MEETING NOTES
of the
STORMWATER STAKEHOLDER ADVISORY COMMITTEE (SSAC)
Lexington-Fayette Urban County Government (LFUCG)

Meeting: June 5, 2026
Time of Meeting: 9:00 a.m.
Location of Meeting: Phoenix Building – 3rd Floor Conference Room

Attendees:
Amy Clark, Town Branch Watershed At-large Representatives
Jim Griggs, Boone Creek Watershed At-large Representatives
Amy Sohner, Chair, Bluegrass Greensource
Scott Southall, West Hickman Watershed At-large Representatives
Russ Turpin, Wolf Run Watershed At-large Representatives
Jerry Davis, Friends of Wolf Run
Sara Bell, Bluegrass Greensource
Eileen Burk, KY American Water Company
Anna Stephens, Ball Homes
Jim Conner, UK
Samantha Castro, Tunnell, Spangler, Walsh & Associates
Pace Cooke Emmons, WaterwaysLex
Steve Evans, KWRI
Butch Jones, Citizen
Doug McClaren, McConnell Springs
Richard McClure, UK FM
John McMaine, UK
Riley Power, RES
Brian Stephens, Ball Homes
Vaughan Adkins, LFUCG Division of Engineering
Denice Bullock, LFUCG Division of Water Quality
Chris Chaney, LFUCG Division of Planning
Madison Dixon, LFUCG Division of Water Quality
Jason Drew, LFUCG Division of Water Quality
George Fordjour, LFUCG Division of Water Quality
Kenzie Gleason, LFUCG Division of Planning
Brian Hayes, LFUCG Division of Engineering
Gabe Hensley, LFUCG Division of Water Quality
Becky Irwin, LFUCG Division of Water Quality
Chase Jones, LFUCG Division of Water Quality
Frank Mabson, LFUCG Division of Water Quality
Angela Poe, LFUCG Division of Environmental Services
Joseph Richey, LFUCG Division of Water Quality
Simon Swansegar, LFUCG Division of Water Quality
Abby Terry, Tetra Tech, LFUCG MS4 Program Management
Bailee Young, LFUCG Division of Water Quality

Opening Remarks
Amy Sohner opened the June meeting at 9:02 a.m. and asked those in attendance to introduce themselves and their organization when speaking.

Approval of 03/06/2026 Minutes
Ms. Sohner asked if there were any additions or corrections to the March 6th minutes. There were none.

A motion was made by Jim Conner, seconded by Steve Evans, and carried unanimously to approve the minutes of March 6, 2026, meeting with attachments.

Complete Streets Manual

Kenzie Gleason, LFUCG Division of Planning, along with Samantha Castro, of Tunnell, Spangler, Walsh & Associates, presented an overview of the Complete Streets Manual.

Ms. Gleason explained that the Complete Streets Manual is a joint effort between the Division(s) of Engineering and Traffic Engineering, with help from the Division of Planning, in coordinating with each division and Toole Design, and Tunnell, Spangler, Walsh & Associates.

Toole Design is a national firm that specializes in multimodal street design which includes as complete streets, pedestrians, bicycles, and transit type-oriented planning as well as for cars. Tunnell, Spangler, Walsh & Associates specialize in stormwater aspects for as covered in the Complete Streets Manual.

Ms. Gleason explained that the Complete Streets Manual was developed due to several policy directives from the Urban County Council about how people can traverse the community. The policies that were adopted by Council are as follows:

- Complete Streets Policy (2022)
  - "Public streets should be safe and accessible for all members of the community - regardless of age, ability, income, or travel mode"
- Vision Zero Policy (2025)
  - "LFUCG shall work toward a goal of eliminating traffic fatalities and serious injuries"
- Council STREEETS Safety Task Force (2025)
  - Street safety via Engineering, Education, and Enforcement
  - Engineering = Complete Streets Design Manual

Engineering and design practices are always evolving from both the development pattern and the way the roads have been built. Since the 70s and 80s, the focus was on street design that prioritized travel efficiency over walking, biking and public transit. Now the focus is to balance the street design and the safety of those streets for all users; not just cars. The old philosophy was that faster is better, and the new philosophy is, slower is safer.

The Complete Streets Manual works to integrate and coordinate with the following manuals and regulations that impact street design:

- Roadway Design Manual (2005)
- Land Subdivision Regulations
- Neighborhood Traffic Management Program

The Guiding Principles for Street Design are trying to increase safety, accessibility, liveability, sustainability, maintainability and transparency (in design decisions making).

What does it apply to?

- Official "Engineering Manual"
  - One of seven Engineering Manuals governing the design and construction of public infrastructure
  - Replaces Roadway Design Manual
- New/Infill Development
  - Built by developers to be dedicated, owned & maintained by LFUCG
- LFUCG Roadway Capital Improvement Projects

Ms. Gleason briefly explained the following slide:

Designing for Complete Streets - What's Changed?

Street Design Element	Old Roadway Design Manual	New Complete Streets Manual
Street elements and widths:	Ignore the surrounding land uses	Respond to surrounding land uses
The standard bikeway is:	Uncomfortable for most users	Comfortable and fully separated from traffic
The standard intersection is:	Difficult to enforce safe driving	Keeps traffic flowing while reducing serious crashes and injuries
Traffic calming features:	Require more costly retrofits	Gets it right the first time
Streets are designed for speeds:	That can result in death	That significantly reduce the chance of death
Sidewalk widths:	Meet the minimum ADA standards	Are sized based on pedestrian comfort and surrounding land uses
Medians are:	Not required on major roadways	Required to reduce speeds, improve traffic flow and pedestrian safety
Street trees are required:	Only in residential areas	Everywhere to slow speeds, shade sidewalks, and cool our city
Planting strip widths are:	Not wide enough for large trees	Make sure large trees can survive

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Ms. Gleason touched on the Chapters in the Complete Streets Manual Organization

Chapter 1: Introduction

- Purpose & How to Use the Manual
- How its Applied
  - New Neighborhood Development
  - Infill and Redevelopment
  - Development Along Thoroughfares
  - LFUCG Improvement Projects
  - KYTC Improvement Projects
- Waivers and Variance Process

Chapter 2: Street Improvements Procedures for Private Development

- Planning & Design Requirements
  - Subdivision Plans & Plats
  - Development Plans
- Construction & Dedication of Infrastructure
- Surety, Warranty, and Final Acceptance process

Chapter 3: Street Types & Typical Cross-Sections

- Typical Cross-Sections
  - Neighborhood Street
  - Avenue
  - Alley
  - Boulevard
  - Thoroughfare
- Street Classification
- Modal Emphasis

Chapter 4: Street Corridor Elements

- 4.3 Roadway Zone
- 4.3.2 Stormwater Management
  - Prevent ponding
  - Preserve positive drainage
- 4.5 Landscape & Greenspace Elements
  - Green infrastructure
  - Sufficient planting / vegetative zones
  - Native and climate-resilient
  - Stormwater integration

Chapter 5: Intersection and Crossing Elements

- Intersection Geometric Design
- Traffic Control Devices
- Roundabouts and Traffic Circles
- Pedestrian Crossing Elements
- Bicycle Facilities at Intersections

Chapter 6: Speed Management

- Roadway Reallocation
- Vertical Measures
- Horizontal Measures
- Surface Treatments
- Enclosure

Draft Review & Adoption Timeline

Review & Approval Process	Timeline
Draft to engineering, utility & development contacts	April 1
Stakeholder workshop / open house	April 17 & 24
Update to EQPW Committee	May 12
Release public draft	May 12
Release revised draft based on stakeholder and public input	June 9
Stakeholder workshop / open house	June 12
Present revised draft to EQPW Committee	June 16
EQPW report out to full Council	August 18
Council adoption	Summer '26
Initiate Subdivision Regulation Amendment	Summer '26
PC final action	Fall '26
Council final action	Fall '26

Ms. Castro briefly described what specifically in the manual pertains to stormwater.

- Guiding Principles for Street Design
    - Safety
    - Accessibility
    - Livability
    - Sustainability - *Streets should support broader* ***community goals for environmental stewardship by providing green infrastructure and stormwater management****, reducing emissions, improving air quality, encouraging alternative travel modes, and by using sustainable and durable materials.*
    - Maintainability
    - Transparency

Chapter 4: Street Corridor Elements
- 4.3 Roadway Zone
- 4.3.2 Stormwater Management
    - Prevent ponding
    - Preserve positive drainage
- 4.5 Landscape & Greenspace Elements
    - Green infrastructure
    - Sufficient planting/vegetative zones
    - Native and climate-resilient
    - Stormwater integration

<u>Comments and questions</u> – Amy Clark said that the manual begins with new development, but there are also many areas within the urban area that will be redeveloped. She asked are the standards separated or at least is the procedure relaxed or flexible with standards for infill and redevelopment. Ms. Gleason said that if the request is new development, the manual calls for the request to go through the Planning Commission waiver process. The applicant would need to explain why there's some sort of constraint that is preventing them from achieving the desired standard and prescribed standard. The staff understands the constraint when working in these areas, but the manual is a resource for the applicant to make sure what they are proposing is within the overall intent and goals of the manual itself.

Ms. Clark said that the Board of Adjustments is charged with Variances that deal with the Zoning Ordinance. She asked if the criteria for variances are the same as the criteria for waivers. Ms. Gleason indicated she is not familiar with the Board of Adjustment process, but the new development standards are within the Land Subdivision Regulations. The Land Subdivision Regulations are generally written to be very prescriptive, with not a lot of wiggle room. Only the Planning Commission can waive anything that is identified in the Land Subdivision Regulations. She was not aware of any applicability to the Board of Adjustments, but she could pose that question.

Russ Turpin explained that he works with grantees who were awarded funding through the Stormwater Quality Projects Incentive Grant Program. These projects go above and beyond what is required. He asked if the elements listed in the manual required to be done, or if some of these be subject to the stormwater grant to be put in place. Ms. Gleason said that many of the green infrastructure elements are permissible but not required. Aside from the planting strips and trees, rain gardens are not required but they are allowed. She indicated that she is not familiar with the Stormwater Quality Projects Incentive Grant Program, but she believes there needs to be a Maintenance Agreement in place.

Mr. Turpin asked who the applicant would be. Ms. Young replied that it is tricky because it is on the right-of-way. It would have to be a third party that is not the city, applying for that request.

Steve Evans asked if there is a list for native and climate resilient species reference in the Stormwater Manual. Ms. Gleason said that in most cases they don't identify species, but rather they are referenced to other resources that are available. For approved planting species, the Planting Manual would be referenced.

<u>Riparian and Landscape Restoration for Stormwater Management</u>

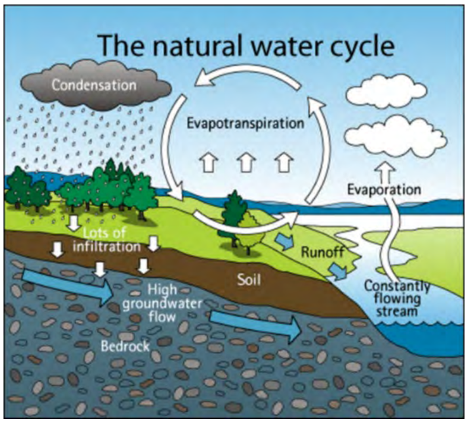
Dr. John McMaine, University of Kentucky, presented an overview of the Riparian and Landscape Restoration for Stormwater Management.

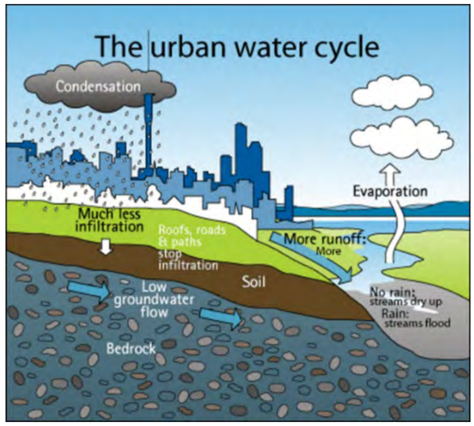
<u>Acknowledgements</u>
Funding – Biosystems and Agricultural Engineering
Abbie Davidson – Biosystems and Agricultural Engineering (BAE) (UK)
Patrick Faust – BAE (UK)
Myranda Hentges – BAE (UK)
Quinn Rison – BAE (UK)
Noah Lane – BAE (UK)
Cole Crumbaker – BAE (UK)
Kennedy Griggs – BAE (UK)
Jeromie Viana – Biological Engineering (Univ. of Nebraska Lincoln)

A natural ground cover has 40% evapotranspiration, 10% runoff, 25% shallow infiltration and 25% deep infiltration. However, the chart below shows the higher the impervious cover, the higher percentage of evapotranspiration, runoff, shallow infiltration and deep infiltration decreases.

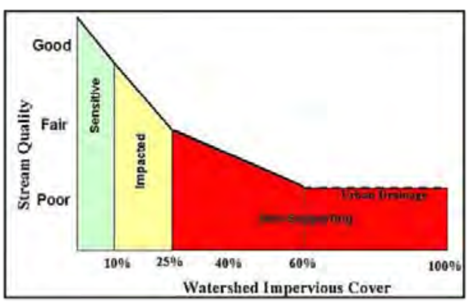
Impervious cover	Evapotranspiration	Runoff	Shallow infiltration	Deep infiltration
10-20%	38%	38%	21%	21%
35-50%	35%	30%	20%	15%
75-100%	30%	55%	10%	5%

Natural water cycle versus the urban water cycle.

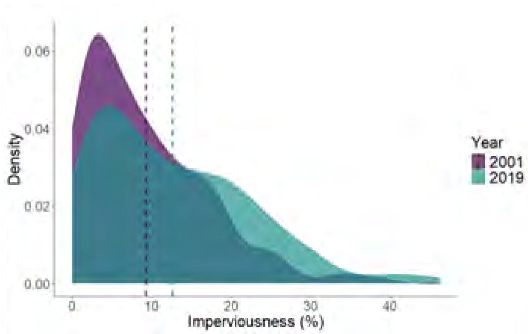




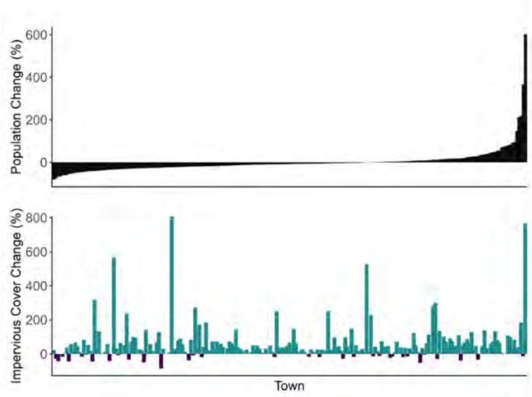
Watershed impervious cover



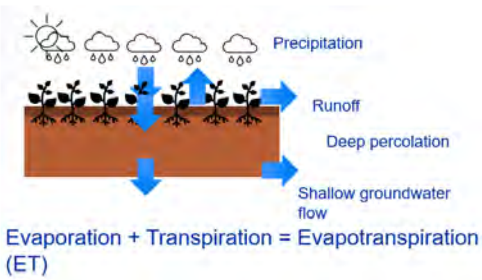
Change of the total imperviousness in small towns from 2001 to 2019. In eastern South Dakota - the average imperviousness in these towns rose from 9.26% in 2001 to 12.60% in 2019.



Impervious changes from 2001-2019 versus population changes from 2000-2020 in towns. In several South Dakota towns, a decrease in population was still accompanied by an increase in impervious surfaces.



There are different pieces to the water balance that can make a difference in ecological restoration. Precipitation, liquid or frozen, can run off the surface or it can infiltrate the ground straight down to the shallow groundwater flow or it can be stored on the surface or in the soil or it can return to the atmosphere through transpiration or evaporation (evapotranspiration).



How can ecological restoration affect water balance? When water lands on the surface, the capacity and soil vegetation matrix will determine how much water is captured and infiltrated through the soil. This has to do with compaction of the soil and macropores in the soil so depending on the size of the pores will determine how much water can move through the soil surface.

How can ecological restoration affect storage in the soil? An increase or decrease in organic matter can determine soil storage. If the compaction of the soil decreased there is a better distribution of the pore sizes.

Saturated hydraulic conductivity is measured by how fast water moves through the soil when all pores are filled with water. If there is a low saturated hydraulic connectivity, it is probably due to either too much clay, or compacted soil.

Field capacity is the amount of water remaining in soil after saturation and free drainage. Field capacity is important to ensure the right balance of water for the root system. The difference between saturation and field capacity means there is more water in the soil.

Permanent wilting point or wilting point is when a plant root can no longer extract water from the soil causing it to wilt irreversibly.

If the field capacity increases and the wilting point decreases, there will be storage available in that soil profile. This is beneficial to the trees and plant life. However, if there is a big rain event, the water moving through the soil reaches its field capacity, which means most of the water was not stored in the soil profile. If the wilting point is high the plants the plant life cannot get any more of that water out of the soil.

