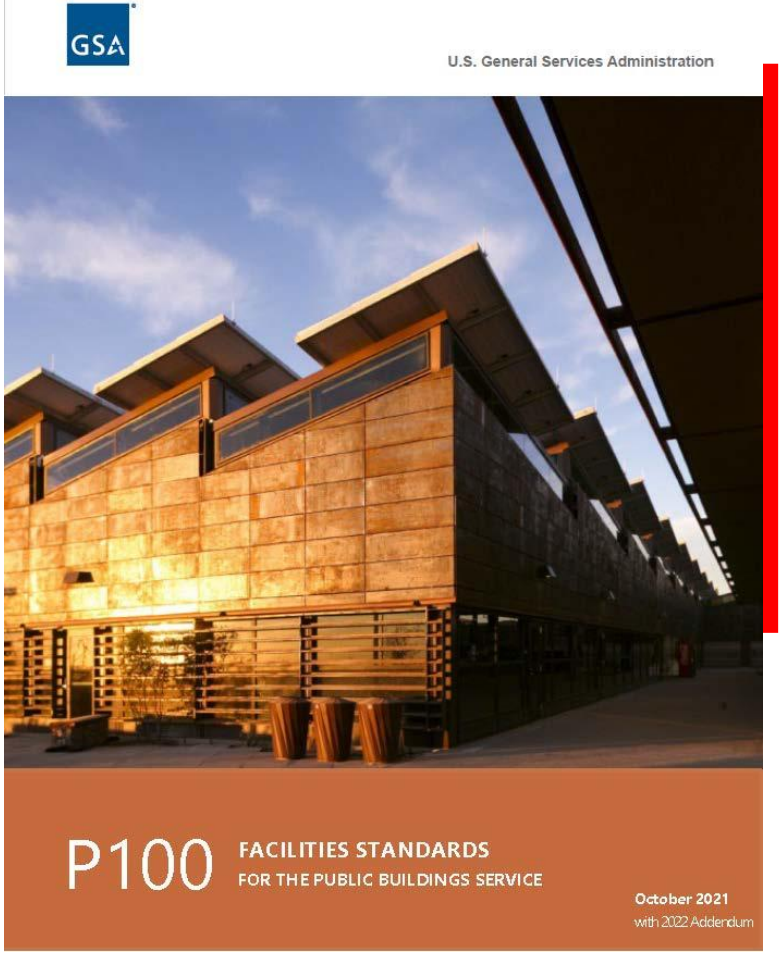
P100 - Training 2021

The Facilities Standards for the Public Buildings Service

This session is being recorded.

2022 Addendum



GSA

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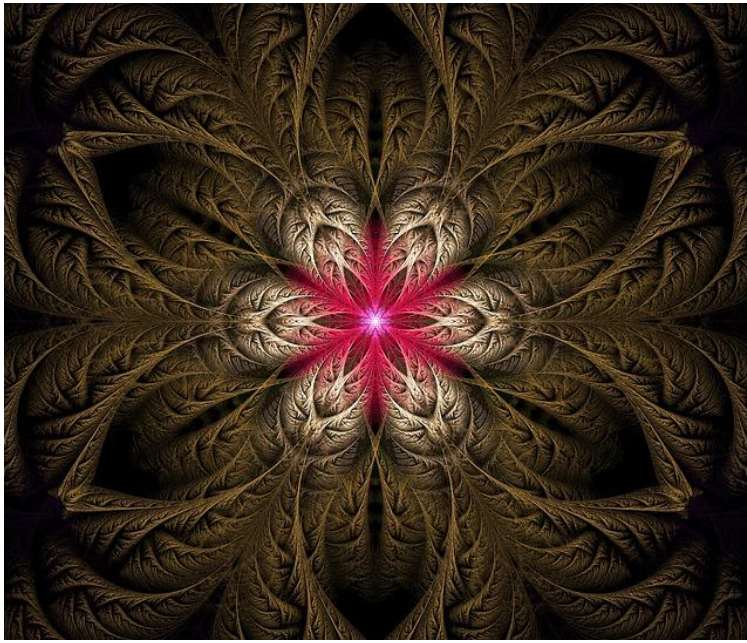
01
Introduction



Introduction to P100

- Application of P100, including Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA) projects
- Future updates
  - 2023 addendum for EO14057
  - 2024 New Version

C.2 2022 ADDENDUM SUMMARY OF CHANGES FROM THE 2021 VERSION

Table C.2 Summary of Changes

Section Number	Section Title	Summary of Change
Throughout	ASCE 7	Remove all references to the old standard from 2010
1.3.3	Energy and Sustainable Design	Added EO 14057
1.4.8	ASHRAE 90.1	Updated to use the latest DOE approved standard regardless of date
1.9.2.9	Decarbonization	Added GSA's new embodied carbon reduction requirement
1.9.2.10	Key Sustainable Products	Renamed "GSA Buy Clean Product Standard" and updated requirements
2.1	Urban Planning and Public Use Performance Table	Updated requirements for Collaborative Design Process
2.2.2	Collaborative Design Process	Updated requirements
3.1	Roofing and Horizontal Waterproofing-Membrane System	Updated requirements and service life
3.3.5	Masonry and Concrete Materials	Added requirement to use new concrete standard
3.4	Interior Performance Table	Updated certain materials to comply with Buy Clean
3.6.1	Cornerstone	Added service life requirement
3.6.5	Family Restroom	Renamed "Family/Single Occupancy Restrooms" and update requirements
4.8.5	Low Embodied Carbon Concrete	New section
4.8.6	Environmentally Preferable Asphalt	New Section
5.3.2	HVAC Systems	Added requirements for "all electric" systems
5.3.2.1	Chiller Plant	Updated for EPA SNAP requirements
5.3.2.3	Cooling Towers	Updated clearance requirements
5.3.2.4	Water Distribution Systems	New Section created by moving other sections into one.
5.3.2.11	Integrated Sequences of Operations (ISOO)	Updated for new point requirements
5.3.2.16	Air Conditioning and Heat Pump Refrigerants	New section to comply with SNAP program
5.3.3.5	Boilers	Clarified bank controllers
5.3.5.5 – 5.3.5.9		Sections deleted and moved to new water distribution systems section
5.4	Plumbing	Added requirements for "all electric" systems
5.4.5	Plumbing Piping	Updated requirements for piping
5.5.2	Simple/Understandable to Operate	Deleted section
6.5.6.1	Feeder Assignments	Updated requirements
6.5.7.2	Receptacles–Circuit Loading	Removed green color requirement
6.5.7.6	Conductors & Conduit Systems	Updated conductor requirement
6.5.7.8	Electric Vehicle Supply Equipment (EVSE)	Replaced existing text with updated requirements
6.5.9.1	Classification of Emergency Power Supply Systems (EPSS)	Updated fuel storage requirement
6.5.12.3	Short Circuit, Coordination and ARC Flash Study	Clarified model requirement
8.1.7	Security Design: Agency Responsibilities	Updated requirements
A.1.9	Turnover Documents	Updated to Kahua

