DISTRICT OF COLUMBIA BUILDING INDUSTRY ASSOCIATION

Start Here!

OCCUPIED ROOFS TECHNICAL TRAINING & PRESENTATION

Tuesday, June 5, 2018

DISTRICT OF COLUMBIA BUILDING INDUSTRY ASSOCIATION

DCBIA / DCRA
Rooftop Technical Training & Presentation

June 5, 2018
8:00 AM to 11:00 AM
Park Chelsea Rooftop, 880 New Jersey Avenue SE

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With expanded regulations governing DC rooftops, both commercial and residential tenants are excited about this growing amenity space. However, from solar panels to stormwater management, to swimming pools to penthouses, to dog parks and the screening of mechanical equipment, the competition for the best use rooftop space is demanding and the regulations are complex. Hear from DCBIA architects on the challenges and successes of occupied DC rooftops and from DCRA leadership on how the agency administers the safety of rooftops in DC.

8:00 AM — 8:20 AM	**Breakfast & Networking**
8:20 AM — 8:30 AM	**Welcome:** **Melinda Bolling**, Director, Department of Consumer & Regulatory Affairs (DCRA) **Brad Fennell,** President, DCBIA & Senior Vice President WC Smith **Lisa Mallory,** CEO, DCBIA
8:30 AM — 9:00 AM	**Topic 1:** **DCBIA** Overview of The Collective Rooftops Park Chelsea Rooftop – Success and Challenges Legal Considerations
9:00 AM — 10:00 AM	**Topic 2:** **DCRA** Zoning Overview Overview of Permit and DC Building Code
10:00 AM – 10:10 AM	**BREAK**
10:10 AM – 10:40 AM	**Topic 3:** **DCRA & DOEE** Solar in DC Stormwater Management and Green Area Ratio
10:40 AM – 11:00 AM	**Q&A**

DISTRICT OF COLUMBIA BUILDING INDUSTRY ASSOCIATION

DCBIA / DCRA
Rooftop Technical Training & Presentation

DCBIA Presenters:

Brian Strott, Vice President and **Matt Tsau**, Senior Project Manager, **WC Smith**

Guclu Durusoy, AIA, Associate Principal and **Marius Radulescu**, AIA, Associate Principal, **SK+I Architecture**

Overview of The Collective Rooftops

Phil Esocoff, FAIA, Gensler

Park Chelsea Rooftop – Success and Challenges

Christy Shiker, Partner, Holland & Knight

Legal Considerations

Summary of Zoning Considerations for penthouse habitable space and rooftop space

Production of Affordable Housing associated with penthouse habitable space

DCRA and DOEE Presenters:

Kathleen Beeton, Deputy Zoning Administrator, Zoning, DCRA

Zoning Overview

- What is a roof?
- Penthouse Regulations
- Habitable Penthouse Regulations
- Architectural Embellishments and Elements
- Solar
- Common Plan Review Issues
- Certificate of Occupancy (C of O)
- Antennas

Christopher Bailey, Deputy Building Official, DCRA

Overview of Permit and DC Building Code

- Buildings and Construction
- Height and Area
- Roof Loading
- Occupancy and Use Classification

Jeff Reiss, Third Party Program Technical Advisor, DCRA

Building Code Overview

- Fire Protection
- Swimming pools
- Rooftops - The Good, the Bad and the Ugly

Keith Winston, Green Building Inspector, DCRA

Solar in DC

- Background
- Value of Solar
- Permitting Solar
- Inspecting Solar

Margie Noonan, Environmental Engineer, DOEE

Stormwater Management (SWM) and Green Area Ratio (GAR)

- Triggers and Requirements
- SWM and GAR Overlap
  - Green Roofs

The Collective

park chelsea
At The Collective

AGORA
At The Collective

THE GARRETT
At The Collective

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GROUP EXERCISE
MAIN GATHERING SPACE
PARK CHELSEA
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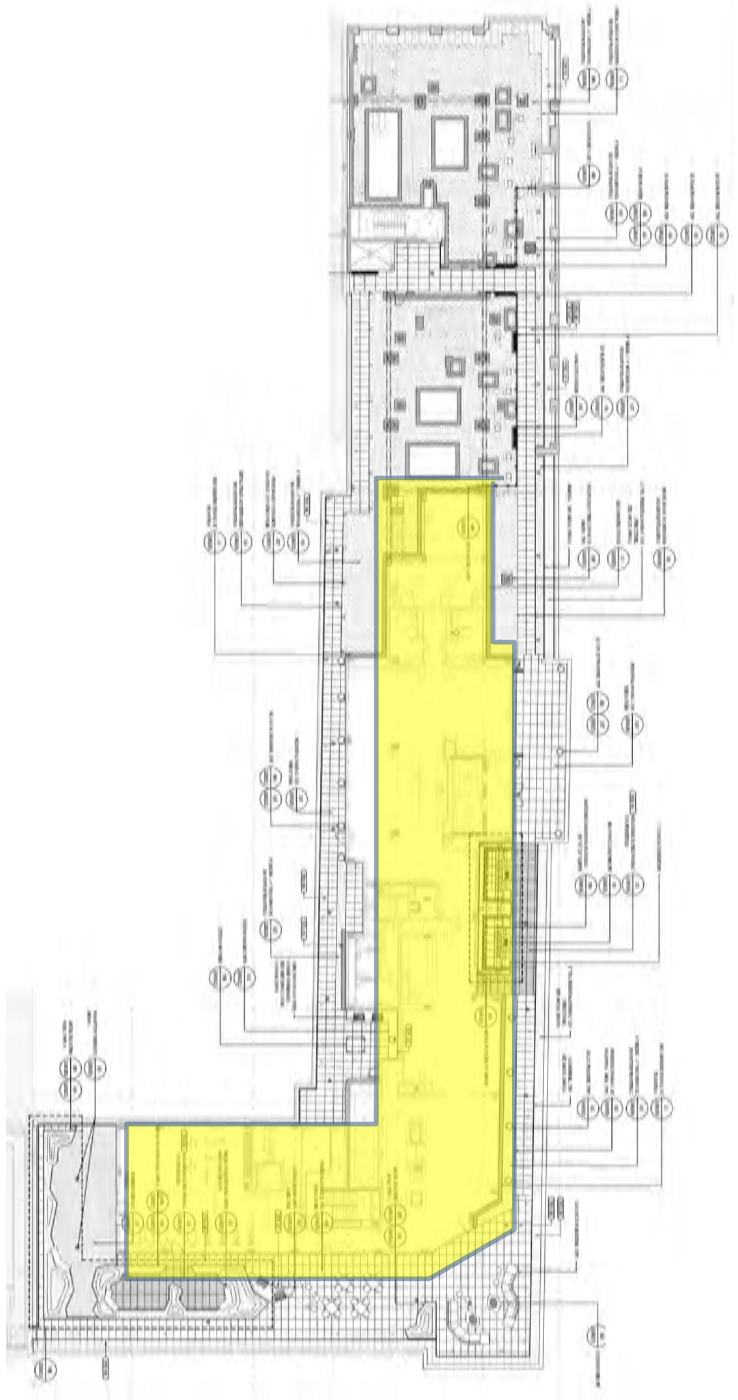
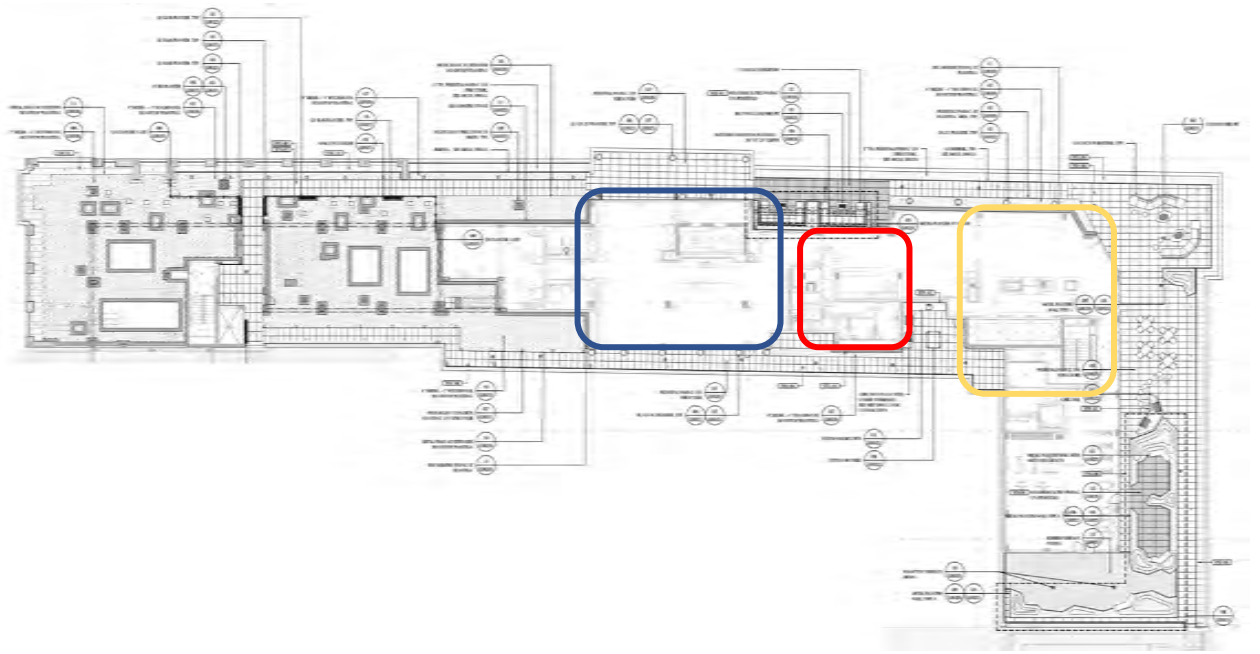
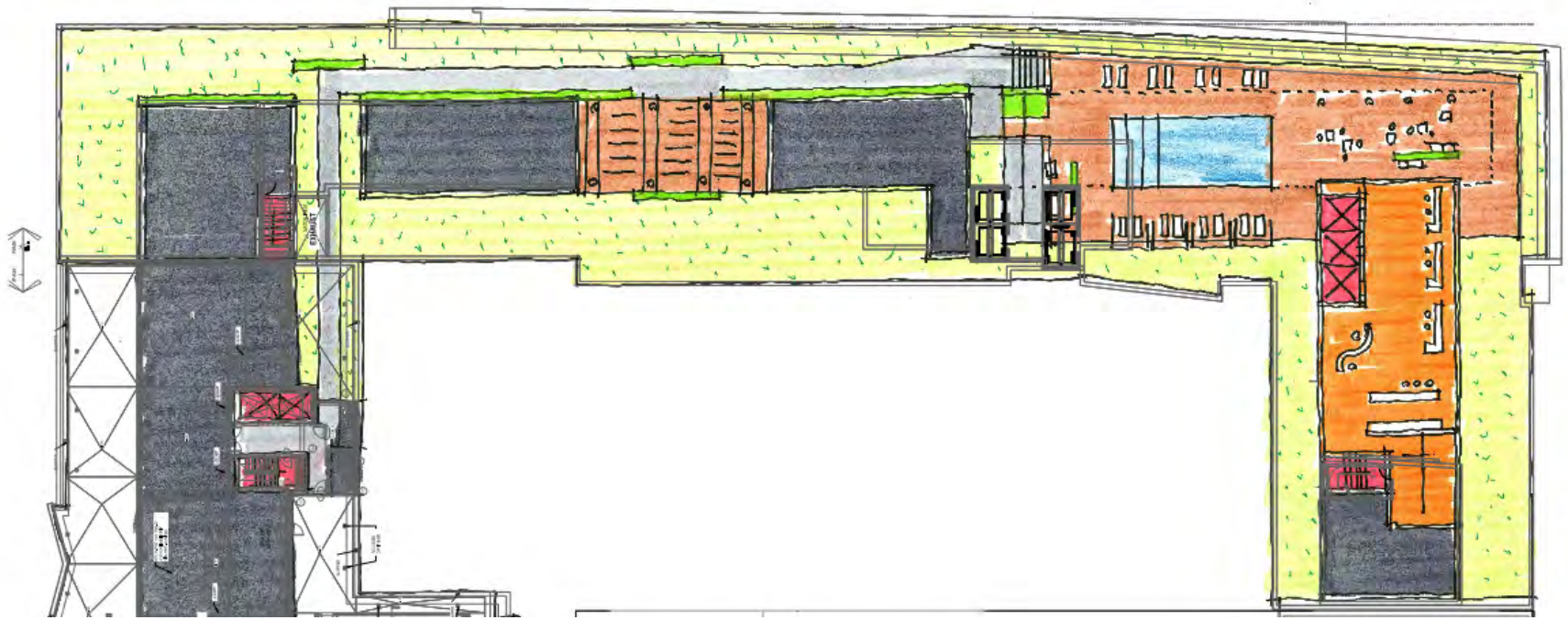
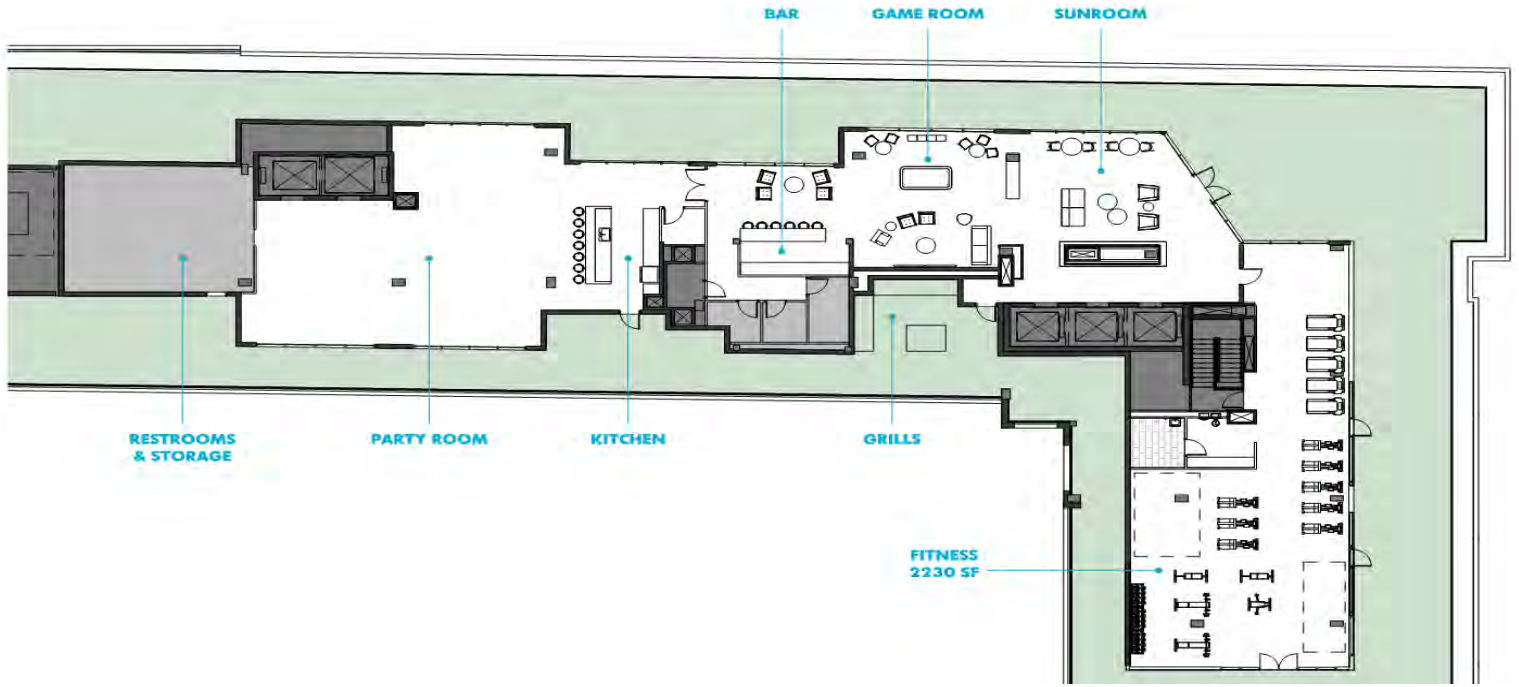






