Design Solutions for Sustainable Streets & Roadsides

August 24, 2021

David Bloniarz
USDA Forest Service
Amherst, MA
dbloniarz@fs.fed.us

Design Solutions for Sustainable Streets & Roadsides

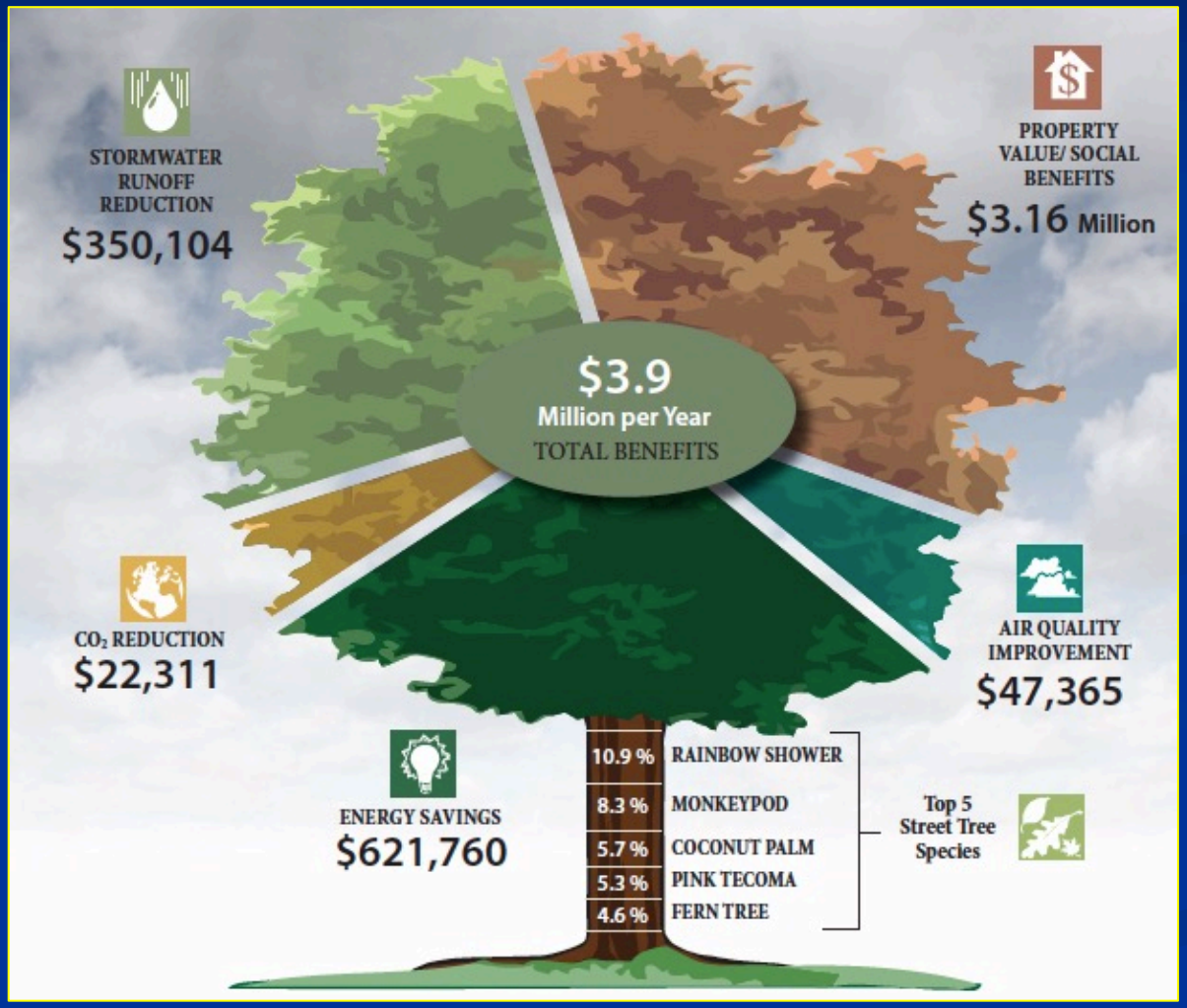
www.unri.org/research-documents

David Bloniarz
USDA Forest Service
Amherst, MA
dbloniarz@fs.fed.us

Topics for today's presentation

- Tree values and climate change
- Design as a process
- Trees as design and landscape elements
- Street Lighting in urbanized landscapes
- Streetscape scenarios

