# Design Solutions for Sustainable Streets & Roadsides

David Bloniarz
USDA Forest Service
Amherst, MA

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www.unri.org/research-documents

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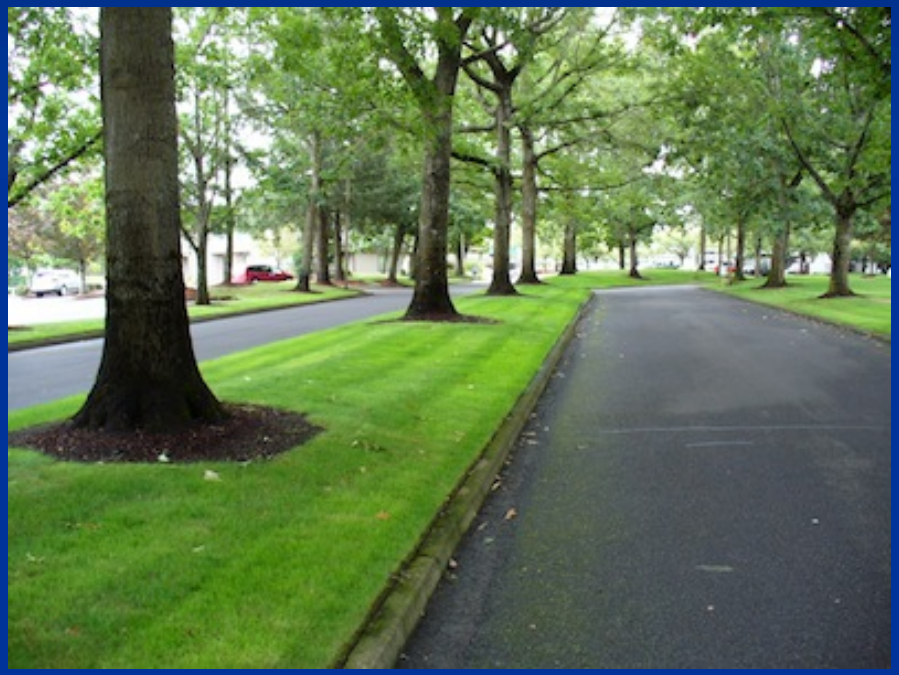
# Topics for today's presentation

- Tree values
- Design as a process
- Trees as design and landscape elements
- Constraints in urbanized landscapes
- Streetscape scenarios
- A few solutions

# Urban design to encourage tree canopy



- Trees often grow poorly in urban areas for a variety of reasons.
- Poor design is often one of those reasons.

# Few people want cities without trees

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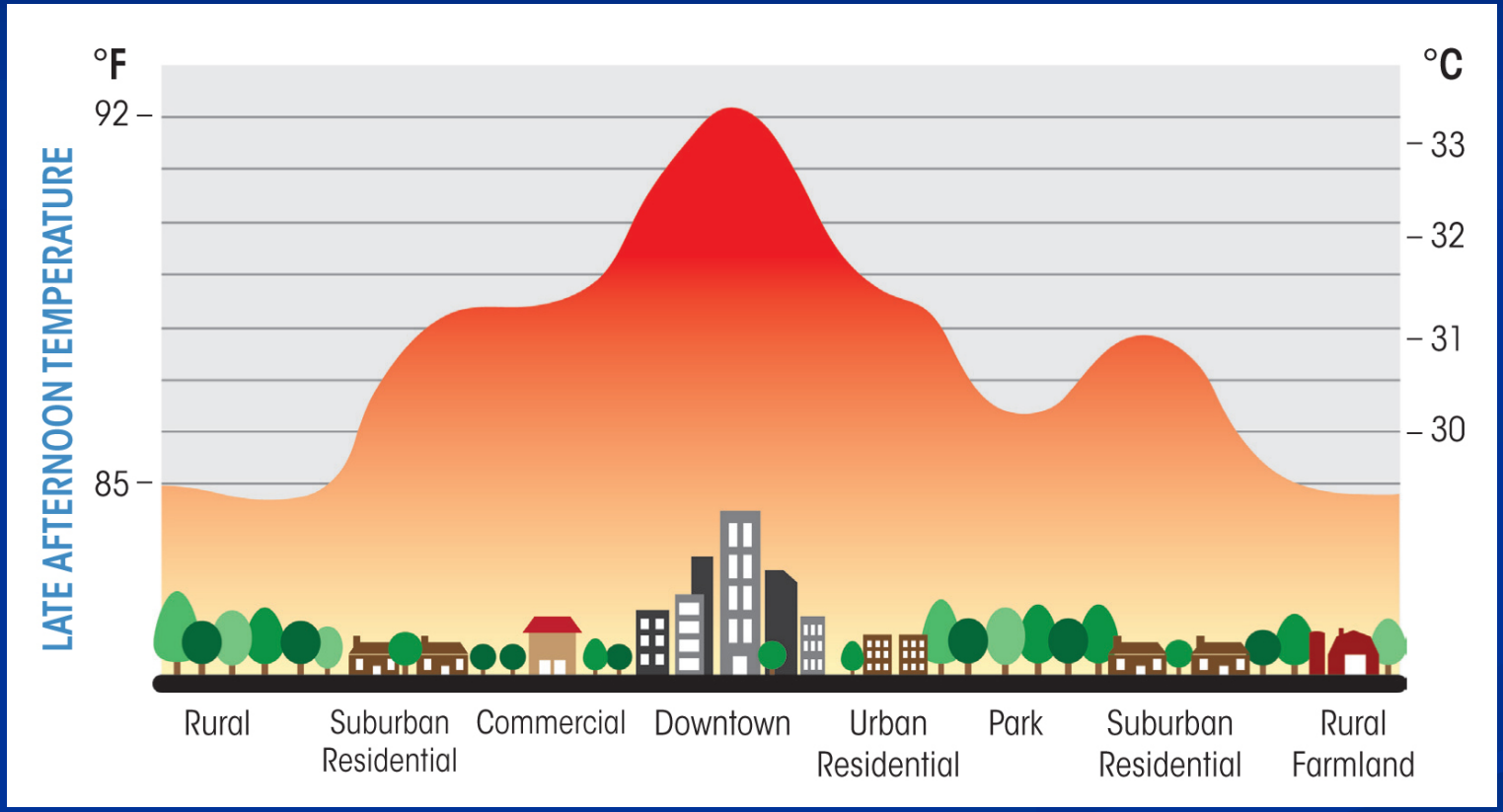
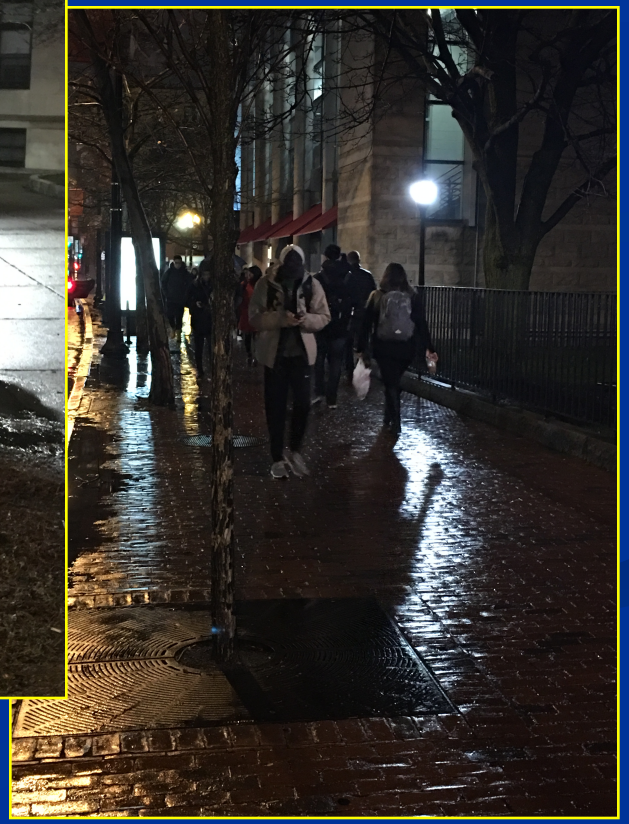
- A city without trees is hotter in summer, receives less rainfall, has greater runoff following storms, has fewer shoppers, and is not inviting

# Urban Heat Island



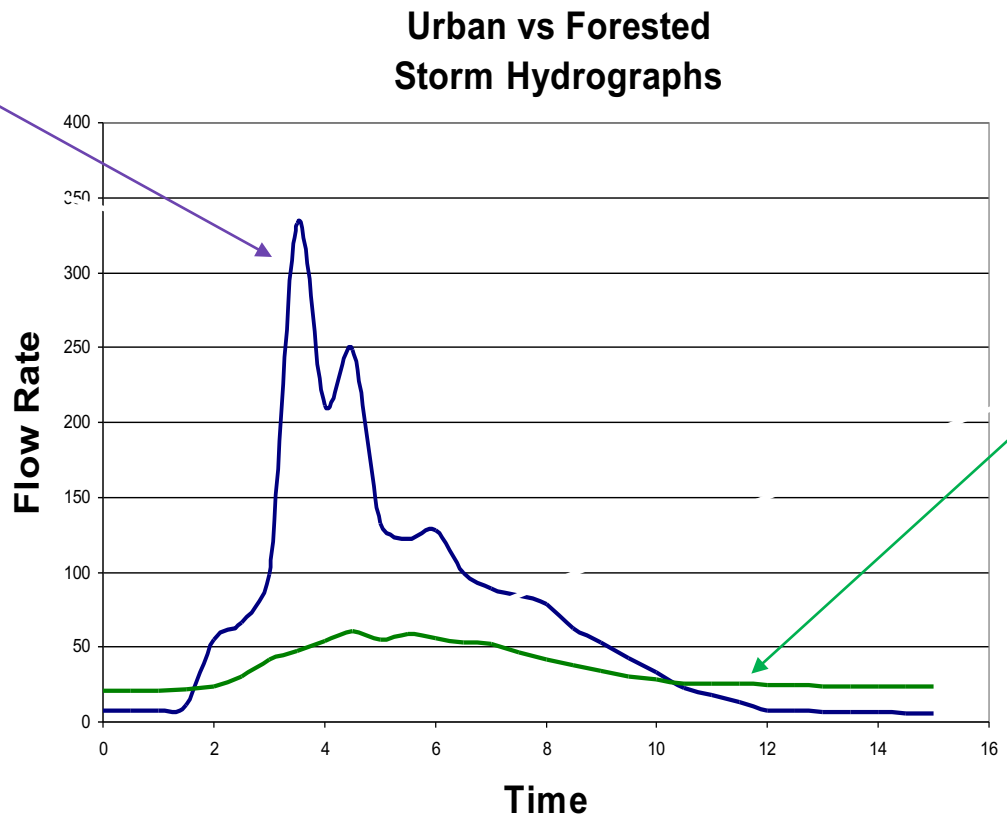
# Impact of Stormwater & Impervious Area



# The Urban Storm Hydrograph

## *Greater Peaks & Volume*

Urban




Forested

# Poor design leads to failure

- Trees struggle unless spaces are designed appropriately
- When lots of money is thrown at tree projects without guidance from knowledgeable professionals, waste occurs and no one wins

# Poor design leads to failure

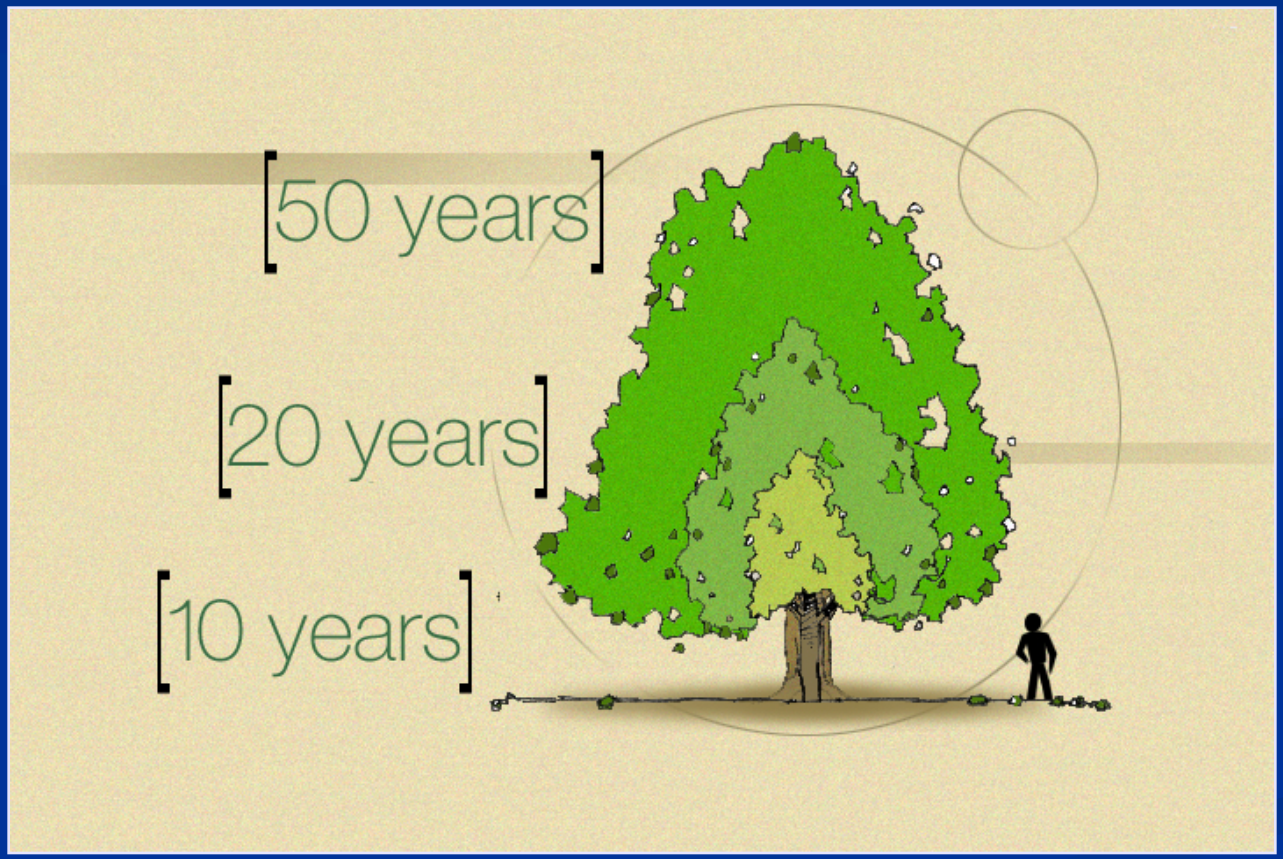
# Poor design leads to failure

# Poor design leads to failure

# Good design leads to success

- Trees thrive when good designs are executed properly
- Healthy trees increase property value, intercept air pollutants, buffer temperatures, reduce wind speed, cool the city, reduce runoff from storms, encourage people to visit and spend money at shops, and create a more inviting community

