

9/10/2021

## Agenda

### **Green Transportation Infrastructure Workshop North Central Texas Council of Governments August 24, 2021 | Zoom Meeting**

- 9:30 AM**      **Welcome and Workshop Introduction**  
Shawn Conrad, Principal Transportation Planner, NCTCOG  
Sydnee Steelman, Transportation Planner, NCTCOG
- 9:35 AM -  
11:05 AM**      **OVERVIEW OF GREEN INFRASTRUCTURE RESOURCES**
- Resources and Opportunities**
- Economic and Environmental Benefits of Stewardship Tool  
Kate Zielke, Principal Transportation Planner, NCTCOG
- RISE Coalition  
Tamara Cook, Senior Program Manager, NCTCOG
- Transportation integrated Stormwater Management (TriSWM)  
Tamara Cook, Senior Program Manager, NCTCOG
- Overview of the EPA Green Infrastructure Program and Available Resources**
- Brent Larsen, Section Chief, US EPA Region 6  
Nelly Smith, State and Tribal Programs Chief, US EPA Region 6
- Session Q&A**
- 11:05 AM –  
12:00 PM**      **LOCAL EXAMPLES AND IMPLEMENTATION STRATEGIES**
- Drainage and Stormwater**
- Bioswales: City of Lewisville Old Town Project  
Sagar Medisetty, Traffic Engineer, City of Lewisville
- Rain Gardens: City of Dallas Beckley/Commerce St intersection Green Street Project  
Don Raines, Senior Planner, City of Dallas
- Rain Gardens: Elm Street Streetscape Improvements  
Christina Turner-Noteware, City Engineer, City of Dallas
- Session Q&A**
- 12:00 PM –  
1:00 PM**      **Lunch**

9/10/2021

**1:00 PM – LOCAL EXAMPLES AND IMPLEMENTATION STRATEGIES (Cont.)**  
**2:25 PM**

**Pavements and Surfaces**

Silva Cells: Sundance Square Plaza in Fort Worth and San Jacinto Plaza, Rockwall  
Brenda Guglielmina, Account Manager, DeepRoot Consulting

Permeable Pavements: The Green at College Park, Arlington  
David Hopman, Associate Professor at the University of Texas at Arlington

**Lighting**

LED Lighting: City of Arlington LED Streetlights Conversion  
Oscar Valle, Public Works Operations Supervisor, City of Arlington

Solar Lighting: Bus Shelter Solar Lighting, Trinity Metro  
Sandip Sen, Service Implementation Manager, Trinity Metro

**Session Q&A**

**2:25 PM – CLOSING**  
**2:30 PM**

**Wrap-Up/Final Thoughts**

# NCTCOG Green Transportation Infrastructure

**Sundance Square-Fort Worth**



**San Jacinto Plaza-Rockwall**



# Silva Cell 2- 3 Heights for Design Flexibility

## 1x system

**H** System Height: 16.7"

**W** Width: 24"

**L** Length: 48"

Soil volume capacity:  
approximately 10 cubic ft of soil

## 2x system

**H** System Height: 31"

**W** Width: 24"

**L** Length: 48"

Soil volume capacity:  
approximately 20 cubic ft. of soil

## 3x system

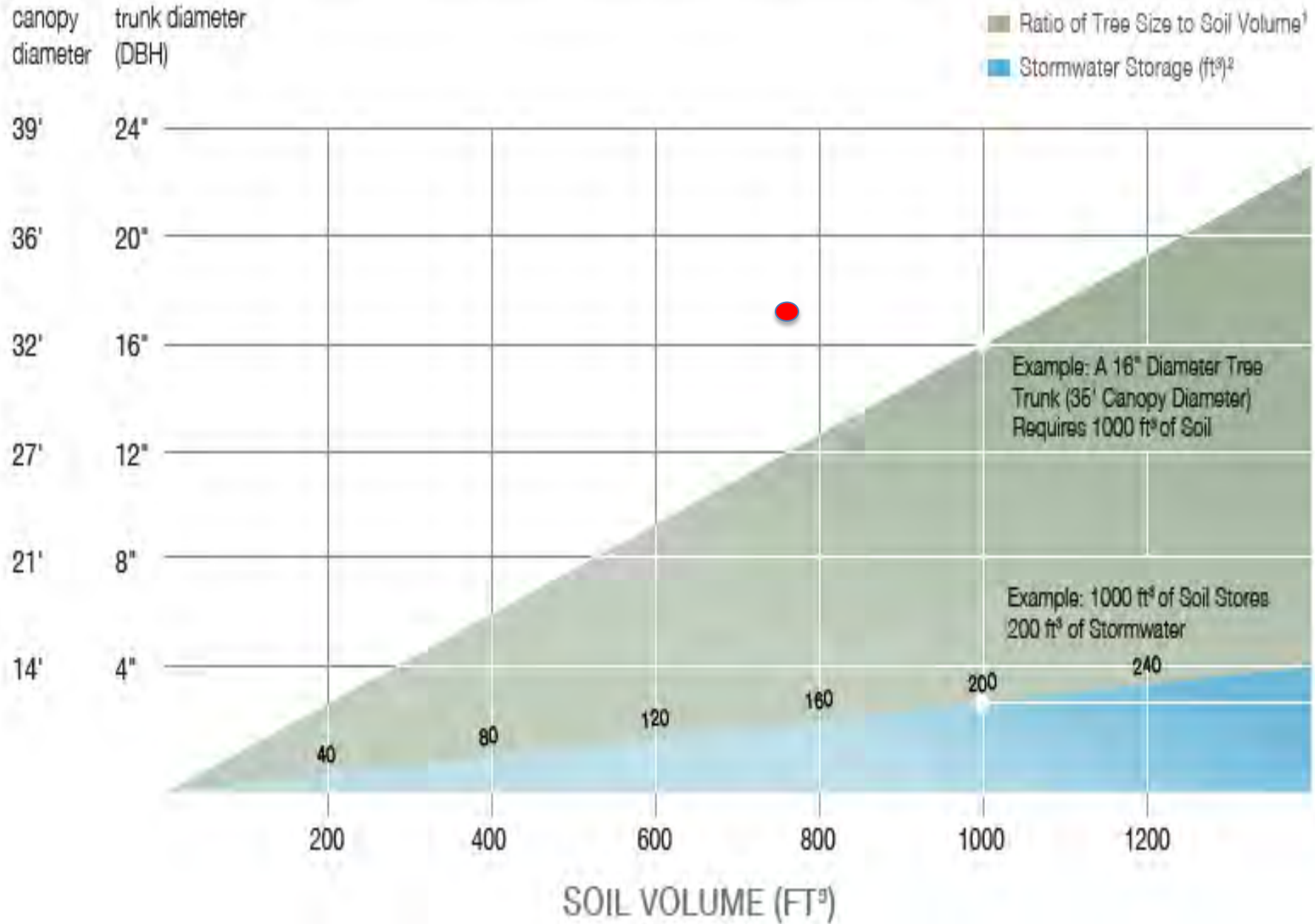
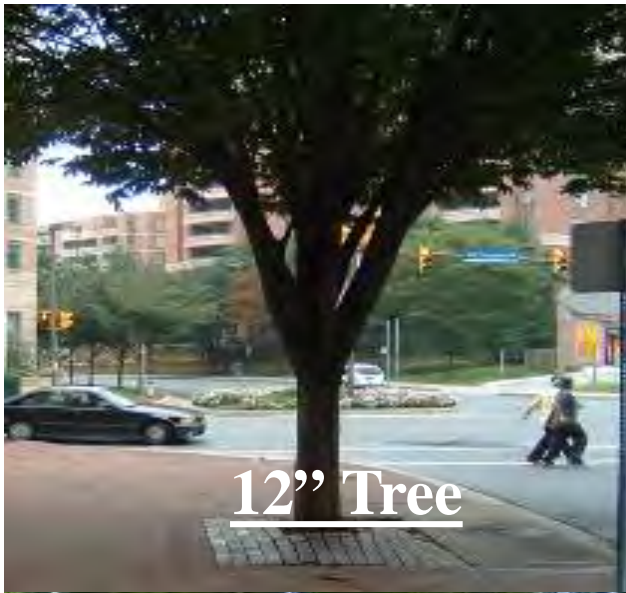
**H** System Height: 43"