Street Trees Provide Benefits



Honolulu's Street Tree Benefits

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

Few people want cities without trees

Few people want cities without trees

Few people want cities without trees

Few people want cities without trees

Few people want cities without trees

Few people want cities without trees

Few people want cities without trees

Few people want cities without trees

Few people want cities without trees

Few people want cities without trees

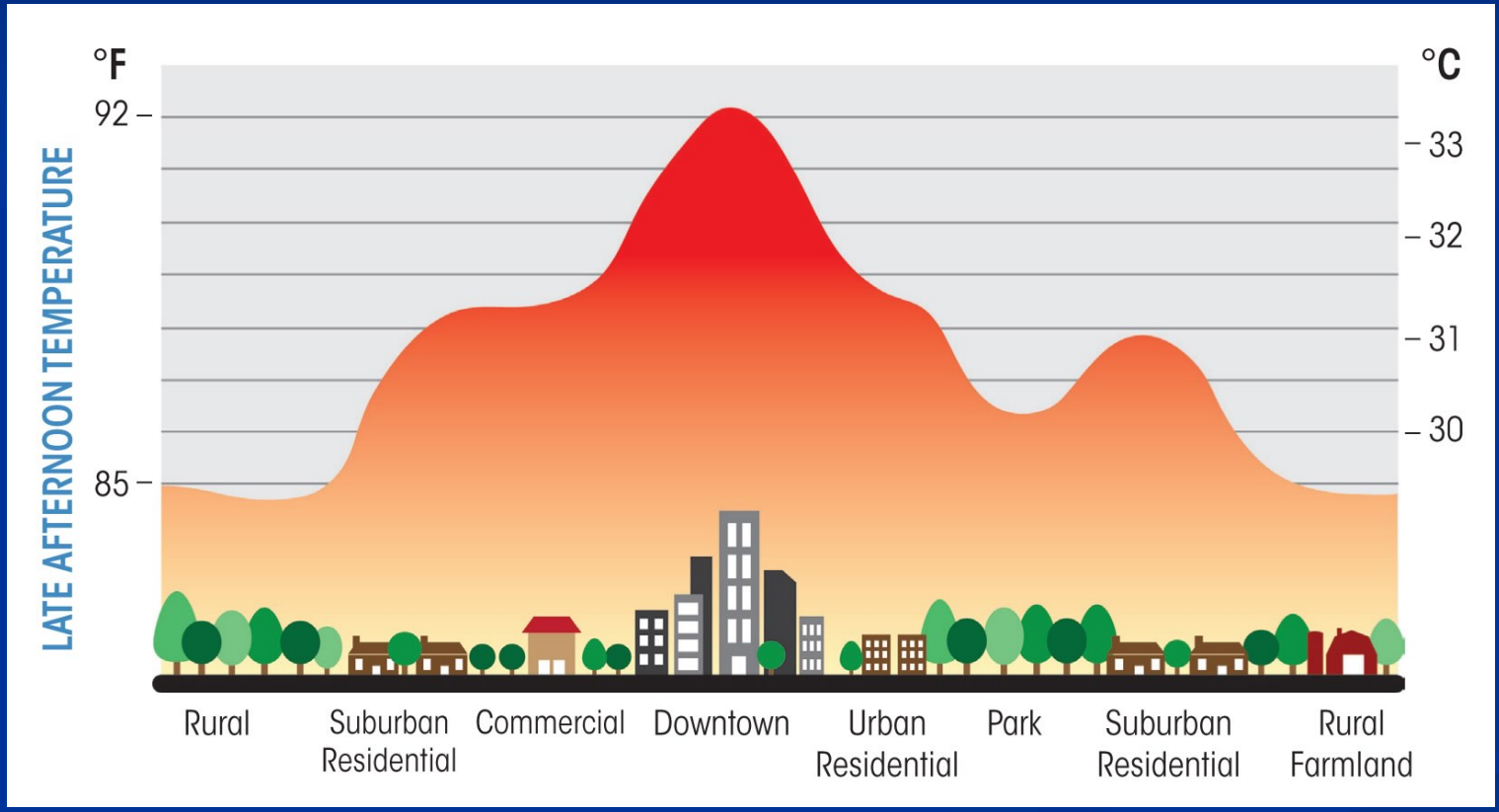
Few people want cities without trees

Few people want cities without trees

Few people want cities without trees

Few people want cities without trees

Urban Heat Island



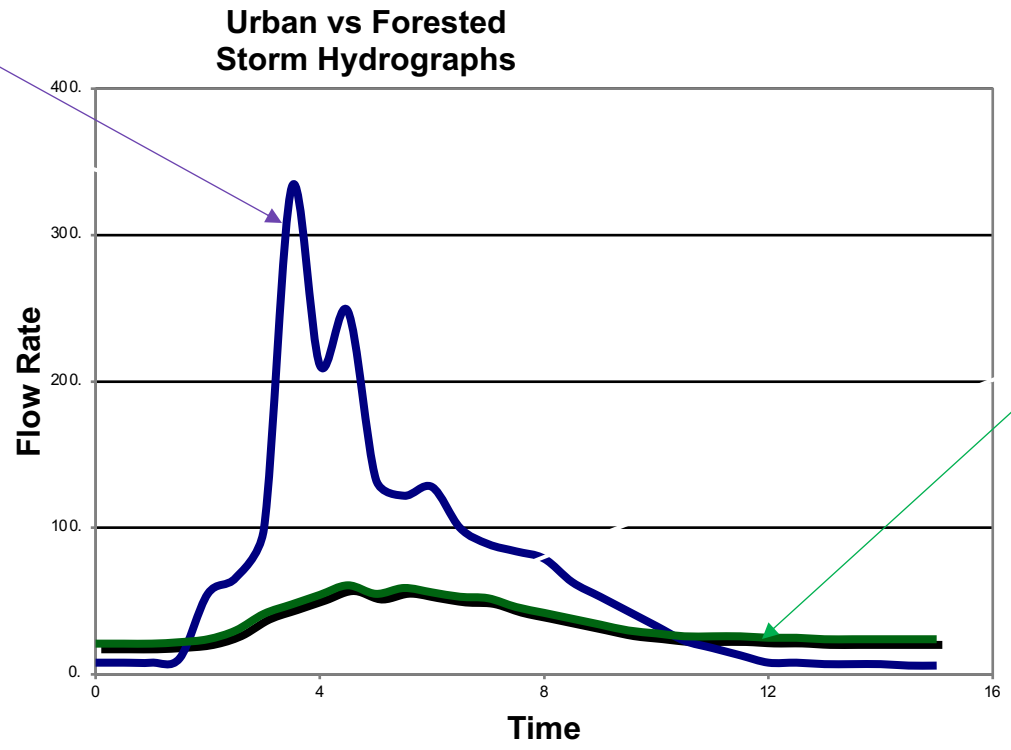
Impact of Stormwater & Impervious Area

The Urban Storm Hydrograph

Greater Peaks & Volume

å

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

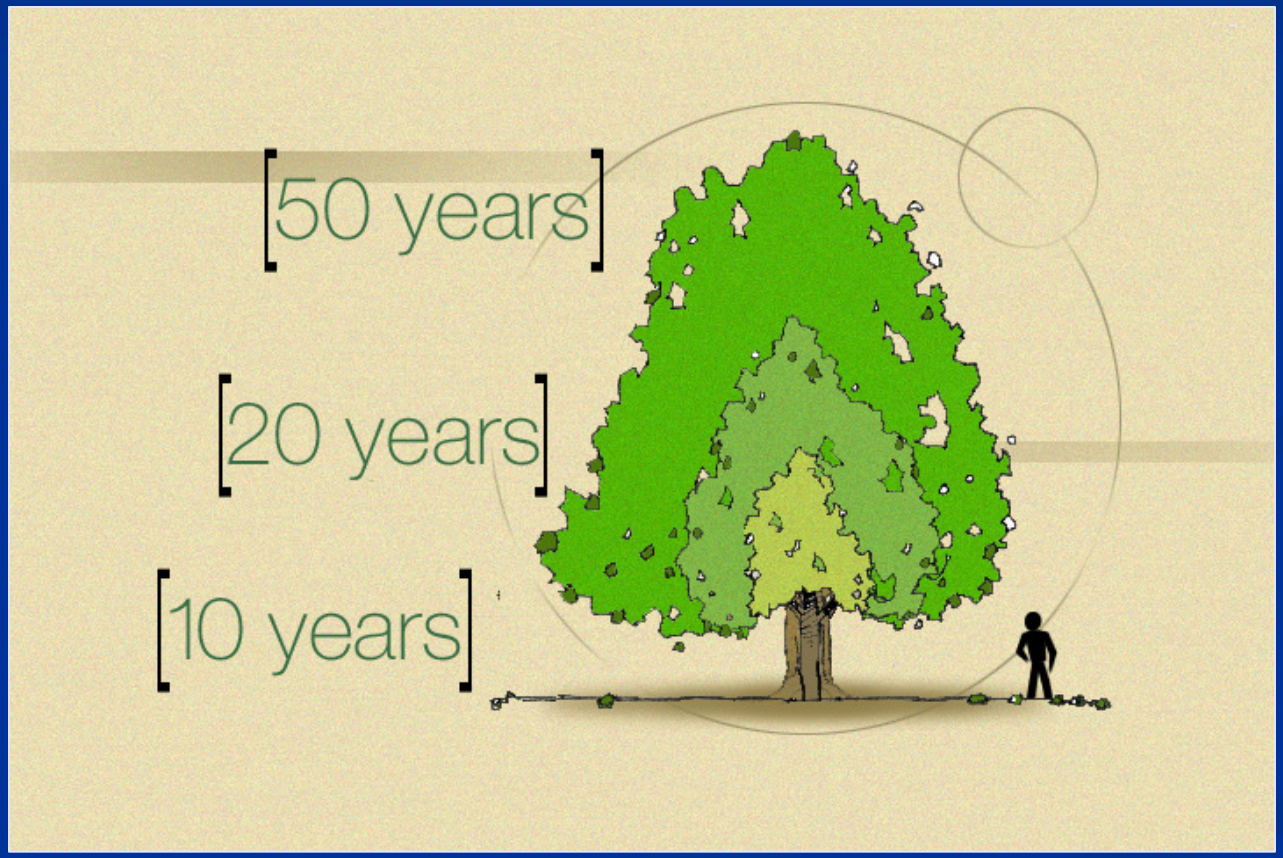
Poor design leads to failure

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



Good design leads to success

Good design leads to success

Good design leads to increased value - economic & environmental

Good design leads to increased value - economic & environmental

Tree Facts

Serving Size: 14 in DBH (35.6 cm)
Species: Pin Oak, ***Quercus palustris***

Amount Per Serving

Carbon sequestered 259 lbs	avoided 257 lbs
	% Annual Value*
Total Carbon 537 lbs	
O3 $1.96	
VOC(Volatile Organic Compounds) $0.93	
NO2(Deposited) $0.85	
NO2(Avoided) $3.36	
SO2(Deposited) $0.25	
SO2(Avoided) $1.40	
PM10(Deposited) $1.77	
PM10(Avoided) $0.39	
Conserved Kilowatt/hours 96 KwH	
Reduced oil/natural gas consumption 28 therm(s)	
Stormwater intercepted 1,527 gallons	

Property value increase $103.00	Natural Gas $39.93
Stormwater $12.21	Electricity $12.92

*It should be noted that trees themselves emit biogenic volatile organic compounds (BVOCs) which can contribute to ground-level ozone production. This may negate the positive impact the tree has on ozone mitigation for some high emitting species (e.g. Willow Oak or Sweetgum). However, the sum total of the tree's environmental benefits always trumps this negative.

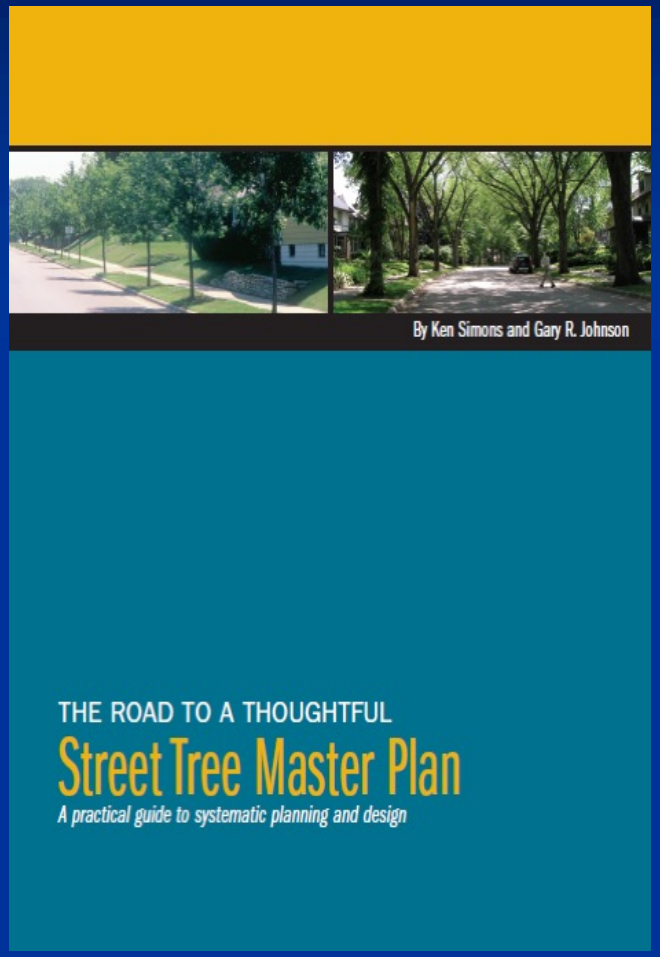
Source
www.treebenefits.com/calculator/ReturnValues.cfm?climatezone=Northeast

