This presentation premiered at WaterSmart Innovations

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INNOVATIONS

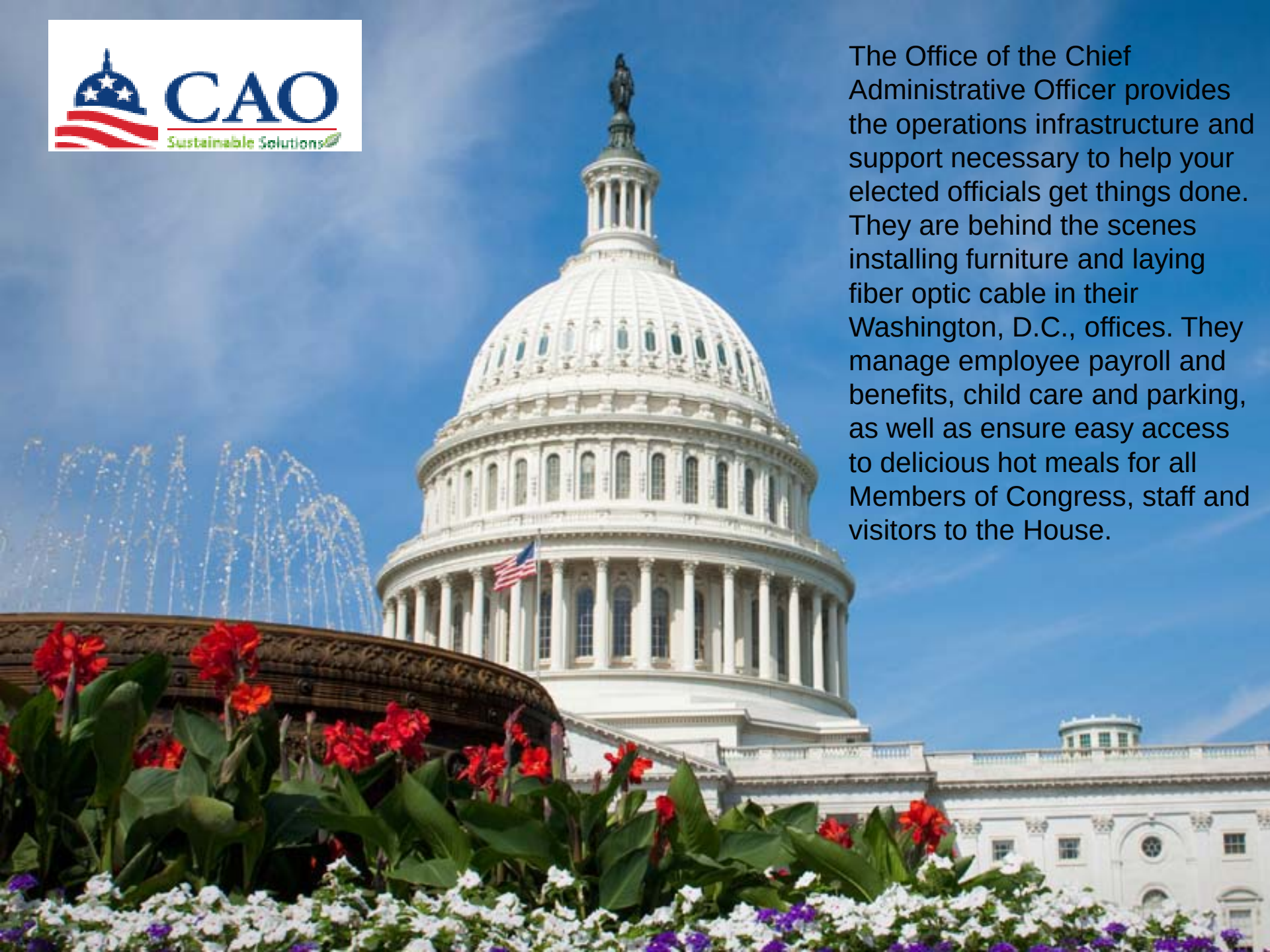
Green Roof at Cannon House Office Building

On March 1, 2007, the Speaker of the House Nancy Pelosi and the Majority Leader Steny Hoyer directed the Chief Administrative Officer of the House to develop a “Green the Capitol Initiative” that would demonstrate leadership to the nation by providing an environmentally responsible and healthy working environment for employees.

Paul E. Bassett LEED-AP
Director of Sustainability
Water Savers, LLC

EPA WaterSense PARTNER

Water Savers, LLC



The Office of the Chief Administrative Officer provides the operations infrastructure and support necessary to help your elected officials get things done. They are behind the scenes installing furniture and laying fiber optic cable in their Washington, D.C., offices. They manage employee payroll and benefits, child care and parking, as well as ensure easy access to delicious hot meals for all Members of Congress, staff and visitors to the House.

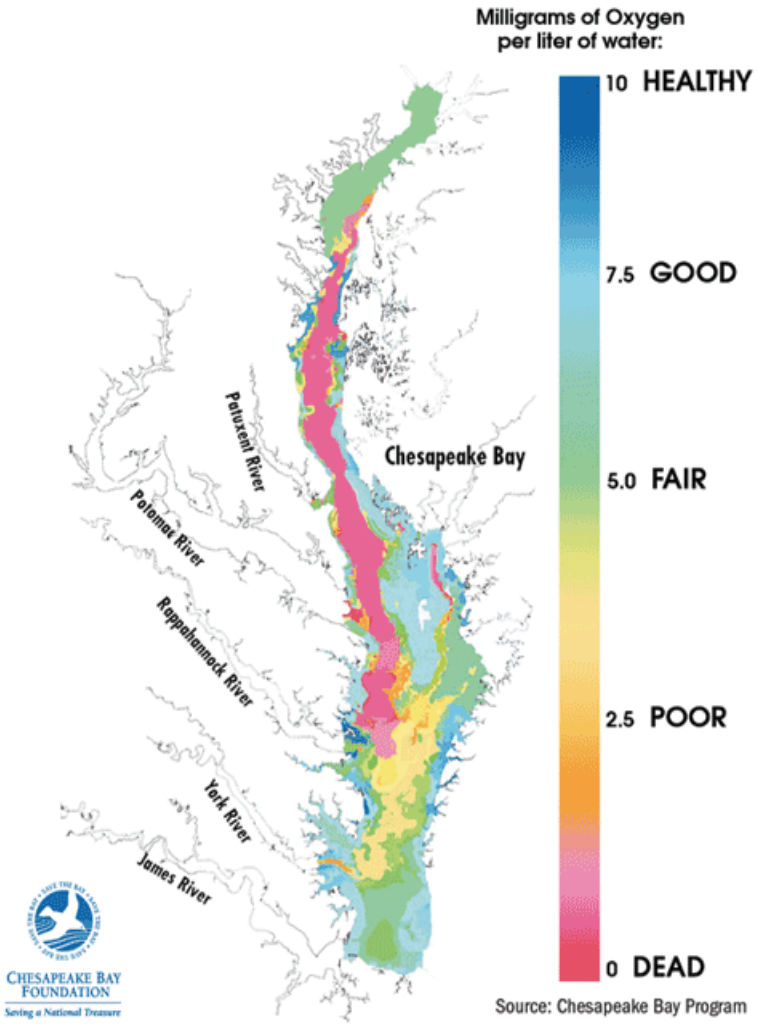
The Office of the Architect of the Capitol (AOC) is responsible to the United States Congress for the maintenance, operation, development, and preservation of 16.5 million square feet of buildings and more than 450 acres of land throughout the Capitol complex. This includes the House and Senate office buildings, the Capitol, Capitol Visitor Center, the Library of Congress buildings, the Supreme Court building, the U.S. Botanic Garden, the Capitol Power Plant, and other facilities. The AOC also provides professional expertise with regard to the preservation of architectural and artistic elements entrusted to its care, and provides recommendations concerning design, construction, and maintenance of the facilities and grounds.

