



Phase 3 Committee Meeting

Presenters:



*Lexington-Fayette Urban
County Government*



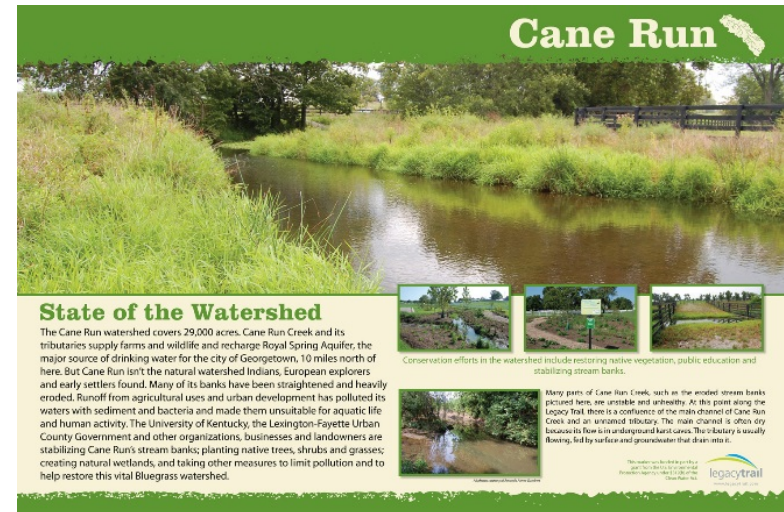
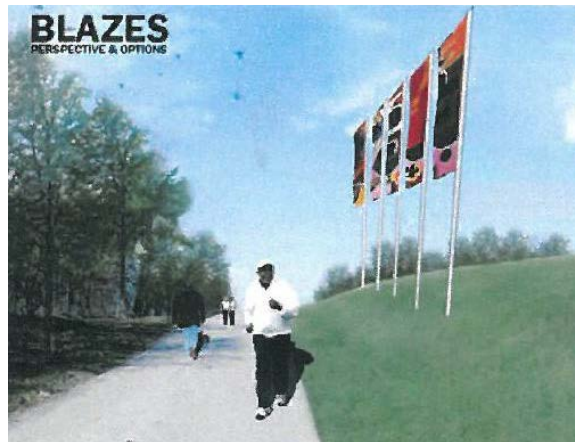
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Sponsor:



Overall Legacy Trail Update

- *Coolavin Rail Trail Status*
- *Flag Poles and Interpretive Signage – Phase 1 and 2*
- *Hope Center*
- *Scott County Connection*



Legacy Trail Phase 3 – Prior Planning

- Phase 3 Goals and Objectives
- Refinement of Potential Alignments →
- Exploration of Two-Way Cycle Track Option ↓



LEGACY TRAIL PHASE 3 DESIGN



Consultant Team



Strand Associates, Inc.®
Prime Engineering Consultant



Landstory
Landscape Architect Subconsultant



EHI Consultants, Inc.
Public Involvement Subconsultant

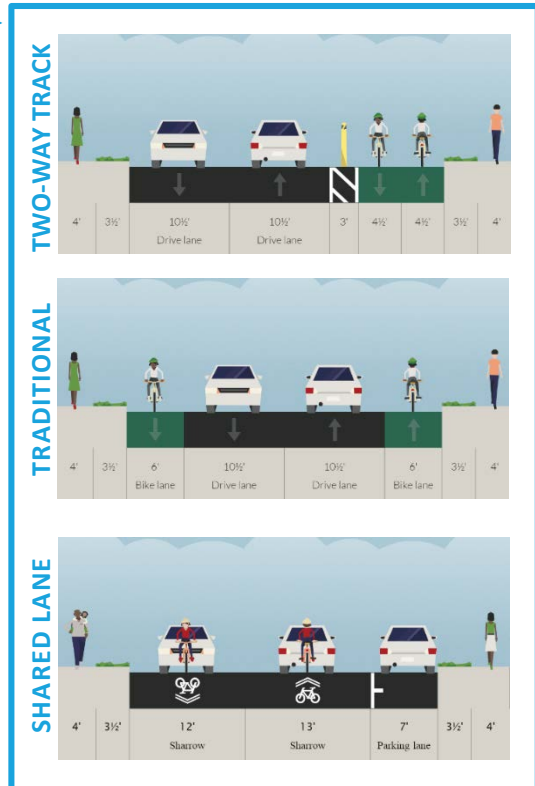


Preliminary Engineering Evaluation

- Perform Case Studies of Existing Cycle Track/Protected Bike Lane Applications
- Develop Acceptable Typical Section Alternatives
- Determine Preferred Route Alternative



- Evaluate Project Budget to Determine Overall Scope of Project Improvements
- Select Alternative for Final Implementation



Cycle Track/Protected Bike Lane Applications

What is a protected bike lane?

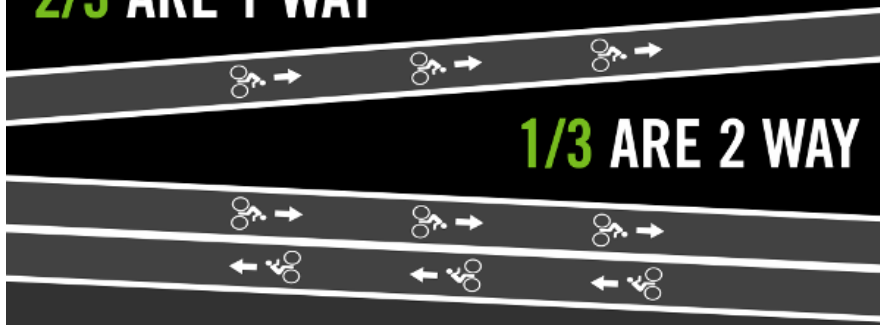
Protected bike lanes are next-generation bikeways being built across the U.S.

They use physical barriers to separate bike lanes from both cars and sidewalks, creating safe, inviting spaces for people to bike. Some, but not all, are painted green.



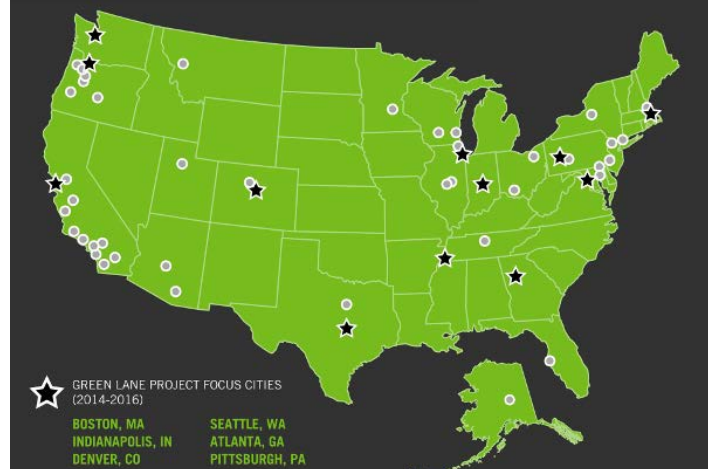
210 Applications Estimated (2014)

2/3 ARE 1 WAY



Source: People for Bikes

Where are protected bike lanes?



Cycle Track/Protected Bike Lane Case Study Review

- *Objective (Find Applications with similar characteristics to help inform design considerations)*
 - + *Location Characteristics*
 - + *Street Cross Section*
 - + *Intersection Types*
 - + *Conflict Potential*

CASE STUDY COMPARISON	CITY	APPROXIMATE POPULATION	BIKE FACILITIES (mi)	ONE-WAY PBL (mi)	TWO-WAY PBL (mi)
	Washington, DC	659,000	63	2.6	3.4
	Indianapolis, IN	838,000	170	0	2.5
	Seattle, WA	640,500	181	0.3	3.8
	Louisville, KY	629,000	171	0	1.7 (Planned)
	Lexington, KY	310,000	57	0	0

Out of 210 Applications, Only 6 Compared Favorably to the Legacy Trail Conditions

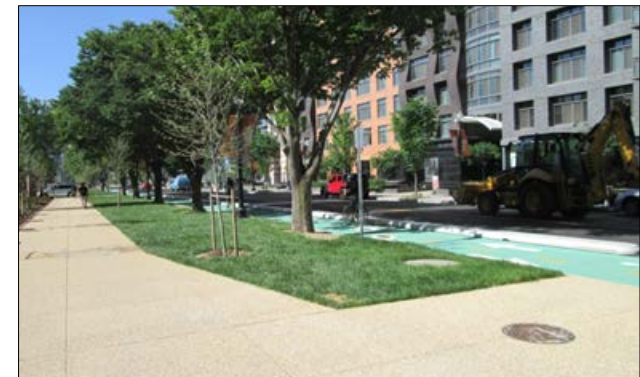
Case Study: Washington D.C. – 1st Street

CATEGORY	STATISTICS
Vehicle	Two-Way
Bicycle	Two-Way
Length	0.46 Miles
Signalized Intersections	3 Each
Unsignalized Approaches	4 Each
Protected Bike Lane Width	8 Feet
Buffer Width	2 - 3 Feet
Speed Limit	25 mph
Buffer Type	Varies



