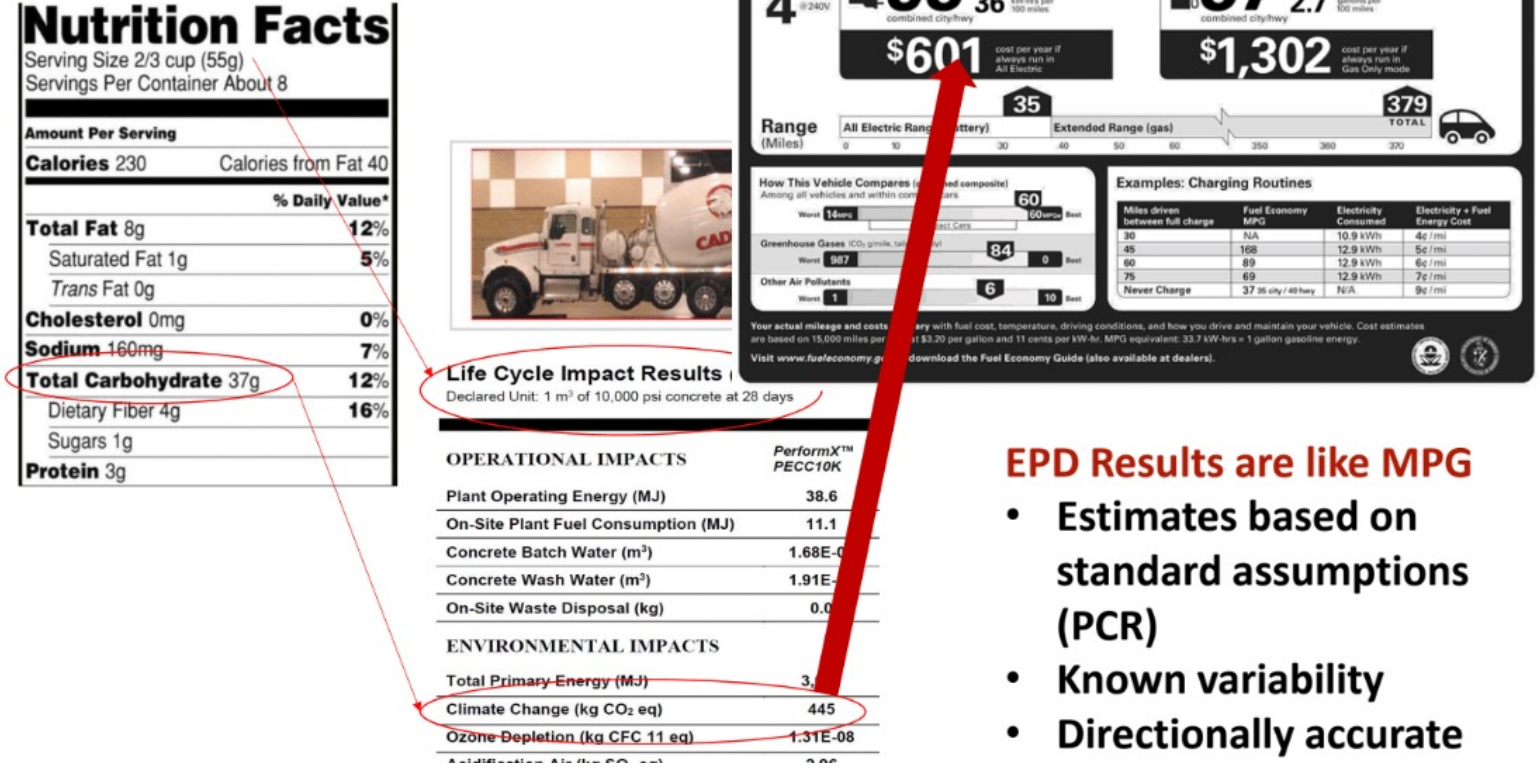
Building Materials



Building Materials

EPDs Enable Embodied Carbon Transparency

Environmental
Product
Declarations



EPD Results are like MPG

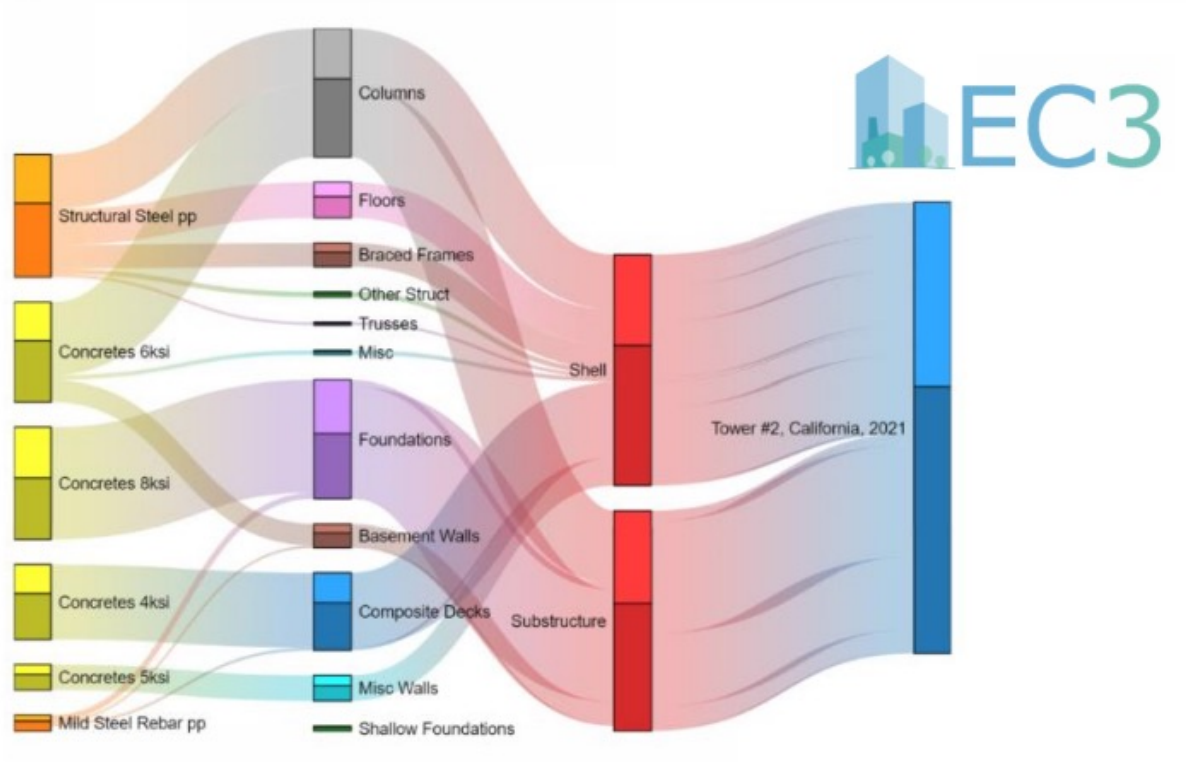
- **Estimates based on standard assumptions (PCR)**
- **Known variability**
- **Directionally accurate**

Building Materials

PROJECT SPONSORS

CHARLES PANKOW FOUNDATION
MAGNUSSON KLEMENCIC ASSOCIATES FOUNDATION
SKANSKA
Interface
AISC
AIA
aci Foundation
Microsoft
ALEXANDRIA.
AUTODESK.
WEBCOR
PERKINS+WILL