# Good design leads to success



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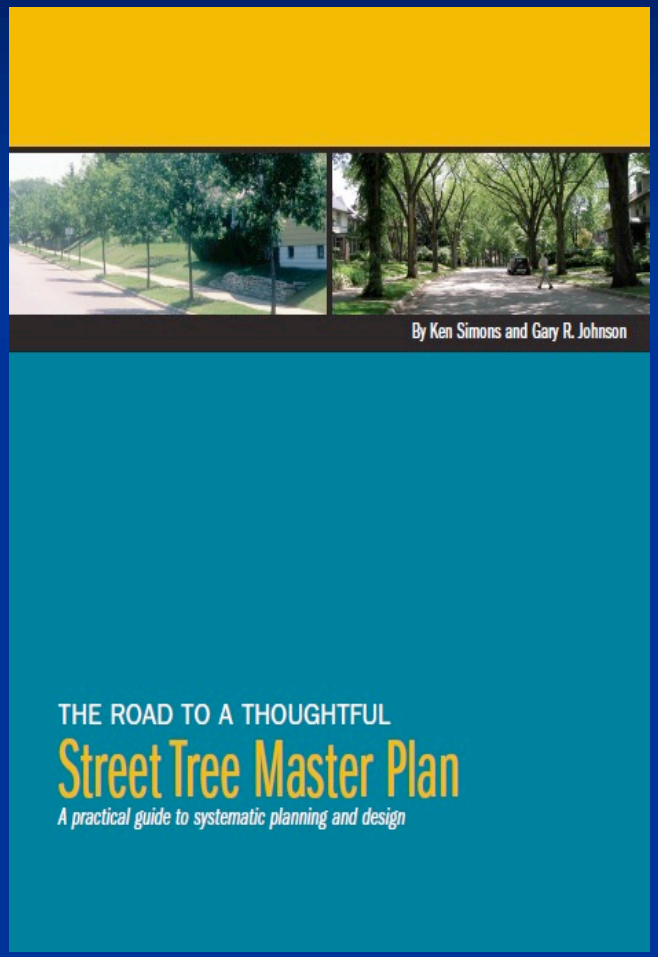
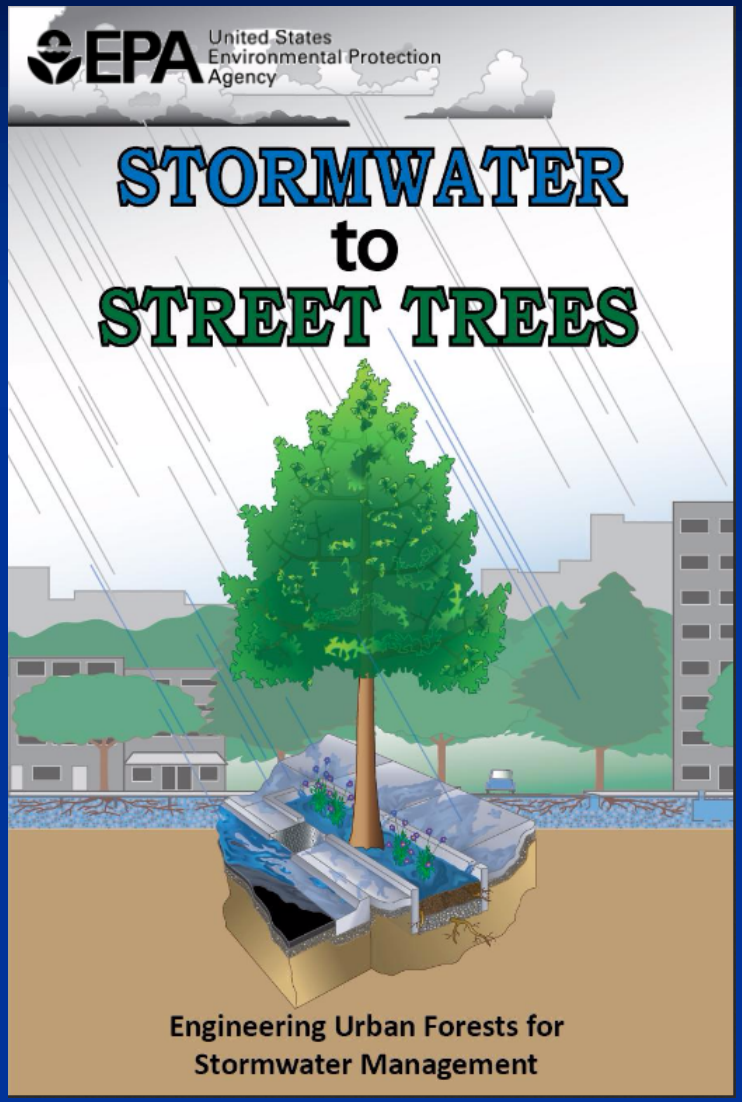



THE ROAD TO A THOUGHTFUL

# Street Tree Master Plan

*A practical guide to systematic planning and design*

Ken Simons[1]
and
Gary R. Johnson[2]




# Stormwater to Street Trees:

## Engineering Urban Forests for Stormwater Management

U.S. Environmental Protection Agency

Office of Wetlands, Oceans and Watersheds

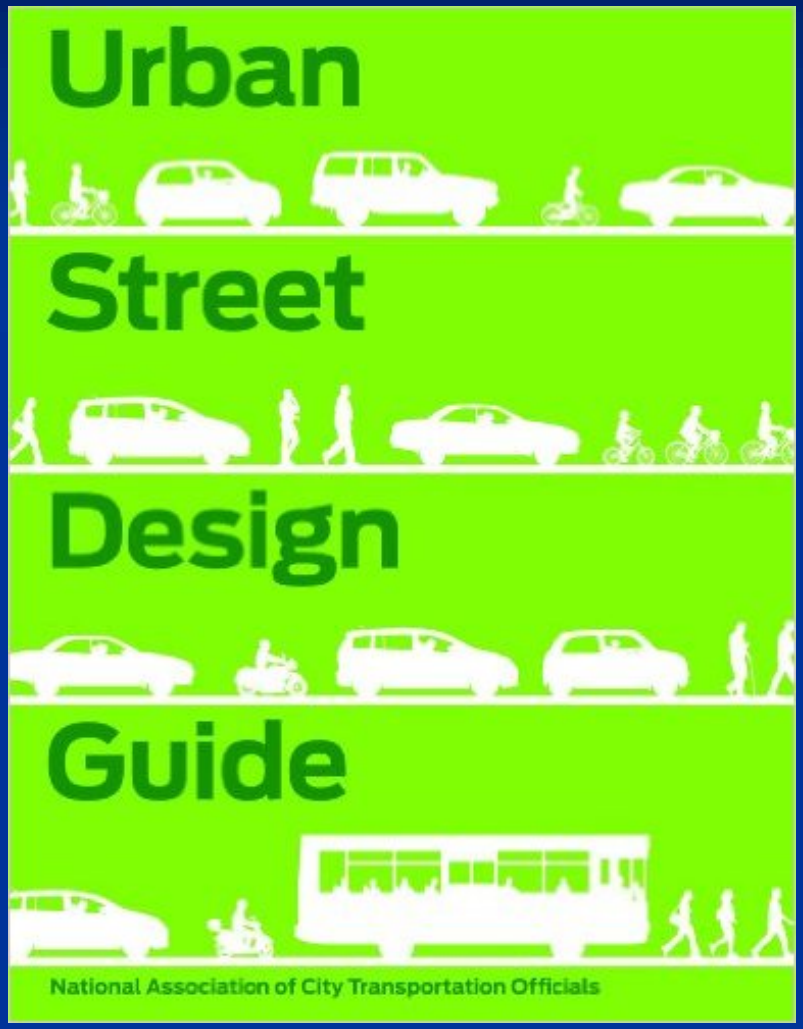
Nonpoint Source Control Branch (4503T)

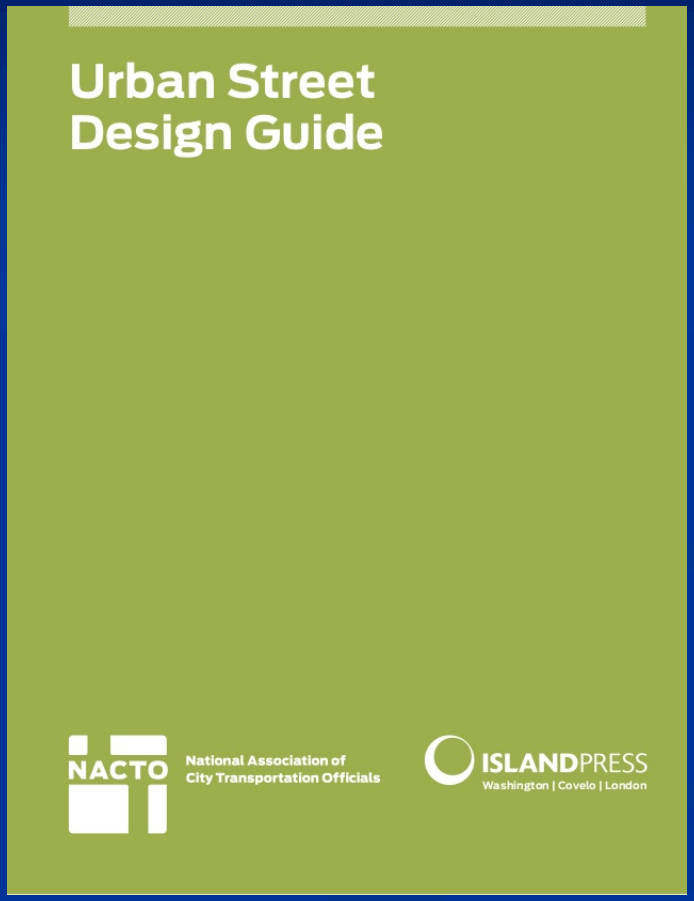
1200 Pennsylvania Ave., NW

Washington, DC 20460

September 2013

EPA 841-B-13-001


Urban
Street
Design
Guide
National Association of City Transportation Officials


Urban Street
Design Guide
NACTO
National Association of
City Transportation Officials
ISLANDPRESS
Washington | Covelo | London

# Good design must be realistic

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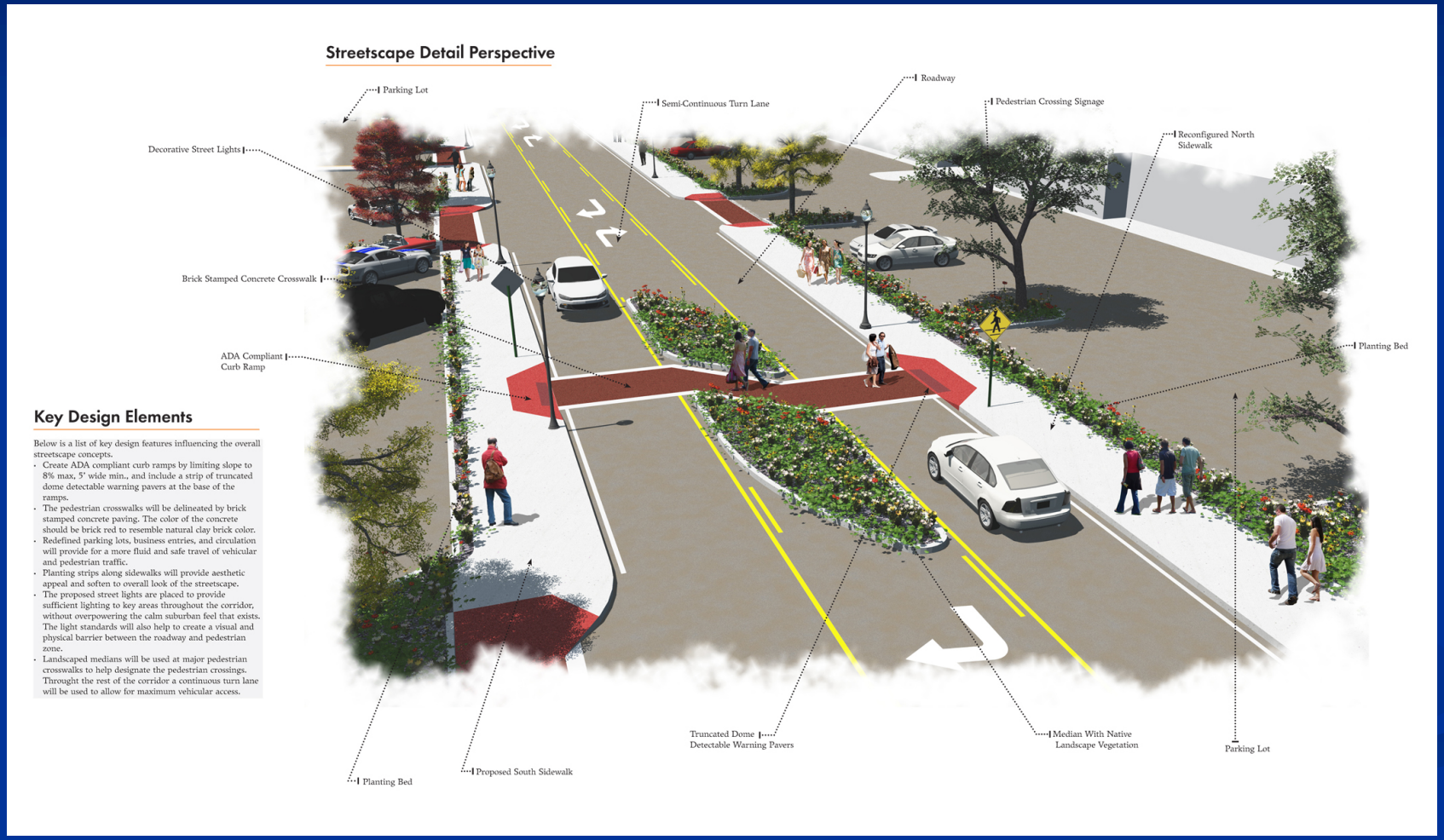
# Good design is contextual