02
Sustainability

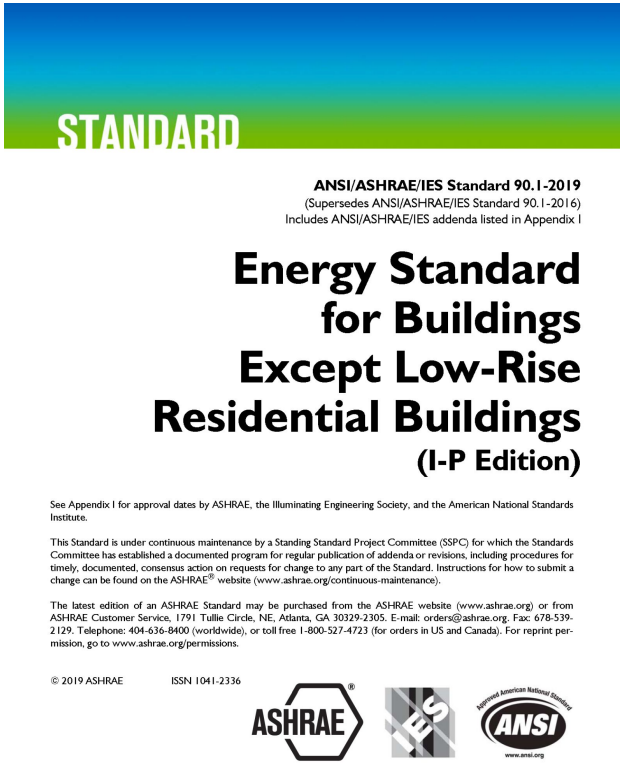
Lance Davis

Sustainability Architect

Walter Tersch

Sustainability Program Manager

ASHRAE 90.1



DOE has approved the 2019 ASHRAE 90.1

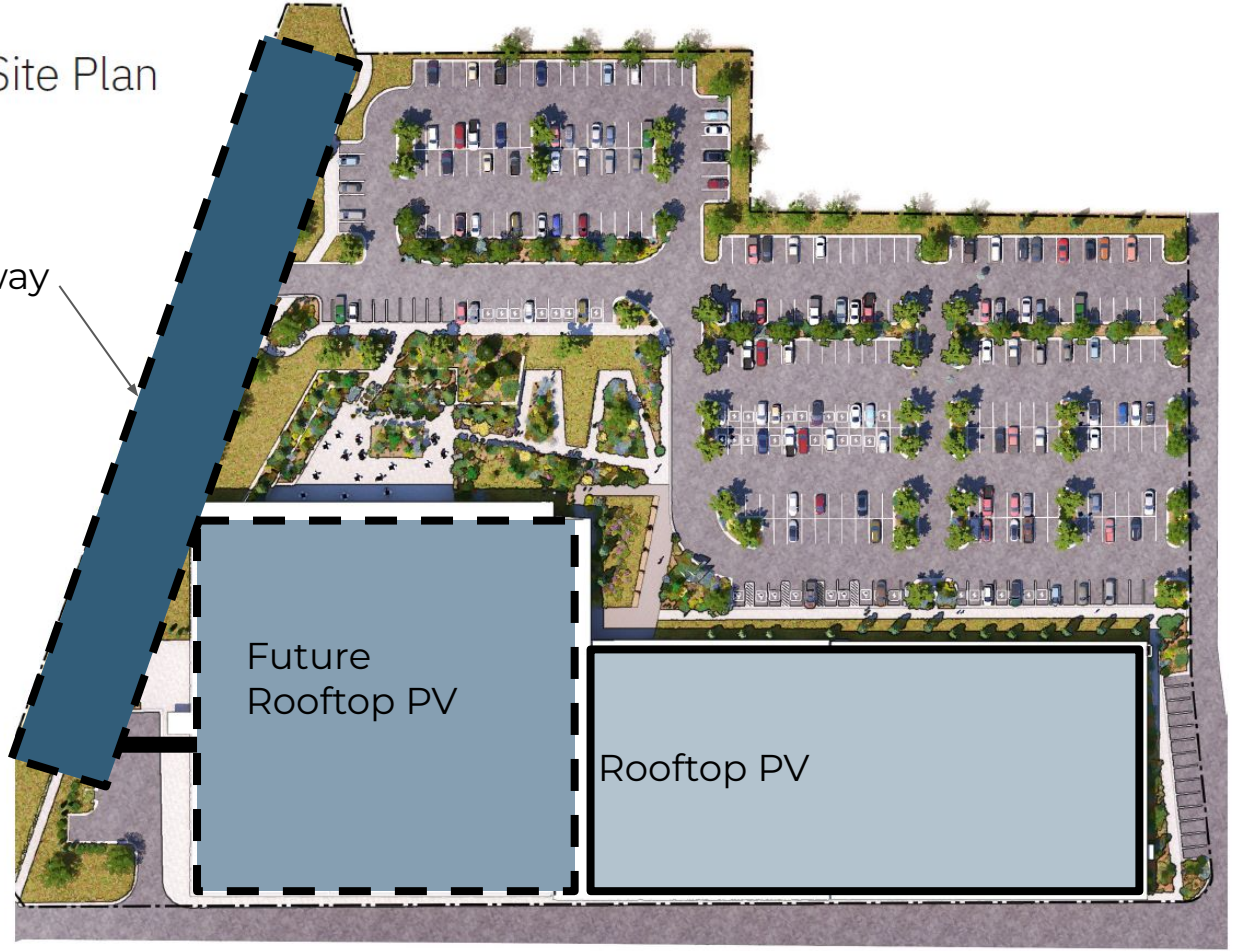
EO 14057

Energy Net-Zero
Electrification

- Emissions
- Water Net-Zero
- Waste Net-Zero

Energy Net Zero

Illustrative Site Plan



EUI=20 kBtu/GSF/year
Requires 161 panels @
2,490 kBtus/year/panel

Rooftop Pv=60 panels
Future Rooftop Pv=60 panels
Future PV=41 panels

1.9.2.9 Decarbonization

New construction and major modernization projects must also:

- Target a **20% reduction in the project's whole-building embodied carbon from materials**, compared to a conventional standard baseline building of the same project type (e.g. modernization or new construction)

- Calculate and compare carbon footprints for at least the structure and enclosure of a standard baseline building and the proposed design using a GSA-approved embodied carbon estimation tool.

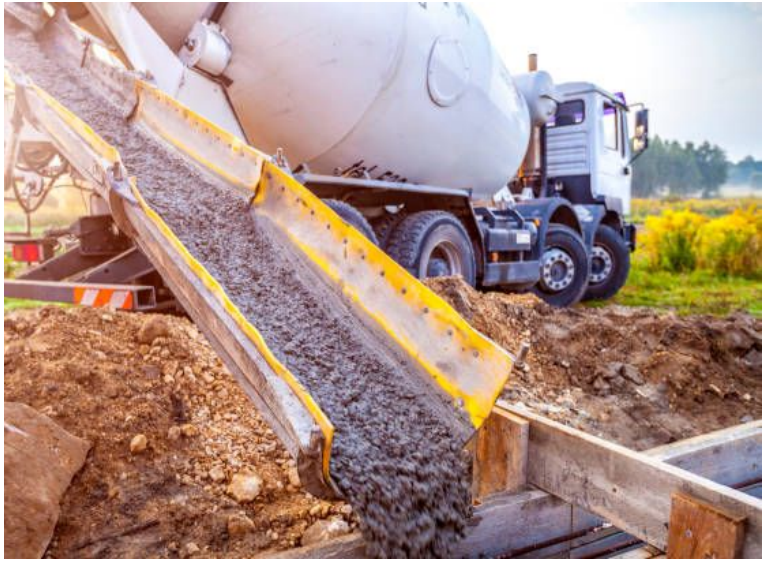
- Earn at least one Building Life-Cycle Impact Reduction LEED BD+C: New Construction point, using LEED credit Option 2 "**Whole-Building Life-Cycle Assessment**" (WBLCA) to conduct a cradle-to-grave life-cycle assessment of the project's structure and enclosure

