

MORE COMPLETE GREEN STREETS

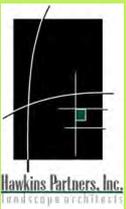
CUMBERLAND  
RIVER  
COMPACT

JUNE 2016



Kim Hawkins, ASLA | Hawkins Partners, Inc. @hpikhawk  
Mark Macy | Metro Public Works  
Jenna Smith | Metro Public Works

**Metro Nashville**  
**Public Works**



April 2009

**16 goals**  
**71 recommendations**

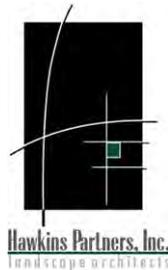
**TOGETHER**  
MAKING  
NASHVILLE  
**GREEN**



The Metropolitan Government of Nashville and Davidson County  
**Green Infrastructure Master Plan**



**amec**



November 1, 2009



# MORE COMPLETE GREEN STREETS

Mayor Barry  
Green and  
Complete  
Streets  
Executive Order  
May 23, 2016

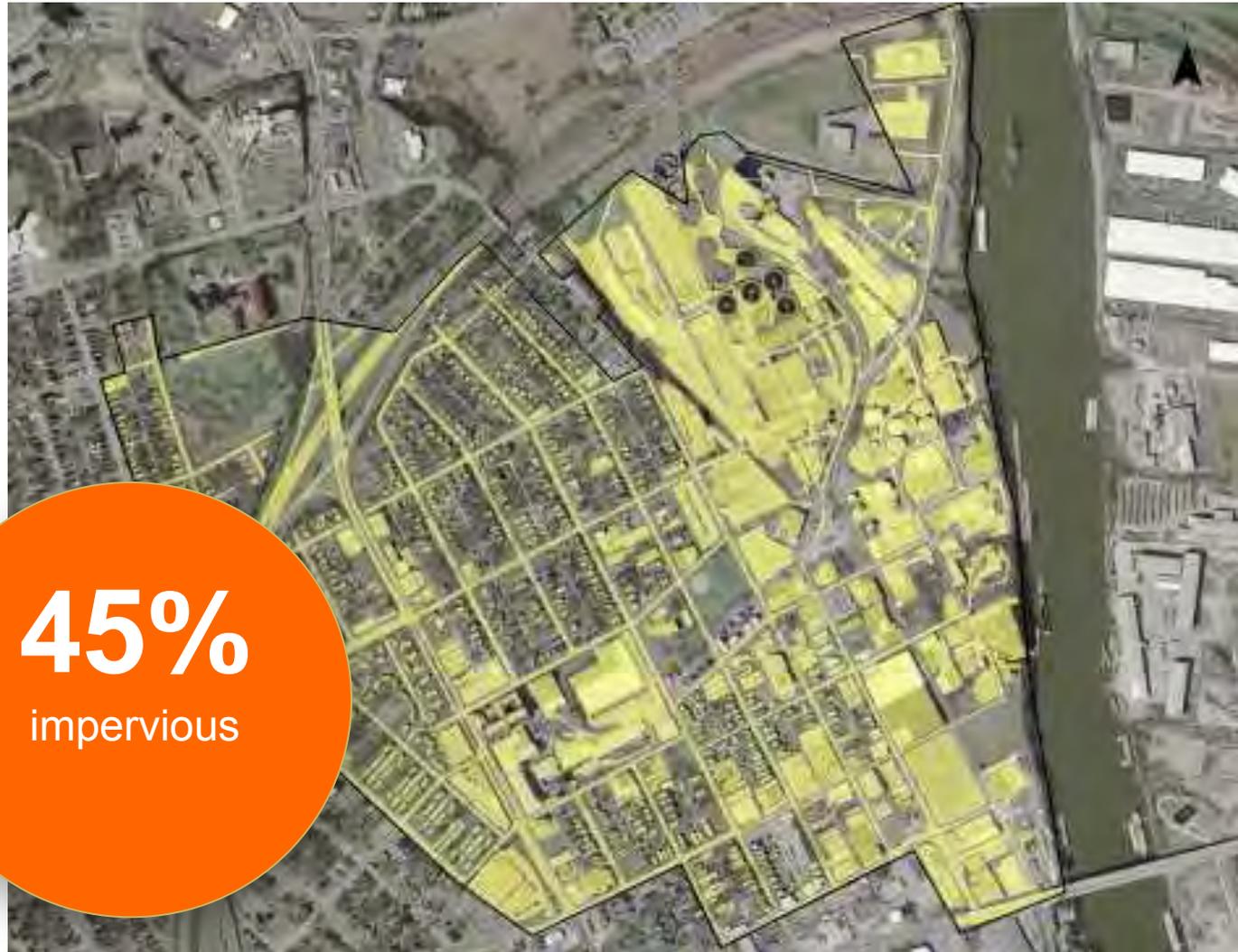


MORE COMPLETE GREEN STREETS

Total  
Impervious Area  
within  
Van Buren  
Sector

16% Buildings  
14% Roads  
15% Parking

**45%**  
impervious





## MORE COMPLETE GREEN STREETS



Existing Documented LID Projects			BMP Used						Project Notes	Basin		
Source	Project	Address	Within CSS Area	Water Harvesting	Constructed Wetland	BioRetention Areas	Water Quality Swales	Green Roof			Infiltration Trench	Permeable Pavement
HPI	AT&T Building/ Plaza	333 Commerce Street	x					x			Green Roof - Intensive	1st & Broadway
Misc	Martin Corner 3	200 11th Street (East Nashville)	x			x						Boscobel
TCA	TN Concrete Association Offices	705 Fort Negley Court	x							x		Driftwood
HPI	Tennessee Association of Realtors	901 19th Avenue South	x			x				x	Pervious Concrete/ Bioretention	Kerrigan
HPI	Public Square	One Public Square	x	x				x			Green Roof - Intensive	Kerrigan
HPI	Adelicia	900 20th Avenue South	x					x			Green Roof - Semi-Intensive	Kerrigan
HPI	Deaderick Street		x			x				x	Green Street bioswales/ Pervious	Kerrigan
HPI	1700 Charlotte	1700 Charlotte Avenue	x			x					Bioswales in parking lot	Kerrigan
Misc	Vanderbilt Student	230 Appleton Place	x			x				x		Kerrigan
Misc	West View Lofts	179 8th Avenue North	x					x			Green Roof - Intensive	Kerrigan
TCA	Trouth Theater	2100 Belmont Avenue	x							x	Parking Lot	Kerrigan
Misc	Neuhoff	1300 Adams Street	x					x				Van Buren
Misc	Werthan Mills	1400 8th Avenue North	x					x			Green Roof - Extensive	Van Buren
Misc	Morgan Park Place	707 Monroe Street	x			x				x	Porous Concrete	Van Buren
TCA	Private Residence	Germantown	x							x	Parking Area	Van Buren/Kerrigan
HPI	5th and Main	501 Main Street	x					x			Green Roof - Extensive	Washington
Misc	West Eastland Townhomes	West Eastland and McFerrin (East Nashville)	x			x					Rain Gardens	Washington
TCA	Pilot Gas Station	6418 Centennial Blvd								x		
TCA	South Inglewood Park	East Nashville - 1625 Rebecca Ave.								x		
HPI	Pinnacle at Symphony Place	150 3rd Avenue South						x			Green Roof - Extensive/Semi-Intensive (under construction)	
HPI	Javanco/ Mercury View	401-501 12th Ave South				x				x	Washed Aggregate Stone	
HPI	Hilton/ Gateway Park	121 4th Avenue South						x			Green Roof - Intensive	
HPI	Terrazzo	12th and Division						x			Green Roof - Extensive	
HPI	Freeman Webb	3810 Bedford Avenue						x			Green Roof - Extensive/Semi-Bioswales, Water harvesting	
HPI	Hill Center - Green Hills	4039 Hillsboro Pike	x			x					Bioswales, Water harvesting	
HPI	Hill Center - Belle Meade	4340 Harding Pike	x			x					Bioswales, Water harvesting	
HPI	NFL Stadium									x	Reinforced Turf paving	
HPI	Dorset Park (GWP)	Granny White Pike								x	Bio-retention areas	
HPI	Southgate	3821 West End Avenue						x			Rain Garden/ Bioswale	
HPI	Private Residence	4443 East Brookfield, Belle Meade								x		
BOB	Carden Avenue Rain Garden	Carden Avenue (Whitland Neighborhood)				x						
Misc	Howard School (Metro)	700 Second Avenue South						x		x	Pervious asphalt and WQ swales	
Misc	Vanderbilt 100 Oaks	719 Thompson Lane				x	x				Bioswales in parking lot	
Misc	Shelby Bottoms Nature Center	1900 Davidson Street						x			Green Roof - Extensive	
Misc	Beaman Park Nature	5911 Old Hickory Blvd								x		
Misc	Bells Bend Nature Center	4187 Old Hickory Blvd								x		
Misc	Ellington Agricultural	440 Hogan Rd.					x	x			Bioswales/ Rain Gardens	
Misc	West End Middle School	3529 West End Ave					x				Rain Garden??	
Misc	Montgomery Bell Acad.	4001 Harding Rd.									?? Planned features - BCA??	
Misc	MTSU Bus Transit Lot											
TCA	Music Row Parking	Music Row								x		
TCA	Walmart Supercenter	Nolensville Rd and OHB								x		
TCA	Friendship Christian	5400 Coles Ferry Pike								x		
TCA	Nashville Nissan	2030 Rosa Parks Blvd								x		
TCA	Nashville Skyline	3460 Dickerson Pike								x		
TCA	Nashville Opera	Sylvan Park - 3622 Redmon St.								x		
TCA	Green Hills YMCA	Green Hills - 4041 Hillsboro Circle								x		
TCA	Global Motorsports	Brentwood - 7116 Moore's Ln.								x		
TCA	Avenue Bank	Green Hills - 3823 Cleghorn Dr.								x		

MORE COMPLETE GREEN STREETS

DEADERICK STREET RENOVATION

- The first green street in the State of Tennessee to incorporate LID features within the public right of way.
- The second green street in the Southeast.
- Shift from transit and narrowed street section.