EC3: Embodied Carbon Calculator for Construction



PROJECT LEADERSHIP

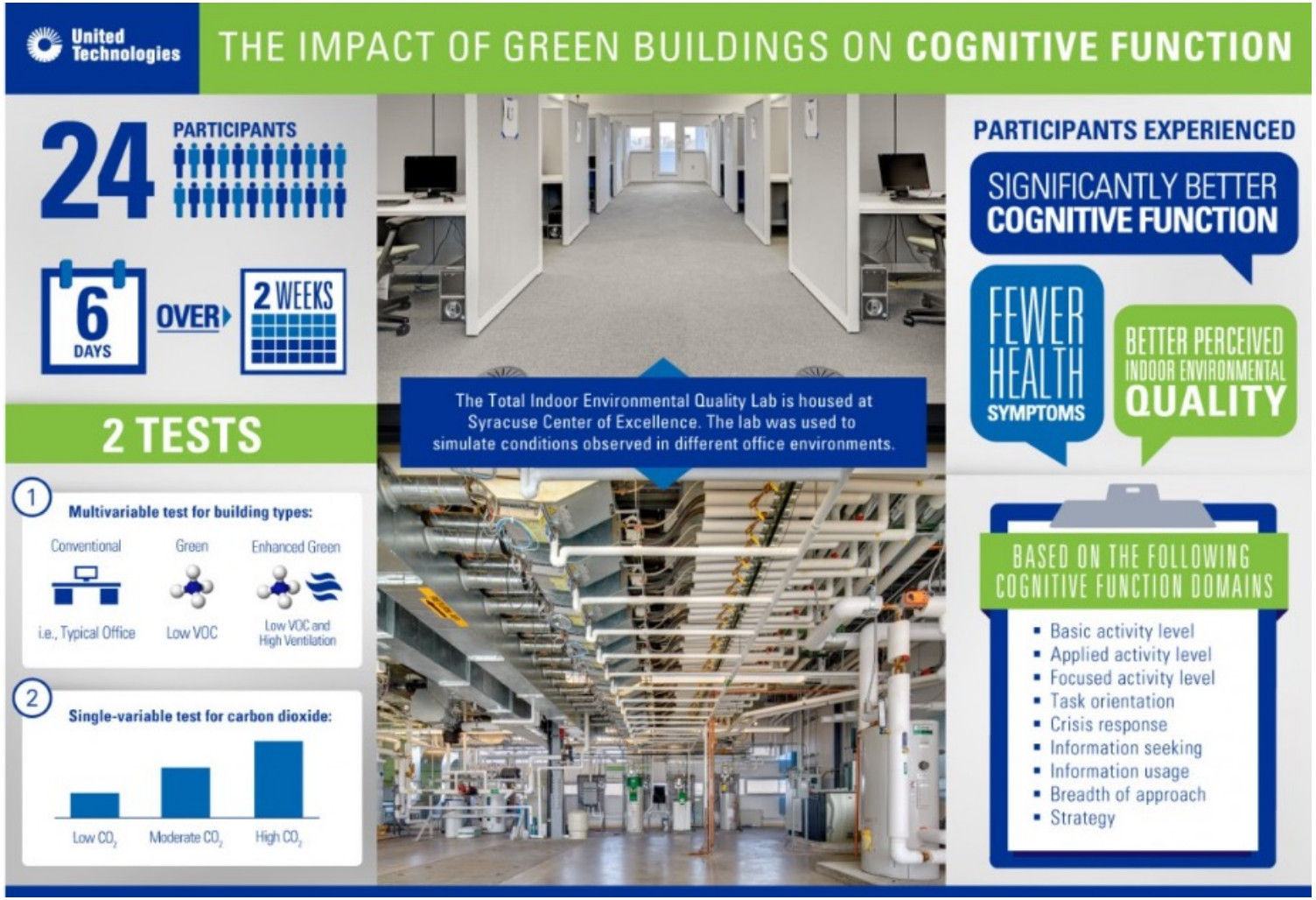
CLF Carbon Leadership Forum
UNIVERSITY of WASHINGTON