# Good design shapes the community

# Good design should be comprehensive



# Good design can provide vision

# Principles of Design

Unity
Balance
Transition
Proportion
Rhythm
Repetition
Simplicity

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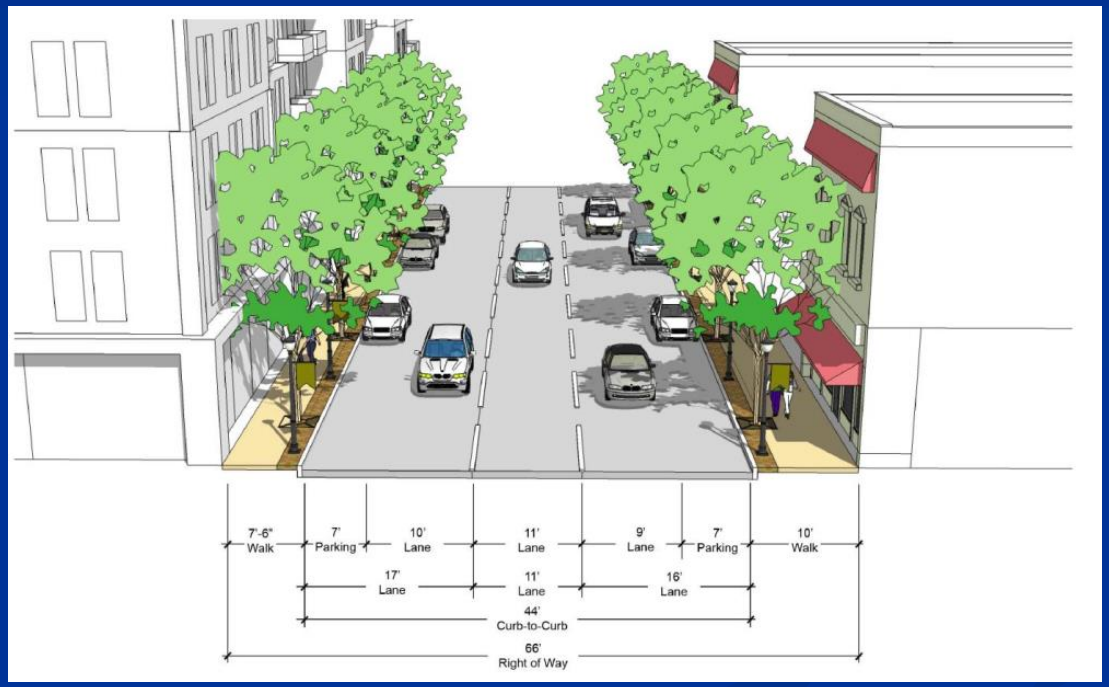

# Elements of Art

Color

Line

Form

Texture

Scale

# Elements of Art

Color

Line

Form

Texture

Scale

# Principles of Science

- Horticulture
  - Plant needs
  - Insect and diseases
  - Hardiness zones
  - Physiological Constraints
- Engineering
  - Materials
  - Methods
  - Soils and drainage
  - Irrigation systems

# Trees as Landscape Elements

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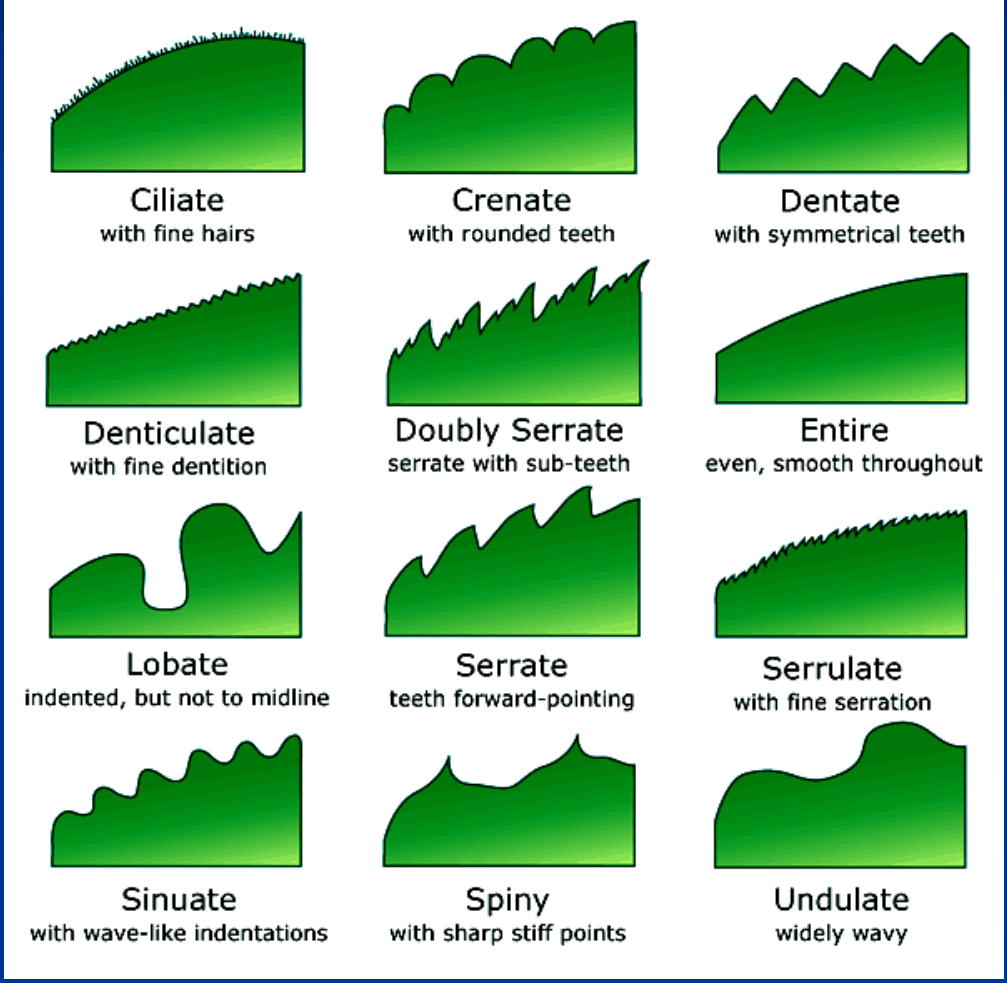
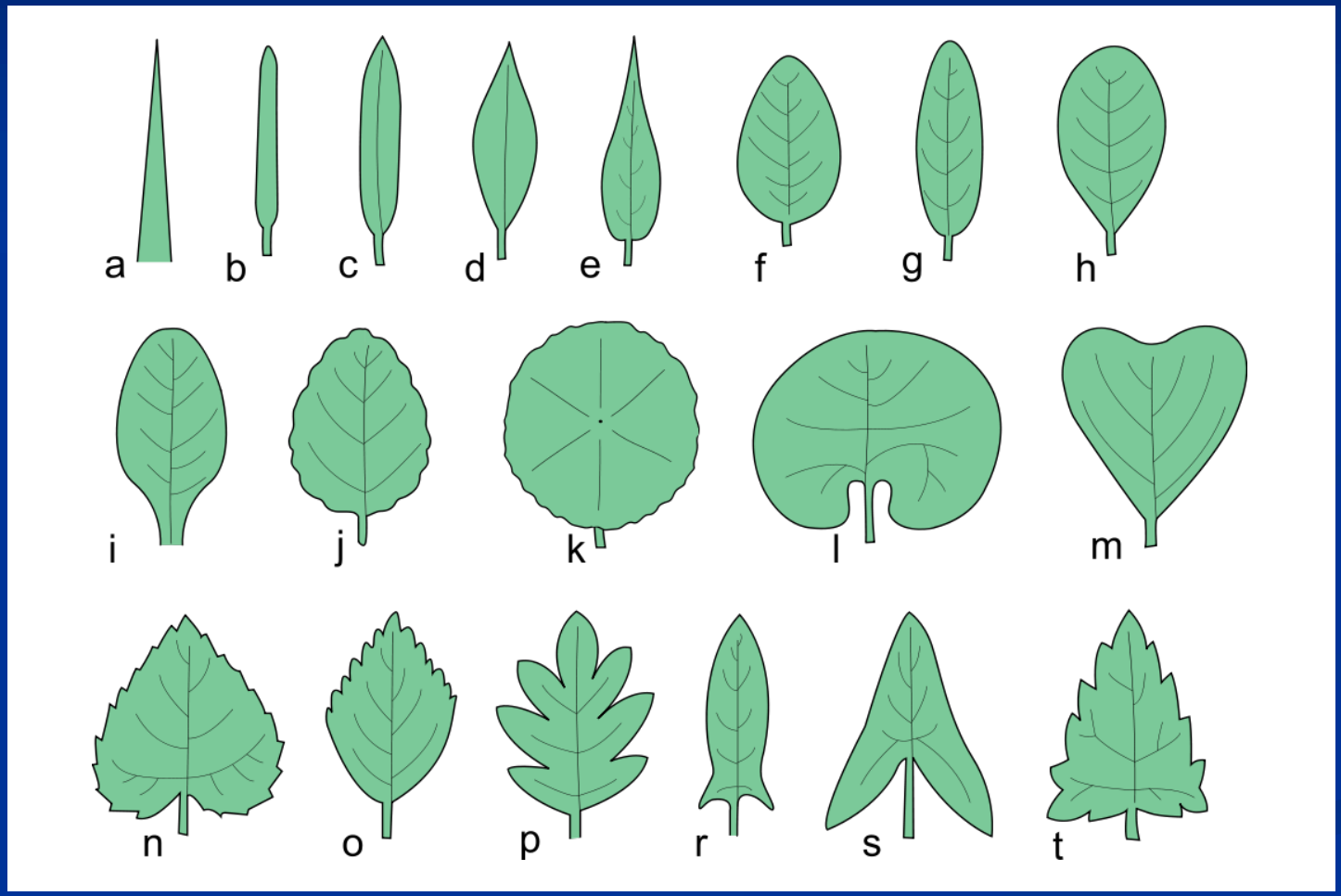



Design Principles

# Trees as Landscape Elements




Design Principles

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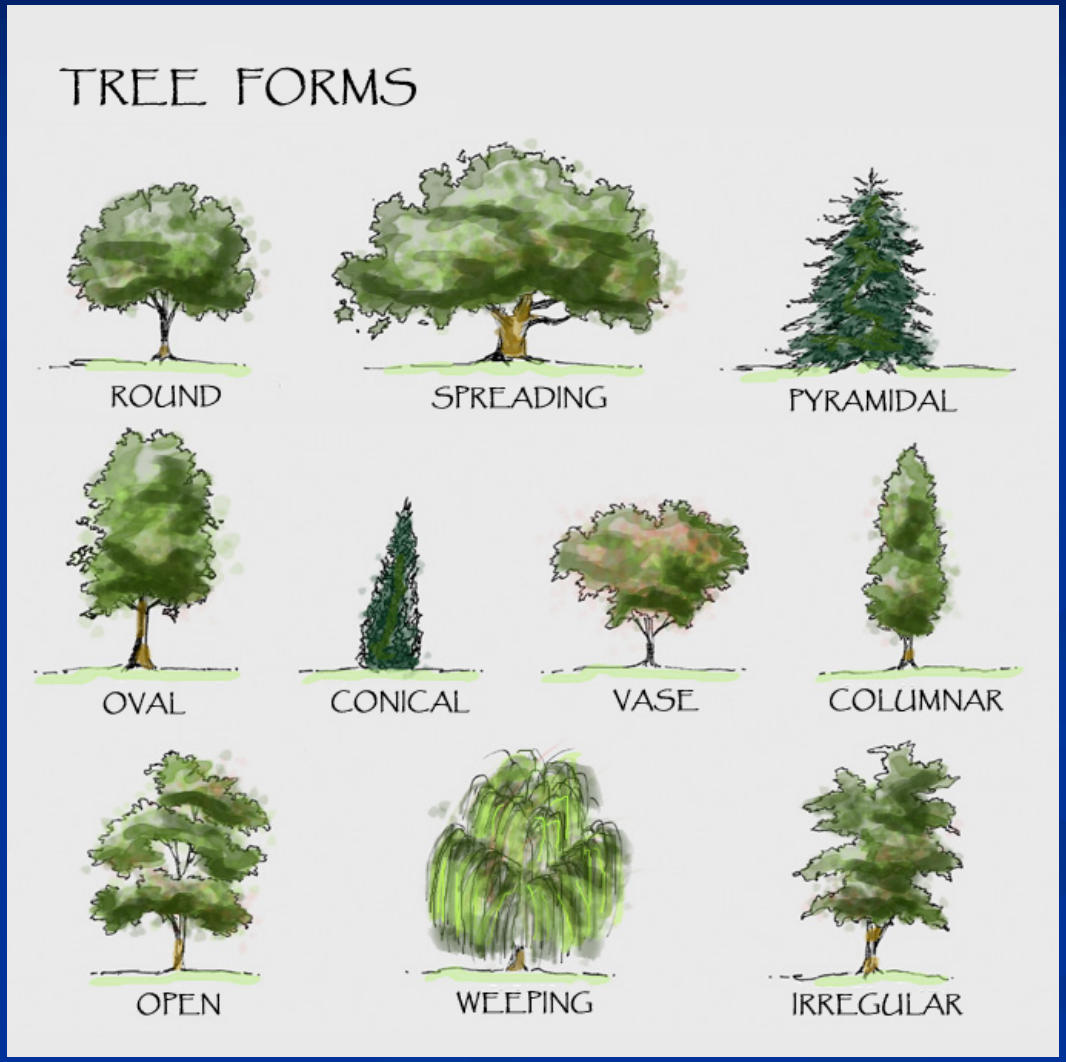


Design Principles

Military Dr

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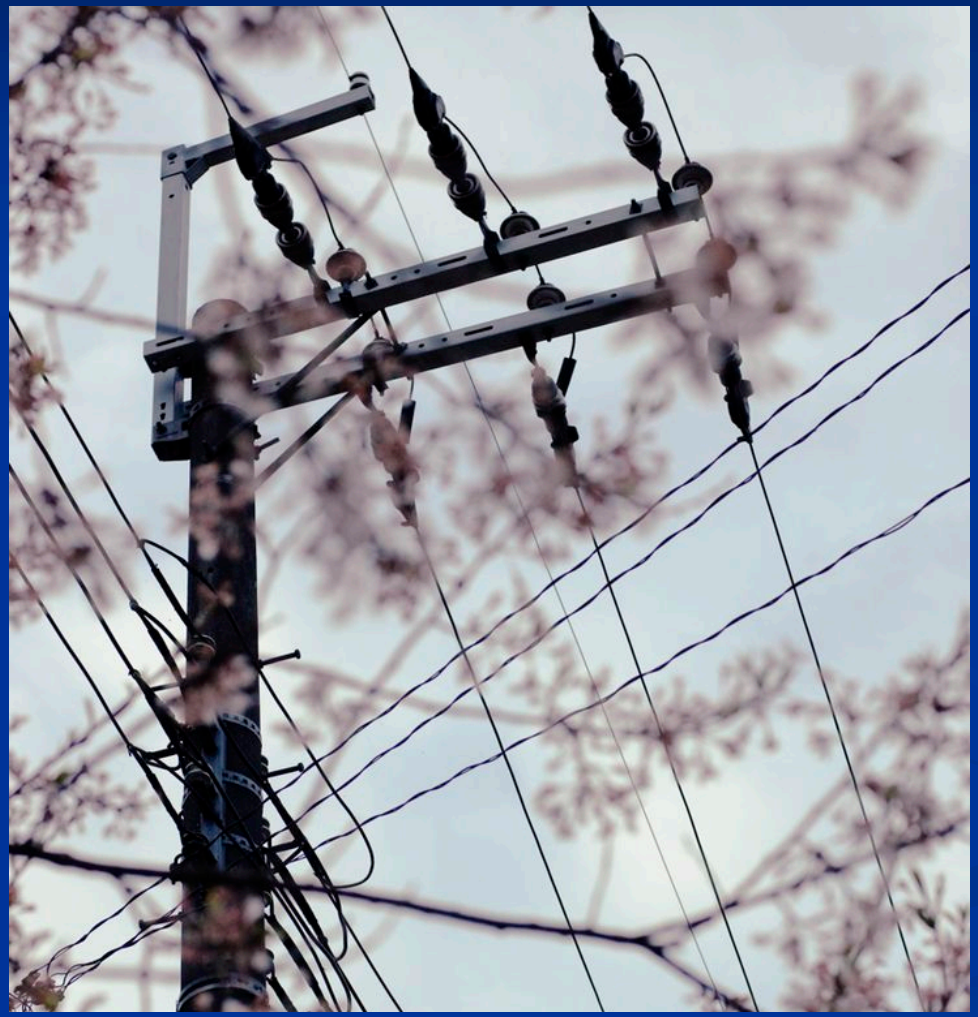