## MORE COMPLETE GREEN STREETS

### PRIMARY LID DESIGN ELEMENTS:

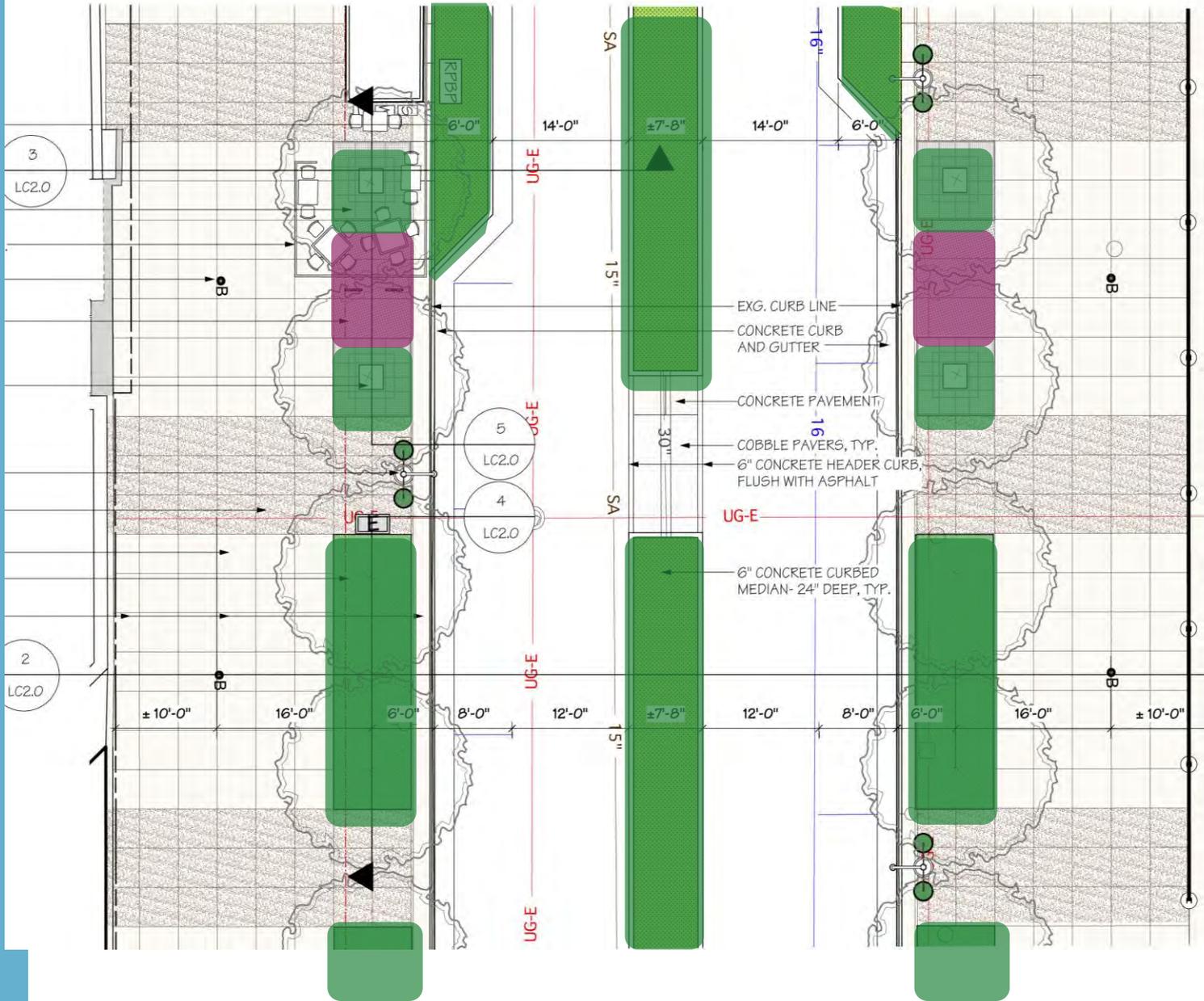
- Continuous street trees and rain gardens on both sides of the street.
- Pedestrian bulb outs with bioretention.
- Additional central median.
- Pervious concrete pavement to reduce runoff.



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STREET TREES -  
TREE GRATES  
AND RAIN  
GARDENS

- 8' x 8' tree grates
- Sidewalks drain into 8' wide rain gardens
- 1-2% cross slopes
- Porous Concrete over structural soils
- Average root zone of 125 SF / tree



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**STREET TREES -  
BEFORE AND AFTER**

- Greater long-term viability

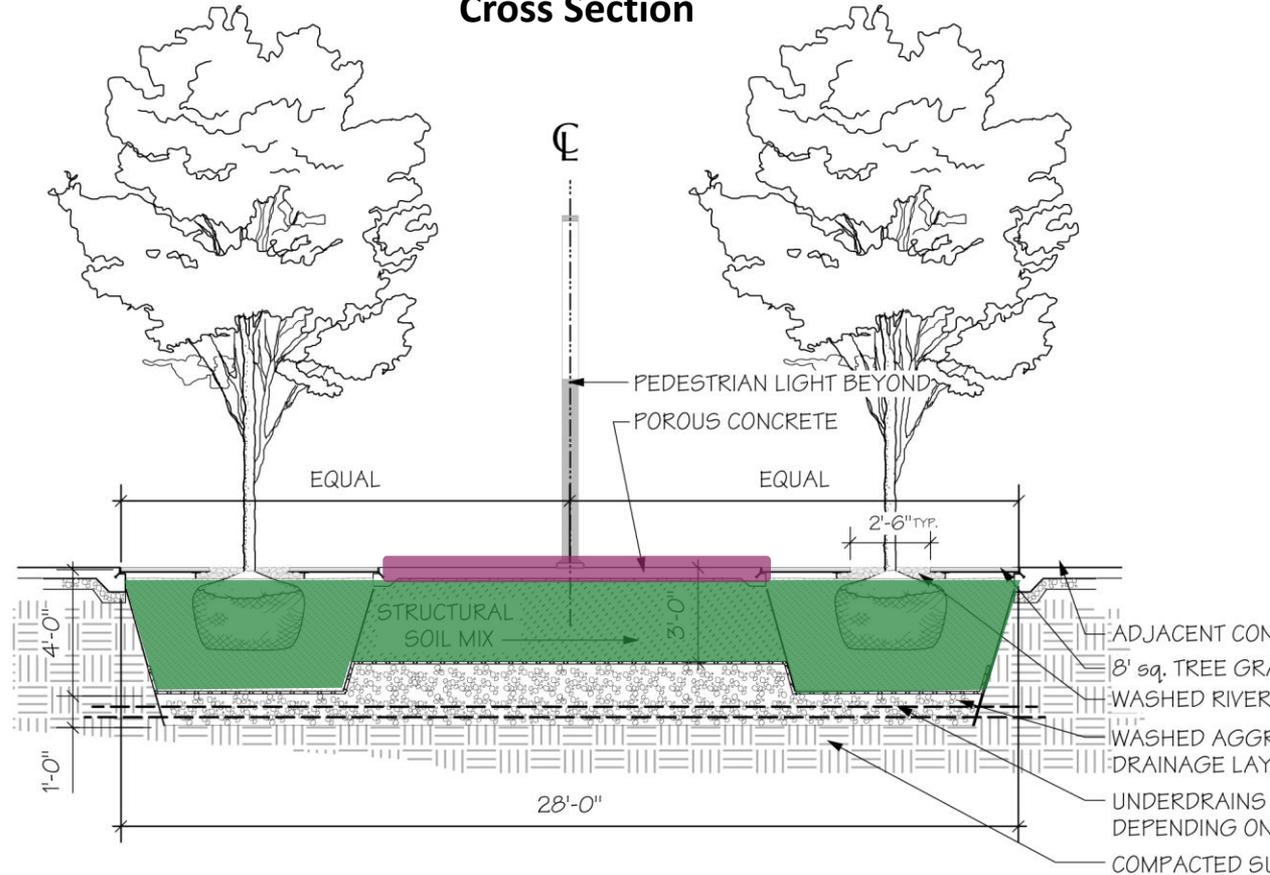


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POROUS CONCRETE AND TREE GRATES

- 3' deep trench of structural soil between trees
- Capped with 4" of porous concrete
- Provides more walking area