The Chesapeake Bay Watershed

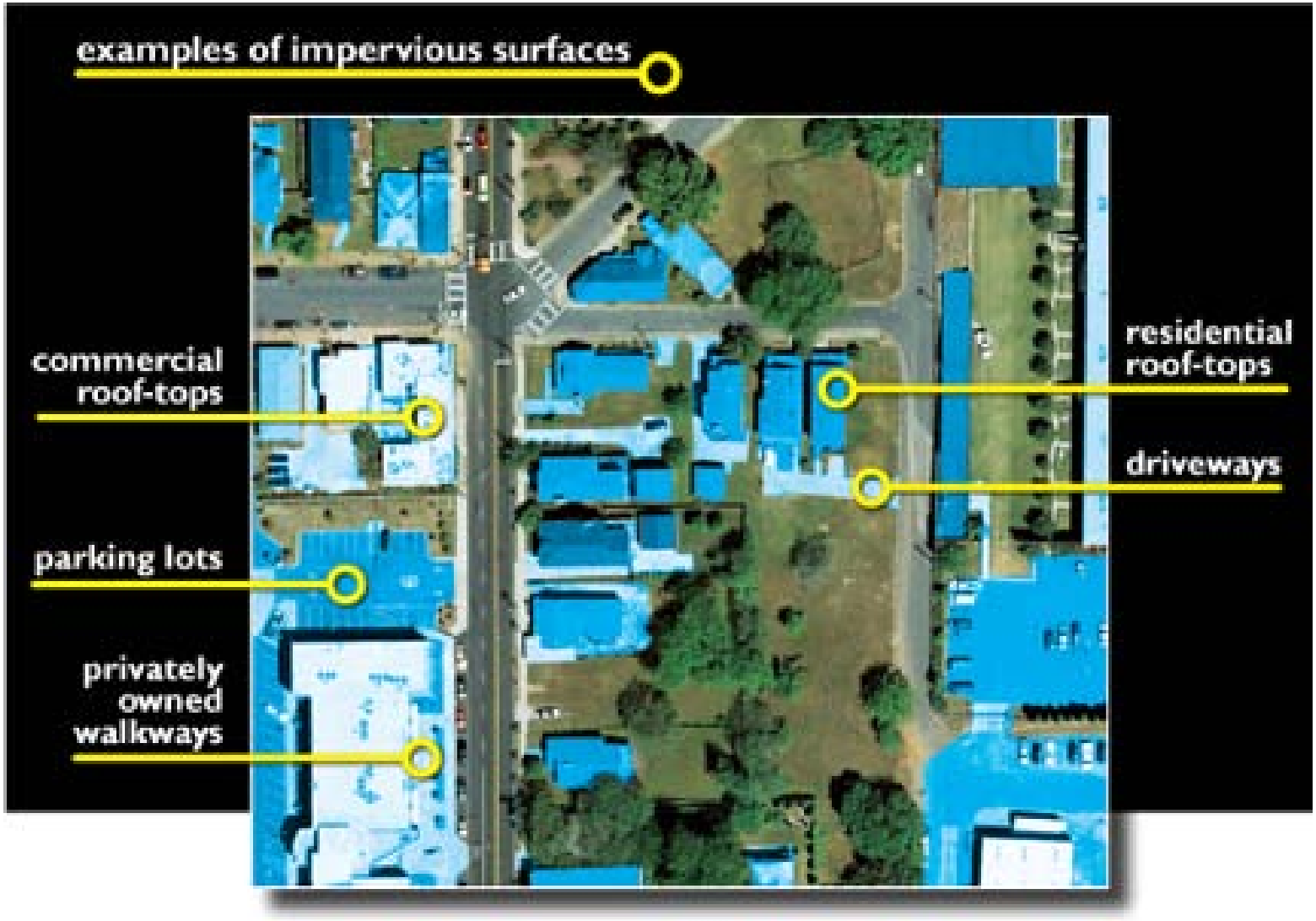
The Chesapeake Bay watershed (drainage basin) extends about five hundred miles north from Suffolk, VA (near Norfolk and Virginia Beach) to the headwaters of Otsego Lake, near Cooperstown, NY, and east from mountain streams near Blacksburg, VA to Berlin, MD (near Ocean City). It is essentially a giant, sprawling system of rivers that all drain into one shallow tidal basin, the Chesapeake Bay and its tidal tributaries (average depth, only 21 feet).

The Chesapeake after several days of heavy rains in the spring of 2005

Chesapeake Bay Dead Zone in Summer 2005



DC Water and Sewer Authority Impervious Surface Area Charge



What is the Impervious Surface Area Charge?

- DC WASA is implementing an impervious surface area charge to more equitably allocate the costs of the CSO Long Term Control Plan. The charge is based upon contribution to surface runoff from wet weather events.
- Impervious Surface Area is an area that does not allow water to easily penetrate, such as rooftops, sidewalks, paved driveways, patios, and parking lots.
- This cost is currently being recovered through a “volumetric”sewer charge.
- The amount of impervious area on each property will be determined from information contained in the District of Columbia’s Geographical Information System (DCGIS).
- Initially, all residential customers will be charged based upon one ERU (Equivalent Residential Unit): a simplified billing that represents a *typical house.*

–1 ERU = 1000 square feet of impervious surface.

–The WASA Board of Directors is exploring an incentive program for the future to recognize property owners that have implemented wet weather control techniques.