4.8.5 Low Embodied Carbon Concrete

All GSA projects that use at least ten (10) cubic yards of a concrete mix must:

- Provide a product-specific cradle-to-gate Type III environmental product declaration (EPD) for each concrete mix.
- Provide low concrete that meets GSA's global warming potential limits

	Maximum Global Warming Potential Limits for GSA Low Embodied Carbon Concrete (kilograms of carbon dioxide equivalent per cubic meter - CO_2e kg/m^3)		
Specified compressive strength (f'c in PSI)	**Standard Mix**	**High Early Strength**	**Lightweight**
up to 2499	**242**	**314**	**462**
2500-3499	**306**	**398**	**462**
3500-4499	**346**	**450**	**501**
4500-5499	**385**	**500**	**540**
5500-6499	**404**	**526**	**N/A**
6500 and up	**414**	**524**	**N/A**
These numbers reflect a 20% reduction from GWP (CO_2e) limits in proposed code language: "Lifecycle GHG Impacts in Building Codes" by the New Buildings Institute, January 2022.			



4.8.6 Environmentally Preferable Asphalt

All GSA projects that use at least ten (10) cubic yards of an asphalt mix must:

1) Provide a product-specific cradle-to-gate Type III environmental product declaration (EPD) for each asphalt mix.

2) Provide environmentally preferable asphalt, which is defined in this context as material manufactured or installed using at least two of these techniques:
   a) 21% or higher reclaimed asphalt pavement content;
   b) Warm mix technology;
   c) Non-pavement recycled content;
   d) Bio-based or other alternative binders;
   e) Improved energy/ carbon efficiency of manufacturing plants or equipment; or
   f) Other environmentally preferable features or techniques.

1.9.2.10 GSA Buy Clean Product Standards

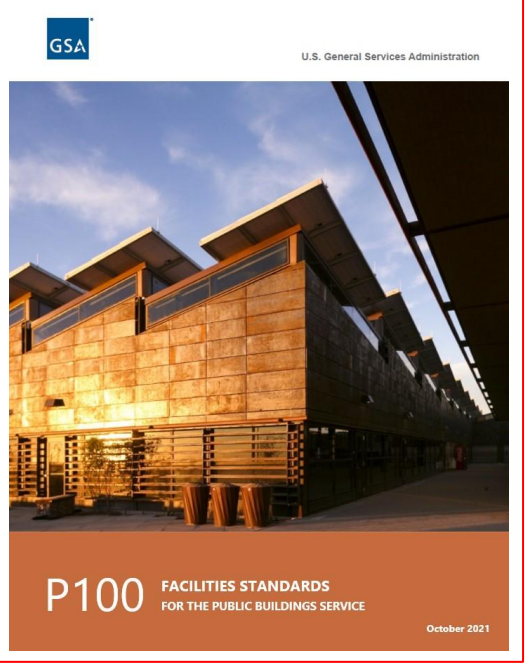
Environmental Product Declarations are required for

- Acoustical Ceilings
- Broadloom/Carpet Tile
- Masonry Partitions
- Metal Stud Partitions
- Linoleum
- Luxury Vinyl Tile (LVT) and Luxury Vinyl Plank (LVP)
- Operable Walls
- Rubber Tile
- Sheet Vinyl
- Vinyl Composition Tile (VCT)

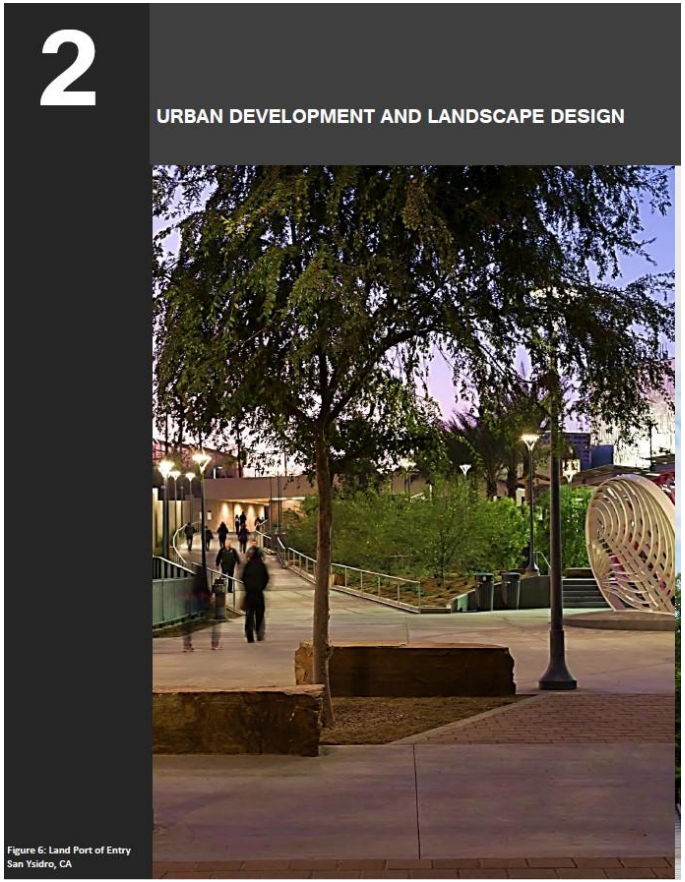
Broadloom/Carpet Tile	
	Environmental
Baseline	Comply with IgCC-2018 Section 901.4.1.4.3 (9.4.1.4.3) Third-Party Multi-attribute Certification - Cradle to Cradle Silver; product-specific cradle-to-gate Type III EPD
Tier 1	N/A
Tier 2	N/A
Tier 3	N/A
M & V	Provide Link to Published NSF 140 or Cradle to Cradle certificate
Plans & Specs	Provide EPD
Calculations & Analysis	N/A
References	
Basis of Design	Describe NSF level or Cradle to Cradle level.
Construction Verification	Verify compliance through product submittal information.

Specific Requirements are listed in section 3.4 Interior Performance Table

03
Urban Development



URBAN DEVELOPMENT & LANDSCAPE DESIGN



Amber Levofsky

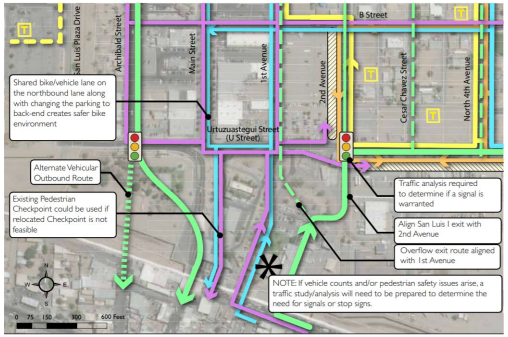
Senior Program Advisor
Center for Urban Development

2.2.2 Collaborative Design Process

The construction and renovation of a federal facility may be one of the more significant real estate investments in many communities. GSA has a responsibility to meet client needs first and, where feasible, federal investment should support local development plans and effectively address relevant concerns. This responsibility derives from the Federal Urban Land Use Act of 1949 (40 U.S.C. Sec. 901-905); the Public Buildings Amendments of 1988 (40 U.S.C. 3312); E.O. 12072 and 13006, as amended by E.O.13946; and EO 14057.