USDA Forest Service's Center for Urban Forest Research

i-Tree Tools CD ROM: http://www.itreetools.org/

42000 06200

Good design leads to increased value - economic & environmental

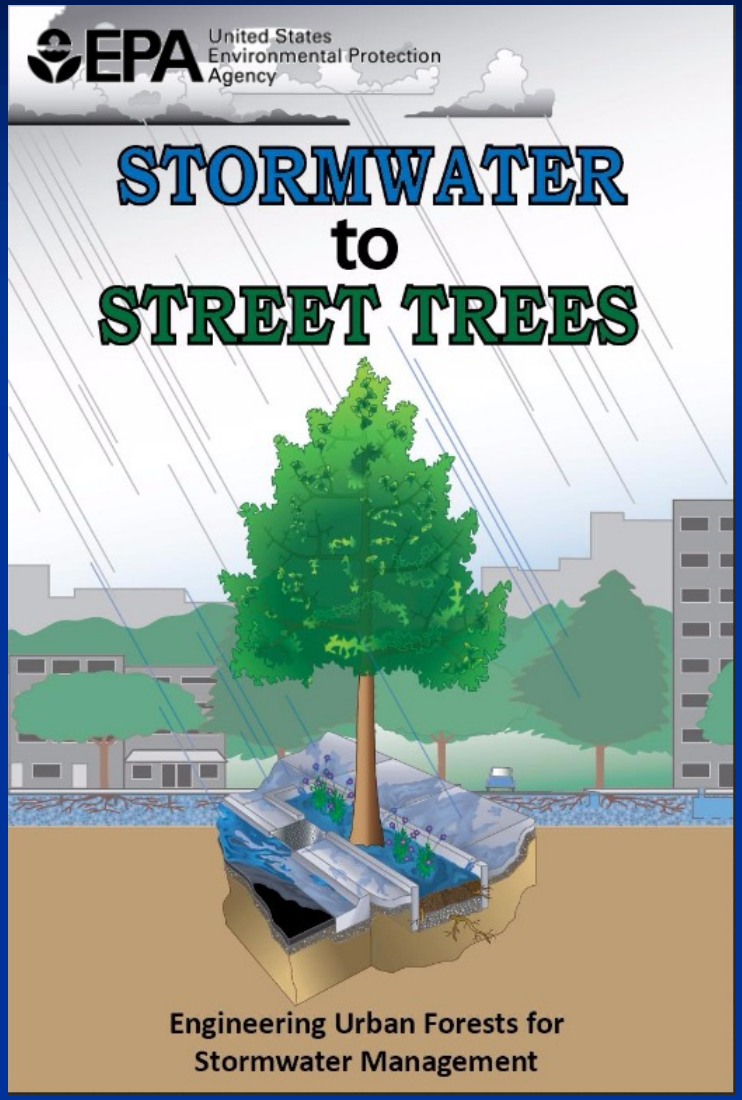


THE ROAD TO A THOUGHTFUL

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

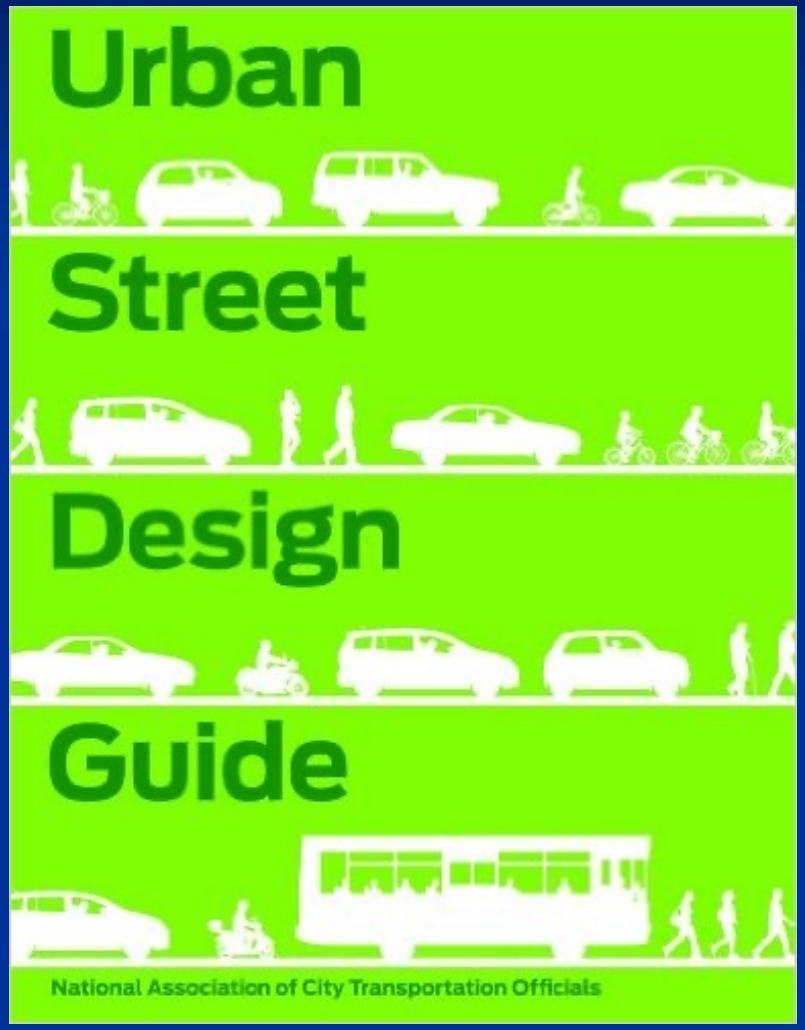
Nonpoint Source Control Branch (4503T)

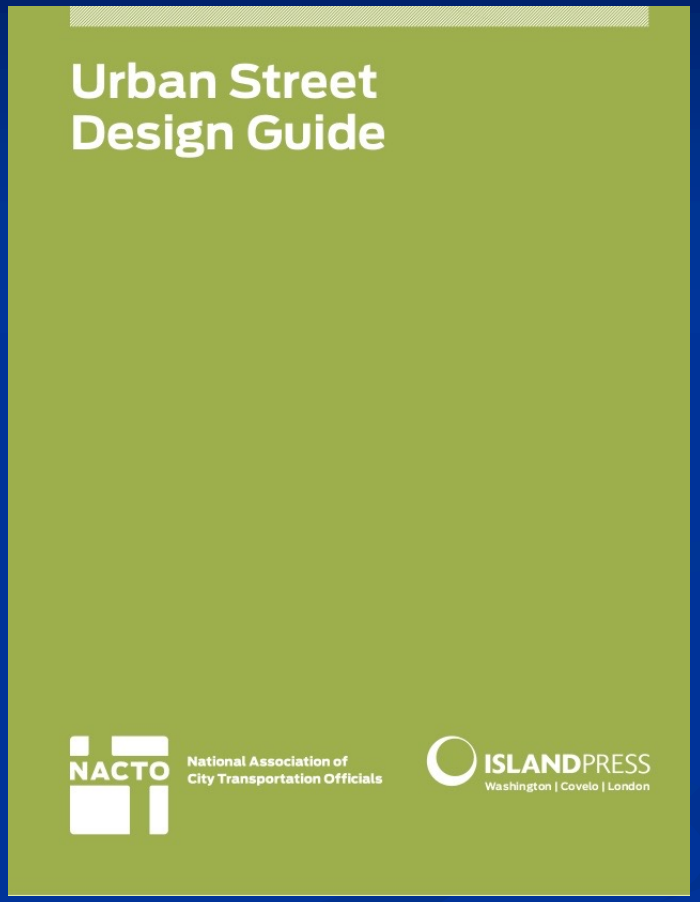
1200 Pennsylvania Ave., NW

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

NACTO

MENU

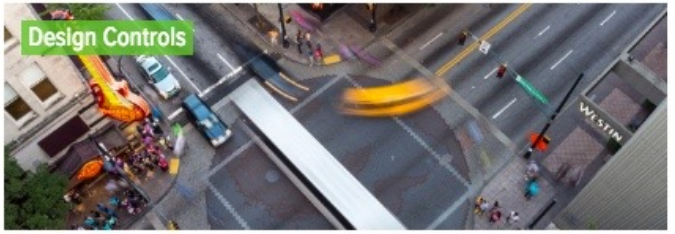
National Association of City Transportation Officials