Comparison of Share of ERUs to Share of Water Consumption by Customer Category

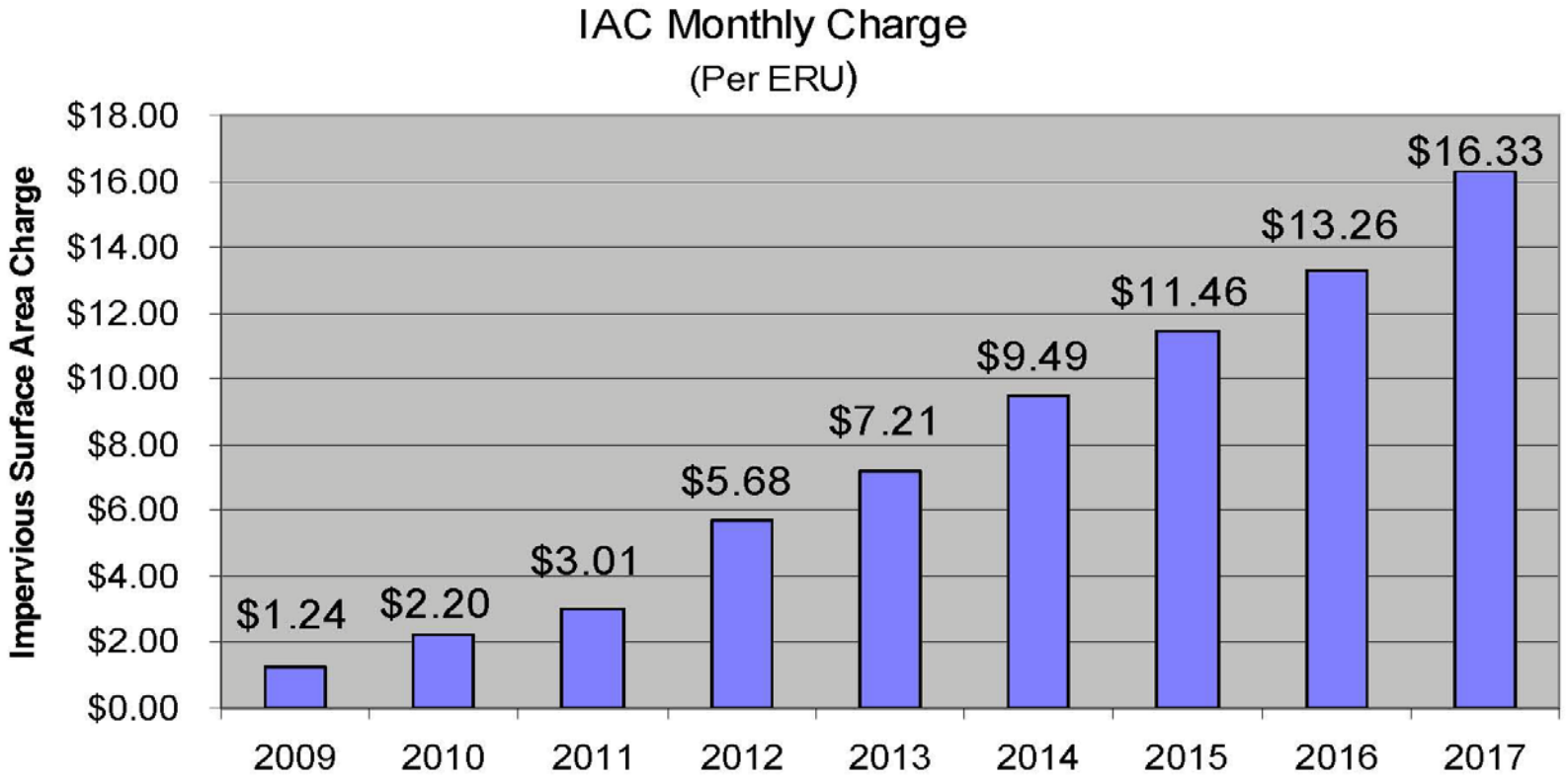
Category	Share of Equivalent Residential Units (%)	Share of Metered Water Consumption
Residential	24.4%	21.3%
Commercial	33.2%	33.0%
Multifamily	10.9%	20.7%
Federal	21.0%	16.9%
Municipal	6.7%	3.2%
DCHA	1.2%	2.9%
WASA	2.6%	2.0%
Totals	**100%**	**100%**

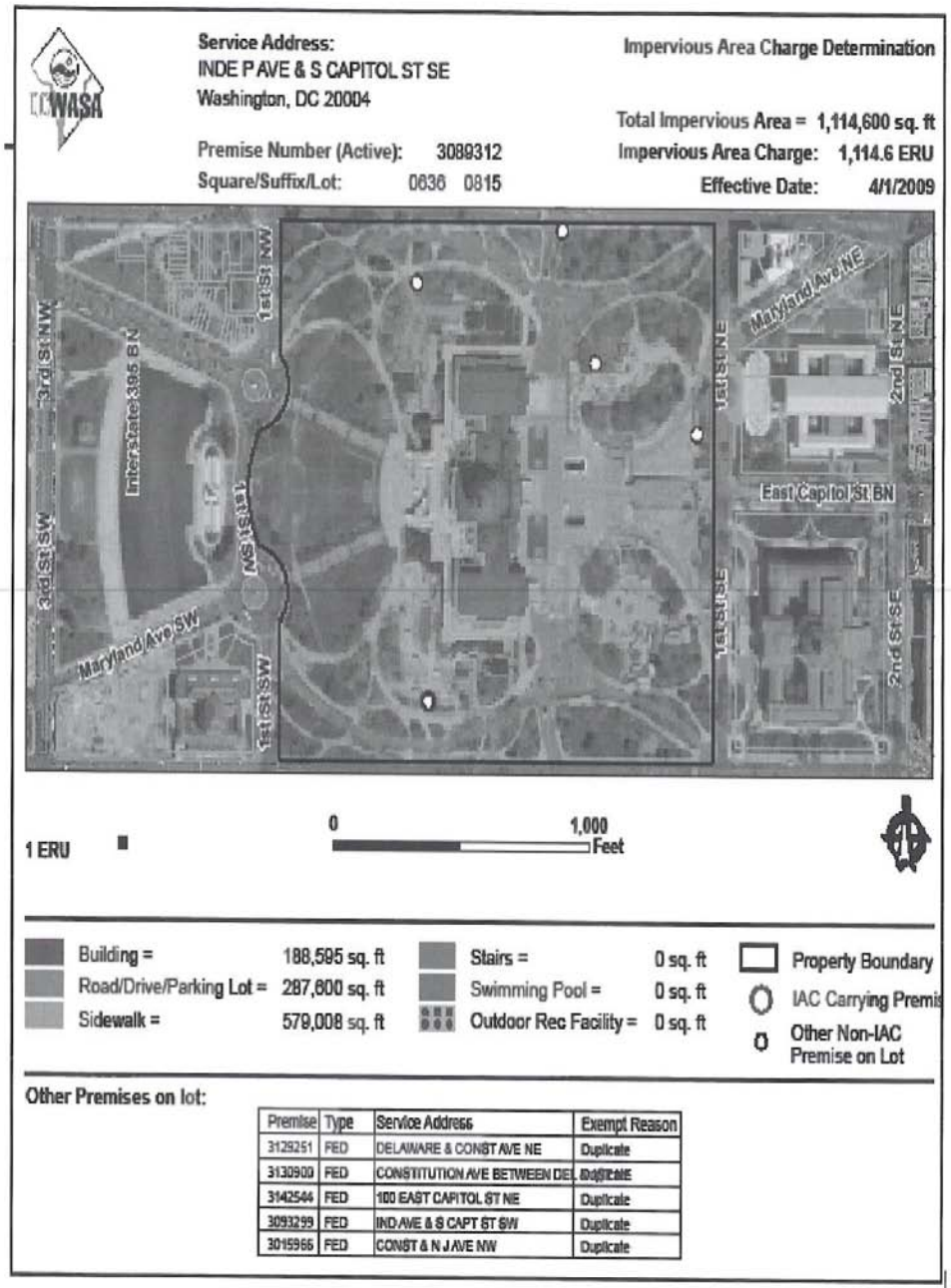
- The table compares the share of impervious area equivalent residential units to the metered water consumption for each customer category.
- An impervious area rate structure will cause a shift in the cost allocation between customer categories due to differences in their water use and the amount of impervious area.
  - Multi-family properties will see a major reduction in costs allocated to that group due to the high-density of the land use.
  - Federal properties will see a larger portion of costs allocated to them due to same reason as above.