Constraints

# Trees as Landscape Elements

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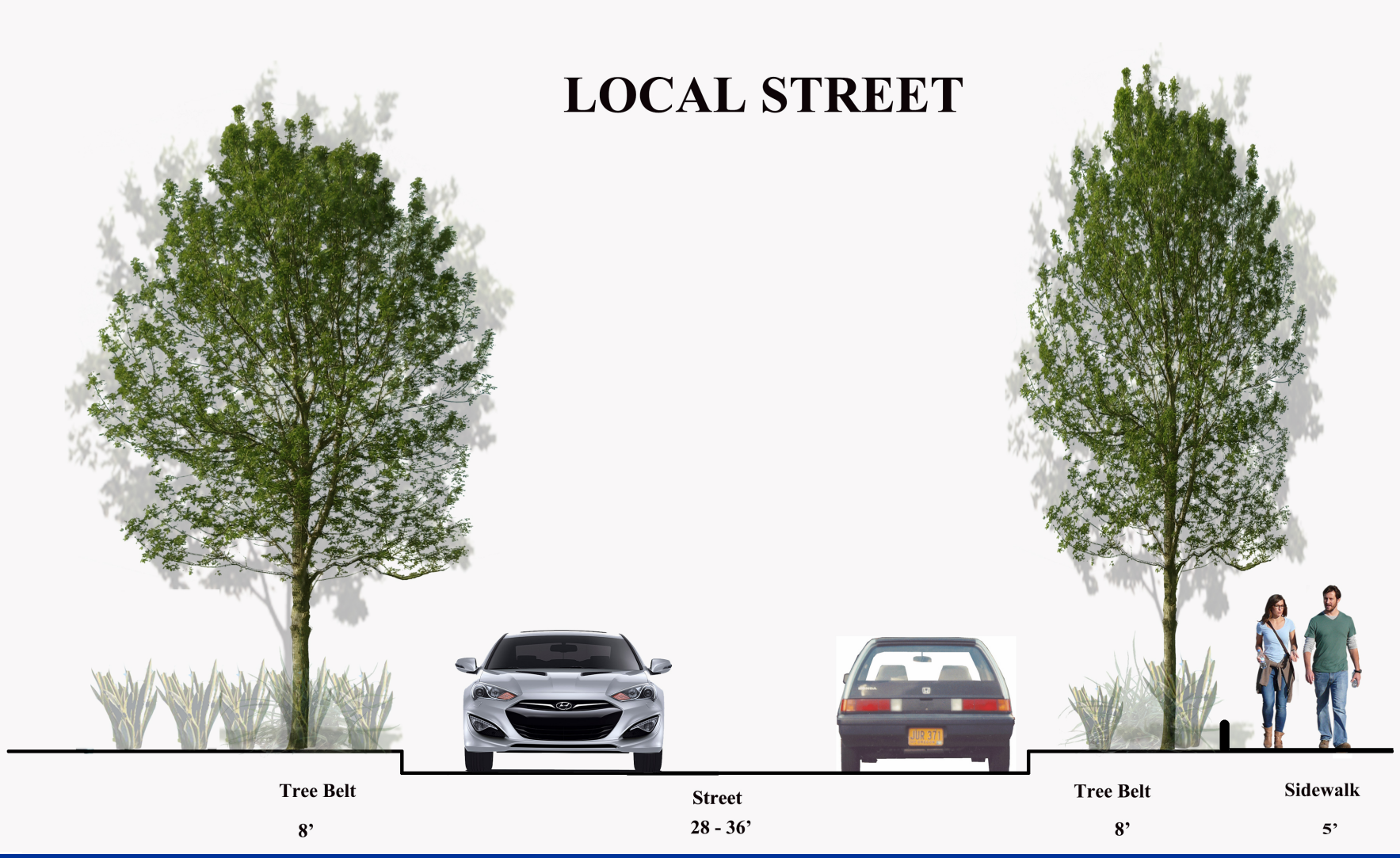
Constraints

# Streetscape design scenarios



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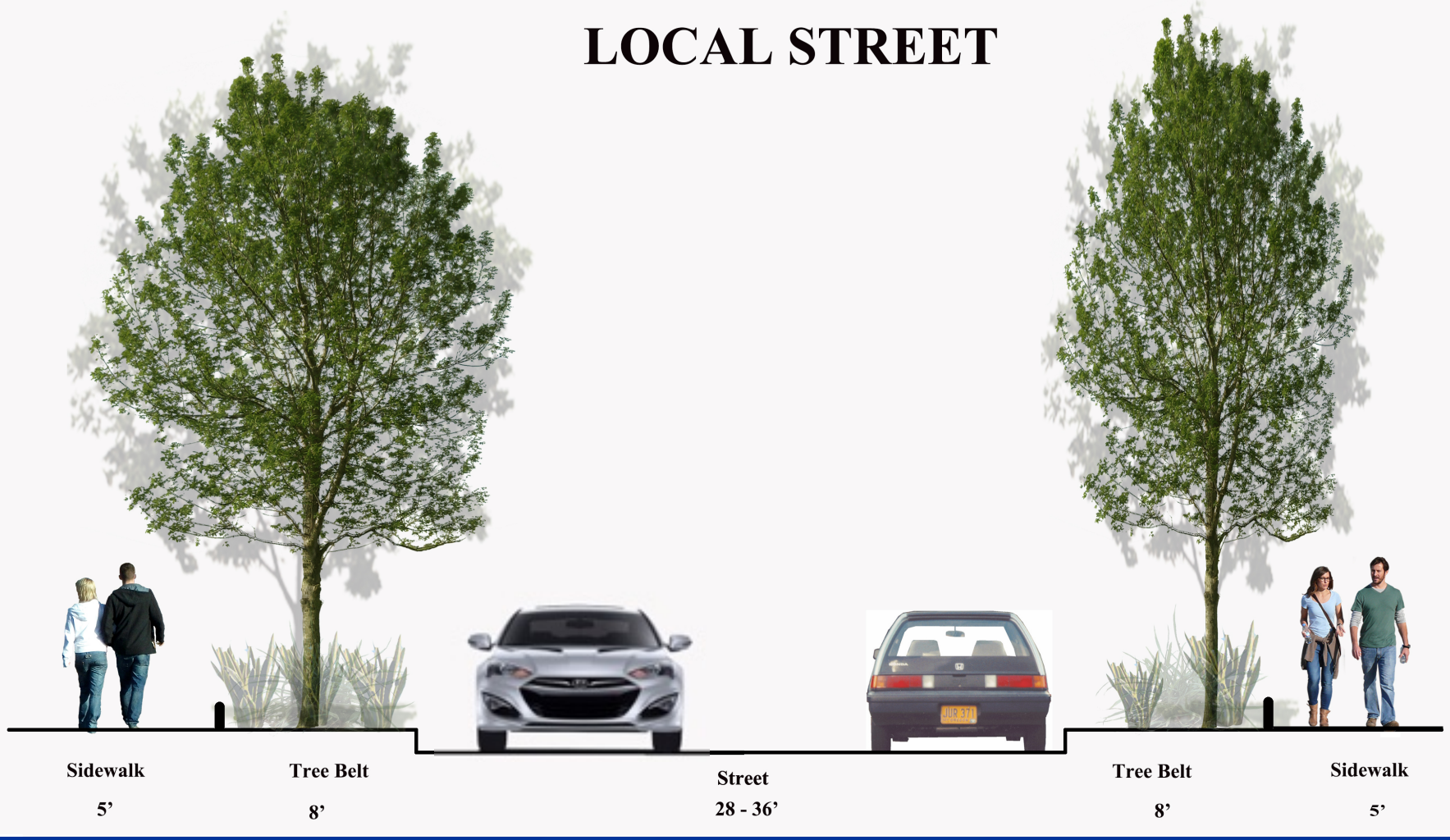

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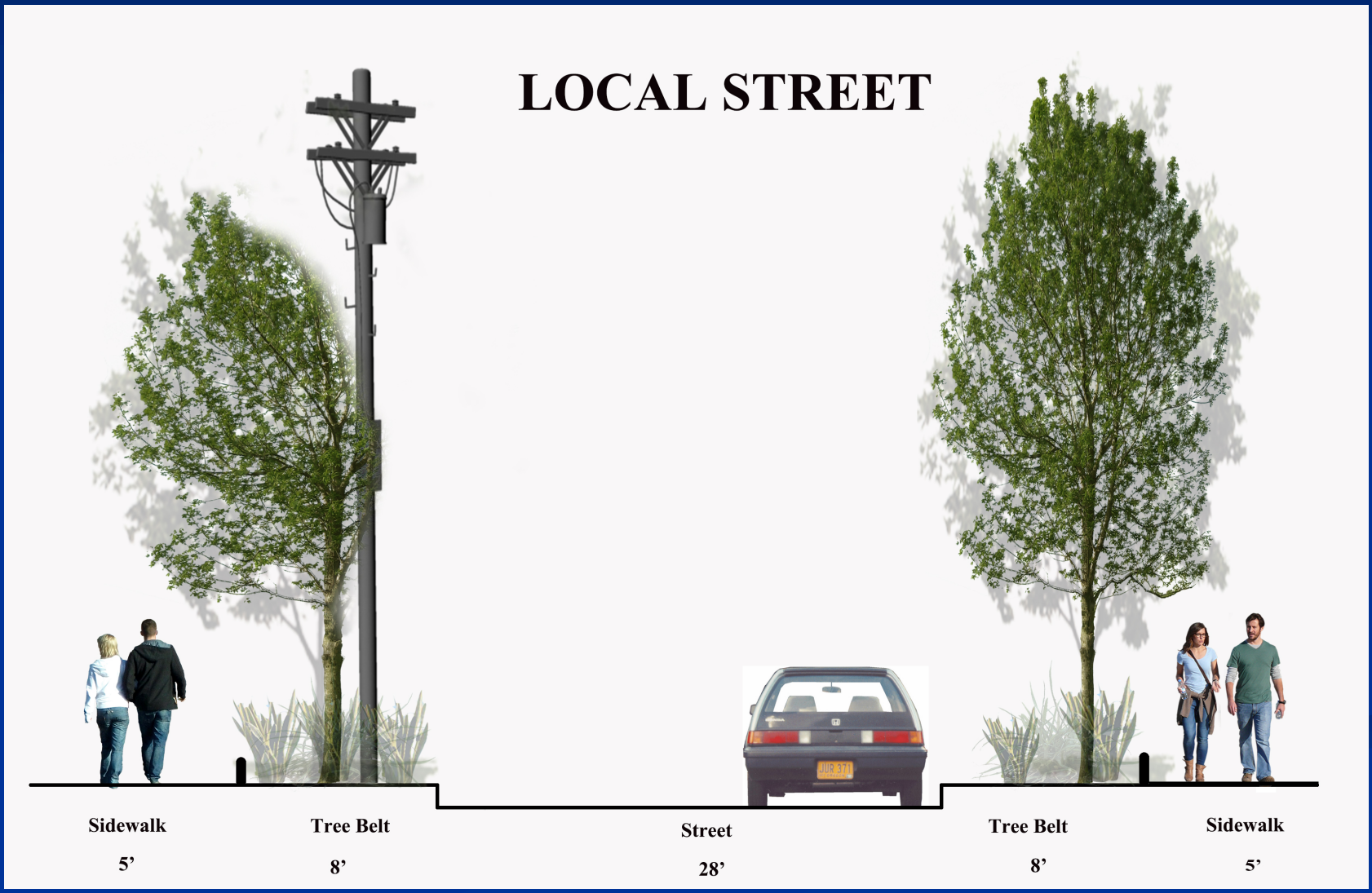