**W** Width: 24"

**L** Length: 48"

Soil volume capacity:  
approximately 30 cubic ft. of soil





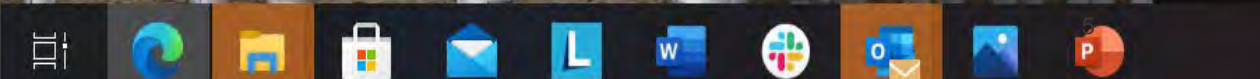
# Designed for Vehicular Loading

## HS20 Load Rating

- Parking Bays
- Plazas
- Parking Lots
- On-Structure
- Sidewalks
- Bike Lanes



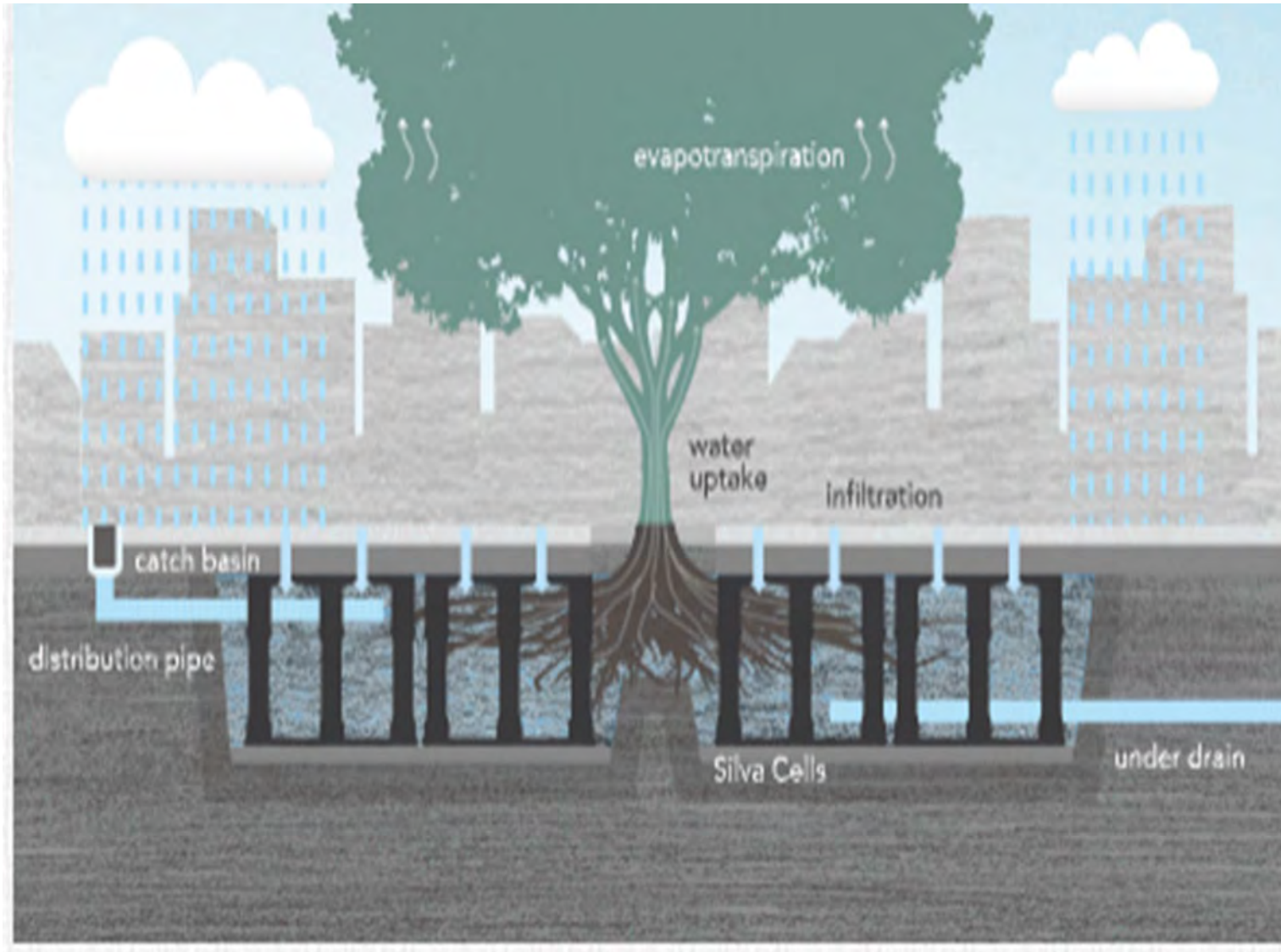
caption



## Traditional Bio Swale

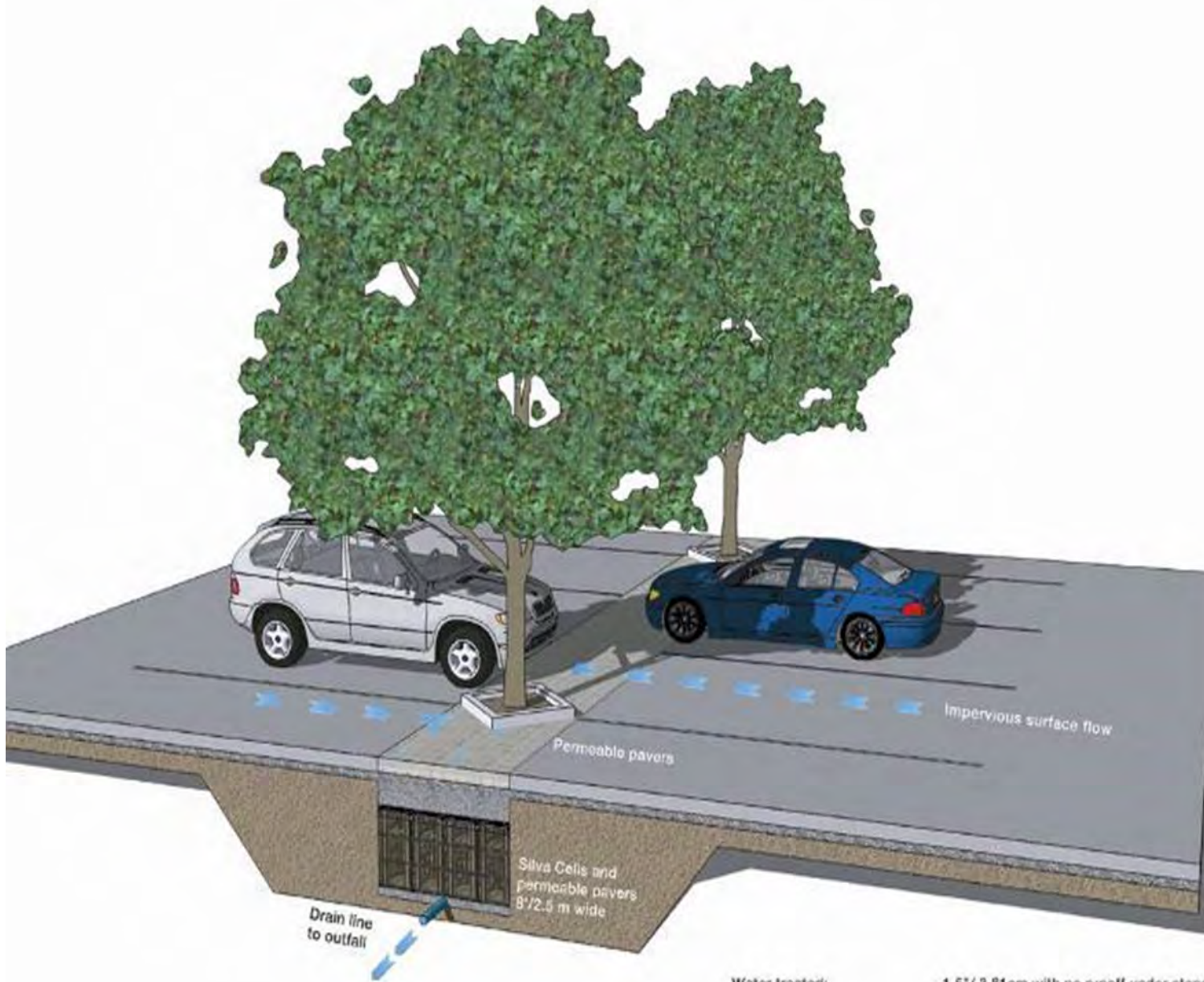


- Uses a lot of land
- Collect garbage
- High Maintenance cost
- TSS is managed on top of the soil



- Take up no space
- Doesn't collect garbage
- 0 Maintenance cost
- TTS and heavy metals treated under the pavement





- Do not lose Parking Spaces
- Shade for every car
- Passive Irrigation for the Trees

Water treated:	1.5" / 3.81cm with no runoff under standard working conditions (will vary by site)
Paved area:	2,160 ft. <sup>2</sup> /200m <sup>2</sup>
Silva Cell surface area:	288 ft. <sup>2</sup> /27m <sup>2</sup>
Silva Cell soil volume (appr.):	1,000 ft. <sup>3</sup> /28m <sup>3</sup>
Silva Cells:	108 units



Heavy  
Do Not Drop

Heavy  
Do Not Drop  
Not For Load Bearing



## Silva Cell 1 Installation

This is our 2 stack system with water line





caption























# DeepRoot **Green** Infrastructure LLC

- Brenda Guglielmina
- [Brenda@deeproot.com](mailto:Brenda@deeproot.com)
- [www.deeproot.com](http://www.deeproot.com)

Thank You!!!!