Impervious Area Statistics

	SF Res	Non Res	TOTALS
Number of Premises to be Billed	104,285	27,610	131,895
Total Billing Impervious Area (sq. ft.)	125,759,654	310,929,129	436,688,783
Percent of Total Billing Impervious Area (%)	28.8%	71.2%	100%
Percent of Total Water Consumption (%)	21.3%	78.7%	100%
Mean Impervious Area per Billable Premise (sq. ft.)	1,206	11,261	3,269
Median Impervious Area per Billable Premise (sq. ft.)	981		

Projected Monthly Residential IAC Charge Per ERU

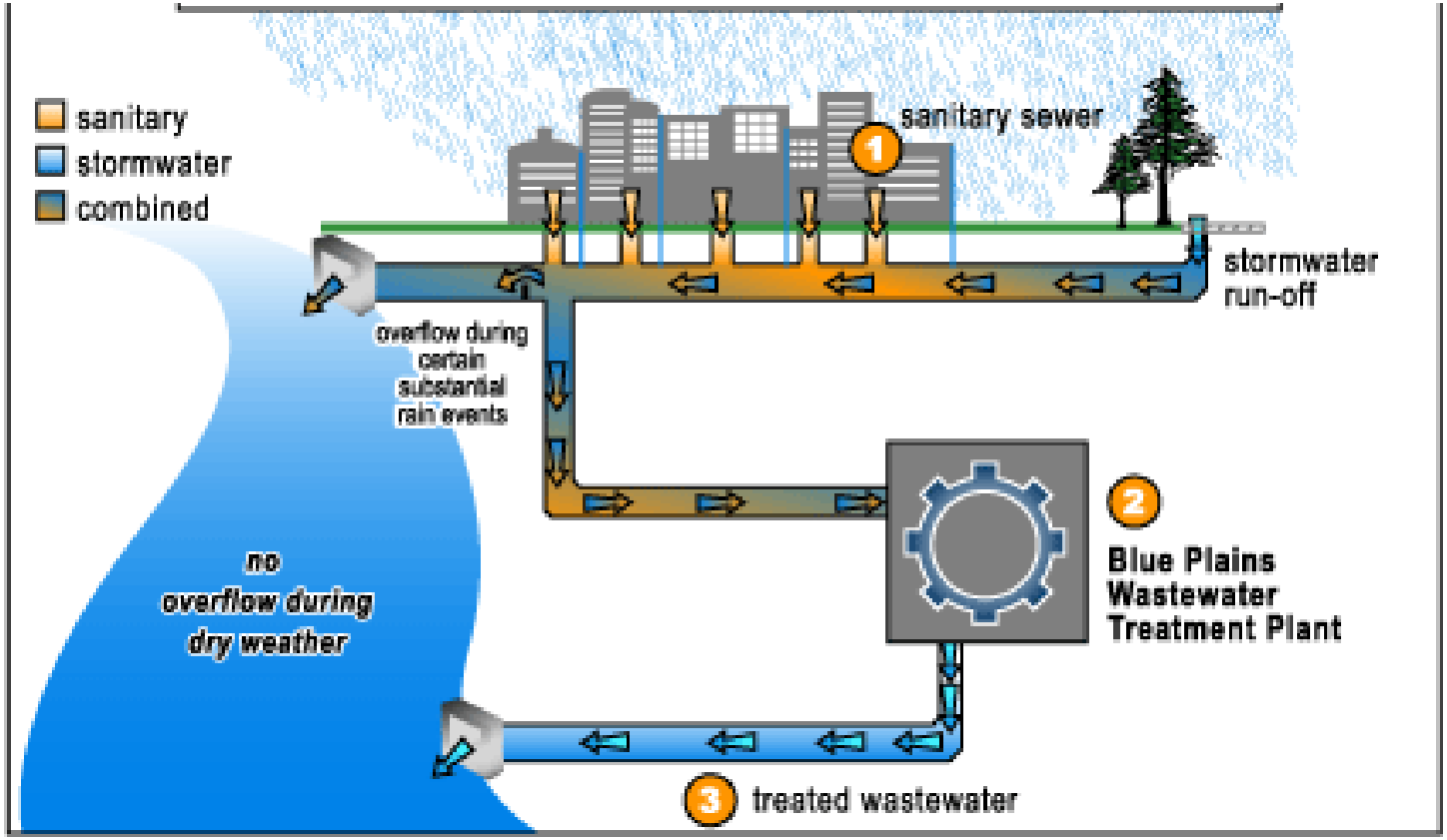




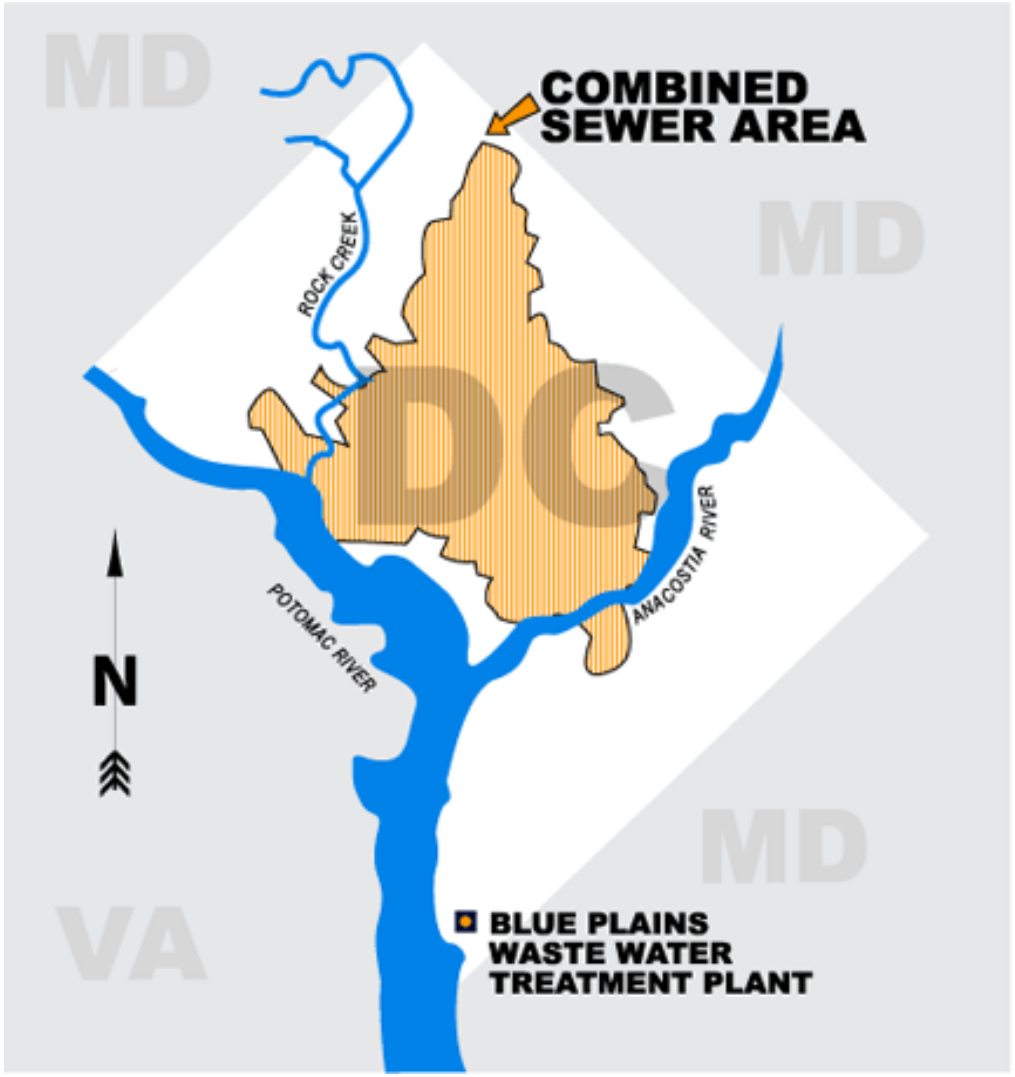
Impervious Area Monthly Charges for US Capitol Grounds				
Year	IAC Rate	Impervious Area	ERU	Total Charge
2009	$1.24	1,114,600	1114.6	$1,382.10
2010	$2.20	1,114,600	1114.6	$2,452.12
2011	$3.01	1,114,600	1114.6	$3,354.95
2012	$5.68	1,114,600	1114.6	$6,330.93
2013	$7.21	1,114,600	1114.6	$8,036.27
2014	$9.49	1,114,600	1114.6	$10,577.55
2015	$11.46	1,114,600	1114.6	$12,773.32
2016	$13.26	1,114,600	1114.6	$14,779.60
2017	$16.33	1,114,600	1114.6	$18,201.42

Impervious Area Monthly Charges for all Federal Property in DC				
Year	IAC Rate	Impervious Area	ERU	Total Charge
2009	$1.24	91,704,644	91704.644	$113,713.76
2010	$2.20	91,704,644	91704.644	$201,750.22
2011	$3.01	91,704,644	91704.644	$276,030.98
2012	$5.68	91,704,644	91704.644	$520,882.38
2013	$7.21	91,704,644	91704.644	$661,190.48
2014	$9.49	91,704,644	91704.644	$870,277.07
2015	$11.46	91,704,644	91704.644	$1,050,935.22
2016	$13.26	91,704,644	91704.644	$1,216,003.58
2017	$16.33	91,704,644	91704.644	$1,497,536.84