cchange labs

2019

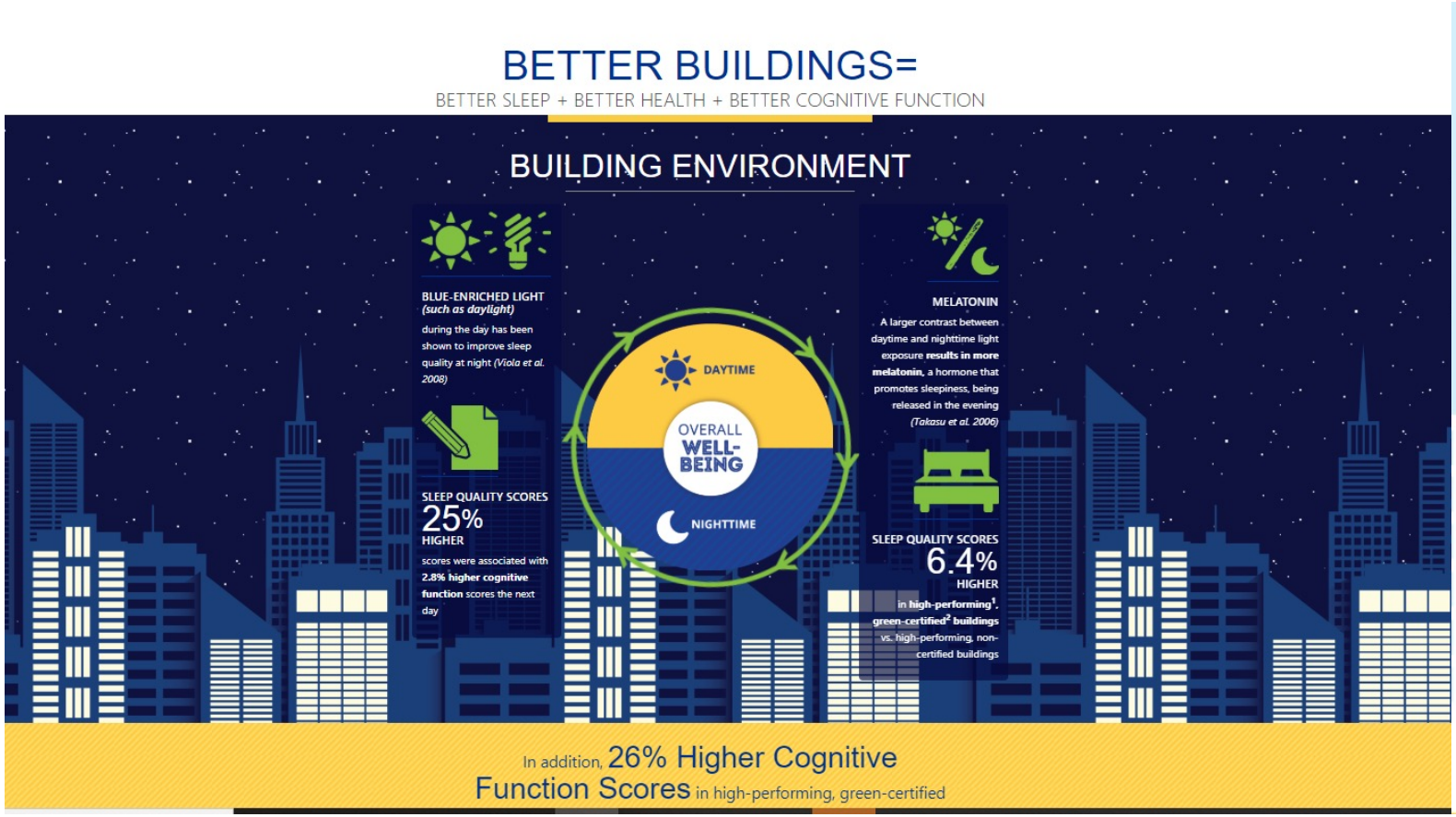
SOLUTIONS

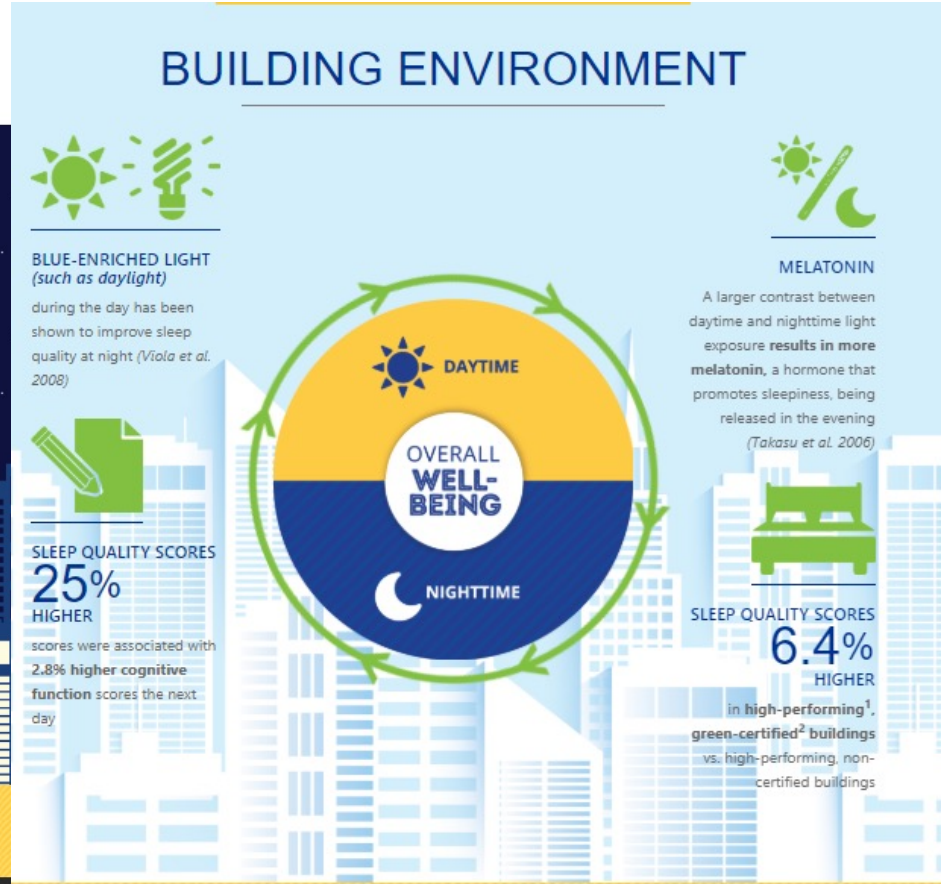
Solutions



https://green.harvard.edu/tools-resources/research-highlight/impact-green-buildings-cognitive-function