# The Green at College Park- University of Texas, Arlington NCTCOG Green Infrastructure Workshop



David Hopman, ASLA –  
The University of Texas at Arlington,  
Landscape Architecture Program  
dhopman@uta.edu

**Location:** Arlington, Texas

**Size:** 2.6 acres / 112,820 ft<sup>2</sup>

**Type:** Educational / Institutional

**Team:** Schrickel, Rollins and  
Associates(now Parkhill)  
The University of Texas at  
Arlington, NCTCOG



# College Park District





# College Park District



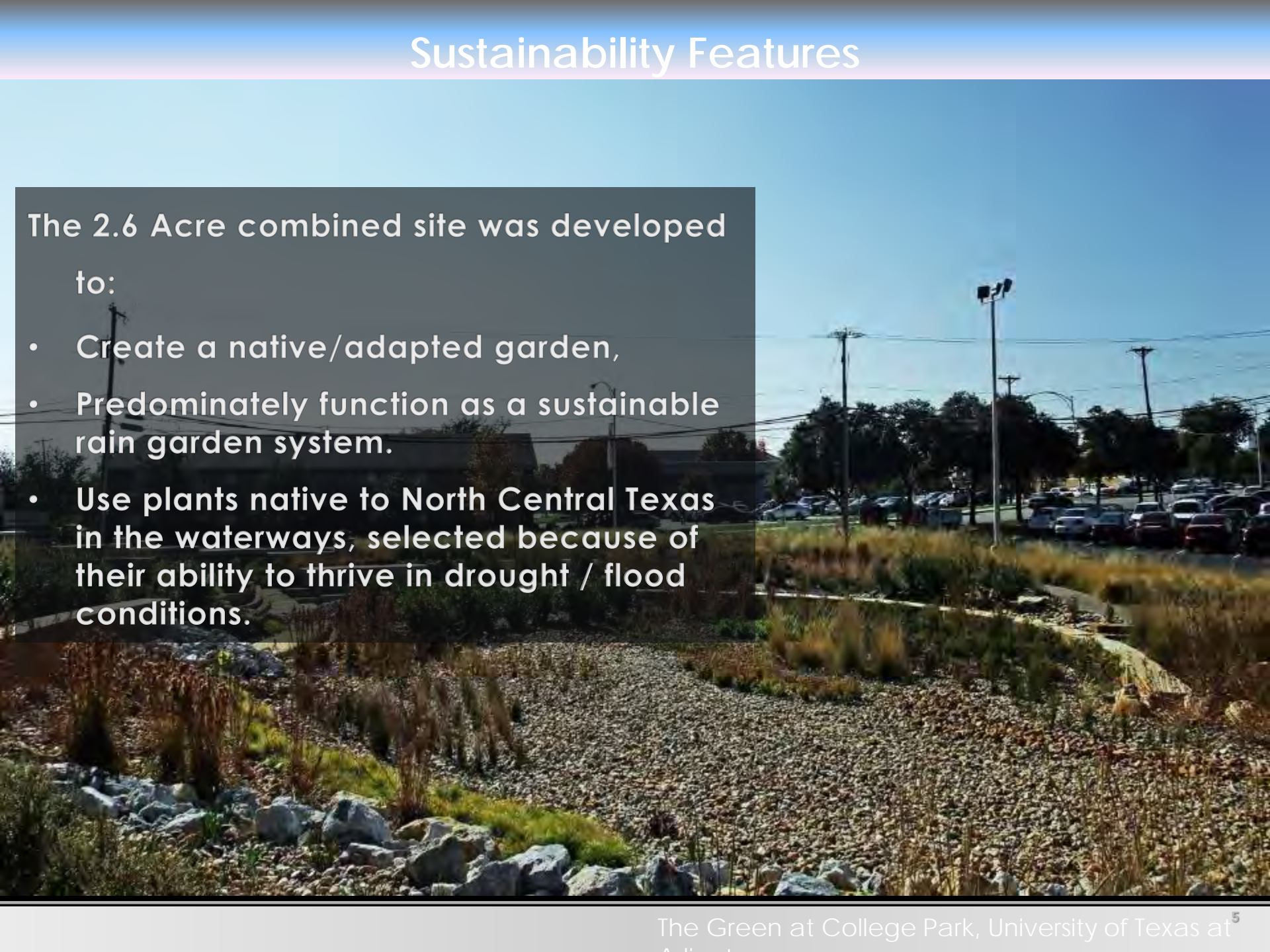
# THE SUSTAINABLE SITES INITIATIVE™



# Sustainability Features

The 2.6 Acre combined site was developed to:

- Create a native/adapted garden,
- Predominately function as a sustainable rain garden system.
- Use plants native to North Central Texas in the waterways, selected because of their ability to thrive in drought / flood conditions.



# Sustainability Features

The site's other sustainability features include

- reducing use of potable water,
- designing rainwater/stormwater features to provide landscape amenity,
- using native/adapted plants,
- reducing urban heat island effects,
- using recycled and regional material;
- design for human health and well-being; and,
- promoting sustainability awareness and education.



January 2012

# SUSTAINABLE **SITES** INITIATIVE™

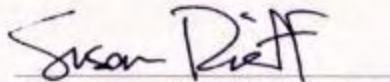
HEREBY CERTIFIES

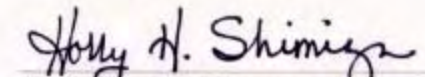
## THE GREEN AT COLLEGE PARK ARLINGTON, TEXAS

HAS SUCCESSFULLY MET THE SUSTAINABLE SITES INITIATIVE CRITERIA REQUIRED UNDER  
*THE SUSTAINABLE SITES INITIATIVE: GUIDELINES AND PERFORMANCE BENCHMARKS 2009*  
TO EARN A ONE STAR CERTIFICATION RATING.

2012  **SITES**  
CERTIFIED

  
Nancy C. Somerville, Executive Director, American Society of  
Landscape Architects

  
Susan Rieff, Executive Director, Lady Bird Johnson Wildflower  
Center at The University of Texas at Austin

  
Holly Shimizu, Executive Director, United States Botanic Garden



## Structure of the Prerequisites and Credits:

1. Site Context
2. Pre- Design Assessment and Planning
3. Site Design- Water
4. Site Design- Soil and Vegetation
5. Site Design- Materials and Selection
6. Site Design- Human Health and Well-Being
7. Construction
8. Operations and Maintenance
9. Education and Performance Monitoring
10. Innovation or Exemplary Performance



November 2019

# DEVELOPMENT ISSUES THAT INCREASE IMPERVIOUS COVER



- REMOVAL OF TREE CANOPY COVER
- REMOVAL OF GROUND COVER – VEGETATION
- REMOVAL OF PERMEABLE TOP SOIL
- SEVERE COMPACTION AND PAVING OF REMAINING SOIL
- UNDERGROUND PIPE AND SEWER INFRASTRUCTURES

SOURCE: ELENA BERG, PLANNER

College Park  
District site in  
2007



College Park  
District site in  
2016





# Biomass Density Calculations From the Sustainable Sites Initiative

## CREDIT4.6: Preserve and restore appropriate biomass on site

EXISTING SITE BDI					
				Total Site Area (sq.ft.)=	113400
Land Cover/vegetation type zones	Biomass density index for Arlington, TX		Percentage of total site area for this zone	Biomass density value x percentage of total site area	
Trees with understory	6	580	0.01	0.03	
Trees without understory (less than 10% herbaceous shrub cover)	4	0	0.00	0.00	
Shrubs	3	0	0.00	0.00	
Desert Plants	1.5	0	0.00	0.00	
Annual plantings	1.5	0	0.00	0.00	
Grasslands and turf grass	2	40220	0.35	0.71	
Wetlands	6	0	0.00	0.00	
Impervious cover or bare ground not shaded by vegetation structures	0	72600	0.64	0.00	
SUBTOTAL		113400	1.00	0.74	
					0
<b>Existing site BDI (Bio Mass Density)</b>					<b>0.74</b>

# Biomass Density Calculations From the Sustainable Sites Initiative

PLANNED SITE BDI					
				Total Site Area (sq.ft.)=	113400
Land Cover/vegetation type zones	Biomass density index for Arlington, TX	Area in square feet	Percentage of total site area for this zone	Biomass density value x percentage of total site area	
Trees with understory	6	31800	0.28	1.68	
Trees without understory (less than 10% herbaceous shrub cover)	4	4302	0.04	0.15	
Shrubs	3	3741	0.03	0.10	
Desert Plants	1.5	0	0.00	0.00	
Annual plantings	1.5	0	0.00	0.00	
Grasslands and turf grass	2	44049	0.39	0.78	
Wetlands	6	13104	0.12	0.69	
Impervious cover or bare ground not shaded by vegetation structures	0	16404	0.14	0.00	
<b>SUBTOTAL</b>		<b>113400</b>	<b>1.00</b>	<b>3.40</b>	
ADDITIONAL VALUE for horizontal or vertical surfaces covered with vegetation				0	
<b>Planned site BDI (Bio Mass Density)</b>				<b>3.40</b>	