Tree Grate Cross Section



5 CROSS SECTION - Through Planting Zone "B"  
SCALE: 1/4" = 1'-0"

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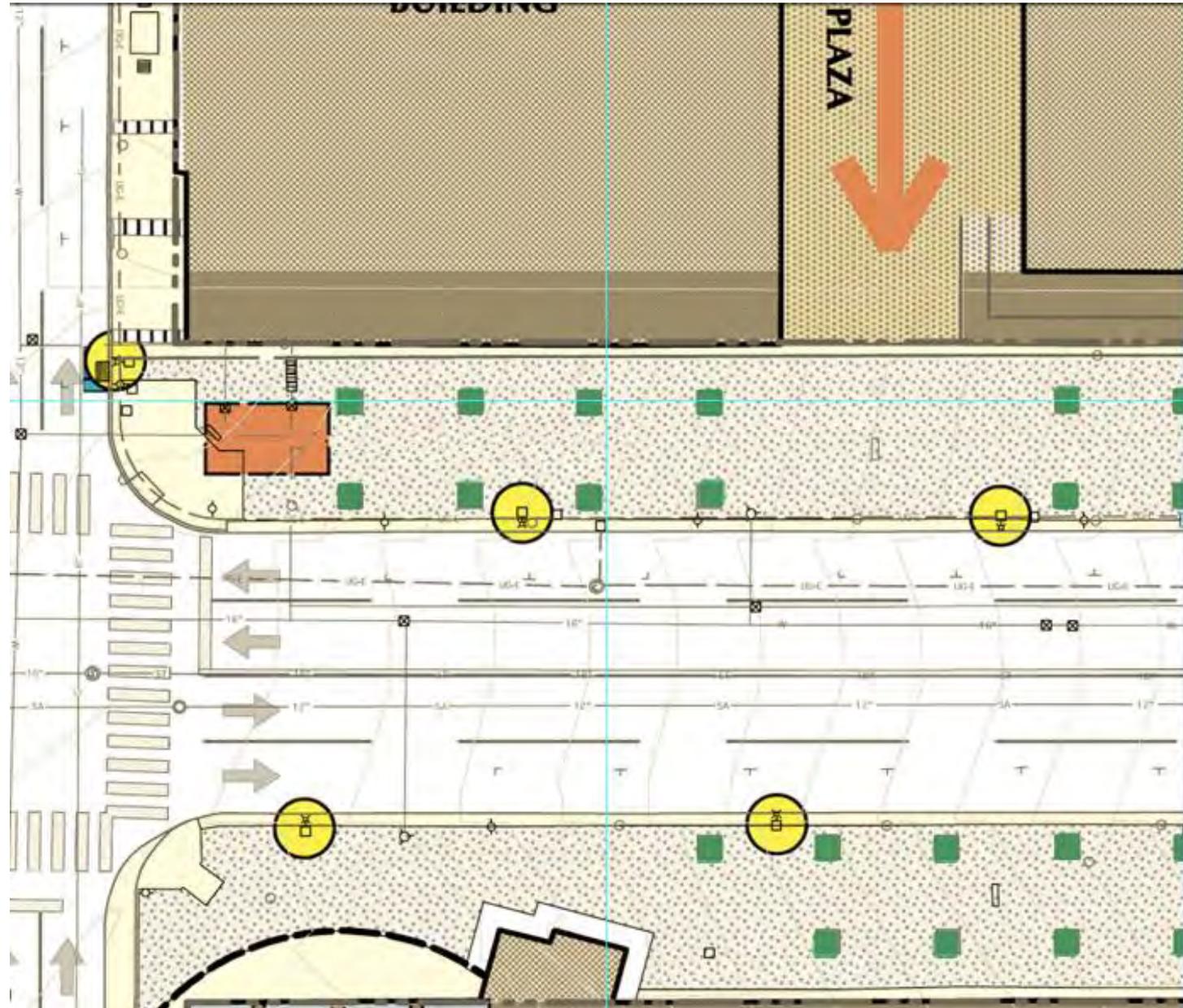


**Structural Soil and Pervious  
Concrete Installation – in  
progress**

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PERMEABLE SURFACES

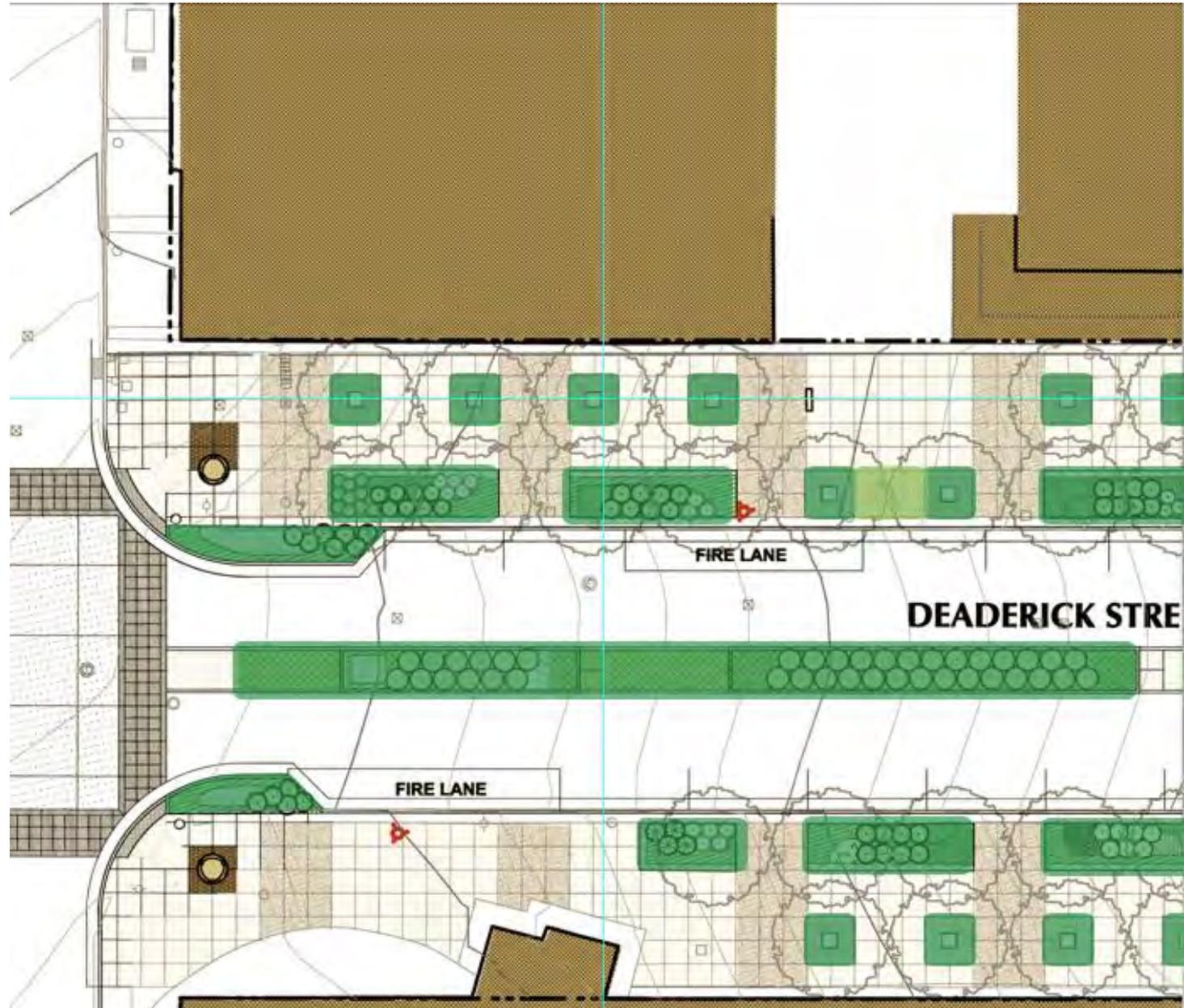
- 700% increase in permeable surfaces
- Previous condition 4' x4' tree grates only



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PERMEABLE SURFACES

- 700% increase in permeable surfaces
- 8' x8' tree grates
- Rain gardens
- Pedestrian Bulb outs
- Median
- Porous Concrete



## PEDESTRIAN BULB OUTS

- Addition of 12,000 s.f. of planted area in rain gardens or bioswale areas.
- Required a 2' depth of engineered soil.
- Incorporate existing storm drain



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**STORMWATER RESULTS**

- Inlets at bioswales designed with modified curb grate and pavers set at varying levels for storm dissipaters.
- Additional capture areas and depth of bioswales divert approximately **1.2 million** gallons of stormwater per year from the Cumberland River.



MORE COMPLETE GREEN STREETS

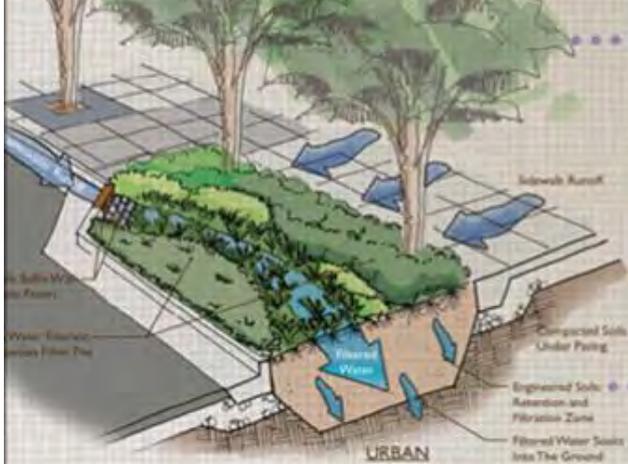
EDUCATIONAL AWARENESS

- 8 wayfinding kiosks were custom designed to include environmental graphic panels which interpret the 'green' benefits of the new streetscape.
- The citizens of Nashville can readily understand the overall environmental benefits to the community created by the redesign.
- The signage also celebrates and interprets the street's historical significance.