To meet this responsibility, the project team must understand local stakeholders, plans and conditions and must meet the requirements outlined in the previous matrix. This aligns with applicable SITES certification elements, including factor 2.2 (Pre-Design Site Assessment) and C2.4 (Engage users and stakeholders), and relevant Federal directives noted above.

The community stakeholder analysis (CSA) mentioned in the performance matrix must include key local or tribal governments, businesses, residential associations, and other relevant stakeholders, including those who may have environmental justice concerns, or who have substantial interest in the project's outcome and impacts.



Yuma Sun

Sanchez and Reina mayors will be recognized for border collaboration

CESAR NEYOY, UNDER THE SUN May 15, 2018 Updated May 15, 2018 (0)

2.2.2 Collaborative Design Process

Collaborative Design Process	
Design Process Considers Input of Local Stakeholders	
Baseline	For new construction or other projects with significant impact on the public realm (e.g., landscape, facades, perimeter security), GSA's regional project team meets with local officials about the project and considers their input during the preparation: Prior to design start, GSA project team meets with local officials, shares general project info, gets officials' input, and reviews local plans. At first Peer Review, the project team presents input from consultation with local officials, presents findings from a completed community stakeholder analysis, and explains the project's developing design strategy in that context. At Final Design Concept presentation for Commissioner's approval, project team presents local input, outlines responding design strategy, and presents detail regarding relevant building and landscape design elements to enable meaningful consideration of the concept.

FS Stage *(a meeting):*
- GSA shares scale, scope of project.
- Locals share relevant plans and goals for GSA to consider and plan for.

Pre-Design *(a meeting):*
- Design team gets better informed
- Document dump and establish local relationships for project
- e.g. During POR or SITES/LEED workshop

During Design *(a meeting if needed):*
- Design team shows the design's response to input
- GSA evaluates design strategy with this input among the relevant factors.
- Design approval is based, in part, on GSA understanding and acceptance of this design strategy

Addition to the performance matrix

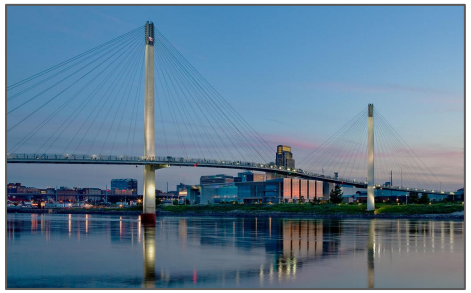
2.2.2 Collaborative Design Process: Community (Stakeholder) Analysis Tool

GSA Internal Use Only - Information is Pre-decisional and Exploratory in Nature

Stakeholder Name	Org	Org Type or Role	Predisposition	Impact of project? (low-med-high)	Influence on Project? (low-med-high)	What is important to stakeholder?	How could they support project goals?	How could they block/diminish project goals?	Outreach Goal	Outreach Strategy	Last Touch	Next Touch
example	Client Agency X	Building user	Skeptical of survey; worried about losing parking space	High	High	Maintaining parking space; assuring employees and unions of survey confidentiality	Encouraging survey responses; letting process play out; keeping open mind about solutions;	By blocking or under-returning surveys	Ensure high comfort level with process, get their buy in from start; Convey importance of surveys to better serve	Present project effort at monthly tenant meeting; keep ____ informed; provide fact sheet;	4/4/2019	5/15/2019
example	Local Businesses	Business (non-relocation)	Neutral - worried about loss of business from main street during construction/if	Medium	Low	Having traffic diverted from mainstreet can impact in-place customer base; customers may be confused as to business status or	Provide support in papers and encourage local government/planning department be active	Negative press or potential law-suite over loss of business		Hold initial information meeting to hear concerns; invite to quarterly stakeholder meetings for real time feedback. Send monthly	n/a	TBD
example	Neighboring Planning Department Z	Government	Distrust of federal government. Concerns over design elements, increased traffic	High	High	Ensuring project is integrated into surroundings, including local character and local planning/economic development plans and	Provide valuable insight into local issues and concerns for better risk management; efficient	Not recommending support to local government officials; not providing local	Create trust and lasting relationships; Create opportunity to resolve local concerns that have schedule	Involve in feasibility study before NEPA scoping; Dialogue and use opportunity for GSA learns more about local plans, context, ongoing	4/1/2022	5/1/2022
example	Homeowner	Private Residence (potential relocation)	Concerned. Property is adjacent to existing port and depending on	tbd	tbd	Would like to avoid relocation. If not possible, wants to have full and complete info about relocation options to plan for	Participate in discussions with project team and GSA Relocation Program to weigh options and	Negative press or potential law-suite over loss of residence.	Create trust and provide complete and timely information. If relevant, engage with homeowner to discuss	Direct meeting and email contact. All outreach should be coordinated through GSA's URA program.	6/15/2019	
example	County Planning Dept	Government	Neutral. Responsible for implementing county transportation and	High	tbd	Needs complete info about extent and timing of potential impacts to incorporate into their planning and keep their constituents informed.	Could use their expertise and credibility to support the final design as not having negative traffic	If they don't understand the reason for or disagree with projects impact on	Early engagement and inclusion in early project planning analysis. They may be able to suggest	Engage early and share technical information/project planning parameters.Present at monthly council meeting prior to design start.		
example	Neighborhood Civic Association	Civic org	Skeptical. Org. represents a disadvantaged	tbd	tbd	Concerned about truck traffic (incl. pedestrian safety, pollution) and whether				Include org in EA scoping meeting for input; understanding EJ related		

Access the CSA here





ANY QUESTIONS?