Can the field capacity be significantly changed? The graph below is a summary of rate of increase in volumetric water content (mm H2O 100 mm -1 soil) with an increase of 10 g C kg-1 mineral soil. For Coarse soil - 1% increase in soil organic carbon yields. 2.3 mm H_2O per 100 mm soil = 0.1 in per 3.9 in of soil = 1 inch of available water per 40 inches of soil

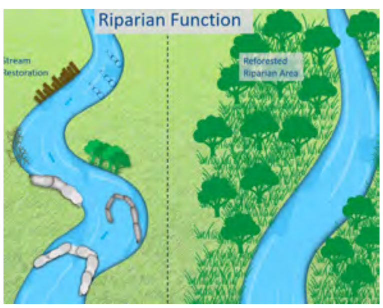
Texture		SAT	FC	WP	AWC
General	n	14	23	20	19
	Mean	2.95	1.61	0.17	1.16
	SD	1.53	1.54	1.55	1.01
Coarse	n	12	19	18	19
	Mean	4.39	2.33	0.86	1.94
	SD	2.17	2.96	1.74	1.28
Medium	n	12	22	21	21
	Mean	3.59	2.11	0.68	1.79
	SD	1.65	1.74	1.19	1.5
Fine	n	9	12	11	11
	Mean	3.23	1.28	0.54	1.41
	SD	2.09	2.05	1.74	1.95

Can riparian and upland areas be better sponges.
Experimental Design

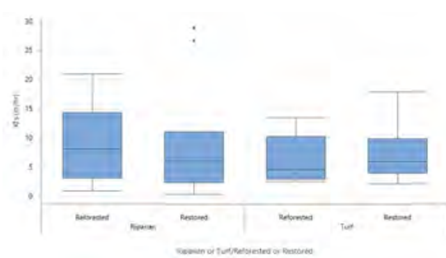
Treatments –
<u>Riparian (sampled in 2025, will sample in 2026)</u>
Reforested (17 sites) vs. Stream Restoration (17 sites) vs. Adjacent Turf (34 sites, 1:1 for riparian areas)

<u>Upland (will sample in 2026)</u>
Reforest the Bluegrass (14 sites)
Adjacent Turf (14 sites, 1:1 for RtB sites)

Three sampling points within each treatment



The graph below shows the difference between Riparian vs. Turf and Reforested and Restored



The graph below indicates A through C results are within the riparian and D through F results are the adjacent greenspace area.

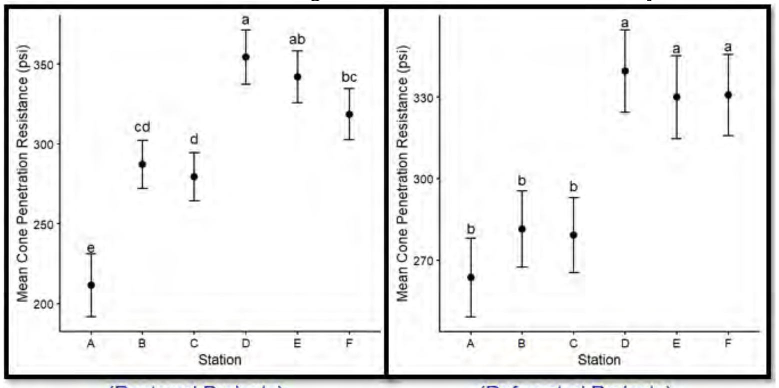
	Reforested		Restored	
A	13.6 cm/hr	n=4	19.2 cm/hr	n=6
B	32.2 cm/hr	n=2	30.2 cm/hr	n=7
C	26.3 cm/hr	n=3	21.3 cm/hr	n=5
D	15.9 cm/hr	n=9	19.7 cm/hr	n=6
E	11.7 cm/hr	n=4	19.7 cm/hr	n=4
F	21.4 cm/hr	n=8	20.7 cm/hr	n=6

Mean:
Kfs (cm/hr)
28.8
21.6
14.4

Cone Penetration Resistance is the force required to push a standardized steel cone tip into the ground at a constant rate, divided by the cone's projection.

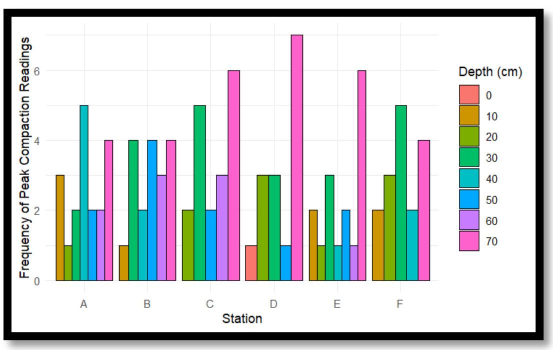
Mean Compaction by Station – a low number means it was easy to push the cone tip into the ground, and the soil was not compacted. A high number means it was very hard to push the cone tip into the ground, and the soil was very compacted.

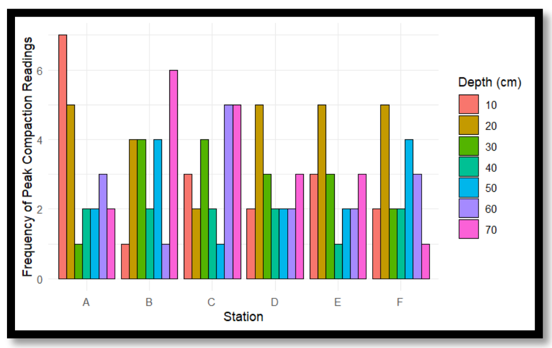
The difference between A through F - Restored and Reforested Projects



(Restored Projects) (Reforested Projects)

Peak compaction Frequency





Reforested Projects Restored Projects

Conclusions and Future work

- Numerical (but not statistically significant) difference in hydraulic conductivity between –
  - Riparian and green space
  - Reforested and restored
- Significant difference in compaction between -
  - Riparian and green space
  - Reforested and restored
- Correlation across measured parameters
  - Does compaction significantly affect function
  - Does a reforested riparian area have higher field capacity
- How should we adjust recommendations for improving riparian function
  - Just reforest
  - Restore but reduce compaction

<u>Comments and questions</u> – Russ Turpin indicated that in his experience some of the rain garden and green infrastructure project designs would call for 70% sand 15% compost and 15% topsoil. It seems that field capacity is not taken into consideration that it is difficult to get plants to grow in high sandy soil. He asked what examples could be recommended from other communities using specifications to attain good growth when it comes to stormwater and green infrastructure. Dr. McMaine said compost is a heavy organic matter that retains water and nutrients. There has been concern with increasing the field capacity because of the possible tradeoff of leeching or sourcing some of those nutrients downstream. Not all composts are the same. Some are more mature with more nutrients. Some are more bioavailable than others. Some may be more prone to leeching.

Frank Mabson asked if there were considerations in terms of urban versus rural when the cone test was being done. Dr. McMaine replied that all the sites were from the stream restoration inventory within Lexington. Most of the sites were typical urban residential or mixed-use areas.

Butch Jones asked how long it normally takes for soil to compact. Dr. McMaine said that it could happen instantaneously if there is heavy equipment on the soil or it could happen over time from cumulative chronic events.

Scott Southall asked what other factors were looked at as far as those differential increases in capacity. Dr. McMaine gave a brief description of the chart below.

Parameters	Method	Depths
Texture	PARIO+ (METER Group)	0-4, 4-8, 8-12, 12-24,24-36 (in)
Ksat (saturated hydraulic conductivity)	KSAT (METER Group)	Surface
Kfs (field saturated hydraulic conductivity)	SATURO (METER Group)	Surface
Soil Moisture Release Curve	HYPROP and WP4C (METER Group)	Surface
Resistance to Penetration	Penetrologger (Eikelkamp)	0-31.5 (in)
Wet Aggregate Stability	Wet Sieve (Eikelkamp)	0-4, 4-8, 8-12, 12-24, 24-36 (in)

Gabe Hensley commented that organizations are making an efforts in these small communities that could possibly influence policy or design standards at the state level by providing data and research to those in the decision making process. At that level, it is more challenging in the urban environment than in the rural environment.

Climate Change Impacts on Precipitation and Flooding in Kentucky

Dr. Nabil Al Aamery and Dr. Jimmy Fox were not present at the meeting, but the video below discusses their views on Climate Change Impacts on Precipitation and Flooding in Kentucky over the next 30 years.

https://www.youtube.com/watch?v=-YalIU7fcT4

Comments and questions – There were no comments or questions.

Other Discussions

Russ Turpin said with the lag time between FEMA and federal directions it is hard to predict. Do LFUCG MS4 communities have the ability to set their own standards based on design specifications. Abby Terry said that LFUCG precipitation values in the Stormwater Manual are based on Atlas 14 which is currently being evaluated for updates. Once the update is completed then it is assumed there would be an update to the precipitation values in the Stormwater Manual.

Scott Southall said that there is also some historic modeling that is based on local events.

Steve Evans said that most of these systems are designed on the 25-year storm, but obviously, that is changing. He asked if there are any considerations as to how you might need to retrofit or have expanded capacity in the future for those existing basins.

Butch Jones said that in a normal construction there are asphalt and concrete sidewalks, but where does the permeability aspect come in. He asked if Lexington is advocating for more permeable parking lots. Brian Hayes said that the Stormwater Manual does address water quality aspects and there is a litany of availability on what they may use, but that's up to them. Amy Sohner said that the stormwater fee is based on the amount of impervious surface.

Mr. Jones said that anything that falls on asphalt is runoff that goes directly to the stream. Streams feed into the creeks, creeks feed into the rivers, rivers feed into the major rivers, and you just get flooding. Everything that happens upstream floods downstream. Mr. Hayes said that there are stormwater control features per the Stormwater Manual.

Ms. Sohner asked if it is quantity and quality. Mr. Hayes replied it involves both.

Frank Mabson said that there is a slow rate of return when investing in permeable options.

Ms. Sohner said that there are higher maintenance costs on permeable pavement.

Ms. Clark said sometimes you are not allowed infiltration such as in the Royal Spring Aquifer. Mr. Mabson replied when it comes to the Stormwater Incentive Grant Program, the grantee is required to notify the Royal Spring Aquifer Committee of their proposal.

Mr. Hayes added that localized surface infiltration is probably acceptable; whereas well injection or deep well infiltration is probably not with the context of Royal Springs Aquifer.

Potential Topics for Next Meeting

Ms. Young asked if there were any suggestions for future topics. Eileen Burke asked for an update on the stormwater infrastructure along the Midland corridor and how it has been performing since installation.

Announcements

June 13th – Truck-a-Palooza
June 20th – River Sweep Event
June 22nd – Virtual Q&A Session for Class B Infrastructure Grants at 6 pm
June 24th – Virtual Q&A Session for Class B Infrastructure Grants at 1 pm
June 30th – July 9th Office Hours for Stormwater Quality Incentive Grants
July 11th – Free Trash Disposal Day
July 23rd – Water Quality Fees Board Meeting
July 24th – Filing Deadline for Class B Infrastructure
June 29th – Wolf Run Watershed Council Meeting
August 16th – 50th Annual Woodland Art Fair
August 26th and 27th – Third Quarter Volunteer Monitoring
September 4th - Stormwater Stakeholder Advisory Committee Meeting

Adjournment
The meeting concluded at 10:51 a.m.

STORMWATER STAKEHOLDER ADVISORY COMMITTEE

June 5, 2026

LEXINGTON

LEXINGTON

Meeting Agenda

1. Approval of 03/06/2025 Minutes
2. Complete Streets Manual – Kenzie Gleason, LFUCG Division of Planning
3. Riparian and Landscape Restoration for Stormwater Management– Dr. John McMaine, University of Kentucky
4. Climate Change Impacts on Precipitation and Flooding in Kentucky, Dr. Nabil Al Aamery and Dr. Jimmy Fox
5. Potential Topics for Next Meeting
6. Announcements

Potential Topics for Next Meeting

Announcements

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Lexington-Fayette Urban County Government Complete Streets Design Manual

June 5, 2026

LEXINGTON TOOLE DESIGN Tunnell Spangler Walsh

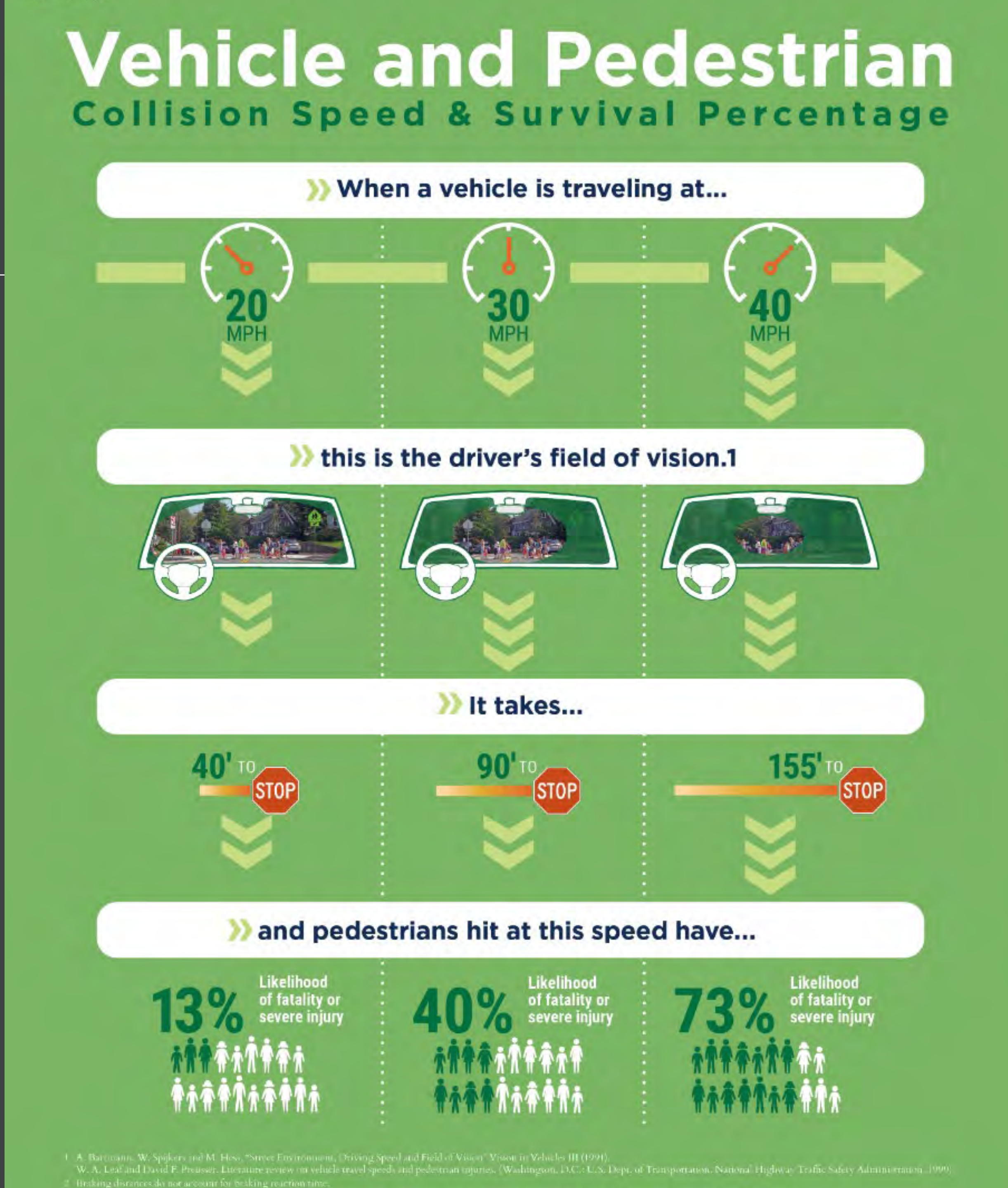
Why Develop a Complete Streets Design Manual?

- **Policy directives adopted by Council**
  - **Complete Streets Policy (2022)**
    - “Public streets should be safe and accessible for all members of the community - regardless of age, ability, income, or travel mode”
  - **Vision Zero Policy (2025)**
    - “LFUCG shall work towards a goal of eliminating traffic fatalities and serious injuries”
  - **Council STREEETS Task Force (2025)**
    - Street safety via Engineering, Education, Enforcement
    - Engineering = Complete Streets Design Manual

Why Develop a Complete Streets Design Manual?

- Modernize Street Standards
  - Engineering & design practices evolve
  - Car-centric → All travel modes
  - Faster is better → Slower is safer

- Integrate Street Standards
  - Roadway Design Manual (2005)
  - Land Subdivision Regulations
  - Neighborhood Traffic Management Program



Guiding Principles for Street Design

- Safety
- Accessibility
- Livability
- Sustainability
- Maintainability
- Transparency (in design decisions-making)

What does it apply to?