Previous Zoning Regulation



New Zoning Regulation

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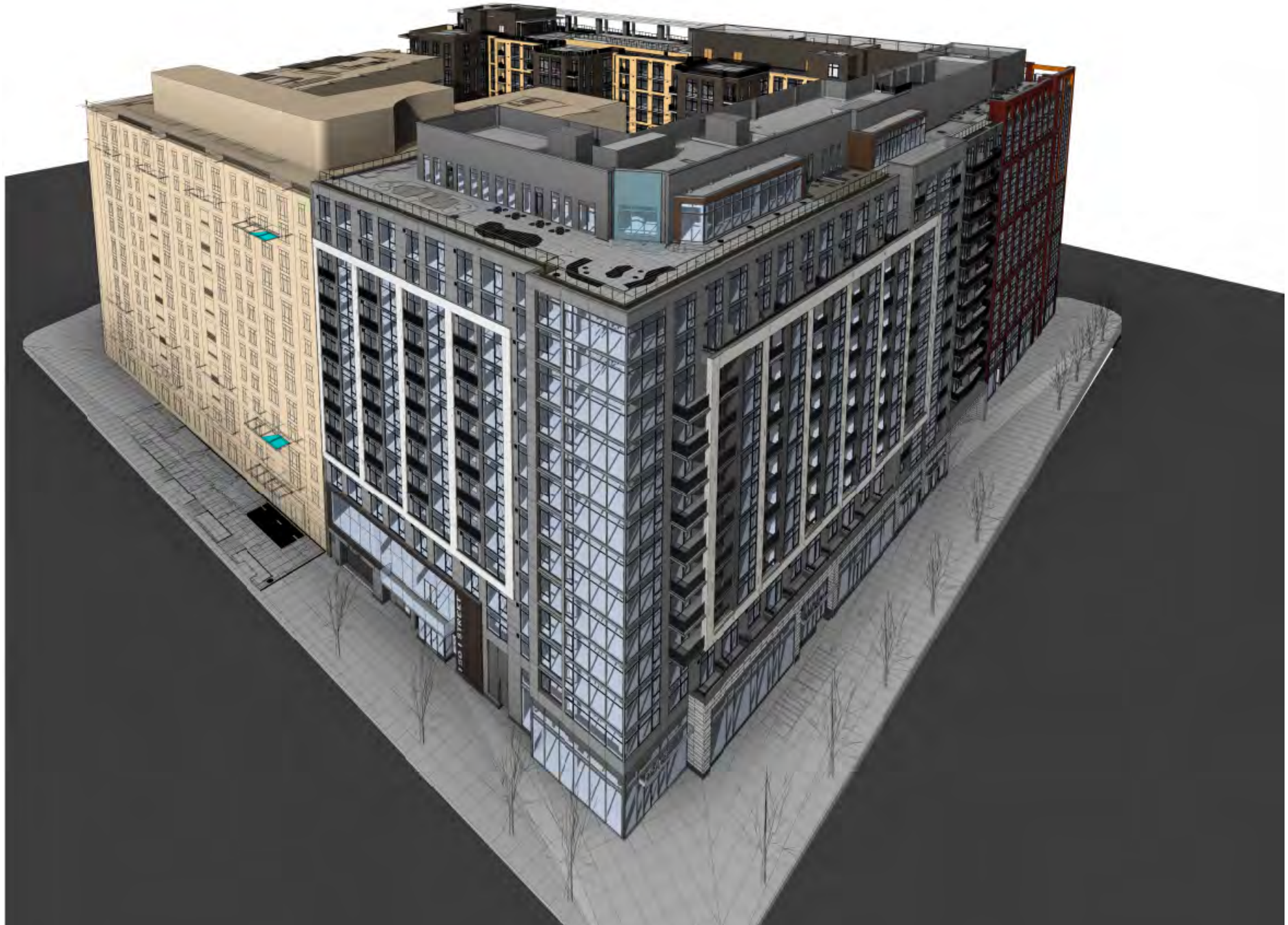

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Penthouse Regulations | Legal Considerations

- **General Requirements – Subtitle B, Chapter 1500**
  - Penthouses may contain mechanical equipment or any use permitted within the zone, except
    - Penthouse habitable space on a detached, semi-detached, rowhouse, or flat regardless of zone.
    - In residential (R) zones where the building is limited to 40 feet, a penthouse is limited to mechanical space and ancillary space associated with a rooftop deck to a maximum of 20% of the roof area devoted to outdoor, uncovered recreation space.
    - A nightclub, cocktail lounge, or restaurant use is only allow by special exception regardless of zone.
    - Penthouse habitable space is not permitted on any building within a defined area around the White House.
  - Penthouse habitable space on a detached, semi-detached, rowhouse, or flat is only allowed by special exception, and the penthouse is limited to 10 feet high and shall only contain a stair or elevator access to the roof and ancillary storage space.

- **General Requirements (continued)**
  - Except for setback, penthouses less than four feet high above a roof or parapet are not subject to the penthouse regulations in Subtitle C, Chapter 15.
  - Single enclosure required, except rooftop egress stairs not containing any other form of habitable or mechanical space may be contained within separate enclosures.
  - Multiple elevator cores in separate enclosures allowed when roof levels vary by one floor or more.
  - Up to three heights permitted, can mix habitable and mechanical within the three permitted heights.
  - Enclosing walls shall not exceed 20% from vertical.

Penthouse Regulations | Legal Considerations

- **Penthouse Height**
  - Maximum permitted penthouse height (mechanical and habitable) and number of stories established within each zone, additional height provided under a Planned Unit Development within some zones.
  - Architectural embellishments allowed to exceed maximum penthouse height provided the architectural embellishment does not result in the appearance of a raised building height for more than thirty percent (30%) of the wall on which it is located.
- **Penthouse Area**
  - Aggregate square footage of all penthouse levels or stories (6'-6" or more) count toward FAR, except:
    - Penthouse mechanical space
    - Communal recreation space
    - Up to 0.4 FAR penthouse habitable space (other than communal recreation space)
    - Mechanical equipment owned and operated by a fixed right-of-way public mass transit system

- **Penthouse Setbacks**
  - 1:1 setback required from front and rear building wall.
  - 1:1 setback required from side building wall:
    - In any zone, on a detached, semi-detached, rowhouse, or flat that is: (i) adjacent to a property with a lower or equal matter of right height, or (ii) on a corner lot adjacent to a public or private street or alley or public park.
    - In R-1 through R-3 and RF zones, on any building that is not a detached, semi-detached, rowhouse, or flat that is (i) adjacent to a property with a lower or equal matter of right height, or (ii) on a corner lot adjacent to a public or private street or alley or public park.
    - For other than R-1 through R-3 and RF zones, on any building that is not a detached, semi-detached, rowhouse, or flat that is adjacent to a property with a lower or equal matter of right height.
    - In any zone, on a building adjacent to a property improved with a designated landmark or contributing structure to a historic district that is built to a lower height regardless of the permitted matter-of-right height.
    - In any zone, on a building with walls bordering an open court.

- **Penthouse Setbacks (continued)**
  - 0.5:1 setback required from any side building wall that is not adjoining another building wall and not meeting any of the conditions that require a 1:1 setback.
  - 2:1 setback from any building wall that fronts onto Independence Avenue S.W. between 12th Street, S.W. and 2nd Street, S.W., or fronting onto Pennsylvania Avenue, N.W. between 3rd Street, N.W and 15th Street, N.W., subject to any penthouse constraints contained within adopted PADC Guideline documents.

Penthouse Regulations | Cost Considerations

- **Residential Buildings**
  - Except for communal rooftop recreation or amenity space, penthouse habitable space is subject to Inclusionary Zoning ("IZ").
  - Even if a residential development is not subject to IZ (certain zones or IZ not triggered), any penthouse habitable space other than communal recreation space is still subject to IZ.
  - Percent set aside requirement for penthouse habitable space is either 8% or 10% depending upon construction type and zone district (same as base building).
  - Target income level for penthouse habitable space is 50% MFI, regardless of tenure type.
  - IZ units resulting from penthouse habitable space shall be provided within the building, except that a contribution to a housing trust fund can satisfy the IZ requirement, when:
    - Penthouse habitable space provided on an existing building that is not undergoing renovation or expansion.
    - Penthouse habitable space provided on existing building not otherwise subject to IZ.
    - Building not otherwise required to provide IZ for low income households and set aside is smaller than the smallest dwelling unit in the building.

Penthouse Regulations | Cost Considerations

- **Nonresidential Buildings**
  - All forms of penthouse habitable space (including communal recreation space) triggers the affordable housing requirements of Subtitle C, Section 1505.
  - Affordable housing requirements triggered above 1,000 square feet of gross floor area.
  - Must construct (new or rehabilitated) or financially assist through a contribution to an affordable housing trust fund.
  - If constructed, the amount of affordable housing required is based upon the location of the affordable housing.
  - Target income level is 50% MFI

- **Housing Production Trust Fund Contribution**
  - Contribution is equal to one-half (0.5) the assessed value of the proposed penthouse habitable space.
  - Assessed value (land only) used must be taken from the Office of Tax and Revenue assessment record no earlier than 30 days prior to building permit.
  - For residential buildings, the FAR used must the maximum permitted residential FAR
  - For nonresidential buildings, the FAR used must the maximum permitted nonresidential FAR
  - Amount of penthouse habitable space must include a prorated amount of common circulation space
  - Contribution is equal to:
    - Value / FAR GFA = (assessed value / land area) / maximum permitted (residential / nonresidential) FAR
    - Assessed value of penthouse habitable space = Value / FAR GFA * amount of penthouse habitable space
    - Contribution Amount = Assessed value of penthouse habitable space / 2

DCBIA | DCRA Technical Rooftop Training

Department of Consumer and Regulatory Affairs
June 5, 2018

Zoning

Kathleen Beeton
Office of Zoning Administrator

Overview

- What is a roof?
- Penthouse Regulations
- Habitable Penthouse Regulations
- Common Plan Review Issues
- Architectural Embellishments and Elements
- Solar
- Antennas
- Certificate of Occupancy (C of O)

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What is a Roof?