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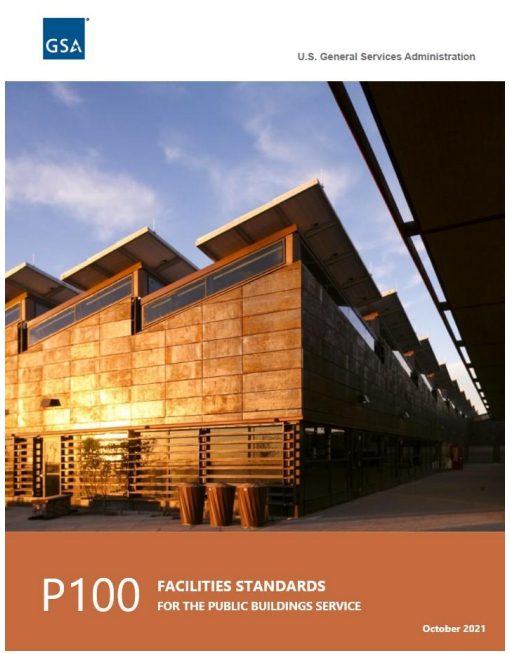
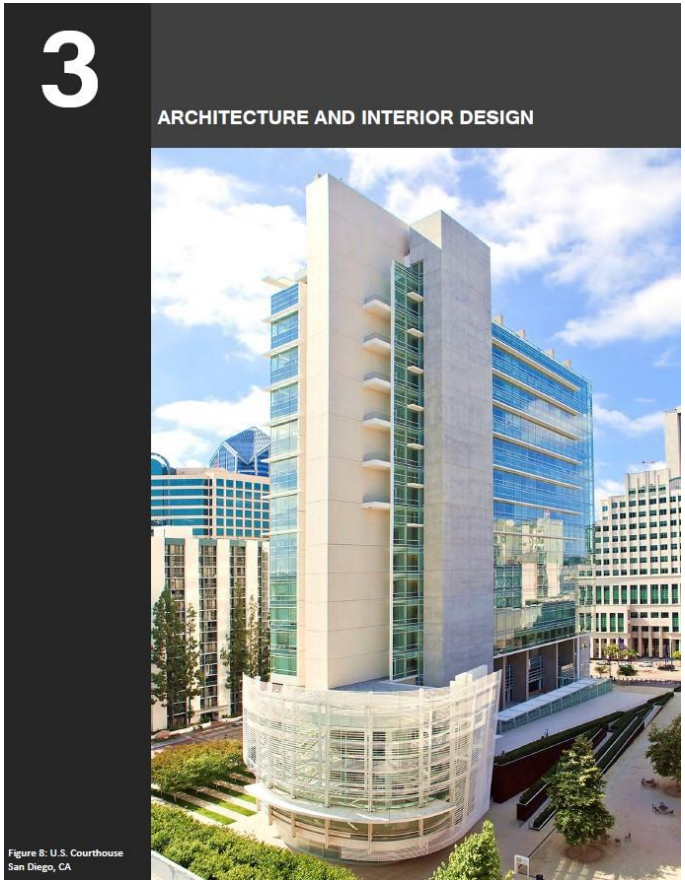
Urban Development InSite page here

04
Architecture

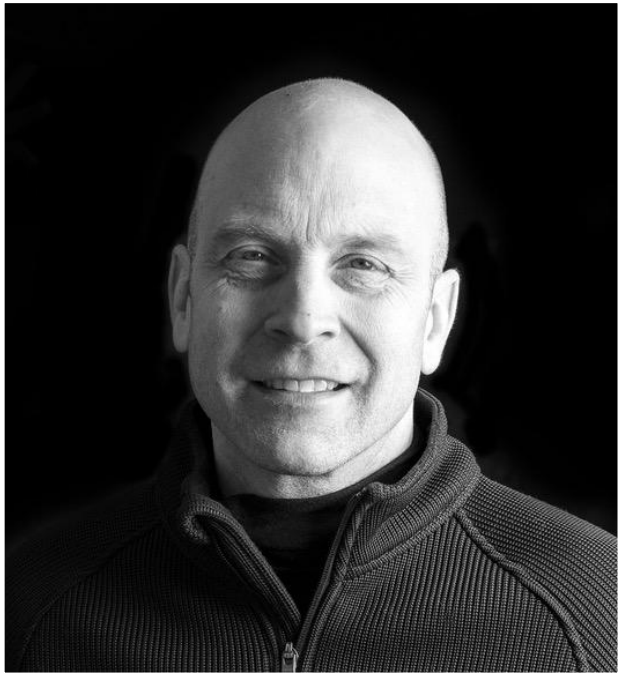


Architecture & Interior Design



Jason Danielson

Building Enclosures Architect



Roofing Baseline and Tier clarifications

- ASTM 8231 reference added for roofing ELD testing
- Roofing minimum performance requirements added for Mission Critical facilities
  - Must be Tier 1 or higher
- Roofing service life tied to Baseline and Tier levels
- Wind Resistance references added for UL 580, ANSI-FM 4474, Florida TAS 114

Cornerstone

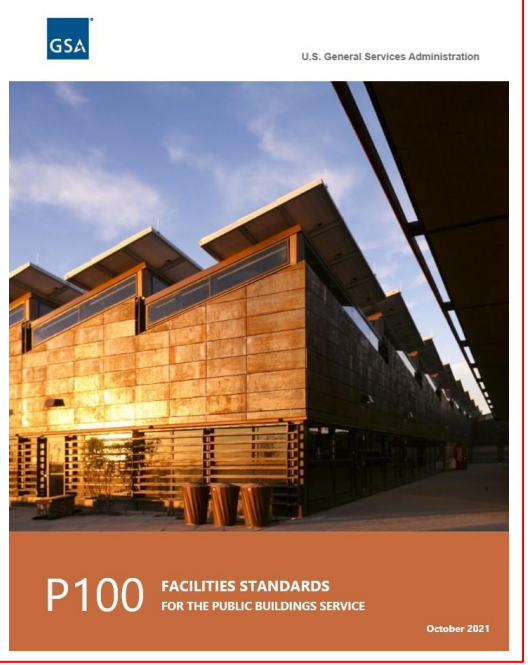
Cornerstone service life identified

Family/Single Occupancy Restroom

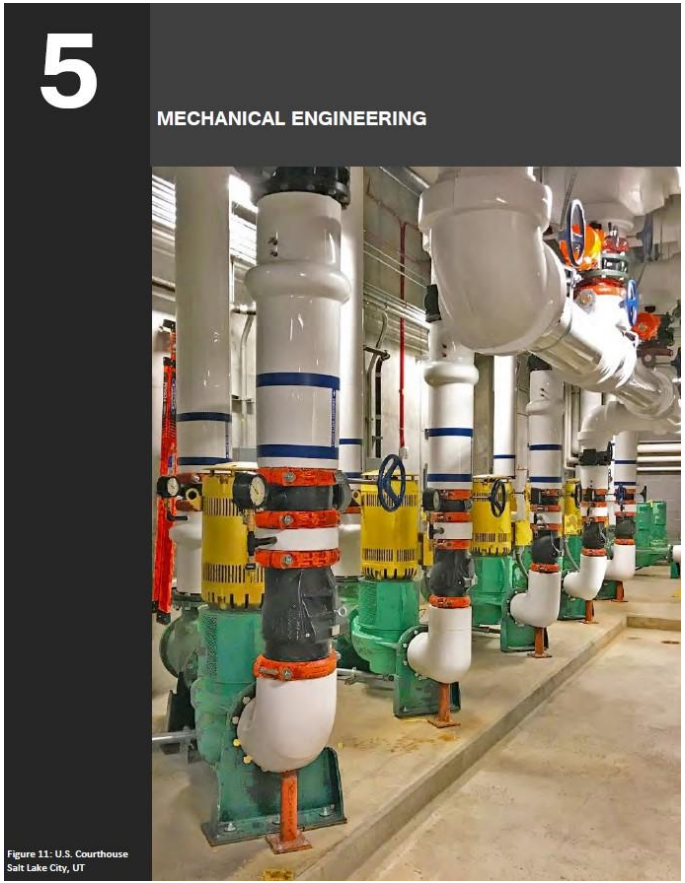
Updated use description and sign requirements

