

A photograph of a modern building with a green roof and a landscaped garden in the foreground. The building features a mix of materials, including dark wood siding and light-colored stone. The garden is filled with various plants, including agave and succulents. The text is overlaid on a semi-transparent white banner across the middle of the image.

Green Infrastructure Working Group Integrate Nature into the City

March 13, 2015

Green Infrastructure Working Group Schedule

Land Cover & Natural Function
Integrate Nature into the City
Beneficial Use of Stormwater
Stormwater Options for Redevelopment & Infill

2008

Imagery Date: 1/31/2008 30°14'56.20" N

2014

Imagery Date: 10/2/2014 30°15'02.54" N 97

Objectives

- Introduction to form-based codes
- Discuss best practices & challenges relating to **integrating nature into the city** for new & re-development
 - Current methods of integrating nature into the city
 - Discussion of the current Landscape Ordinance's objectives, strengths, and weaknesses
 - Integration of landscape with stormwater management, public right-of-way, and urban design concepts
 - Other national models

Agenda

Arrivals & Introductions	1:00
Staff presentation	1:10
Introduction to Form-Based Codes	
Existing Austin requirements	
Landscape Ordinance objectives, strengths, and weaknesses	
Other national models	
Integration of stormwater management, public ROW	
Small group discussion	2:15
Large group summary & recap	3:05
Future meetings	3:45

Note: There will be short breaks both before and after the small group discussion

Imagine Austin Priority Programs

- 1. Invest in a compact and connected Austin**
- 2. Sustainably manage our water resources**
3. Continue to grow Austin's economy by investing in our workforce, education systems, entrepreneurs, and local businesses
- 4. Use green infrastructure to protect environmentally sensitive areas and integrate nature into the city**
5. Grow and invest in Austin's creative economy
6. Develop and maintain household affordability throughout Austin
- 7. Create a Healthy Austin Program**
- 8. Revise Austin's development regulations and processes to promote a compact and connected city**

Imagine Austin Priority Programs

“Use green infrastructure to protect environmentally sensitive areas and **integrate nature into the city.**”

Form-Based Codes

See additional Form-Based Code presentation:

<http://austintexas.gov/page/green-infrastructure-working-group>

Health and community benefits of green infrastructure

- Nature has pervasive and large effects on our **social, psychological, and physical well-being**
- Even small amounts important, just has to exist
- Needs to be visible
- Creates livable transitions between urban areas



No greenspace



With greenspace

Health and community benefits of green infrastructure

Social

- More social ties, generosity, sense of community, and social support
- Less aggression, violence, and crime

Psychological

- Better academic achievement, management of major life issues, and self-control
- Less ADHD, depression, and anxiety disorders

Physical

- Less stress, childhood obesity, disease, and mortality
- Better immune function and longevity

Health and community benefits of green infrastructure



Dr. Frances Kuo's recommendations

- Make everyday places and views greener.
- Provide nearby green spaces—at various scales.
- Make the most of green spaces.

Example regulations that promote nature in the city

- Landscape requirements
- Tree protections
- Hill Country Roadway requirements
- Stream & CEF* setbacks + floodplain restrictions
- Open space requirements
- Parkland dedication
- Impervious cover limits
- Stormwater regulations
- Steep slope restrictions

*CEF = Critical Environmental Features (e.g., springs, wetlands, karst features, etc.)

Landscape Ordinance

Original intent (1982)

- Air quality protection
- Natural hydrology maintenance
- Noise abatement
- Glare abatement
- Urban Heat Island mitigation
- Native vegetation protection
- Visual buffering
- Beautification
- Property value enhancement
- Unique identity of Austin
- Energy conservation
- Protection of health, safety, and general welfare

Landscape Ordinance

Additional objectives (to add to 1982 ideas)

- Stormwater treatment
- Climate change resiliency & mitigation
- Water conservation

Landscape Ordinance

Original intent language (1982)

1. To aid in stabilizing the environment's ecological balance by contributing to the
2. processes of air purification, oxygen regeneration, ground water recharge, and storm water runoff retardation, while at the same time aiding in noise, glare and heat abatement;
3. To ensure that the local stock of native trees and vegetation is replenished;
4. To assist in providing adequate light and air and in preventing overcrowding of land;
5. To provide visual buffering and enhance the beautification of the City;
6. To safeguard and enhance property values and to protect public and private investment;
7. To preserve and protect the unique identity and environment of the City of Austin and preserve the economic base attracted to the City of Austin by such factors;
8. To conserve energy; and
9. To protect the public health, safety and general welfare;

Current Regulations

- Existing tree protection
- Parking lot design
- Buffering
- Percentage of lot to receive landscape (streetyard)
- Stormwater infiltration

