



P100 2021

The Facilities
Standards for the
Public Buildings
Service

This session is being recorded.

Training





Architecture & Interior Design (& Building Enclosure)

3

ARCHITECTURE AND INTERIOR DESIGN



Figure 8: U.S. Courthouse
San Diego, CA

Andrew Bywater

Architect
Center for Architecture
Central Office



GENERAL ARCHITECTURE TECHNICAL COMMITTEE

Andrew Bywater - CO
Robert Theel - Region 05
Maria Ciprazo - Region 09
Harvey Maruya - Region 11



3.6 GENERAL ARCHITECTURE

3.6.1 CORNERSTONE

3.6.2 REGISTRY OF DESIGNERS AND BUILDERS

3.6.3 PROMOTE THE USE OF STAIRS

3.6.4 VERTICAL TRANSPORTATION

3.6.4.1 VERTICAL TRANSPORTATION/ELEVATOR TRAFFIC ANALYSIS

3.6.4.2 ELEVATORS

3.6.4.3 ELEVATOR CLASSIFICATIONS

3.6.4.4 MACHINE-ROOMLESS (MRL)

3.6.4.5 ESCALATORS

3.6.4.6 WHEELCHAIR LIFTS

3.6.5 FAMILY RESTROOMS

3.6.6 LACTATION ROOMS

3.6.7 BIRD-SAFE BUILDING DESIGN

*Sections that have changed

3.6.1 CORNERSTONE

A cornerstone is required for all new buildings as a part of the exterior wall. The cornerstone must be a cut stone block **or similar long lasting material** having a smooth face of size adequate to present the following incised letters:

UNITED STATES OF AMERICA
(PRESIDENT'S NAME), PRESIDENT
GENERAL SERVICES ADMINISTRATION
(ADMINISTRATOR'S NAME), ADMINISTRATOR
(YEAR OF CONSTRUCTION START) -
(YEAR OF PROJECT COMPLETION)



3.6.1 CORNERSTONE



FBI Field Office - Miramar, FL

POSSIBLY A BIT TOO LITERAL!



The New United States mission to the United Nations building.

DATES / NAMES - INTERESTING CONFLICT AT TIMES



LPOE - Derby Line, VT

EXAMPLE OF A NON-STONE MATERIAL

3.6.3 PROMOTE THE USE OF STAIRS

Consider stair and circulation space design so they are readily accessible, easy to find, and desirable to use.



Springfield, MA US Courthouse



3.6.4 VERTICAL TRANSPORTATION

3.6.4.4 MACHINE-ROOMLESS (MRL)

A machine-roomless elevator is an elevator with the drive machine, governor, and other related components located in the elevator hoistway.

- Main line disconnect switches must be installed within 18 inches of the strike jamb of control room door
- The car position, movement, and direction must be able to be determined from the control room
- Provide HVAC in the control room so that the temperature does not go below 50 degrees or above 90 degrees
- Access to the governor must be provided from outside the hoistway
- The suspension means must be manufactured for elevator use only and be constructed from steel only

3.6.5 FAMILY RESTROOMS

All federal buildings **must** provide one or more family restrooms.

Minor change: One accessible urinal is no longer required.



3.6.6 LACTATION ROOMS

All federal buildings **must** provide facilities to meet these requirements.