- Official “Engineering Manual”
  - One of seven engineering manuals governing the design and construction of public infrastructure
  - Replaces Roadway Design Manual
- New / Infill Development
  - Built by developers to be dedicated, owned & maintained by LFUCG
- LFUCG Roadway Capital Improvement Projects

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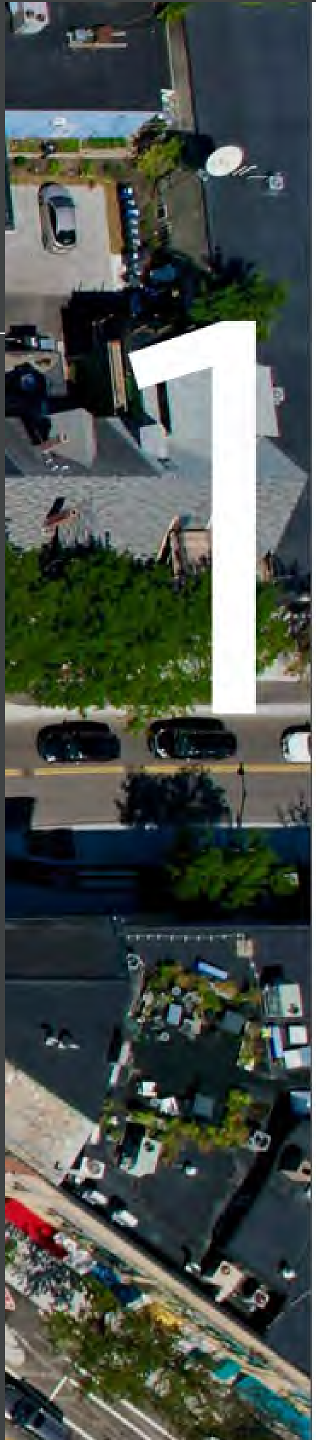
The standard intersection is:	Difficult to enforce safe driving	Keeps traffic flowing while reducing serious crashes and injuries
Traffic calming features:	Require more costly retrofits	Gets it right the first time
Streets are designed for speeds:	That can result in death	That significantly reduce the chance of death
Sidewalk widths:	Meet the minimum ADA standards	Are sized based on pedestrian comfort and surrounding land uses
Medians are:	Not required on major roadways	Required to reduce speeds, improve traffic flow and pedestrian safety
Street trees are required:	Only in residential areas	Everywhere to slow speeds, shade sidewalks, and cool our city
Planting strip widths are:	Not wide enough for large trees	Make sure large trees can survive

Complete Streets Manual Organization

- Chapter 1: Introduction
- Chapter 2: Procedures for Private Development
- Chapter 3: Street Types & Typical Cross-Sections
- Chapter 4: Street Corridor Elements
- Chapter 5: Intersection and Crossing Elements
- Chapter 6: Speed Management
- Chapter 7: Procedures for Public Improvement Projects
- Chapter 8: Pavement Design + Construction Specifications

Chapter 1

- Purpose & How to Use the Manual
- How its Applied
  - New Neighborhood Development
  - Infill and Redevelopment
  - Development Along Thoroughfares
  - LFUCG Improvement Projects
  - KYTC Improvement Projects
- Waivers and Variance Process

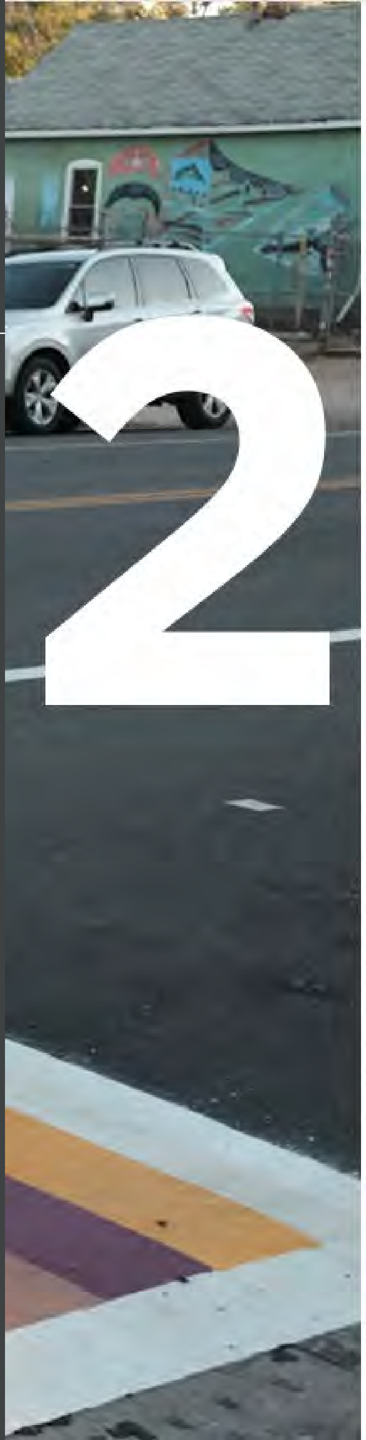


Introduction

Lexington's streets are essential public spaces that support daily life, economic activity, and access to destinations for people of all ages and abilities. The street network is continually evolving and changing in response to growth, travel patterns, community goals and expectations. Expanding safe and reliable travel options has been a long-standing priority for Lexington and is reflected in the community's adopted plans and policies.

Chapter 2

- Planning & Design Requirements
  - Subdivision Plans & Plats
  - Development Plans
- Construction & Dedication of Infrastructure
- Surety, Warranty, and Final Acceptance process

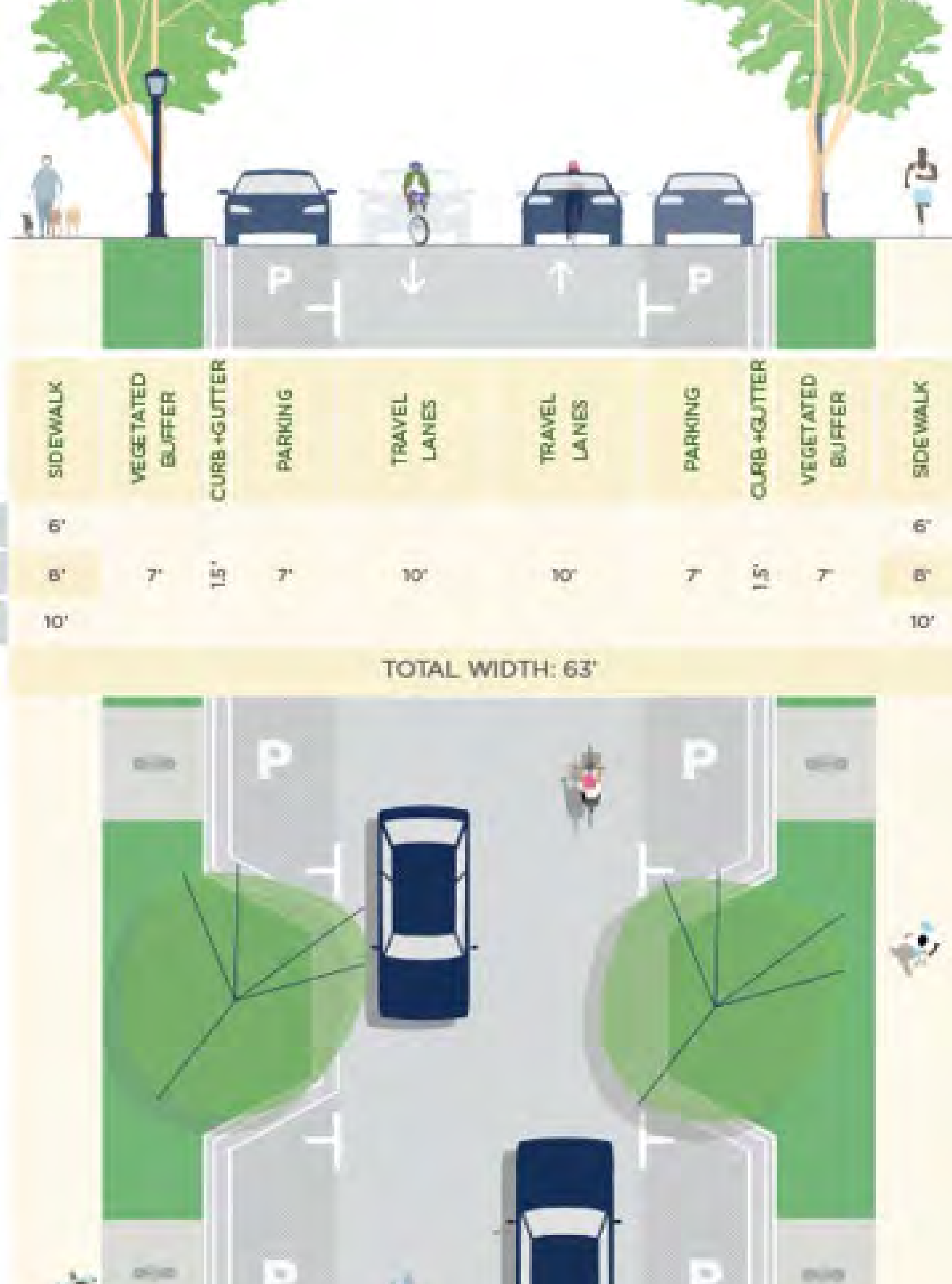


Street Improvement Procedures for Private Development

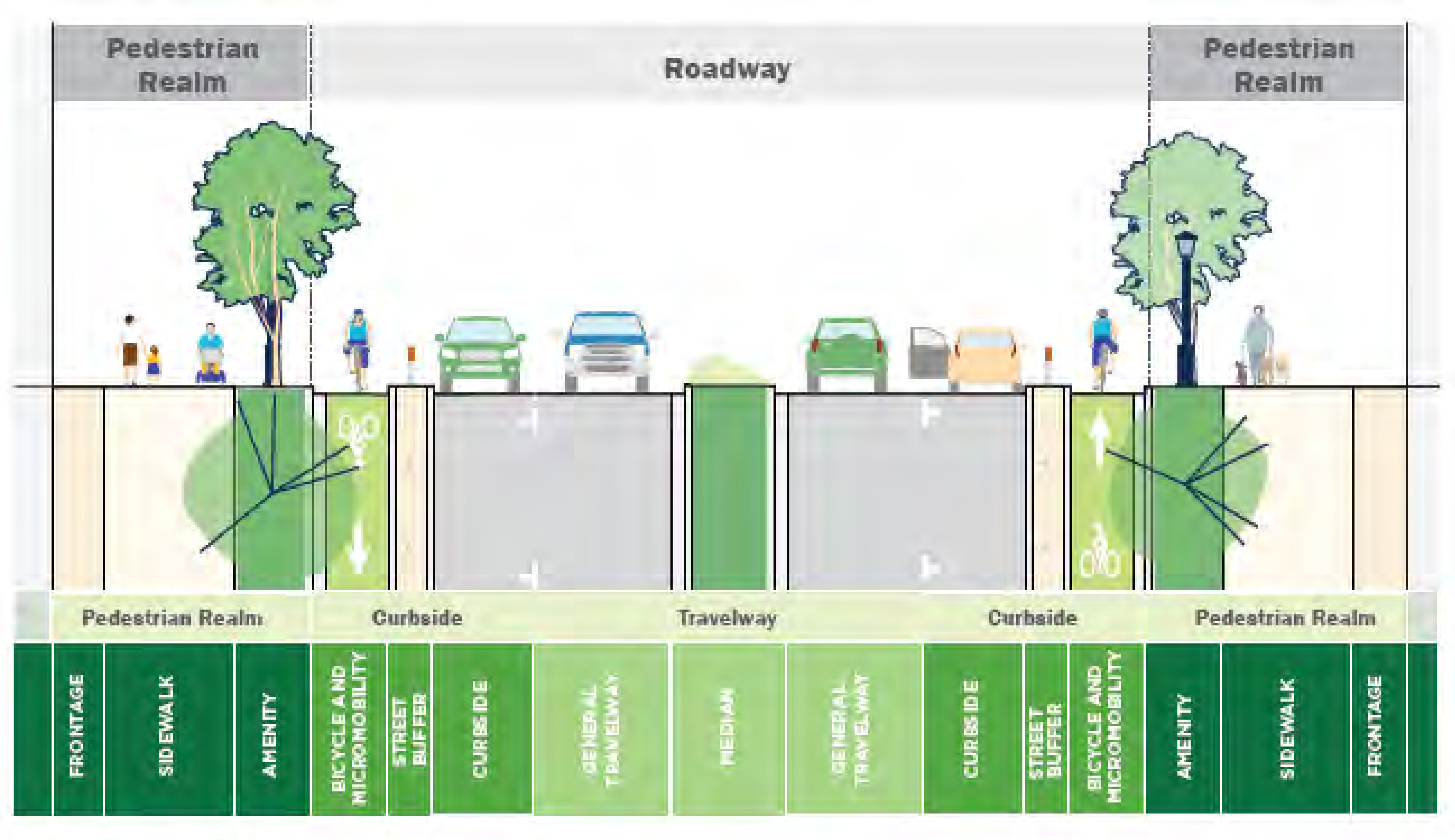
Private development projects that include new or improved streets and other public infrastructure must complete the development review process established by the LFUCG. The review and approval process may require zoning changes, development plans, subdivision plans, and infrastructure improvement plans.

Chapter 3: Street Types

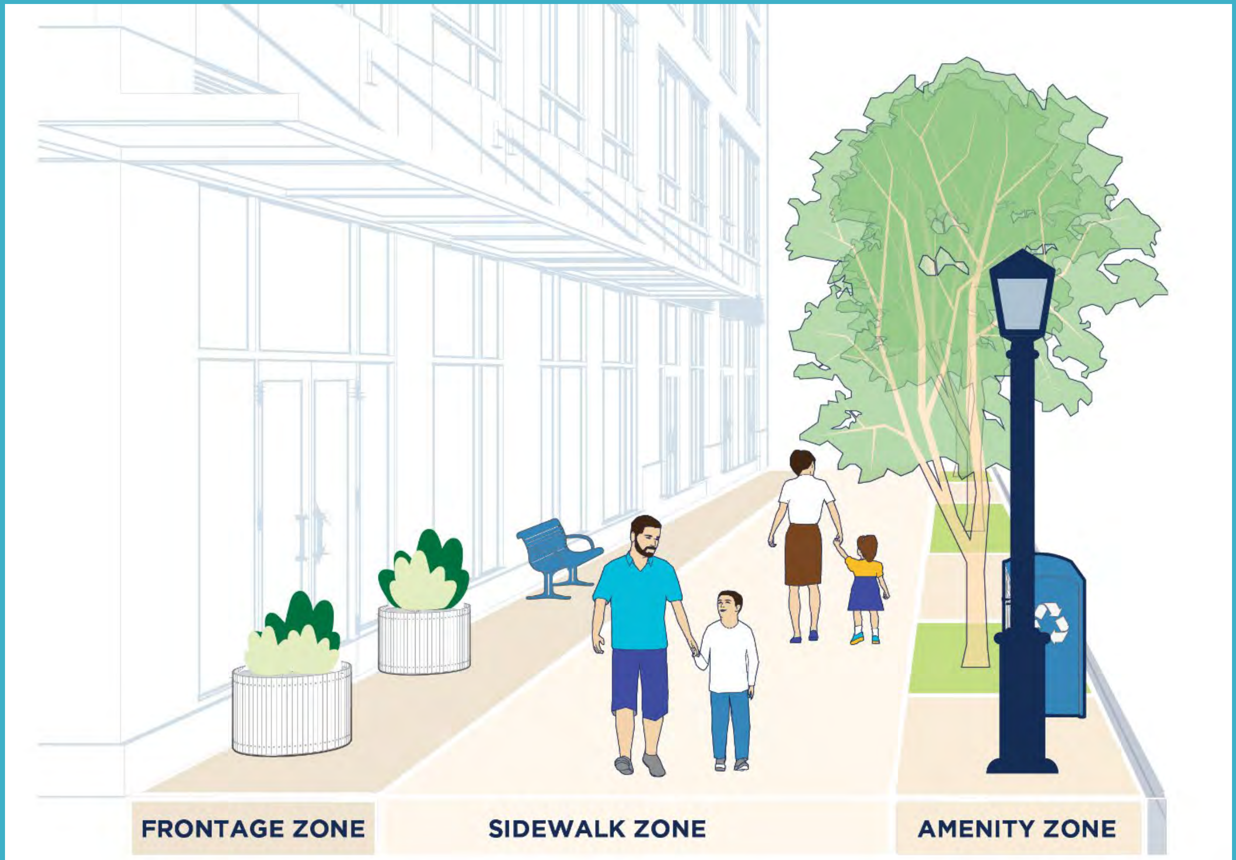
- Typical Cross-Sections
  - Neighborhood Street
  - Avenue
  - Alley
  - Boulevard
  - Thoroughfare
- Street Classification
- Modal Emphasis



Chapter 4: Street Corridor Elements



Pedestrian Zone



PEDESTRIAN ZONE DIMENSIONS

STREET TYPE	DEVELOPMENT INTENSITY	FRONTAGE ZONE (FT)			SIDEWALK (FT)		AMENITY ZONE (FT)		
		Default	Min	Max	Default	Min	Default	Min	Max
Neighborhood Street	Low Medium to High	N/A	N/A	N/A	6’	5’	7’	5’	8’
Avenue	Low	N/A	N/A	N/A	8’	5’	7’	5’	8’
	Medium to High	2’	2’	6’	10’	5’	6’	5’	12’
Boulevard	Low	N/A	N/A	N/A	10’	5’	7’	5’	8’
	Medium to High	2’	2’	6’	12’	5’	8’	5’	8’
Thoroughfare	Medium to High	N/A	N/A	N/A	8’	5’	7’	5’	N/A
Alley	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