- Not defined in DCMR 11, therefore, refer to Webster's Dictionary which defines a roof as:

1. the covering of a building;
2. material used for a roof;
3. the roof of a dwelling conventionally designating the home itself
    a. the highest point
    b. the upper limit

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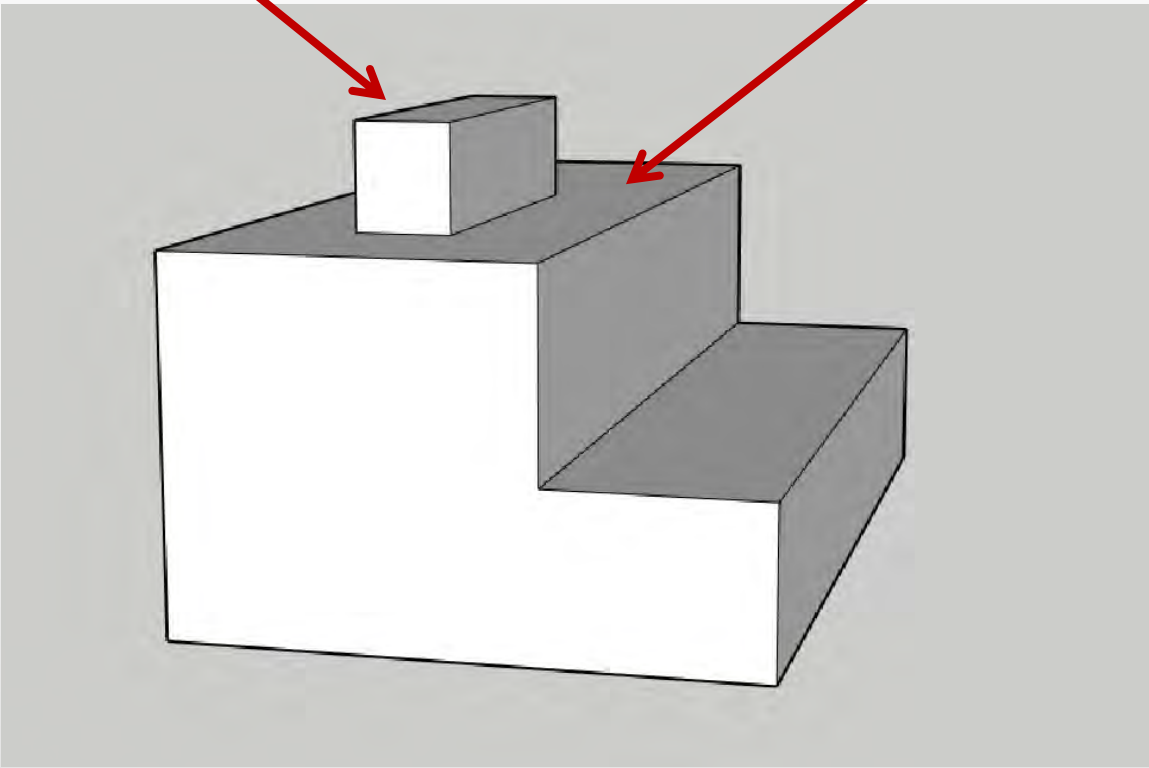
Mechanical Penthouse

Roof



Penthouses Types

- **Penthouse Mechanical Space:** An enclosed space within a penthouse devoted to mechanical equipment for the building, elevator over-rides, or stair towers.

- **Penthouse Habitable Space:** An enclosed space within a penthouse devoted to any use permitted in the zone, unless otherwise restricted, other than penthouse mechanical space. The term penthouse habitable space shall include communal recreation space and associated facilities such as storage, kitchen space, change rooms, or lavatories.

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What is Not a Penthouse?

- Skylights, gooseneck exhaust ducts serving kitchen and toilet ventilating systems, roof mounted antennas, and plumbing vent stacks shall not be considered as penthouses.

- Penthouse regulations are located principally in Subtitle C, Chapter 15 of DCMR 11.

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Where is Penthouse Habitable Space Permitted?

- **C-1500.3**: A penthouse may house mechanical equipment or any use permitted within the zone, *except* as follows:

  a. Penthouse habitable space on a detached dwelling, semi-detached dwelling, rowhouse, or flat shall be limited pursuant to Subtitle C § 1500.4;

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Where is Penthouse Habitable Space Permitted?

b. Within residential zones in which the building is limited to forty feet (40 ft.) maximum, the penthouse use shall be limited to penthouse mechanical space and ancillary space associated with a rooftop deck, to a maximum area of twenty percent (20%) of the building roof area dedicated to rooftop unenclosed and uncovered deck, terrace, or recreation space;

c. A nightclub, bar, cocktail lounge, or restaurant use shall only be permitted as a special exception if approved by the Board of Zoning Adjustment under Subtitle X, Chapter 9.

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Penthouse Habitable Space & FAR

C-1503.1: For the purposes of calculating floor area ratio (FAR) for the building, the aggregate square footage of all penthouse levels or stories measuring six and one-half feet (6.5 ft.) or more in height shall be included in the total floor area ratio permitted for the building, with the following *exceptions*:

a. Penthouse mechanical space;
b. Communal recreation space;
c. Penthouse habitable space, other than as exempted in Subtitle C § 1503.1(b) with a floor area ratio of less than four-tenths (0.4).

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Penthouse Affordable Housing Requirement

- If habitable space is constructed within a penthouse, it will likely trigger an affordable housing requirement.

- Where required and depending on such factors as whether the building is commercial, residential (Inclusionary Zoning (IZ) or non-IZ), and the size of the penthouse, the requirement may be satisfied by either:
  - Including additional Inclusionary square footage in the development;
  - paying into a housing trust fund; or
  - providing off-site affordable units.

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Most Common Plan Review Issues Involving Penthouses

- **Setbacks**
  - 1 to 1 setback is missed or not provided where required.
  - When not initially designed to meet setback requirements, compliance with the setback requirement may cause the mechanical enclosure to be too small for proposed mechanical equipment.
- **Screening**
  - Does not provide a 1 to 1 setback.
  - Does not completely enclose mechanical features horizontally and vertically.
  - Proposed screening must meet zoning regulations and be approved by HPO/CFA, where applicable.
  - Depending on roof type, new structural reinforcement may be required to support the required screening.

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Most Common Plan Review Issues Involving Penthouses, Cont.

- **Affordable Housing Requirement**
  - Contribution amount is not calculated correctly.
- **Other**
  - Penthouse habitable space is too large causing FAR limit to be exceeded. Once the penthouse is .40 FAR or more of penthouse habitable space (excluding mechanical penthouse and communal recreation space) it is included in the total building FAR.
  - Restaurants and bars with seating not allowed on roofs in commercial zones without BZA approval.
  - Stair penthouses, pergolas and other shading and storage features not allowed on residential roofs without BZA approval.

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Most Common Plan Review Issues Involving Penthouses, Cont.

Architectural Embellishments

- **11 DCMR Subtitle C, § 1501.3 allows:**
  - "architectural embellishments consisting of spires, towers, domes, minarets, and pinnacles may be erected to a greater height than any limit prescribed by these regulations or the Height Act, provided the architectural embellishment does not result in the appearance of a raised building height for more than thirty percent (30%) of the wall on which the architectural embellishment is located."

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Protected Architectural Elements

- **RF (typically row dwelling zones) special protections, found in Subtitle 11 DCMR Subtitle E, §206.1:**
  - "(a) A roof top architectural element original to the building such as cornices, porch roofs, turrets, towers, or dormers, shall not be removed or significantly altered, including shifting its location, changing its shape or increasing its height, elevation, or size. For interior lots, not including through lots, the roof top architectural elements shall not include identified roof top architectural elements facing the structure's rear lot line. For all other lots, the roof top architectural elements shall include identified rooftop architectural elements on all sides of the structure;"
  - Deviation from the protections requires a Special Exception from the Board of Zoning Adjustment (BZA).

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Examples of Protected Architectural Elements in RF Zones

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Solar

- Generally required to meet 1:1 setback requirement from front and rear roof edges. Cannot exceed 4 feet in height above the roof or parapet wall.
- Applicants can self-certify that their proposed solar roof installation complies with the setback requirements and are exempted from zoning review.
- Solar canopies greater than 4 feet in height are considered a structure and must meet lot occupancy, setbacks, FAR, and height limitations for the zone in which they are located.

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Protected Solar

- **RF (typically row dwelling zones) special protections, found in Subtitle 11 DCMR Subtitle E, §206.1**:
  - Any addition, including a roof structure or penthouse, shall not significantly interfere with the operation of an existing solar energy system of at least 2kw on an adjacent property unless agreed to by the owner of the adjacent solar energy system. For the purposes of this paragraph, the following quoted phrases shall have the associated meanings:
    1. "Significantly interfere" shall mean an impact caused solely by the addition that decreases the energy produced by the adjacent solar energy system by more than five percent (5%) on an annual basis, as demonstrated by a comparative solar shading study acceptable to the Zoning Administrator; and

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Protected Solar, Cont.

- **RF (typically row dwelling zones) special protections, found in Subtitle 11 DCMR Subtitle E, §206.1**:
    2. "Existing solar energy system" shall mean a solar energy system that is, at the time the application for the building permit for the adjacent addition is officially accepted as complete by the Department of Consumer and Regulatory Affairs or an application for zoning relief or approval for the adjacent addition is officially accepted as complete by the Office of Zoning, either:
        a. Legally permitted, installed, and operating; or
        b. Authorized by an issued permit; provided that the permitted solar energy system is operative within six (6) months after the issuance of the solar energy system permit not including grid interconnection delays caused solely by a utility company connecting to the solar energy system.
- Deviation from the protections requires a Special Exception from the BZA.

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Antennas

- **Common Types Of Antennas:** The most common types of antennas are panel or dish antennas and they are typically mounted on a sled, mounted directly to the building walls or concealed within stealth enclosures.
- **Sled Mounted Antennas**: These building mounted antennas are mounted on vertical poles attached to a horizontal base or sled for stabilization.
- **Building Mounted Antennas**: These antennas are either dish or panel antennas mounted directly to the building walls.
- **Stealth Antennas**: These building mounted antennas are hidden within vertical canisters or screened enclosures designed to imitate architectural features.

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Antennas

Equipment Cabinet

Building Mounted Panel Antennas

Antennas

Building Mounted Dish Antennas

Antennas

- **Equipment Shelters**: Equipment Shelters are large roof mounted buildings or cabinets that contain vital machinery needed to power and monitor roof mounted antennas. Equipment Shelters are not regulated as penthouses their setbacks are governed under the antenna regulations.
- **Setbacks**: All roof mounted antennas are required to provide vertical and horizontal setbacks. Building mounted antennas such as dishes are limited in size. Roof mounted antennas are also limited in size.
  - Height setbacks are measured from the roof.
  - Horizontal setbacks are measured from the intersection of the roof upon which they are placed and the exterior wall(s) closest to them.

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Antennas

- **Documents:** Antenna applications are required to provide documentation verifying compliance with zoning standards and FCC requirements.
- **Radio Frequency (RF) Letter**: The RF letter verifies compliance with maximum allowable radiation emissions.
- **O.P. Letter**: The Office of Planning Letter verifies that the antenna installation has been approved by the Office of Planning.
- **Antenna Supplemental Form**: The Antenna Form documents the number, type and mounting height of all antennas.

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Antennas

Common Problems:

- **Antenna Location**: Proposed roof mounted antennas are commonly placed too close to the roofs edge increasing their visibility.
- **Antenna Height**: Proposed antennas are commonly mounted too high increasing their visibility.
- **Screening**: Proposed antennas are not properly screened.
- **Documentation**: Building permits are missing vital documents such as the O.P and R.F. Letters and the Antenna Form.
- **Missing Drawings**: Many permits are missing the required elevations.

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Certificate of Occupancy (C of O)

- Use of roof must be shown on approved building plans, BZA approval granted where necessary (e.g. roof-top bar/cocktail lounge), and passed inspections prior to desired occupancy.
- Include any proposed roof-top uses on C of O application, e.g. swimming pool, bar/cocktail lounge, habitable penthouse space, temporary use (such as a tent, etc.) and the proposed occupant load.
- Temporary uses may be subject to the building permit review process prior to C of O and will be issued with an expiration date.

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What Projects Do the Penthouse Affordable Housing Rules Apply?

- *All projects* that are providing Penthouse habitable space must submit a Penthouse Affordable Housing Addendum ("Penthouse Addendum") form to demonstrate compliance with applicable affordable housing rules:
  - Residential
  - Commercial/Non-residential use
  - Existing buildings
  - New buildings
  - Inclusionary Zoning (IZ) projects
  - Non-IZ projects

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What Projects Do the Penthouse Affordable Housing Rules Apply?

- **Non-Residential (i.e. Commercial) Buildings** – if the amount of penthouse space exceeds 1,000 square feet, then an affordable housing requirement is triggered.

- **Residential Buildings** – the construction of penthouse habitable space, except penthouse habitable space devoted exclusively to communal rooftop recreation or amenity space for the primary use of the residential building, is subject to affordable housing requirement.

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How Is An Affordable Housing Requirement Satisfied?

- Where required and depending on such factors as whether the building is commercial, residential (IZ or non-IZ), and the size of the penthouse, the requirement may be satisfied by either:
  - providing additional Inclusionary square footage in the development (if it is an IZ development),
  - paying into a housing trust fund, or
  - providing affordable units off-site.

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Other Penthouse Addendum Resources

- **What other resources do you have to assist filling out the form?**
  - Subtitle C, Chapters 1000 & 1500 of the Zoning Regulations (www.dcregs.dc.gov)
  - CIZC & Penthouse Affordable Housing Instruction Guide (on the DCRA website)
    (dcra.dc.gov)
  - Zoning Technician

Permits and Building Codes

Christopher Bailey
Permit Operations Division

Overview

- Definitions and Terms
- Buildings and Construction
- Height and Area
- Roof Loading
- Occupancy and Use Classification

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Zoning and Building Regulations

While zoning and building codes are closely related, they both serve different functions. In a nutshell:

- Zoning codes regulate how a given section of land can be used and what type of business can utilize the land and its structures;
- On the other hand, Building codes regulate the details of the structures themselves. To maintain a minimum standard for life safety and constructability.