DC Combined Sanitary-Sewer System



Combined Storm-Sanitary Area Map



DC WASA Proposed Underground Stormwater Tunnels

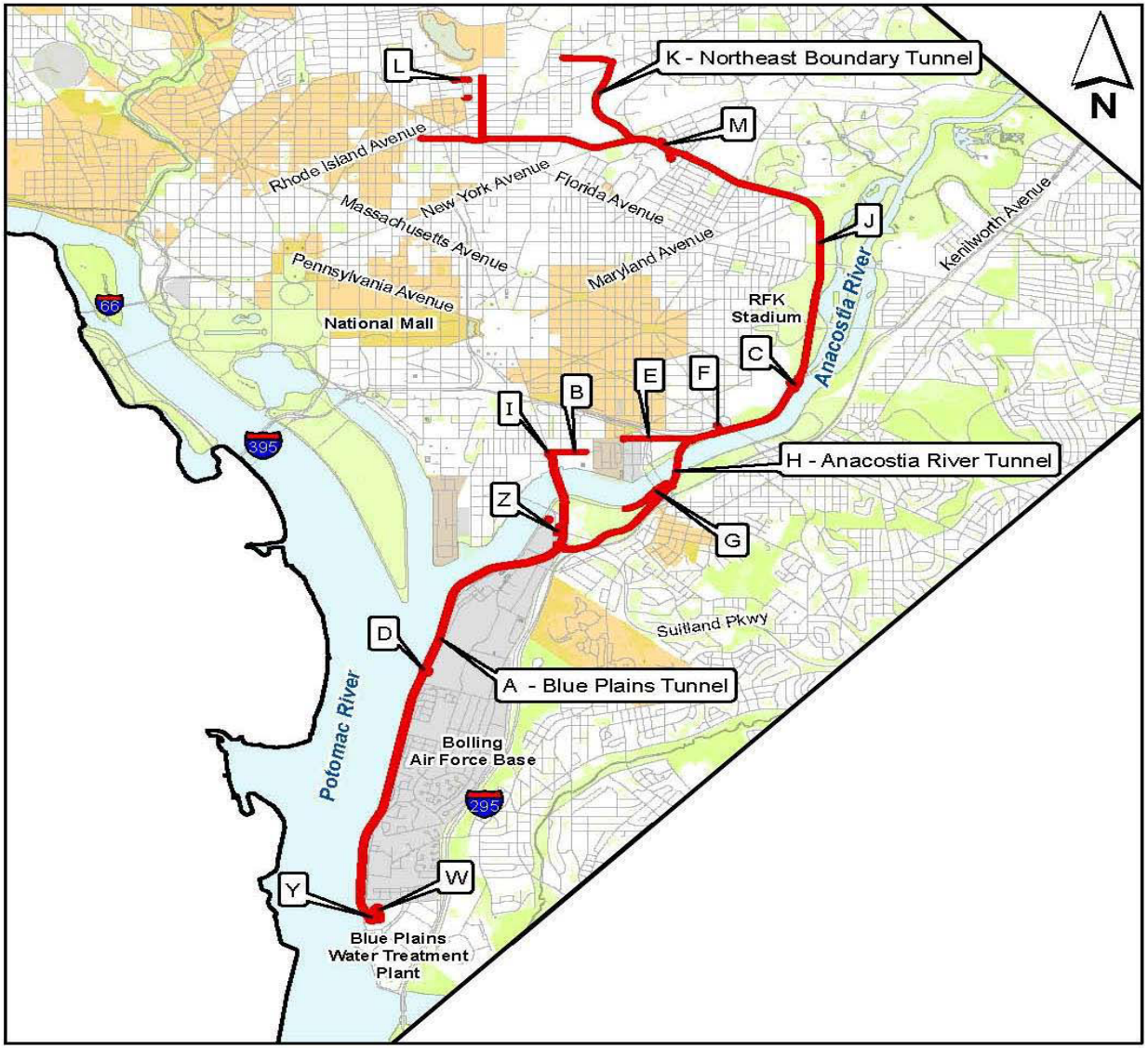


Figure 1:
Anacostia River Projects

Major Project Facilities & Contract Divisions

Legend

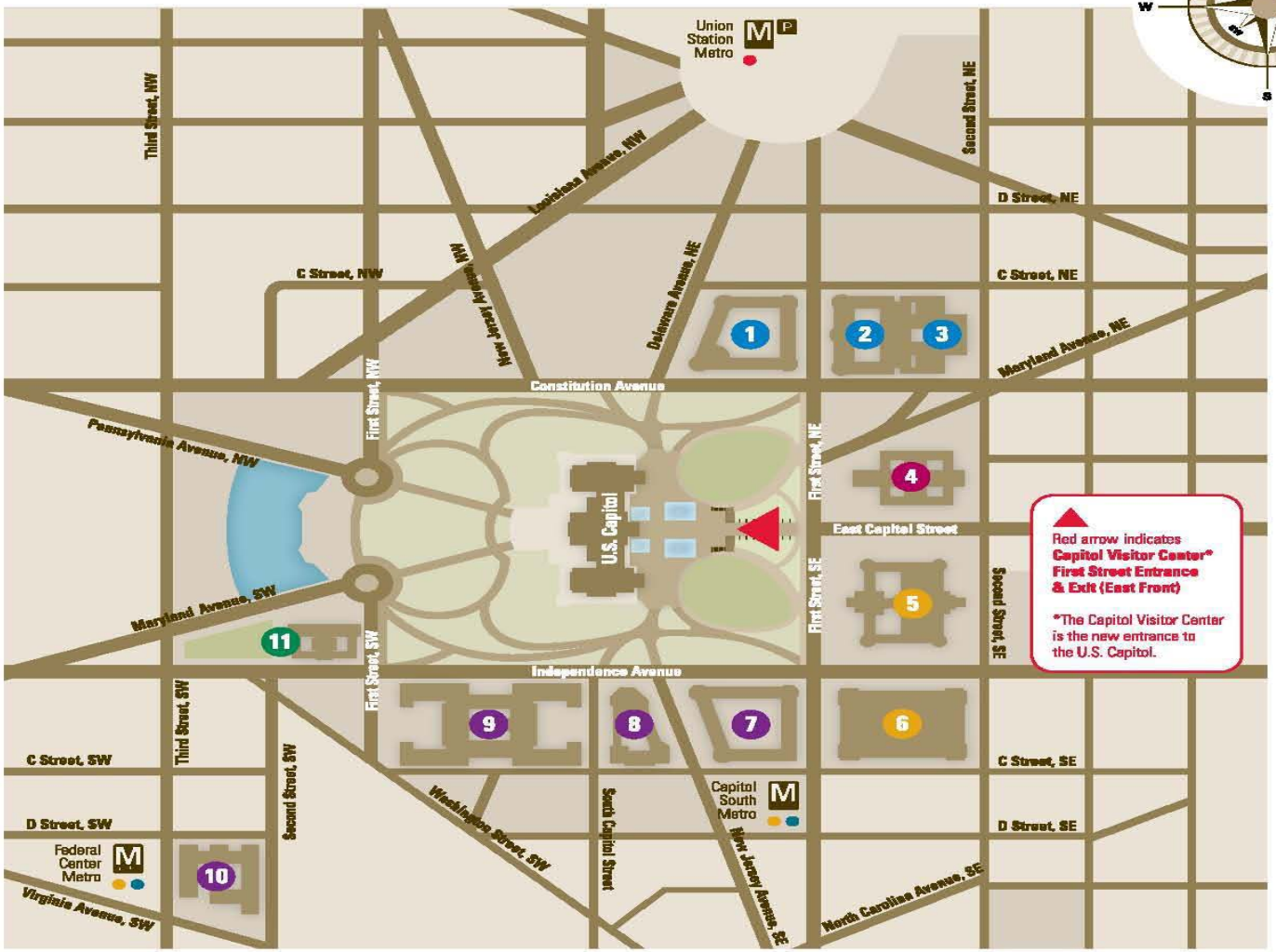
- Contract Divisions
- Road
- Water
- Parks & Forests
- Historic District
- Military Base

Scale: 1 in = 6,000 feet

0 3,000 6,000 12,000 Feet

Source: District Department of Transportation. 2009. *Street Centerlines, Sidewalks, Buildings, Parks.* Washington, DC.