Urban Street Design Guide

Urban Street Design Guide

PURCHASE GUIDE

GUIDE NAVIGATION



Good design must be realistic

Good design must be realistic

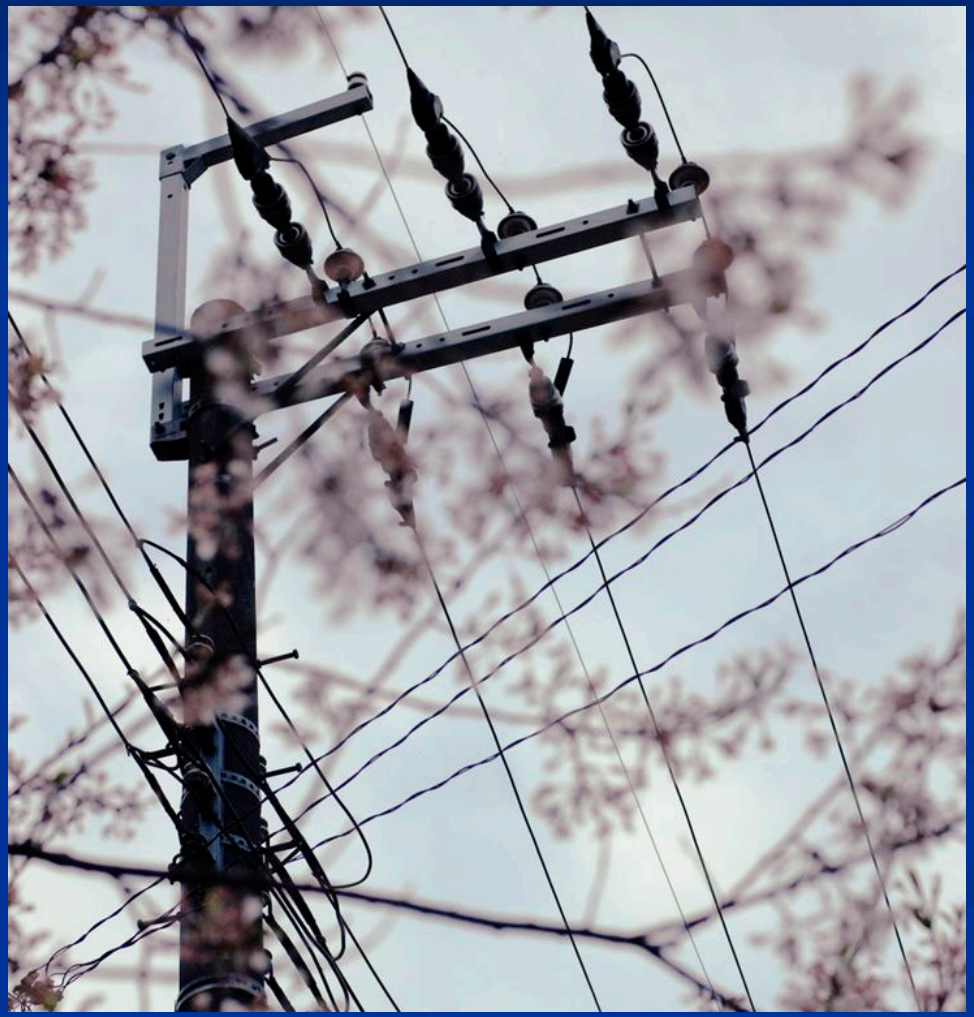
Good design must be realistic

Good design must be realistic

Trees as Landscape Elements


Military Dr

Tree Canopies and Overhead Utilities



Constraints

Tree Canopies and Overhead Utilities

Constraints