When trying to construct a new building, re-develop, change the use or alter an existing use of a property both Zoning and Building Codes must be met. Because these regulations are created by different entities, the language can be confusing. So please note that meeting the standards of both may be challenging, but the Office of Zoning and Department of Consumer and Regulatory Affairs are here to help.

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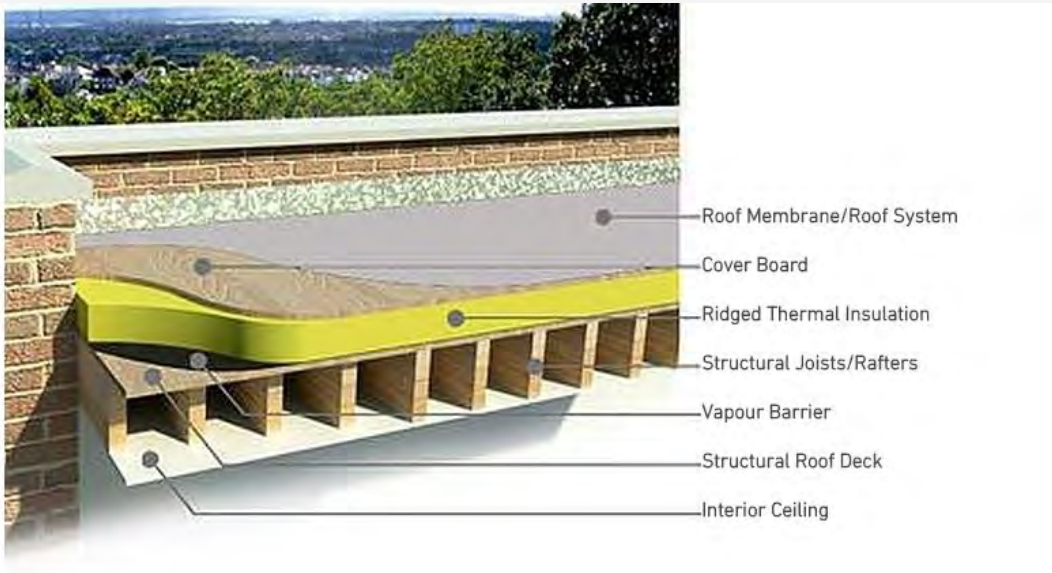
Definitions and Terms

- **Roof Assembly**
  - A system designed to provide weather protection and resistance to design loads. A roof assembly includes a variety of components the roof deck, vapor barrier, substrate or thermal barrier or insulation, roof membrane and roof covering.



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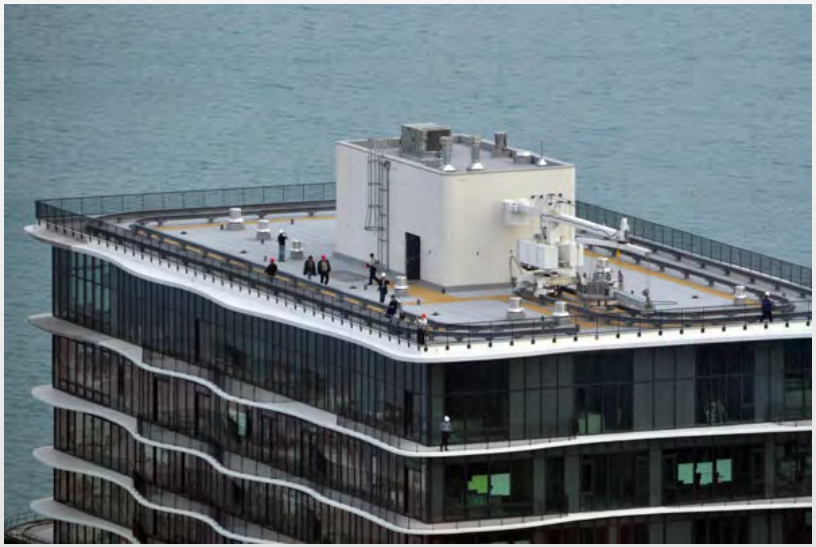
Definitions and Terms

- **Penthouse as defined by the Building Code**
  - An enclosed, **unoccupied** rooftop structure used for sheltering mechanical and electrical equipment, tanks, elevators and related machinery, and vertical *shaft* openings.



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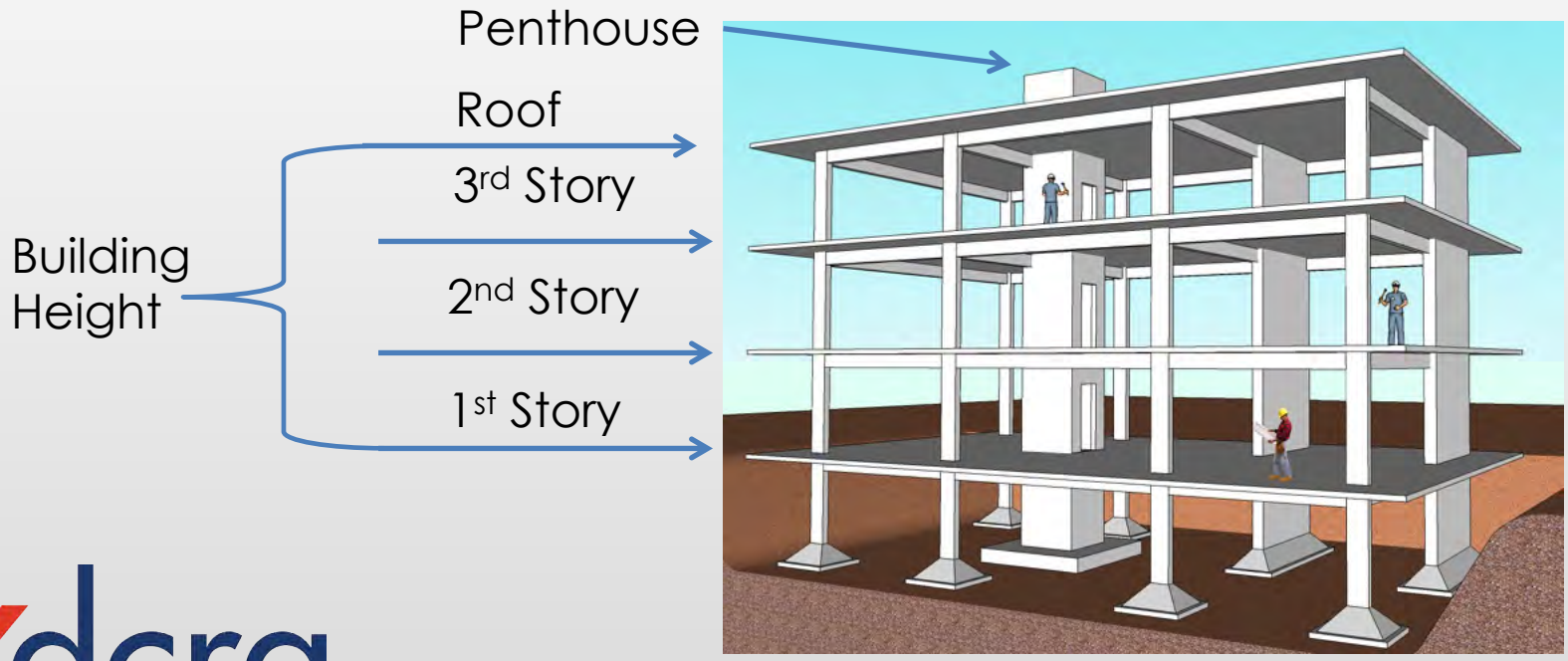
Definitions and Terms

- **Story**
  - That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above.



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Buildings and Construction

Several factors affect the general limitation of a building.

1. **The Type of Construction**

   Combustible Wood framing, Non-combustible Steel, CMU, Concrete panels, Brick, etc., are all different types of construction that can limit a building in use, height and area.

2. **The Types Protections**

   Egress components, Fire alarms, Sprinkler systems, Fire resistant materials will restrict the building.

3. **The Use and Occupancy**

   Assembly, Retail, Factory, Residential, Business, Storage Institutional and Hazardous uses may limit a building.

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Heights and Areas

Based on the buildings Use, Type of Construction, and Protections. The Maximum Height and Area can be determined. For example, a restaurant owner wants to expand to the roof in an existing 2 story building.

- A restaurant is an **Assembly** use.
- The roof has an existing mechanical penthouse.
- The Owner plans to have the bar that is enclosed on the side of the mechanical penthouse.
- The habitable portion of the new roof enclosure has created a non conformity and is now creating an additional story.

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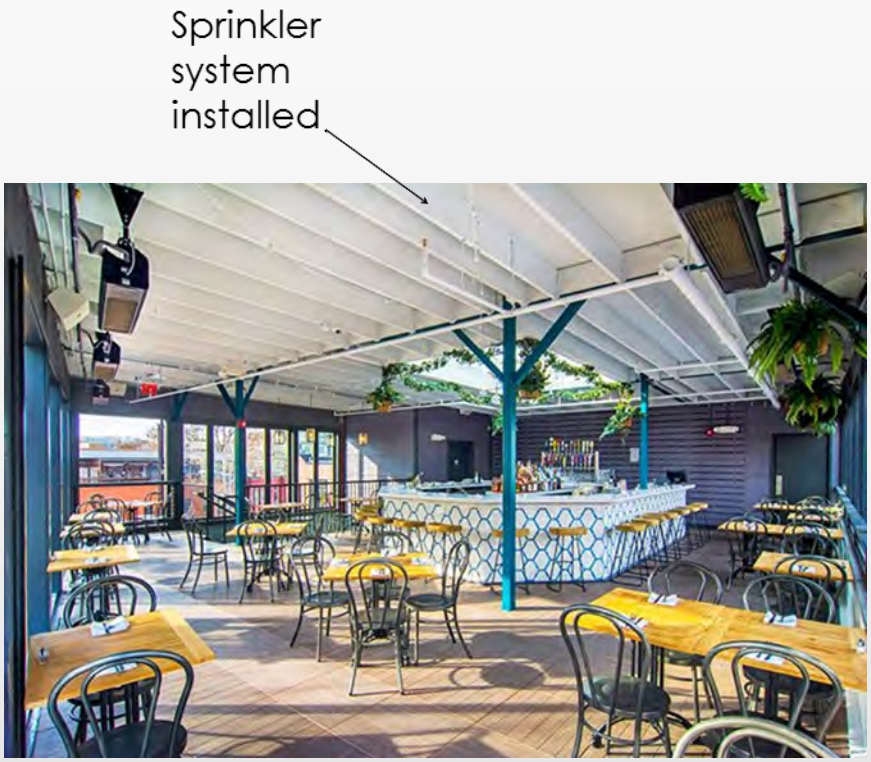
Heights and Areas

What was originally a **2** story building and penthouse is now a **3 story building**. This new roof construction and use are NOT permitted without additional building upgrades. According to the building code and Table 503, if the building construction consists of exterior CMU block wall and interior wood framing, the maximum height is limited to 2 stories.

- One solution is to install a sprinkler system. Where required by code to increase the allowed building height by one story; the sprinkler system shall be installed throughout the building. This installation would permit an additional story.



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Roof Loading

Roof loading is another concern when altering a rooftop into an occupied space. The existing roof was **NOT** designed to support an Assembly use. A Structural engineer will design a new system capable of supporting the new loads like people, equipment, furniture and any anticipated services.

Going from this to this.

Occupancy and Use

- An Assembly use located on a roof will required **two** independent means of egress from the roof to the level of exit discharge (grade).

- This new area can also require an accessible route, (ADA) because the new area is likely to contribute more to the existing area.

- The combined area of all restaurant spaces will be used to calculate the new maximum **Occupant load.** More Area means more people and with it the facilities such as restroom and exits must be calculated to accommodate the increased occupant load.

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Examples of Not a Story

- There are examples of rooftop uses that do not trigger requirements for full height stories.
- Rooftops that do not create habitable enclosed spaces, "Open roof decks."
- Open roof decks have to comply with access, loading and egress. Two exits are required however the building construction type and height restrictions are not a factor.

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DC Building Code

Jeffrey Reiss
Inspections and Compliance Administration

Overview

- Fire Protection
- Roof covered structures
- Gas grills
- Swimming pools
- 2012 Swimming Pool and Spa Code
- Commonly missed items
- Rooftops - The Good, the Bad, and the Ugly
- Design considerations

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Fire Protection
Roof Covered Structures

- Exterior covers, canopies, porte-cocheres, balconies, decks or other similar projects exceeding 4-feet in width require sprinkler protection.
- Consideration should be used to protect the system from freezing.

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Fire Protection
Roof Covered Structures

- An alternative to providing a sprinkler system is the use of non-combustible, limited-combustible or Fire retardant-treated wood as defined by NFPA 703 Standards for Fire Retardant-Treated Wood and Fire Retardant Coatings for Building Materials.
- Exterior fire retardant coatings typically require annual maintenance.

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Rooftop Open Flames

- Open-flame Cooking devices (grills) include charcoal burners and any other open flame cooking device. Open flame devices are governed by the International Fire Code.
- Open-flame cooking devices shall not be operated within 10-feet of any building or combustible construction.