CLEANING STORMWATER IN DEADERICK STREET

When rain falls, rain washes dirt particles and pollutants from the surface into the ground. The soil and plants act together as filtering mechanisms to cleanse the water as it makes its way to streams and rivers. When urban rains run off paved surfaces or roofs, they eventually drain to rivers or lakes. If unfiltered, this untreated rainwater reaches our water bodies, it is unfavorable for plants and wildlife and affects our drinking water.

Urban rain gardens are a way to remove typical contaminants before rainwater reaches the storm drains and ends up in our water bodies. Providing depressed landscaped areas where the water from the street can collect and slowly filter into the soils and through the plant material is a means of removing pollutants. This method of treating stormwater mimics the natural hydrologic cycle by relying on biological processes to improve stormwater.



Sustainability STORMWATER

**MAKING A GREEN STREET**

After Redevelopment Authority

**700% Increase In Green Space**

Full streetfront  
Full streetfront

**HELPING THE CUMBERLAND**

The improvements on Deaderick Street divert up to approximately

**1.2 million gallons** of stormwater from the Cumberland River, allowing it to infiltrate ground instead.

**POROUS CURBS**

Deaderick Street curb is made of porous concrete. This allows rainwater to filter into the ground, reducing runoff.

**PLANTS**

Plants and grasses at their most lush.

People who will not sustain trees will soon live in a world which C

**URBAN TREES**

**WHY ARE STREET TREES IMPORTANT?**

Street trees are proving to be a great value for urban spaces. An average street tree costs about \$300 to plant and can return over \$90,000 in direct benefits over the course of its lifetime. Just a few of the benefits include pollution removal, improved air quality, energy savings, reduction of the urban heat island, and improved water quality.

The removal of harmful air pollutants and the benefits to storm water runoff are two of the most important benefits of urban trees. Trees actually absorb air pollutants into their leaves, making the air cleaner for us to breathe. One tree will hold up to 13 pounds of carbon in its canopy per year. Street trees can also hold an enormous amount of water in their canopies. Just one tree can reduce stormwater runoff by over 4,000 gallons per year!

The social benefits of street trees are also exceptional. Trees lower hot summer temperatures and block the sun on the sidewalks. By providing shade, trees can lower the temperature of surrounding surfaces by 35 degrees! Street trees are considered to improve the visual quality of trees are identified as being one of the most important indicators for attractiveness in communities.

**TREES CAN LOWER SIDEWALK TEMPERATURES BY 35 DEGREES!**

OFFICE OAK LEAVES

## MORE COMPLETE GREEN STREETS

### BEYOND STORMWATER MANAGEMENT

- low flow irrigation nozzles, using 33% less water
- LED traffic signals, custom designed pedestrian, and guidance lighting
- solar powered parking meters
- recycled crushed concrete for sub-base for walks
- recycled coal fly ash in concrete
- recycled steel in streetlights, tree grates, site furniture and wayfinding kiosks
- additional bicycle racks





28th STREET

2.2 miles

DEADERICK STREET

# MORE COMPLETE GREEN STREETS

28<sup>th</sup>/31<sup>st</sup>  
connector



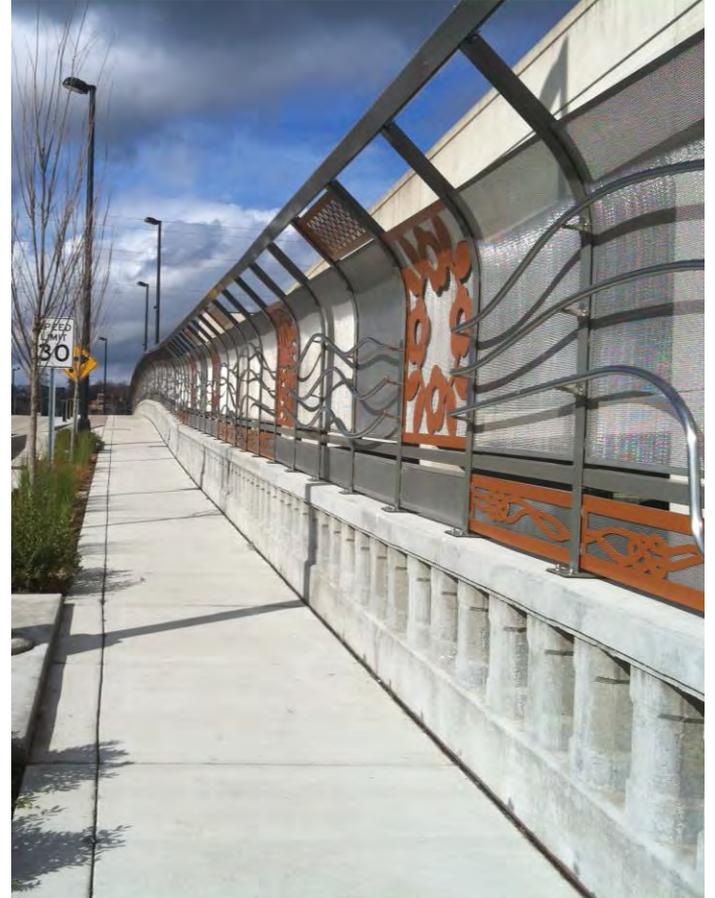
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28<sup>th</sup>/31<sup>st</sup>  
connector



# MORE COMPLETE GREEN STREETS

-Collaboration  
with artist,  
David Dahlquist



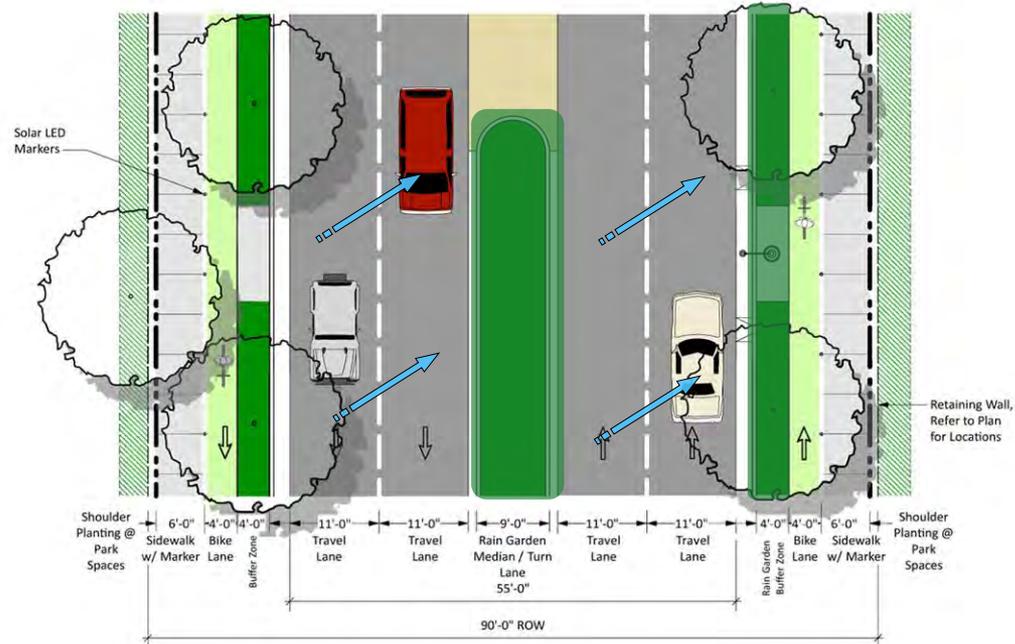
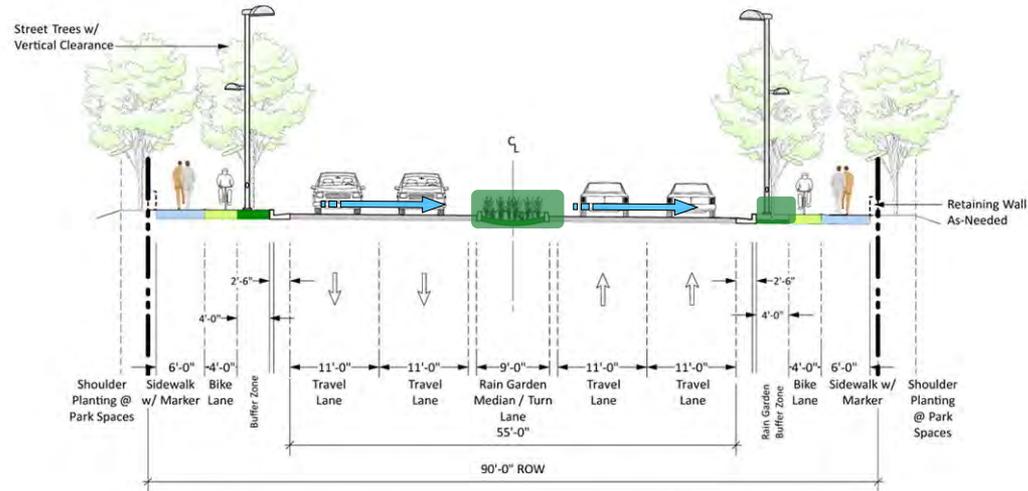
MORE COMPLETE GREEN STREETS

28<sup>th</sup>/31<sup>st</sup>  
connector



# MORE COMPLETE GREEN STREETS

## 28<sup>th</sup>/31<sup>st</sup> connector



MORE COMPLETE GREEN STREETS

28<sup>th</sup>/31<sup>st</sup>  
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# MORE COMPLETE GREEN STREETS

28<sup>th</sup>/31<sup>st</sup>  
connector



MORE COMPLETE GREEN STREETS

28<sup>th</sup>/31<sup>st</sup>  
connector



**Purpose :**

- Balance multi modal accessibility with aesthetic
- Improve quality of life for residents, visitors and businesses
- The project grew out of several discussions with the community

**MURPHY ROAD STREETSCAPE OVERALL PROJECT PLAN**



**Safety :**

- fewer conflict points for vehicles

**Efficiency :**

- 30 percent more traffic than typical intersections.