PEDESTRIAN ZONE ELEMENTS

LEGEND

- ■ Required
- ● Recommended
- ○ Optional
- ✕ Not Permitted

	NEIGHBORHOOD STREET	AVENUE	BOULEVARD	THOROUGHFARE	ALLEY	PAGE REFERENCE
Trees	■	■	■	■	✕	
Landscaping	●	●	●	●	✕	
Green Infrastructure	●	●	●	●	✕	
Seating	●	●	●	○	✕	
Bicycle/Micromobility Parking	●	■	■	●	○	
Recycling/Trash Receptacles	●	●	●	●	○	
Plazas/Parklets	✕	○	○	✕	✕	
Dockless Mobility	✕	○	○	○	✕	
Pedestrian Scale Lighting	●	■	■	●	●	
Pedestrian/Bicycle Wayfinding	●	●	●	●	✕	
Sidewalk-Level Driveways	■	■	■	■	✕	
Public Art/Pop-up Spaces	✕	○	○	✕	✕	
Sidewalk Cafes	✕	●	○	✕	✕	

Bikeway Zone

GUIDANCE ON APPROPRIATE BIKEWAY BY STREET TYPE

STREET TYPE	DEVELOPMENT INTENSITY	PARAMETER	SHARED-USE PATH OR SIDE PATH		ONE-WAY SEPARATED BIKE LANE		TWO-WAY SEPARATED BIKE LANE		BUFFERED BIKE LANE (2' min. buffer, 3.5' min. next to parking, dim below does not include buffer)		CONVENTIONAL BIKE LANE		ADVISORY BIKE LANES		PAVED SHOULDER	
			Default	Min	Default	Min	Default	Min	Default	Min	Default	Min	Default	Min	Default	Min
Neighborhood Street	All	Bikeway	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6'	4'	N/A	N/A
		Street Buffer	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Avenue	Low	Bikeway	10 (Both Sides)	10'	5'	5'	10'	10'	6'	6'	N/A	N/A	N/A	N/A	N/A	N/A
		Street Buffer	6'	3'	1.5'	1.5'	3'	1.5'	4'	2'	N/A	N/A	N/A	N/A	N/A	N/A
	Medium to High	Bikeway	N/A	10'	6'	5'	12'	10'	7'	6'	N/A	N/A	N/A	N/A	N/A	N/A
		Street Buffer	N/A	3'	1.5'	1.5'	3'	1.5'	4'	2'	N/A	N/A	N/A	N/A	N/A	N/A
Boulevard	M	Bikeway	10' (Both	10'	6'	5'	10'	10'	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thoroughfare																
Alley																

Legend: Defa

Roadway Zone

LANE WIDTH DIMENSIONS BY STREET TYPE

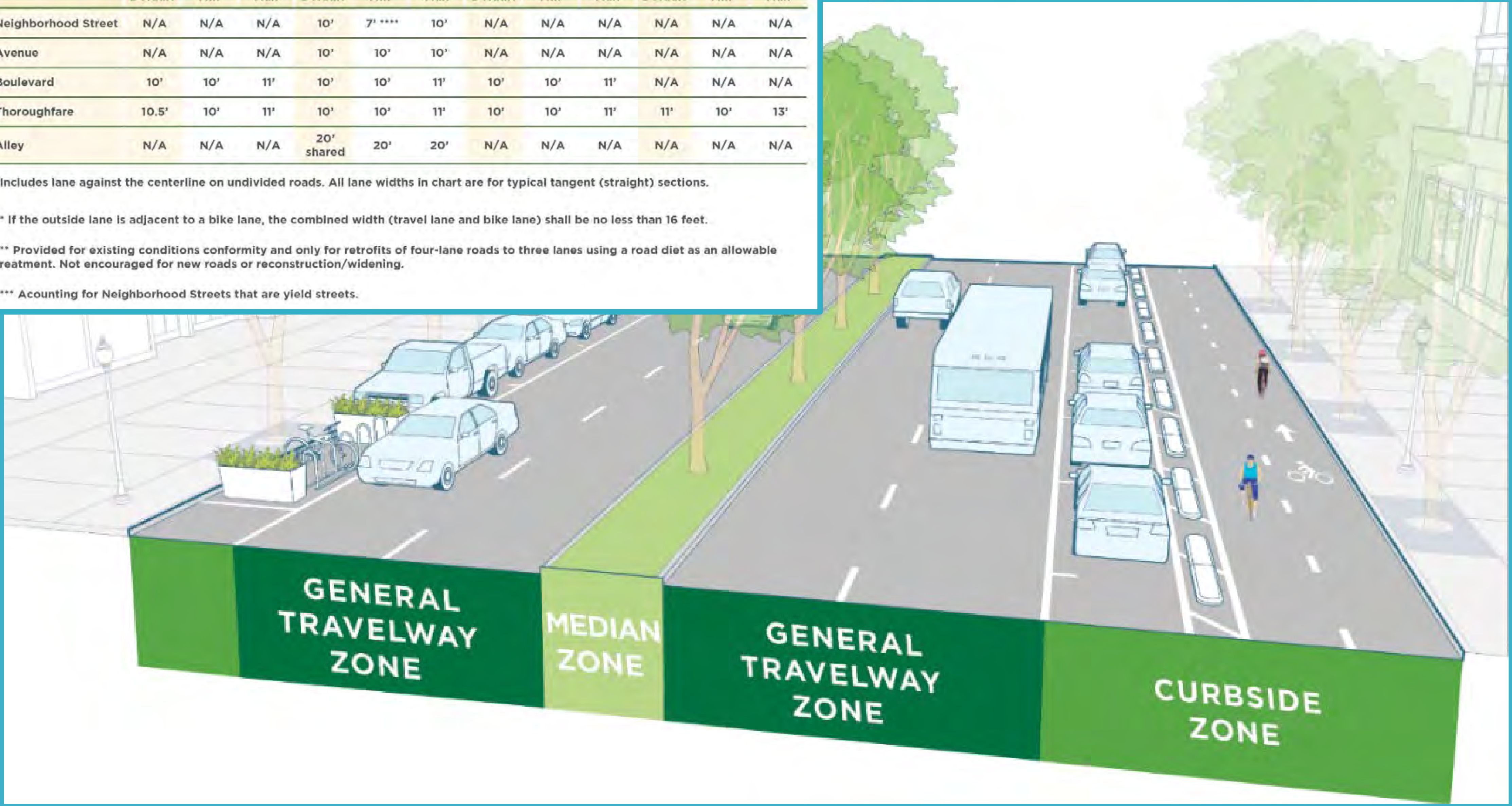
STREET TYPE	OUTSIDE TRAVEL LANE **			INSIDE TRAVEL LANE*			LEFT-TURN LANE			TWO-WAY LEFT TURN LANE ***		
	Default	Min	Max	Default	Min	Max	Default	Min	Max	Default	Min	Max
Neighborhood Street	N/A	N/A	N/A	10'	7' ****	10'	N/A	N/A	N/A	N/A	N/A	N/A
Avenue	N/A	N/A	N/A	10'	10'	10'	N/A	N/A	N/A	N/A	N/A	N/A
Boulevard	10'	10'	11'	10'	10'	11'	10'	10'	11'	N/A	N/A	N/A
Thoroughfare	10.5'	10'	11'	10'	10'	11'	10'	10'	11'	11'	10'	13'
Alley	N/A	N/A	N/A	20' shared	20'	20'	N/A	N/A	N/A	N/A	N/A	N/A

*Includes lane against the centerline on undivided roads. All lane widths in chart are for typical tangent (straight) sections.

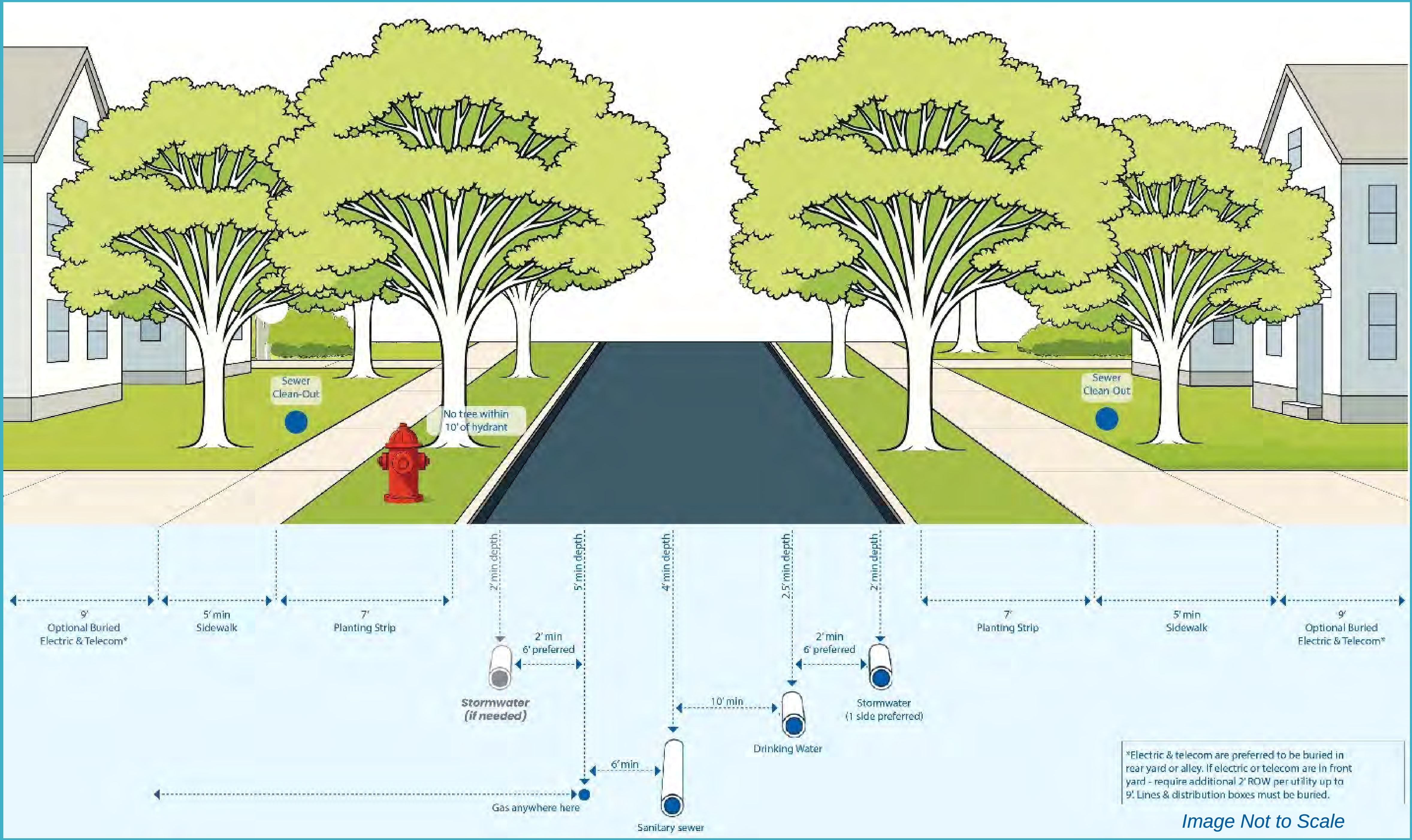
** If the outside lane is adjacent to a bike lane, the combined width (travel lane and bike lane) shall be no less than 16 feet.

*** Provided for existing conditions conformity and only for retrofits of four-lane roads to three lanes using a road diet as an allowable treatment. Not encouraged for new roads or reconstruction/widening.

**** Acounting for Neighborhood Streets that are yield streets.

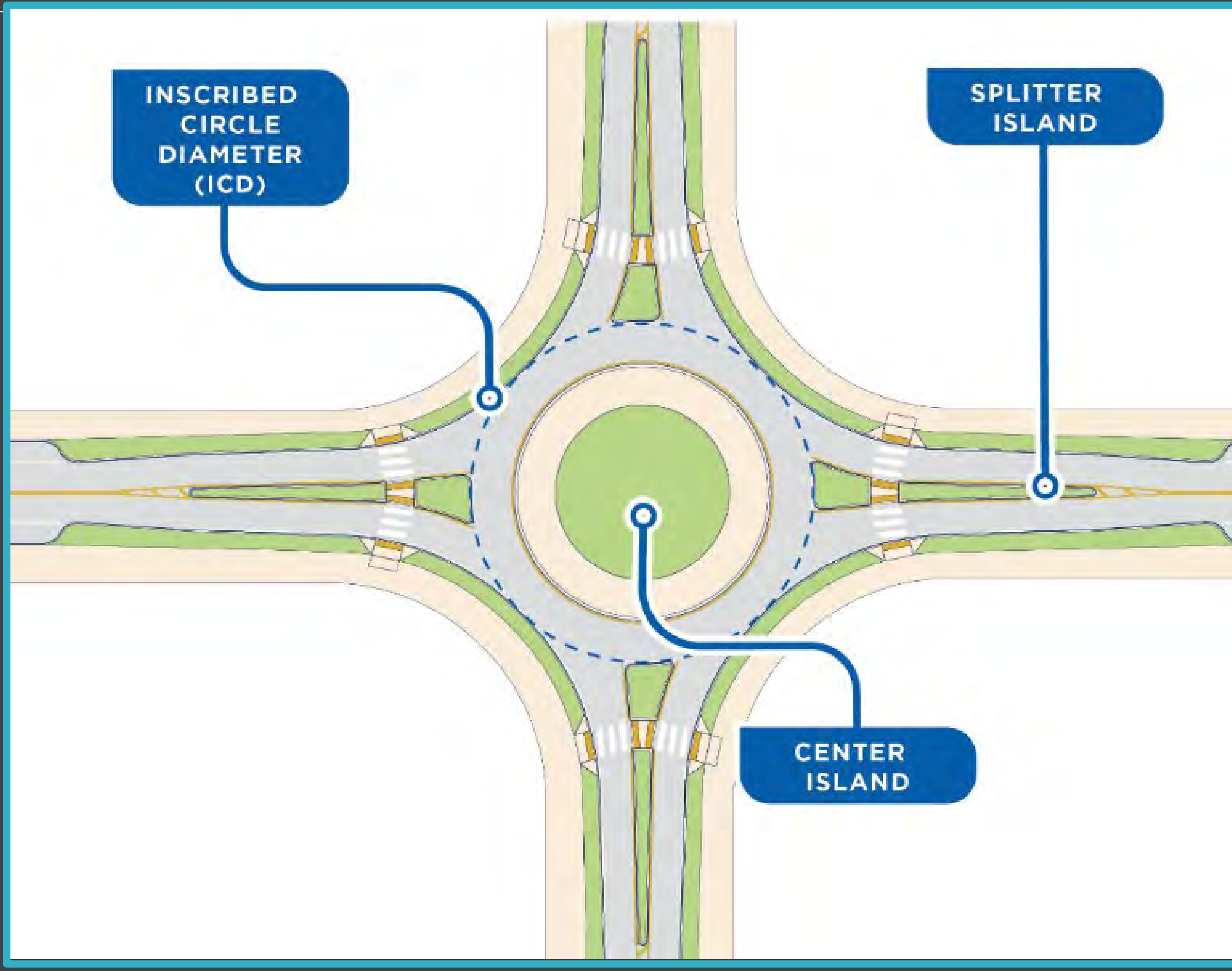


Utility Zone



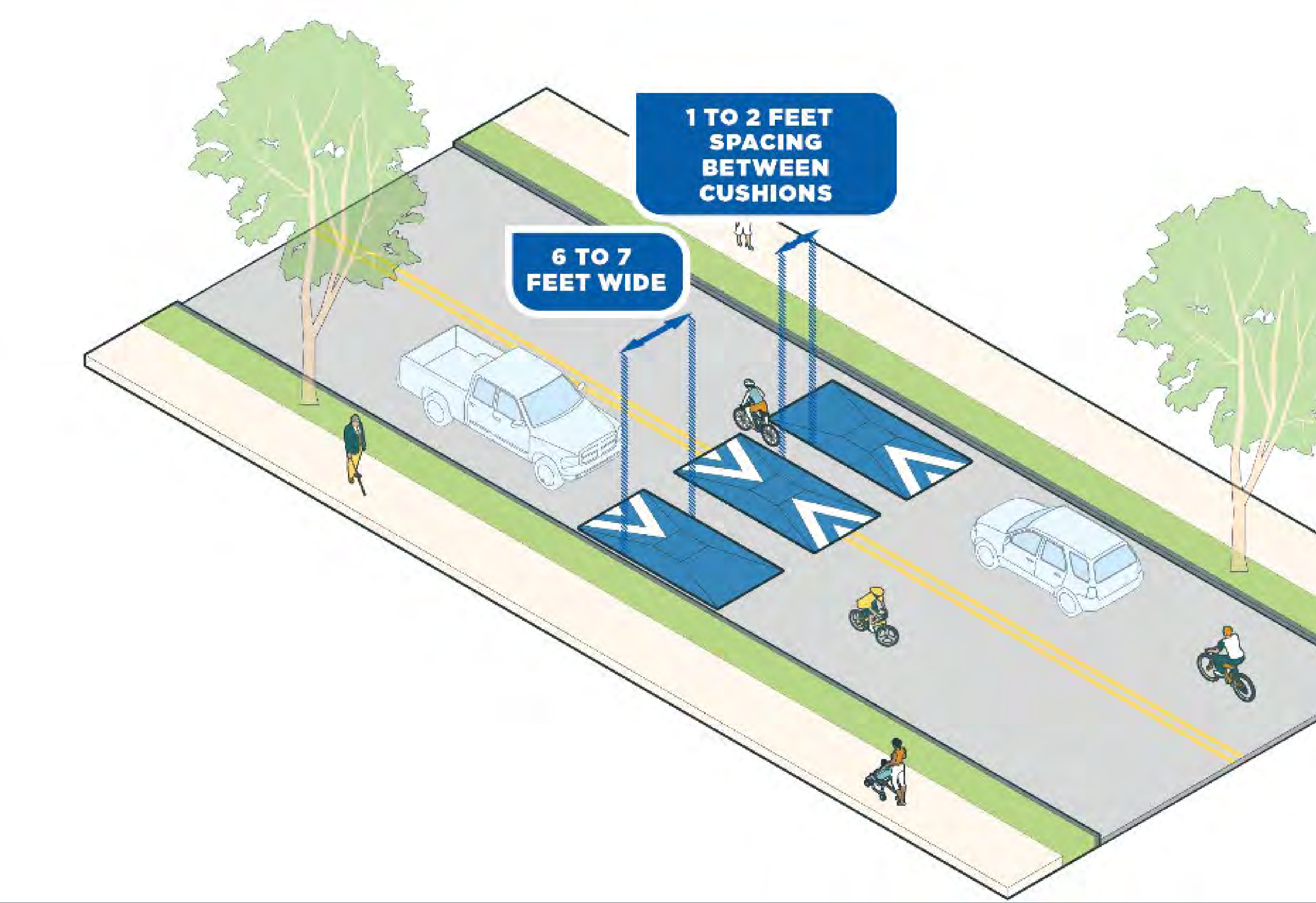
Chapter 5: Intersection and Crossing Elements