Rooftop Open Flames

- **Exceptions**
  - Detached single-family dwellings;
  - Buildings, balconies and decks protected by an automatic sprinkler system;
  - Natural gas grills installed on a non-combustible surface and located 10-feet or more from combustible construction.

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Swimming Pools

- Pursuant to the International Code Council, DCRA now has one document that addresses the agency's design and inspection needs for swimming pool and spa safety, the International Swimming Pool and Spa Code. All levels of government and Building Safety Professionals recognized the need for a mandatory set of baseline requirements to comprehensively address all aspects of swimming pool and spa safety. Previously, the requirements were spread out through the IBC, IPC, NEC, IFGC.

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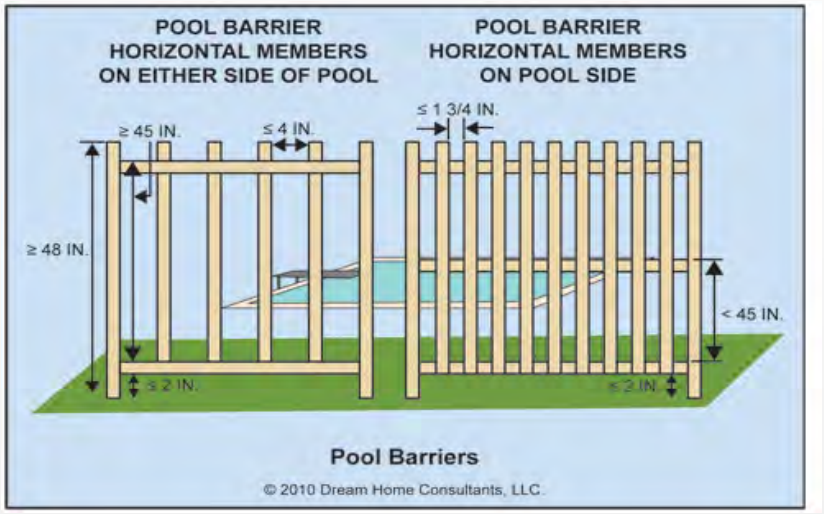
Commonly Missed Items



- Barrier heights and clearances shall not be less than 48-inches above grade.
- Vertical clearance between grade and the bottom barrier shall not exceed 2 inches.
- Vertical openings are determined by how the horizontal barriers are spaced and range from 1.75-inches to 4-Inches.

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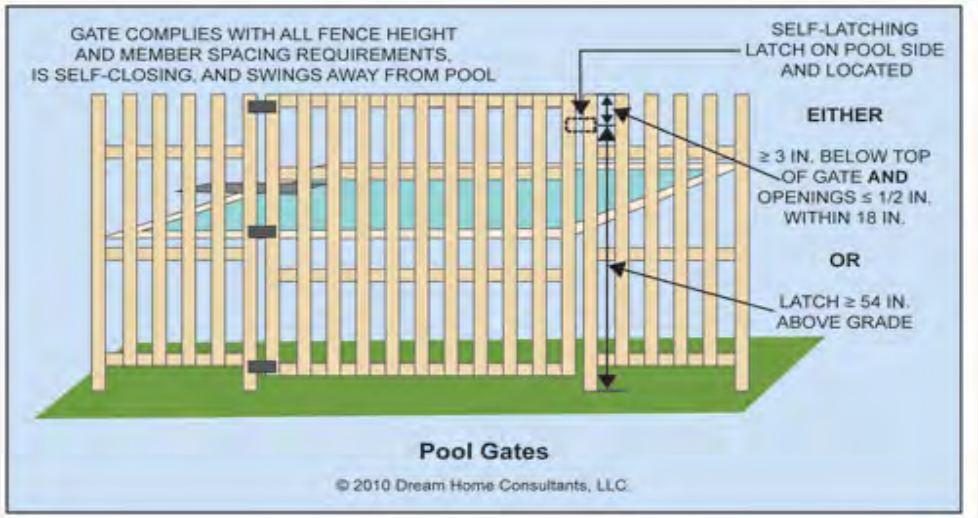
Commonly Missed Items



- Gates shall be self closing and self latching on the pool side
- Latches less than 54-inches from grade shall be on the pool side and be located a minimum 3" below the top of the gate AND shall have no openings greater than 1/2 –inch within 18-Inches of the release mechanism
- Gates shall swing in the direction of egress.

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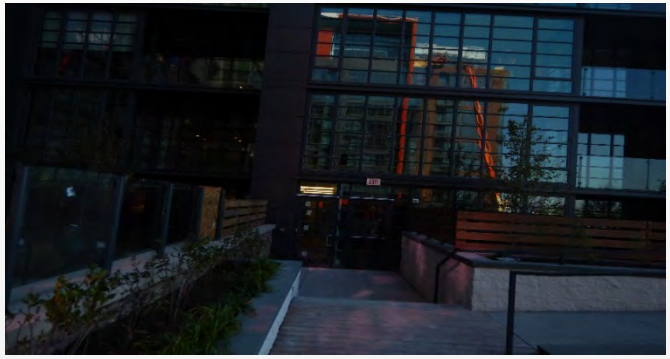
Commonly Missed Items



- Structure walls as a barrier: Where a wall of a dwelling unit or structure serves as part of the barrier, doors and operable windows with sill heights less than 48-inches shall be equipped with one or more of the following:
  - An alarm that produces an audible warning when door or screen are opened;
  - A safety cover listed and approved in accordance with ASTM F1346;
  - An approved means of protection, such as self latching devices, provided that the degree of protection afforded is not less than the items previously listed;
  - Plan and design for Fail Secure features in your security design.

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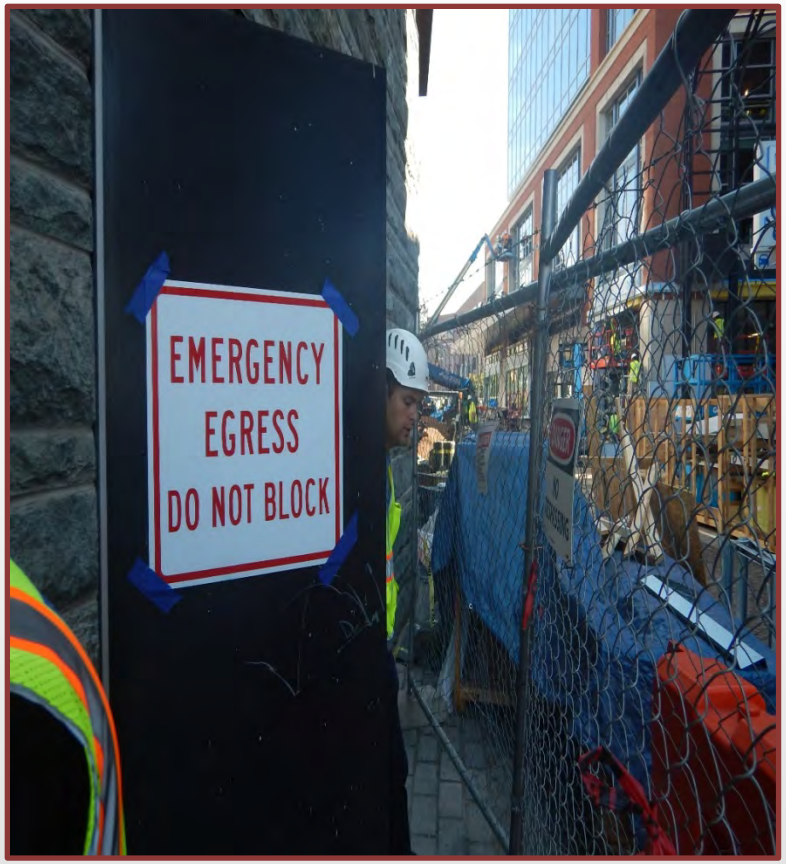
The Good, the Bad, and the Ugly



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Rooftops
The Good, the Bad, and the Ugly

- Egress doors shall have a floor or landing on each side of the door

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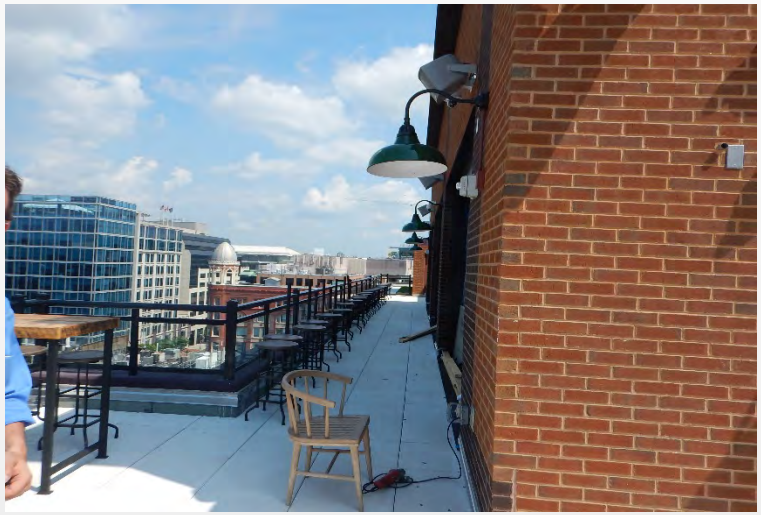
Rooftops
The Good, the Bad, and the Ugly



- Exit doors and exit access doors shall be readily visible from any direction of egress travel to clearly indicate the direction of egress.
- Exit doors shall be placed a distance apart equal to not less then one-half of the length of the maximum overall diagonal dimension of the building or area to be served measured in a straight line between the exit doors. Where a NPFA 13 systems is installed, the separation shall not be less than one-fourth of the overall diagonal dimension of the area served.

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Rooftops
The Good, the Bad, and the Ugly

- Guards are required along open sided walking surfaces, that are located more than 30-inches measured vertically to the floor or grade below.
- Guard opening limitations differ between mechanical areas (up to 21" openings) and public access (4" openings).

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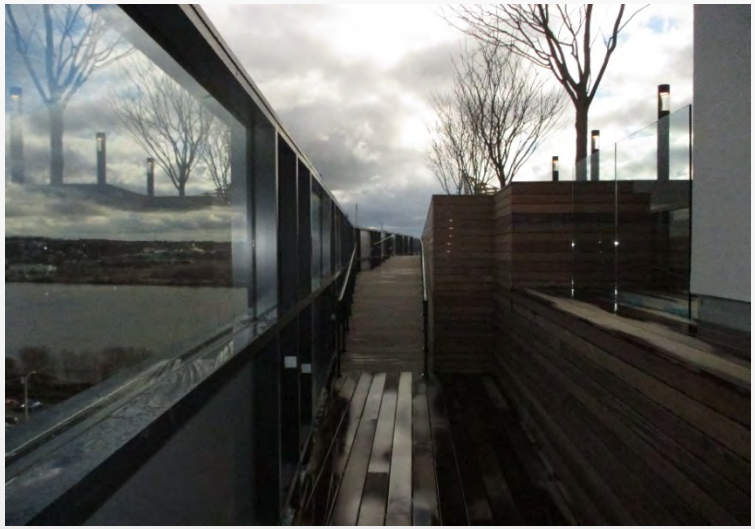
Rooftops
The Good, the Bad, and the Ugly



- Egress widths shall not be reduced. Under 50 occupants, 26-inches is required to be maintained and 50 or more occupants requires 44-inches.
- Where a change in elevation is less than 1 foot, the surface may be sloped no greater than 5%. If the level change is greater than 1 foot, a ramp shall be used with an 8% slope and handrails shall be provided on both sides.

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Rooftops
The Good, the Bad, and the Ugly

- Elevation changes of less than 12-inches can be sloped. Where the slope is greater than one unit vertical in 20 units horizontal (5%), a ramp shall be used.