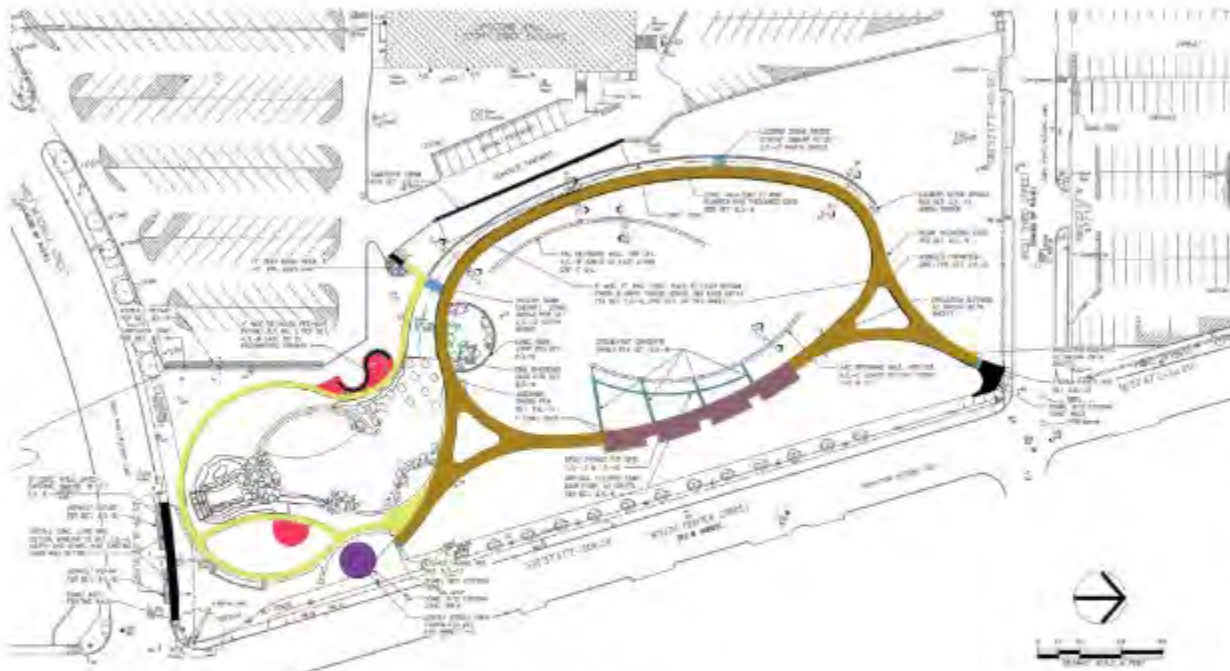
POINT LOOK UP TABLE FOR TEMPERATE GRASSLANDS, SAVANNAS AND SHRUBLANDS (DFW AREA)

Existing Site BDI	Planned Site BDI				
	0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	2.0 and above
0-0.5	No credit	3 POINTS	5 POINTS	8 POINTS	8 POINTS
0.5-1.0	No credit	No credit	3 POINTS	5 POINTS	8 POINTS
1.0-1.5	No credit	No credit	No credit	3 POINTS	8 POINTS
1.5-2.0	No credit	No credit	No credit	No credit	8 POINTS
2.0 and above	No credit	No credit	No credit	No credit	8 POINTS

# The Green at UTA College Park, UTA



Schrickel, Rollins and Associates  
 12000 4th Street, Fort Worth, TX 76102  
 817-335-1100  
 www.sra.com



1 SIDEWALK ENLARGEMENT

- LEGEND**
- Concrete Paving
  - Pervious Concrete w/recycled glass
  - Colored Concrete
  - Pervious Decomposed Granite
  - Concrete Pavers- Missip Bend 800's
  - Yellow and Rust
  - Flag Stone
  - Limestone

**CONSTRUCTION NOTES**

1. ALL MATERIALS TO BE USED SHALL BE OF THE QUALITY AND TYPE SPECIFIED IN THE SCHEDULE AND SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE ARCHITECT.

2. ALL MATERIALS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND THE LATEST EDITIONS OF THE CONCRETE MANUAL AND THE CONCRETE FINISHING HANDBOOK.

3. ALL MATERIALS SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE CONCRETE MANUAL AND THE CONCRETE FINISHING HANDBOOK.

4. ALL MATERIALS SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE CONCRETE MANUAL AND THE CONCRETE FINISHING HANDBOOK.

## CREDIT 4.12:

**Intent:**  
 Use vegetation and reflective materials to reduce heat islands and minimize effects on microclimate and on human and wildlife habitat.

**Requirements:**  
 5 points: Use any combination of the following options to reduce urban heat island effects for 60 percent of all site hardscape and structures (including roads, sidewalks, courtyards, shelters, and parking lots).

**Provided:**  
 Material Use Plan

## Calculations:

1. Pervious Paving (pervious concrete w/recycled glass + pervious granite) 3707 sq.ft.
2. Concrete Pavers >=29 SRI 2015
3. Concrete Paving >=29 SRI 8671 sq.ft.
4. Limestone >29 SRI 184 sq.ft.
5. Pervious Paving Decomposed Granite >29 SRI 530sq.ft.
6. Colored concrete <=29 SRI 227 sq.ft.
7. Flag Stone <=29 SRI 530sq.ft.

Hardscape material with >=29 SRI = 73%

DATE: 1/20/2015

PROJECT NAME: The Green at College Park, UTA

PROJECT ID: UTA332

PROJECT ADDRESS: 12000 4th Street, Fort Worth, TX 76102

SCALE: N15

Sheet No: 24  
 Credit 4.12

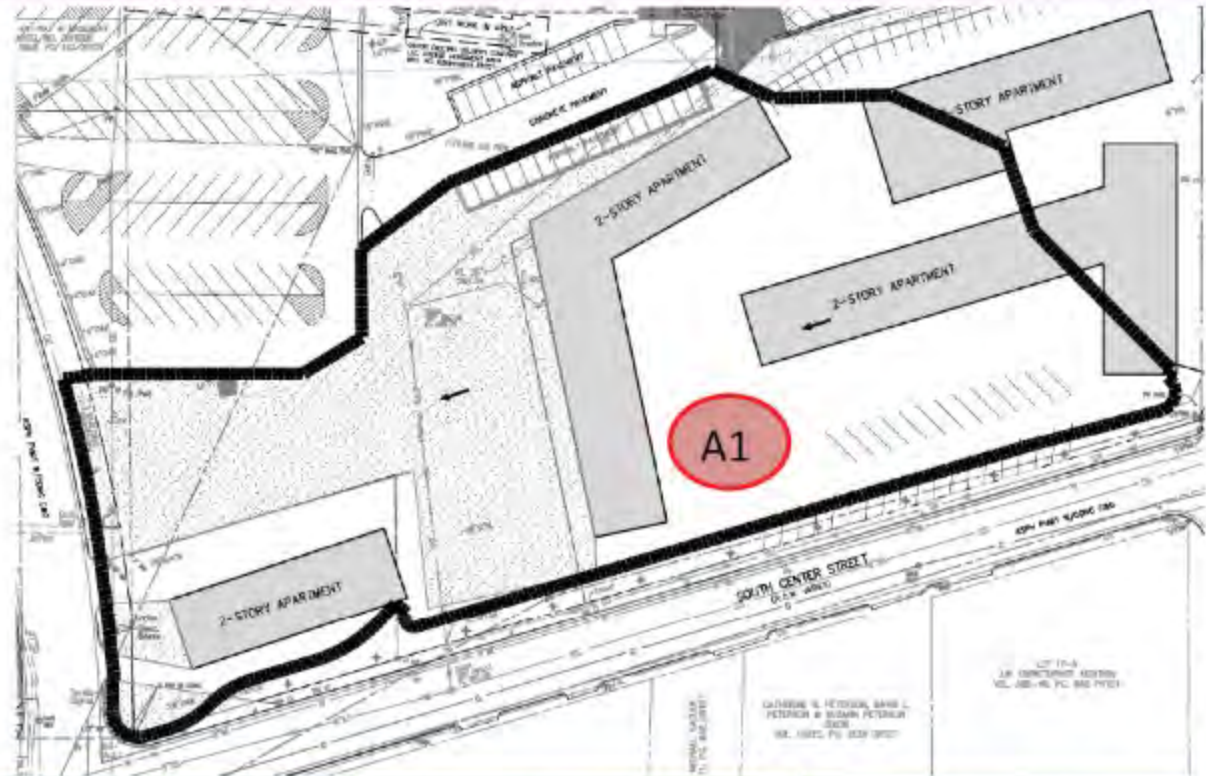
Urban Heat Island Plan

## Credit 3.5: Manage stormwater on site

### GOALS:

Achieve 60 percent improvement in water storage capacity.  
(Brownfield)