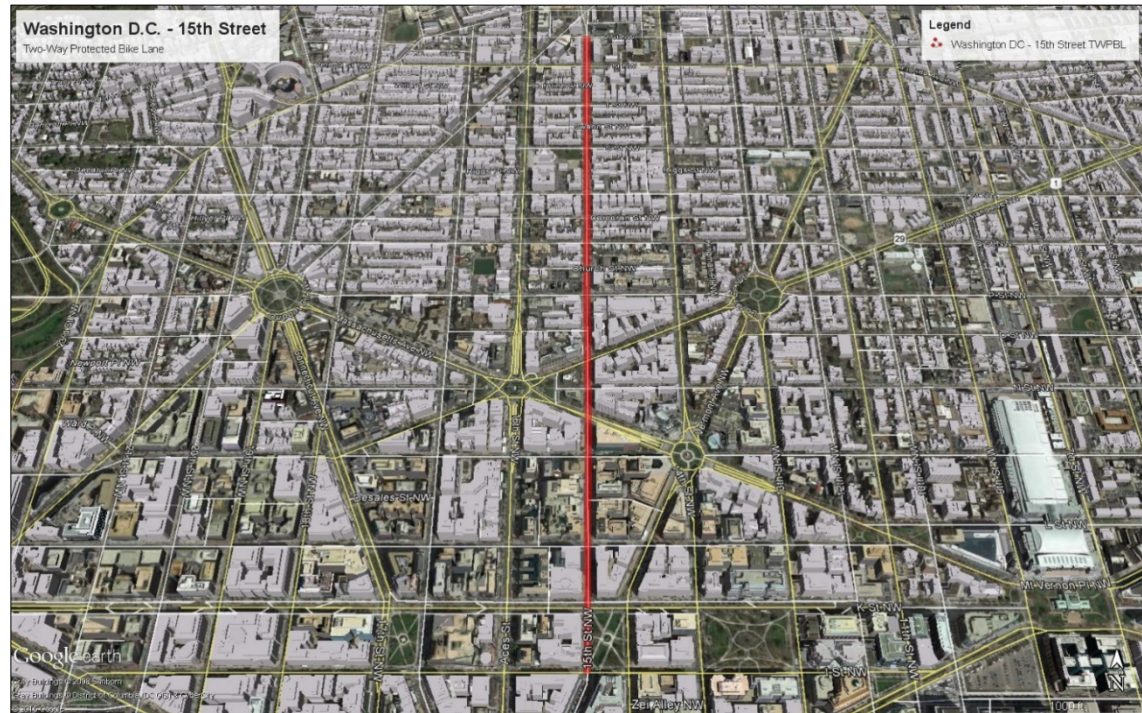
KEY IMPLEMENTATION FEATURES AND ADDITIONAL FINDINGS

- Left turns across the PBL are separated by phasing at signalized intersections.
- Noted typical vehicular operating speeds are less than the posted speed limit and relatively close to bicycle speeds.
- Noncompliance with bicycle signals and pedestrian signals is greatly increased when cross streets are at lower volumes.



Case Study: Washington D.C. – 15th Street

CATEGORY	STATISTICS
Vehicle	One-Way (0.8 miles) Two-Way (0.35 miles)
Bicycle	Two-Way
Length	0.46 Miles
Signalized Intersections	8 Each
Unsignalized Approaches	6 Each
Protected Bike Lane Width	8 Feet
Buffer Width	2 - 3 Feet
Speed Limit	30 mph
Buffer Type	Delineator Posts/Parking



KEY IMPLEMENTATION FEATURES AND ADDITIONAL FINDINGS

- Left turns across the PBL are separated by phase or all-together prohibited and right turns on red are prohibited at signalized intersections.
- Uncontrolled intersections include signs requiring vehicular turning movements to stop for bicycles and pedestrians.
- Noncompliance with bicycle signals and pedestrian signals is greatly increased when cross streets are at lower volumes.



Case Study: Indianapolis, IN – Shelby Street

CATEGORY	STATISTICS
Vehicle	Two-Way
Bicycle	Two-Way
Length	0.52 Miles
Signalized Intersections	4 Each
Unsignalized Approaches	5 Each
Protected Bike Lane Width	8 - 10 Feet
Buffer Width	1.5 Foot Min.
Speed Limit	30 mph
Buffer Type	Raised Curb/Steel Bollards



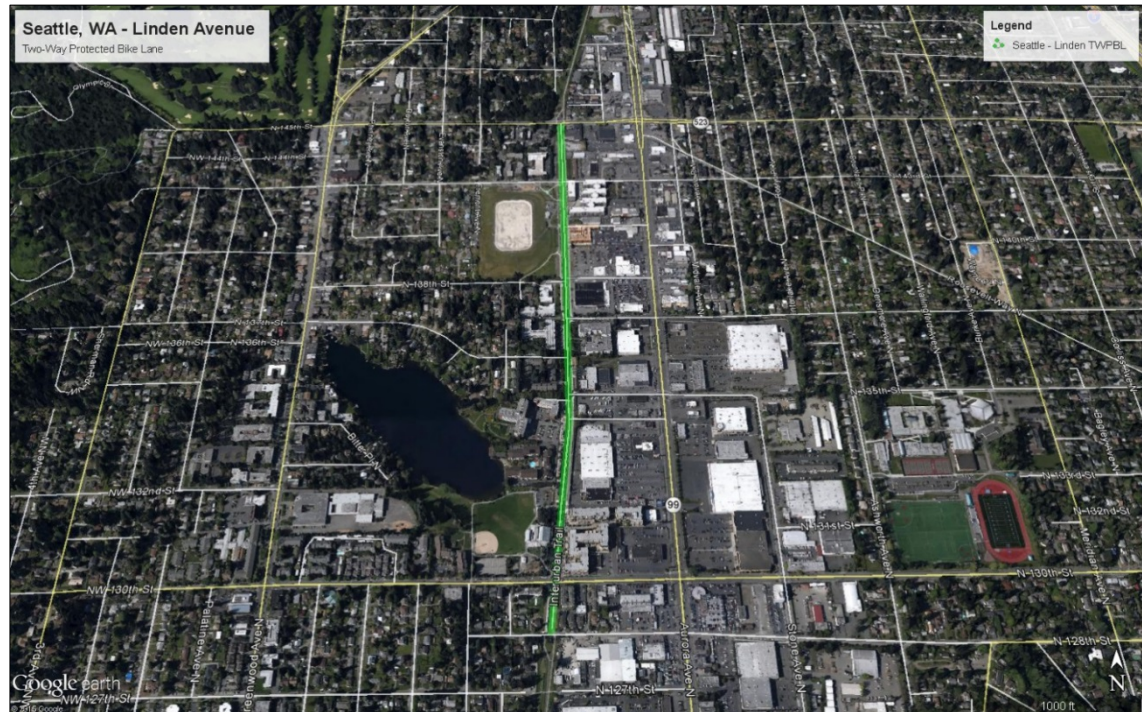
KEY IMPLEMENTATION FEATURES AND ADDITIONAL FINDINGS

- Signalized intersections do not have left-turning conflicts.
- Presence of raised concrete curb and steel bollards provide traffic calming.
- Noncompliance with bicycle/pedestrian signals is not generally an issue.



Case Study: Seattle, WA – Linden Avenue

CATEGORY	STATISTICS
Vehicle	Two-Way
Bicycle	Two-Way
Length	0.8 Miles
Signalized Intersections	3 Each
Unsignalized Approaches	5 Each
Protected Bike Lane Width	8 - 10 Feet
Buffer Width	2 to 3 Foot Min.
Speed Limit	25 mph
Buffer Type	Varies



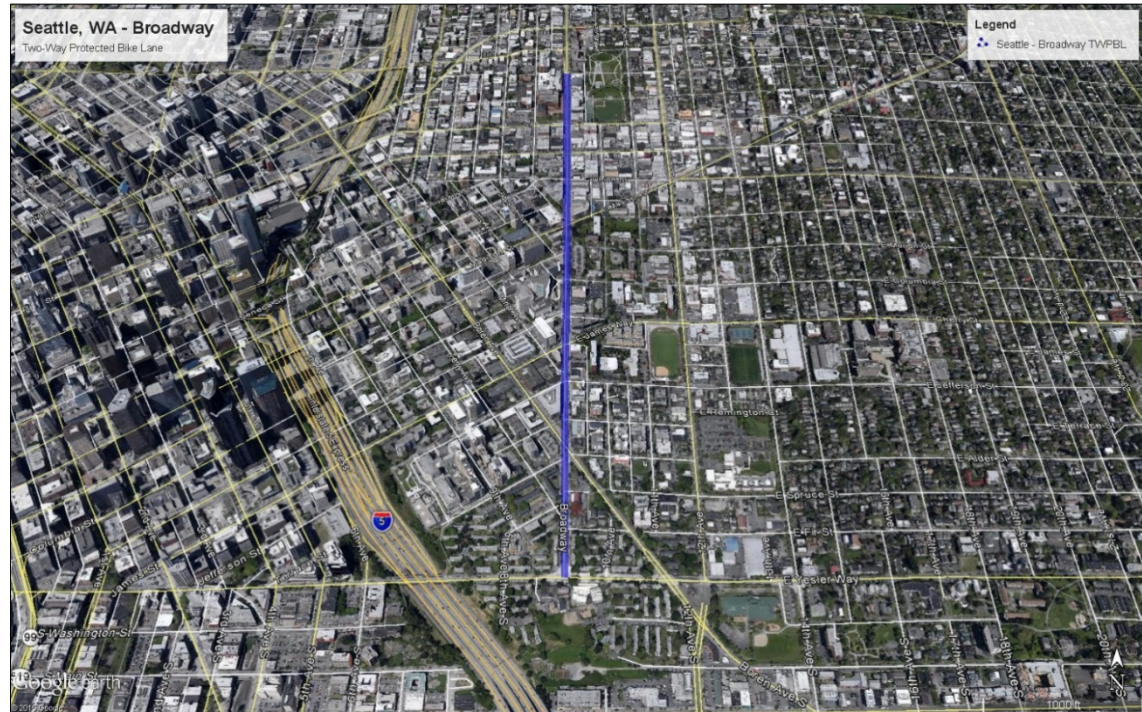
KEY IMPLEMENTATION FEATURES AND ADDITIONAL FINDINGS

- Left turns across the PBL are separated by phasing at signalized intersections.
- Corridor has limited turning conflicts and various buffer types to provide positive protection.
- Red light compliance at intersections is higher in heavier traffic areas.