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Solar PV in Washington DC

Keith Winston
Green Building Division

Overview

- Some Background
  - Long-term DC Commitment
  - Commercial vs. Residential
  - Solar Systems Overview
- Value of Solar
- Permitting Solar
- Inspecting Solar

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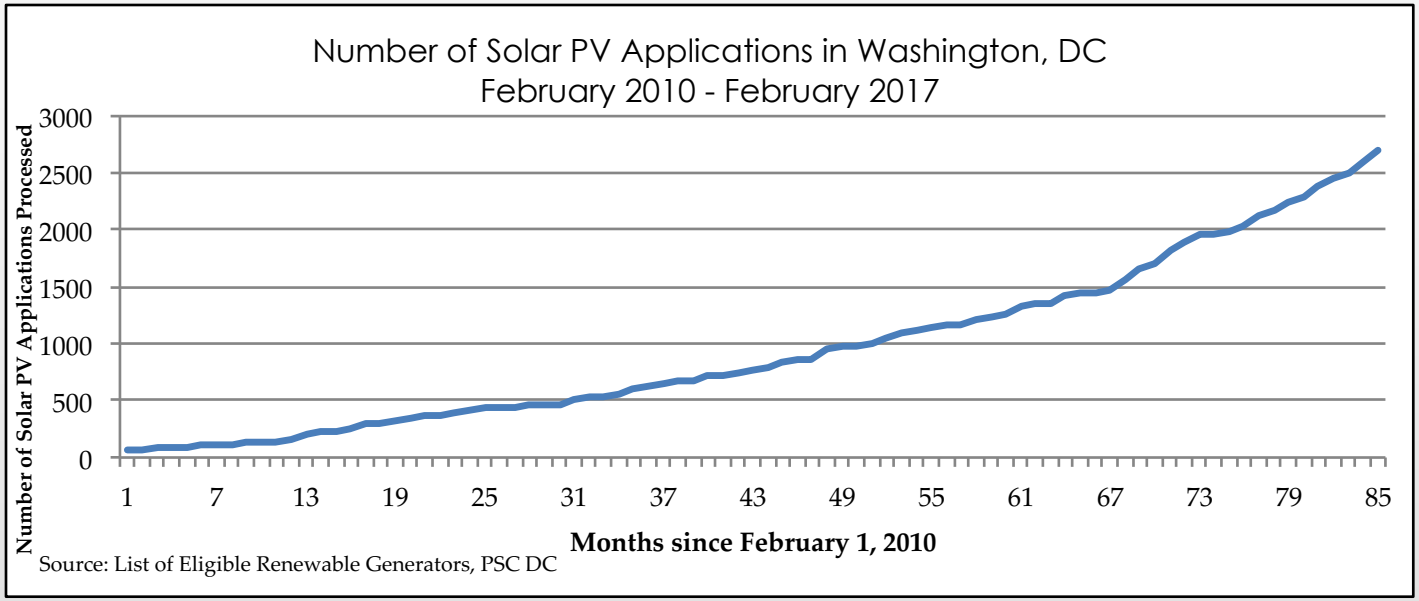
Solar In DC

- **2,879** DC-based solar PV applications processed since February 2010.
- Average system size for commercial projects is **47.01 kW.**
- Recent years have seen a significant shift towards commercial systems in DC.



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Long-Term DC Commitment

- Why?
  - Climate commitments
  - Potential resilience contribution of distributed generation
- How?
  - Years of incentives
  - Solar carve-out & SRECs
  - PACE
  - Community solar
  - Solar for all

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Commercial vs. Residential

- The distinction is defined differently in different codes.
- Fire code essentially interprets commercial to be flat roofs for the purposes of solar (DCFC 605.11).

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Solar Renewable Energy Credits (SRECs)

- Represent the environmental benefits of solar.
- Are "generated" in parallel with electrical generation.
- Have substantial financial value.
- May initially belong to the owner or installer (per contract).
- Are sold in a stock-market-like manner.

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Solar Renewable Energy Credits (SRECs)

- May be sold en masse ("up front," at a discount) or intermittently at market value.
- Have a 3 year shelf life.
- Are sold through a broker (i.e. SRECTrade, FlettExchange).
- FTC & SREC ruling: PV no longer renewable after sale of SRECs ("Deceptive Claim").
- Value is capped by Solar Alternative Compliance Payment (SACP) and fixed schedule.

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SREC SACP Schedule

Energy Year	% Solar Requirement	Estimated SRECs Required (MWh)	SACP
2017	0.98%	113,049	$500
2018	1.15%	133,986	$500
2019	1.35%	158,861	$500
2020	1.58%	187,786	$500
2021	1.85%	222,075	$500
2022	2.18%	263,698	$500
2023	2.50%	306,133	$500
2024	2.60%	317,070	$400
2025	2.85%	347,558	$400
2026	3.15%	384,143	$400
2027	3.45%	420,728	$400
2028	3.75%	457,313	$400
2029	4.10%	499,995	$300
2030	4.50%	548,775	$300
2031	4.75%	579,263	$300
2032	5.00%	609,750	$300

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That's Not All

In addition to SRECs, developers should consider federal tax incentives and other programs that can improve the financial performance of commercial solar in DC.

1. Investment Tax Credit (ITC)
2. Net Energy Metering (NEM)
3. Community Solar
4. Property Assessed Clean Energy (PACE)

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Federal Investment Tax Credit (ITC)

- **The Basics**
  - A 30% federal tax credit claimed against tax liability of commercial investors (Section 48) in solar energy property.
    - Equal to the 30% of the basis invested in eligible property.
  - Can be claimed by the business that owns the project.
  - Steps down to 26% in 2020, 22% in 2021, and 10% thereafter (in perpetuity).
  - Must (at least) commence construction by the end of 2023 to be eligible.

Find out more information at:
www.seia.org/policy/finance-tax/solar-investment-tax-credit
programs.dsireusa.org/system/program/detail/658

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Net Energy Metering (NEM)

- An agreement between customers and Pepco for reimbursement at the full rate for excess generation.
- Applies to the excess of your production beyond your real-time consumption.
- Typically limits system size to approximate annual energy use of the associated Pepco account.

Monthly Electric Bill =
[Total electricity used] – [Electricity produced by PV panels] + surcharges

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Pepco Net Energy Metering (NEM)

NET ENERGY METERING AND SMALL GENERATOR INTERCONNECTION APPLICATION CHECKLIST

green power connection
District of Columbia

We support renewable energy and partner with our customers to ensure safe and reliable interconnection of renewable energy into the electric grid.

Interconnection Process

- Customers who generate their own electricity with renewable energy sources can interconnect with the grid and receive bill credits for excess generation
- Green Power Connection™ (GPC) is Pepco's process for facilitating small generator interconnections and net energy metering (NEM) requests
- Small generator technologies that qualify for NEM and interconnection with our system include solar (photovoltaic or "PV"), wind, biomass, anaerobic digestion, geothermal electric, fuel cells using renewable sources, hydro, and cogeneration and microturbines. See our GPC website for more details
- Title 15 of the *D.C. Municipal Regulations* (DCMR) defines the interconnection and net metering regulations and application processes Pepco follows. Chapter 40 sets out the *District of Columbia Small Generator Interconnection Rules* (SGIR) and Chapter 9 sets out the *Net Energy Metering Rules* and defines Pepco's net metering application process

Application Forms and Fees

- A fully completed and signed *District of Columbia*
- The interconnection application is a two-part process, and the NEM Contract is a separate document altogether. See the back of this sheet for the Level 1 components and requirements of both
- Pepco will calculate and invoice the contractor for any required application fee

Nameplate Capacity	Application Fee
Level 1 10 kW or less and invertor-based	None
Level 2 2 MW or less radial distribution circuit or spot network serving one customer	$500
Level 3 area network (50 kW or less) radial distribution circuit (10 MW or less)	$500
Level 4 less than 10 MW and not Level 1, 2, or 3	$1,000

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Pepco Net Energy Metering (NEM)

Green Power Connection Interconnection Application Process

25 business days (App. Part I) | 35 business days (Customer) | 20 business days (App. Part II) = 80 business days

Research → Select → Apply → Approval → Install → Inspect → Meter → Authorization → Operate

Steps	Actions	Responsible
1. Research	• **Research** the various types of renewable energy systems available and decide which system best fits your consumption needs. Renewable energy-generating systems can be sized to meet up to 100% of your energy needs • Understand your electrical load and energy consumption history	• **Customer**
2. Select	• Interview and **select** a reputable installing contractor	• **Customer**
3. Apply	• Understand the documentation needed with the interconnection agreement (e.g., rebate forms, permit applications, inspection forms) • **Apply** and submit Part I of Pepco's interconnection application and agreement along with the supporting documentation. For applicants in the District of Columbia who wish to net meter, a signed D.C. NEM Contract is also required • Applications without supporting documentation will be delayed. You can re-submit a corrected application and documentation • Pepco will send contractor or customer an invoice for any application fee	• **Customer** Apply for Building Permit • **Pepco**
4. Approval	• Wait for Pepco's **Approval to Install** before installing any renewable generator equipment • Pepco will provide you a written screening result or **Approval to Install**	• **Customer** • **Pepco**
5. Install	• Begin constructing and **installing** your renewable generator facility	• **Customer**
6. Inspect	• After installation, submit Part II of our interconnection agreement, including a copy of the certificate of completion and the **inspection certificate** • We will review your documentation to verify the interconnection application meets regulatory requirements and the application fee, if any has been paid	• **Customer** • **Pepco**
7. Meter	• We will install your **net-capable meter**	• **Pepco**
8. Authorization	• We will send you an **Authorization to Operate** letter	• **Pepco**
9. Operate	• Receipt of the authorization letter means you can **operate** your renewable system	• **Customer**

Apply online at: www.pepco.com/gpc

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Property Assessed Clean Energy (PACE)

- A financing tool to help property owners repay the costs of energy efficiency, water and renewable energy improvements over long (15-20 years) periods through a special assessment placed on the property.
- Can, in certain cases, deliver up to 100% financing with no out-of-pocket payments and at fixed rate financing.
- Ideally suited for commercial, multi-family, or institutional buildings in DC, but both large and small projects qualify.

DC PACE is currently **the nation's only** clean energy financing program for building upgrades.

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Property Assessed Clean Energy (PACE)

Many types of projects can be developed through PACE:

- Office buildings, institutional buildings, multifamily dwellings, industrial facilities, and most commercial properties in DC.

PACE-financed measures range from single installations to larger-scale retrofits:

- From solar PV panels to energy efficiency upgrades (e.g., HVAC).

To learn more: www.urbaningenuity.com/dc-pace

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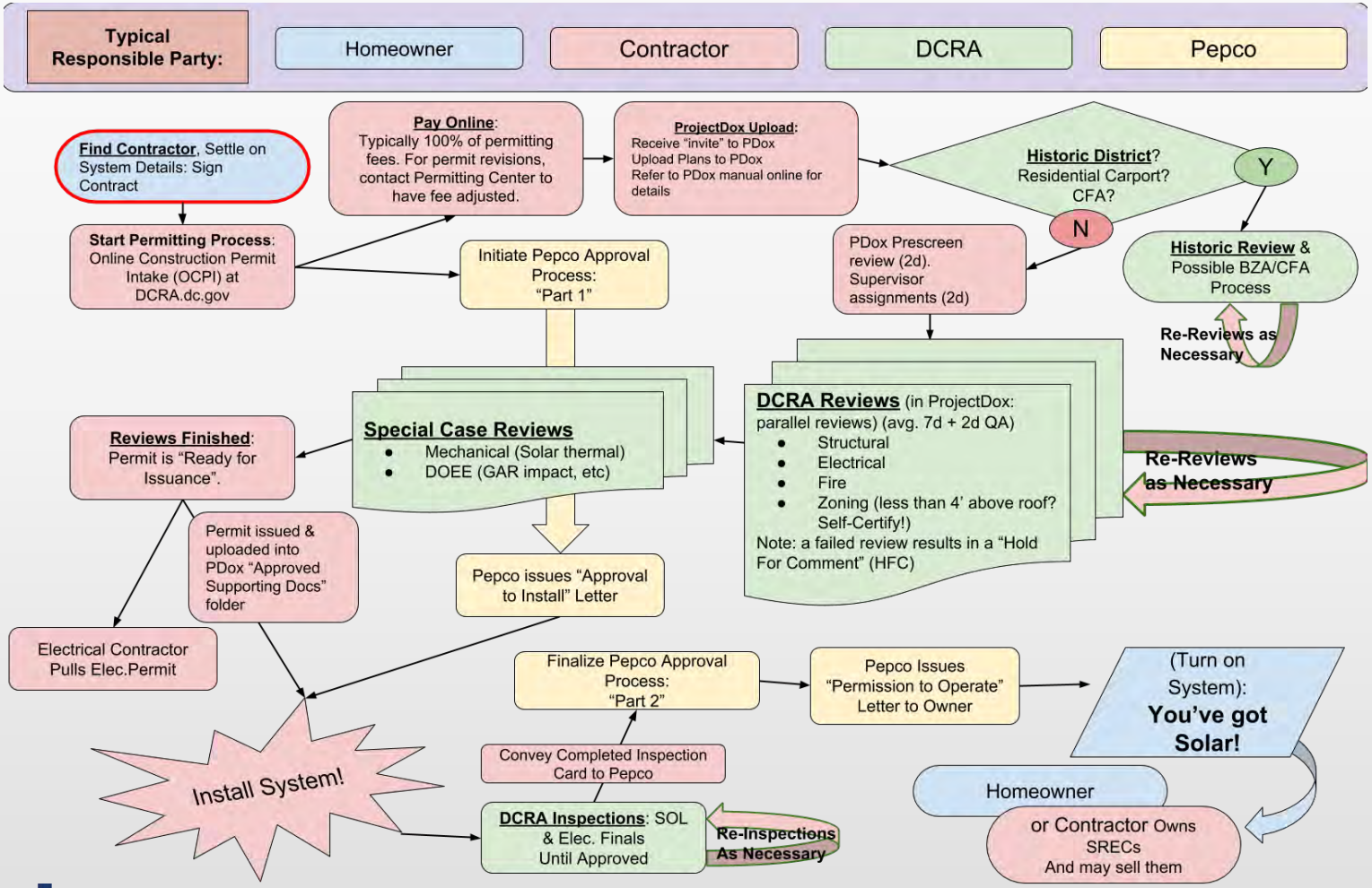
DC Solar Permitting Process