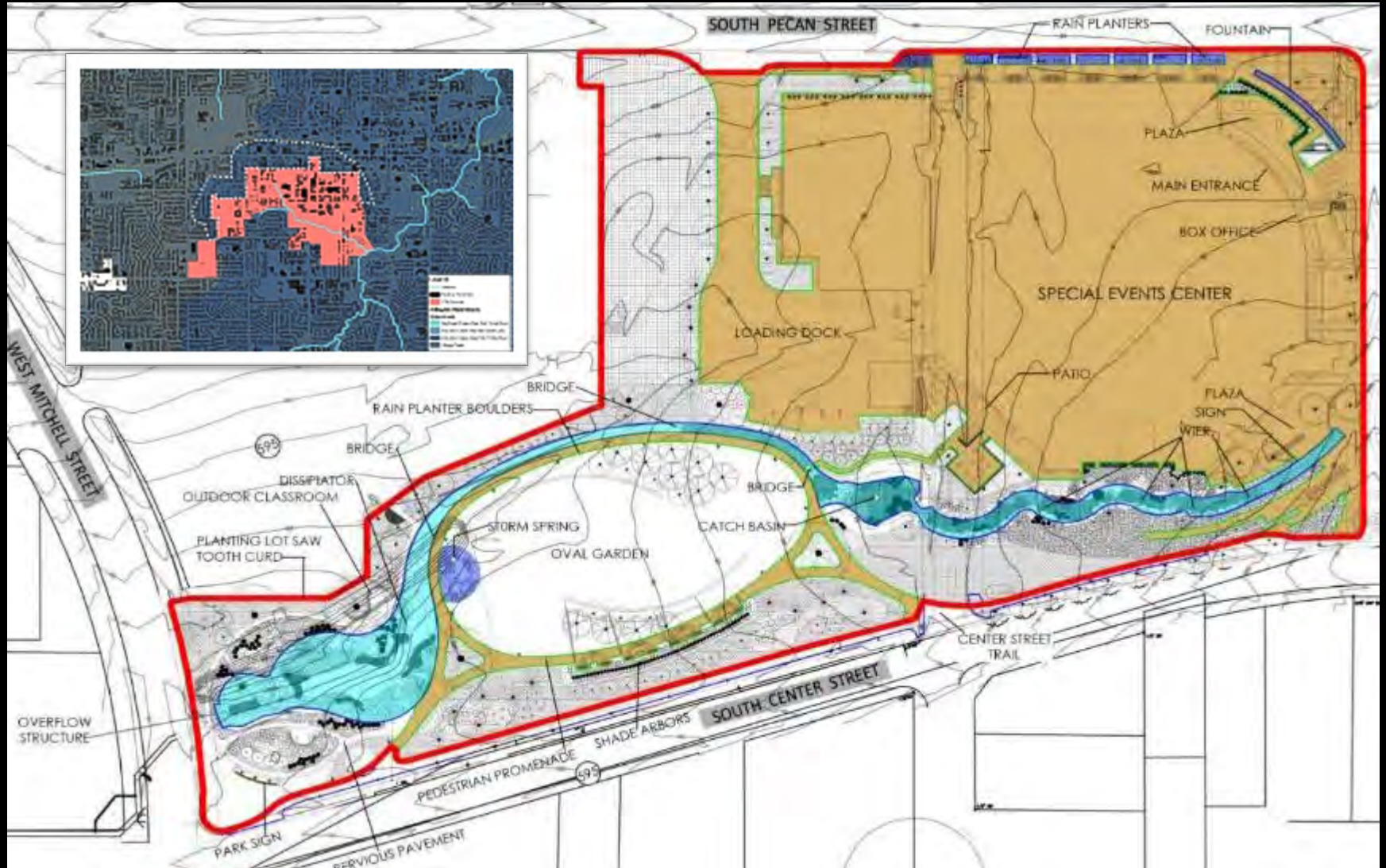
Target CN = 83



CONDITIONS	AREA	ACRES	WEIGHTED CN	% IMPERVIOUS
Existing	A1	2.59	95	95
Target	A1	2.59	83	15

Existing Impervious Curve Number (water storage capacity) = 98; Open CN= 80

# UTA Green at College Park





**A College Park Center Drainage** consists of surface runoff, storm water from roof drains and condensate from the airconditioning system.

**B The Rain Channel** is conveyance system that consists of a porous soil structure protected by a layer of rock mulch. This channel increases infiltration of runoff into the soil and filters total suspended solids.

**C The Storm Spring** relieves pressure from the underground campus storm drainage system. During large storm events, it functions as a reverse inlet, allowing storm drainage from underground pipes to overflow into the oval lawn area for detention.

**D The Detention Lawn** temporarily holds water during large storm events and gradually allows it to drain into the Rill Garden.

**E The Rill Garden** is a complex system of vegetation that thrives in drought and flood conditions. Below the surfacelayer of rock mulch is a porous soil structure that increases infiltration. The soil system, rock mulch and vegetation work together to remove pollutants from storm run-off. This garden replaces an eroded drainage channel that existed on the site.

**F The Check Dam** helps to filter storm water and encourages infiltration by reducing velocity and increasing the amount of time storm water is detained on site.

**G The Overflow Structure** controls the amount of water that leaves the garden and drains to Johnson Creek. The controlled release also alleviates flooding of adjacent streets.

**H The Biofilter** is a vegetated system that removes total suspended solids from parking lot run-off before eventually draining into the rill garden.

**I The Microdepressions** are shallow depressions in the landscape that are sculpted to retain irrigation and storm runoff. Below the depressions are large rock sumps that store water and release it into the soil to be used by surrounding vegetation. Planted in the shallow areas are native plants that grow in wet soil conditions.

**ADDITIONAL INFORMATION:**



**B**



**E**



**I**

## Credit 3.5: Manage stormwater on site



CONDITIONS	AREA	ACRES	WEIGHTED CN	% IMPERVIOUS
Existing	A1	2.59	95	95
Proposed	A1	2.59	83	15

Impervious CN= 98; Open CN= 80

Image Source: Parkhill

## Credit 3.5: Manage stormwater on site



CONDITIONS	AREA	ACRES	WEIGHTED CN	% IMPERVIOUS
Existing	A1	2.59	95	95
Proposed	A1	2.59	83	15

Impervious CN= 98; Open CN= 80





The Green at College Park, University of Texas at Arlington

# UTA Green at College Park



# UTA Green at College Park



# UTA Green at College Park



# UTA Green at College Park





UTA Green at College Park: November 8, 2010: Filter Pave System



UTA Green at College Park: November 8, 2010: Filter Pave System



UTA Green at College Park: November 8, 2010: Filter Pave System





UTA Green at College Park: November 8, 2010: Filter Pave System



UTA Green at College Park: November 8, 2010: Filter Pave System



UTA Green at College Park: 2019



UTA Green at College Park: 2020

Decomposed Granite

FilterPave



UTA Green at College Park: 2021

**PLANT LEGEND**

PLANT LEGEND - CANOPY TREES				
SYL	COMMON NAME	SCIENTIFIC NAME	SIZE - HEIGHT	SPACING
1	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
2	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
3	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
4	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
5	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
6	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
7	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
8	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
9	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
10	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'

PLANT LEGEND - ORNAMENTAL TREES				
SYL	COMMON NAME	SCIENTIFIC NAME	SIZE - HEIGHT	SPACING
11	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
12	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
13	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
14	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
15	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
16	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
17	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
18	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
19	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
20	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'

PLANT LEGEND - SHRUBS, VINES & ORNAMENTAL GRASSES				
SYL	COMMON NAME	SCIENTIFIC NAME	SIZE - HEIGHT	SPACING
21	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
22	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
23	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
24	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
25	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
26	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
27	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
28	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
29	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
30	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'

