Midtown Redevelopment Authority  . Walter P Moore  . Design Workshop
A New Look at LID in Houston
Bagby Street Corridor
AGENDA

• Introduction
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  • Philip Koske, PLA, AICP Principal, Design Workshop
  • Charlie Penland, PE, LEED AP Principal, Walter P Moore

• Description of Midtown

• Bagby Street Corridor Project

• LID Features in an urban environment
PRESENTATION GOALS

• Introducing Midtown and its potential
• Revealing a collaborative process between client, engineer and designer
• Integrating sustainable practices in street design
• Using metrics to convey a case for holistic sustainability
I. INTRODUCING MIDTOWN
midtown – a model of urban development

- Pedestrian-oriented urban community
- Centrally located in heart of Houston
- Vibrant, densely populated mixed use neighborhood
- Popular restaurants and dynamic nightlife
- State of Texas Cultural Arts and Entertainment District
midtown – a model of urban development

- Prime location is Midtown’s greatest asset
  - Close proximity to major freeways
  - Positioned between Houston’s two major employment centers – Downtown/Central Business District and Texas Medical Center
  - Three METRORail stations along Main Street
Midtown Redevelopment Authority / Tax Increment Reinvestment Zone (TIRZ) created in 1995

Abandoned and blighted area with insufficient infrastructure

TIRZ formed to foster economic development and eliminate blight

Funding provided through incremental taxes generated in Zone

Initial focused on multi-family developer agreements to increase number of residents

Currently administers proactive Capital Improvements Program (CIP) to stimulate development

midtown – a model of urban development
Blighted areas transformed into thriving, pedestrian-friendly mixed use neighborhoods

Vibrant, culturally diverse community

Active lifestyle

Increase in Population

- 1995 - under 1000 residents
- 2012 - ~ 9500 residents

Increase in Property Tax Base

- 1995 - $157 million
- 2012 - $1.2 billion
Midtown’s investment in Bagby highlights commitment to community

Highly visible and emerging mixed use district of the Zone

Vibrant, pedestrian-oriented node at Bagby and Gray intersection

Convenient southbound collector from I-45 to US-59

Conversion of fast-moving street into a balanced vehicle and pedestrian-friendly destination

Catalyst project for sustainability
Bagby – Why Low Impact Development?

- The origin of the project was the need for a new storm line to add capacity for upstream areas.
- Design team brought LID as an option.
- Midtown wanted to make a difference.
- LID provides a drainage and water quality solution that fits in with the image of this community.
- LID provided a cost savings to the project.
- The “Greenroads” designation added to the attention and value to the community.
II. BAGBY STREET
**DILEMMA & THESIS**

- **Dilemma:** the tension between a “Livable Center” and a “Commuter Thoroughfare” limits reinvestment potential in Midtown.

- **Thesis:** By creating quality systems along the entire stretch of the street, proving the real transportation value of the corridor AND focusing added value near key redevelopment parcels, the design will foster sustainability and advance the Midtown redevelopment trend.
**SUSTAINABILITY AND METRICS**

**ENVIRONMENT:**
- minimize excessive use and non beneficial planting
- reduce of heat island effect
- reduce of noise pollution
- increase green stormwater use
- reduce potable water use consumption
- improve localized air quality
- implement Green Streets Standards

**COMMUNITY:**
- provide community programming / interaction /function
- collaborate with community members
- foster unique neighborhood identity and character
- improve wayfinding and visitor experience
- Implement interpretive plan centered on green infrastructure
- engage community at key benchmarks

**ART/AESTHETIC:**
- provide a distinct and unique 'place'
- create a timeless experience
- focus on detailing
- implement public art as a long term benefit to the new cultural art district
- create an authentic interpretive program
- provide composition of form, texture, color, pattern in all materials

**ECONOMICS:**
- design and construct within budget
- tie improvements to potential return on investment (public and private)
- limit impact on business during construction
- Implement plan that is financially attractive for redevelopment
EXISTING TREES AND PEDESTRIAN FEATURES

- Trees were evaluated to determine their value to the community and human comfort
- Tree health, root growth conditions, soils, canopy disturbance, species
- Expanded rapid taper root zone area and advanced soil amendments
midtown – a model of urban development

- Bagby Street - one way southbound roadway near western edge of Midtown
- Reconstruction project is result of drainage study in 2008 to address flooding issues in area
- Existing drainage system had limited capacity and inadequate for current developments
- Project scope includes 60 inch storm sewer replacement, waterline replacement, and sanitary sewer upgrades
- Streetscape redevelopment including pavement reconstruction, landscape and hardscape upgrades, and relocation of overhead utilities
GreenRoads helps to define Bagby as exemplary corridor of Midtown

Incorporate innovative and sustainable solutions to enhance lifestyle of residents and visitors

Environmentally and economically sustainable for lasting vibrancy of community

Commitment to operation and maintenance of area by Midtown Management District to ensure long term value in Zone
MASTER PLAN: NOT A ONE SIZE FITS ALL
GREEN = GREEN

- WQ credits of rain gardens written into the PER
GREEN = GREEN
EPHEMERAL INTERPRETATION
RAIN GARDEN DESIGN