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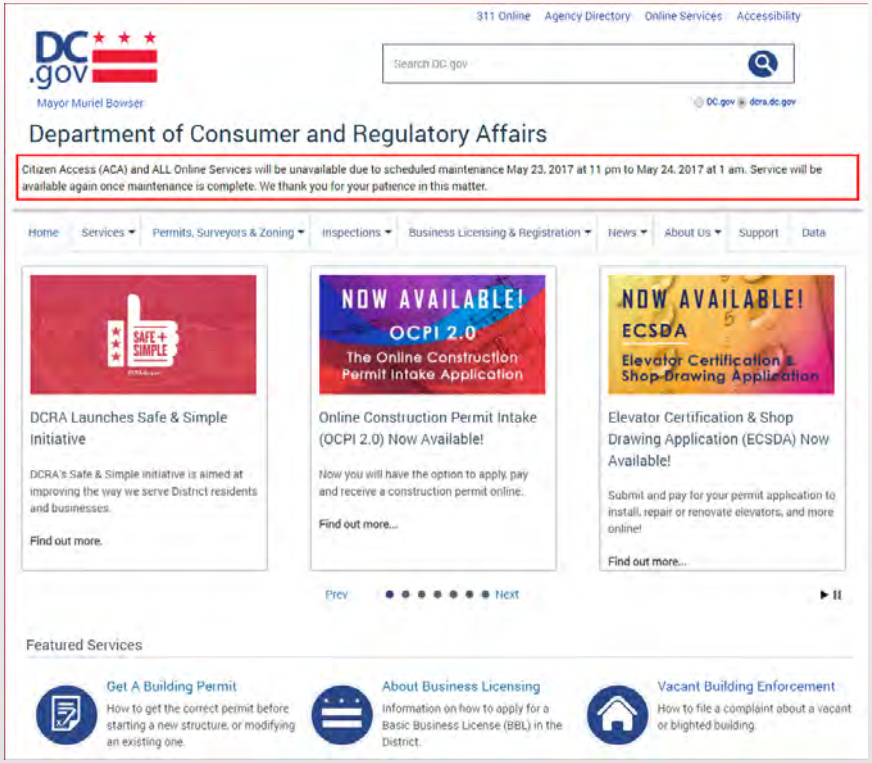
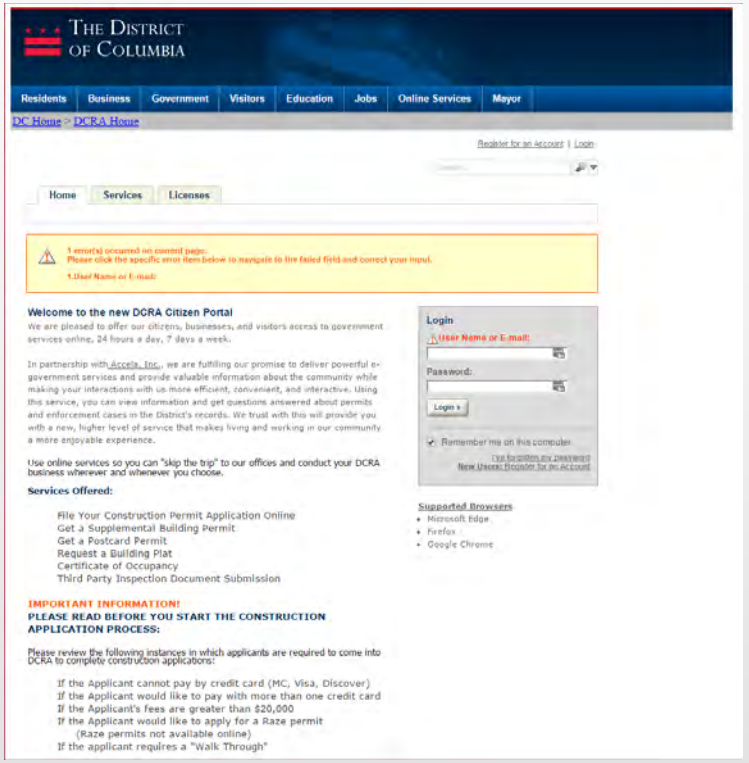
Online Construction Permit Intake
OCPI 2.0

Start the process, pay, and obtain your permit online!





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ProjectDox Electronic Document Submittal & Review

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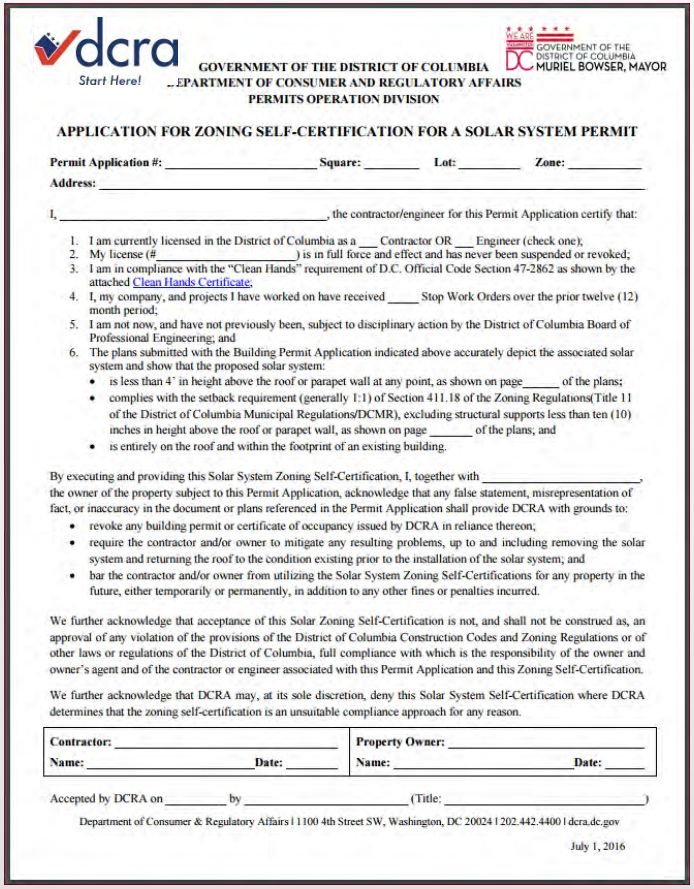
Application for Zoning Self-Certification for a Solar System Permit

Every system less than 4 feet above the roof or parapet wall should have a Solar Zoning Self-Certification included with their submitted documents.



dcra Start Here!

GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF CONSUMER AND REGULATORY AFFAIRS
PERMITS OPERATION DIVISION

WE ARE DC GOVERNMENT OF THE DISTRICT OF COLUMBIA MURIEL BOWSER, MAYOR

APPLICATION FOR ZONING SELF-CERTIFICATION FOR A SOLAR SYSTEM PERMIT

Permit Application #: _____ **Square:** _____ **Lot:** _____ **Zone:** _____

Address: _____

I, _____, the contractor/engineer for this Permit Application certify that:

1. I am currently licensed in the District of Columbia as a ___ Contractor OR ___ Engineer (check one);
2. My license (# _____) is in full force and effect and has never been suspended or revoked;
3. I am in compliance with the "Clean Hands" requirement of D.C. Official Code Section 47-2862 as shown by the attached Clean Hands Certificate;
4. I, my company, and projects I have worked on have received _____ Stop Work Orders over the prior twelve (12) month period;
5. I am not now, and have not previously been, subject to disciplinary action by the District of Columbia Board of Professional Engineering; and
6. The plans submitted with the Building Permit Application indicated above accurately depict the associated solar system and show that the proposed solar system:
   - is less than 4' in height above the roof or parapet wall at any point, as shown on page_____ of the plans;
   - complies with the setback requirement (generally 1:1) of Section 411.18 of the Zoning Regulations(Title 11 of the District of Columbia Municipal Regulations/DCMR), excluding structural supports less than ten (10) inches in height above the roof or parapet wall, as shown on page _____ of the plans; and
   - is entirely on the roof and within the footprint of an existing building.

By executing and providing this Solar System Zoning Self-Certification, I, together with _____, the owner of the property subject to this Permit Application, acknowledge that any false statement, misrepresentation of fact, or inaccuracy in the document or plans referenced in the Permit Application shall provide DCRA with grounds to:

- revoke any building permit or certificate of occupancy issued by DCRA in reliance thereon;
- require the contractor and/or owner to mitigate any resulting problems, up to and including removing the solar system and returning the roof to the condition existing prior to the installation of the solar system; and
- bar the contractor and/or owner from utilizing the Solar System Zoning Self-Certifications for any property in the future, either temporarily or permanently, in addition to any other fines or penalties incurred.

We further acknowledge that acceptance of this Solar Zoning Self-Certification is not, and shall not be construed as, an approval of any violation of the provisions of the District of Columbia Construction Codes and Zoning Regulations or of other laws or regulations of the District of Columbia, full compliance with which is the responsibility of the owner and owner's agent and of the contractor or engineer associated with this Permit Application and this Zoning Self-Certification.

We further acknowledge that DCRA may, at its sole discretion, deny this Solar System Self-Certification where DCRA determines that the zoning self-certification is an unsuitable compliance approach for any reason.

Contractor: _____	**Property Owner:** _____
Name: _____ **Date:** _____	**Name:** _____ **Date:** _____

Accepted by DCRA on _____ by _____ (Title: _____)

Department of Consumer & Regulatory Affairs | 1100 4th Street SW, Washington, DC 20024 | 202.442.4400 | dcra.dc.gov

July 1, 2016

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Tilt and Azimuth: How Much Does It Matter?

Difference in Output from Flat (kWh)						
	Azimuth					
	North	East	South East	South	South West	West
Tilt	0	90	135	180	225	270
0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	-4.3%	-0.1%	3.0%	4.3%	3.1%	0.0%
10	-9.4%	-0.5%	5.5%	7.8%	5.2%	-0.4%
20	-20.7%	-2.4%	8.5%	13.0%	8.6%	-2.6%
30	-31.6%	-5.6%	9.4%	15.8%	9.4%	-5.8%
40	-41.7%	-9.8%	8.1%	15.3%	8.1%	-10.1%
Find this at:		goo.gl/8s8sWp				

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Stormwater Management (SWM) and Green Area Ratio (GAR)

DEPARTMENT OF ENERGY & ENVIRONMENT

Photo credit: Oculus, Inc.

Stormwater Management

What are the triggers/requirements?

- **Major land-disturbing (MLD) activity**
  - Retain the first 1.2 inches of rainfall
    - On-site
    - Combination of on-site and off-site retention
  - Detention requirement to maintain peak discharge
    - 2-year storm to pre-development conditions (meadow standard used)
    - 15-year storm to pre-project conditions

- **Major substantial improvement (MSI) activity**
  - Retain the first 0.8 inches of rainfall
    - On-site
    - Combination of on-site and off-site retention
  - No Detention requirements

Stormwater Retention Volume

$$\mathbf{SWRv = P\ (Rv_I * \%I + Rv_C * \%C + Rv_N * \%N) * SA * 7.48 / 12}$$

- SWRv = Volume required to be retained on site (gal)
- P = Precipitation (in)
- Rv_I = 0.95 (runoff coefficient for impervious cover)
- Rv_C = 0.25 (runoff coefficient for compacted cover)
- Rv_N = 0.0 (runoff coefficient for natural cover)
- %I = % of site in impervious cover
- %C = % of site in compacted cover
- %N = % of site in natural cover
- SA = Surface area (square feet)

Green Area Ratio

What is it?

- A flexible green site design requirement established in 2013 that varies by zone.

Roof menu items may include…

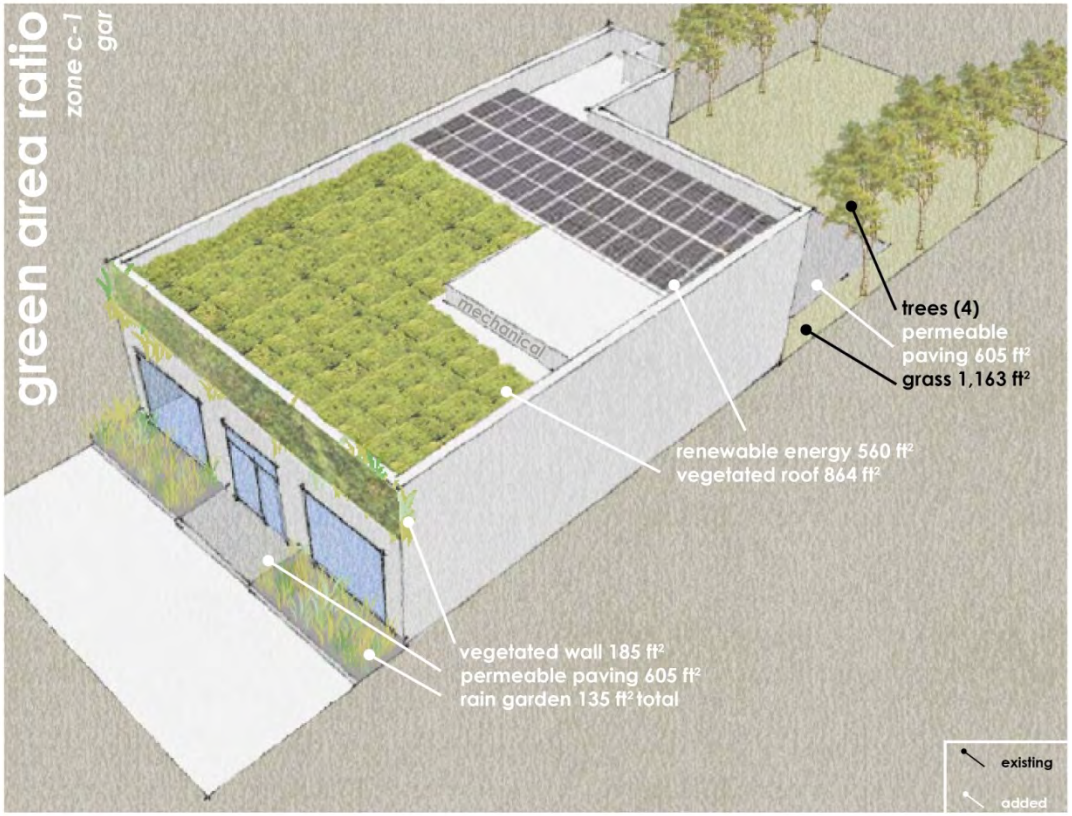
- Vegetated Roofs
- Native/non-native vegetation
- Renewable energy
- Bioretention planters
- Green facades
- Permeable pavement