U.S. CAPITOL COMPLEX

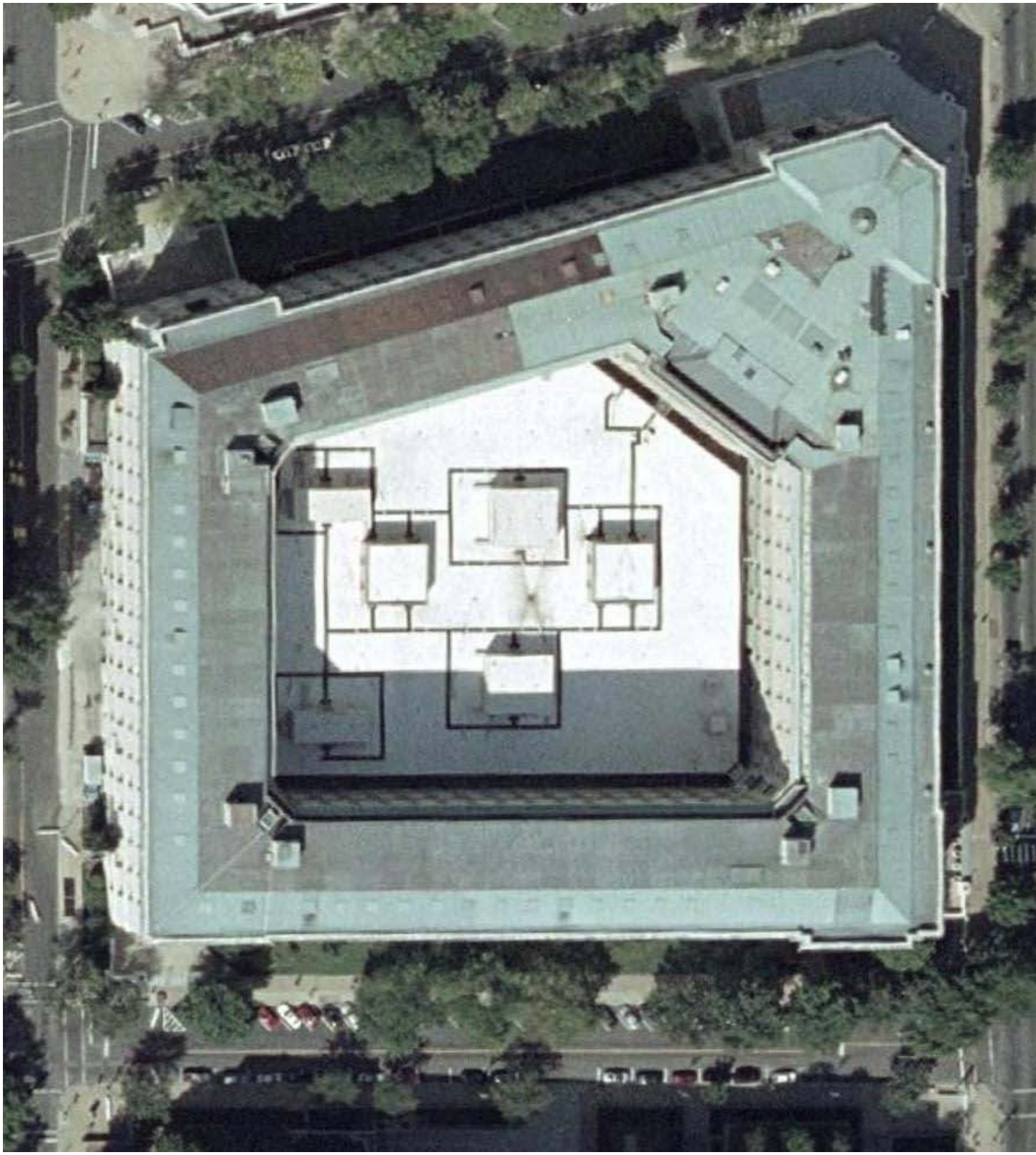


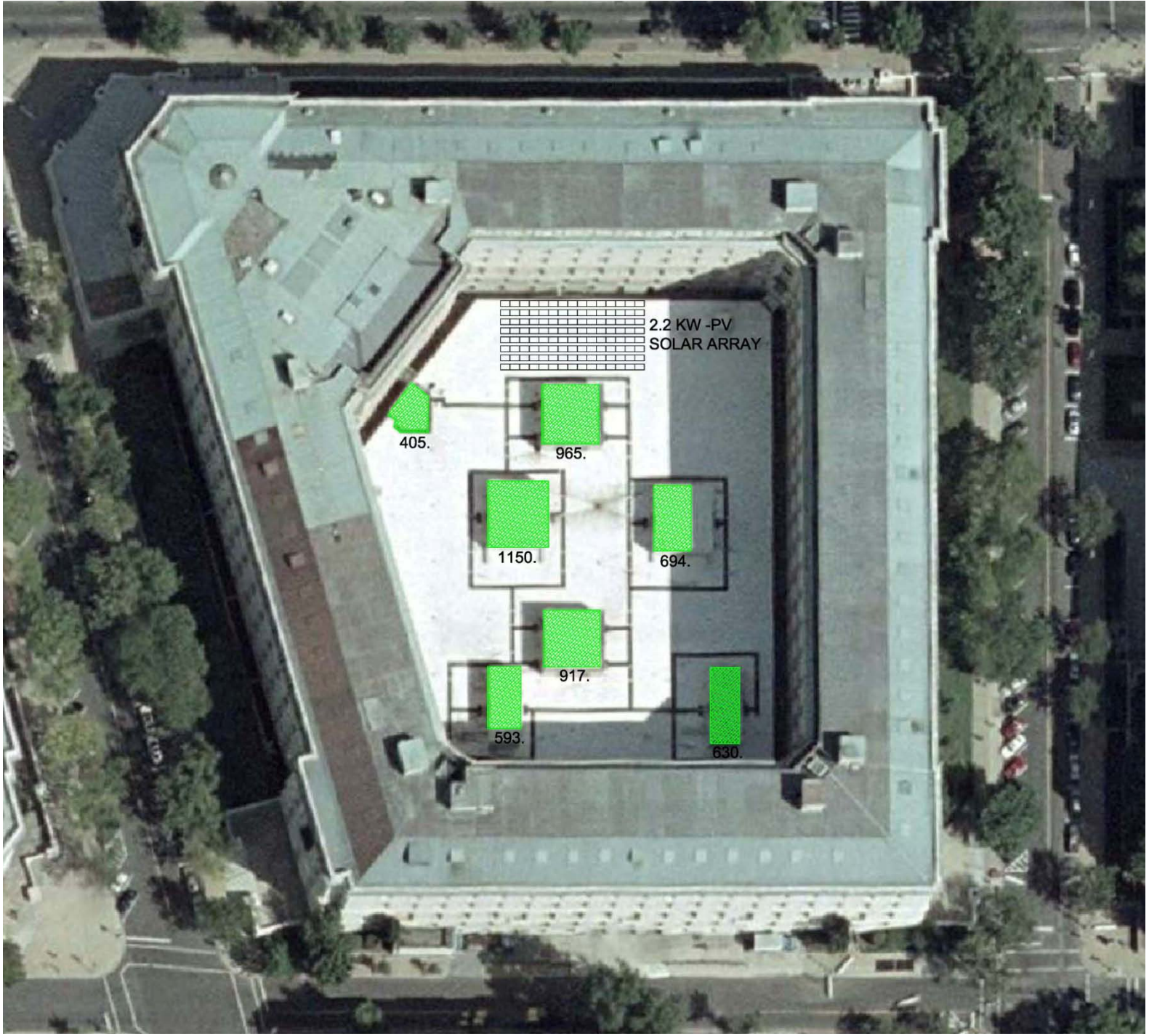
1. Russell Senate Office Building
2. Dirksen Senate Office Building
3. Hart Senate Office Building
4. U.S. Supreme Court
5. Jefferson Building, Library of Congress
6. Madison Building, Library of Congress
7. Cannon House Office Building
8. Longworth House Office Building
9. Rayburn House Office Building
10. Ford House Office Building
11. U.S. Botanic Garden & the National Garden

Cannon House Office Building

The Cannon House Office Building, completed in 1908, is the oldest congressional office building as well as a significant example of the Beaux Arts style of architecture. It occupies a site south of the Capitol bounded by Independence Avenue, First Street, New Jersey Avenue, and C Street S.E. The building was occupied by the 60th Congress on December 12, 1907. The House, by resolution, directed the Speaker to appoint a select committee of five members to arrange for distribution of rooms.