Solutions





https://naturalleader.com/thecogfxstudy/study-2/

Solutions

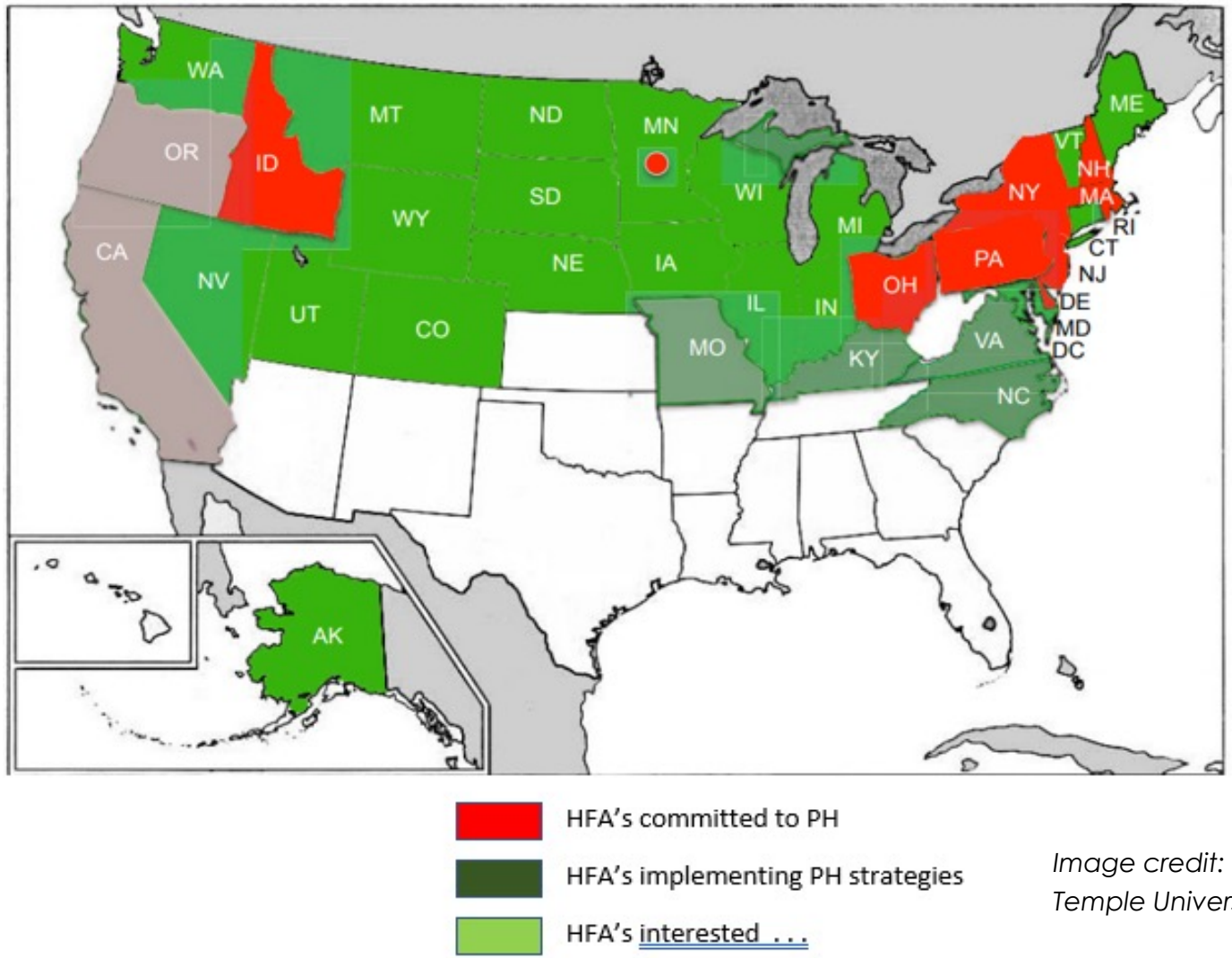


Image credit: The PHFA Project by Tim McDonald, Temple University Architect Research Center

Solutions

Green Rewards for existing multifamily:

- ASHRAE Level 2 audit paid for
- Lower pricing than "non-green" loans
- Underwriting 75% of owner's projected savings
- Underwriting 25% of tenant's projected costs

Green Preservation Plus:

- Awards for updating equipment & reducing costs

New Construction Certified Projects:

- Lower all-in interest rate with "green bundling" loans

LEED® FOR HOMES

Home Innovation NGBS GREEN CERTIFIED™

ENERGY STAR

Solutions

"Residents of Crescent Crossings, the majority of whom are members of low-income households, can live both comfortably and sustainably at Crescent Crossings. This is of particular importance in a community of predominantly older, less efficient homes

. . . may have formerly had to choose the necessitates of rent or food over their utility bills, residents are able to stress less without sacrificing comfort during cold winters and humid summers."

their sustainable homes and enjoy learning how to conserve energy by using their sustainable home's features, such as programmable thermostats.

"Especially in our affordable housing communities, utility savings for residents is very valuable and directly impacts the their daily lives."

in tending to their lives at work and school. Orientation training provided by staff educates residents on the functionality of their new apartments and the befits they receive which helps reduce maintenance requests.