Table 3.2 Lactation Stations

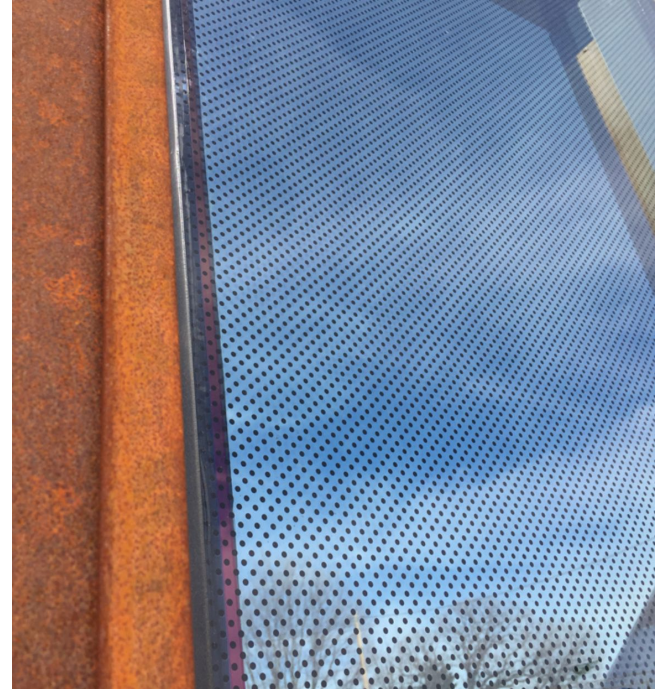
Number of Female Employees	Number of Stations Needed
Under 100	1
Approximately 250	2
Approximately 500	3
Approximately 750	4
Approximately 1000	6
For every additional 1000 female employees	6 additional stations
At least one lactation station must be accessible to the public.	

Public buildings that are open to the public and contain a public restroom provide a lactation room, other than a bathroom, that is hygienic and is available for use by members of the public



3.6.7 BIRD-SAFE BUILDING DESIGN

- All glass, from ground level to a minimum of 40 feet above grade must have a Threat Factor rating of 30 or less
- All glass, 15 feet above a green roof must have a Threat Factor rating of 30 or less
- All glazed corners or fly-through conditions must have a Threat Factor less than or equal to 25



Jason Danielson

**National SME, Building Enclosures
Office of the Chief Architect**



BUILDING ENCLOSURE TECHNICAL COMMITTEE

Jason Danielson - CO
Roland Royster - R04
Cheryl Craigo - R05
David Leites - R09
Harvey Maruya - R11



3.1 - 3.2 BUILDING ENCLOSURES

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3.2.8 ACOUSTIC CONTROL 11278

3.2.9 ENCLOSURE SERVICE LIFE 11279

***Sections that have changed**

3.1 ENCLOSURE PERFORMANCE TABLE

Four levels of Performance

- Prioritize performance opportunities that stem from climate, site, program, mandates, and other conditions.

Determine appropriate Tiers early via the Performance Matrix (budget request)

Table-wide; Validate Performance Goals via Design Excellence in Design Phase, and via Total Building Commissioning in Construction

Envelope – Natural Hazard	
Seismic Resistance	
Baseline	Life Safety
Tier 1	Reduced Damage
Tier 2	Immediate Occupancy
Tier 3	Operational
M & V	Performance Mockup Testing
Plans & Specs	Provide Connection details and complete load path information
Calculations & Analysis	IBC, ASCE 7-10, FEMA356, ASTM E 2026, Project team Calculations & Inspec
References	
Basis of Design	Describe seismic resistance design assumptions
Construction Verification	
Windborne Debris Resistance	
Baseline	Comply with IBC
Tier 1	Large Missile < 30-ft from Grade & Small Missile > 30-ft of Grade

3.1 ENCLOSURE PERFORMANCE TABLE

Table-wide, Calculation & Analysis Responsible Party is Broadened:

- Design Team to Project Team

Table-wide, References Broadened to Current Version, including:

- IBC
- AAMA Testing
- ASTM Testing
- NRCA

Envelope – Natural Hazard	
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Baseline	Life Safety
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Baseline	Comply with IBC
Tier 1	Large Missile < 30-ft from Grade & Small Missile > 30-ft of Grade

3.1 ENCLOSURE PERFORMANCE TABLE

Roofing and Horizontal Waterproofing Membrane Attribute:

- **M&V References Added:**
 - **ASTM D7240 & ASTM D7877**

- **Construction Verification:**
 - **CxA (Agent) changed to CxP (Provider)**
 - **NRCA Manual QA & Testing reference updated**