Clarify new construction from existing buildings

05
Mechanical & Plumbing



Mechanical Engineering



Robert Wager

Mechanical Engineer

5.3.2 HVAC Systems

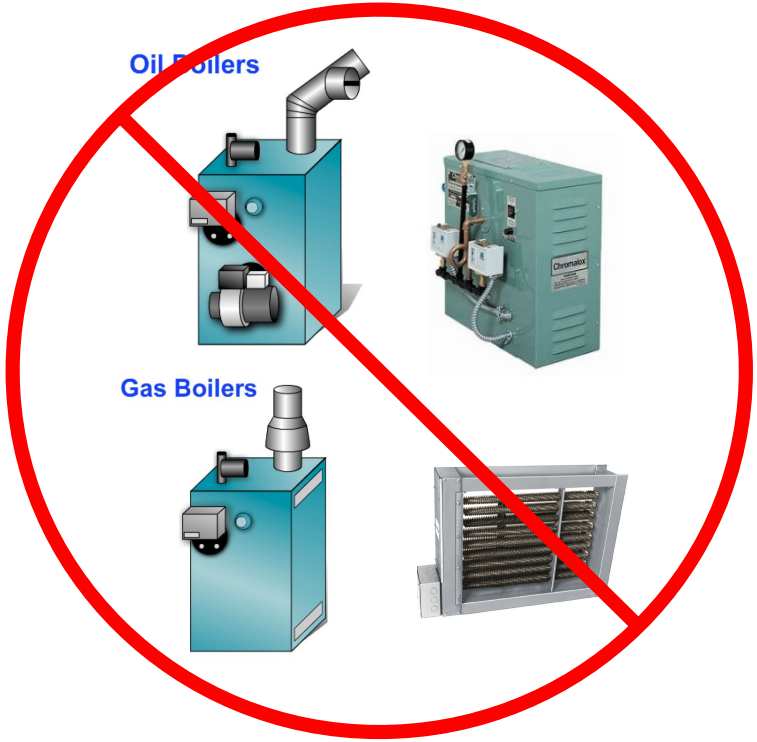
For Exception Use Only

Revised section:

- All projects installing HVAC equipment must use all-electric equipment.

- Ensure the analysis of alternatives and LCCA include:
  - ground source
  - air source
  - water source heat pump technologies

- Fossil fuels and electric resistance heating may only be used to supplement electric heat pump-powered capacity:
  - during emergency backup situations or
  - when low outdoor air temperatures prevent installed electric heat pump equipment from meeting the tenant's minimum indoor temperature



5.3.2.1 Chiller Plant

Revised section:

- New chiller equipment may only use refrigerant substitutes listed as "Acceptable" by the U.S. Environmental Protection Agency (EPA)'s Significant New Alternatives Policy (SNAP) Program, e.g. for centrifugal or positive displacement chillers.

- Refrigerants listed as Unacceptable may not be used in new chiller equipment at GSA projects, even where EPA's "unacceptable as of" date is in the future.

- Only domestic construction materials must be specified in construction contracts performed in the United States except when a waiver to the Buy American Act is granted or per the requirements in FAR 25.2."unacceptable as of" date is in the future.

Significant New Alternatives Policy (SNAP)

Substitutes in Centrifugal Chillers

https://www.epa.gov/snap/substitutes-centrifugal-chillers

Substitutes in Positive Displacement Chillers

https://www.epa.gov/snap/substitutes-positive-displacement-chillerslers

5.3.2.16 Air Conditioning & Heat Pump Refrigerants

Revised section:

- New air conditioning and heat pump equipment may only use refrigerant substitutes listed as "Acceptable" by the EPA's SNAP Program for air conditioning and heat pumps.

- Refrigerants listed as Unacceptable may not be used in new air conditioning or heat pump equipment at GSA projects, even where EPA's "unacceptable as of" date is in the future.

Significant New Alternatives Policy (SNAP)

Substitutes in Residential and Light Commercial Air Conditioning and Heat Pumps

https://www.epa.gov/snap/substitutes-residential-and-light-commercial-air-conditioning-and-heat-pumps

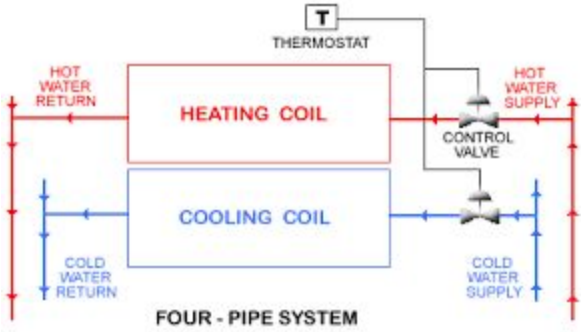
5.3.2.3 Cooling Towers

Added:

- A minimum 4-foot clearance must be maintained between the top of the roof and underside of the cooling tower basin.

5.3.2.4 Water Distribution Systems

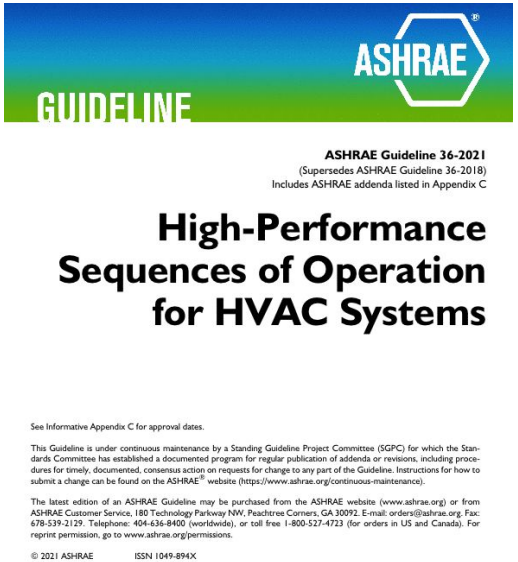
Revised section numbers:
5.3.5.5 PRIMARY HEATING SYSTEMS moved to 5.3.2.4.1
5.3.5.6 DISTRICT STEAM HEATING moved to 5.3.2.4.2
5.3.5.7 HOT WATER HEATING SYSTEMS moved to 5.3.2.4.3
5.3.5.8 PIPING SYSTEMS moved to 5.3.2.4.4
5.3.5.9 PIPING INSULATION moved to 5.3.2.4.5



5.3.2.12 Integrated Sequences of Operations (ISOO)

Added to section:

- Sequences of Operation must follow the most recently published version of ASHRAE Guideline 36, High-Performance Sequences of Operation For HVAC Systems. Provide the hardwired points required in Guideline 36, Section 4, List of Hardwired Points, with the following additions:
  - All fan statuses (including supply, return, relief, fan-powered boxes) are Required
  - All filter pressure drop transducer analog inputs are Required
  - Outside air flow sensors are Required
  - Air handler sensors including MAT, RAT, heating coil SAT are Required
  - Chilled water plant and hot water plant points marked as O (Optional) must be supplied as A-Apply (Apply if the feature/system hardware is included by the designer)



5.3.3.5 Boilers

Added to section:

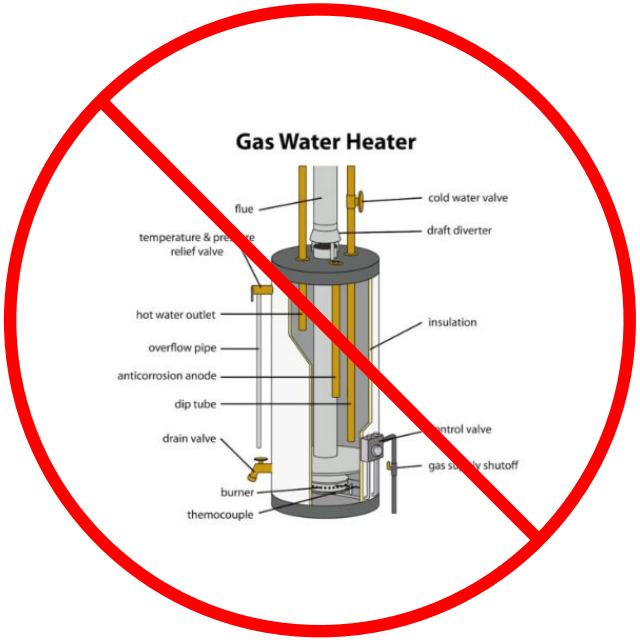
- Modular systems must have bank controllers and grandmaster bank controllers to prevent individual modules within a bank from simultaneously cycling ON/OFF with another separate bank of modules.