Current Regulations

Tree Preservation



Current Regulations

Tree Preservation



Current Regulations

Parking Lots



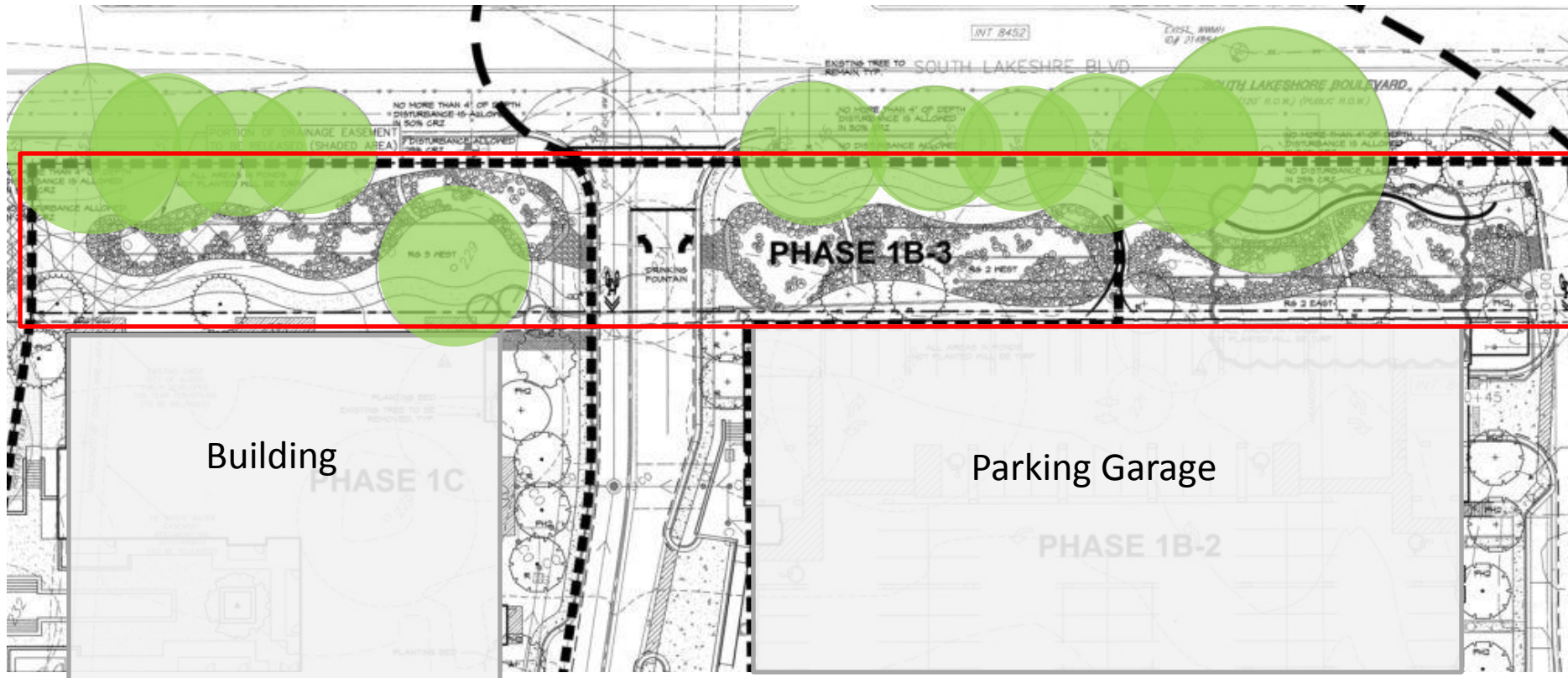
Current Regulations

Buffering



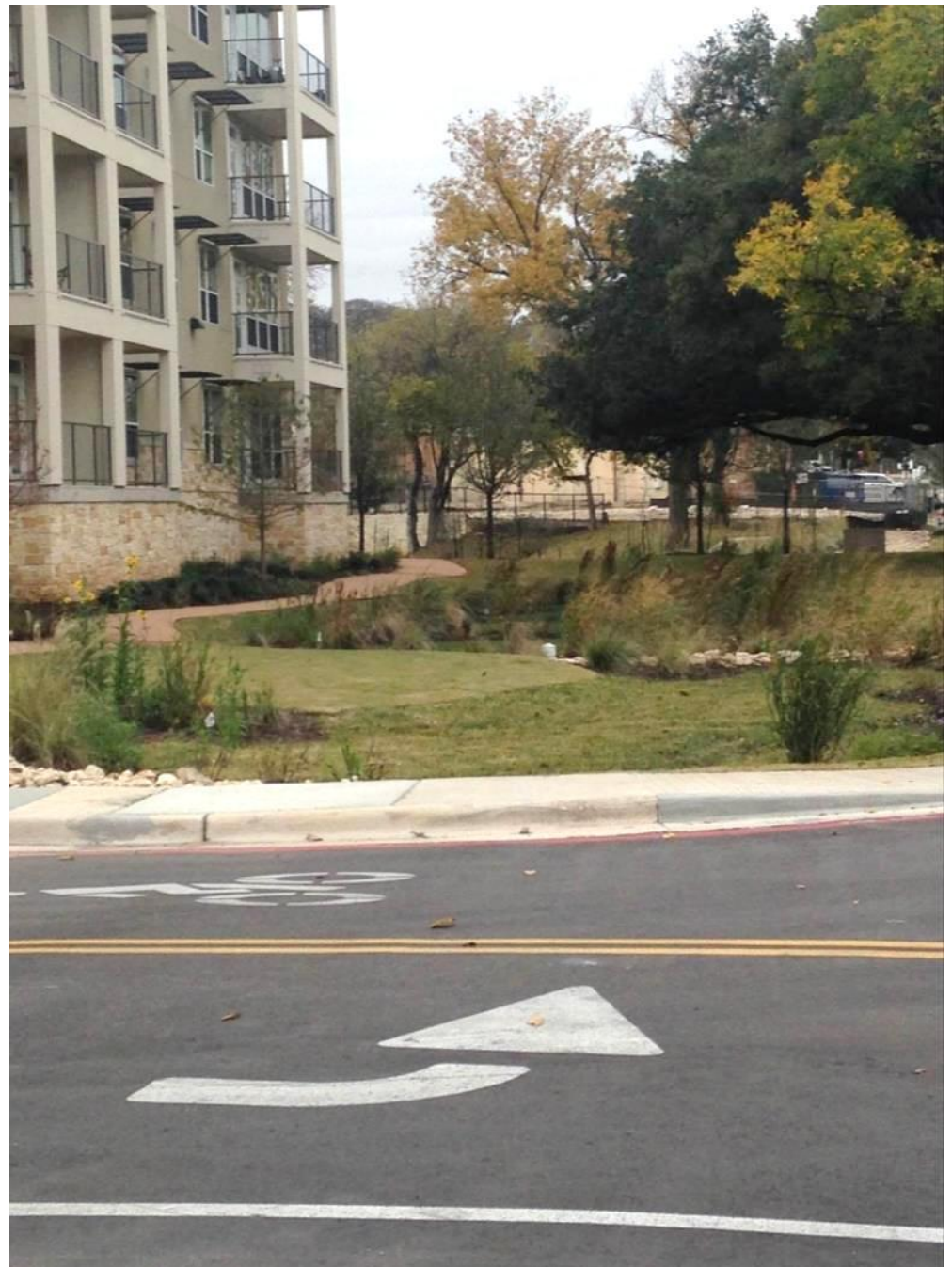
Current Regulations

Streetyard





South Shore District



Analysis of potential improvements

- Different requirements for different contexts
 - Urban, suburban, transition
 - Ensure sufficient landscaped area
 - Remodeling/infill challenges
- Shade trees + functional pervious areas
- Water management, use, and irrigation
- Clarity and organization improvements