- Intersection Geometric Design
- Traffic Control Devices
- Roundabouts and Traffic Circles
- Pedestrian Crossing Elements
- Bicycle Facilities at Intersections



Chapter 6: Speed Management Strategies

- Roadway Reallocation
- Vertical Measures
- Horizontal Measures
- Surface Treatments
- Enclosure

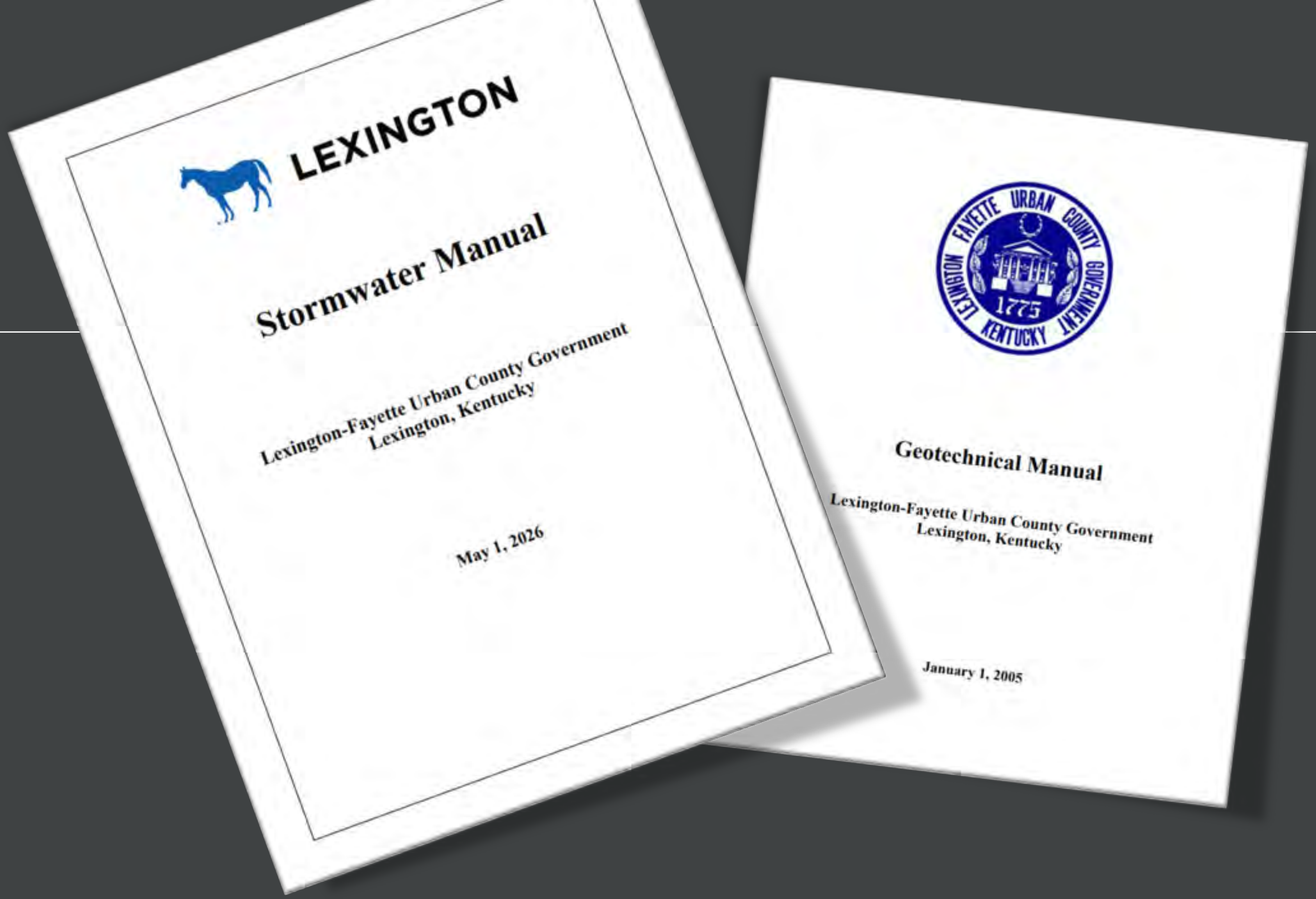


Draft Review & Adoption Timeline

Review & Approval Process	Timeline
Draft to engineering, utility & development contacts	April 1
Stakeholder workshop / open house	April 17 & 24
Update to EQPW Committee	May 12
Release public draft	May 12
Release revised draft based on stakeholder and public input	June 9
Stakeholder workshop / open house	June 12
Present revised draft to EQPW Committee	June 16
EQPW report out to full Council	August 18
Council adoption	Summer '26
Initiate Subdivision Regulation Amendment	Summer '26
PC final action	Fall '26
Council final action	Fall '26

Let's Talk Stormwater

- Guiding Principles for Street Design
  - Safety
  - Accessibility
  - Livability
  - Sustainability
  - Maintainability
  - Transparency



Sustainability – Streets should support broader ***community goals for environmental stewardship by providing green infrastructure and stormwater management****, reducing emissions, improving air quality, encouraging alternative travel modes, and by using sustainable and durable materials.*

Chapter 4: Street Corridor Elements

4.3 Roadway Zone

- 4.3.2 Stormwater Management
  - Prevent ponding
  - Preserve positive drainage

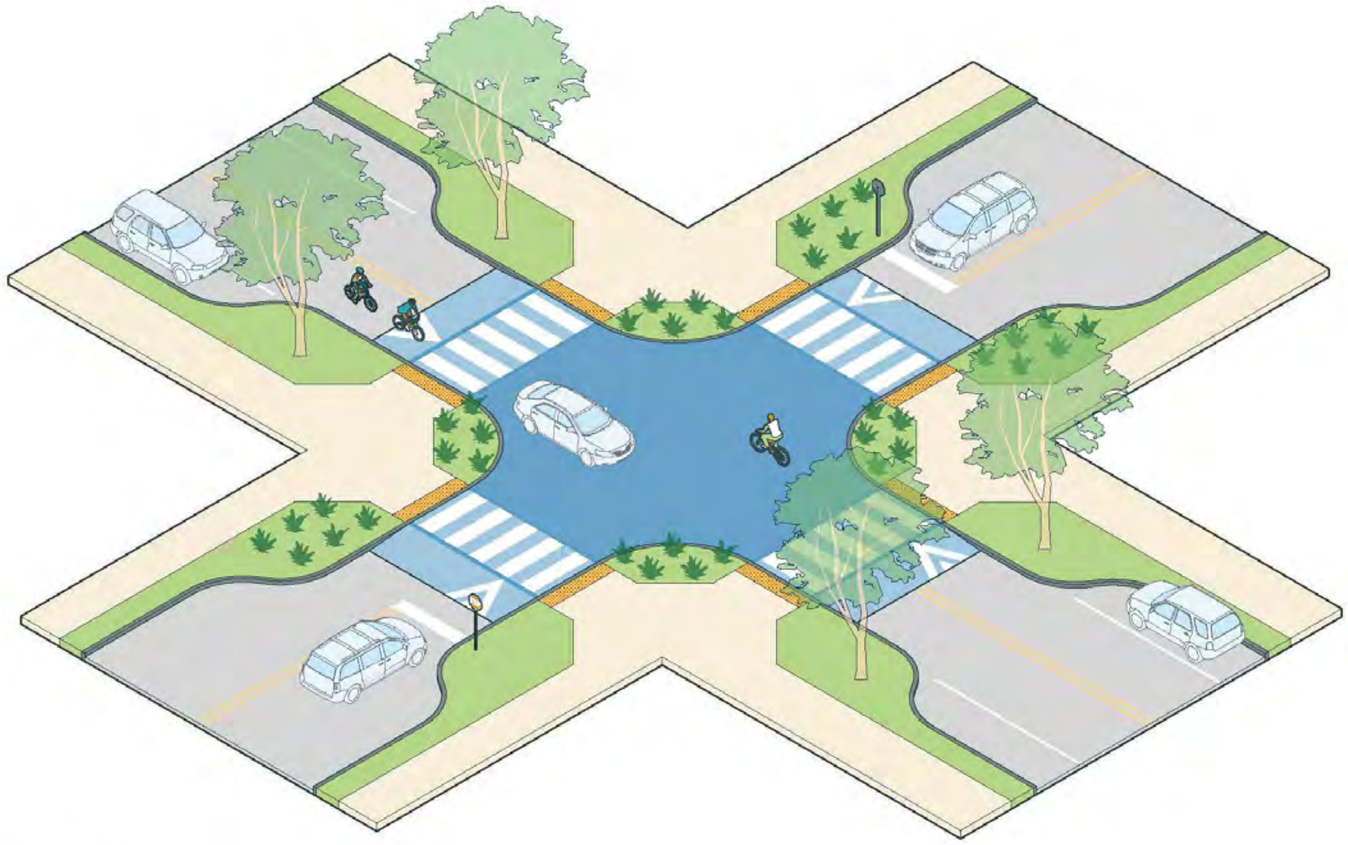
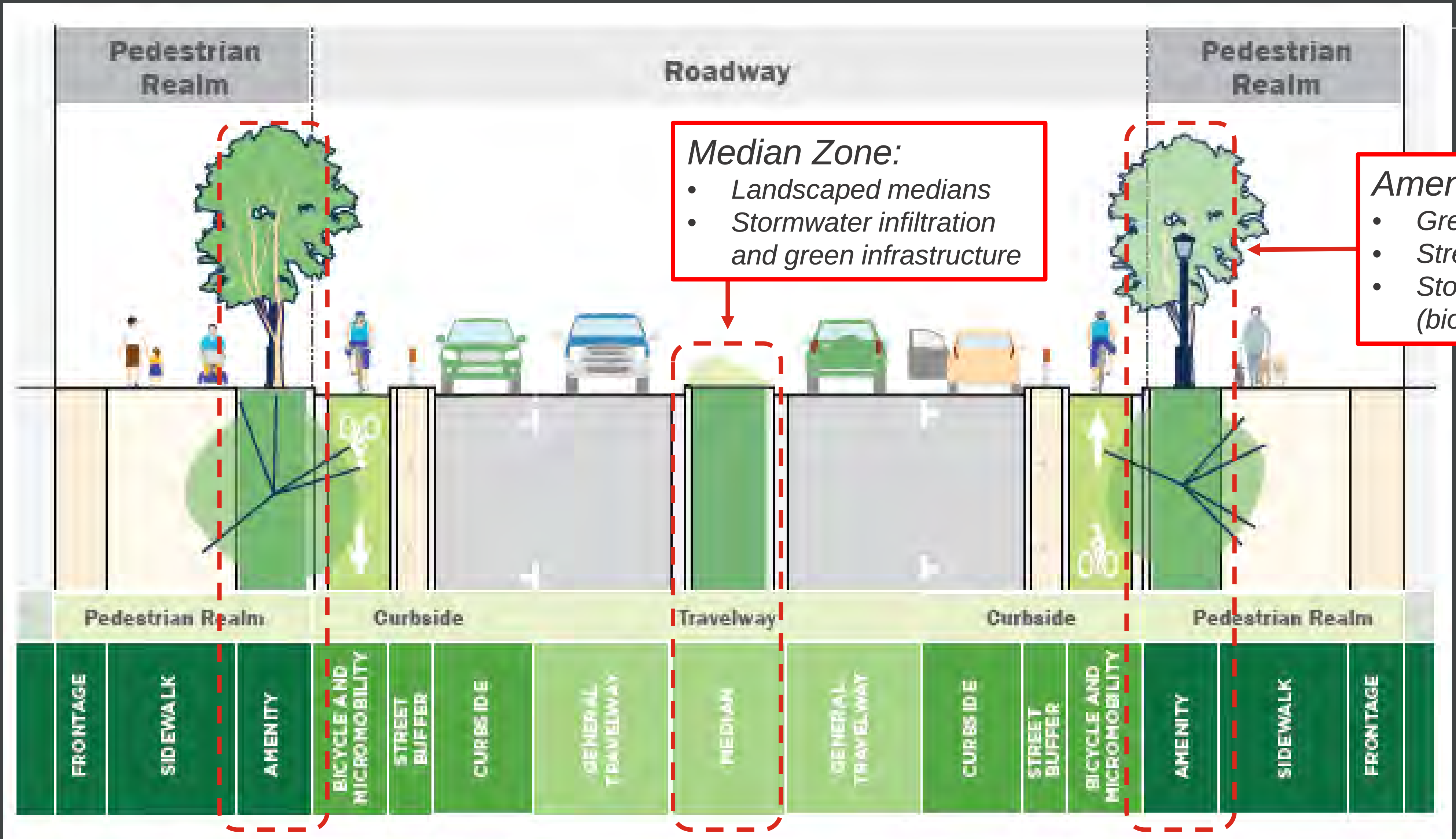


FIGURE 6-7 Raised Intersections

Chapter 4: Street Corridor Elements



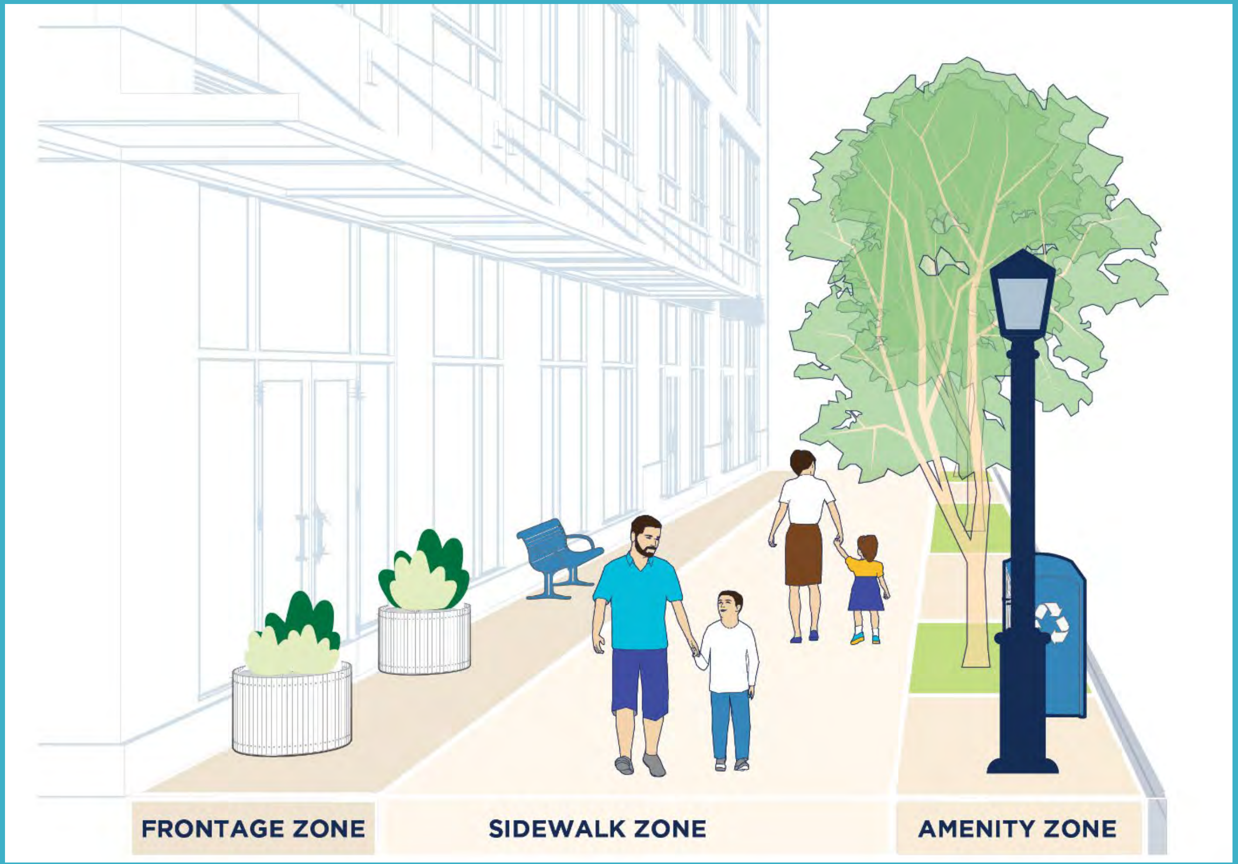
Median Zone:

- *Landscaped medians*
- *Stormwater infiltration and green infrastructure*

Amenity Zone:

- *Green infrastructure*
- *Street trees / vegetation*
- *Stormwater features (bioswales, planters, etc.)*

Pedestrian Zone



PEDESTRIAN ZONE DIMENSIONS

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	Medium to High	2'	2'	6'	10'	5'	6'	5'	12'
Boulevard	Low	N/A	N/A	N/A	10'	5'	7'	5'	8'
	Medium to High	2'	2'	6'	12'	5'	8'	5'	8'
Thoroughfare	Medium to High	N/A	N/A	N/A	8'	5'	7'	5'	N/A
Alley	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

PEDESTRIAN ZONE ELEMENTS

LEGEND

- ■ Required
- ● Recommended
- ○ Optional
- ✕ Not Permitted

	NEIGHBORHOOD STREET	AVENUE	BOULEVARD	THOROUGHFARE	ALLEY	PAGE REFERENCE
Trees	■	■	■	■	✕	
Landscaping	●	●	●	●	✕	
Green Infrastructure	●	●	●	●	✕	
Seating	●	●	●	○	✕	
Bicycle/Micromobility Parking	●	■	■	●	○	
Recycling/Trash Receptacles	●	●	●	●	○	
Plazas/Parklets	✕	○	○	✕	✕	
Dockless Mobility	✕	○	○	○	✕	
Pedestrian Scale Lighting	●	■	■	●	●	
Pedestrian/Bicycle Wayfinding	●	●	●	●	✕	
Sidewalk-Level Driveways	■	■	■	■	✕	
Public Art/Pop-up Spaces	✕	○	○	✕	✕	
Sidewalk Cafes	✕	●	○	✕	✕	

Chapter 4: Street Corridor Elements

4.5 Landscape & Greenspace Elements

- Green infrastructure
- Sufficient planting / vegetative zones
- Native and climate-resilient
- Stormwater integration

SOIL FUNCTION IN REFORESTED AND RESTORED RIPARIAN AREAS: IMPLICATIONS FOR STORMWATER

JOHN MCMAINE

BIOSYSTEMS AND AGRICULTURAL ENGINEERING

UNIVERSITY OF KENTUCKY

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Patrick Faust – BAE (UK)

Myranda Hentges – BAE (UK)

Quinn Rison – BAE (UK)

Noah Lane – BAE (UK)

Cole Crumbaker – BAE (UK)

Kennedy Griggs – BAE (UK)

Jeromie Viana – Biological Engineering (Univ. of Nebraska Lincoln)

From natural ground cover, as a percent of the water balance, **RUNOFF**

- Increases 2x with 10-20% impervious cover
- Increases 3x with 35-50% impervious cover
- Increases 5.5x with 75-100% impervious cover

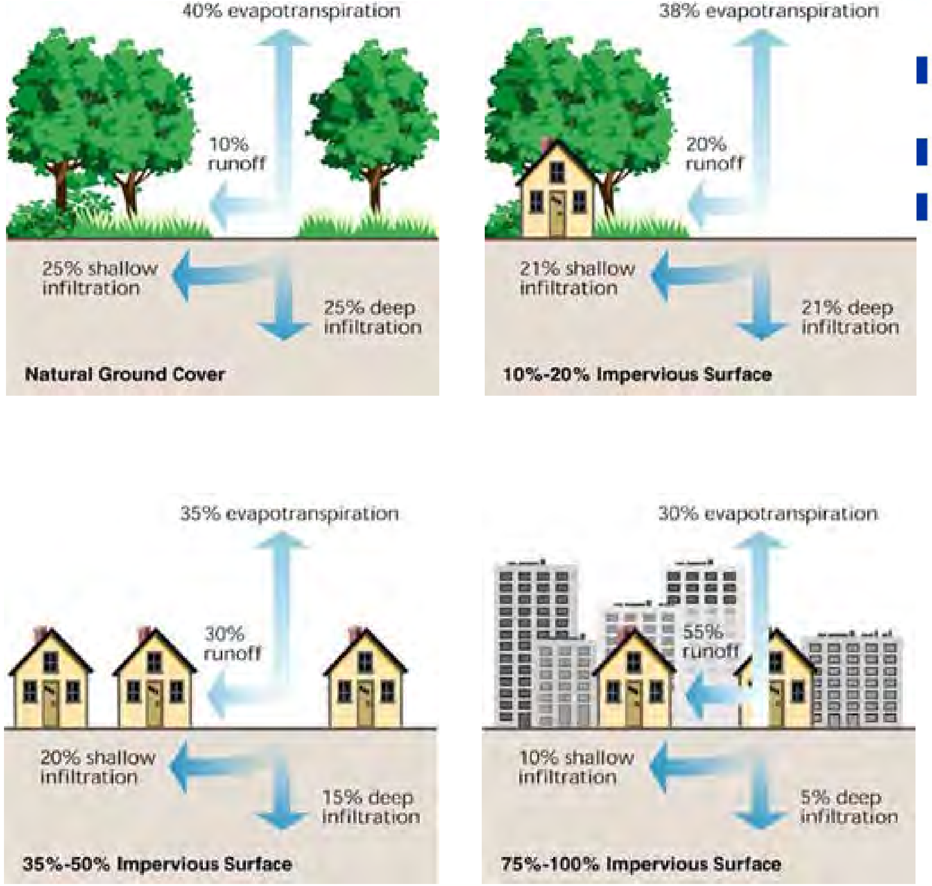

Image Credit – epa.gov

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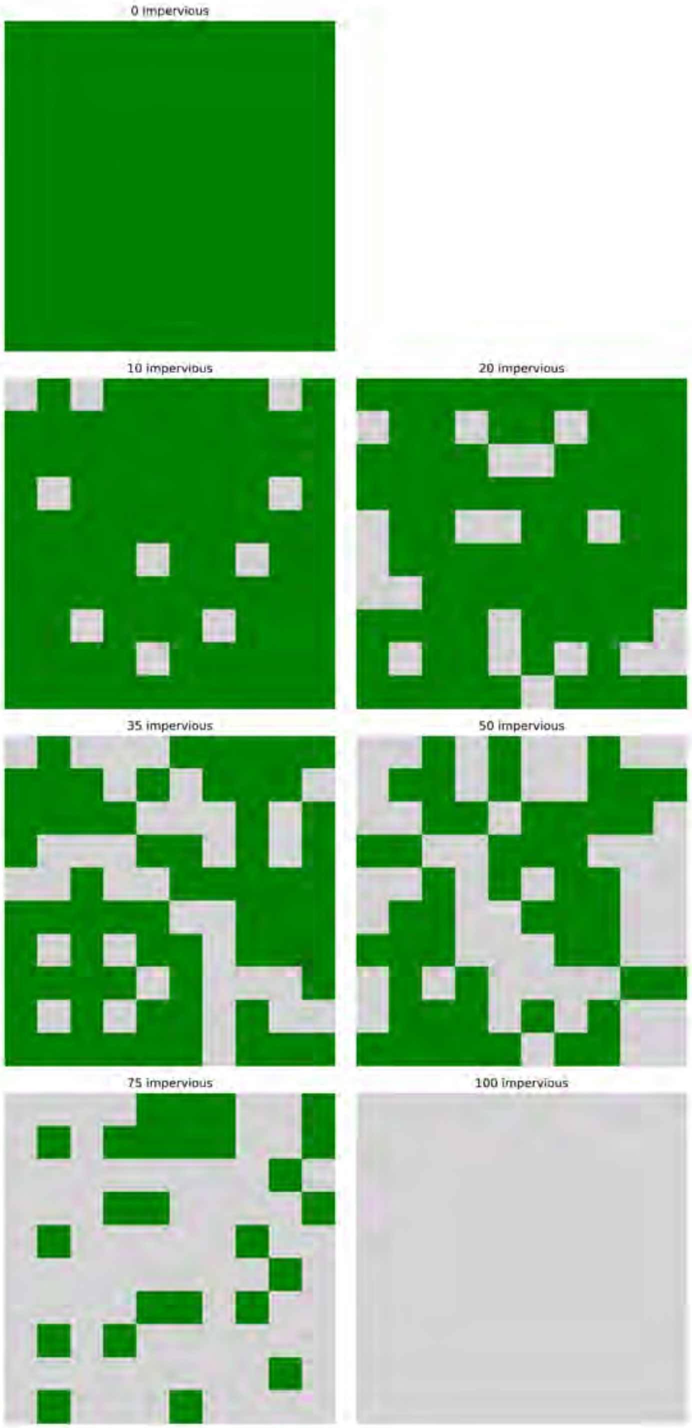
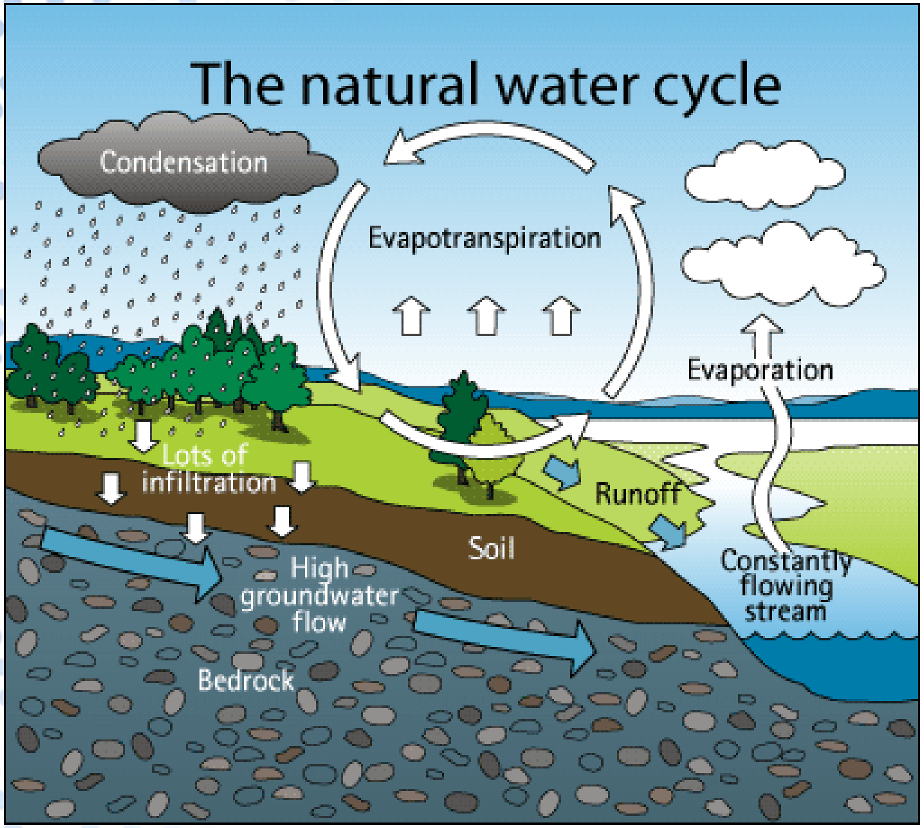
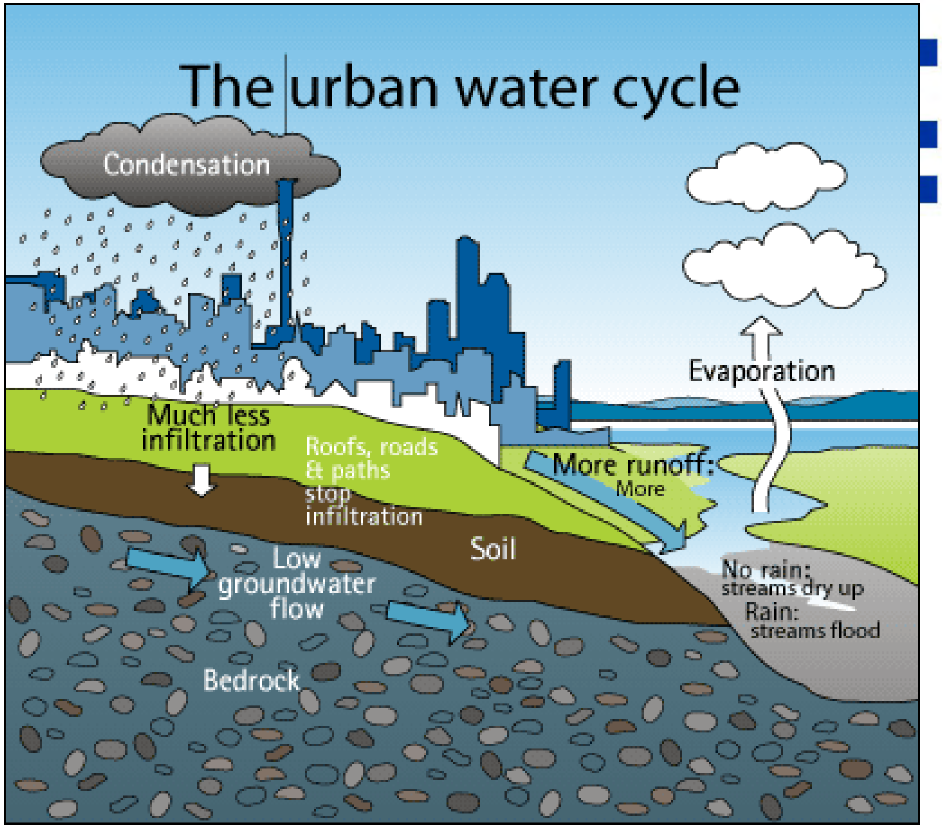
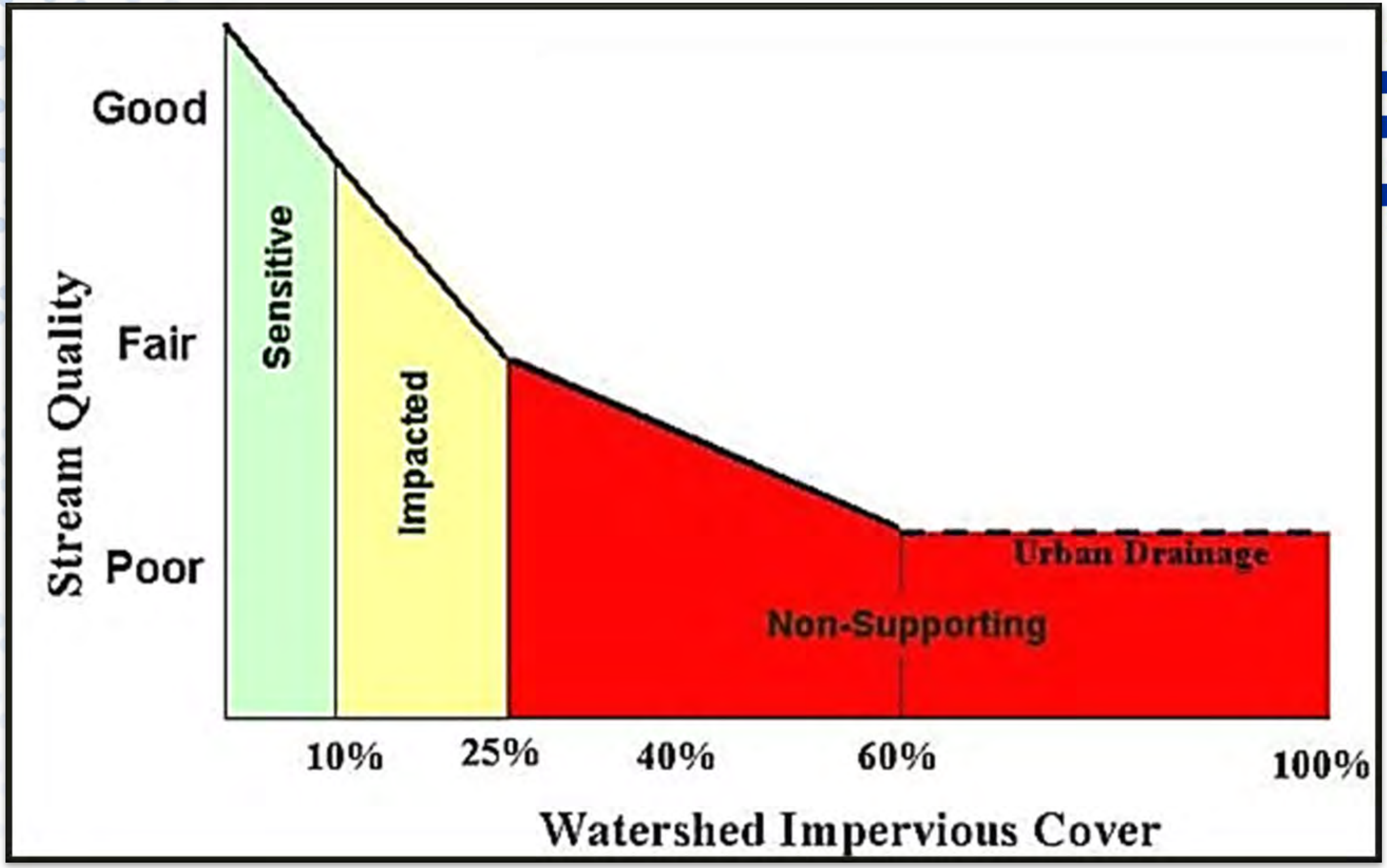