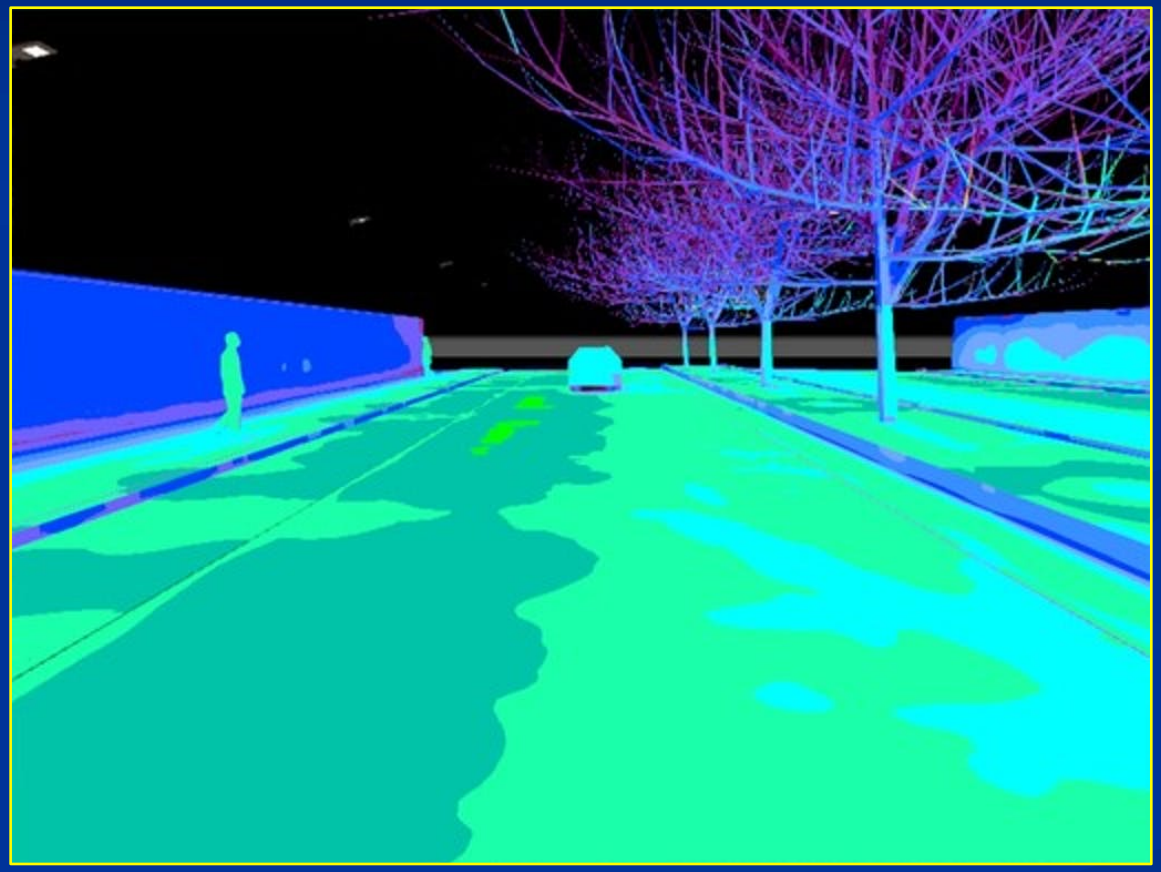
Trees as Landscape Elements

Constraints

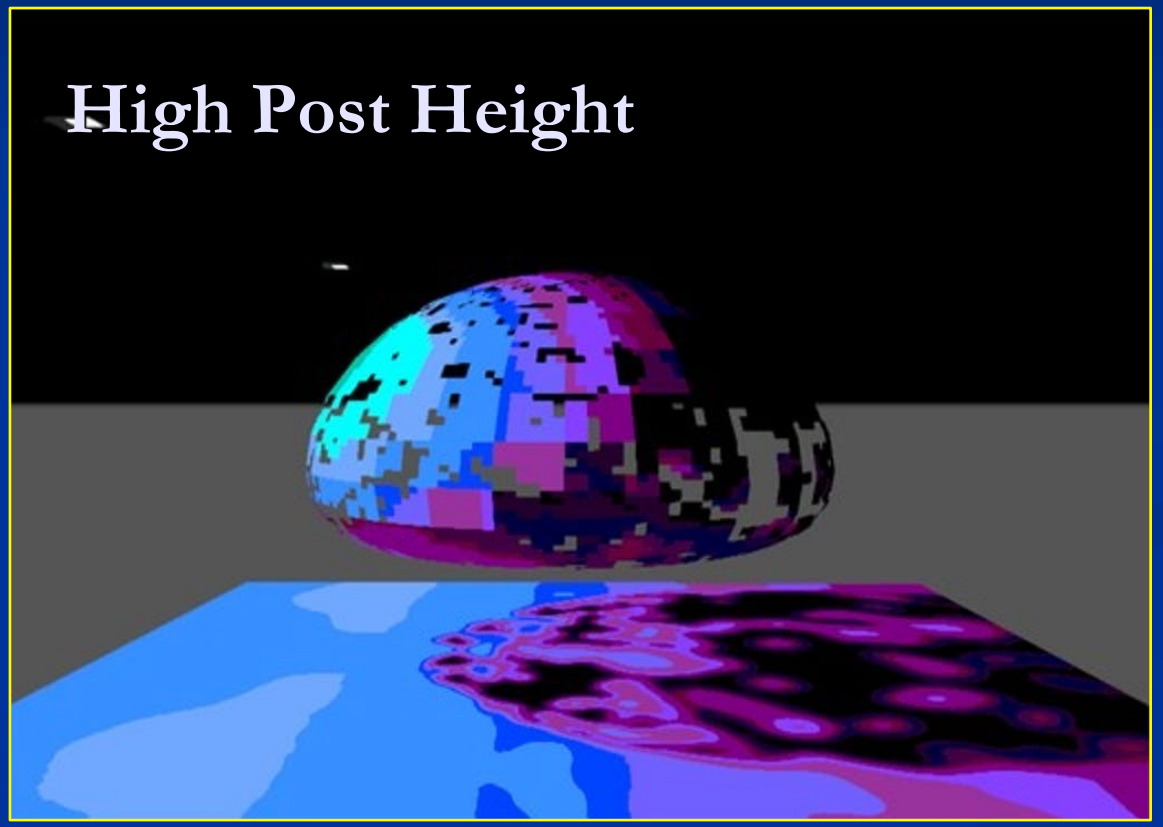
Tree Canopies and Street Lighting

Tree Canopies and Street Lighting

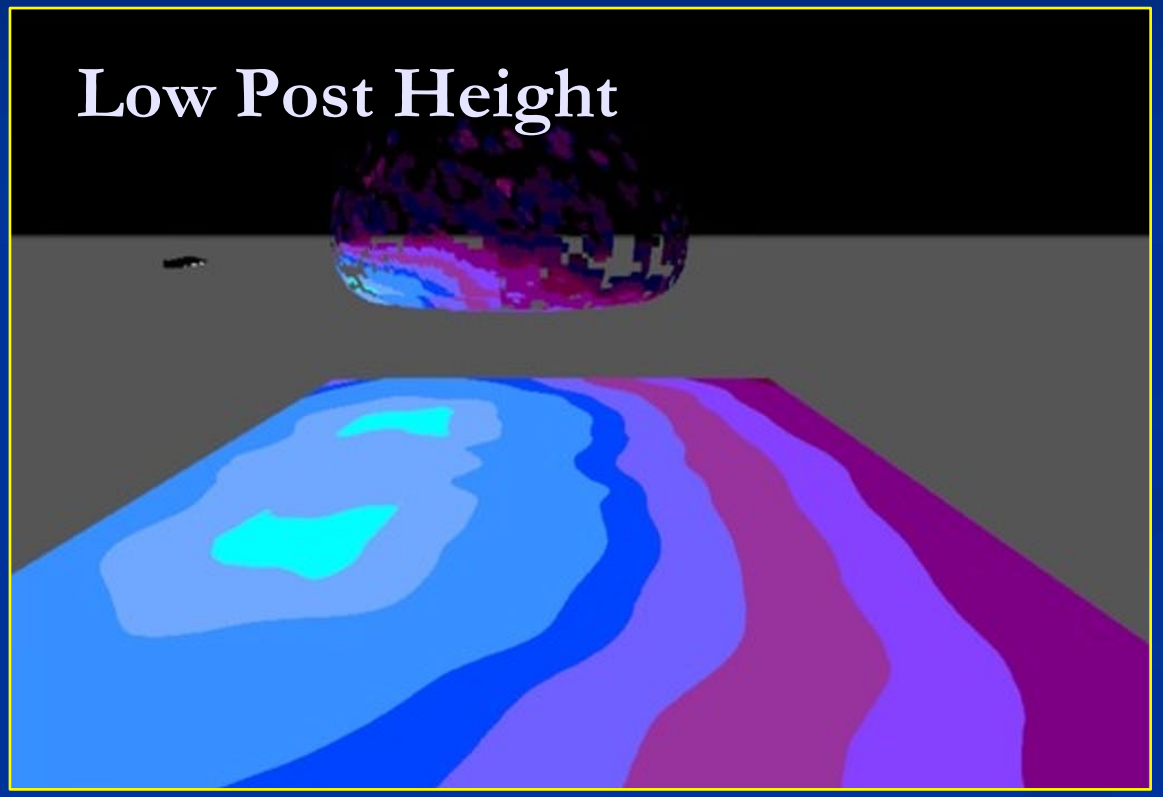
Tree Canopies and Street Lighting



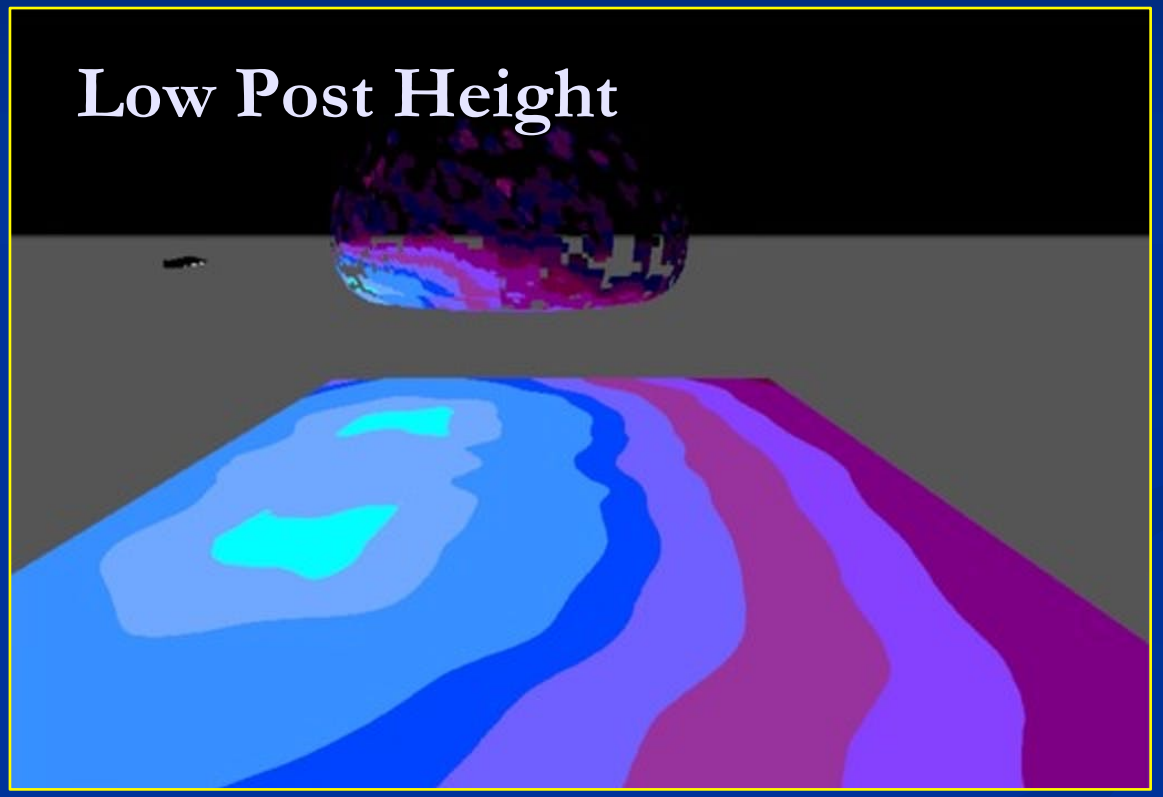
Tree Canopies and Street Lighting



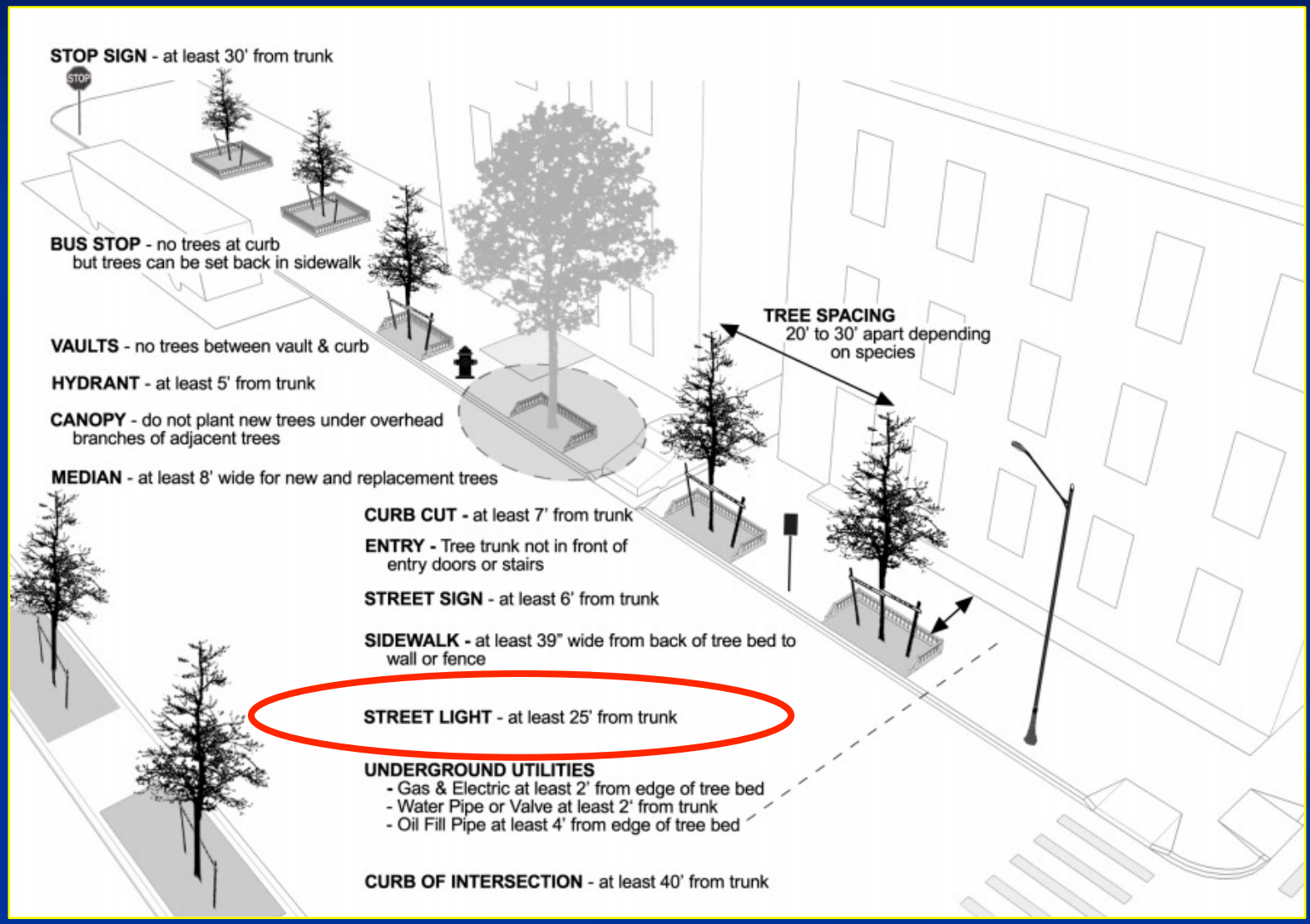