Case Study: Seattle, WA – Broadway

CATEGORY	STATISTICS
Vehicle	Two-Way
Bicycle	Two-Way
Length	1.1 Miles
Signalized Intersections	13 Each
Unsignalized Approaches	2 Each
Protected Bike Lane Width	8 - 10 Feet
Buffer Width	2 - 3 Feet
Speed Limit	30 mph
Buffer Type	Varies



KEY IMPLEMENTATION FEATURES AND ADDITIONAL FINDINGS

- PBLs are the preferred application along this street car corridor because of the reduced risk of bicycle tires getting lodged in the depressed track channels.
- Left turns across the PBL are separated by phasing at signalized intersections.
- PBL is located in a vibrant district and has higher congestion levels which generally helps reduce vehicular speeds.
- Increased usage of the PBL decreases safety concerns because of increased awareness.



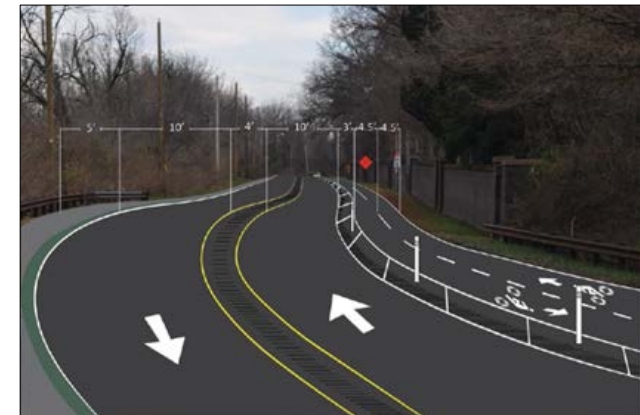
Case Study: Louisville, KY – Lexington Road (Planned)

CATEGORY	STATISTICS
Vehicle	Two-Way
Bicycle	Two-Way
Length	1.7 Miles
Signalized Intersections	1 Each
Unsignalized Approaches	3 Each
Protected Bike Lane Width	9 Feet
Buffer Width	3 Feet
Speed Limit	35 mph
Buffer Type	Delineator Posts/ Rumble Strips



KEY IMPLEMENTATION FEATURES AND ADDITIONAL FINDINGS

- Several options were evaluated and the two-way PBL was chosen as the preferred option to minimize conflicts.
- Left turns across the PBL will be separated by phasing at the signalized intersection.
- Noted objections include loss of several on-street parking spaces and safety of bicyclists at intersections and conflict points.



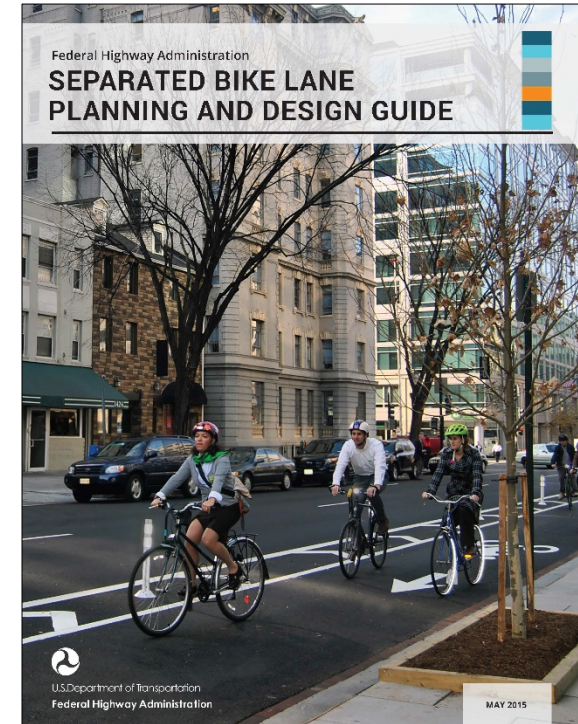
Case Study: Summary of Findings

- *Minimize Conflicts*
 - + *Seattle's Broadway – Control Bicycle Crossing of Street Car Tracks*
 - + *Louisville's Lexington Road – Significant Portion has No Conflicting Turns*
- *Primary Concern*
 - + *Introduction of Bicycles Traveling Against Traffic*
- *Keys To Success*
 - + *Eliminating Turning Conflicts*
 - + *Heavy Usage*
 - + *Targeted Education*
 - + *Monitoring To Identify Adjustments*

Project Location	Street Application	Buffer Types (B=Bollards, C=Curb, D=Delineators, P=Parking, O=Other)	Buffer Width	Protected Bike Lane Width	Restricted Left Turn @ Signalized Intersections	Restricted Right Turn on Red @ Signalized Intersection	Bicycle Signals @ Signalized Intersection
1st Street–DC	Two-Way	D, P	2-3'	8'	Yes	Yes	No
15th Street–DC (One-Way)	One-Way	D, P	2-3'	8'	Yes	None	No
15th Street–DC (Two-Way)	Two-Way	D, P	2-3'	8'	Yes	Yes	No
Shelby Street–Indianapolis	Two-Way	B, C	1.5'	8-10'	None	No	Yes
Linden Avenue–Seattle	Two-Way	C, D, P	2-3'	8-10'	Yes	No	Yes
Broadway–Seattle	Two-Way	C, D, P, O	2-3'	8-10'	Yes	No	Yes
Lexington Road–Louisville	Two-Way	D, O	3'	9'	Yes	*	*

FHWA Planning and Design Guidance

- *Safety Real or Perceived?*
 - + *Existing Data Relatively Small*
 - + *Increase in Bicycle Crashes at Intersections*
 - + *Need Communities to Monitor and Share Information*
- *Pilot Projects - Test, Monitor, and Adapt Concepts*
- *Maintain Separation Between Separate Through and Turning Movements*



*“New May 2015
Guidance of
Affirmed Case
Study Findings.”*

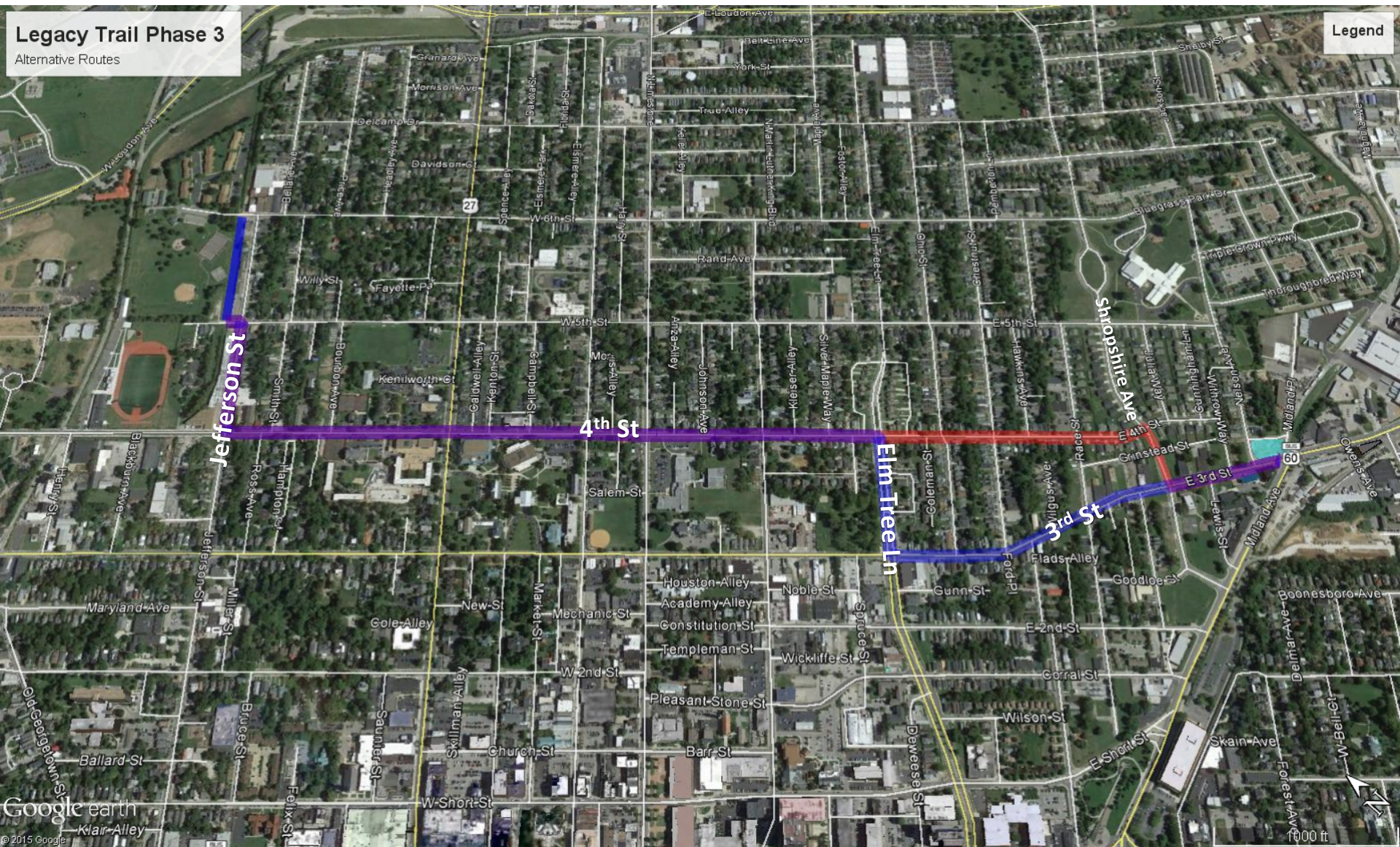
LFUCG Assessment and Conclusion for Two-Way Cycle Track/Protected Bike Lane Alternative

- *Alternative Specific Challenges*
 - + *Unexpected conflicts at driveways and minor street approaches*
 - + *Requires street widening for over a third of the corridor to meet minimum typical section (32')*
 - *Acquire right-of-way from adjacent properties*
 - *Relocation of utilities*
 - *Base infrastructure construction cost would exceed overall grant funding (excluding right-of-way and utility relocation)*
 - + *Requires signal phasing/timing modifications to the corridor and traffic analysis to review impact to cross street corridors*
- *Based on the alternative challenges, the City has eliminated this alternative from consideration on this project.*

PEDALING FORWARD....