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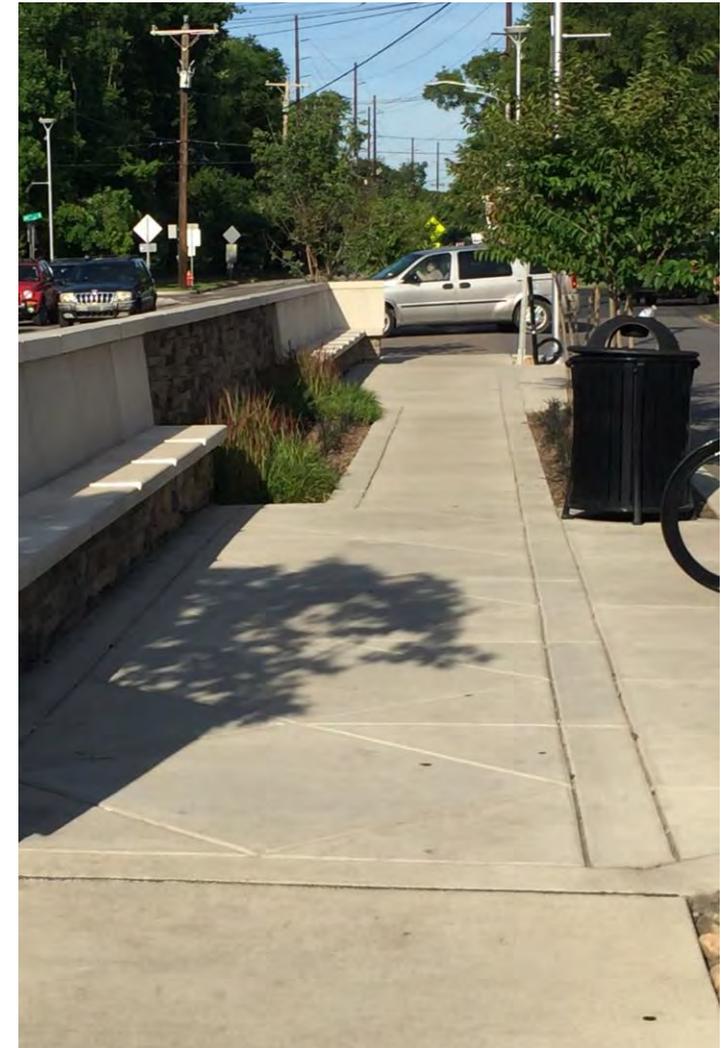
***Aesthetics:***

- The central island of the roundabout provides a space for native plants to grow
- Public art: tiles that were designed by local 3<sup>rd</sup> graders



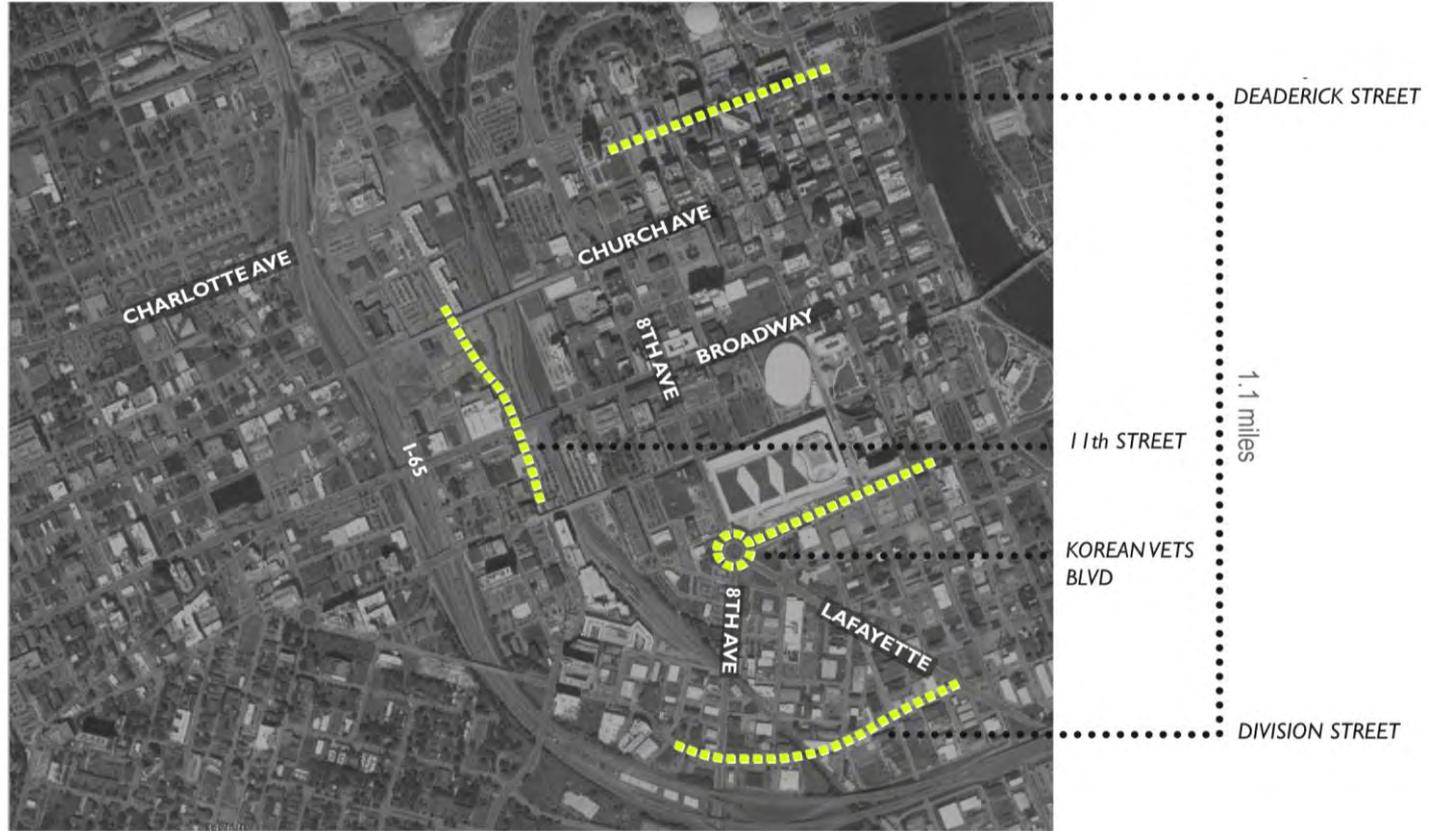
***Green and Complete Street Elements:***