5.4 Plumbing

For Exception Use Only

Added to section:

- All projects installing domestic water heating (service water heating) equipment must use all-electric equipment.
- Ensure the analysis of alternatives and LCCA include:
  - solar water heating
  - ground source heat pump water heater
  - air source and water source heat pump water heater technologies
- When using electric resistance water heaters, size equipment based on careful consideration of intended usage (e.g. showering), recovery rate, and any hot water storage capacity.
- Fossil fuels may only be used to supplement electric-powered capacity:
  - during emergency backup situations; or
  - when low outdoor air temperatures prevent installed electric equipment from meeting the tenant's minimum service water heating water temperature.



5.4.5 Plumbing Piping Sanitary, Waste, Vent, and Storm Piping

Added to section:

- Sanitary, waste, vent, and storm PVC pipe and fittings may be used below ground in lieu of the typical cast iron pipe and fittings.
- Pipe and fittings must be schedule 40 DWV type and conform to ASTM D 2665 solid wall PVC pipe.
- PVC pipe with cellular core, foam core or composite core is NOT approved for use.
- Piping installed in stable soil must conform with ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
- Piping installed in unstable or unusual soil conditions must conform with ASTM F2536 Standard Guide for Installing Plastic DWV Piping Suspended from On-Grade Slabs.

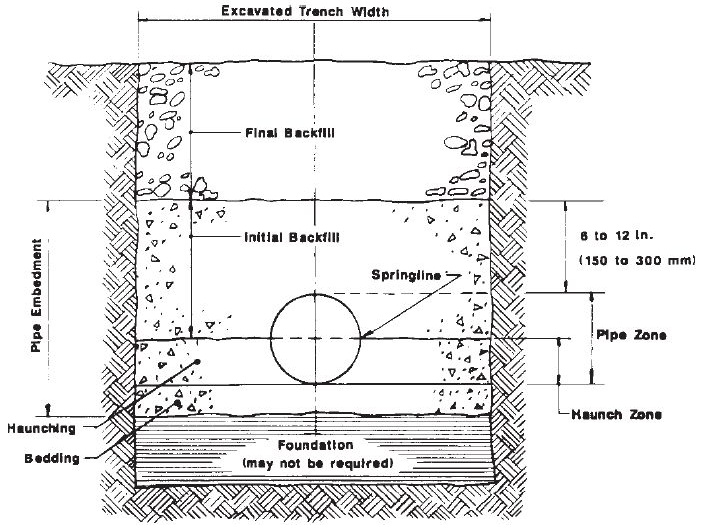


FIG. 1 Trench Cross Section Showing Terminology

Thanks!

Do you have any questions?

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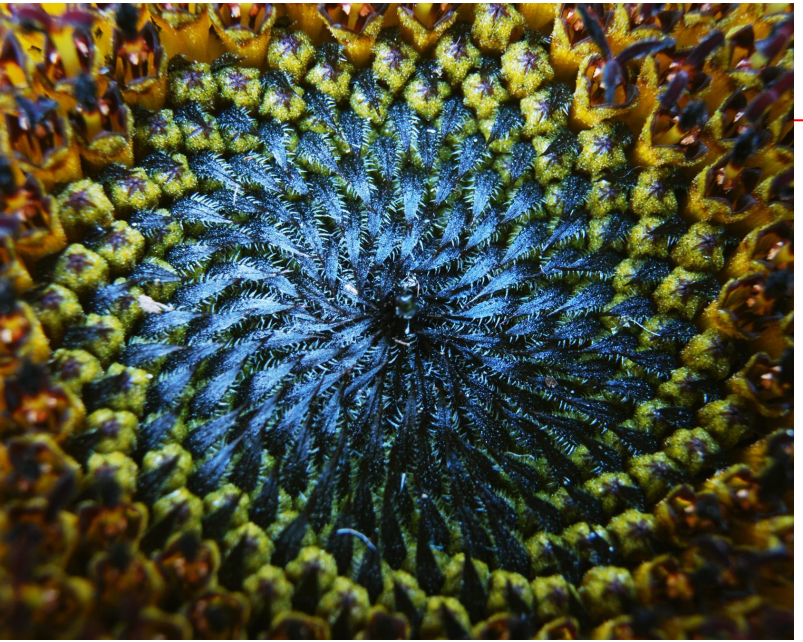
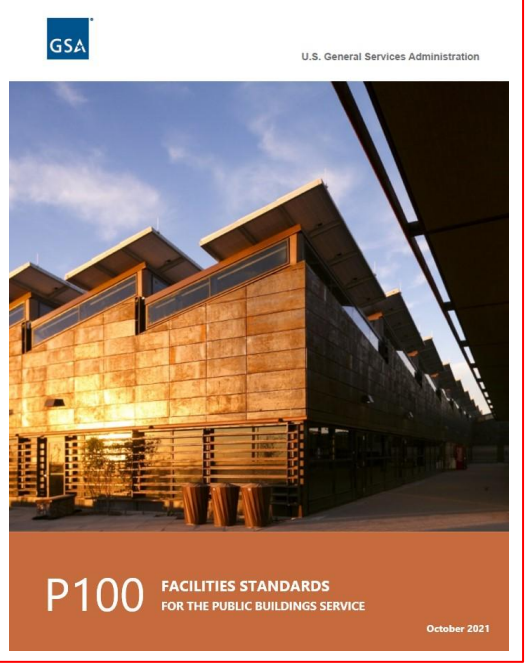
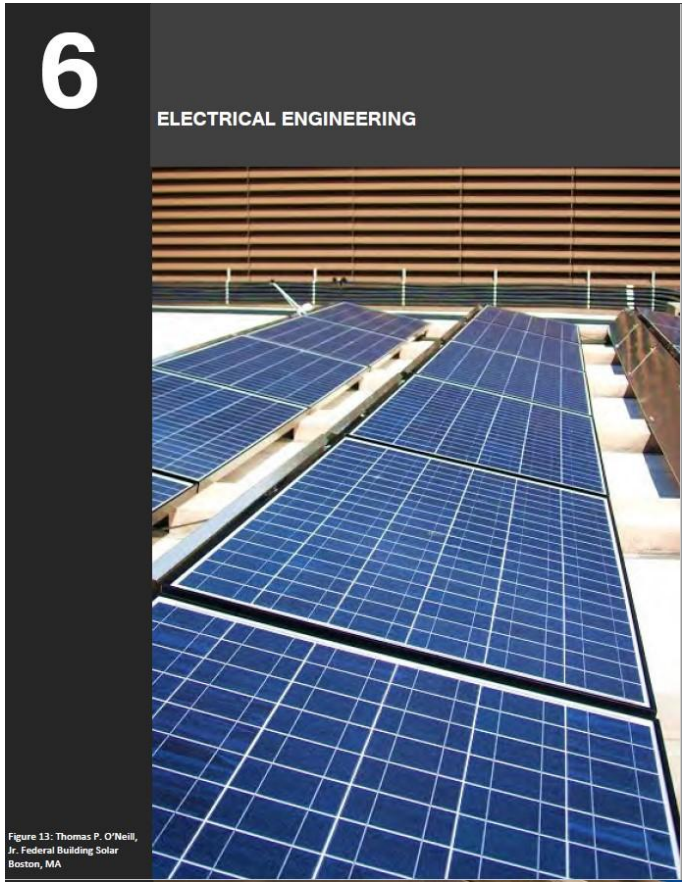