Route Alternatives



Common Route Opportunities and Constraints

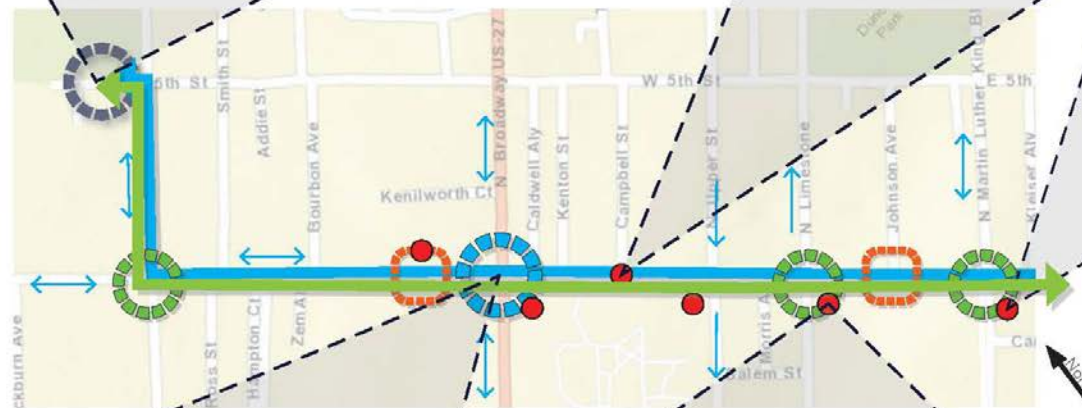
►Coolavin Park



►Transylvania University



►The Living Arts & Science Center



►Broadway / 4th Street Intersection



►Lexington Traditional Magnet School (Middle School)

►Overall Segment

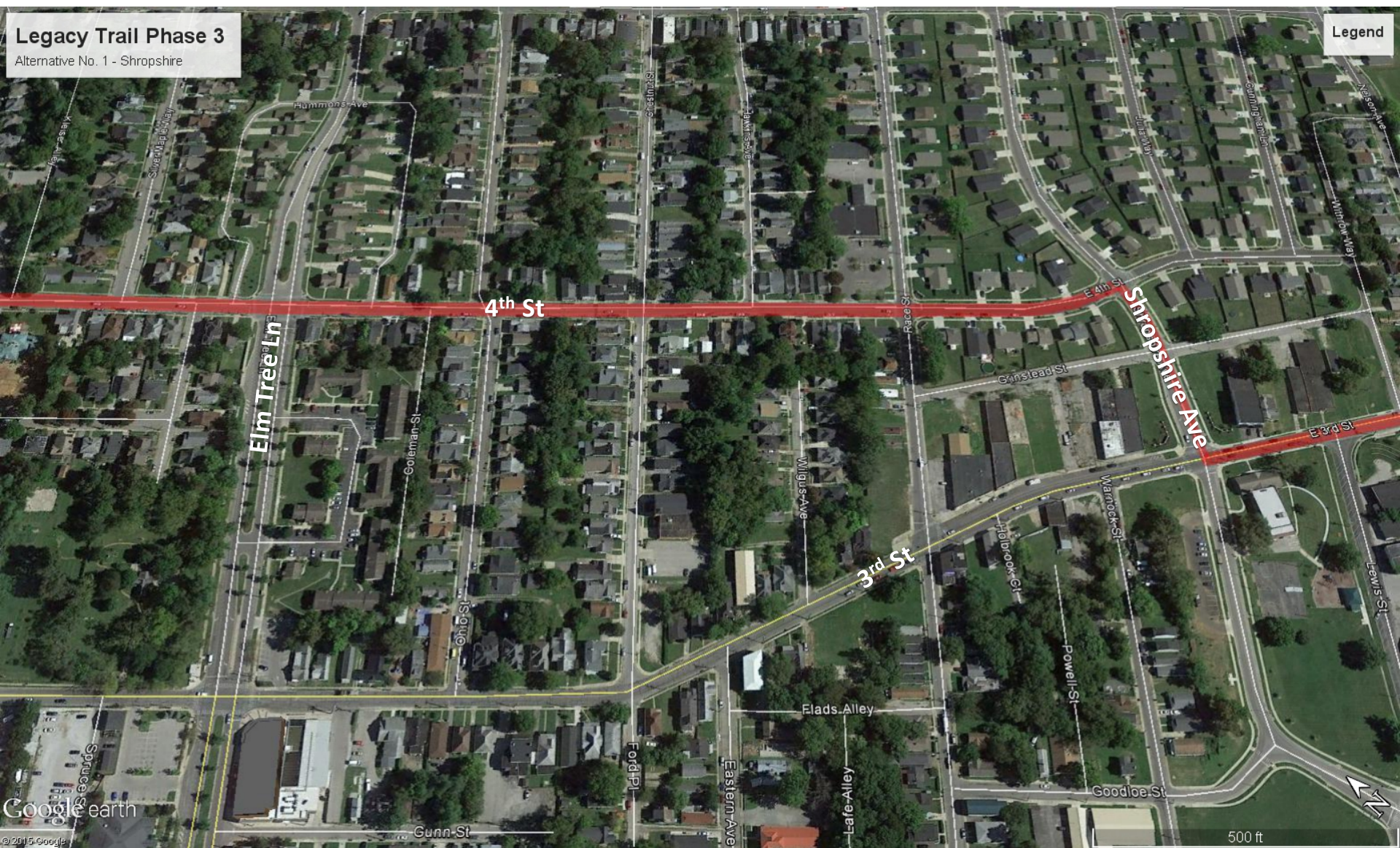
Opportunities:

- Neighborhood destinations
- History & Heritage
- Community Oriented Activities & Programs

Constraints:

- Private Property (Limited Open Space)
- Higher Traffic Volumes at Broadway

Alt. No.1: Shropshire Linkage



Alt. No.1: Shropshire Opportunities and Constraints

► The 4th Street Farm



► Issac Murphy Memorial Art Garden



► Overall Segment

Opportunities:

- Low travel volumes
- Neighborhood user focused

Constraints:

- Large removal of resident parking
- Primary focus on neighborhood use



► Equestrian View Subdivision



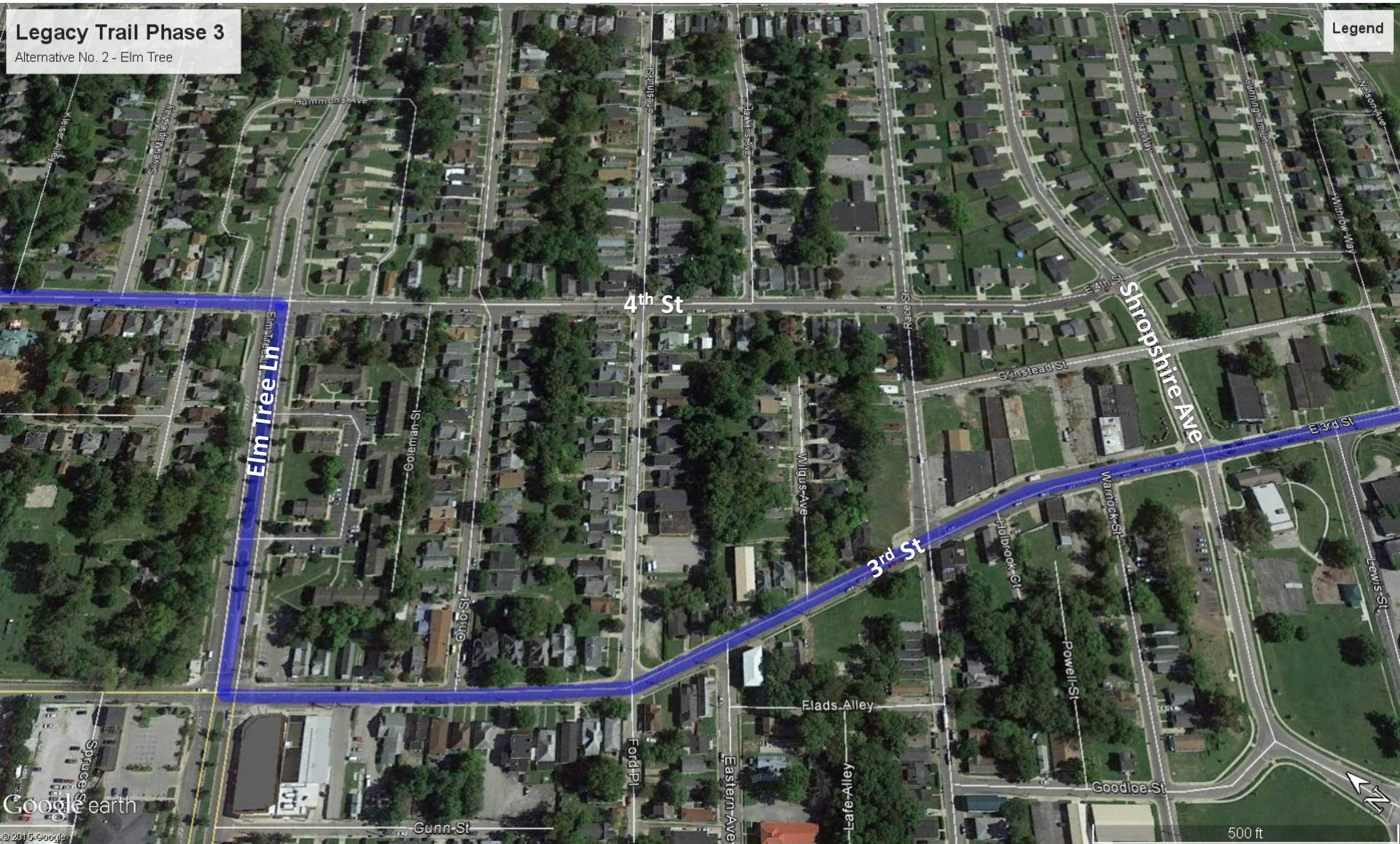
► East End Farmer's Market

Alt. No.1: Shropshire Corridor Considerations

- Sufficient width for both typical section alternatives (Width $\geq 30'$)
- Higher residential on-street parking demand
- Existing bike lanes on Shropshire from 3rd to 4th
- Residential section
 - + Fewer destinations
 - + Lower traffic volumes
(Least traveled section of overall)