GAR: Score Calculation

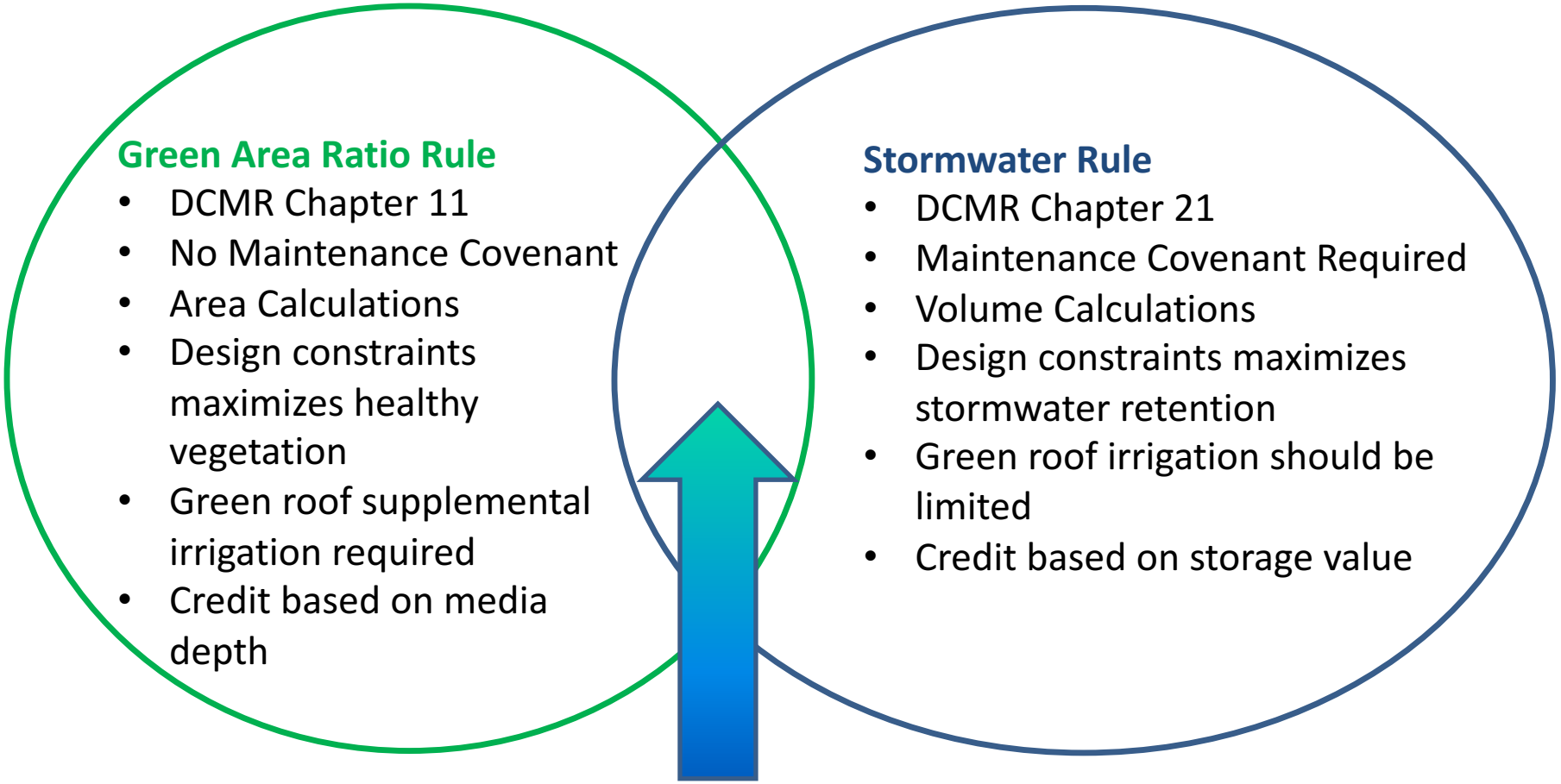
How to calculate:

- **Add up landscape elements by number or size**
  - # trees
  - Size of green roof
  - Size of rain garden
  - # of plants
  - Soil depths
- **Divide by lot area**
- **= GAR score**

$$GAR = \frac{(\text{area of landscape element 1 x multiplier}) + (\text{area of landscape element 2 x multiplier}) + \ldots}{\text{Lot Area}}$$



GAR & Stormwater Overlap



Overlap: to achieve stormwater environmental benefits
Landscape Elements often the same practices as LID BMPs

Green Roofs

GAR	SWM
Credited by surface area	Credited by retention volume
Depth = soil media only	Depth = soil media + retention/drainage layer
Container plantings over structure credited	Containers must meet stormwater guidelines
Plant type by soil media depth and irrigation provided	Plants need to resist and withstand drought, fire, wind, snow-loading, heat stress, etc.
Permanent irrigation needs dependent upon specified plant type and % coverage	No permanent irrigation on extensive roofs Storage volume for permanently irrigated intensive roofs reduced by half
Multiplier accounts for soil media + groundcover vegetation – Plants > 2-foot credited separately	Provide material specifications for each layer
Must follow SWM Guidebook feasibility, design, construction, and maintenance criteria, as well as applicable building codes	Follow ASTM specifications
Rooftop agriculture allowed, provided there is year-round plant coverage	Rooftop agriculture not permitted for retention credit at this time
Green roof below panels may receive full credit, must follow SWM 2017 Errata	

SWM:
Green Roof Design Criteria

Sizing Equation

$$Sv = SA\ [\ d * \eta_1\ ) + (DL * \eta_2\ )]/12$$

Sv = storage volume (cu. ft.)

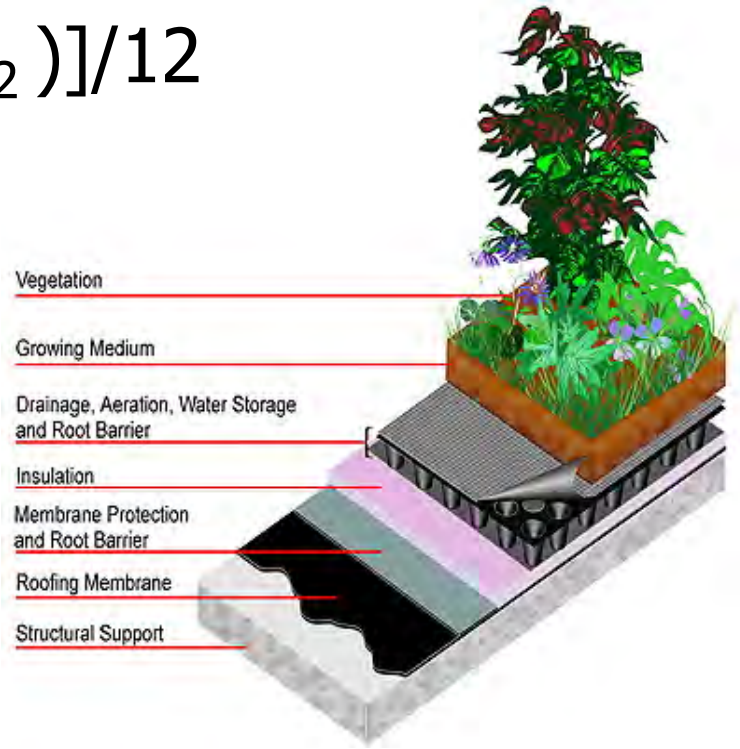
SA = green roof area (sq. ft.)

d = media depth (in.)

η_1 = media porosity (typically 0.25 but consult manufacturer specs)

DL = drainage layer depth (in.)

η_2 = drainage layer porosity (consult specific product specifications)



Retention Value = Sv = 100% of Storage Volume in Media and Drainage Layer

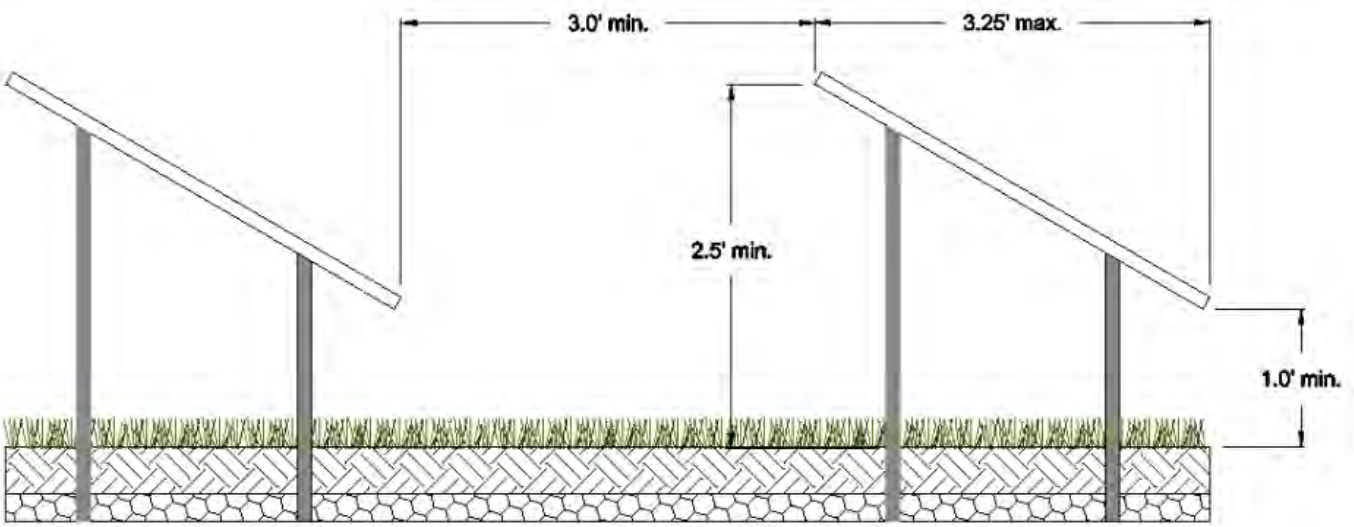
GAR:
Vegetated Roof Plant Coverage Guidelines

Vegetated roof coverage for plant species			Credited categories		
Soil media depth	**No permanent irrigation**	**Permanent irrigation**	**Native** (H1.)	**Groundcover** (B1.)	**Plant ≥ 2'** (B2.)
2–4" soil (C1 - Extensive)	Succulents Non-succulents (≤10% cover)	Succulents Non-succulents (≤10% cover)	30% max.	No (Included in green roof)	No
4–8" soil (C1 - Extensive)	Succulents-Grasses-Herbaceous Non-succulents (≤30% cover)	Succulents-Grasses-Herbaceous	50% max.		
8–12" soil (C2 - Intensive)	Succulents-Grasses-Herbaceous	Succulents-Grasses-Herbaceous - Small shrubs	100% max.		Yes
12–24" soil (C2 - Intensive)	Grasses-Herbaceous Succulents (≤10% cover)	Succulents-Grasses-Herbaceous-Shrubs			
24"+ soil (C2 - Intensive)		Succulents-Grasses-Herbaceous-Shrubs-Trees			

Renewable Energy Over Green Roofs

Accepted for GAR and SWM, provided:

- Meets minimum height clearance and spacing requirements
- Runoff is diverted to area under solar panels (SWM)
- Vegetation does not interfere with solar collection (GAR)
- May be re-examined as additional research becomes available



GAR: Renewable Energy

Solar photovoltaic and solar thermal credited for GAR only, no SWM benefits
Credit provided to area of array
Green roof below panels may receive full credit, must follow SWM 2017 Errata
Schematic plan for electrical or plumbing systems
Shall comply with applicable DCRA building codes

Minimum Submittal Requirements:

- Supplemental solar permit number
- Reference note on GAR plans listing all electrical, plumbing, mechanical, or other relevant solar sheets
- Schematic solar diagram and solar specifications
- Shading analysis

GAR: Roof Agriculture

GAR	SWM
Bonus element	No retention credit
Credit based on media depth and plant height	Considered impervious surface or compacted cover (≥ 6” depth)
Refer to GAR credits C1-C2, and B1-B3	

Stormwater Limitations:

- Require frequent irrigation
- Require additional nutrients
- Lack year-round coverage

Upcoming Trainings

- **Green Area Ratio**
  - Wednesday, July 25, 2018
- **Stormwater– General Compliance**
  - Wednesday, June 13, 2018
- **Using the Stormwater Database**
  - Tuesday, June 19, 2018
  - Thursday, July 26, 2018
- **Stormwater Retention Credit (SRC) Generation**
  - Thursday, June 14, 2018
  - Friday, July 27, 2018
- **SRC Financial Return Calculator**
  - Thursday, June 7, 2018
- **Specialized BMP Design and Maintenance**
  - Permeable Pavement: Thursday, June 21, 2018

Questions?

For additional information:

doee.dc.gov/swregs

doee.dc.gov/GAR

Questions and Answers

dcra