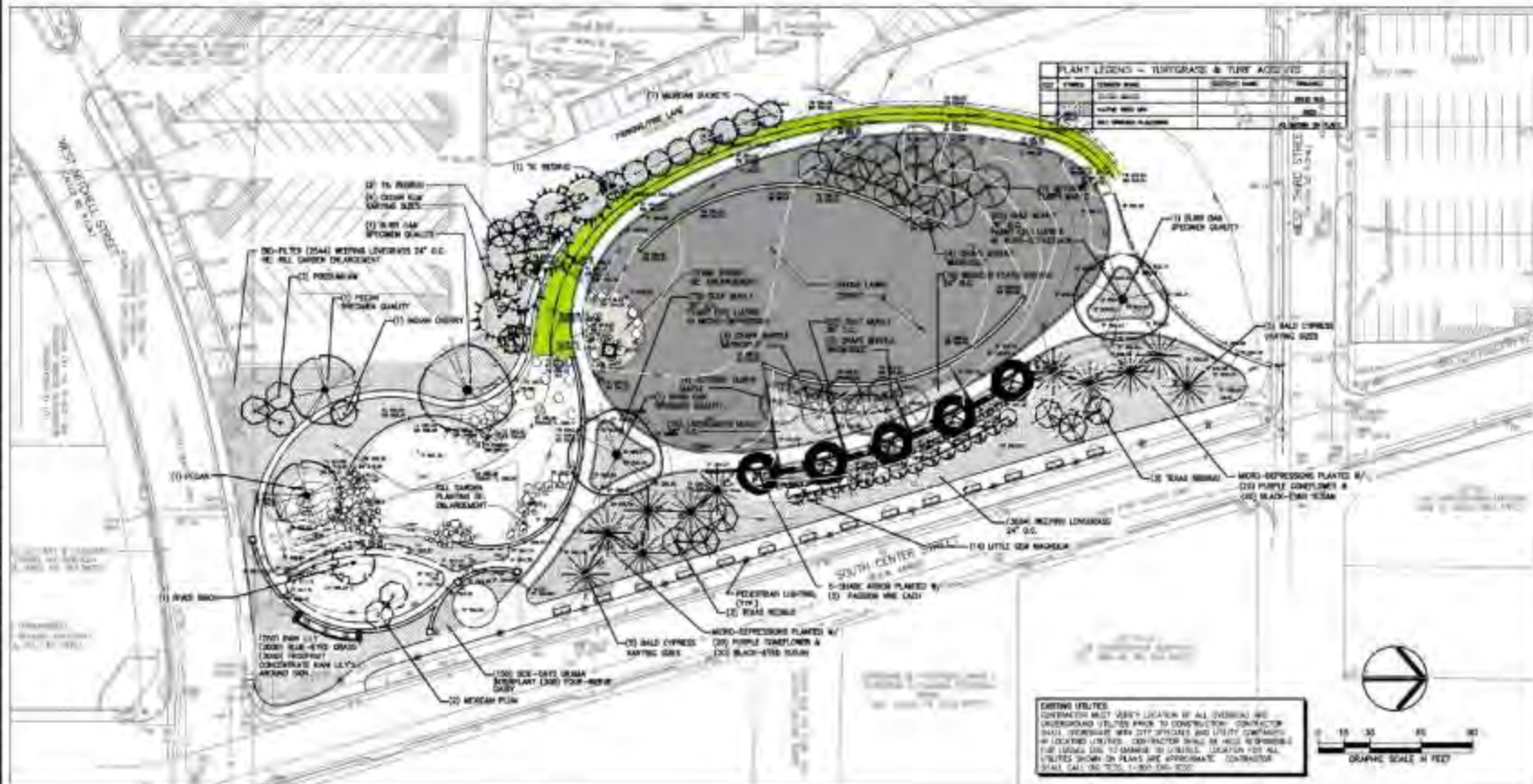
PLANT LEGEND - RILL GARDEN & RAIN PLANTERS				
SYL	COMMON NAME	SCIENTIFIC NAME	SIZE - HEIGHT	SPACING
31	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
32	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
33	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
34	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
35	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
36	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
37	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
38	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
39	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
40	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'

PLANT LEGEND - RILL GARDEN & RAIN PLANTERS CONT'D				
SYL	COMMON NAME	SCIENTIFIC NAME	SIZE - HEIGHT	SPACING
41	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
42	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
43	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
44	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
45	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
46	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
47	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
48	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
49	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
50	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'

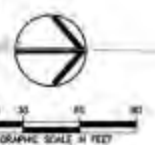
PLANT LEGEND - RILL GARDEN & RAIN PLANTERS CONT'D				
SYL	COMMON NAME	SCIENTIFIC NAME	SIZE - HEIGHT	SPACING
51	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
52	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
53	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
54	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
55	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
56	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
57	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
58	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
59	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
60	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'

PLANT LEGEND - RILL GARDEN & RAIN PLANTERS CONT'D				
SYL	COMMON NAME	SCIENTIFIC NAME	SIZE - HEIGHT	SPACING
61	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
62	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
63	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
64	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
65	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
66	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
67	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
68	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
69	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
70	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'

PLANT LEGEND - RILL GARDEN & RAIN PLANTERS CONT'D				
SYL	COMMON NAME	SCIENTIFIC NAME	SIZE - HEIGHT	SPACING
71	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
72	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
73	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
74	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
75	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
76	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
77	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
78	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
79	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
80	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'



PLANT LEGEND - TURFGRASS & TURF ACCENTS				
SYL	COMMON NAME	SCIENTIFIC NAME	SIZE - HEIGHT	SPACING
81	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
82	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
83	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'
84	ORANGE BLOSSOM GUM	Avicennia nitida	7' CAL. 50'	12'-12'



**EXISTING UTILITIES**  
 CONTRACTOR MUST VERIFY LOCATION OF ALL EXISTING AND UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL COORDINATE WITH CITY UTILITIES AND UTILITY COMPANIES TO LOCATE UTILITIES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING UTILITIES TO DETERMINE TO LOCATE. LOCATION FOR ALL UTILITIES SHOWN ON PLANS ARE APPROXIMATE. CONTRACTOR SHALL CALL 811 TO LOCATE UTILITIES PRIOR TO CONSTRUCTION.

**SIRA**  
 Scheckel, Kollins and Associates, Inc.  
 Landscape Architecture - Civil Engineering - Planning  
 985 Corporate Drive West, Suite 1000, Arlington, VA 22202  
 Phone: (703) 441-1100  
 Fax: (703) 441-1101  
 Website: www.sira.com

**ELECTRICAL ENGINEER**  
**YACED ENGINEERING, INC.**  
 3840 W. 141st Street  
 Arlington, Texas 76017  
 (817) 463-2277 FAX (817) 463-2278

**IRRIGATION DESIGNER**

**DAVID POOL IRRIGATION CONSULTANTS**  
 1000 West Oak Street, Suite 100  
 Arlington, Texas 76010  
 (817) 261-1100 FAX (817) 261-1101

**UTA CAMPUS GREEN**



This document is prepared for the  
 Project by REMEC  
 Under the Authority of:  
 James Toward, Residential  
 Landscape Architect #2330  
 On September 16, 2009  
 P. W. SELL, P.E. by State of Texas, Certificate  
 No. 10000, State of Texas, Professional  
 Engineer, Electrical Engineering

DATE:	SEPTEMBER 16, 2009
REVISED:	
STARTED:	10/8 REVIEW
DESIGN BY:	AT
DRAWN BY:	PJL/S
FOR NO.:	4991
PROJECT NAME:	UTA CENTER/UT GREEN

**PLANTING PLAN**

SCALE:	1"=30'	1/8"=15'
INSET NO.:		

**L-6**

# UTA Green at College Park

## PLANT LEGEND – SHRUBS, VINES & ORNAMENTAL GRASSES

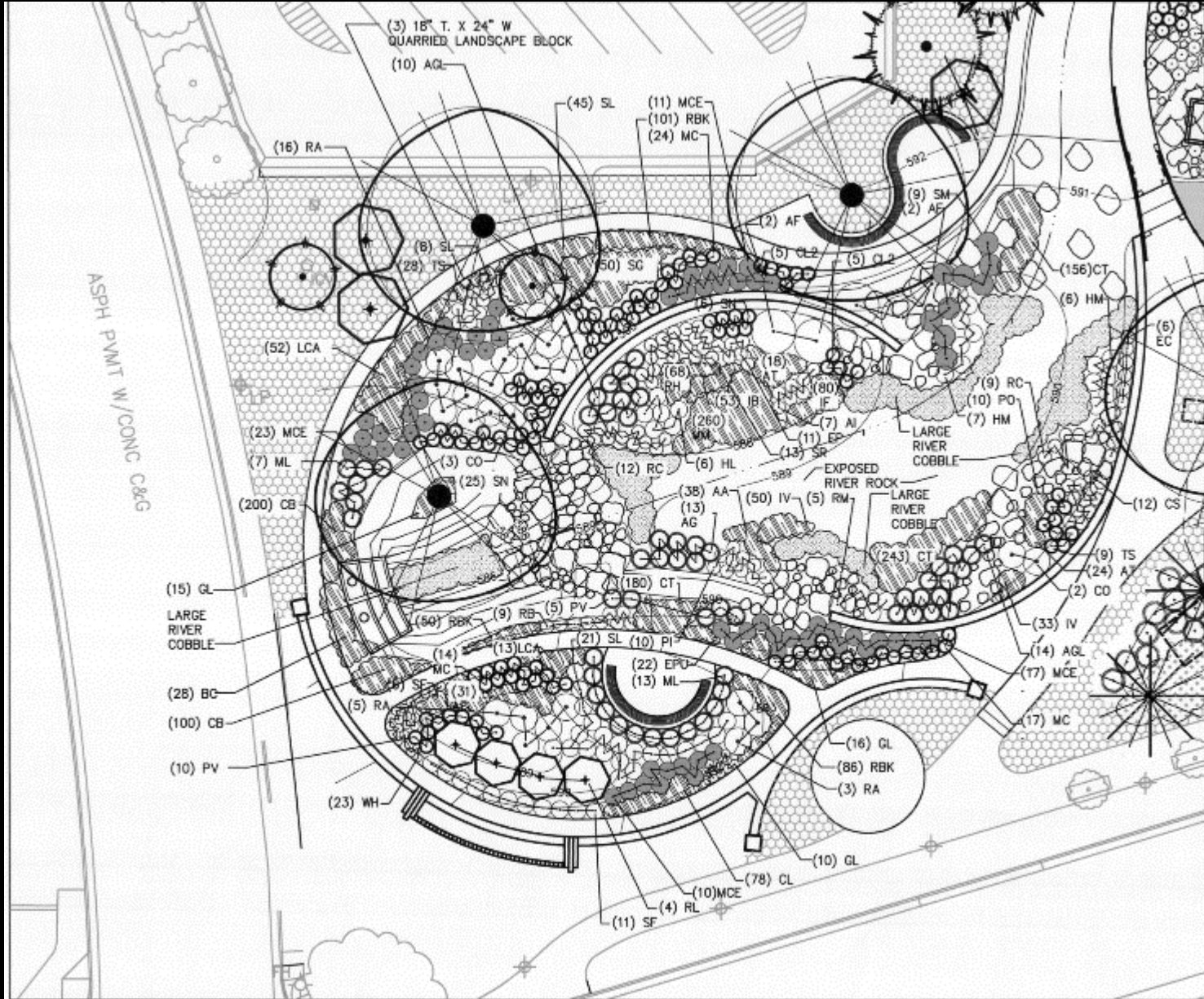
QTY.	COMMON NAME	SCIENTIFIC NAME	SIZE – REMARKS	SPACING
70	DWARF YAUPON HOLLY	<i>Ilex vomitoria 'nana'</i>	5 GAL.	36" O.C.
19	TEXAS SAGE	<i>Leucophyllum candidulum 'Thunder Cloud'</i>	5 GAL.	36" O.C.
52	GULF MUHLY	<i>Muhlenbergia capillaris 'Lanca'</i>	5 GAL.	36" O.C.
123	LINDHEIMER'S MUHLY	<i>Muhlenbergia lindheimeri 'Lani'</i>	5 GAL.	36" O.C.
15	PASSIONFLOWER	<i>Passiflora X 'Lavender Lady'</i>	5 GAL.	AS SHOWN
20	FRAGRANT SUMAC GRO-LOW	<i>Rhus aromatica 'Gro-low'</i>	5 GAL.	72" O.C.
33	KNOCK-OUT ROSE	<i>Rosa X</i>	5 GAL.	36" O.C.
78	MIDCAN FEATHERGRASS	<i>Stipa tenuissima</i>	3 GAL.	24" O.C.