Alt. No.2: Elm Tree Linkage

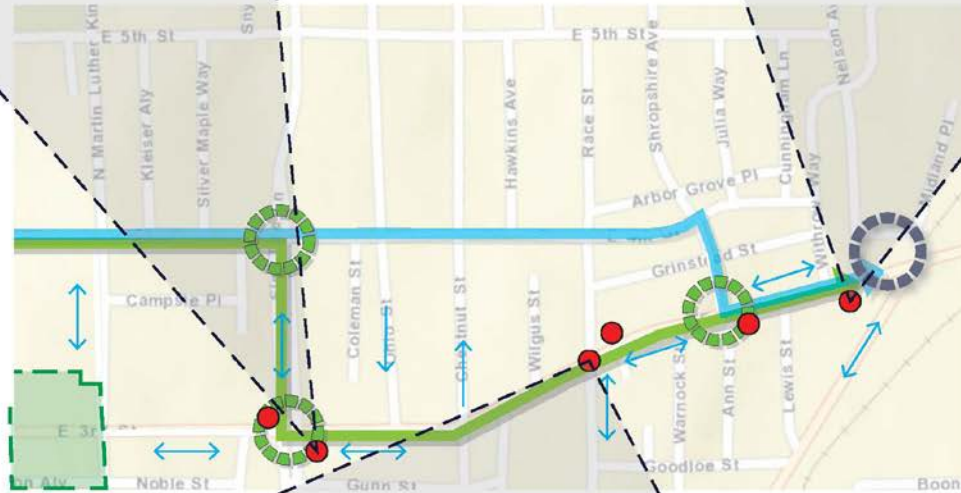


Alt. No.2: Elm Tree Opportunities and Constraints

► The Lyric - Cultural Arts Center



► Charles Young Community Center & Park



► Overall Segment

Opportunities:

- Proposed as Third Street Corridor (planned commercial district)
- Highlights art & culture
- Wide range of users/visitors

Constraints:

- Current commercial conditions
- Higher traffic volumes



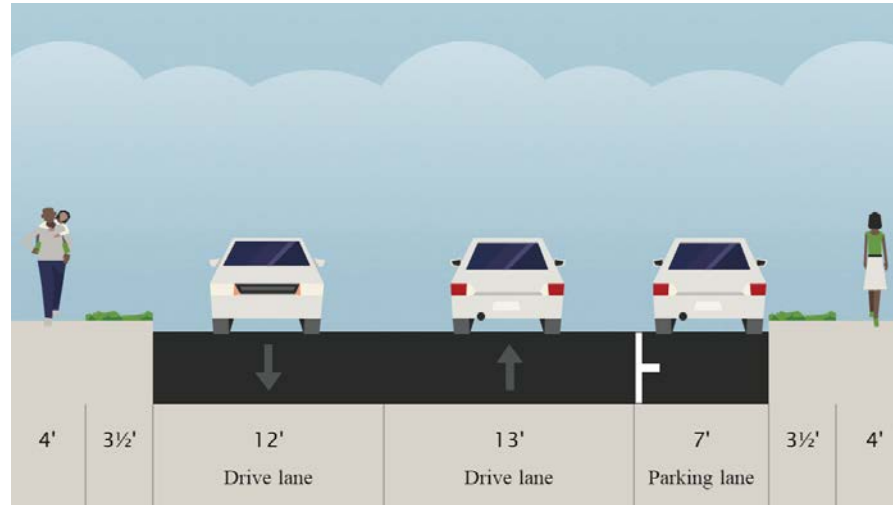
► Commercial development corridor

Alt. No.2: Elm Tree Corridor Considerations

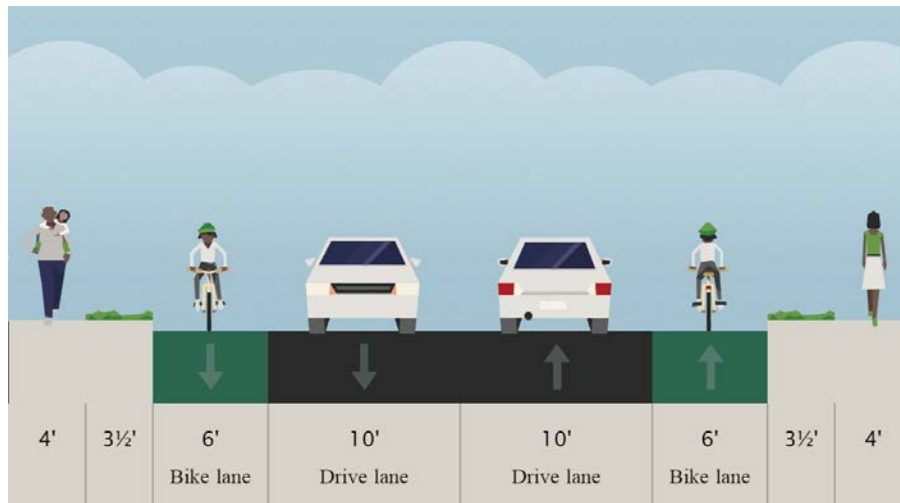
- *Constrained section (Less than 30') on 3rd from Elm Tree to Ford*
- *Low daily on-street parking demand, but high parking demand for events*
- *Existing dedicated left turn lane on westbound 3rd at Elm Tree*
- *Existing bike lanes and dedicated on-street parking*
 - + *3rd from Shropshire to Race*
 - + *Elm Tree Ln from 3rd to 4th*
- *Commercial/Residential section*
 - + *More destinations*
 - + *Higher traffic volumes*
(Most traveled section of overall)