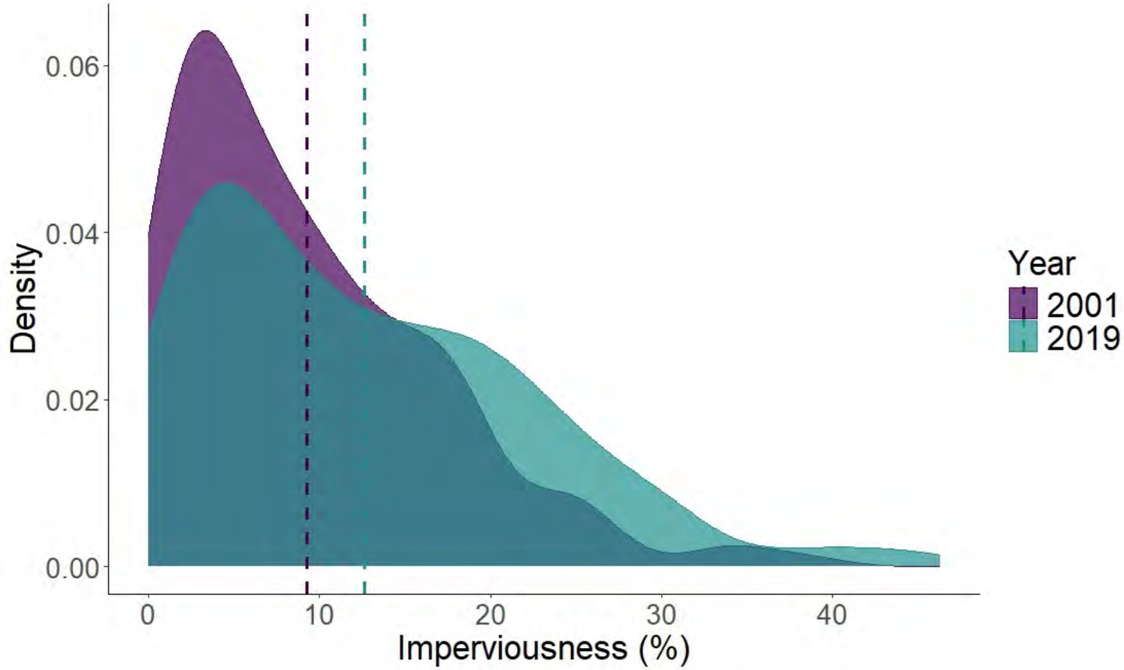
Aukland Council



Center of Watershed Protection 2003

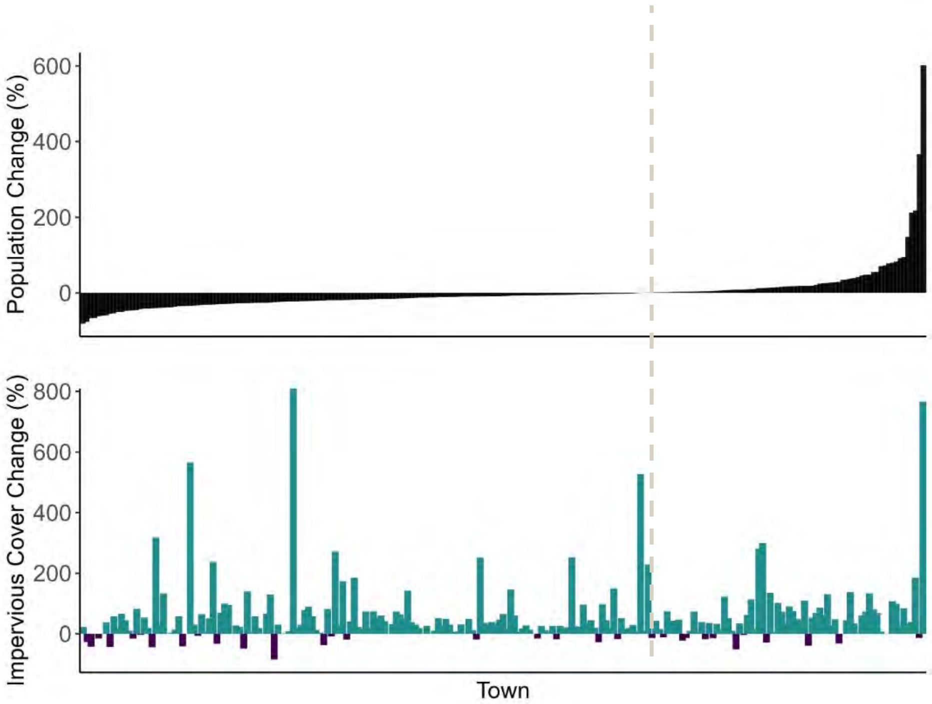
CHANGE OF TOTAL IMPERVIOUSNESS CHANGE IN SMALL TOWNS FROM 2001 TO 2019

- In eastern South Dakota -
  The average imperviousness in these towns rose from **9.26%** in 2001 to **12.60%** in 2019.



IMPERVIOUSNESS CHANGE FROM 2001-2019 VS. POPULATION CHANGE FROM 2000-2020 IN TOWNS

- In eastern South Dakota -
  In several towns, a decrease in population was accompanied by an increase in impervious surfaces.



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Research article

Looking beyond MS4 communities: Assessing impervious cover and population dynamics in small towns

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[b] Department of Biosystems and Agricultural Engineering, University of Kentucky, Lexington, KY, 40506, USA
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ARTICLE INFO

Keywords:
Impervious cover
Rural watershed
Population change
MS4
Policy
Water resources

ABSTRACT

Water quality and quantity are strongly influenced by land use and land cover, with impervious surfa
as a key indicator of watershed health. Increased imperviousness alters watershed hydrology, shifti
infiltration-dominant to runoff-dominant, leading to reduced groundwater recharge, higher runoff,
peak discharge, and channel enlargement. In the United States, policy regarding stormwater man
predominantly focused on towns with populations greater than 10,000. However, any increase in i
cover can negatively affect hydrology and water quality, and communities with populations smaller th
often lack the financial and technical resources to mitigate issues from impervious cover. This study
changes in impervious cover in small towns and HUC-12 watersheds in eastern South Dakota betwee
2019, alongside population changes from 2000 to 2020 in towns with populations under 10,000. Impe
changes were evaluated using the NLCD, and population shift was assessed using U.S. census data. A
performed to compare changes over time, followed by linear regression and generalized additive
examine the effects of population density dynamics and proximity to larger cities on changes in impe
Results reveal significant demographic changes, with more than half of the towns studied experien
lation declines, while those closer to larger cities saw growth. Despite these population declines, many
significant increases in imperviousness, highlighting that population change alone does not fully expla
impervious surfaces and that other factors, such as land-use policies and socio-economic factors, pla
icant role. Although small towns contributed modestly to overall watershed imperviousness, more tha
%) of these towns had already exceeded the 10 % threshold commonly associated with ecological imp
2019. Additionally, the average imperviousness in these towns rose from 9.3 % in 2001 to 12.7 %
highlighting the need for expanding the focus of stormwater policy beyond larger communities. Interestingly, while imperviousness significantly increased in small towns, most watersheds experienced a decline, and only 28.2 % of watersheds saw increases primarily among those near larger urban centers, underscoring complex spatial patterns in land use. These findings highlight the importance of addressing these challenges with finer-scale watershed delineations, localized management support, and strategies to enhance community resilience and improve water resource management in small towns.

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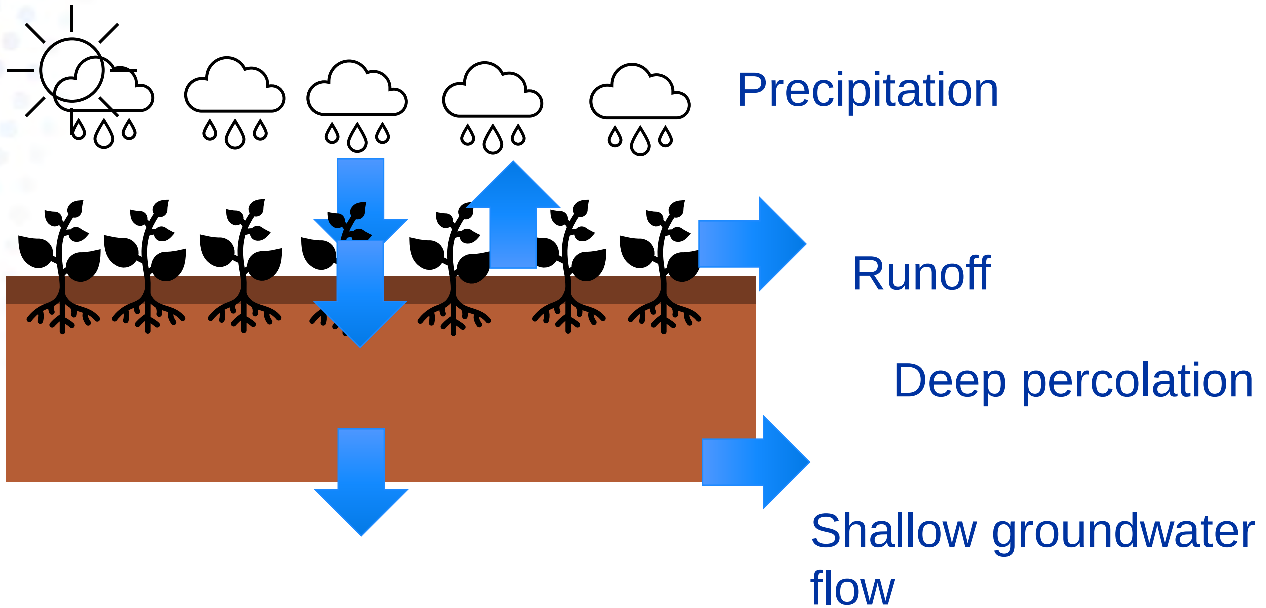
RIPARIAN AREAS AS STORMWATER MANAGEMENT

THE WATER BALANCE



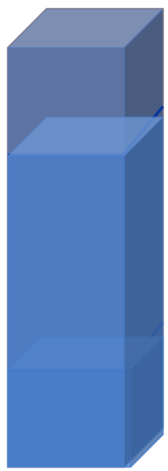
Evaporation + Transpiration = Evapotranspiration (ET)

HOW MUCH WATER CAN A SOIL HOLD?

Gravitational water

Field capacity

Wilting point



Saturation

Plant available water

Oven dry

Adobe Stock Image

University of Kentucky

CAN WE SIGNIFICANTLY CHANGE FIELD CAPACITY?

FOR COARSE SOIL →

1% INCREASE IN SOIL ORGANIC CARBON YIELDS

2.3 MM H_2O PER 100 MM SOIL =
0.1 IN PER 3.9 IN OF SOIL =
1 INCH OF AVAILABLE WATER PER 40 INCHES OF SOIL

Table 2. A summary of the rate of increase in volumetric water content (mm H_2O 100 mm^{-1} soil) with an increase of 10 g C kg^{-1} mineral soil.

Texture		SAT	FC	WP	AWC
General	*n*	14	23	20	19
	Mean	2.95	1.61	0.17	1.16
	SD	1.53	1.54	1.55	1.01
Coarse	*n*	12	19	18	19
	Mean	4.59	2.33	0.86	1.94
	SD	2.17	2.96	1.74	1.28
Medium	*n*	12	22	21	21
	Mean	3.59	2.11	0.68	1.79
	SD	1.65	1.74	1.19	1.5
Fine	*n*	9	12	11	11
	Mean	3.23	1.28	0.54	1.41
	SD	2.09	2.05	1.74	1.95

Minasny, B. and McBratney, A.B. (2018), Limited effect of organic matter on soil available water capacity. Eur J Soil Sci, 69: 39-47. https://doi.org/10.1111/ejss.12475

CAN WE MAKE RIPARIAN AND UPLAND AREAS BETTER SPONGES?

EXPERIMENTAL DESIGN

Treatments –

Riparian (sampled in 2025, will sample in 2026)

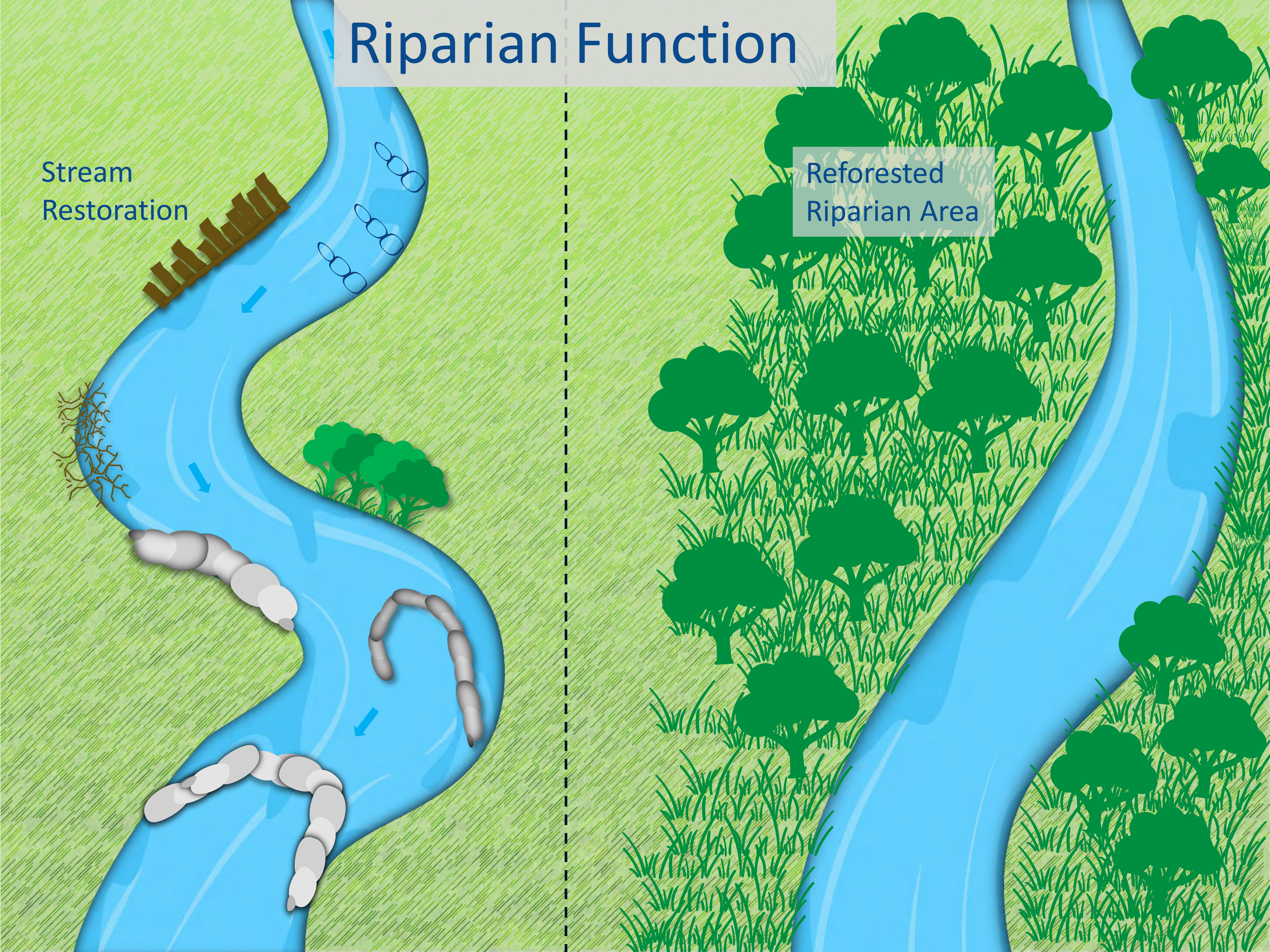
Reforested (17 sites) vs.
Stream Restoration (17 sites) vs.
Adjacent Turf (34 sites, 1:1 for riparian areas)