Construction Verification	CxP to witness Performance Mock-Up Test outlined in ASTM E331, E1105 as applicable
Roofing and Horizontal Waterproofing-Membrane System	
Baseline	Do not use roof surface for Storm Water Retention or allow water to otherwise pool Highly resistant to physical damage Designs that prohibit entrapment of water
Tier 1	Baseline AND Fully Reinforced Membrane System Membrane System Fully Bonded to the Structural Deck
Tier 2	Tier 1 AND Membrane System Fully Bonded to the Structural Deck Monolithic/Seamless
Tier 3	Tier 2 AND System Protected from Temperature and Ultraviolet Radiation. Inverted Membrane
M & V	NRCA Roofing Manual and NRCA Waterproofing Manual, current editions, AAMA ASTM D5957, ASTM D7240, ASTM D7877
Plans & Specs	Yes
Calculations & Analysis	Yes
References	
Basis of Design	Describe roofing and horizontal waterproofing membrane water penetration resistance
Construction Verification	CxP to verify installation and witness integrity testing. Refer to The NRCA Waterproofing Manual for guidance regarding quality assurance inspection and membrane integrity tests
Roofing and Horizontal Waterproofing-Minimum Slope	
Baseline	International Building Code, Section 1507

3.1 ENCLOSURE PERFORMANCE TABLE

Roofing / Horizontal Drainage:

- Removed Tiers beyond Baseline

Roofing and Horizontal Waterproofing-Dr	
Baseline	International Plumbing Code, Section 1106 for 100 yr. max., 1-
Tier 1	N/A
Tier 2	N/A
Tier 3	N/A
M & V	N/A
Plans & Specs	IPC, Section 1106 for 100 yr. max., 1-hr rainfall design
Calculations & Analysis	IPC, Section 1106 for 100 yr. max., 1-hr rainfall design
References	
Basis of Design	Describe basis for designing the roofing and horizontal waterp
Construction Verification	CxP to verify installation and witness integrity testing. Refer to guidance regarding quality assurance inspection and membran
Roofing and Horizontal Waterproofing-Green Roof (V	
Baseline	Tier 3 requirements of Roofing and Horizontal Waterproofing IBC compliant minimum roof slope AND

3.1 ENCLOSURE PERFORMANCE TABLE

Enclosure Air Tightness:

- **Baseline modified 0.25cfm/ft2 @75 Pa**
- **Added Reference to IgCC-2018 Section 1001.3.1.3.5 Building Envelope Airtightness**
- **Tiers Removed**
- **ASTM E3158 reference added**

Enclosure Airtightness (All Six Sides of the Building)	
Baseline	1.25 L/s/M ² (0.25 cfm/ft ²) @ 75 Pa (0.3" wc). Comply with IgCC-2018 Section 1001.3.1.3.5 Building Envelope Airtightness
Tier 1	N/A
Tier 2	N/A
Tier 3	N/A
M & V	ASTM E779 ASTM E1827 ASTM E1186 ASTM D4541 ASTM E3158
Plans & Specs	Yes
Calculations & Analysis	No
References	
Basis of Design	Provide requirements for enclosure airtightness performance and describe continuous air barrier.
Construction Verification	CxP to witness Blower Door Test outlined in ASTM E1827. Conduct testing before air barrier is concealed by completed construction.
Thermal Performance	

3.1 ENCLOSURE PERFORMANCE TABLE

Thermal Performance:

- Tiers Removed

Construction Verification	E1827. Conduct testing before air barrier is concealed by completed construction.
Thermal Performance	
Thermal Performance	
Baseline	ASHRAE 90.1, Section 5.5 and where section 5.5 is referenced
Tier 1	N/A
Tier 2	N/A
Tier 3	N/A
M & V	ASHRAE 90.1
Plans & Specs	Yes
Calculations & Analysis	ASHRAE 90.1
References	
Basis of Design	Provide thermal performance characteristics of the enclosure assemblies. It may be considered when life cycle cost benefits can be demonstrated.
Construction Verification	CxP to perform HVAC system testing per ASHRAE Guideline 1.1 (Guideline 3 2007)

3.1 ENCLOSURE PERFORMANCE TABLE

Acoustic Control:

- **Baseline changed - Comply with IgCC-2018 Section 801.3.3**
- **Tiers removed**



Construction Verification	CxP inspection and verification to be performed as outlined in ASTM 2813
Enclosure Acoustic Control	
Acoustic Control Assuming NC-35 interior	
Baseline	Comply with IgCC-2018 Section 801.3.3 (8.3.3), Acoustical Control
Tier 1	N/A
Tier 2	N/A
Tier 3	N/A
M & V	ASTM E90, E366 & E966
Plans & Specs	Classification by E1332
Calculations & Analysis	No
References	
Basis of Design	Provide enclosure sound control performance requirements.
Construction Verification	Testing witnessed by the CxP per ASTM E1124
Enclosure Service Life	