## PLANT LEGEND – RILL GARDEN & RAIN PLANTERS

SYMB.	QTY.	COMMON NAME	SCIENTIFIC NAME	SIZE – REMARKS	SPACING
AA	38	SPIDER MILKWEED	<i>Asclepias asperula</i>	1 GAL.	15" O.C.
AF	4	INDIGO BUSH	<i>Amarpha fruticosa</i>	8 GAL.	10' O.C.
AG	17	BIG BLUESTEM	<i>Andropogon gerardii</i>	5 GAL.	48" O.C.
AGL	33	BUSHY BLUESTEM	<i>Andropogon glomeratus</i>	5 GAL.	48" O.C.
AI	9	SWAMP MILKWEED	<i>Asclepias incarnata</i>	1 GAL.	24" O.C.
AT	30	BUTTERFLY WEED	<i>Asclepias tuberosa</i>	1 GAL.	18" O.C.
CB	300	CREEK SEDGE	<i>Carex blanda</i>	Plugs	6" O.C.
CL	21	INLAND SEA OATS	<i>Chasmanthum latifolium</i>	5 GAL.	36" O.C.

## PLANT LEGEND – RILL GARDEN & RAIN PLANTERS CONT'D.

SYMB.	QTY.	COMMON NAME	SCIENTIFIC NAME	SIZE – REMARKS	SPACING
CS	12	UPRIGHT SEDGE	<i>Carex stricta</i>	3 GAL.	36" O.C.
CT	1616	TEXAS SEDGE	<i>Carex texensis</i>	PLUGS	6" O.C.
EC	25	BLUE MISTFLOWER	<i>Eupatorium coelestinum</i>	1 GAL.	24" O.C.
EH	358	HORSETAIL RUSH	<i>Equisetum hyemale</i>	5 GAL.	36" O.C.
EP	25	JOE-PYE WEED	<i>Eupatorium purpureum</i>	1 GAL.	36" O.C.
HL	8	HALBERD-LEAF HIBISCUS	<i>Hibiscus laevis</i>	5 GAL.	36" O.C.
HM	7	CRIMSON-EYED MALLOW	<i>Hibiscus moscheutos</i>	5 GAL.	36" O.C.
IB	50	ZIGZAG IRIS	<i>Iris brevicaulis</i>	1 GAL.	12" O.C.
IF	80	COPPER IRIS	<i>Iris fulva</i>	1 GAL.	12" O.C.
IV	83	SOUTHERN BLUE FLAG	<i>Iris virginica</i>	1 GAL.	12" O.C.
LC	30	CARDINAL FLOWER	<i>Labella cardinalis</i>	1 GAL.	18" O.C.
MC	78	GULF MUHLY	<i>Muhlenbergia capillaris</i>	3 GAL.	36" O.C.
MCE	71	DWARF WAX MYRTLE	<i>Moralea cerifera 'nana'</i>	5 GAL.	48" O.C.
ML	22	LINDHEIMER'S MUHLY	<i>Muhlenbergia lindheimeri</i>	5 GAL.	36" O.C.
MM	1556	BIG-FOOT CLOVER	<i>Maralea macropoda</i>	PLUGS	6" O.C.
PI	15	SPRING OBEDIENT PLANT	<i>Physotegia intermedia</i>	1 GAL.	24" O.C.
PO	10	MARSH FLEABANE	<i>Pluchea odorata</i>	1 GAL.	36" O.C.
PV	5	FALL OBEDIENT PLANT	<i>Physotegia virginiana</i>	1 GAL.	36" O.C.
RA	23	AROMATIC SUMAC	<i>Rhus aromatica</i>	5 GAL.	72" O.C.



**RILL GARDEN ENLARGEMENT**  
 SCALE 1" = 20'



# UTA Green at College Park Rill Garden

looking North from Marine Creek Parkway



2007: from google maps

# UTA Green at College Park Rill Garden

looking North from Marine Creek Parkway



2012: from google maps

# UTA Green at College Park Rill Garden

looking North from Marine Creek Parkway



2015: from google maps

# UTA Green at College Park Rill Garden

looking North from Marine Creek Parkway



2021: by David Hopman



UTA Green at College Park: 2020



The Green at College Winter 2012



The Green at College Park-Summer 2021



UTA Green at College Park: 2020

# SUSTAINABLE SITES



# UTA Green at College Park





## Questions/Comments?



David Hopman, ASLA –  
The University of Texas at Arlington,  
Landscape Architecture Program  
dhopman@uta.edu

**Location:** Arlington, Texas

**Size:** 2.6 acres / 112,820 ft<sup>2</sup>

**Type:** Educational / Institutional

**Team:** Schrickel, Rollins and  
Associates(now Parkhill)  
The University of Texas at  
Arlington. NCTCOG





# LED STREETLIGHT CONVERSION PROJECT



Oscar Valle  
Traffic Operations Supervisor

Department of Public Works &  
Transportation



**5,223 Streetlights out of a total of approximately 23K streetlights Citywide remain to be converted to LED**

## PROJECT SCOPE

- 5164 Residential Streetlights
- 14 Canopy Lights
- 45 Antique Lights



**Total cost to complete  
LED streetlight  
conversion \$2,464,000  
with City crews**

**Received Arlington  
Tomorrow Fund Grant in  
February 2020 for  
Phase I**

## PROJECT PHASING

### Phase I – 2500 Fixtures

- IH-20/Cooper – High Masts with 66 fixtures
  - Estimated completion in Sept. 2020
- IH-20/SH360 High Masts with 18 fixtures
  - Estimated completion in Oct. 2020
- IH-30 High Masts with 216 fixtures
  - Estimated completion in April 2021
- All Residential areas between Park Row Drive and the northern City Limits, including the UTA area, with 2200 fixtures.
  - Estimated completion in April 2021



## PROJECT PHASING

- Phase II – Approximately 3500 fixtures in FY21
  - Between Park Row Drive and Arbrook Blvd.
- Phase III – Approximately 1400 fixtures in FY22
  - Between Pleasant Ridge Road and Sublett Road
- Phase IV – Approximately 1297 fixtures in FY23
  - Between Sublett Road and southern City Limit





## ENERGY SAVINGS

- 100W changed to 55 LED saves about \$1.56 each light per month
- 100W changed to 94 LED saves about \$0.65 each light per month
- 150W changed to 100 LED saves about \$2.46 each light per month





## LIFE EXPECTANCY OF LED STREETLIGHTS



- Life expectancy for LED fixtures are typically 10 years. There is no bulb for LED's, the fixture and diode is one complete item.
- Life expectancy for High Pressure Sodium fixtures is only 5 years.
- LED fixture warranty is 10 years



## REDUCTION OF LIGHT POLLUTION

- LED fixtures create a white light
- Provides better visibility
- Does not contain toxic chemicals such as mercury
- The light pattern is focused on the roadway with less light pollution and improved color rendering.