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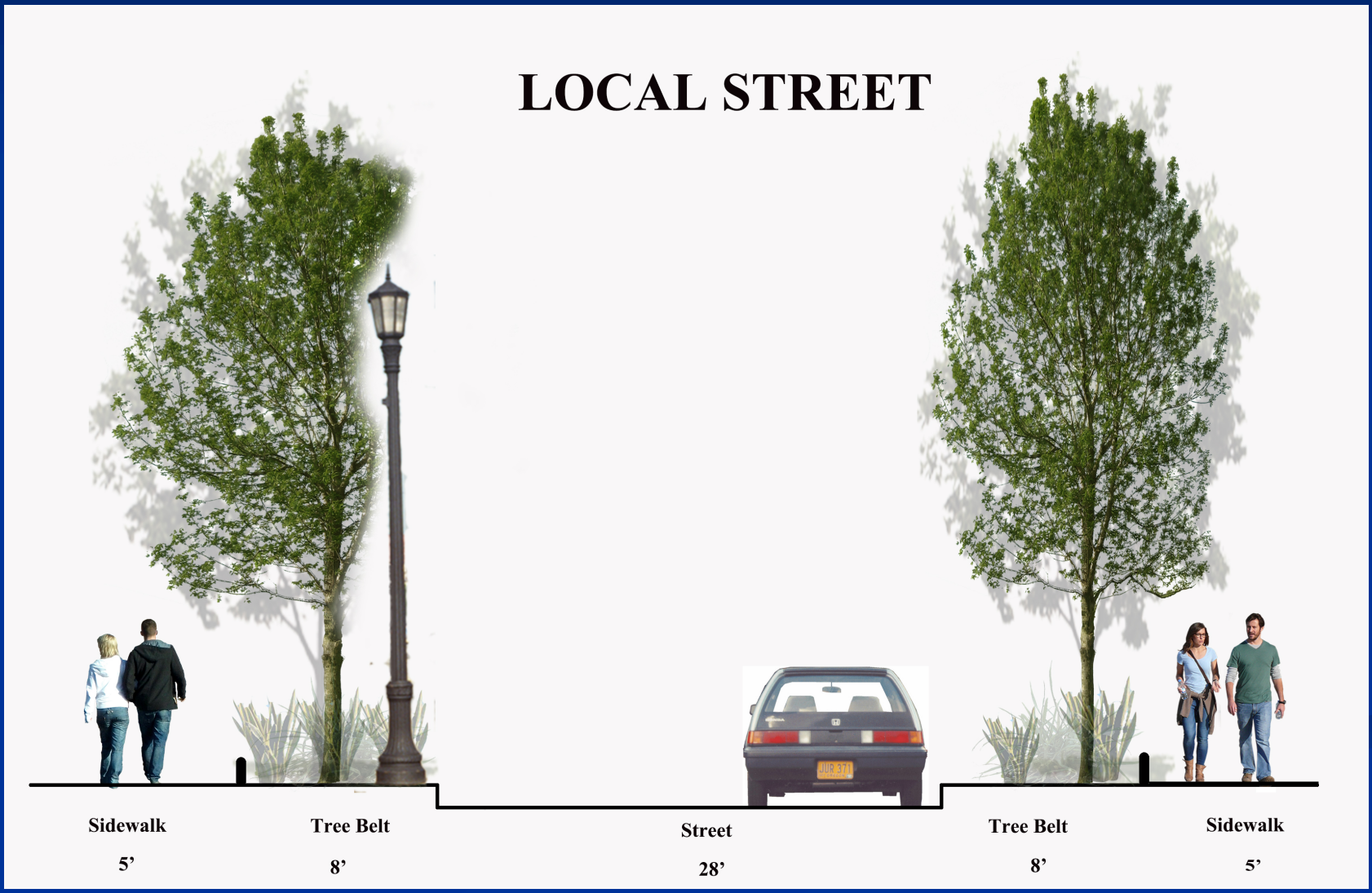
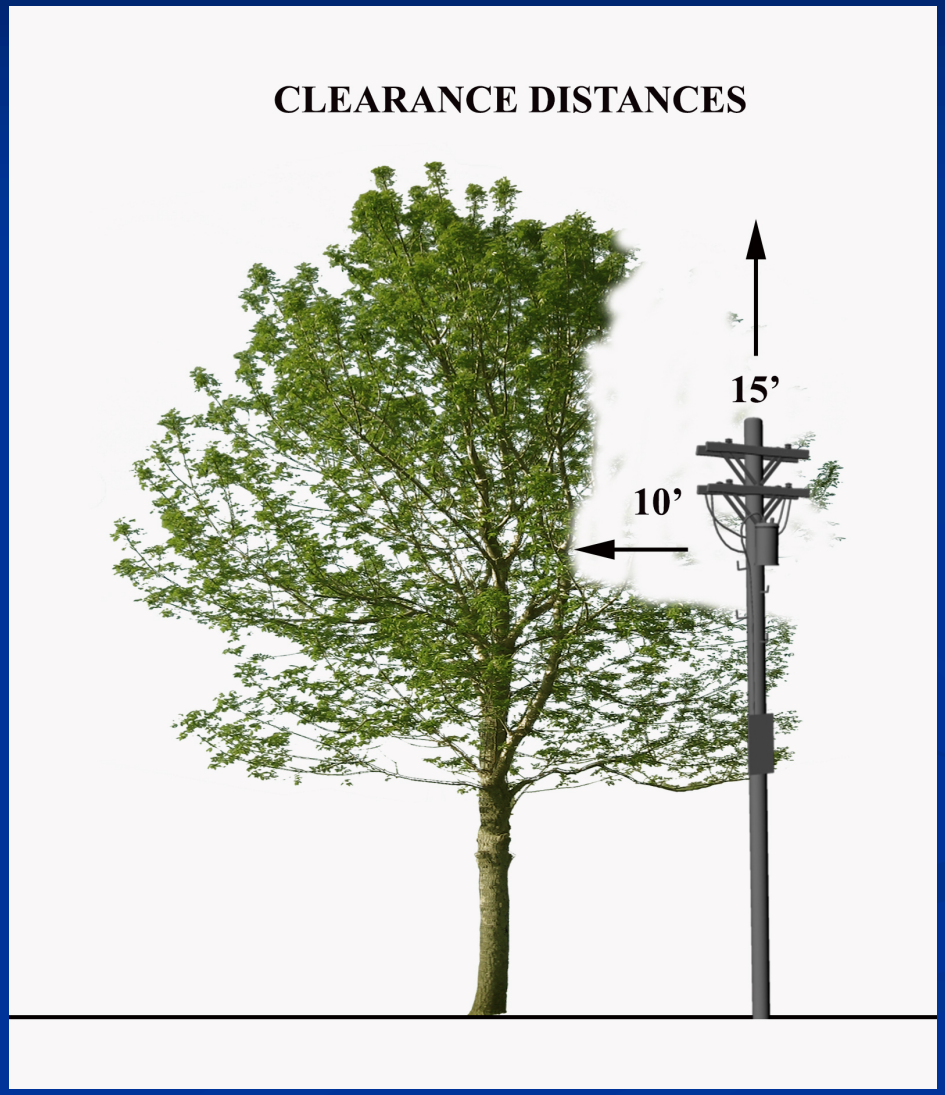


# Streetscape design considerations



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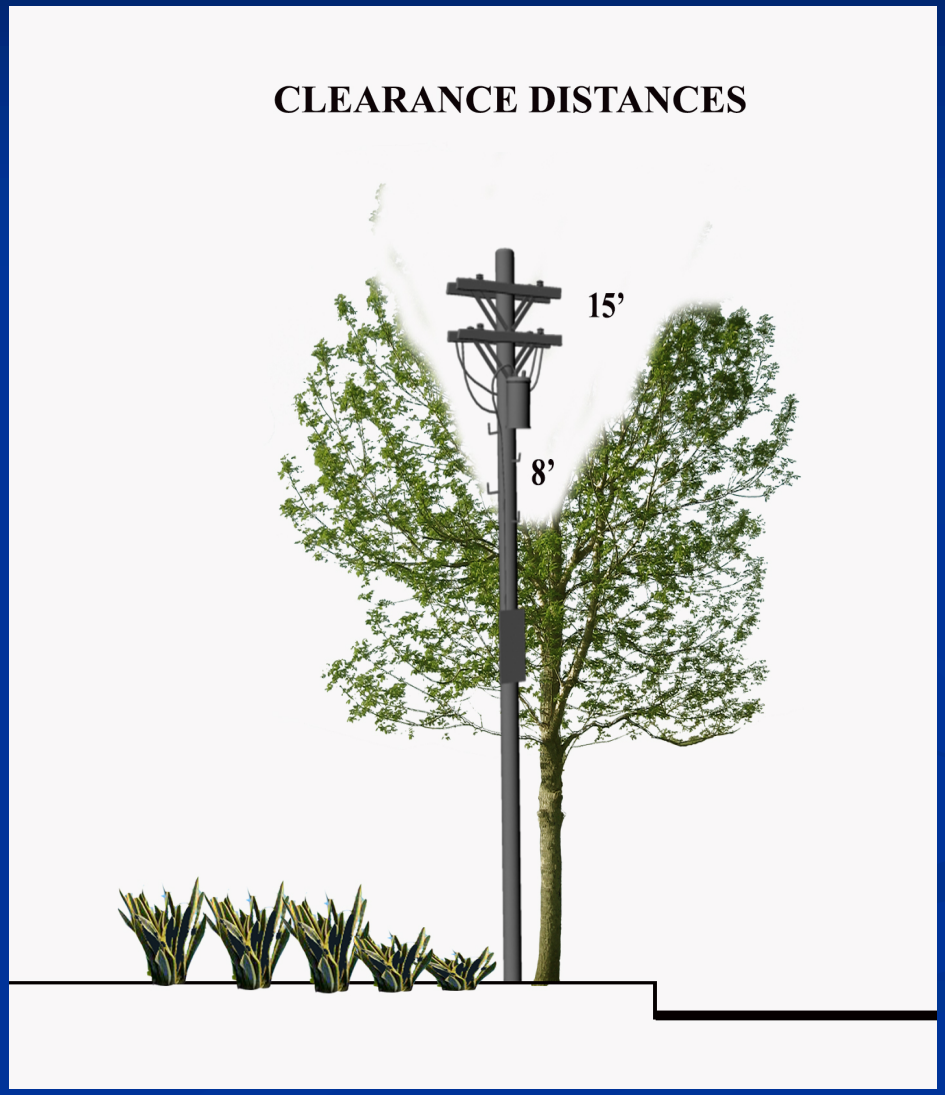

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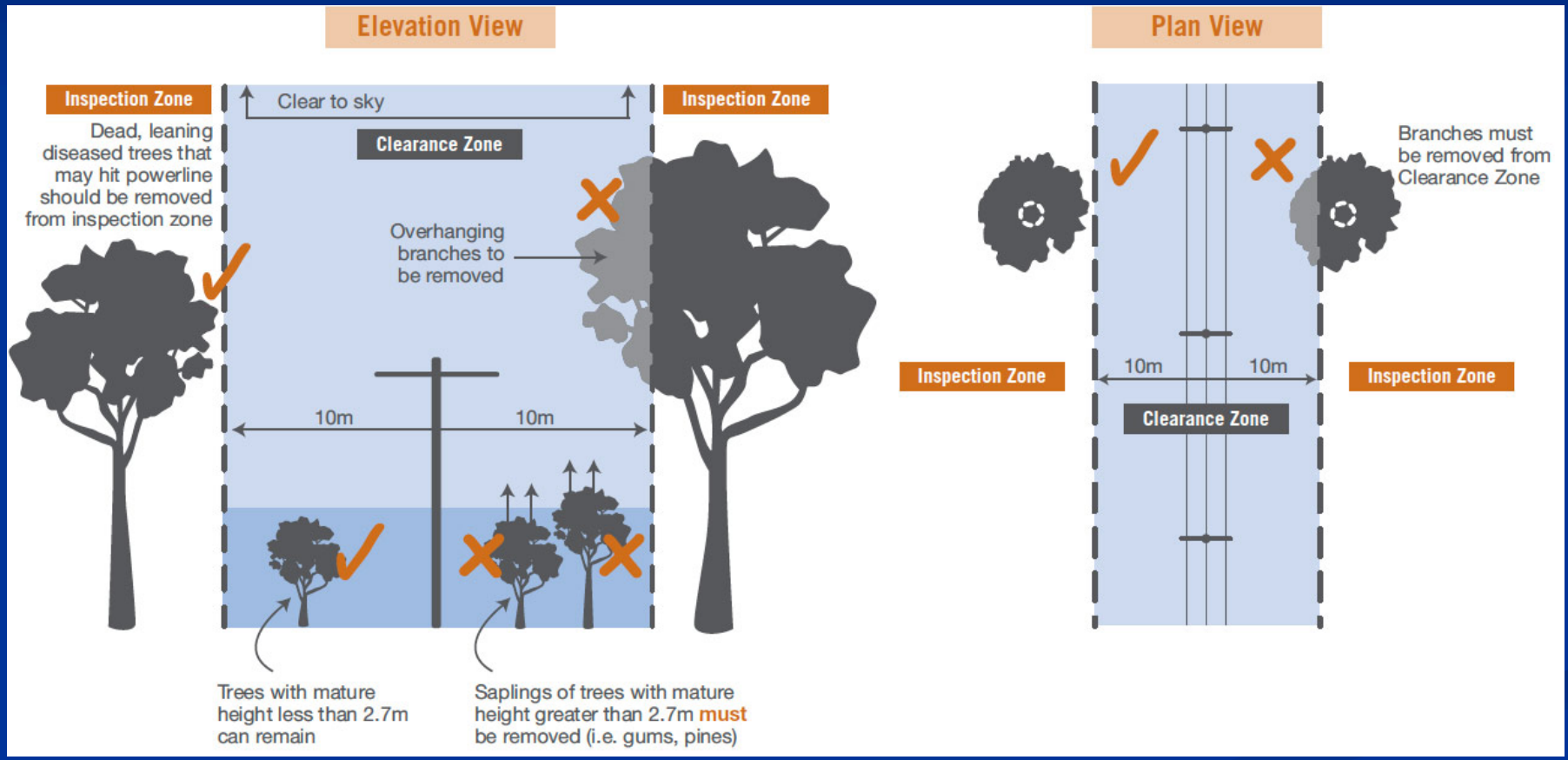

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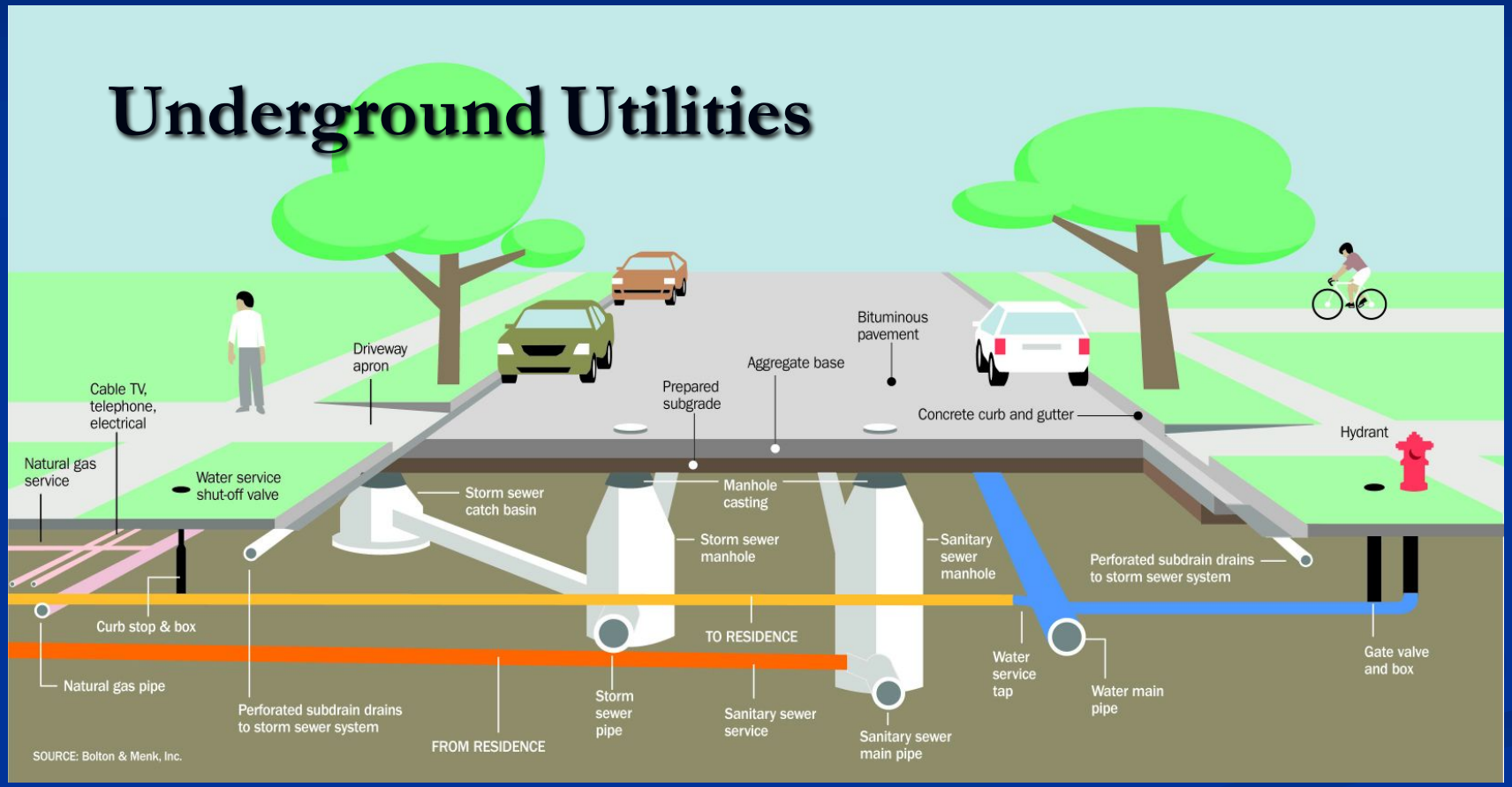