From White to Green




2.2 KW -PV
SOLAR ARRAY
405.
965.
1150.
694.
917.
593.
630.

Green Roof Terminology

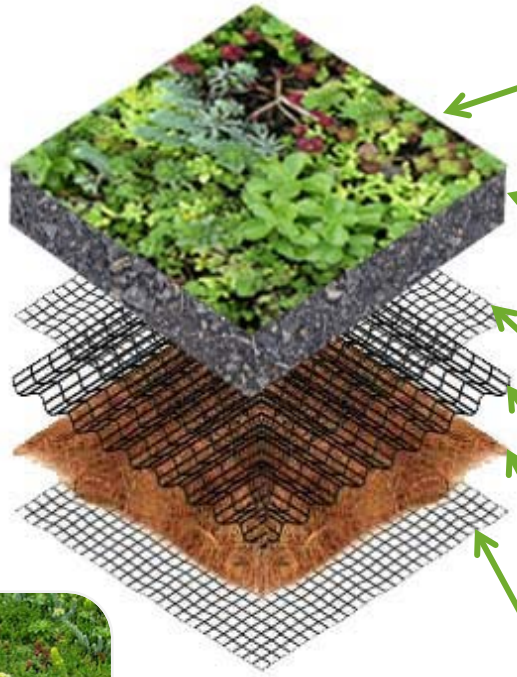
A green roof is a roof of a building that is partially or completely covered with vegetation and soil, or a growing medium, planted over a waterproofing membrane. This does not refer to roofs which are merely colored green, as with green roof shingles. It may also include additional layers such as a root barrier and drainage and irrigation systems. Also known as “living roofs,” green roofs serve several purposes for a building, such as absorbing rainwater, providing insulation, creating a habitat for wildlife, and helping to lower urban air temperatures and combat the heat island effect. There are two types of green roofs: intensive roofs, which are thicker and can support a wider variety of plants but are heavier and require more maintenance, and extensive roofs, which are covered in a light layer of vegetation and are lighter than an intensive green roof.