Upland (will sample in 2026)

Reforest the Bluegrass (14 sites)

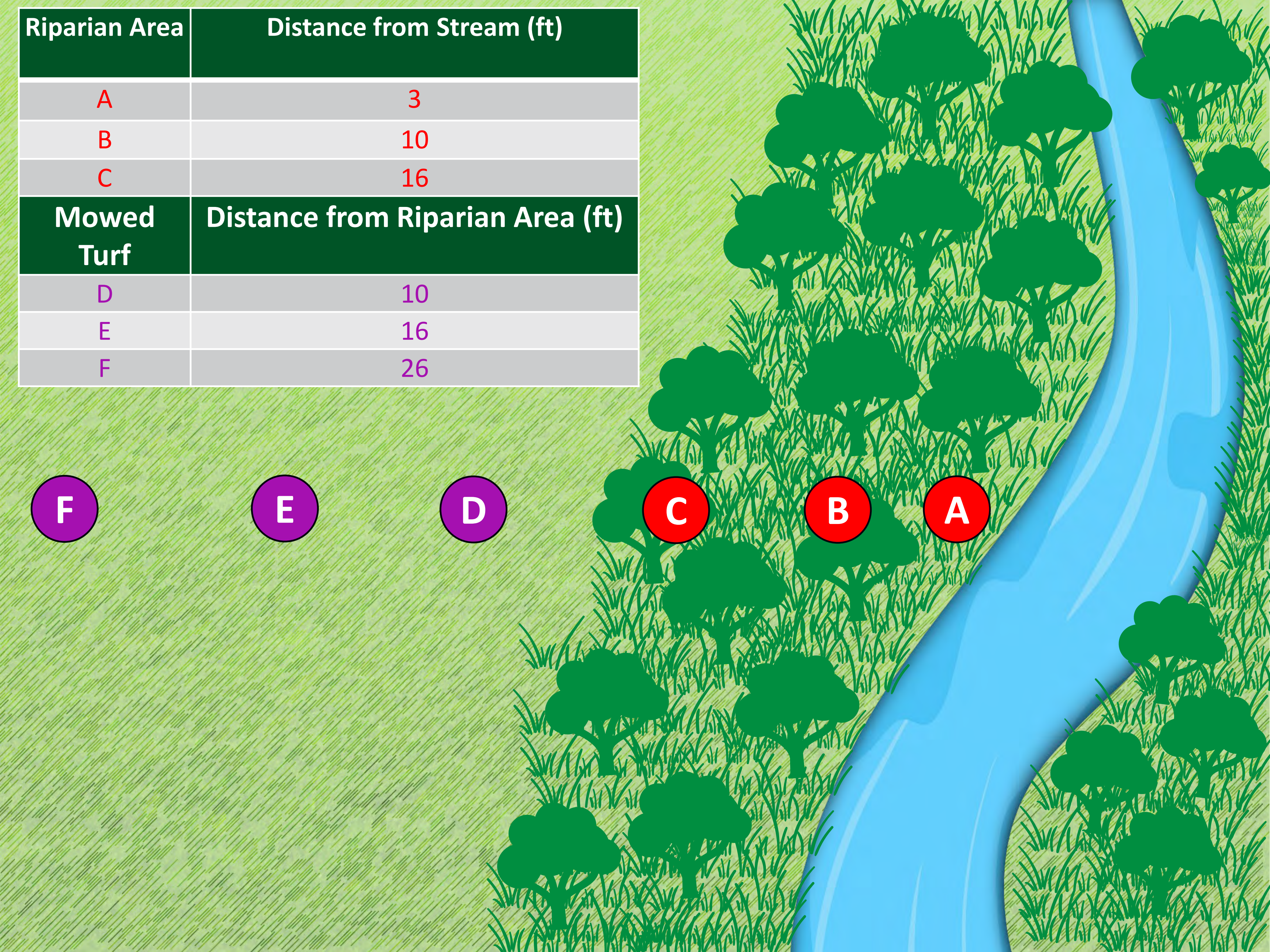
Adjacent Turf (14 sites, 1:1 for RtB sites)

Three sampling points within each treatment



Riparian Function
Stream
Restoration
Reforested
Riparian Area

Riparian Area	Distance from Stream (ft)
A	3
B	10
C	16
Mowed Turf	**Distance from Riparian Area (ft)**
D	10
E	16
F	26

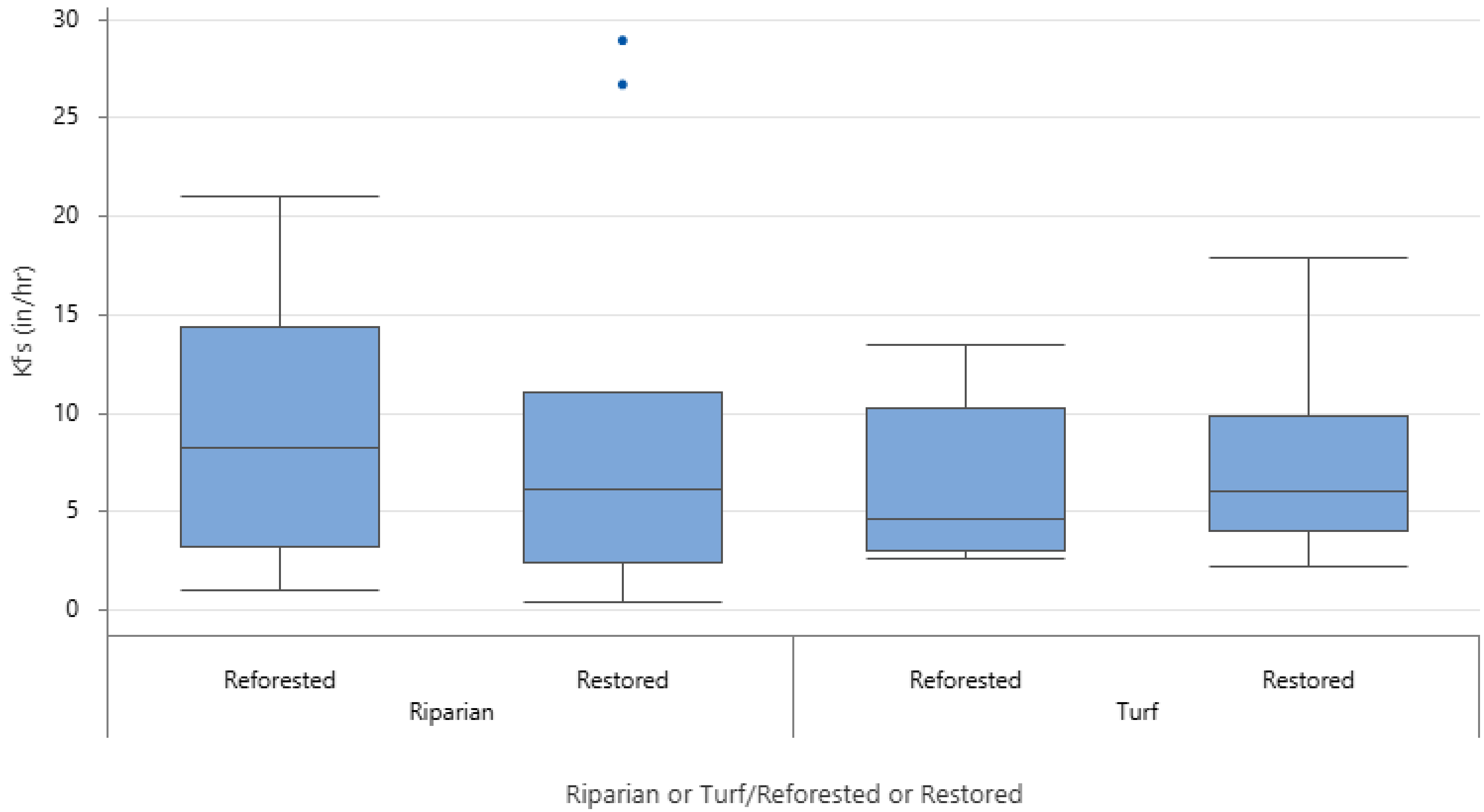


PARAMETERS TO MEASURE

Parameters	Method	Depths
Texture	PARIO+ (METER Group)	0-4, 4-8, 8-12, 12-24, 24-36 (in)
Ksat (saturated hydraulic conductivity)	KSAT (METER Group)	Surface
Kfs (field saturated hydraulic conductivity)	SATURO (METER Group)	Surface
Soil Moisture Release Curve	HYPROP and WP4C (METER Group)	Surface
Resistance to Penetration	Penetrologger (Eikelkamp)	0-31.5 (in)
Wet Aggregate Stability	Wet Sieve (Eikelkamp)	0-4, 4-8, 8-12, 12-24, 24-36 (in)

PRELIMINARY RESULTS
FIELD SATURATED HYDRAULIC CONDUCTIVITY

Reforested vs. Restored
Riparian vs. Turf



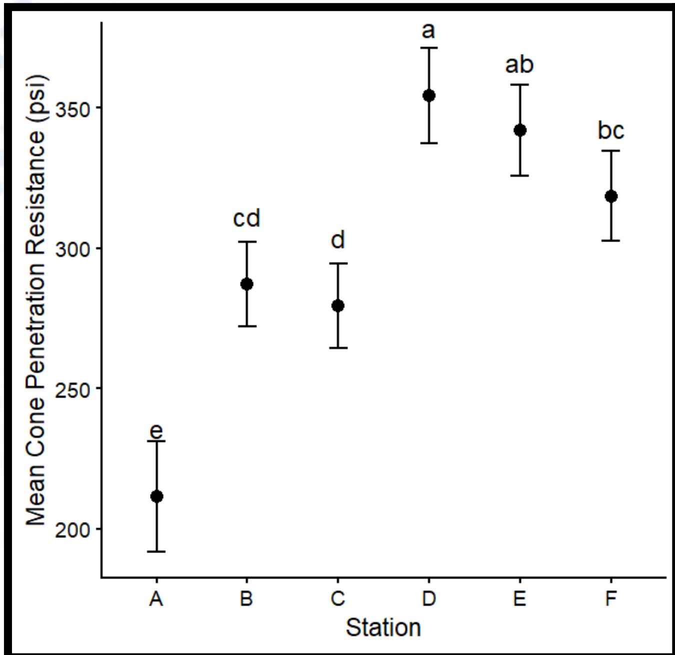
Reforested vs. Restored

	Reforested		Restored	
A	13.6 cm/hr	n=4	19.2 cm/hr	n=6
B	32.2 cm/hr	n=2	30.2 cm/hr	n=7
C	26.3 cm/hr	n=3	21.3 cm/hr	n=5
D	15.9 cm/hr	n=9	19.7 cm/hr	n=6
E	11.7 cm/hr	n=4	19.7 cm/hr	n=4
F	21.4 cm/hr	n=8	20.7 cm/hr	n=6

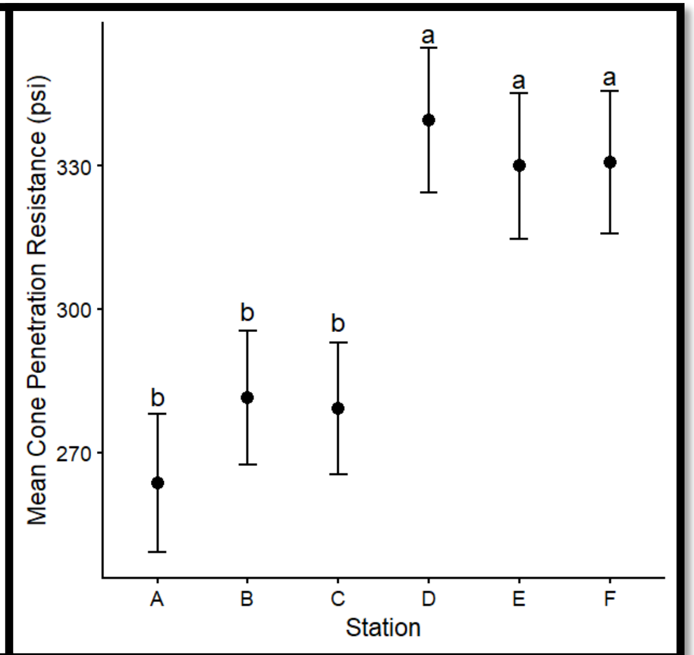
Mean:
Kfs (cm/hr)
28.8
21.6
14.4

PRELIMINARY RESULTS
CONE PENETRATION RESISTANCE

MEAN COMPACTION BY STATION

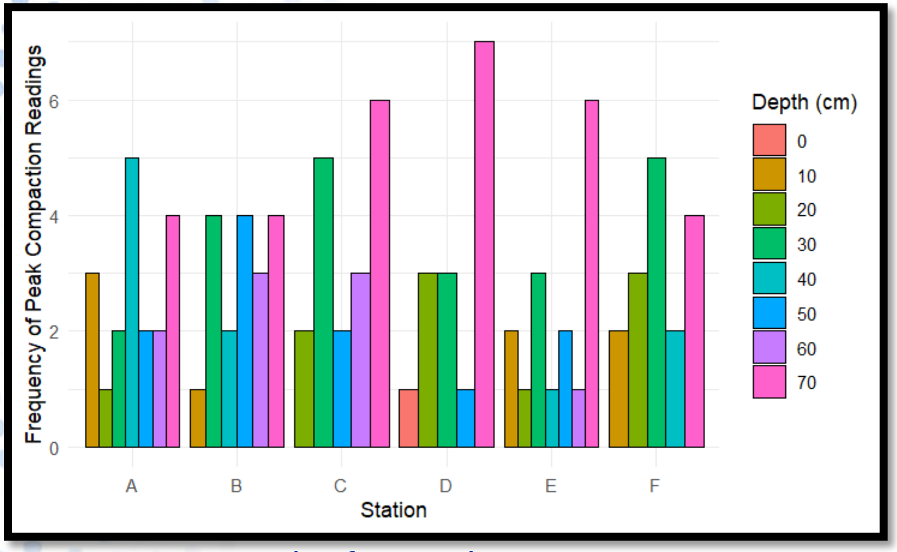


(Restored Projects)

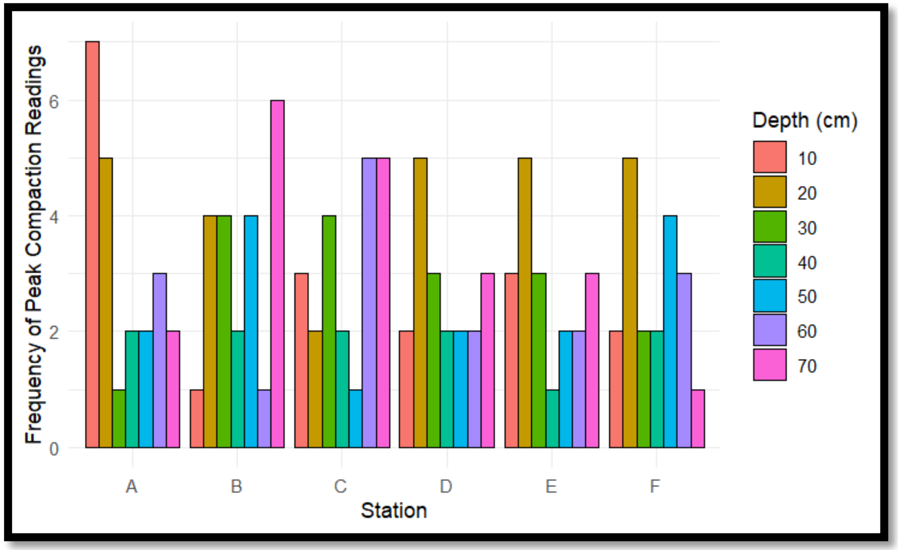


(Reforested Projects)

PEAK COMPACTION FREQUENCY



(Reforested Projects)



(Restored Projects)

FUTURE WORK

CONCLUSIONS AND FUTURE WORK

- Numerical (but not statistically significant) difference in hydraulic conductivity between –
  - Riparian and green space
  - Reforested and restored
- Significant difference in compaction between -
  - Riparian and green space
  - Reforested and restored
- Correlation across measured parameters
  - Does compaction significantly affect function?
  - Does a reforested riparian area have higher field capacity?
- How should we adjust recommendations for improving riparian function?
  - Just reforest?
  - Restore but reduce compaction?

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ADDITIONAL PARAMETERS

Parameters	Method	Depths
Texture	PARIO+ (METER Group)	0-4, 4-8, 8-12, 12-24, 24-36 (in)
Ksat (saturated hydraulic conductivity)	KSAT (METER Group)	Surface
Kfs (field saturated hydraulic conductivity)	SATURO (METER Group)	Surface
Soil Moisture Release Curve	HYPROP and WP4C (METER Group)	Surface
Resistance to Penetration	Penetrologger (Eikelkamp)	0-31.5 (in)
Wet Aggregate Stability	Wet Sieve (Eikelkamp)	0-4, 4-8, 8-12, 12-24, 24-36 (in)