

# BUTLER UNIVERSITY'S SUNSET AVENUE GATEWAY

Presented by:  
McKenzie Beverage  
Sustainability Coordinator,  
Butler University

John Hazlett, LEED AP O+M  
Team Leader - Integrated Planning,  
Williams Creek



# BUTLER UNIVERSITY

- Founded in 1855
- 295 acre campus
- Located 5 miles north of downtown Indianapolis
- 60 major academic fields and 19 graduate programs
- Current enrollment: ~5,000 students





**BUTLER** UNIVERSITY



# SUSTAINABILITY & CLIMATE PLAN: WATER GOALS

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Short Term Goals	Mid Term Goals
Submetering	Low or No-Flow Fixture Retrofits
Create Awareness Campaigns	Rainfall Capture for Irrigation and Irrigation Sensors
	Graywater and Rainwater Reuse for Toilet Flushing

# SUSTAINABLE LANDSCAPE PLAN GOALS

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- Improve watering techniques
- Use sprinkler shut-off valves and timers
- Use porous pavement
- Plant rain gardens
- Install green roofs



# EXISTING GREEN INFRASTRUCTURE



Porous Pavement – West Parking



Rain Garden – Schrott Center



Rain Garden – Clowes Hall

# BUTLER UNIVERSITY SUNSET AVENUE GATEWAY



Sunset Avenue was redesigned based on a complete streets approach to accommodate pedestrians, bicycles, and vehicle traffic. In addition to multimodal transportation elements, the streetscape design also includes linear rain gardens to manage stormwater within the right of way and reduce the volume of stormwater discharged to the nearby White River and combined sewer system.



**First permeable asphalt bike lane** in the City of Indianapolis

Green Infrastructure elements anticipated to **reduce runoff by up to 50%**

Rain gardens **manage stormwater from largest impervious surface** on campus

**Reduce volume discharged** to the nearby White River and combined system

Streetscape design serves as **gateway** to campus and one of Indianapolis's only **Complete Streets model**



# CITY OF INDIANAPOLIS COMPLETE STREETS POLICY

City's Policy Element	Butler's Project Goals
Support integrated multimodal transportation	Accommodate future public transportation
Promote pedestrian safety	Traffic calming and connectivity
Accommodate bicyclists	Enhance bike safety

Sec 431-803 (c): "The City shall foster partnerships with neighboring communities, businesses and school districts to develop facilities that further the City's Complete Streets Policy"