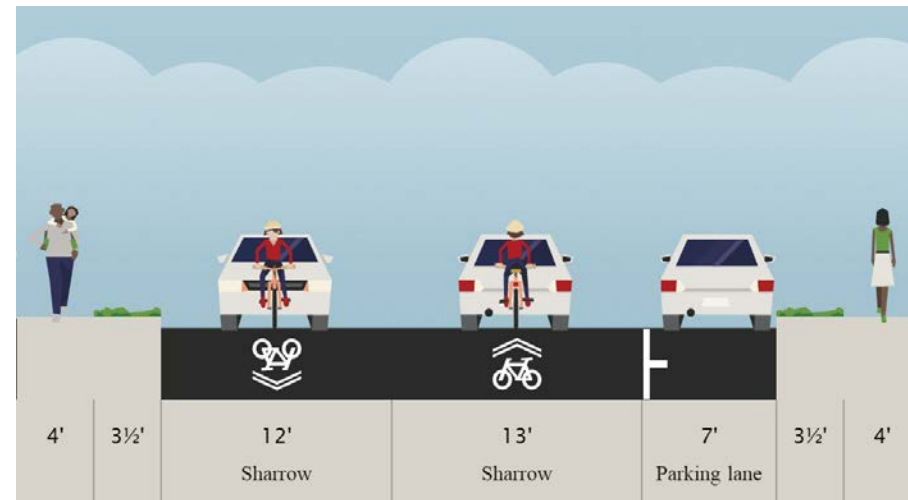
Typical Section Alternatives



Typical Section – Existing Conditions

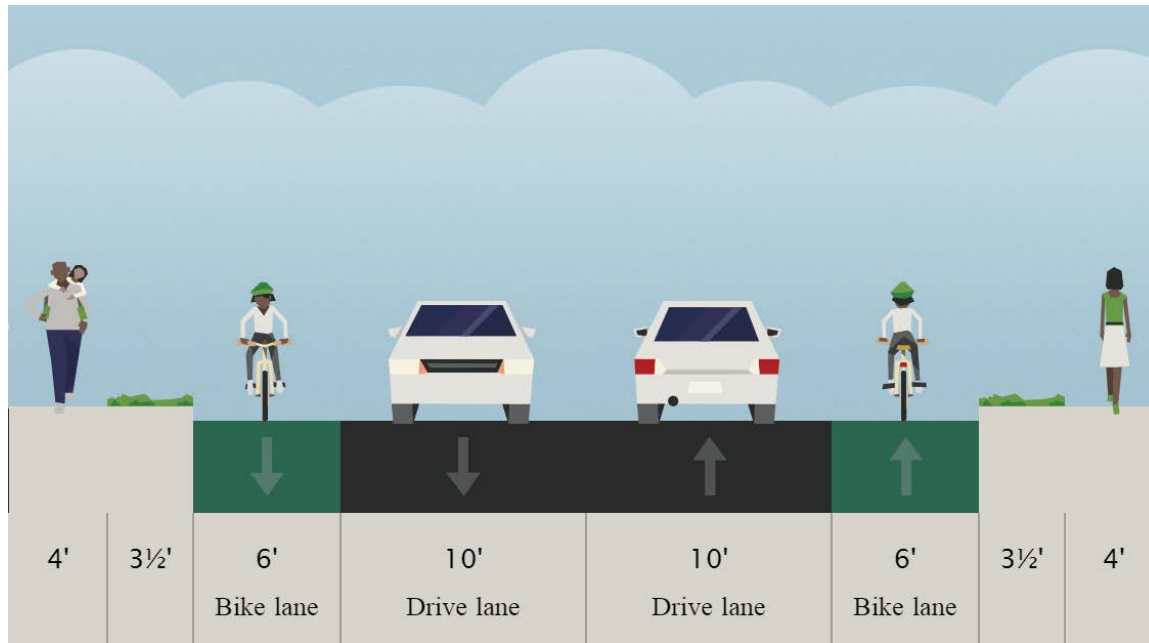


Typical Section Alt. No. 1 – Traditional Bike Lanes



Typical Section Alt. No. 2 – Shared Lane Markings

Typical Section Alt. No. 1: Traditional Bike Lanes



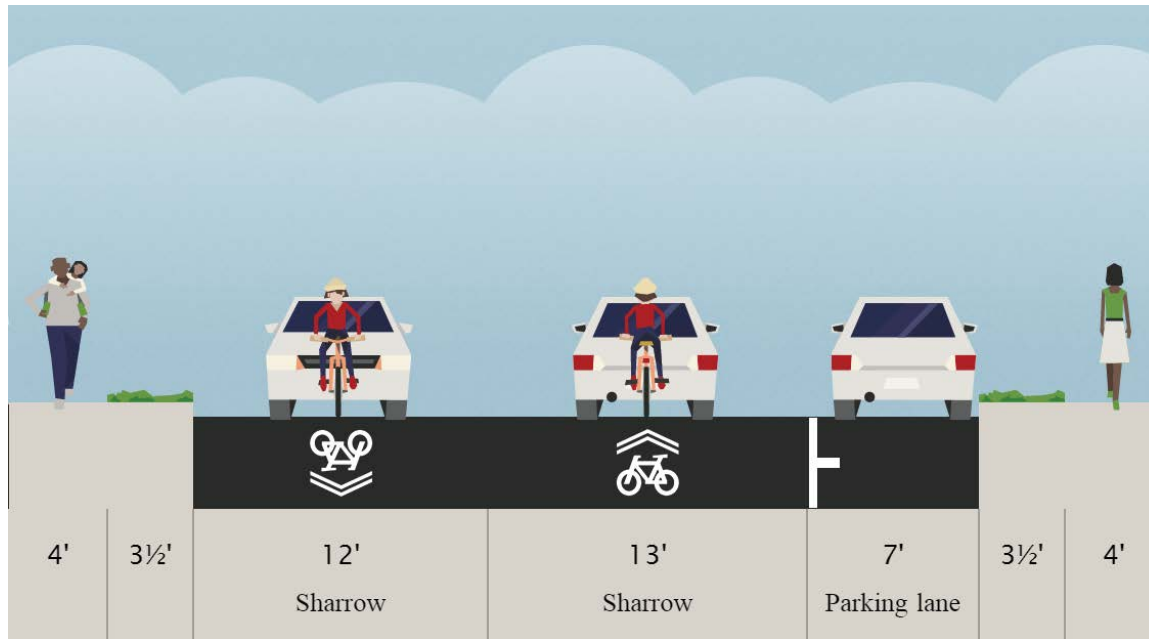
BENEFITS

- Provides a dedicated bicycle facility on routes LFUCG has denoted as preferred routes on the Bike Lexington Map.
- Bike Lanes on low speed streets have shown to attract the more casual user.
- Provides a better opportunity to maintain sense of trail continuity.

NEGATIVES

- Impacts existing on-street parking for a majority of both route alternatives.
- Several constrained sections (<30') are not wide enough to accommodate standard bike lanes and 10' travel lanes. If not widened, these sections will require substandard bike lane width and/or reduced travel lane widths.

Typical Section Alt. No. 2: Shared Lane Markings



BENEFITS

- Provides markings on the existing street to improve driver awareness of bicyclists who will “share” the road.
- Allows existing on-street parking to remain as is.

NEGATIVES

- Maintains a physical connection to the existing trail, but loses the continuity of the trail-like character.
- Intermixing vehicular and bicycle traffic reduces the feeling of safety and security for recreational/family users.

Major Project Alternative Considerations

- *Displacement of On-Street Parking Spaces*
- *Impact to Existing Dedicated Left Turn Lanes*
- *Width Requirements for Constrained Street Sections*



On-Street Parking Spaces Inventory



On-Street Parking Area No. 1

Legacy Trail Phase 3

Parking Area 1 - Impact Review

Legend

- 4 LFUCG Permitted Accessible Parking Spaces

Jefferson St

- Max Observed Parking – 3 Spaces
- Residences without Driveways – 2
- Nearby Parking Alt. – Jefferson

4th St

- Max Observed Parking – 4 spaces
- Observation period June/July (T.U. not in session)
- Portion of parking appeared related to T.U. Construction

Google earth

© 2015 Google

300 ft



legacytrail Ph 3

On-Street Parking Area No. 2

Legacy Trail Phase 3

Parking Area 2 - Impact Review

Legend

- Max Observed Parking – 1 space
- Nearby Parking Alt. – Limestone

- Max Observed Parking – 4 Spaces
- Several Residences without Driveways
- Nearby Parking Alt. – Johnson Ave or Martin Luther King

- Max Observed Parking – 11 Spaces
- Multiple Residences without Driveways
- Nearby Parking Alt. – Silver Maple Way or Elm Tree, or Campsie Court

Google earth

© 2015 Google

300 ft



legacytrail Ph 3

On-Street Parking Area No. 3

Legacy Trail Phase 3

Parking Area 3 - Impact Review

Legend

- Max Observed Parking – 20 Spaces
- Significant Number of Residences without Driveways
- Nearby Parking Alt. – Elm Tree and several other side streets (narrower streets with less availability than other locations along the corridor).

4th St

- Max Observed Parking – 2 Spaces (Significant parking demand for events)
- Several Residences without Driveways
- Nearby Parking Alt. – Elm Tree and several other side streets (narrower streets with less availability than other locations along the corridor).