3.1 ENCLOSURE PERFORMANCE TABLE

Enclosure Service Life; Including Walls, Roofs & Fenestration Attributes:

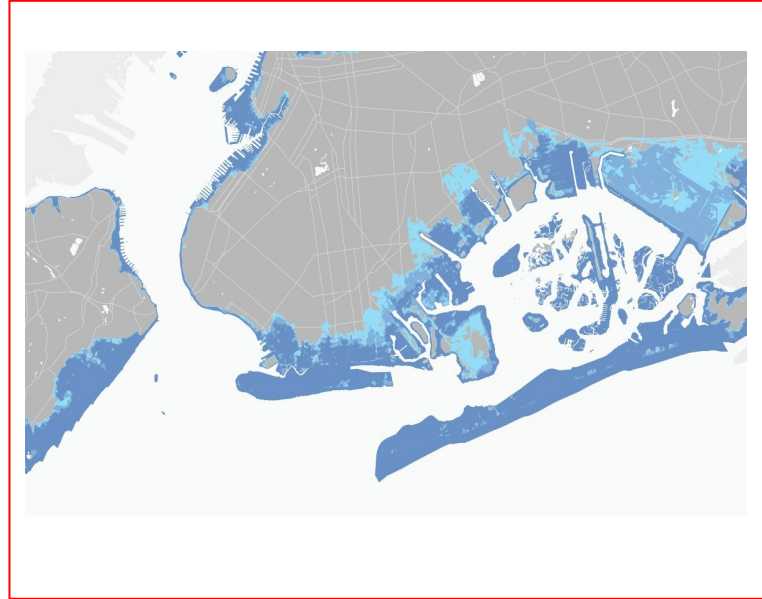
- **Plans & Specs Update:**
 - **Review Deliverables Conformance**
 - **Provide BECx**

Basis of Design	Provide enclosure sound control performance requirements.
Construction Verification	Testing witnessed by the CxP per ASTM E1124
Enclosure Service Life	
Walls (In years to replacement/major rehabilitation)	
Baseline	50/25
Tier 1	75/30
Tier 2	100/40
Tier 3	150/50
M & V	No
Plans & Specs	Review deliverables to confirm. Provide building enclosure Cx.
Calculations & Analysis	No
References	
Basis of Design	Describe expected service life for each enclosure wall type proposed.
Construction Verification	CxP shall confirm through submittal review.
Roofs (Replacement)	
Baseline	20

3.2.1 NATURAL HAZARDS

Flood Resistant D&C

- Removes prior 100 & 500-year flood language
- Instead, references:
 - E.O. 11988, Floodplain Management
 - GSA Order PBS 1095.8 Floodplain Mgmt
 - PBS Floodplain Mgmt Desk Guide
 - Guiding Principles for 1.2 Sustainable Siting
 - IgCC-2018 Section 501.3.1.2 Prohibited Development Activity



3.2.3 WATER PENETRATION RESISTANCE - Roofing

Clarified reference to the NRCA
Waterproofing Manual for waterproofing

Added:

Seamless Roofing under Tier 3

- Built-up slope = $\frac{1}{4}$ " per foot min or,
- Structural Deck = $\frac{1}{4}$ " per foot min

Primary roof drains & secondary
overflow drains set in sumps



3.2.3 WATER PENETRATION RESISTANCE - Green Roofs

Green Roof Reference Added:

- **ASTM 2400M, Standard Guide for Selection, Installation and Maintenance of Plants for Vegetative (Green) Roof Systems**