City of Indianapolis \$1.5M

+

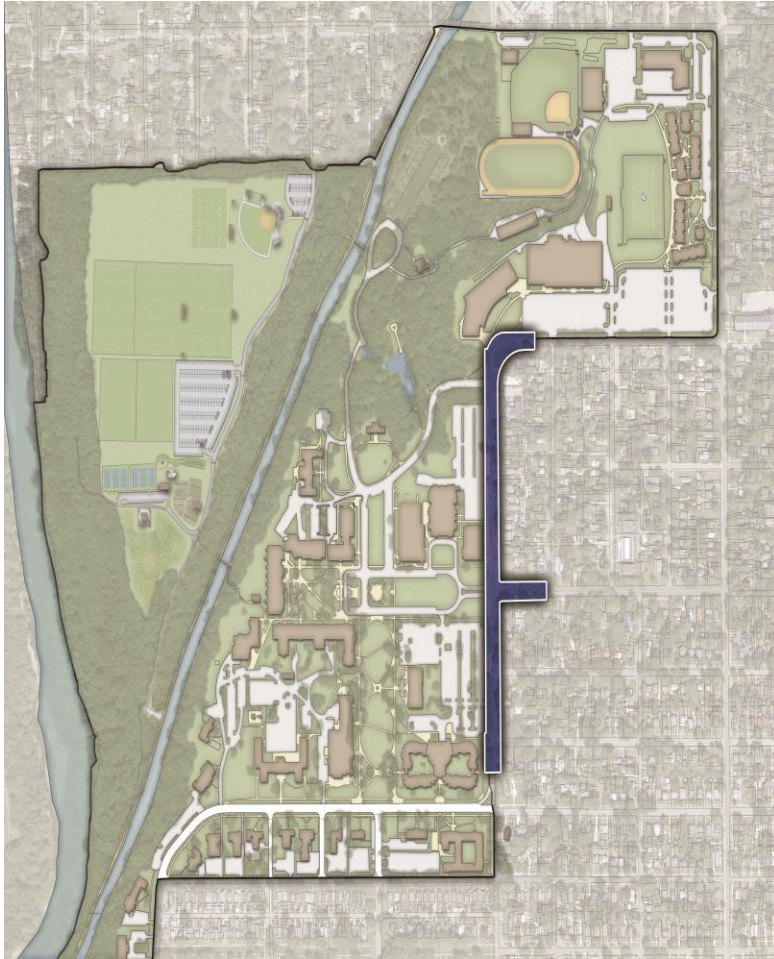
Butler University \$1.5M

**= \$3M Streetscape Project**





# SUNSET AVENUE GATEWAY + STREETScape



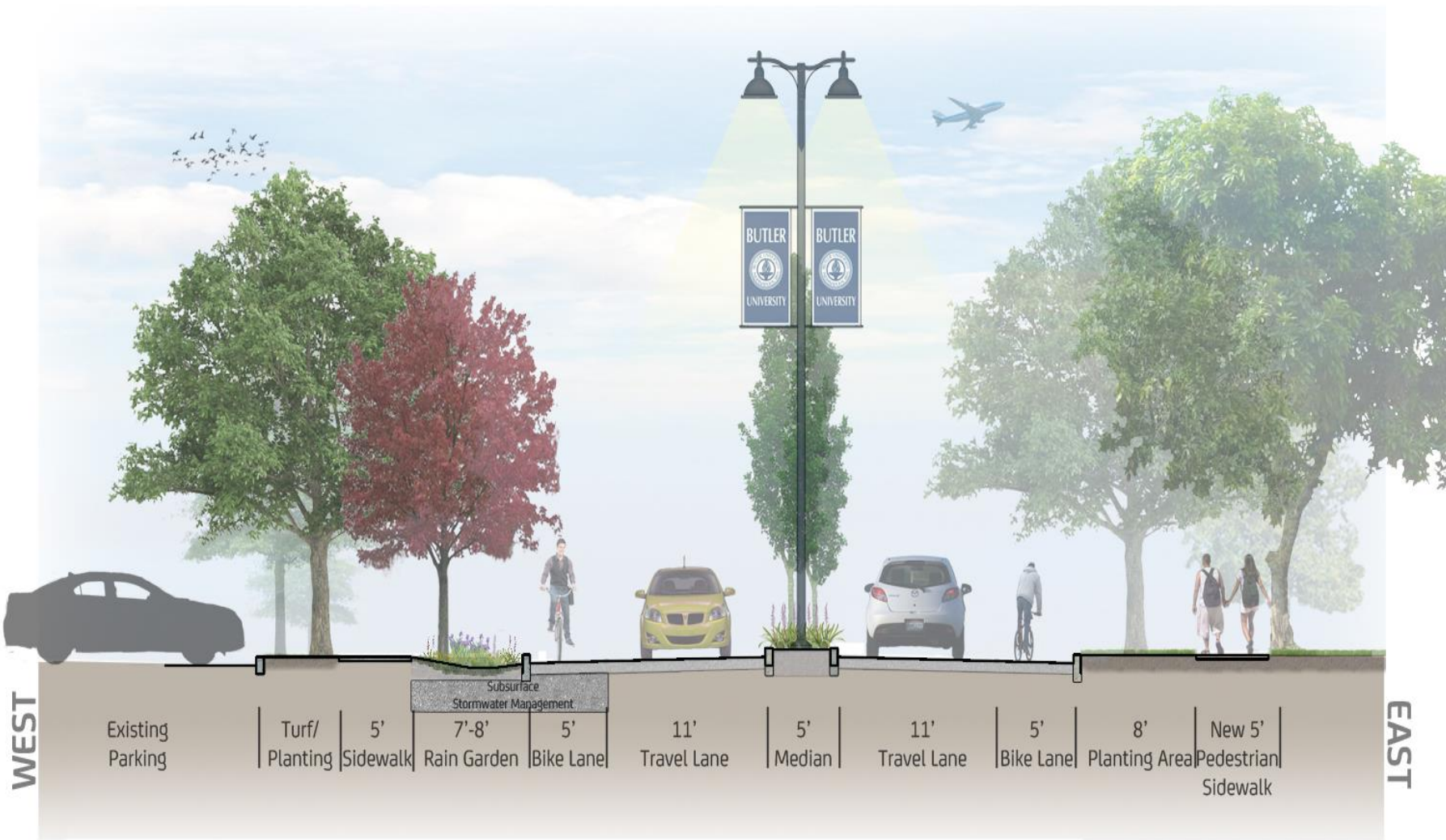


# EXISTING CONDITIONS

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# STREETSCAPE RETROFIT





# POROUS ASPHALT + SUBSURFACE STORAGE



- 5,500 sf Permeable Bike Lane
- Captures Runoff from West Side of Sunset Avenue
- Curb Turnouts & Subsurface Hydraulic Connection Divert Runoff to Rain Gardens

# LINEAR RAIN GARDENS

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- Native Plant Material
- Species Selection:
  - Inundation and Salt Tolerance
  - Limited Diversity
  - Showy Species vs. Wild & Wooly



