Incorporating Green Infrastructure & Sustainable Design

2023 Capital Improvements Design & Construction Seminar

ACEC San Antonio

February 14, 2023

Douglas Melnick, CoSA, Chief Sustainability Officer

What is Green Infrastructure & Sustainable Design?

Green infrastructure filters and absorbs stormwater where it falls. It is "the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater and reduce flows to sewer systems or to surface waters." (EPA)

Low Impact Development (LID) is a sustainable land planning and design approach that manages stormwater on site. It is a set of tools specifically created to mitigate the pollutants and other unhealthy components of stormwater runoff. (SARA)

Sustainable Design seeks to reduce negative impacts on the environment, and the health and comfort of building occupants, thereby improving building performance. The basic objectives of sustainability are to reduce consumption of non-renewable resources, minimize waste, and create healthy, productive environments. (GSA)

Types of Green Infrastructure

Rain Gardens

Infiltration Basins

Cisterns

Green Roofs

Permeable Paving

Blue Roofs

Sustainable Design

Sustainable design principles include the ability to:

- optimize site potential;
- minimize non-renewable energy consumption;
- use environmentally preferable products;
- protect and conserve water;
- enhance indoor environmental quality; and
- optimize operational and maintenance practices.

- The planning, design, construction, and operations of buildings with several central, foremost considerations: energy use, water use, indoor environmental quality, material section and the building's effects on its site.

Paris Climate Agreement

On June 22, 2017, City Council passed Resolution No. 2017-06-22-0031R in support of the Paris Climate Agreement, directing city staff to develop a plan to help San Antonio meet the objectives of this agreement.

After extensive public input, City Council adopted the SA Climate Ready Plan by Ordinance 2019-10-17-0840 on October 17, 2019.

President Biden rejoined the accord on January 20, 2021.

United Nations Climate Change

Office of Sustainability

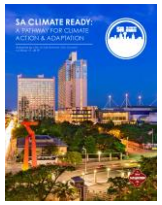
CoSA's Commitments

- Climate equity
- Carbon neutral by 2050
- Climate adaptation
- Reporting requirements

Paris Climate Agreement
Dec 12, 2015

SA Tomorrow Adopted
Aug 11, 2016

SA City Council Resolution in Support of Paris Climate Agreement
Jun 22, 2017

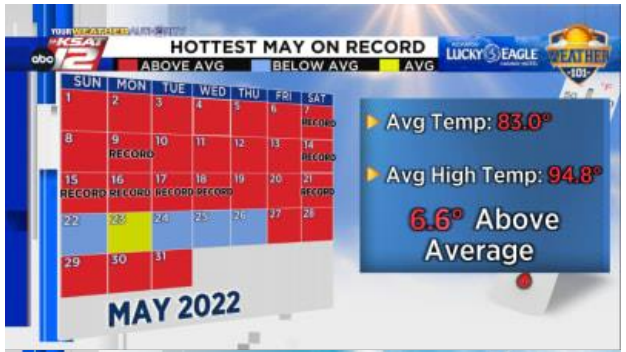


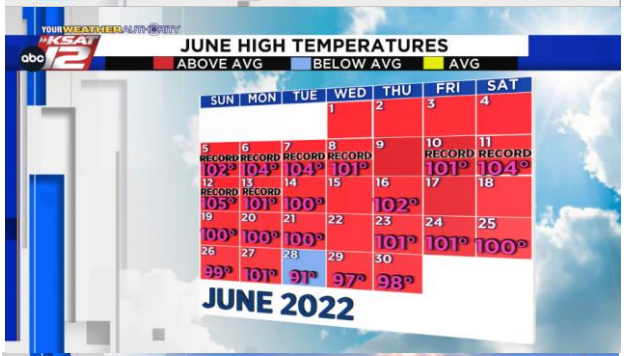
SA City Council Adopts CAAP
Oct 17, 2019

President Biden rejoins Paris Climate Agreement
January 30, 2021

Carbon neutral by 2050

Climate Trends and Design Considerations





	Low Emissions Pathway	High Emissions Pathway
Summer Maximum Temperature	+6°F	+10°F
Hot Days (Maximum Temperature >100 °F)	+48 days	+94 days
Warm Nights (Minimum Temperature >80 °F)	+10 nights	+55 nights
Annual Precipitation	-3 inches	-4 inches