These are lessons they will take with them wherever they go, bringing the message of conservation to the wider community. Finally, Crescent Crossings is an example to the greater affordable housing community of how sustainable building design is achievable, desirable, and marketable."

- Dan Montanaro, JHM Group:

Solutions


CARB Compliant
Primer/Sealer
Air Barrier
Air Sealing
Slab Foundation
Mineral Wool
Insulation
POOL COURTYARD
GARAGE LEVEL 3
GARAGE LEVEL 2
GARAGE LEVEL 1
GARAGE LEVEL 0
NAGLE
STASNEY
SECTION A-A

Solutions

Red List Free
INTERNATIONAL LIVING FUTURE INSTITUTE

GREENSCREEN® FOR SAFER CHEMICALS

WATER STEWARDSHIP
RENEWABLE ENERGY
INVENTORY
SCREEN
ASSESS
OPTIMIZE
MATERIAL HEALTH
SOCIAL RESPONSIBILITY
MATERIAL REUTILIZATION

Health Product DECLARATION

EPA Indoor airPLUS
QUALIFIED HOME

CERTIFIED cradle to cradle

Declare.

Solutions

Karla Butterfield

Sustainability Director

Steven Winter Associates, Inc.
61 Washington Street, Norwalk, CT 06854
203.857.0200 x3030 (w) | 203.246.2880 (c)

kbutterfield@swinter.com

www.swinter.com + LinkedIN | @_SWinter | Facebook

Join Our Team

Employee Owned

Benefits

Career Development

https://www.swinter.com/about-us/careers/

Resources

https://www1.eere.energy.gov/buildings/publications/pdfs/building_america/multi-family_air_sealing_guide.pdf

http://www.c2ccertified.org/products/registry

https://access.living-future.org/

https://hpdrepository.hpd-collaborative.org/Pages/Results.aspx

https://www.greenscreenchemicals.org/

https://materialspalette.org/

https://buildingclean.org/building/products/flooring

https://www1.eere.energy.gov/buildings/publications/pdfs/building_america/multi-family_air_sealing_guide.pdf

https://www.haywardscore.com/

https://wellnesswithinyourwalls.com/