# HINKLE FIELDHOUSE PARKING





# HINKLE FIELDHOUSE RAIN GARDENS

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# PERMEABLE BUS TURNOUT



- Captures Hinkle Fieldhouse Runoff
- Permeable Pavers – 5,000 sf
  - Incorporated into Median Design Campus Standard Paver
  - Use on other GI Projects Throughout Campus

# PERMEABLE BUS TURNOUT

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# HINKLE FIELDHOUSE RAIN GARDENS

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# GREEN INFRASTRUCTURE MAINTENANCE

Inspection Activities	Required Frequency
Inspect to ensure that pavement was installed and functioning properly.	Post-construction
Inspect areas for potential erosion or damage to vegetation.	
<b>Porous Asphalt Pavement Surface</b>	
Visibly inspect for evidence of sediment, debris (e.g., mulch, leaves, trash, etc.), ponding of water, oil-dripping accumulations, clogging of pores and other damage.	Monthly
Inspect the surface for structural integrity. Inspect for evidence of deterioration or spalling.	Annually
<b>Adjacent Areas</b>	
Visibly inspect exposed soil in areas discharging and adjacent to porous asphalt pavement.	Annually or After Major Storm Event
Ensure that the contributing area upstream of the porous asphalt pavement is free of sediment and debris.	
Determine if adjacent areas have adverse affect on porous asphalt pavement.	
<b>Overflow Devices</b>	
Inspect overflow devices (pipes and inlets) for obstructions or debris that would prevent proper drainage when filtration capacity is exceeded.	Annually or After Major Storm Event

**Maintenance**

Maintenance responsibilities shall remain in effect for the life of the BMP from the date the construction is completed. The majority of porous pavements function well with little or no maintenance. Maintenance of porous asphalt pavement consists primarily of prevention of clogging of the void structure. Vacuuming annually or more often may be necessary to remove debris from the surface of the pavements. Other cleaning options may include power blowing and pressure washing.

Maintenance Activities	Required Frequency
Remove excess sediment from construction area and stabilize adjacent areas with vegetation.	Post-construction
Prevent soil from being washed onto pavement by ensuring that adjacent areas are stabilized. Keep landscape areas well maintained with lawn clippings removed to prevent clogging pavement.	Annually, as needed
Rake and remove fallen leaves and debris from deciduous trees and shrubs to reduce the risk of clogging.	
Remove debris and clear obstructions from overflow devices (pipes and inlets).	
If ponding is observed in grass areas, and elevated overflows do not drain, perform water jet cleaning of underdrains	2-3 times per year
Vacuum sweep porous pavement (with proper disposal of removed material), followed by high pressure hosing (when needed) to free pores on the surface.	
If ponding persists, clogged porous asphalt pavement must be repaired or replaced.	If failure exists

**PERMEABLE INTERLOCKING CONCRETE PAVEMENT BMP INSPECTION CHECKLIST**

Site Name \_\_\_\_\_  
 BMP – ID \_\_\_\_\_  
 "As Built" Plans Available? \_\_\_\_\_  
 Inspection Date \_\_\_\_\_ Inspection Time \_\_\_\_\_  
 Days Since Previous Rainfall \_\_\_\_\_ Depth of Previous Rainfall \_\_\_\_\_

Maintenance Item	Satisfactory or Unsatisfactory	Notes
<b>Permeable Pavement Surface</b>		
Sediment		
Debris (leaves, mulch, trash, etc.)		
Ponding of water		
Oil-dripping accumulations		
Other: _____		
Structural Integrity		
Other: _____		
<b>Adjacent Area</b>		
Erosion from underdrain		
Exposed soil in discharge area or adjacent to porous pavement area		
Sediment accumulation		
Other: _____		
<b>Overflow Devices</b>		
Debris (leaves, mulch, trash, etc.)		
Other: _____		
<b>Actions to be taken:</b>		
<b>To be Completed by (Date):</b>		



# PAVER MAINTENANCE





# HINKLE RAIN GARDEN REHAB





# LESSONS LEARNED

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- Leveraged funding and stormwater credits
- In house maintenance requirements
- Construction site stabilization

# BEFORE + AFTER





# BEFORE + AFTER



**BEFORE**



**AFTER**

# BEFORE + AFTER



**BEFORE**



**AFTER**



# BEFORE + AFTER



# BEFORE + AFTER





# BEFORE + AFTER



**BEFORE**



**AFTER**

# BEFORE + AFTER



BEFORE



AFTER



# QUESTIONS

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McKenzie Beverage  
Sustainability Coordinator  
Butler University  
[mbeverag@butler.edu](mailto:mbeverag@butler.edu)  
317.940.6505

John Hazlett  
Team Leader-Integrated Planning  
Williams Creek  
[jhazlett@williams creek.net](mailto:jhazlett@williams creek.net)  
317.430.2154