Elm Tree Ln

3rd St

Shropshire Ave

Google earth

© 2015 Google

300 ft



LANDSTORY

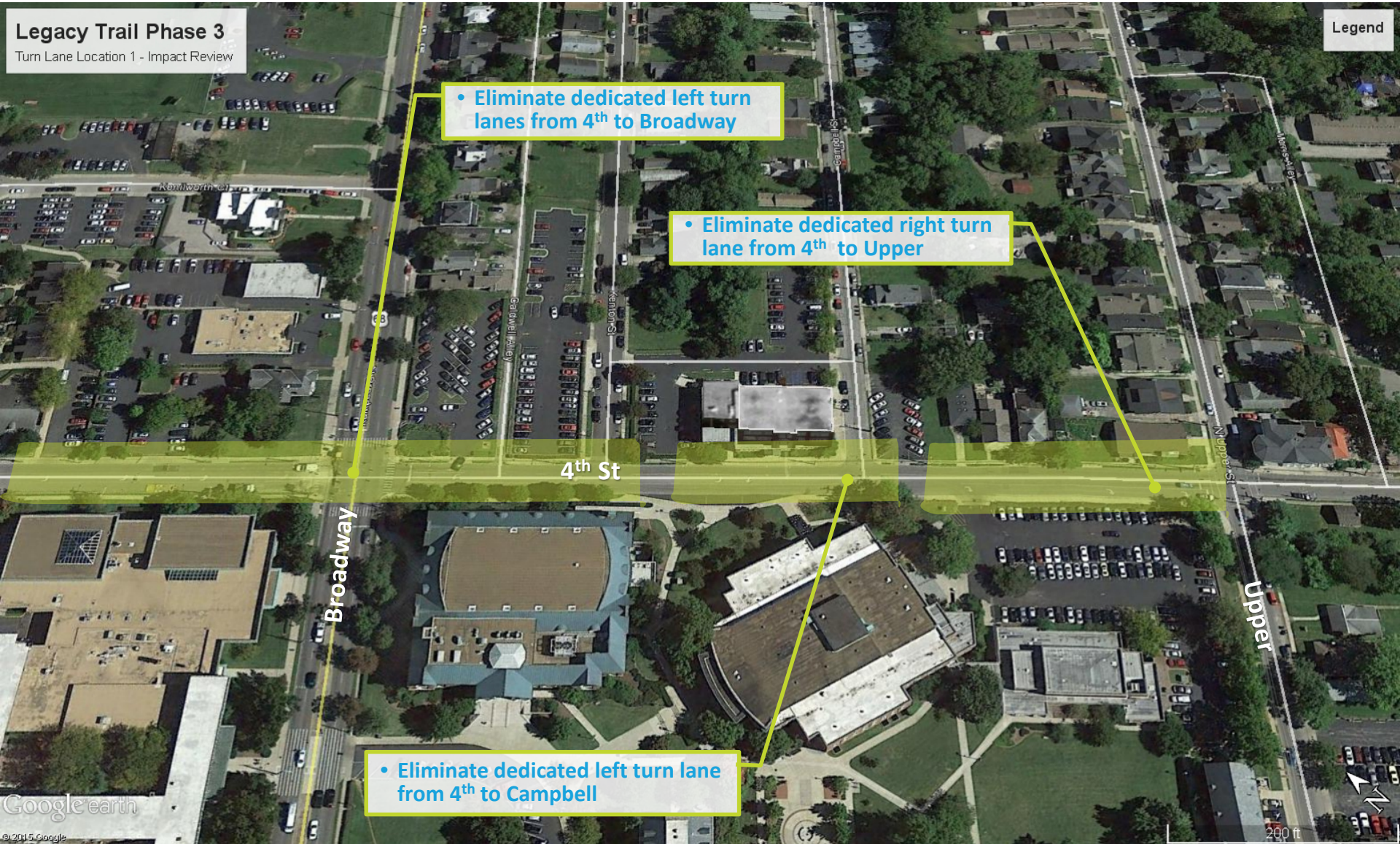


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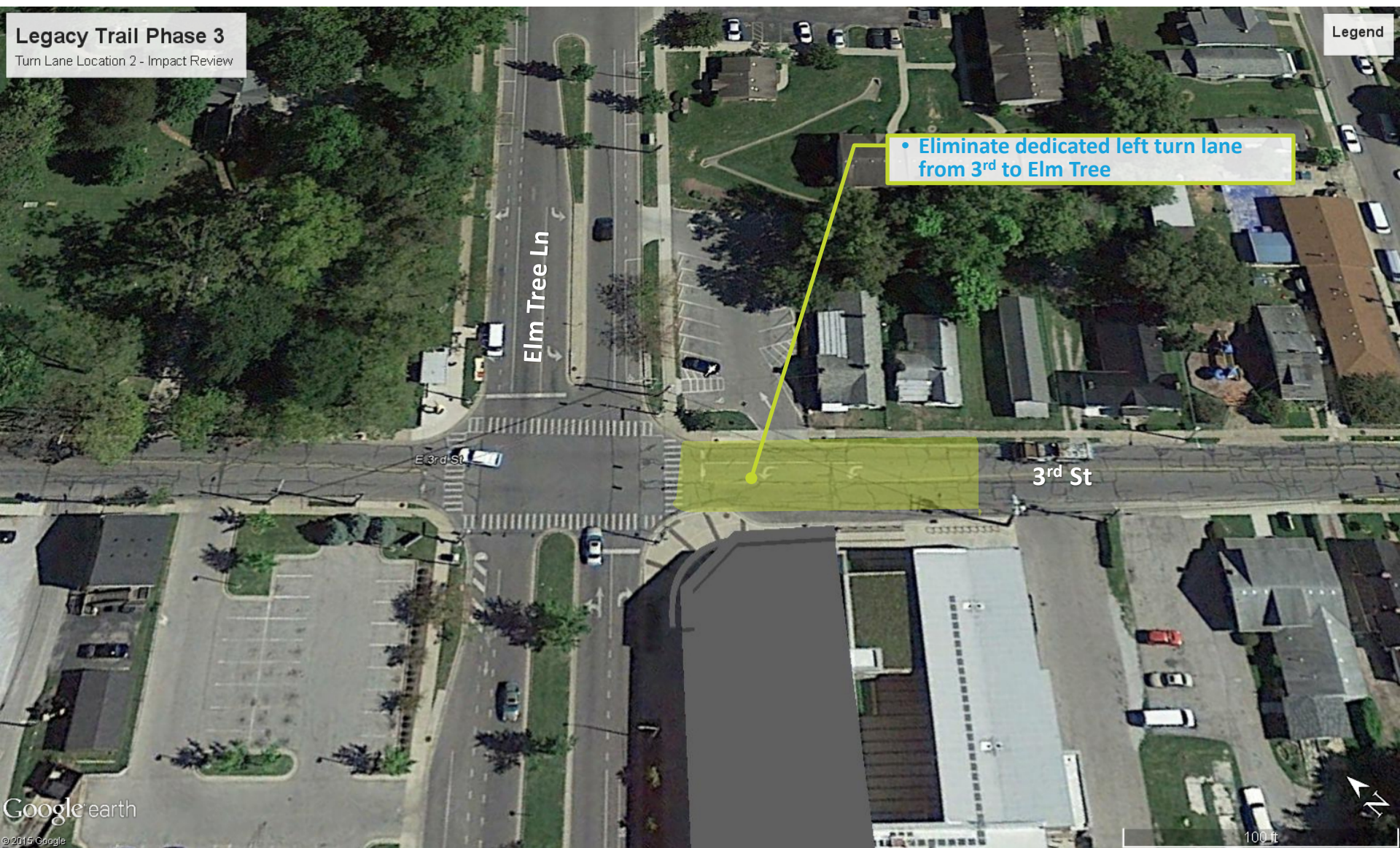
Dedicated Turn Lane No. 1 Impact

Legacy Trail Phase 3
Turn Lane Location 1 - Impact Review

Legend



Dedicated Turn Lane No. 2 Impact



Constrained Section – 4th St. (Upper to Limestone)



CATEGORY	STATISTICS
Length of Constrained Section	350 Feet
Min. Curb to Curb Width	28 Feet
Transit/Bus Traffic	Yes

ROADWAY WIDENING IMPACTS

- Traffic signal infrastructure at both Limestone and Upper.
- Existing overhead and underground utilities in the limited buffer between curb and sidewalk on both sides.
- Properties have limited to no availability for minor right-of-way acquisition.

Constrained Section – 3rd St. (Elm Tree to Ford)



CATEGORY	STATISTICS
Length of Constrained Section	750 Feet
Min. Curb to Curb Width	28 Feet
Transit/Bus Traffic	Yes

ROADWAY WIDENING IMPACTS

- Existing overhead and underground utilities in the limited buffer between curb and sidewalk on both sides.
- Minor right-of-way acquisition would be required to widen the roadway and maintain a minimum buffer.
- Roadway widening would provide opportunity to consider additional streetscape enhancements to corridor if budget allows.

Additional Considerations - Amenities

The Legacy Trail Story

Materials Textures Local Patterns
History Inviting Connectivity Plant Material
Sense of Ownership Development Generator Equestrian Heritage Cost Effective
Timeless Unique Character
Outdoor Fitness Public Art Color Flexible
Family Story Opportunities Universal
Sustainable Safety Regional

► Design Considerations:

- Interpretive Educational Features
- Public Art
- Seating
- Bicycle Parking
- Signage & Way-finding Elements
 - Mile Markers
 - Trail Identification
- Landscape
- Trail Delineators
- Materials
 - Limestone
 - Color Palette / Legacy Trail Logo
- Crosswalk Enhancements
- Design Style
 - Strong Geometry
 - Purposeful Sightlines

► Focus Areas:

- Trail Heads
- Rest Areas
- Major Crossings
- Community Nodes
- Pocket Parks
- Gateways

► Community Opportunities:

- Transylvania University
- Lexington Traditional Magnet School
- The Living Arts & Science Center
- London Ferrill Community Garden
- Lyric Theatre & Cultural Arts Center
- Charles Young Community Center & Park
- East End Farmer's Market

Additional Considerations - Amenities

PUBLIC ART



LEGACY TRAIL



TRAIL MARKERS



SIGHTLINES & GEOMETRY



LANDSCAPE MATERIALS



INTERPRETIVE EDUCATION



Additional Considerations - Amenities



Urban Intersection Accent Concept



Stone Accent Buffer - Side Elevation

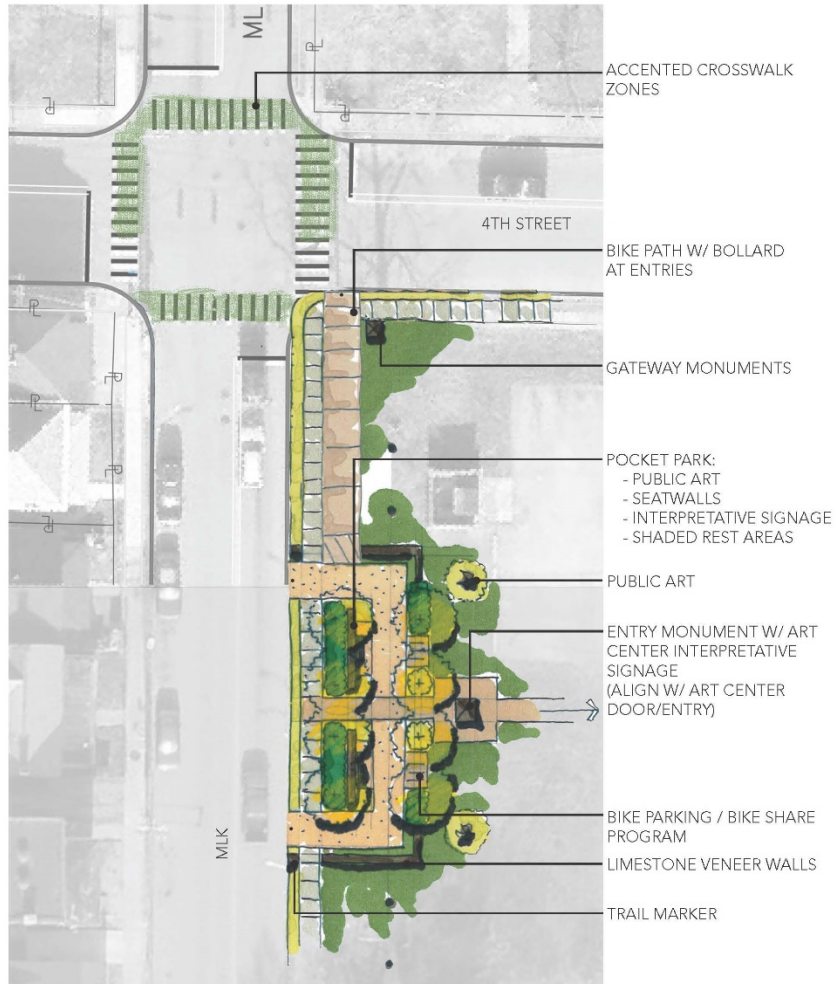
EXISTING SITE PHOTOS:



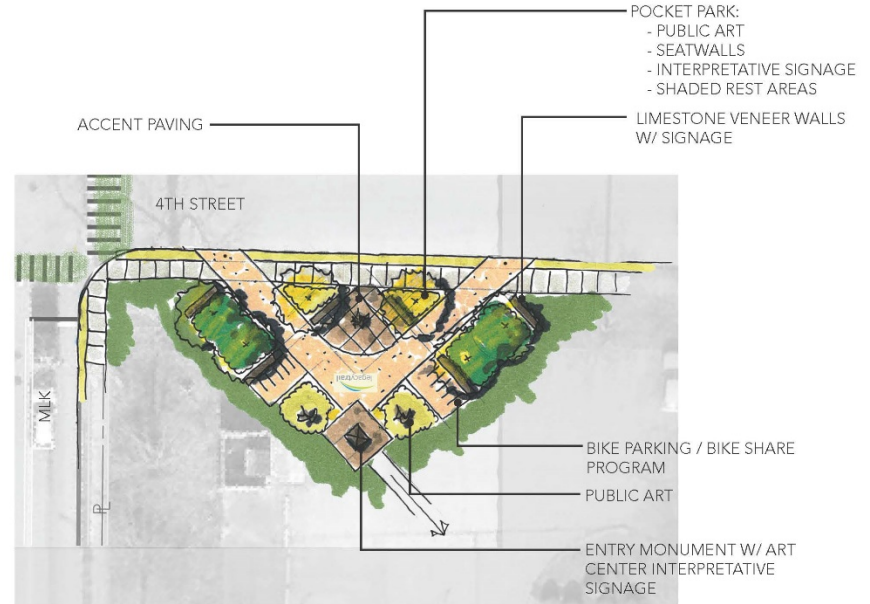
4th & Broadway



Additional Considerations - Amenities



Community Node Concept 'A'



4th & MLK

Community Node Concept 'B'

EXISTING SITE PHOTOS:



Additional Considerations - Amenities

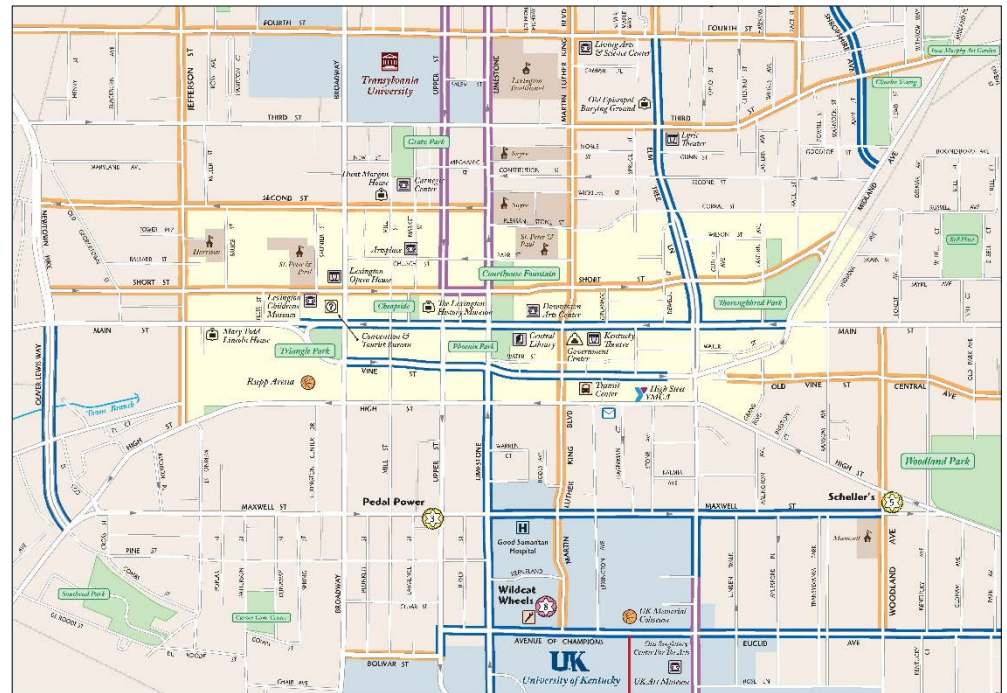


EXISTING SITE PHOTOS:



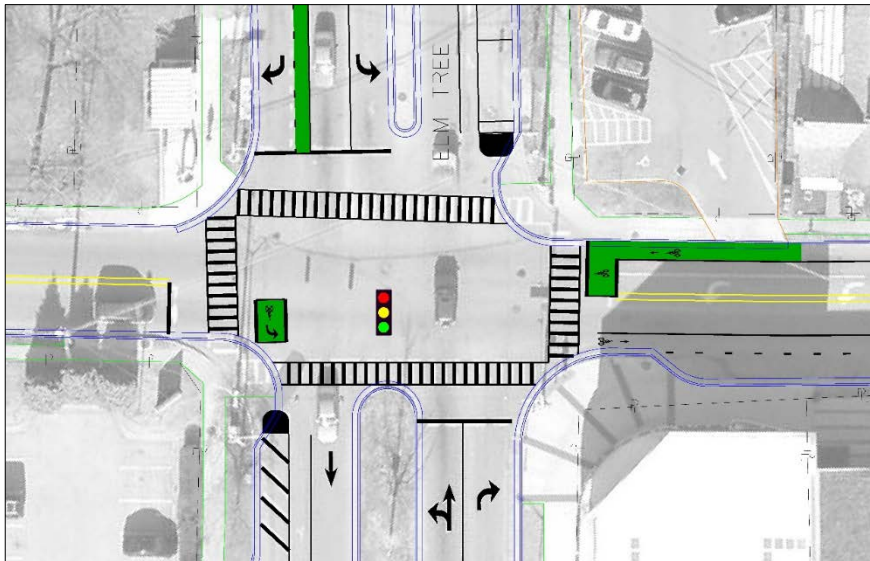
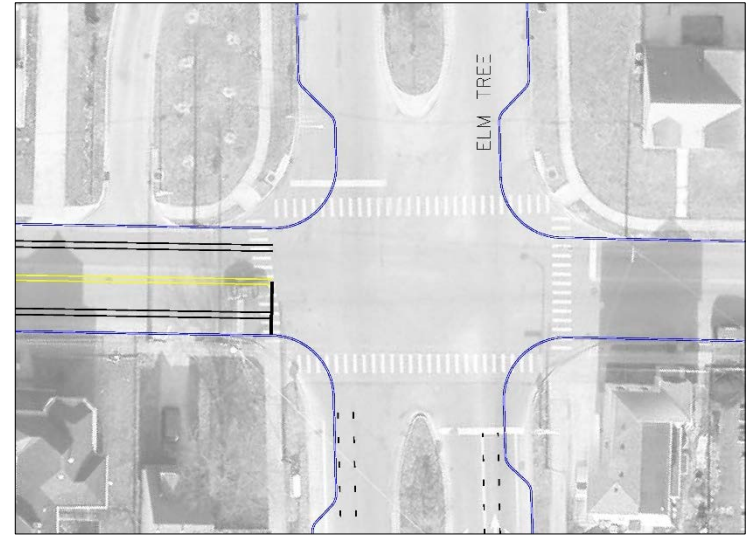
Additional Considerations - Connectivity

- Town Branch Commons (Trail) at Isaac Murphy Memorial Art Garden
- North/South Connectivity for Neighborhood
 - + Existing Elm Tree Bike Lanes
 - + Future Downtown Connection Improvements



Additional Considerations – Safety Improvements

- *Posted speed limit*
- *Traffic calming treatments at intersections*
- *Lighting*
- *Experimental Treatments*
(Bicycle Boxes and Two-Stage Left Turn Treatments)



Alternatives Comparison Matrix

Criteria	ALTERNATIVE ROUTE/TYPICAL SECTION COMBINATIONS			
	Shropshire Route with Traditional Bike Lanes	Shropshire Route with Shared Lane Markings	Elm Tree Route with Traditional Bike Lanes	Elm Tree Route with Shared Lane Markings
Dedicated facility separates people in cars from people on bikes	✓	✗	✓	✗
Attractive to recreational/more casual riders	✓	✗	✓	✗
Minimizes impact to existing on-street parking inventory	✗ (37)	✓	✗ (19)	✓
Ability to maintain the trail feel	✓	✗	✓	✗
Required infrastructure available within budget	✓	✓	✓	✓
Avoids impact to existing left turn lane at 3 rd and Elm Tree	✓	✓	✗	✓
Connects community to destinations/commercial properties	✗	✗	✓	✓

Base Alternative Costs & Additional Considerations

- *Alt. Range (w/ 30% Contingency) - \$1.1 - \$1.2M (\$2.4M Project Funding)*
 - + *Included Costs*
 - *Mill/Overlay for entire route and allowance for full depth repairs*
 - *Pavement marking and signage*
 - *Intersection ADA improvements*
 - *Minor traffic calming improvements*
 - *Interpretive Signage*
 - + *Additional Project Cost Considerations*
 - *Mitigation of impacted on-street parking spaces*
 - *Widening constrained sections – roadway construction, utility relocation, and right-of-way acquisition*
 - *Additional sidewalk replacement*
 - *Amenities and aesthetic treatments*
 - *Street lighting*
 - *Additional traffic calming*
 - *Professional services*

Stakeholder Feedback

- Discussion
- Next Steps



Above images courtesy of lexinthecircle.com