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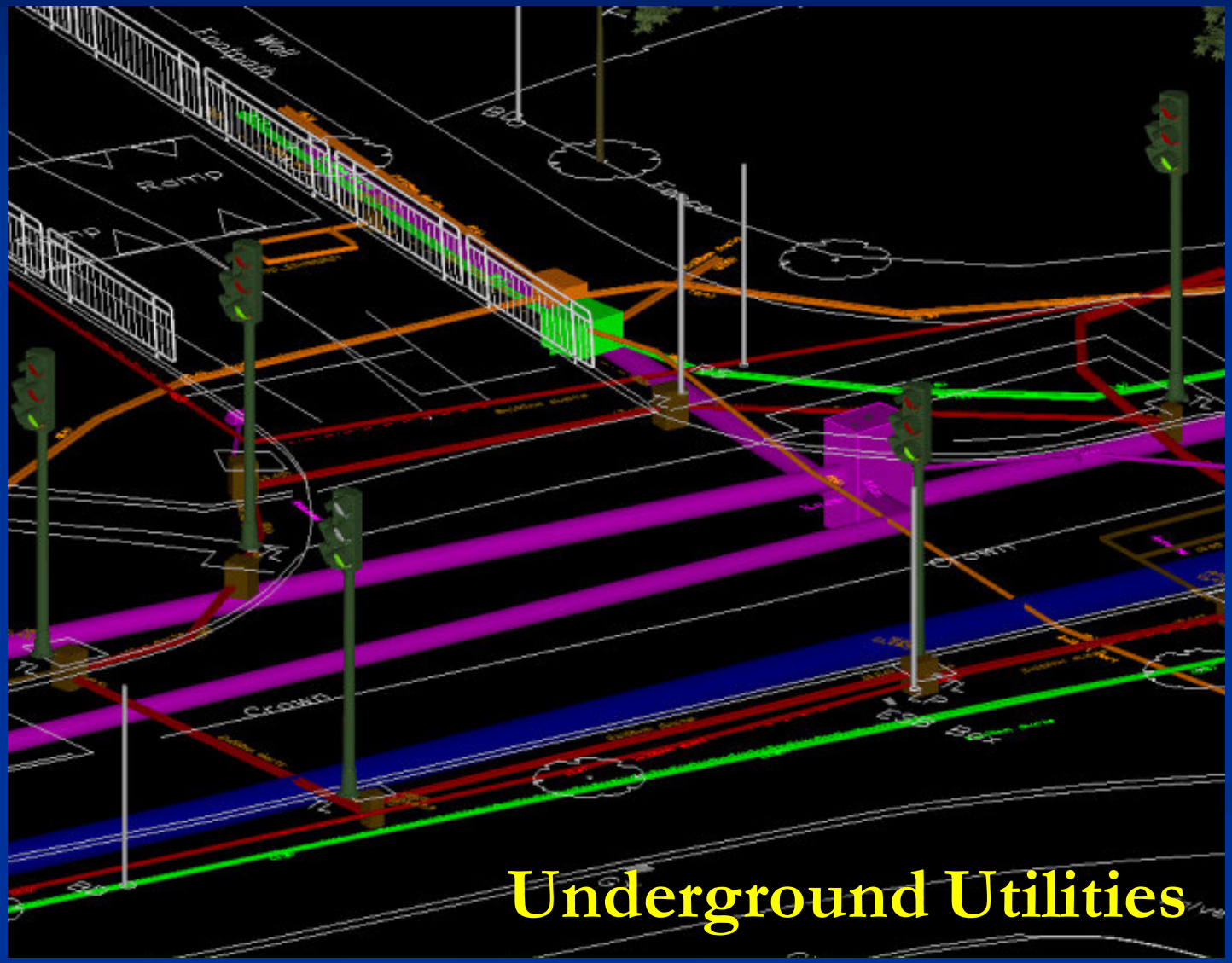

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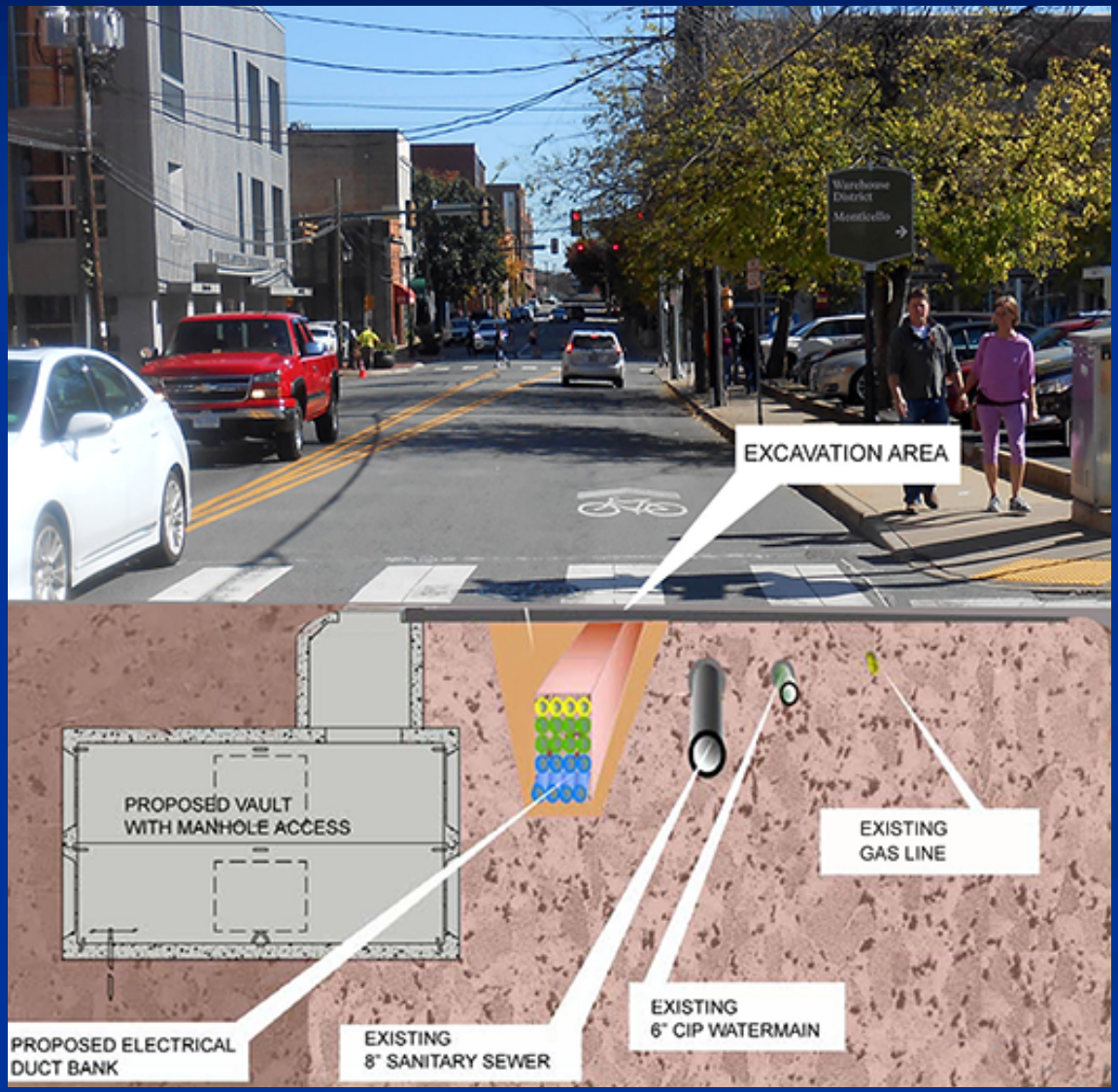

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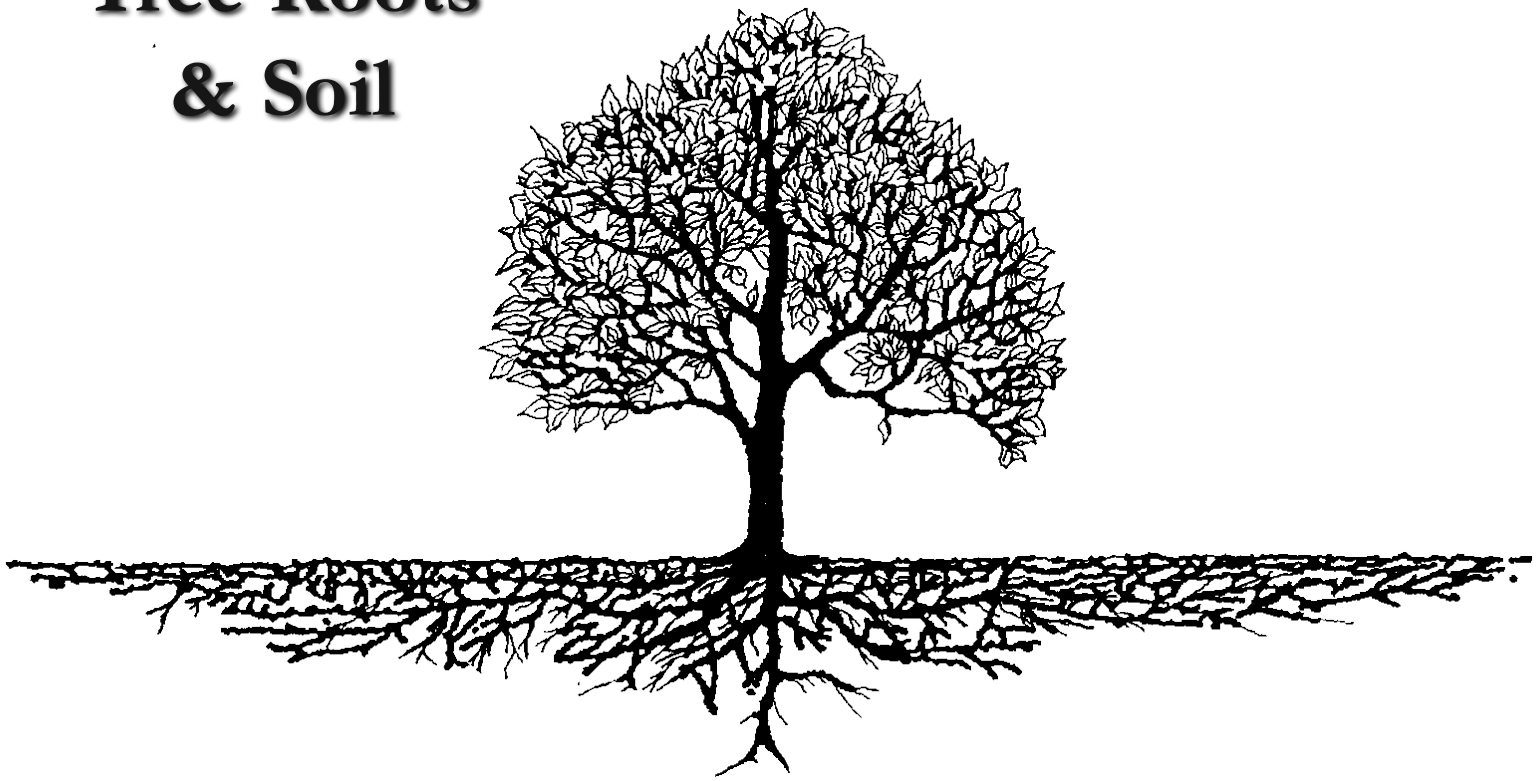

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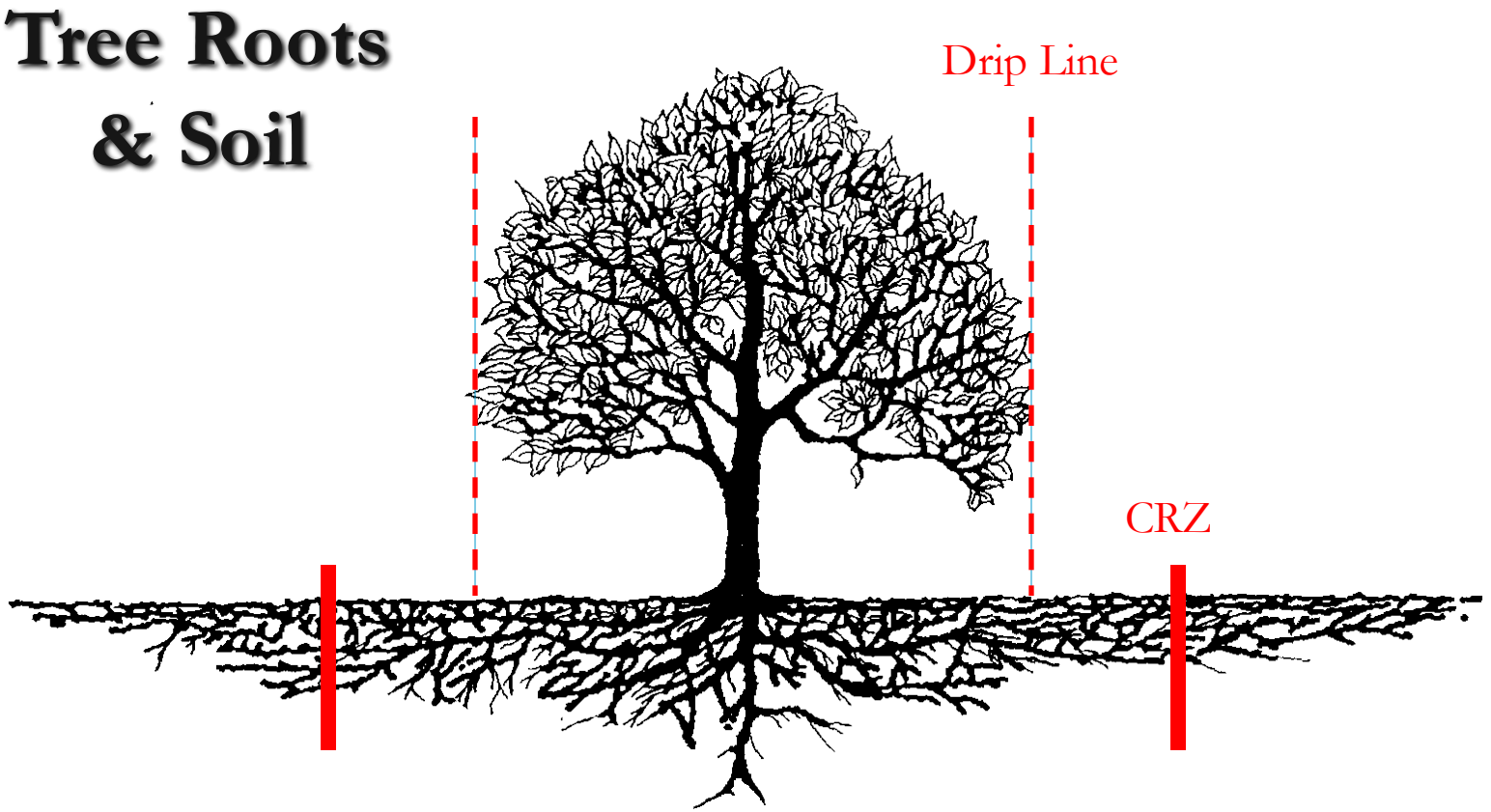