- New sidewalks
- On-street parking
- Street lighting
- Landscaping

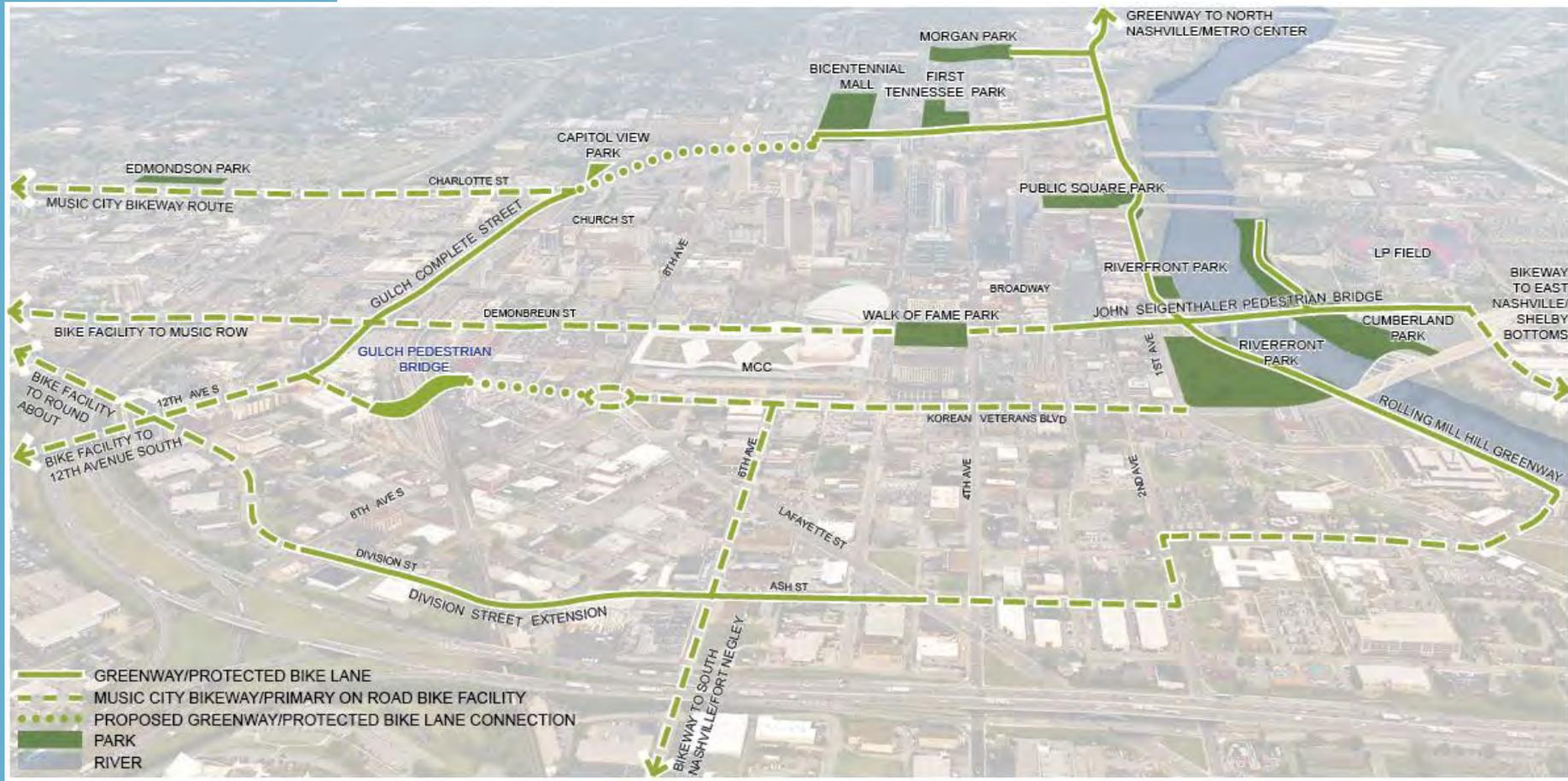


# MORE COMPLETE GREEN STREETS

## Downtown Green and Complete Streets



# Downtown Nashville Network



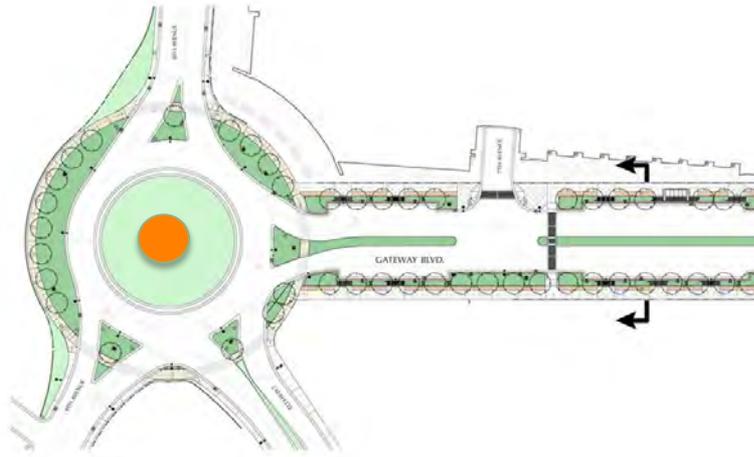
# MORE COMPLETE GREEN STREETS

korean  
veterans  
blvd.



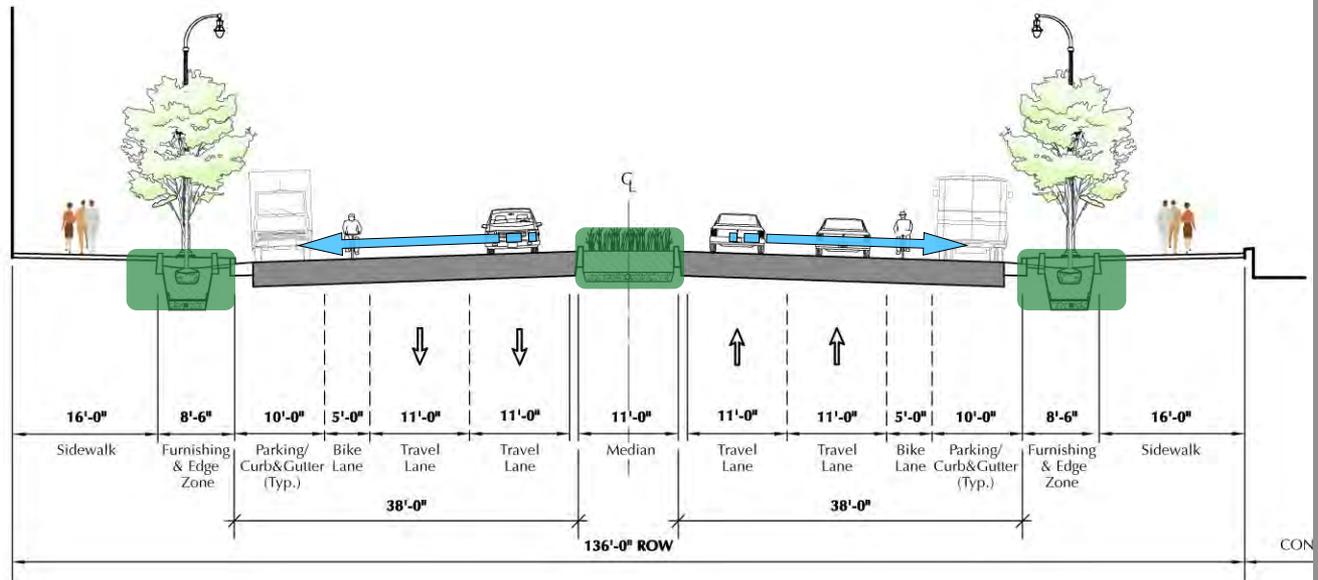
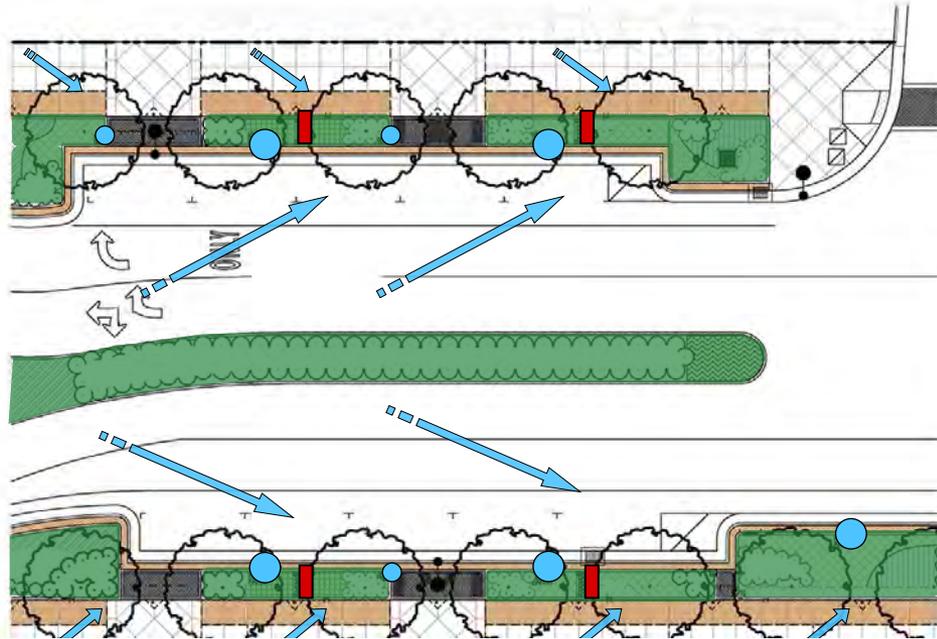
# MORE COMPLETE GREEN STREETS

korean veterans  
blvd.



# MORE COMPLETE GREEN STREETS

Korean Veterans Blvd.



CON

MORE COMPLETE GREEN STREETS

most complete: nashville style

korean veterans  
blvd.



korean veterans  
blvd.

**STORMWATER  
RESULTS**

- Inlets at bioswales designed with modified curb grate and pavers set at varying levels for storm dissipaters.



korean veterans  
blvd.

Changes:

- More capacity for stormwater
- Added waterproof membrane (now a standard detail)



## MORE COMPLETE GREEN STREETS

### Changes:

- More structured basins, stepped weirs
- More pervious concrete at street edge



## MORE COMPLETE GREEN STREETS

korean  
veterans  
blvd.

### STORMWATER RESULTS

- Additional capture areas and depth of bioswales divert approximately **3.2** million gallons of storm water per year.



# MORE COMPLETE GREEN STREETS

## *Lessons Learned:*

### **WATER RUNS DOWNHILL**

- Healthy skepticism
- Engineering over-design / lack of research for LID
- Maintaining green infrastructure.
- All pervious is not necessarily pervious



- Purpose :**
- Connectivity
  - Quality of life
  - 7 station fitness course
  - Creative use of recovered space
- Organization :**
- Community recommendations and plans
  - 3 large public meetings
  - Other public input and stakeholder meetings



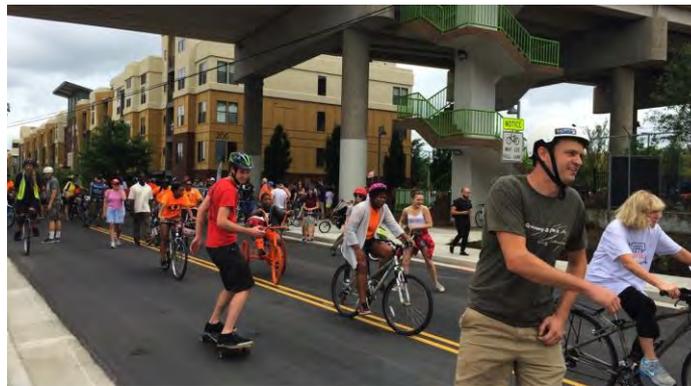
*Green and Complete Street Elements :*

- Multi-use path with separate bike paths and wide sidewalks
- Signalized pedestrian crossing