- Use the largest trees you can afford
- If detention is not a goal, consider stepping interior elevations
- Be sure proposed plant material will grow to heights that complement the depth of the feature
- Spend as much as you can on soils within the rain garden. This is particularly important if you have an impervious liner at the bottom of the feature. At best, 1 tree = 1,000cf of soil!
- When surveyed, observers rank trees highest and standing water lowest
- Understand the requirements and limitations of building features around utilities
- Provide edge protections and adequate crossings
III. DESIGN
DRAINAGE ISSUES

- Large 60” offsite pass through storm line
- City Standards potential conflicts
  - 24” minimum storm line
  - Inlet standards
- Impact mitigation
- Water Quality
Residents are interested in the function of LID features but more interested in positive impacts on downstream recreational amenities.
BACK OF CURB IMPROVEMENTS

- Street furnishings
- Sidewalks and pathways
- Lighting and electric service
- Curb ramps
- Wayfinding and signage
- Crosswalk equipment
- Irrigation
- Plantings
- Street trees
- Existing trees
- Rain Gardens
LID – rain gardens
Other examples
ENVIRONMENT

- First GreenRoads certified project in the State of Texas (final stages)
- 300 tons of CO2 saved through flyash concrete
- 33% of stormwater enters into rain garden

  - Removal of 75% Bacteria
  - Removal of 73% Phosphorus
  - Removal of 93% Oil and Gas
  - Removal of 85% Total Suspended Solids (TSS)
  (source FocalPoint Media)

- 70% tree canopy throughout corridor (32% to 70%)
- 16% decrease in noise decibel levels (approx) in key pedestrian areas (50 db to 42 db)
- 14% decrease in surface temperatures (108 degrees to 95 degrees avg)
Rain Garden Data

- 9 AC project in ROW
- Net minor decrease impervious cover
- Detention and water quality added benefits
- 60” trunk line for future upstream dev. only, no increase required for project
- Rain garden A=9,828 SF
- Rain garden detention volume = 0.68 AC-ft
- Rain gardens serve as WQ inlets
Lessons Learned

- Starts with planning (commit early)
  - Determine the benefits to be achieved
  - Requires owner buy in
  - Plan with the end results in mind
- Important as a design tool - NOT a documentation tool for points
- Important to track progress throughout
- Construction contract must address requirements
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IV. CONSTRUCTION
Street Trees Were Integral

- Typical Biofiltration Wasn’t an Option
- Needed an Efficient Approach
- High Performance Soils Allowed for Smaller Solution
Typical biofiltration would have required biofiltration soils and underdrain along the entire planter box.
High Performance Modular Biofiltration System’s footprint was small enough to remain outside the rootzone of street trees.
Rain Garden Design

- Learning From Past Mistakes
- How Engineered Soils Drain
- Understanding “Bridging”
- Flow Dissipation
Learning From Past Mistakes
Learning From Past Mistakes

NEW 2½"-3" CALIPER TREES & PERENNIAL RAIN-GARDEN PLANTINGS
CONC. CURB W/ 5' WIDTH NYCDP STANDARD CAST IRON CURB PIECE INLET/OUTLET
EXISTING ASPHALT ROADBED
STREET SLOPE TO CURB INLET

PARKING LANE
2'-0" CONC. WALK 5'-0" WIDTH RAIN-GARDEN BED 11' WIDTH CONCRETE SIDEWALK

2" MULCH CONC. CURB & TREE PROTECTION RAIL
SIDEWALK SLOPE 2%

SPECIAL SOIL MIX: NATURAL SANDY LOAM W/ 7%-12% HUMUS, TO PROVIDE THE RISE OF WATER BY CAPILLARY ACTION TO THE PLANT ROOT ZONE

4" CORRUGATED PERFORATED DRAINAGE PIPE ACT AS STORMWATER RESERVOIR

BROKEN STONE BED, ASTM C-33, SIZE #3 (2" TO 1"

GEOTEXTILE
Understanding Engineered Soils
“Bridge” Aggregates

- 3" SHREDDED HARDWOOD BARKMULCH (NO FINES)
- 18" HIGH FLOW MEDIA
  100'/HR (MIN.)
  (SEE SPECIFICATIONS)
- 6" BRIDGING STONE
  (SEE SPECIFICATIONS)
- STRUCTURAL UNDERDRAIN
  (DEPTH VARIES)
- 3" COMPACTED BASE (MIN.)

IMPORMEABLE LINER
(OPTIONAL)

FP100 OPEN MESH GEOTEXTILE

LINER/ CONTAINMENT GEOTEXTILE
“Bridge” Aggregates
“Bridging” Prevents Clogging
Flow Dissipation is Critical
Rain Garden Construction

- Quality Assurance / Quality Control
- Working Around Utilities
- Protecting the Systems
- Signage
- Performance Verification
Quality Assurance
Working Around Utilities

- Modularity Aids in Field Modifications
- Flexibility is Essential to success
Protection During Construction

- Protecting the System is Imperative
- Prevents Premature Sedimentation
- Simple “Activation” Protocol
Signage

- Use Signage When Possible
- Communicate Message in English and Spanish
- Action Items Must be Complete Prior to Activation
Measuring Performance

- Hydraulic Conductivity Test
- Pass / Fail
- Manufacturer / Contractor Must Prove It Works
V. OPERATIONS AND MAINTENANCE

- Staff training vs. contracted maintenance
- Indicators of system problems/failure
- Like typical planting areas, LID features require regular cleaning
- Plantings should be simple enough to intuitively maintain
- Re-application of mulch
- Keep water entry points clean and clear
Discussion and Questions