Based on 2018 Data

- ✓ Increased flooding
- ✓ Increased extreme storms
- ✓ Increased cold weather events

Unified Development Code (UDC)

- The UDC update was adopted by City Council on November 3, 2022
- The following OS amendments were included in the approval:

UDC Section	Subject	Summary of Amendment
Division 3	Statement of Purpose	Adds language to Division 3-Landscaping and Tree Preservation, Statement of Purpose related to tree and plant species adapting to climate change and carbon sequestration.
35-A101	Definitions	Adds new definitions for "embodied carbon", environmental product declaration (EPD)", and "low carbon materials" to Appendix A.
35-526(f)	Environmental Product Declarations	Adds language related to encouraging use of permeable, reflective materials, as well as Environmental Product Declarations (EPDs). Adds language to the Lighting section requiring dark-sky lighting for new parking lots.
35-523	Statement of Purpose	Adds language related to the role of tree canopy in mitigating climate change, Urban Heat Island (UHI) and equity.
35-523(m)(7)	General Planting Standards	Adds requirements for soil suitability for planting landscaping materials.
35-506	Transportation & Stret Design	Adds language to Statement of Purpose incorporating Urban Heat Island and EPD Language. Adds language to Street Lights requiring dark-sky lighting for new streetlights. Adds language to pavement standards encouraging permeable and reflective pavement. Adds language to sidewalk standards encouraging low-carbon materials.
35-398(b)	Renewable Energy Systems	Clarifies language in existing solar array and add new language for additional solar typologies: rooftop solar (35-398 (c)) and solar canopies (35-398(d)).
35-105(b)(9)	SA Climate Ready Plan	Adds the SA Climate Ready Climate Action and Adaptation Plan to the list of Council-Approved Master Plans.