06
Electrical



Electrical Engineering



Jeff Schetrompf

Electrical Engineer

Ben Pisarcik

Electrical Engineer

Table of Contents

01 Miscellaneous

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Miscellaneous

- 6.5.7.6 Added statement Conductors and accessible portions of conduit shall not be abandoned in place.
- 6.5.9.1 (EPSS SWGR & ATS) Switchgear must be provided with a mimic bus and all sections installed on a four-inch high concrete housekeeping pad.
- 6.5.6.1 Bus ducts must be copper or aluminum, fully rated, 3-phase, 3-wire or 3-phase, 4-wire with 100 percent neutral, and an integral ground bus, sized at 50 percent of the phase bus, **IP54** or higher.
- 6.5.7.6.2 Conduit systems must be used between the panelboard and the first **wiring** device.

Drawout Circuit Breakers for Service Entrance Equipment Section 6.5.4.2.1

Old Version: Switchgear must meet UL 1558 and be provided for the service entrance of any building 1200 amperes or greater. Switchgear must have enclosed, drawout-type circuit breakers, one per each size fully equipped spare cubicle, a breaker lifting device, and a ground and test device.

New Version: Switchgear must meet UL 1558 and be provided for the service entrance **equipment and associated distribution sections/circuit breakers** of any building 1200 amperes or greater. **The UL1558** switchgear must have enclosed, drawout-type circuit breakers, one per each size fully equipped spare cubicle, a breaker lifting device, and a ground and test device.

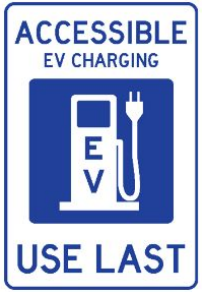
Controlled Receptacles
Section 6.5.7

Old Version: ASHRAE 90.1 controlled receptacles must be green.
New Version: Controlled receptacles must be marked in accordance with ASHRAE 90.1.

Electric Vehicle Supply Equipment (EVSE)
Section 6.5.7.8

In summary the first two paragraphs and GOV requirements have been clarified. Specifics are listed below:

- EVSE chargers must be installed for government-owned vehicles (GOVs/federal fleet vehicles) for **any project significantly modifying or installing parking lots or parking garages,** including excavation or removal of concrete or asphalt pavement.
- At least one accessible parking space **11-foot wide by 20-foot long with a 5-foot adjoining access aisle** must be provided with an EV charger. The accessible EV charger **must not be used as accessible parking for other than charging purposes**. Additional information can be found at the U.S. Access Board's Guide to the ABA Accessibility Standards. ***This EV charger may be used by anyone, regardless of physical ability.***



Electric Vehicle Supply Equipment (EVSE)
Section 6.5.7.8

Federal fleet EVSE infrastructure must minimally include:

- Level 2 Chargers **with no more than two charging ports per charger.**

- **Quantity and configuration of chargers and ports must be designed to accommodate tenant vehicle usage and locations.**

- For lots with fewer than 5 GOVs, install two complete and operational charging ports.

- For lots with 5 – 15 GOVs, install four complete and operational charging ports.

Electric Vehicle Supply Equipment (EVSE) Section 6.5.7.8

Federal fleet EVSE infrastructure must minimally include:

- For lots with greater than 15 GOVs, install complete and operational charging ports such that the quantity represents **30 percent** of the total planned GOV's.

- **For existing facilities with limited electrical capacity receiving plug-in hybrid electric vehicles (PHEV), level 1 chargers may be considered on a 1:1 ratio for PHEVs only. If trenching or coring is involved to support PHEVs, conduit must be upsized to values noted in P100.**

Generator Fuel Storage
Section 6.5.9.1

The class and type of Emergency Power Supply Systems (EPSSs) for federal buildings must be a minimum of Class 48, where 48 is the minimum time in hours for which the EPSS is designed to operate at its rated load without being refueled (see Chapter 4, NFPA 110). **Note that the fuel storage for the fire pump is only required for 16 hours of runtime**.

Arc Flash
Section 6.5.12.3

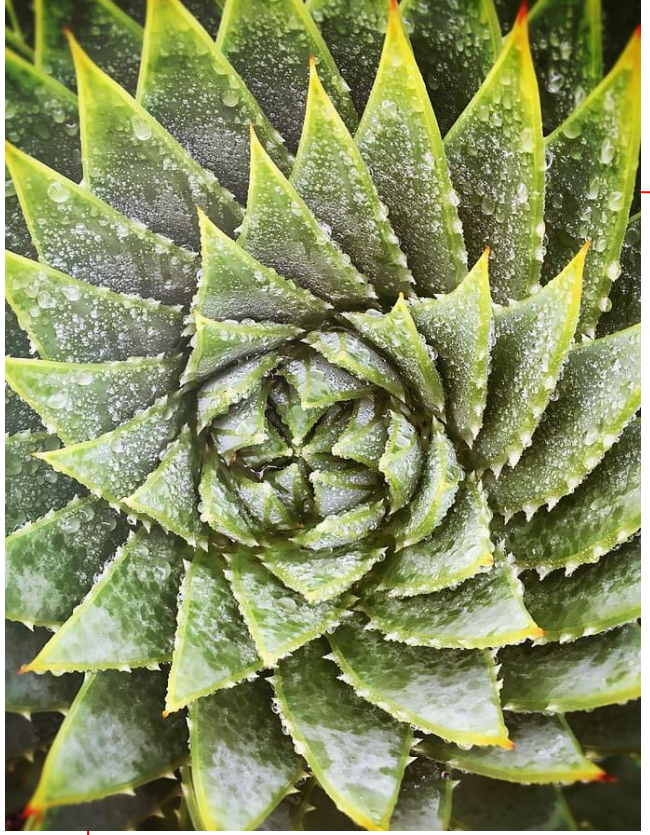
Updates to existing power system models shall be incorporated into any modifying project. **For facilities where no building power system model exists, a model is required to be generated if the main service equipment is replaced or if greater than 25% of the overall electrical distribution system is replaced.**

07
Security

8.1.7 Security Design: Agency Responsibilities

Clarifies roles and responsibilities related to Courthouse security including:

- Prisoner movement, holding cells, and interview facilities
- Installation of electronic security systems
- Perimeter protection, parking, guard booths and screening



08

Questions

Put them in the chat.