Tree Canopies and Street Lighting



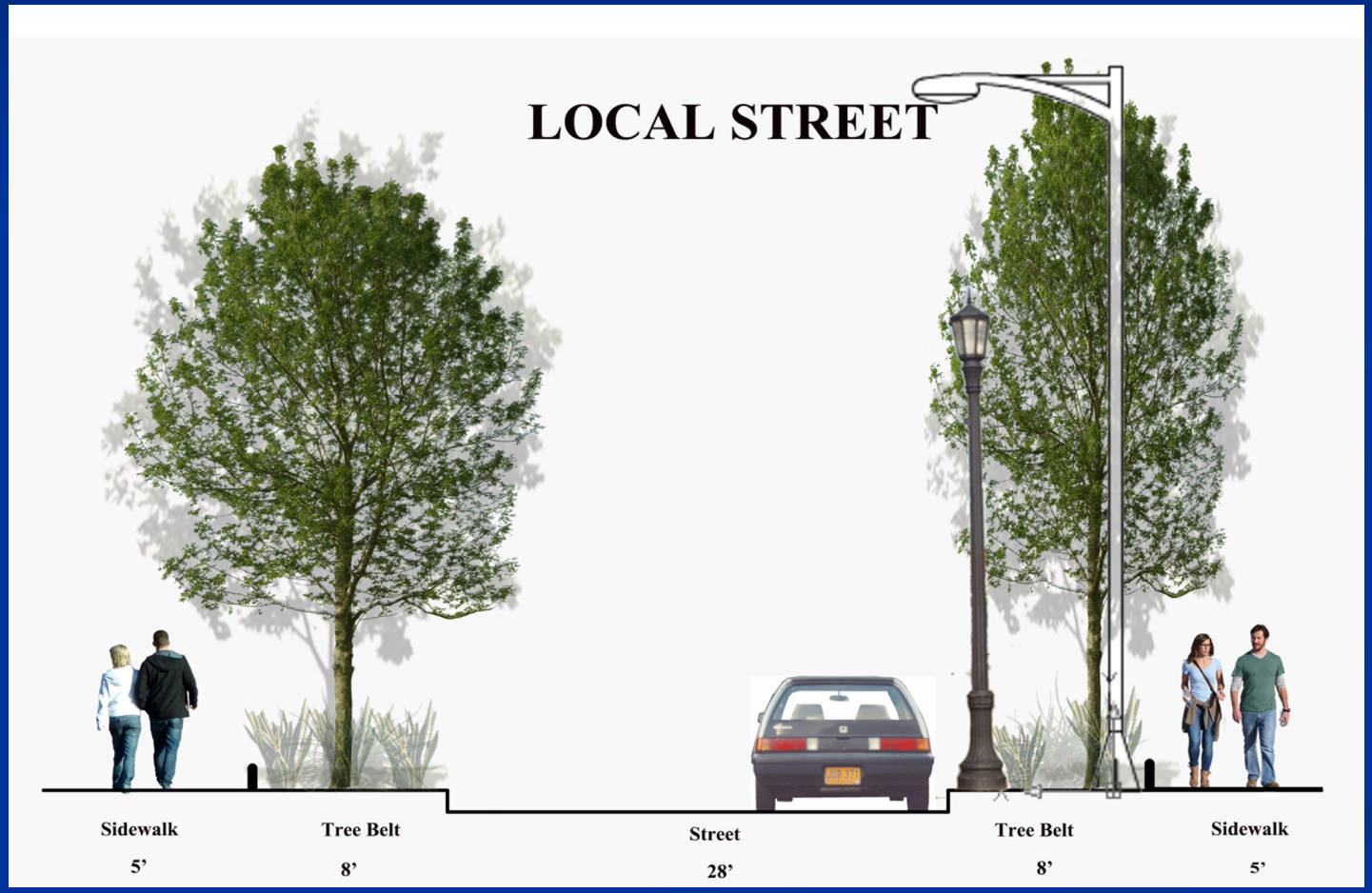
Tree Canopies and Street Lighting



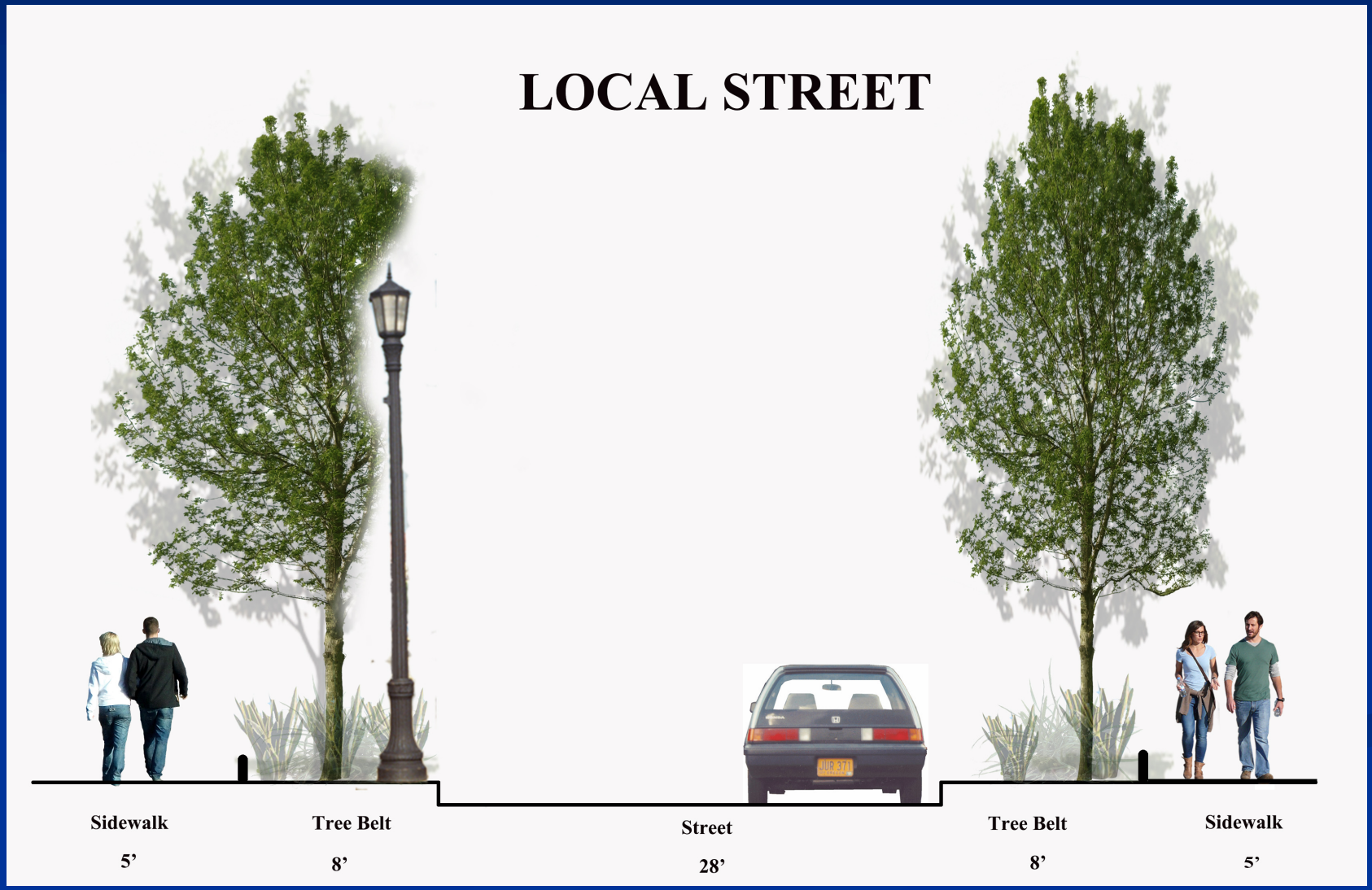
Tree Canopies and Street Lighting



Tree Canopies and Street Lighting



Tree Canopies and Street Lighting



Tree Canopies and Street Lighting

Low Post Height

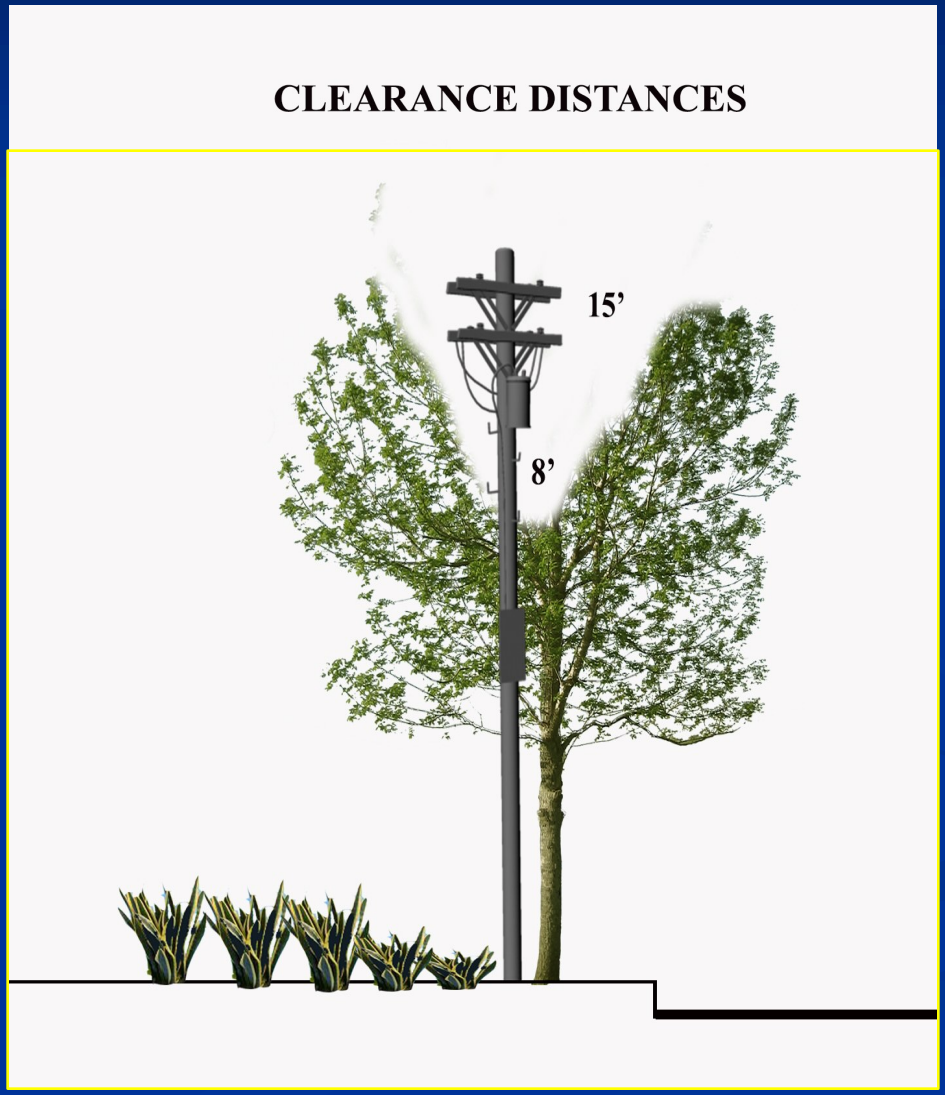
Tree Canopies and Street Lighting