*Environmental “Green” design elements of the project include :*

- Roadside bioretention



## Gulch Pedestrian Bridge

- Providing critical connectivity
- Creating open space in area w great deficit



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First Avenue Roadway Improvements

Two Way Protected Cycle Track

Connections with Greenway System and Seigenthaler Pedestrian Bridge



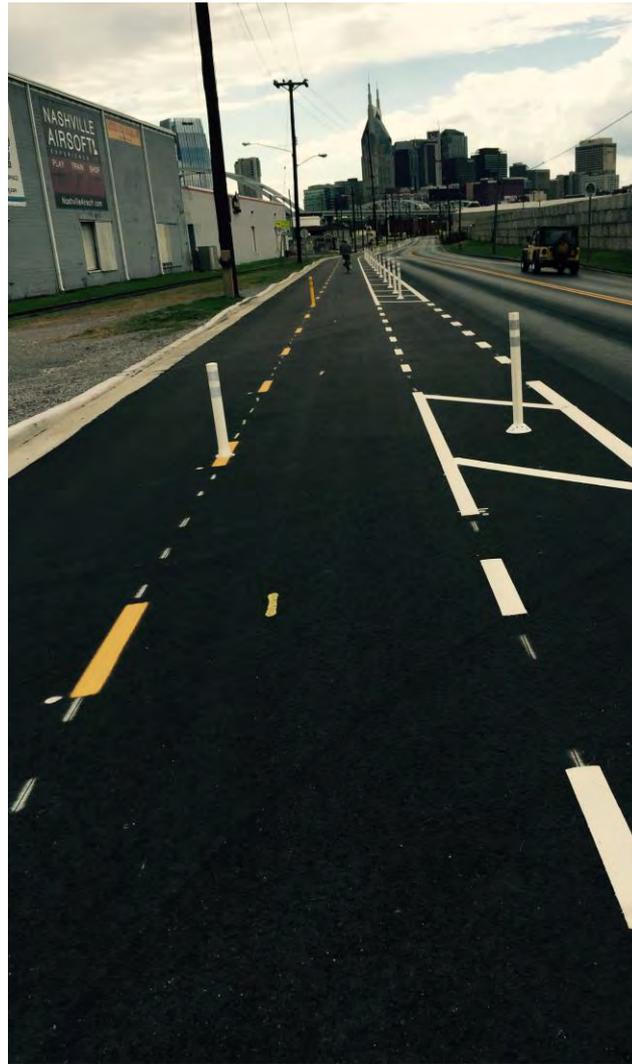


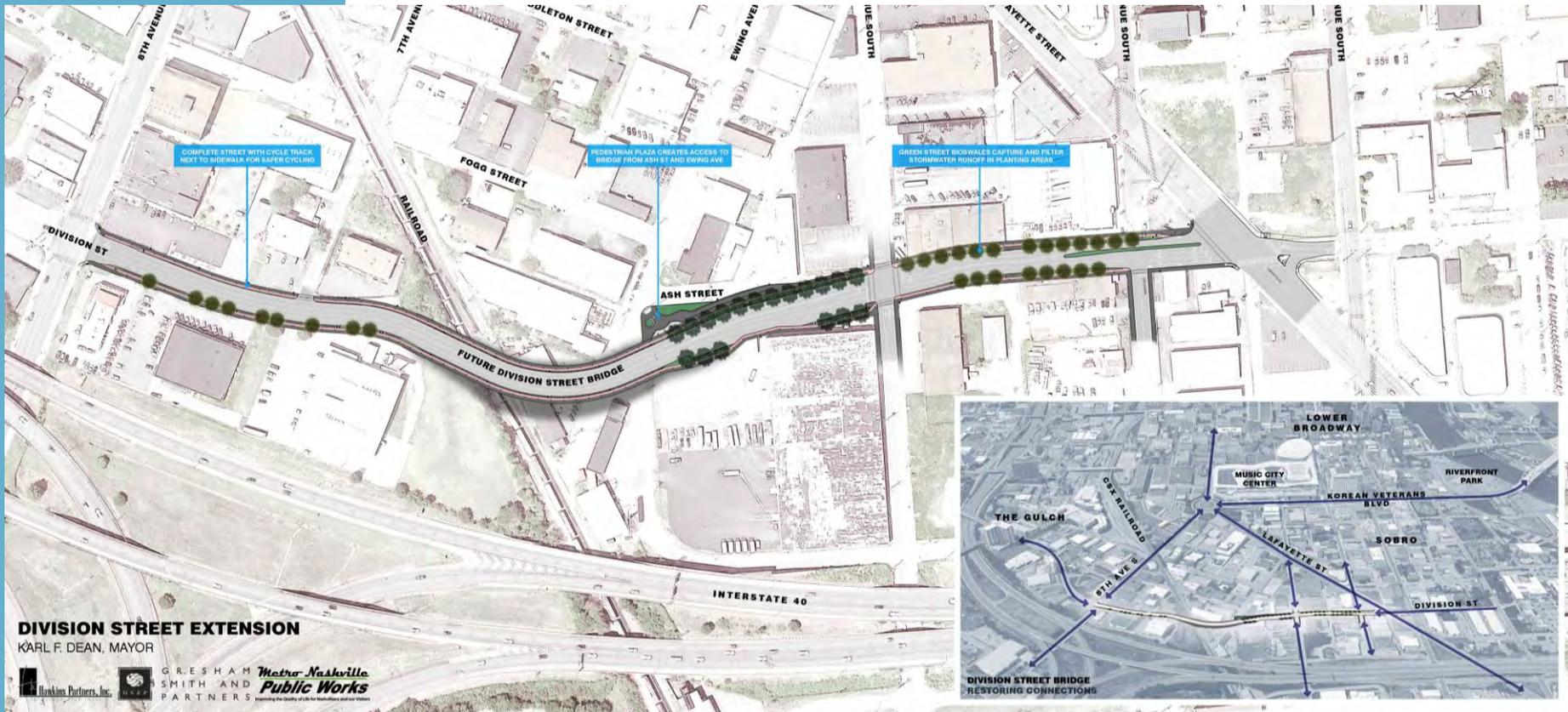
# MORE COMPLETE GREEN STREETS

## Davidson Bike Lane

### Purpose

- Connect downtown residents and tourist to Shelby Park and neighborhoods
- Improve safety of cyclists and pedestrians within an industrial corridor
- Improve water quality and reduce storm water runoff through green solutions





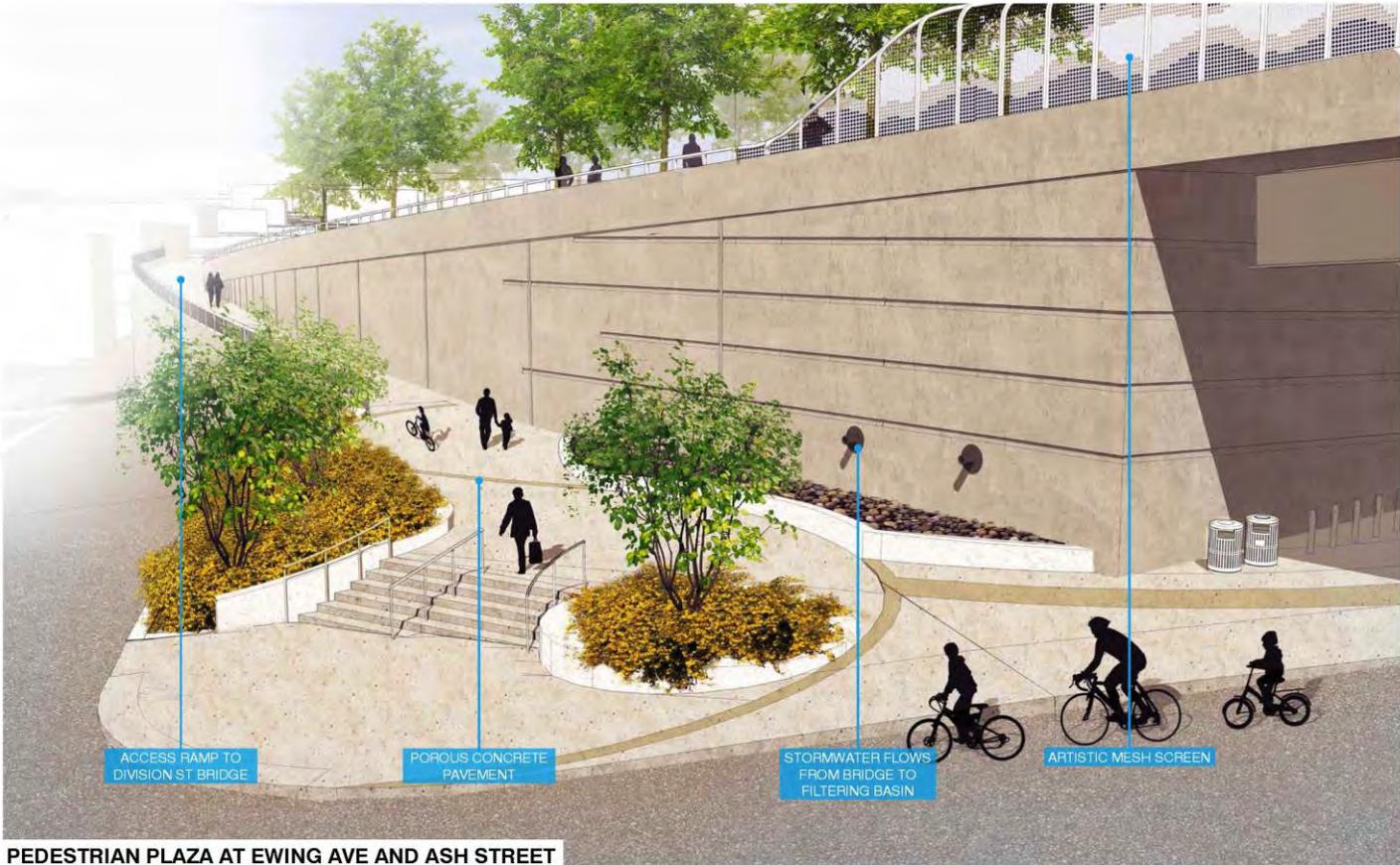
**DIVISION STREET EXTENSION**  
KARL F. DEAN, MAYOR

Hawkins Partners, Inc. GRESHAM SMITH AND PARTNERS *Metro Nashville Public Works*  
Restoring the Quality of Life for Nashville and its Region