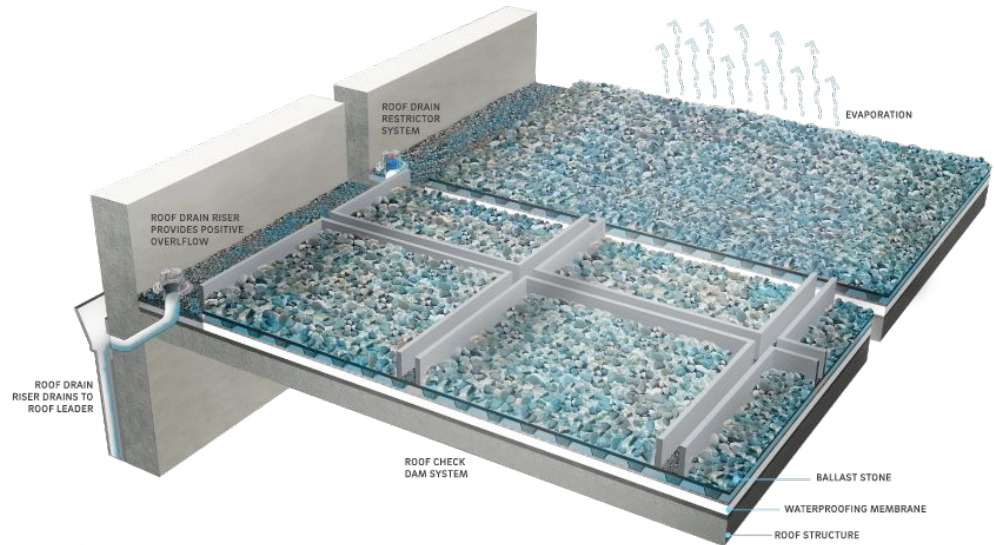
Access Requirements Added:

- **Access by Permanent Means - not by ladder, small window, or temporary means (lift, hoist)**
- **Follow 29 CFR 1920.29 (Fall Protection and Falling Objects)**



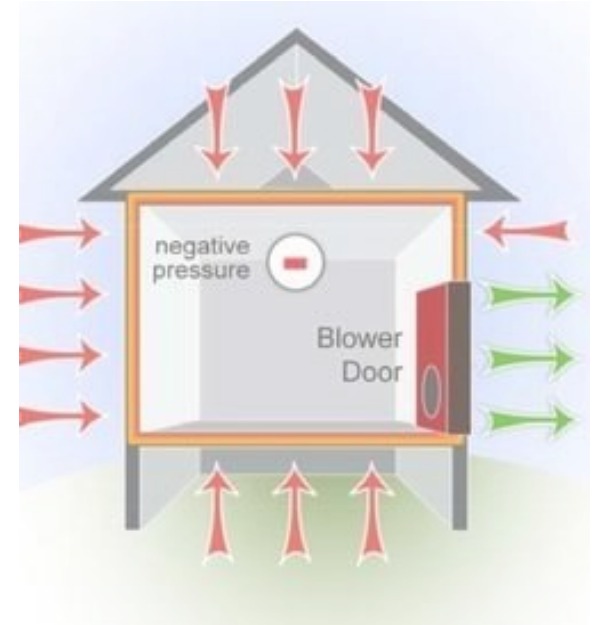
3.2.3 WATER PENETRATION RESISTANCE - Blue Roofs