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# Q&A

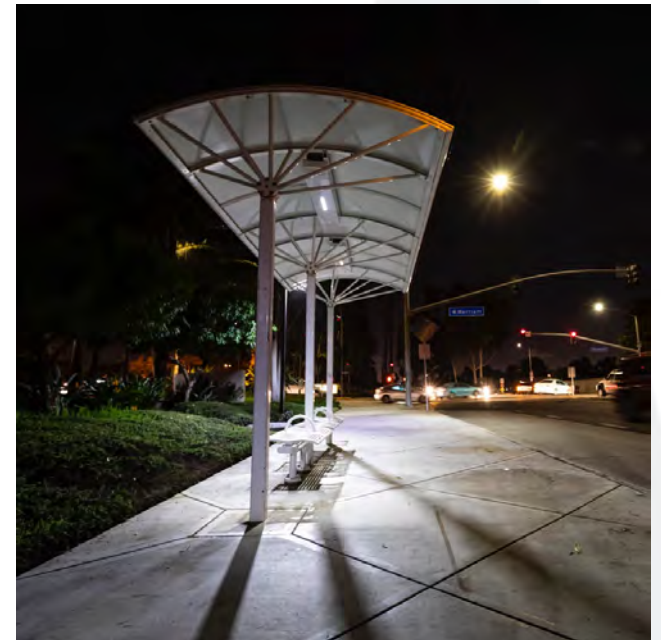
## DISCUSSION

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# Green Transportation Infrastructure Workshop: Solar Lighting

Sandip Sen

Planning Manager – Service Implementation



# Shelter Lighting Systems

- Off-grid security illumination for every bus shelter
- 80W solar array, 8W security luminaire
- Optional cellular monitoring and power for digital displays
- UL Listed. Made in the USA.



# Why Solar?

For many projects, standalone solar lighting is the ideal option.

- **Fast and easy installation**  
Low cost and minimal site disruption
- **No utility connection required**  
Reduced carbon footprint
- **Highly visible**  
Positions our community as a leader in sustainability
- **Long Lasting**  
Commercial grade solutions that last as long as a bus shelter

# Solar Panel Installation

## TSSL Installation Manual

**1.** Using the upper housing as a template, mark the five holes to be drilled in the shelter.

**2.** Drill 2/64" (0.015") deep through bottom surface (8 pins).

Drill 1/16" (0.0625") (Stand Center method).

Insert and fasten 1/4-20 Jack nut in the four mounting holes.

High Peak roof adapter plate option.

For high peak roof shelter types, use the supplied adapter plate as a template for the jack nut mounting (using pre-plate). The main housing is attached to the adapter plate using through bolts.

Hold the friction lock stationary and collapse the jack nut. Use constant pressure against the friction tool with a ratchet. Do not use a power drill to install jack nuts.

**3. Barrel roof mounting**

Let 15" of cord hang inside the shelter.

Use #14 x 1" Tek screw (16 pcs.)

Use #14 x 1.5" Tek screw (8 pcs.)

**3. Peak roof mounting**

Position hole such that the panel covers the fitting when mounted.

Use #14 x 1" Tek screw (8 pcs.)

Use #14 x 1.5" Tek screw (8 pcs.)

IM-TSSL-LB-01 1 of 2 Rev. 10/9/06

**4.**

Mount upper part of the housing to the roof ribs using the supplied hardware. Do not over tighten.

**5.**

Plug the battery connector onto the board at this time. The LEDs should flash on for a few seconds.

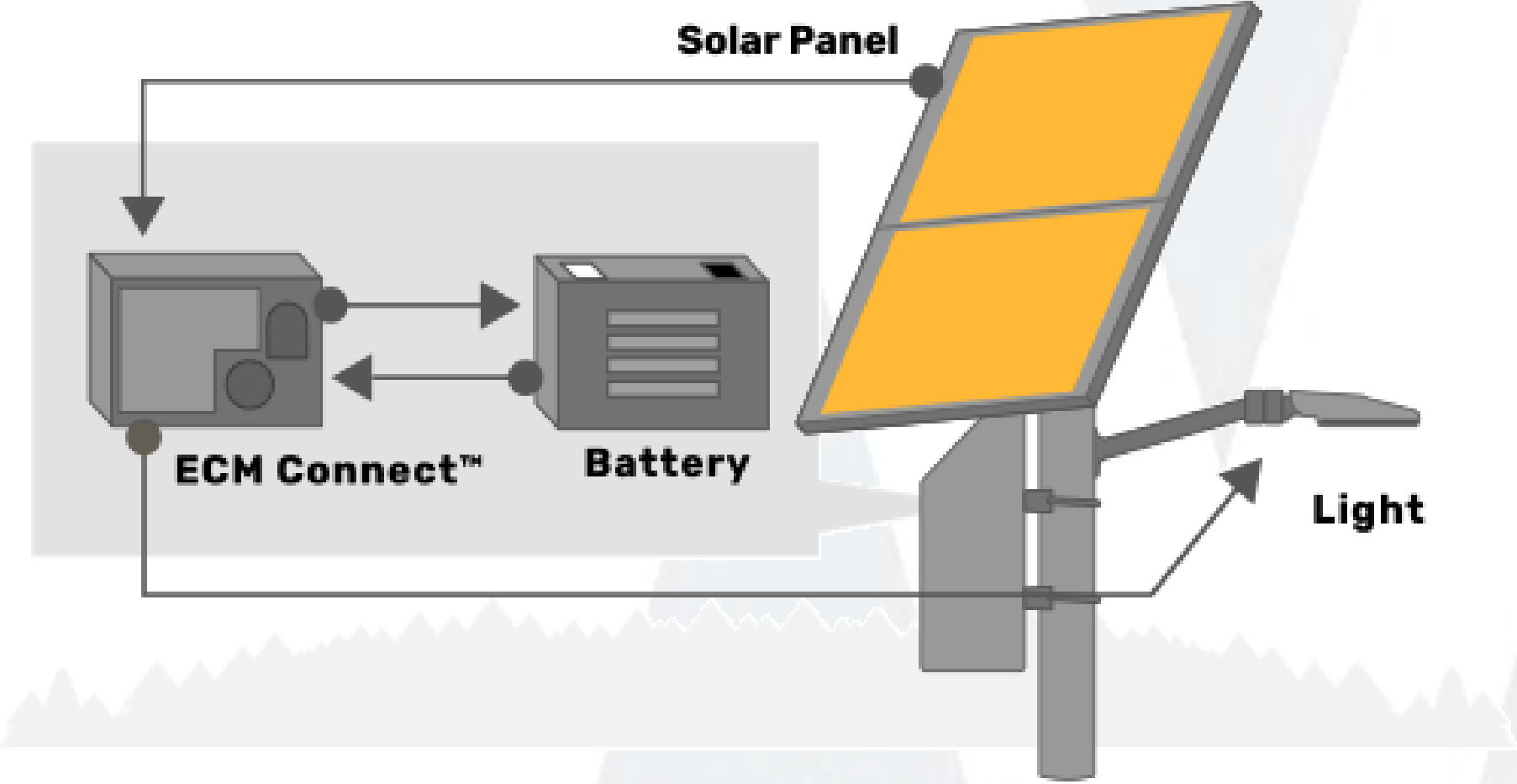
**6.**

Hang the lower part of the housing from the eyes in the upper housing and plug the PV connection together.

**7.**

Holding the assembly together, insert the 8 cover screws. Note: insert at least one center screw in each side of the assembly before letting go.

# How Solar Lighting Works



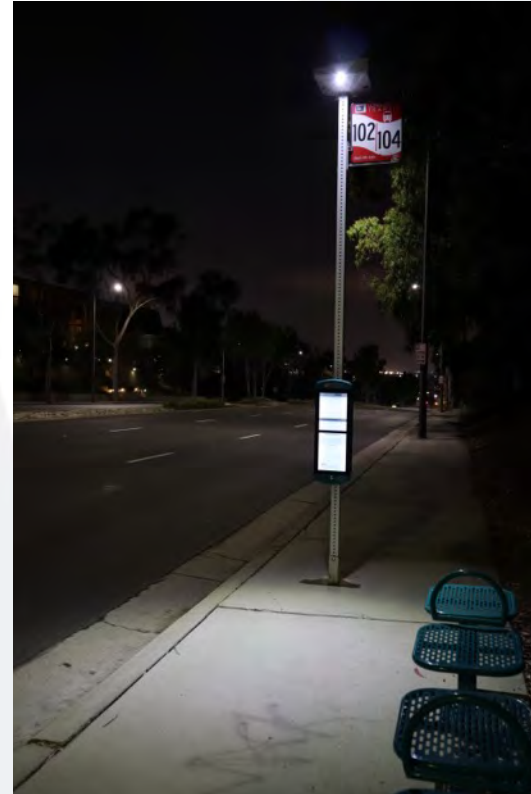
# Trinity Metro Solar Lighting

- **Started installing solar lights in 2010**  
(Majority of solar lights installed 2017-2020.)
- **156 standard shelters**
- **3 downtown shelters**
- **New shelters built with solar lights**
- **Cost savings when done together**



# Pole-Mounted Lighting Systems

- Easily deployed security lighting and optional digital signage
- Enhance security and reduce pass-bys
- Deploy at any bus stop with a standard transit pole
- UL Listed. Made in the USA.





# Contact Information

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