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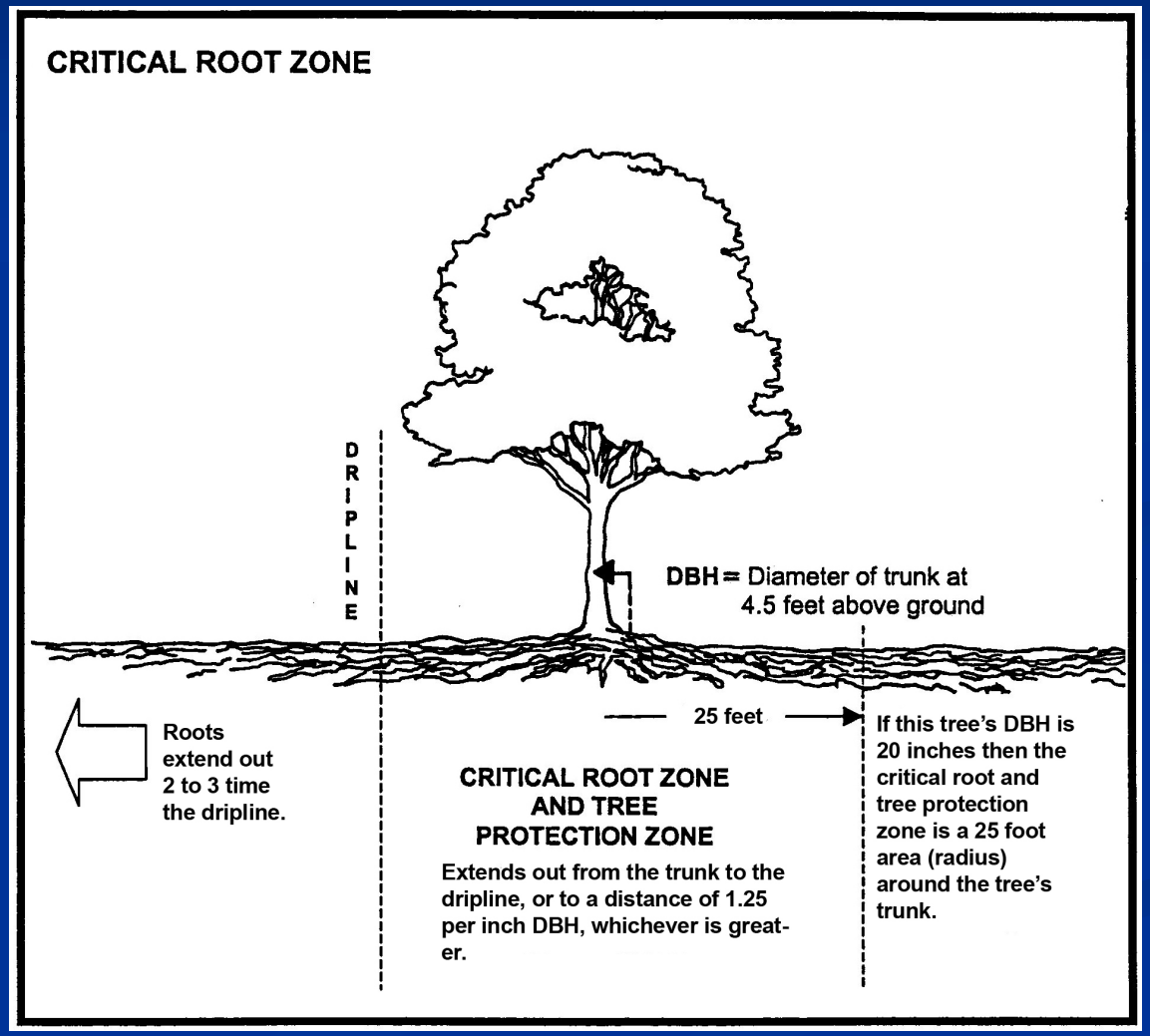
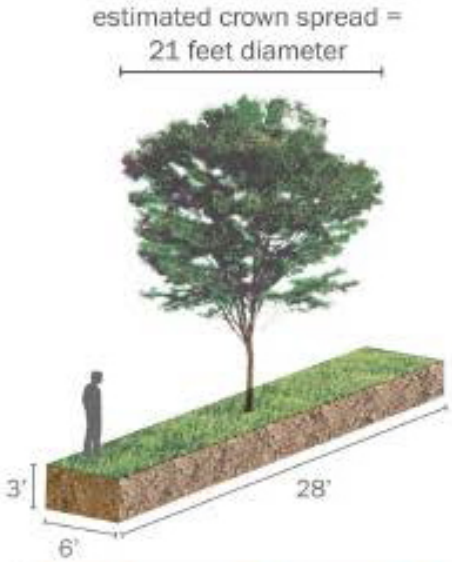