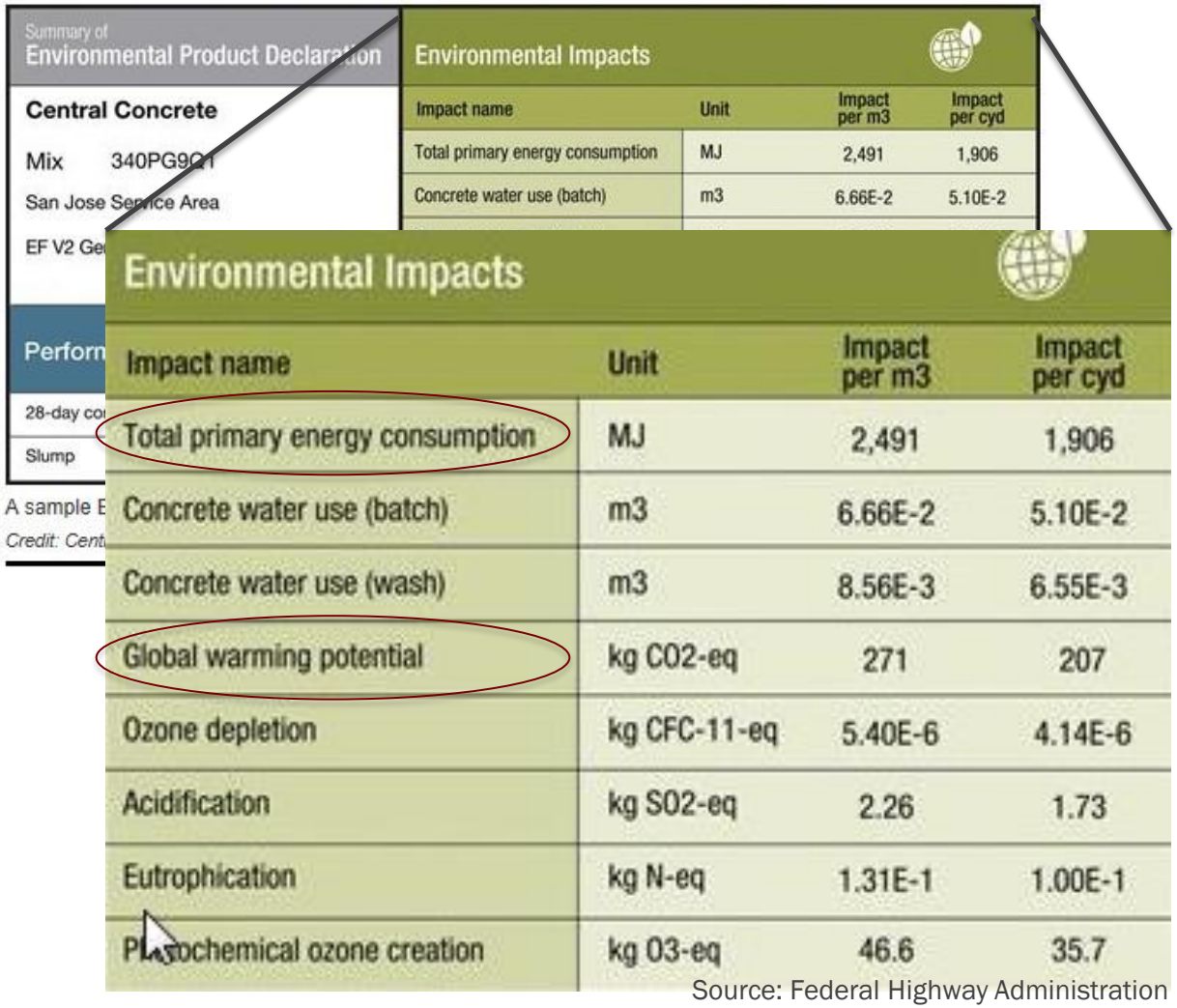
Amendment 18-2

Added language to Definitions & Rules of Interpretation:

- **Embodied carbon**
  - Carbon **emissions associated with materials and construction processes** throughout the whole lifecycle of a building or infrastructure
  - Examples include material extraction, transport to manufacturer or site, manufacturing, deconstruction

Source: Carbon Leadership Forum

Amendment 18-2

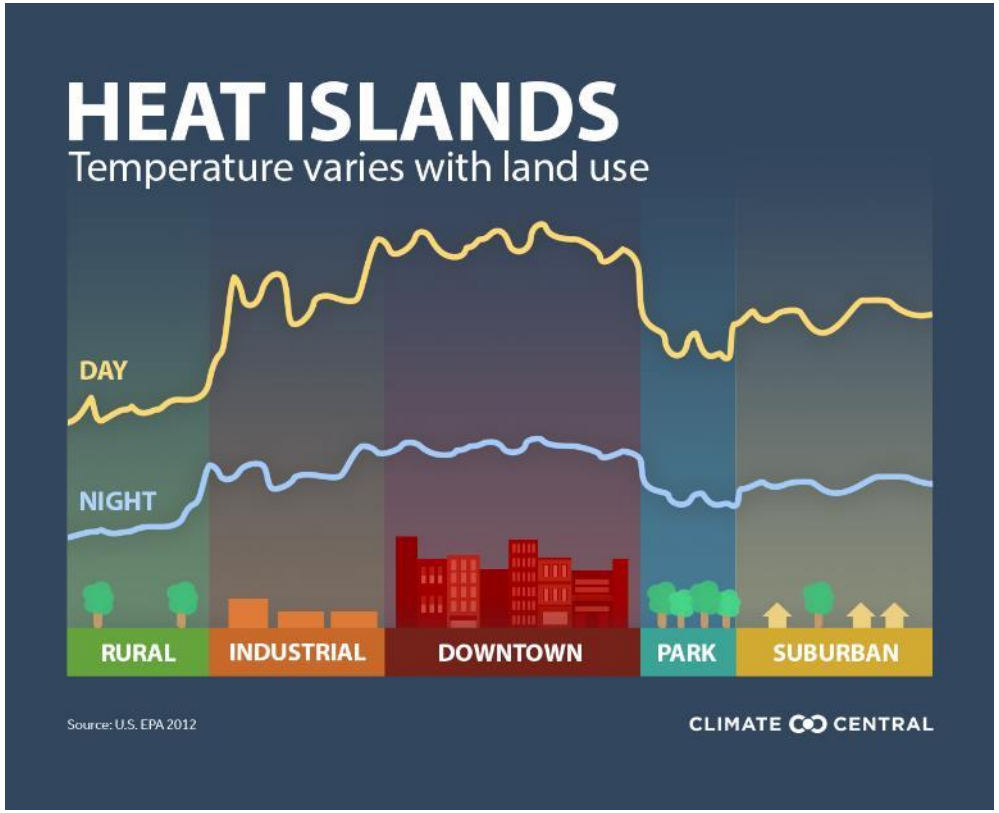


Source: Federal Highway Administration

Added language to Definitions & Rules of Interpretation:

- Environmental Product Declaration
  - A report that summarizes the life cycle of a product in a single, comprehensive report.
  - A 3rd party verified "nutrition label" for building and street products
  - BuildingTransparency.org

Amendment 18-3



Sec. 35-526 – Parking & Loading Standards

- **(f) Construction & Maintenance**
  - **(1) Drainage and Surfacing**
  - *Areas shall be properly graded for drainage, surface with concrete . . . and may utilize permeable materials and/or green infrastructure*.
  - *Cool pavement or reflective surfaces with a solar reflectivity of at 33% is encouraged*.

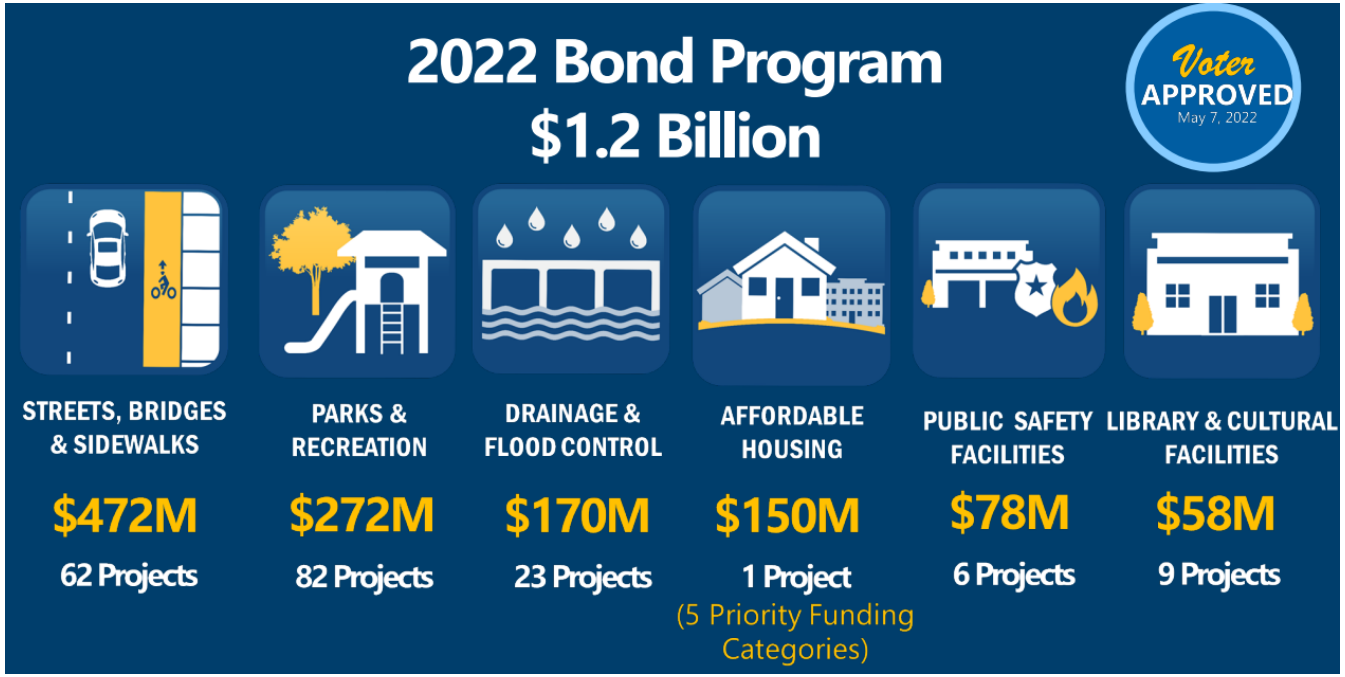
2021 IECC – EV Ready

- **Residential Electric Vehicle Ready Requirements per R410**
  - This section applies to detached one- and two- family dwellings and townhouses three stories or less in height above grade plane.
  - R410.1 Electric vehicle capable. One- and two- family dwellings, townhouses three stories or less with a garage shall have a dedicated 40amp/240volt single receptacle for EV use.
  - Exception: Properties without a garage.
- **Commercial Electric Vehicle Capable Requirements per C409.2**
  - **Number of parking spaces.**
    - The reserved capacity shall be capable to support 5% of the total required parking spaces.