Blue Roofs for Water Storage /
Controlled Release Not Permitted



3.2.5 AIR TIGHTNESS

Confirm the compatibility of Air Barrier System Components



All 6 sides of Building must be tested and verified for Air Tightness

3.2.6 THERMAL PERFORMANCE

Reference Added: ASHRAE 90.1

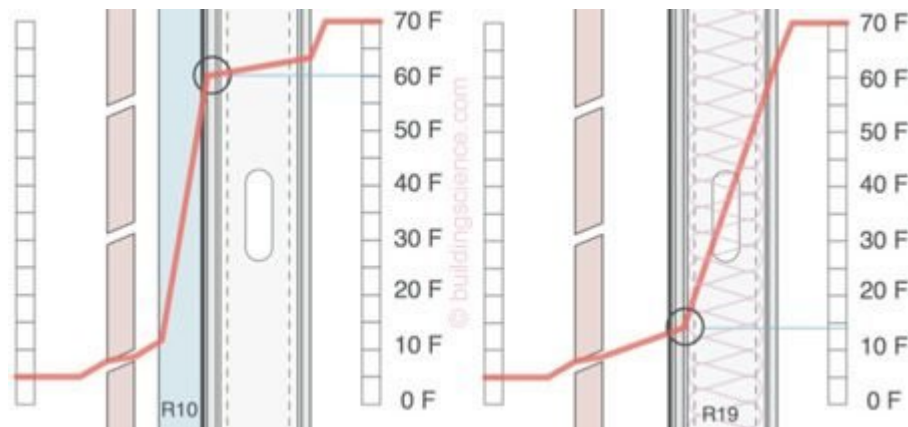
Provide Continuous Insulation

- Shifts Dewpoint Outboard of Drainage Plane

Provide Thermal Breaks

- Reduces Condensation
- Increased Energy Efficiency

Analyze Unique Assemblies to mitigate Unintended Condensation and Uncontrolled Moisture Migration



3.2.7 BUILDING ENCLOSURE COMMISSIONING

Reference Added: ASTM E2813, Standard Practice for Building Envelope Commissioning

BECx Service Provider:

- Minimum 5 yrs Delivering under ASTM E2813 Standard
- Documentation of Core Competencies

Develop Owner's Project Requirements (OPR) in accordance with ASTM E2813

Refine OPR using ASTM E2947

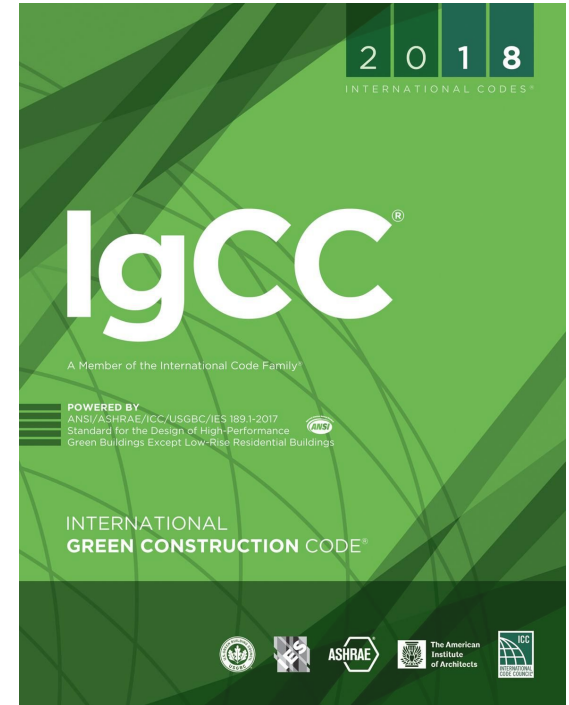


3.2.8 ACOUSTIC CONTROL

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Reference Added:

- **IgCC-2018 Section 801.33 Acoustical Control**



3.3

BUILDING ENCLOSURES

3.3 PRESCRIPTIVE ENCLOSURE REQUIREMENTS 11279

3.3.1 MOISTURE CONTROL 11279

3.3.2 BELOW GRADE SYSTEMS 11279

3.3.3 SUBSTRUCTURE 11380

3.3.4 WALL SYSTEMS 11380

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3.3.7 ROOF SYSTEMS 11783

3.3.8 QUALITY ASSURANCE 12086

3.3.9 SUN CONTROL DEVICES 12086

3.3.10 WINDOW CLEANING

3.3.11 PROVIDING ACCESS TO MAINTAIN EQUIPMENT IN ATRIUMS 12086

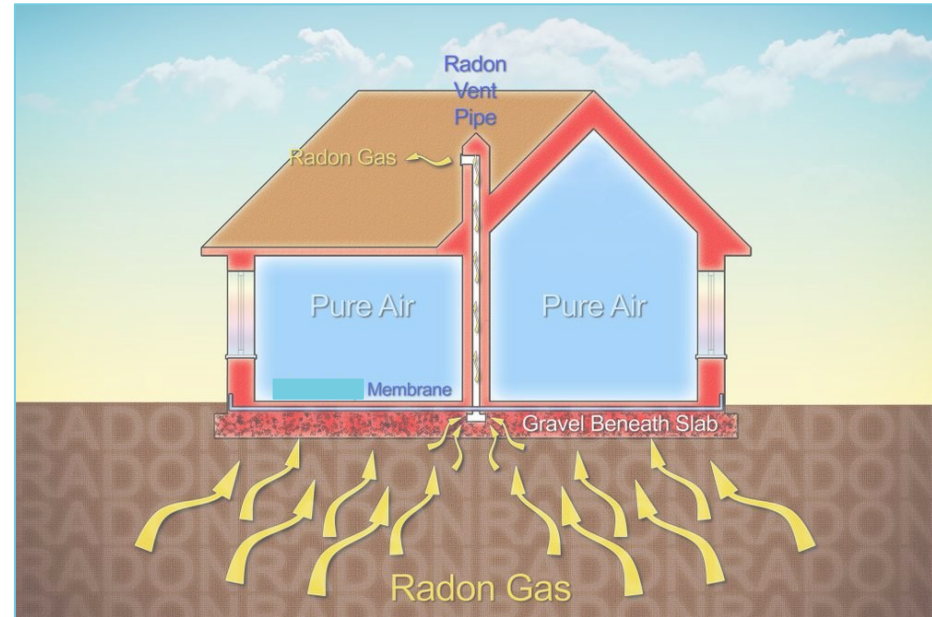
3.3.12 SUSPENDED ACCESS TO ELEVATED LOCATIONS 12187

***Sections that have changed**

3.3.3 SUBSTRUCTURE

References Added:

- **Guiding Principles for Sustainable Federal Buildings, 4.4 Radon Mitigation**
- **IgCC-2018 Section 801.3.4 Soil-Gas Content**



3.3.4 WALL SYSTEMS - Fasteners, Misc Metals

Connections & Fasteners Clarification:

- Corrosion Protection for Components Directly or Indirectly Exposed to Weather
- Specify Stainless Steel Grade for Marine Environments
- Separate Dissimilar Metals with Gasket



3.3.4 WALL SYSTEMS - Penetrations, Air & Moisture Barriers

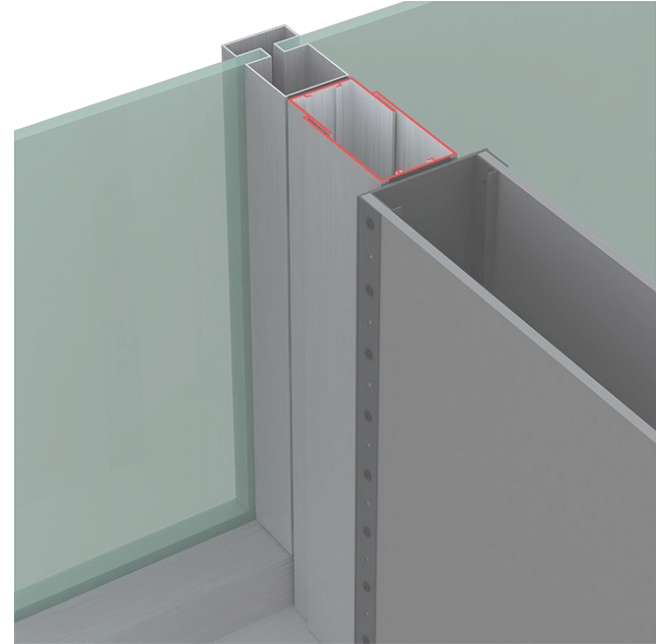
Consolidate Penetrations

Confirm Air Barrier Component Compatibility



3.3.6 FENESTRATION SYSTEMS - Window Frames

Coordinate Curtainwall Mullions and Interior Partitions



3.3.7 ROOF SYSTEMS - Reroofing



Evaluate Capacity of Existing Roof Drainage System for Predicted Future Precipitation Volumes

Address Fall Protection and Safe Suspended Access



3.3.8 QUALITY ASSURANCE - Mock up

Mock-Up Reference added:

- **GSA Commissioning Guide, Sept 2020**



3.3.8 QUALITY ASSURANCE - Air Barrier Testing

Air Barrier Testing Reference Added:

- **IgCC-2018 Section 1001.3.1.3.5, Building Envelope AirTightness**



Thanks!

Do you have any questions?

andrew.bywater@gsa.gov

jason.danielson@gsa.gov

**Please reach out with any
future version P100 suggestions**