# Streetscape design considerations

## Soil Volume

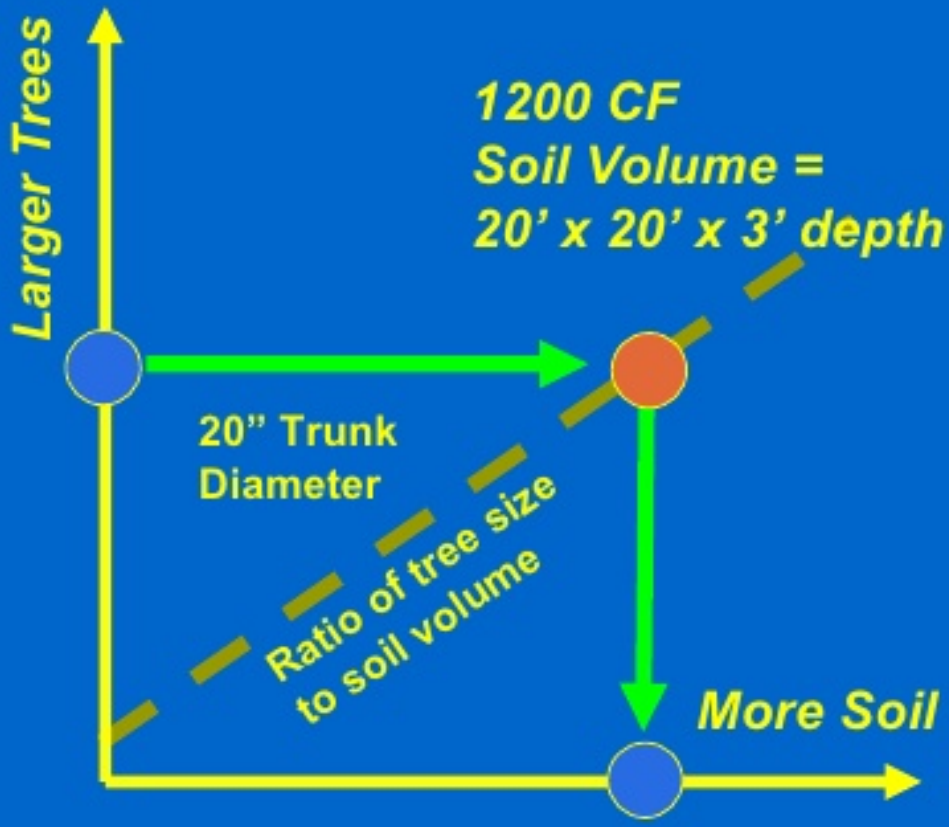
Soil Volume = 120 cubic feet

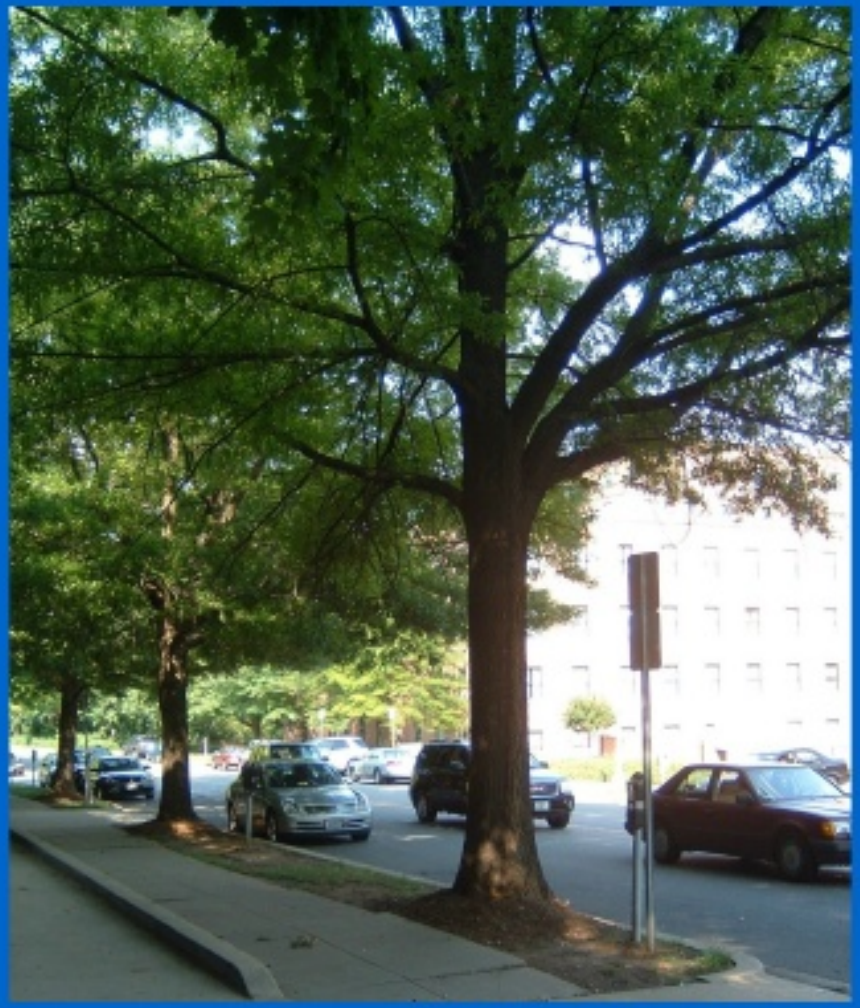



Soil Volume = 500 cubic feet

Soil Volume = 1000 cubic feet

# How Much Soil ?

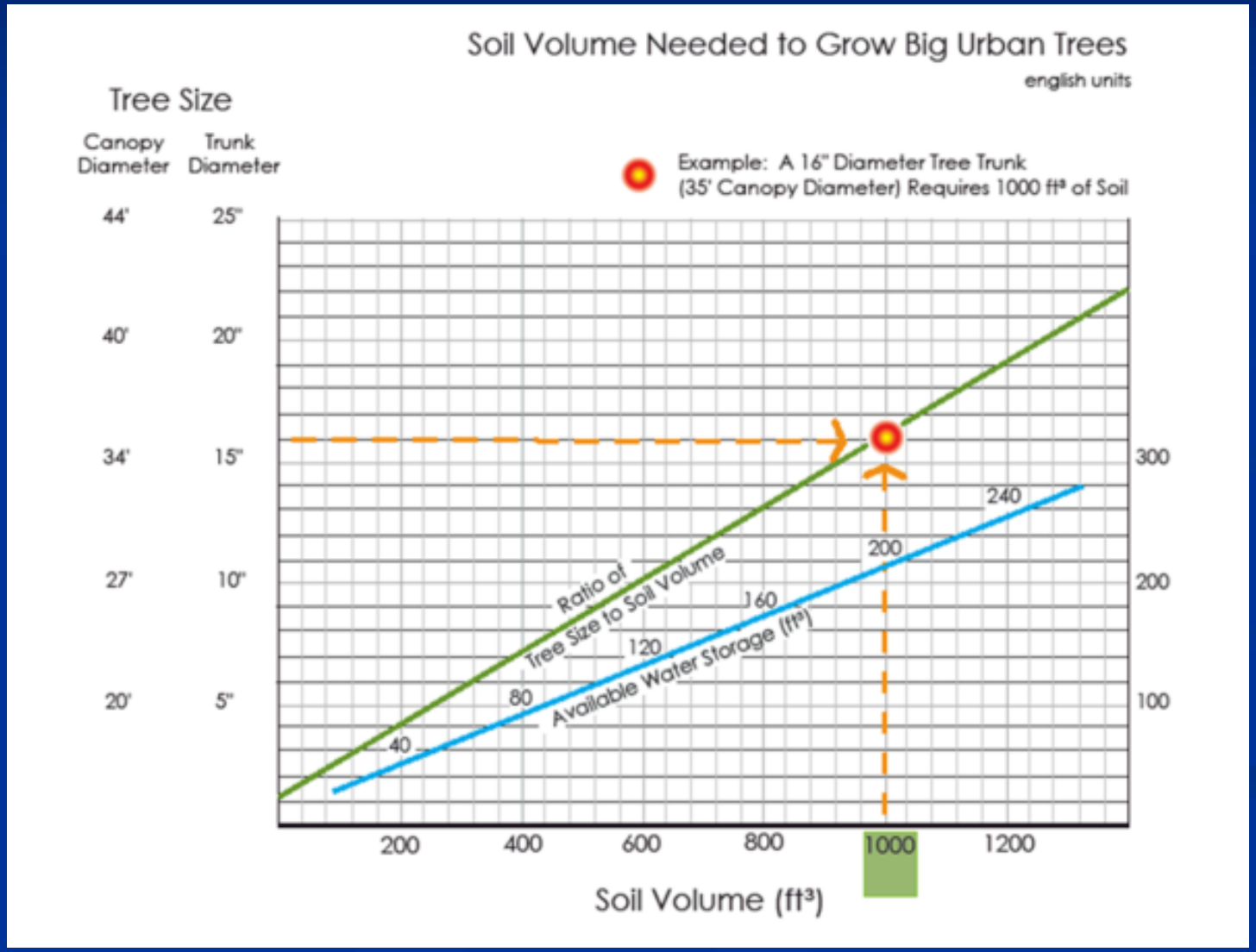


JAMES URBAN, FASLA, ISA

**20" Trunk Diameter Tree will require 20' x 20' x 3' deep soil volume (min.).**

# Streetscape design considerations



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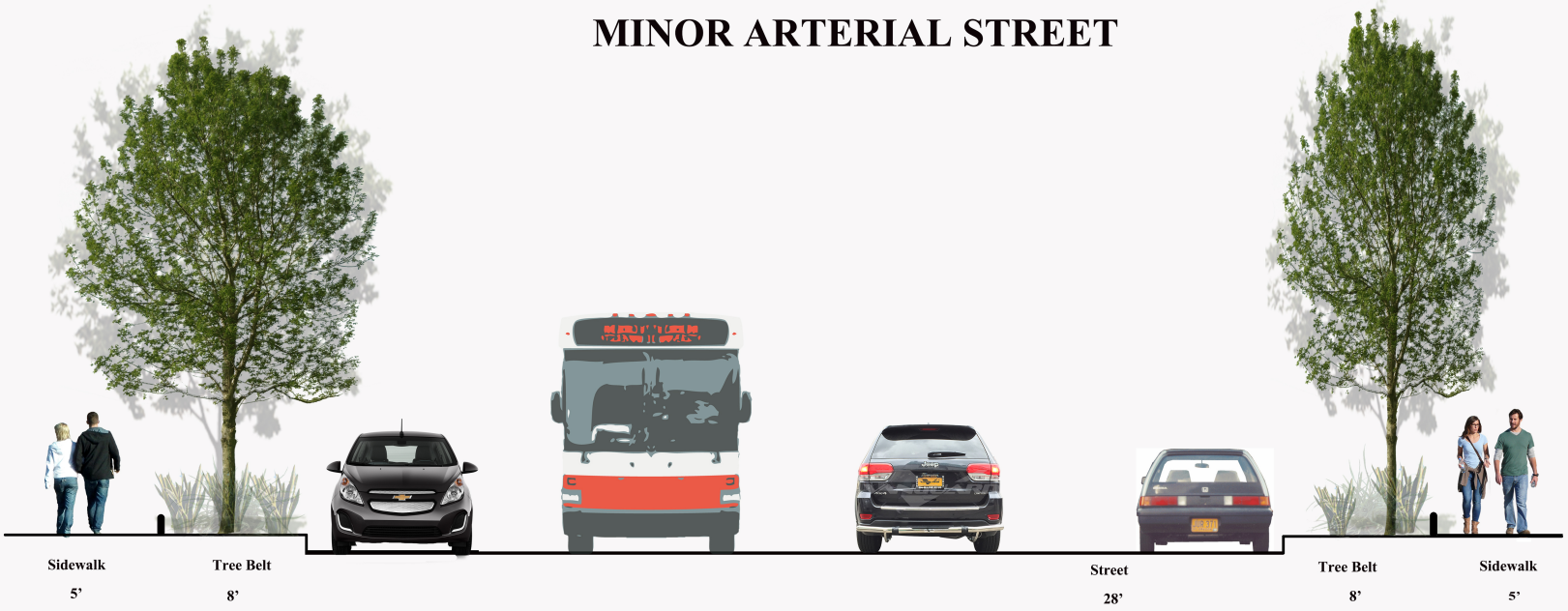

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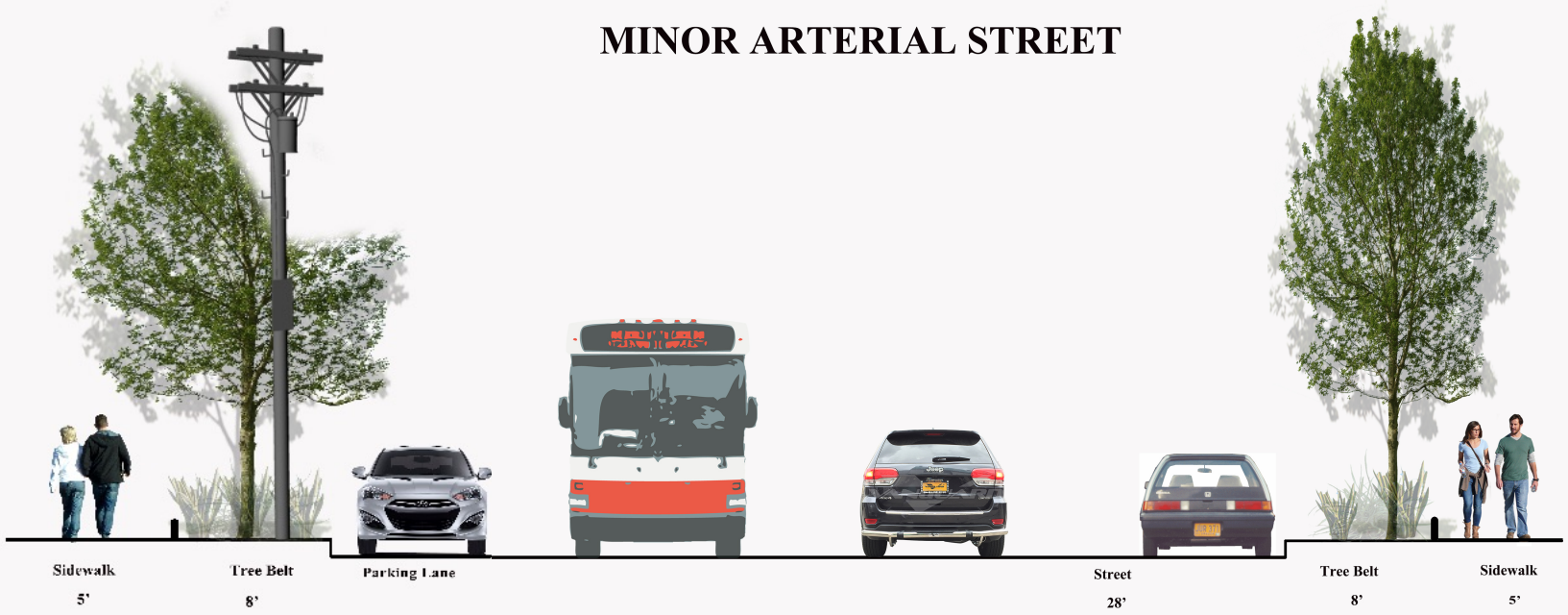

# Streetscape design considerations

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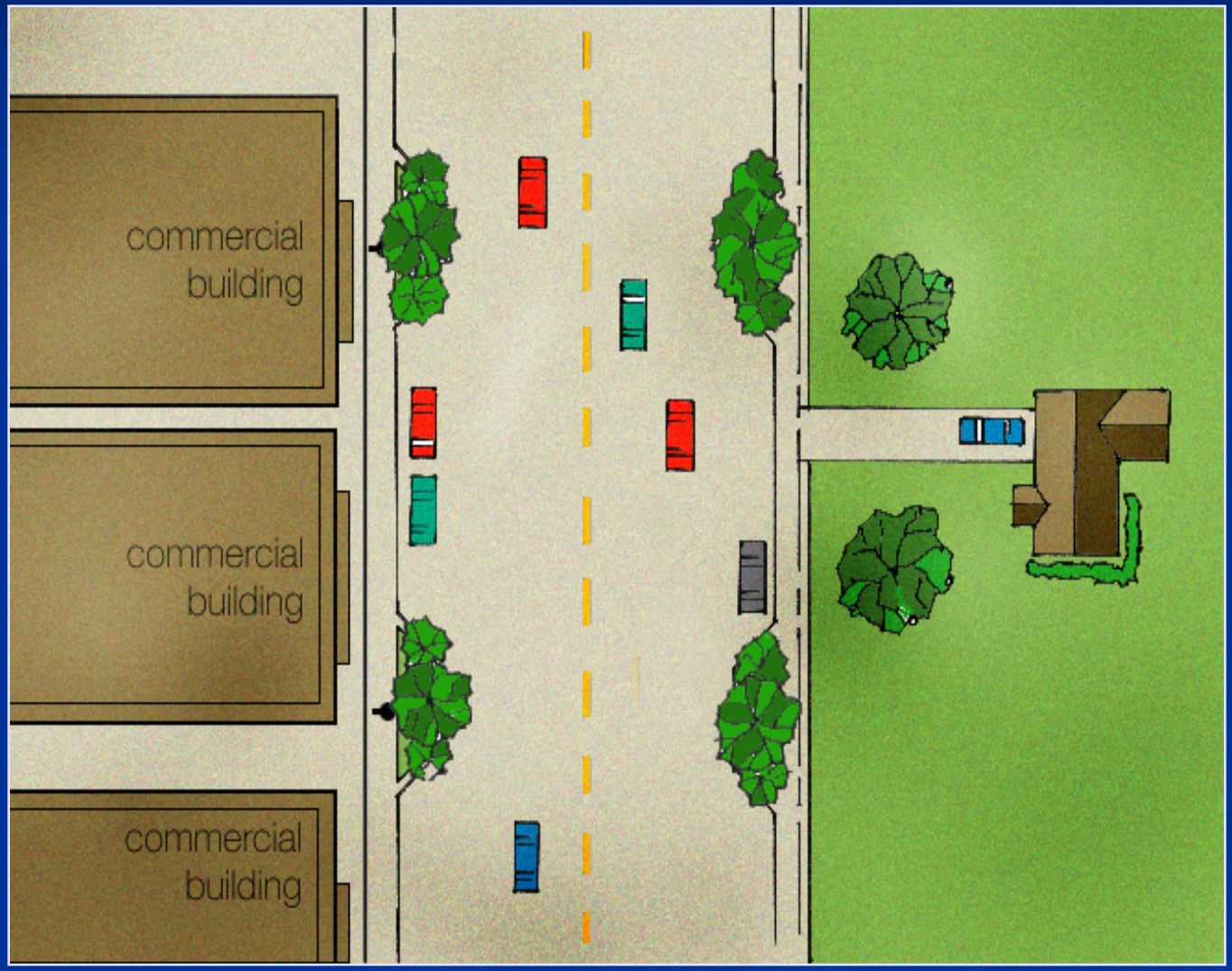
# Consider These Alternatives

- Proper species selection, so that only trees that will not interfere with wires, building and other infrastructure.
- Setback planting appropriate species and shape
- Planting trees in locations within the right of way other than directly below the wires – bump out and terrace plantings.

# Bump Out Planting



# Bump Out Planting

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# Set Back Planting

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# Space – Tree Species Match

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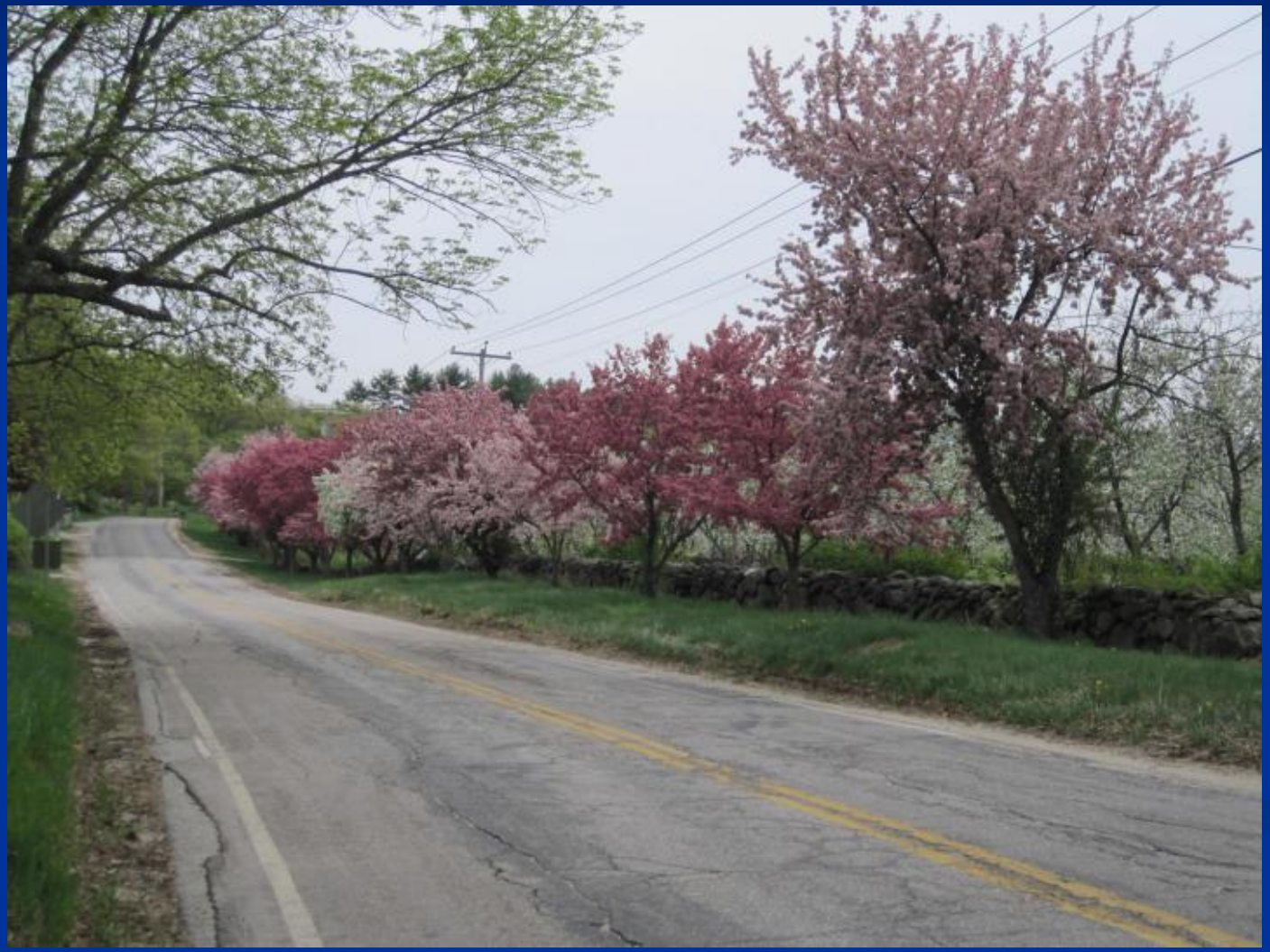

# Be Creative

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Plants
Aluminium profile
Irrigation line
Waterproof back layer
Fytotextile inner layer
Fytotextile breathable layer

SPEED
LIMIT
30

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