2021 IECC – Solar Capable

- **Photovoltaic (PV) Capable per R409**
  - This section applies to detached one- and two- family dwellings and townhouses three stories or less in height above grade plane.
  - R409.1 Electrical service reserve space.
    - The main electrical service panel shall have a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled “For Future Solar Electric.”
    - The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

2022 Bond Climate & Sustainability Goals



Baseline Checklist

- All projects required to meet

Stretch Goals

- All projects consider, but not required

Best In Class

- Certain projects identified in each category to be designed and constructed as best in class

2022 Bond Climate & Sustainability Goals

MATERIALS

- Utilize Environmental Product Declarations (EPDs) for primary materials (e.g. concrete, structural steel, flat glass, etc.), compare options between functionally equivalent products and utilize the materials with the lowest embodied carbon (i.e. Global Warming Potential row on the EPD), where financially feasible.
- Utilize high reflective materials for parking lots (min. SRI of 33) and roofs (min. SRI of 90).
- Source materials from local sources when possible.
- Ensure material and resource landfill diversion and circularity.
- Incorporate reuse materials from local deconstruction projects.

ENERGY

- Projects should be designed to maximize energy efficiency in an effort to achieve zero net energy.
- All new construction and major renovation projects should be designed to prioritize the use of electric systems and appliances for meeting space conditioning, water heating, cooking, lighting, and all other non-emergency functions.
- On-site renewable energy systems or solar and battery storage-ready designs should be considered.
- Utilize dark-sky compliant lighting.
- Utilize OS-provided Urban Heat Island (UHI) maps to identify hot spots in need of heat mitigation.

2022 Bond Climate & Sustainability Goals

WATER AND STORMWATER

- Utilize LID or green infrastructure BMPs to the fullest extent possible.
- Utilize pervious materials when feasible.
- Projects should be designed to utilize as little potable water as possible.
- Utilize water-efficient fixtures and systems.
- Utilize native and drought-tolerant landscaping.
- Consult with SARA to attain future flood risk projections to utilize in design considerations.

BIODIVERSITY & ECOSYSTEM SERVICES

- Incorporate pollinator-supportive habitat when feasible.
- Incorporate street and shade trees to the fullest extent possible.
- Incorporate urban agriculture or food forest concepts when possible.

MOBILITY

- Incorporate EV chargers or EV-Ready infrastructure.
- Incorporate bike infrastructure and bike commuter facilities.
- Incorporate shade structures in high pedestrian areas.
- Consider providing/enhancing connections to transit and bike facilities.

EDUCATION

- Incorporate interpretive amenities to highlight features related to sustainability, resilience, and indigenous cultures.

CoSA Sustainable Building Analysis

New Construction - Design Inputs

Design Component	Unit	Baseline	BSAG Level 3	LEED Silver	LEED Gold
Energy Use Intensity	kBtu / sq ft / year	32.80	27.57	25.94	21.52
Renewable Energy Production	kWh / year	0	11,580	30,000	39,000
Potable Water Use	Gallons / year	22,000	15,400	13,200	11,000
Roofing Solar Reflective Index (SRI)	SRI	5.5	75	85	90
Filtration	MERV Rating	12	13	13	13
Interior Lighting Controls	% of Employees	90%	100%	100%	100%
Daylighting Availability	% of Employees	50%	80%	80%	80%
Quality Views					
Site Sequestration					
Open Space Recreation					

Retrofit - Design Inputs

Design Component	Unit	Baseline	BSAG Level 3	LEED Silver	LEED Gold
Energy Use Intensity	kBtu / sq ft / year	52.99	45.04	41.86	34.45
Renewable Energy Production	kWh / year	0	11,580	30,000	39,000
Potable Water Use	Gallons / year	115,057	80,540	69,034	57,529
Roofing Solar Reflective Index (SRI)	SRI	5.5	75	85	90
Filtration	MERV Rating	12	13	13	13
Interior Lighting Controls	% of Employees	90%	100%	100%	100%
Daylighting Availability	% of Employees	50%	80%	80%	80%
Quality Views	View Rating	1	1	1	1
Site Sequestration	% Green Area	33%	70%	50%	50%
Open Space Recreation	Recreation Types	N/A	Flower Gardens, Community Gardening	Community Gardening	N/A

Autocase
Economic Advisory

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