MORE COMPLETE GREEN STREETS

Purpose :

- To allow for better Traffic Distribution in south downtown loop
- Provide new opportunities for infill development and connections between several Nashville neighborhoods





CYCLE TRACK  
PROVIDES SAFE ROUTE  
AWAY FROM CARS

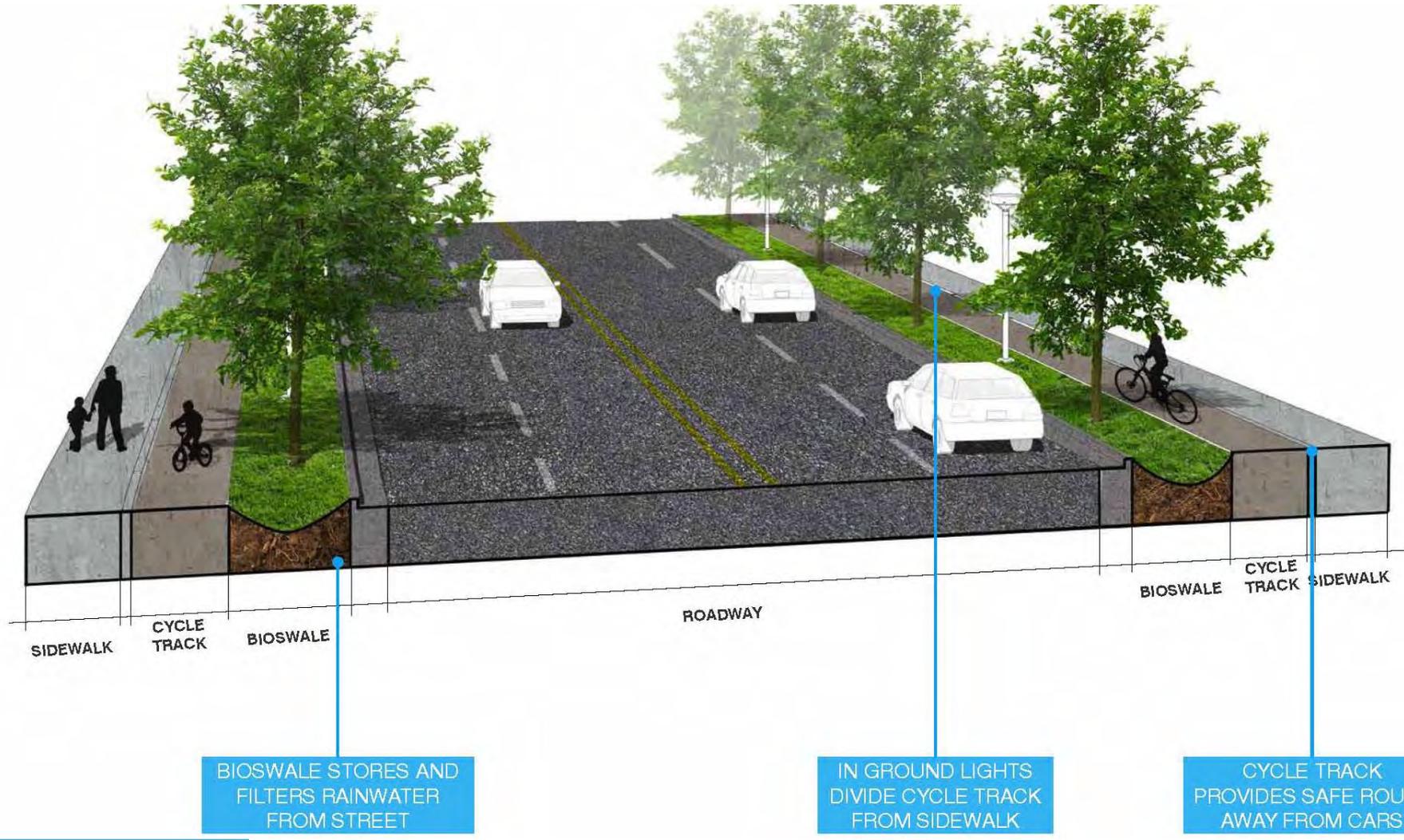
LED LIGHT RAIL

PROTECTIVE BOLLARDS

ARTISTIC MESH SCREEN

PLANTING BUFFER  
AND BIOSWALE

BRIDGE VIEW FACING WEST





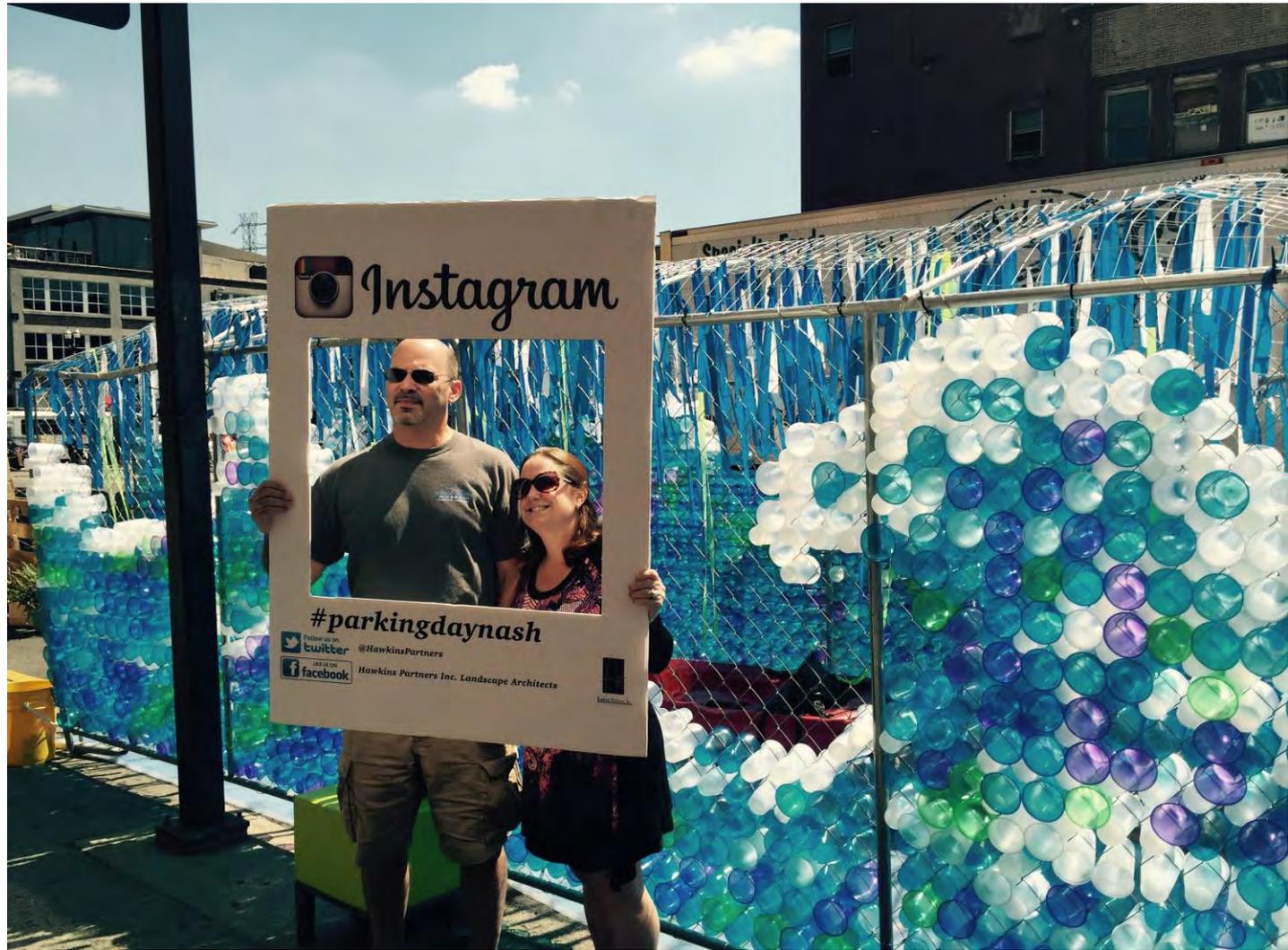
*Parking Day*

*Tactical Urbanism with Parklets*

*Optional use of space traditionally used for Vehicles*

*Reduction of vehicle lanes*





***Broadway  
Scrambler***

- Nashville's first diagonal crosswalks
- Signals all pedestrian traffic at an intersection at once
- Balances the needs of all modes of transportation through a vibrant area



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Mark Macy | Metro Public Works  
Jenna Smith | Metro Public Works

***Metro Nashville***  
***Public Works***