Low Post Height

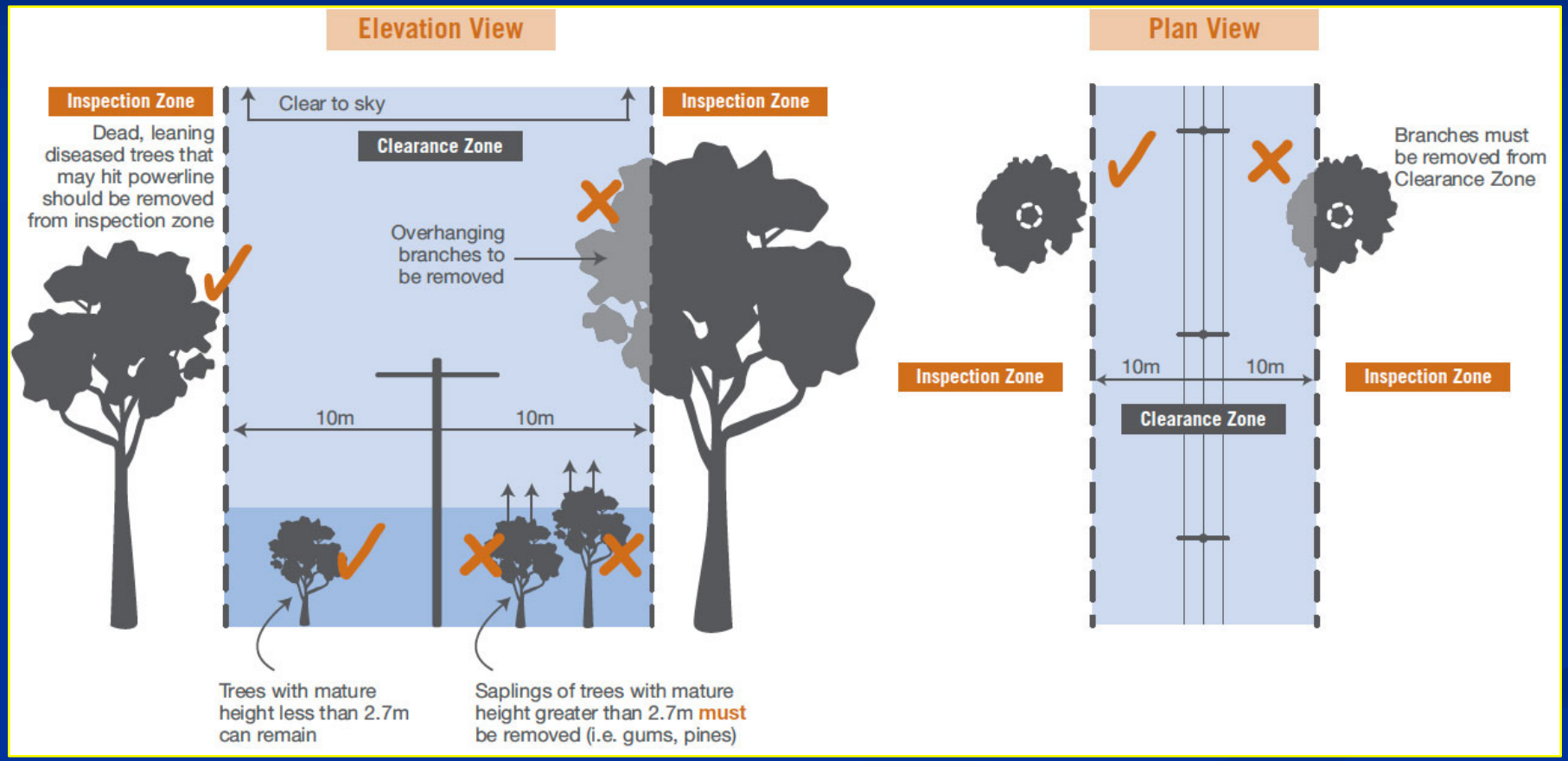
Tree Canopies and Street Lighting

Arm Lamps

Streetscape design considerations



Streetscape design considerations

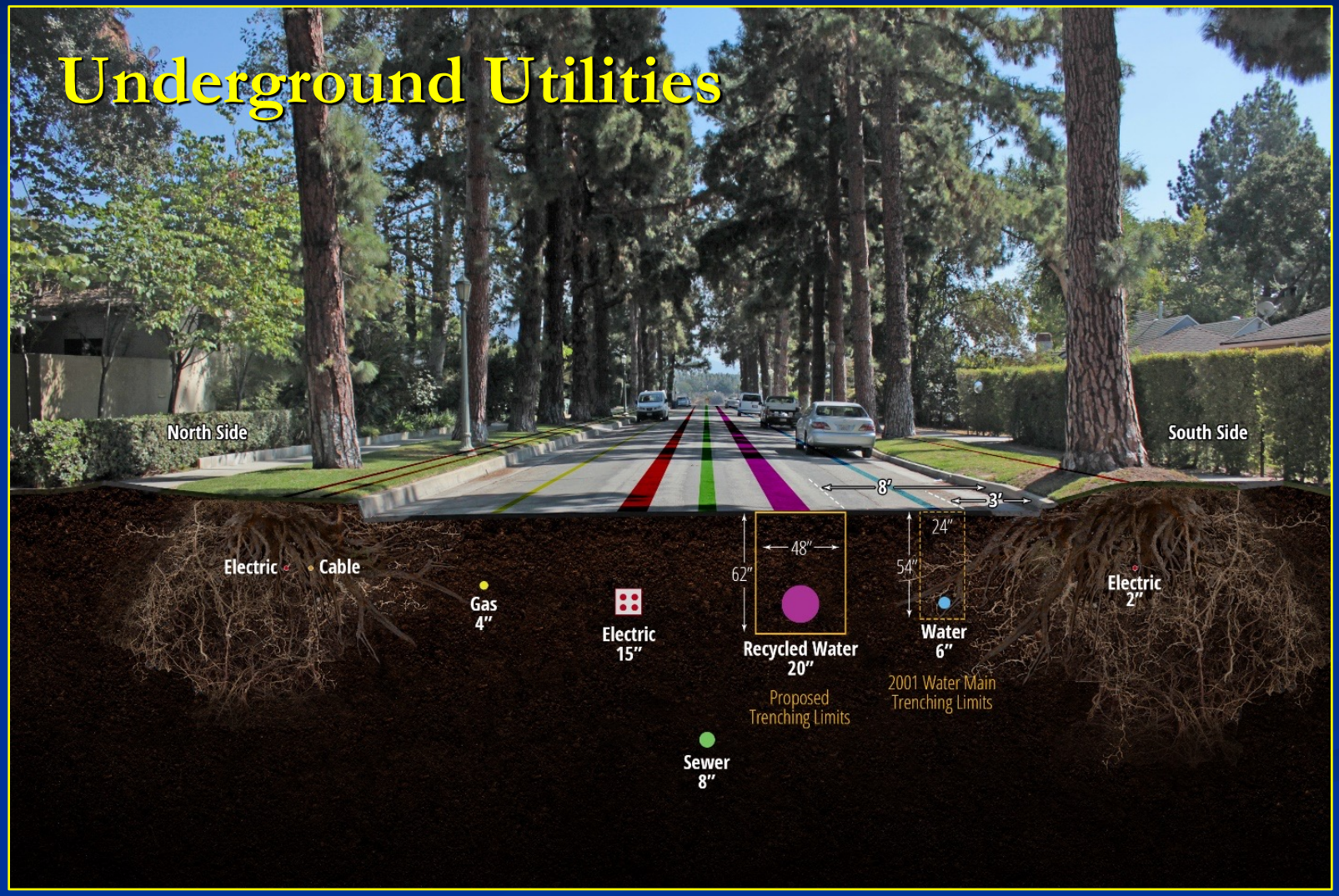


Streetscape design considerations

Streetscape design considerations

Streetscape design considerations

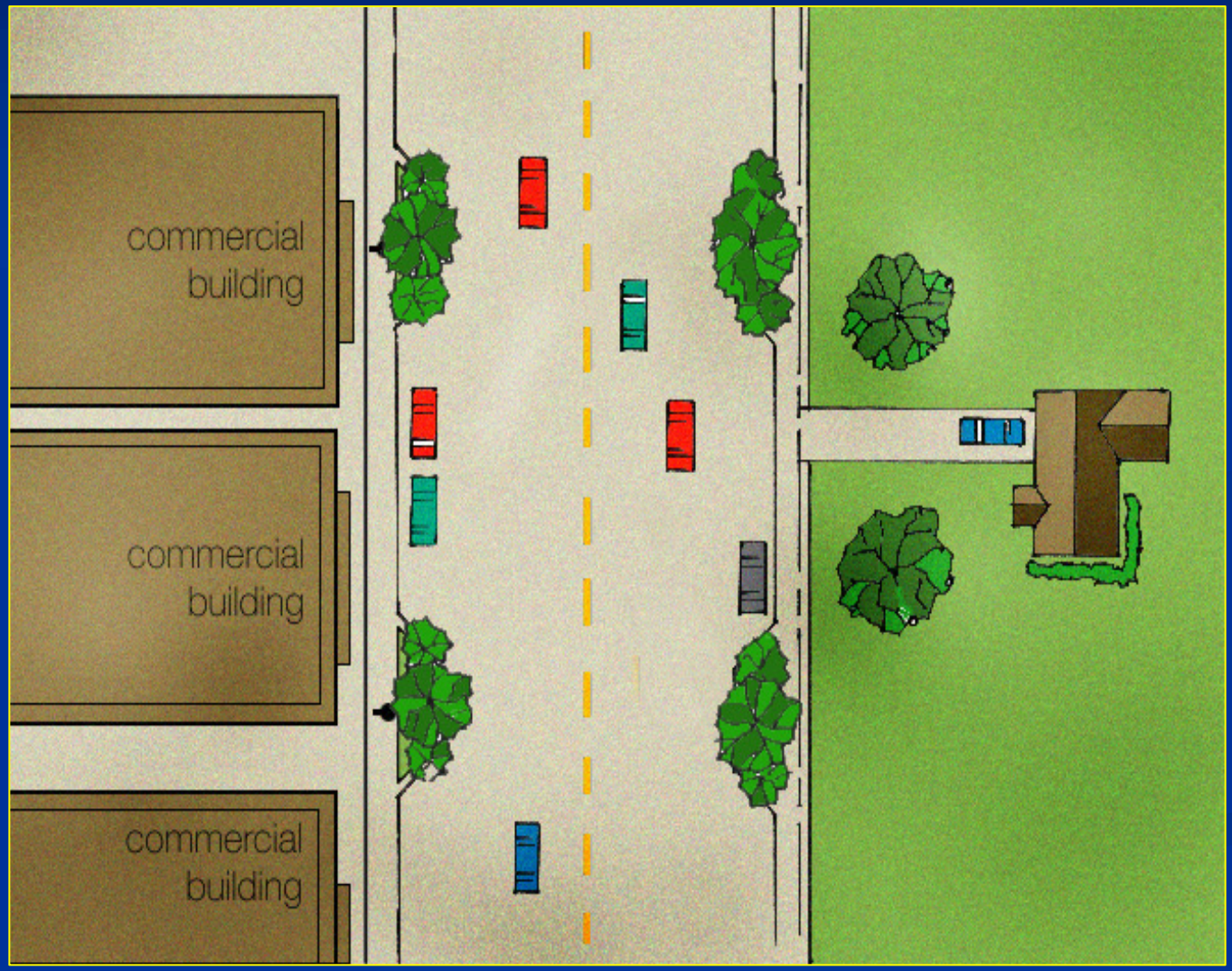
Streetscape design considerations



Consider These Alternatives

- Proper species selection, so that only trees that will not interfere with lighting, 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

Bump Out Planting

Bump Out Planting

Set Back Planting

Set Back Planting

Set Back Planting


SPEED
LIMIT
30

Design Solutions for Sustainable Streets & Roadsides

David Bloniarz
USDA Forest Service
Amherst, MA
bloniarz@umass.edu