• **Intensive** roofs are ideally suited for locations that will receive little or no maintenance, or where structural capabilities are a concern. Recommended plants include sedum, herbs, grasses and other vegetation that can withstand harsh growing conditions. Extensive roofs only require a shallow growing media depth, generally as little as 3” - 4”, and therefore add little weight (typically 18-34 lb/sf wet weight) to the roof structure below.

•**Semi-Intensives** roofs a still considered a lightweight assembly, but with a slightly deeper soil depth, and designed to support sod lawns and perennials. Irrigation will depend on the plant choices and climate. Generally accessible by adjacent hardscape areas, such as a patio, design professionals now have the opportunity to create beautiful additional usable space on projects

•**Extensive** roofs incorporates plants that require regular maintenance, such as watering, fertilizing and mowing. The variety of plants possible is numerous, including sod grass lawns, perennial and annual flowers, shrubs, and even small trees.

Pre-vegetated Mats



Vegetation
Plant mix is customized for each project with respect to varying climate conditions and client specifications. Please see WMI plant list for recommended plant cuttings to select from.

Soil Medium
1 inch deep, 50% expanded shale aggregate, 20% crumb rubber (100% recycled tires), 10% organic composted material, and 20% USDA sand.

Top Net
Polypropylene
Approx weight: 8.0 lbs/1,000 sq. ft.

Center Net
Polypropylene, corrugated
Approx weight: 24.0 lbs/1,000 sq. ft.

Coconut Fiber
Approx weight: 0.50 lbs/sq. yd.

Bottom Net
Polypropylene
Approx weight: 8.0 lbs/1,000 sq. ft.

Total System Saturated Weight: 7.2 lbs/ sq. ft.

Pre-vegetated Trays

- Cost Effective
- Light Weight Composition
- Unlimited Drainage
- Low Maintenance
- Encourages Unrestricted Plant Growth
- Eliminates Potential for Root Bound Plants
- Easily Moved for Membrane Access
- Designed for up to a 4:12 Pitch Roof Angle
- Ease and Flexibility of Installation

Tray Saturated Weights

2.5-inch module =	11-13 pounds per sq. ft. (wet)
Standard 4-inch module=	18-22 pounds per sq. ft. (wet)
New G3 4-inch module =	21-25 pounds per sq. ft. (wet)
8-inch module=	36-44 pounds per sq. ft. (wet)

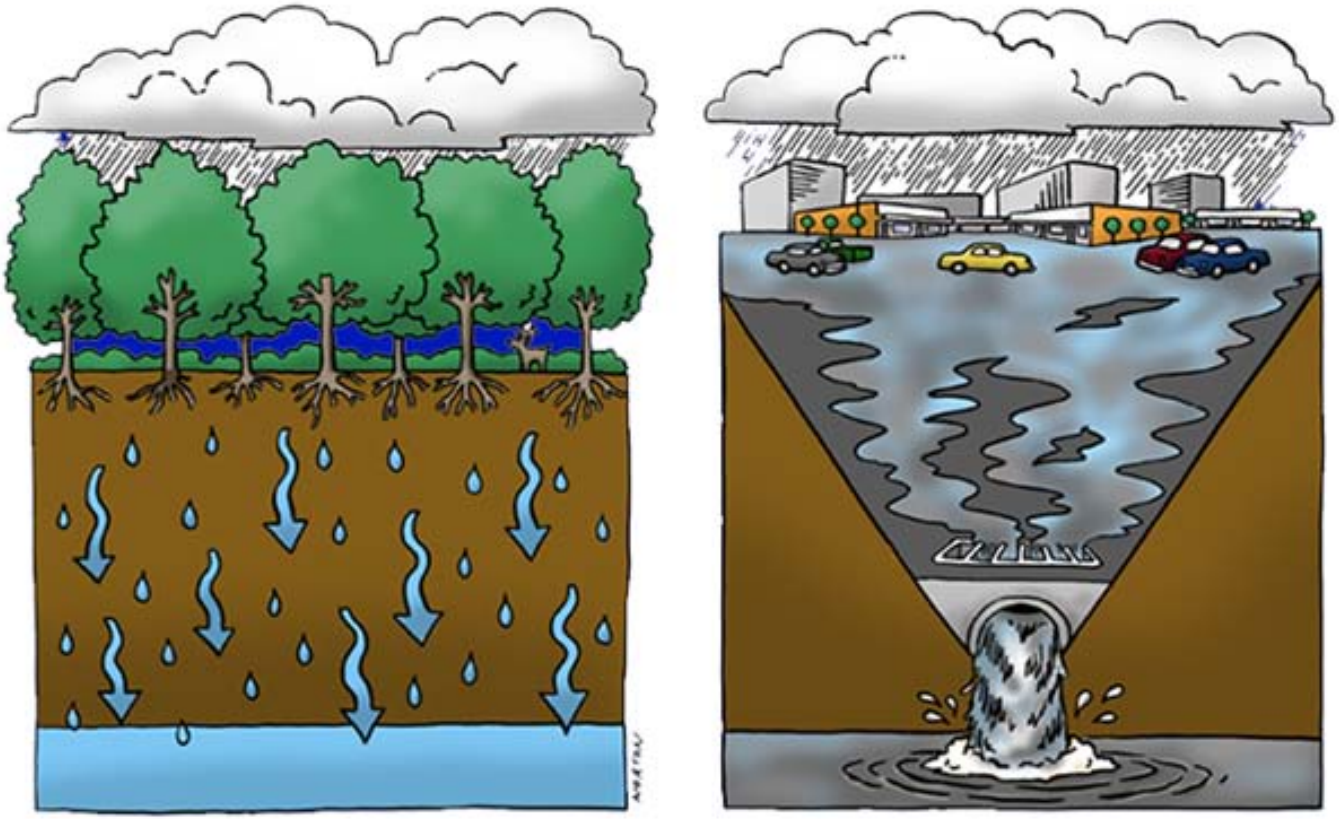
Built-up (Semi-Intensive)

Features:

- Require greater growing media depths 6”-24”
- Can be used for recreation
- Accommodate a wider variety of plants/shrubs/trees
- Require regular maintenance

Land or buildings can be a green filter…

…or it can be a gray funnel



Paul E. Bassett LEED-AP
Director of Sustainability
pbassett@thewater-savers.com
www.thewater-savers.com

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