Context-Sensitive Solutions

Development in 3 contexts

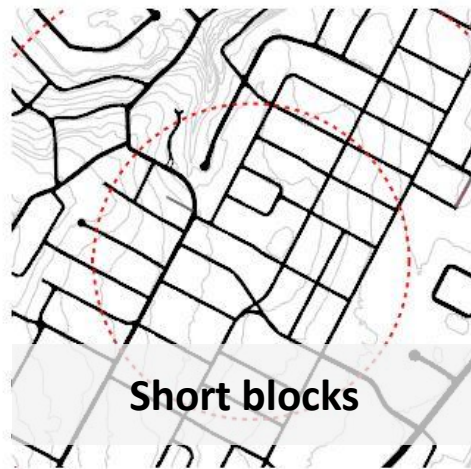


Walkable Urban

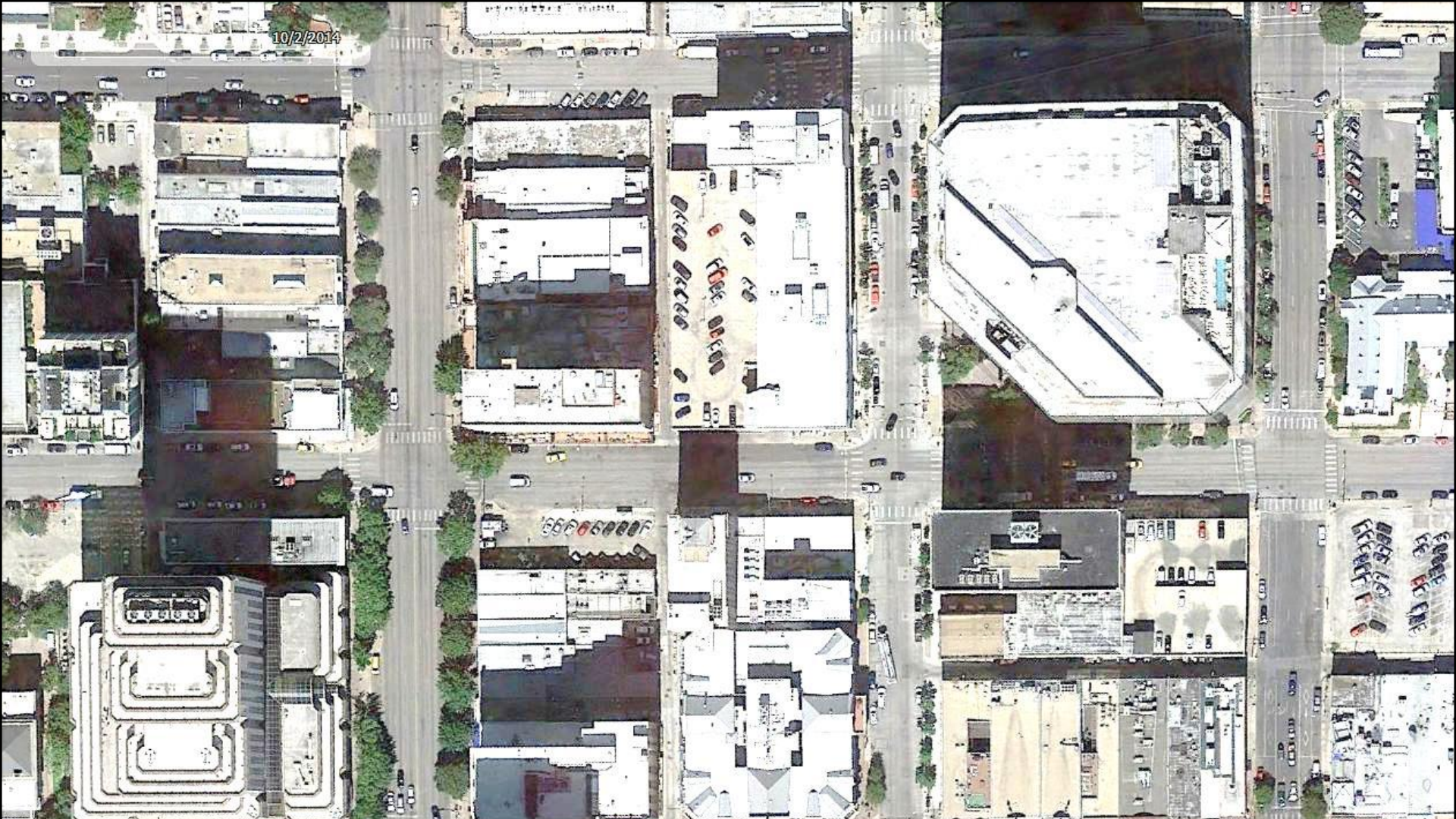
Transitional

Drivable Suburban

Walkable Urban



- High impervious cover
- High urban heat island
- Minimal landscape requirements



Street trees as only greenery?



Need adequate space and soil volume for shade trees



© 2014 Google

Need adequate space and soil volume for shade trees

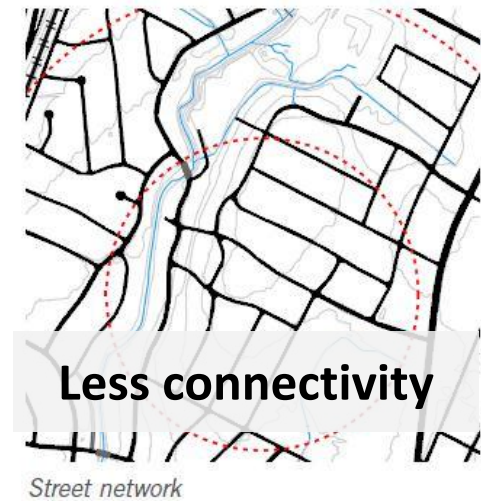
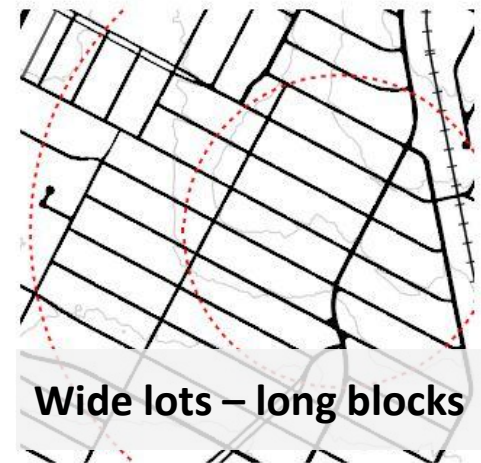


© 2014 Google

Transitional Urban-Suburban

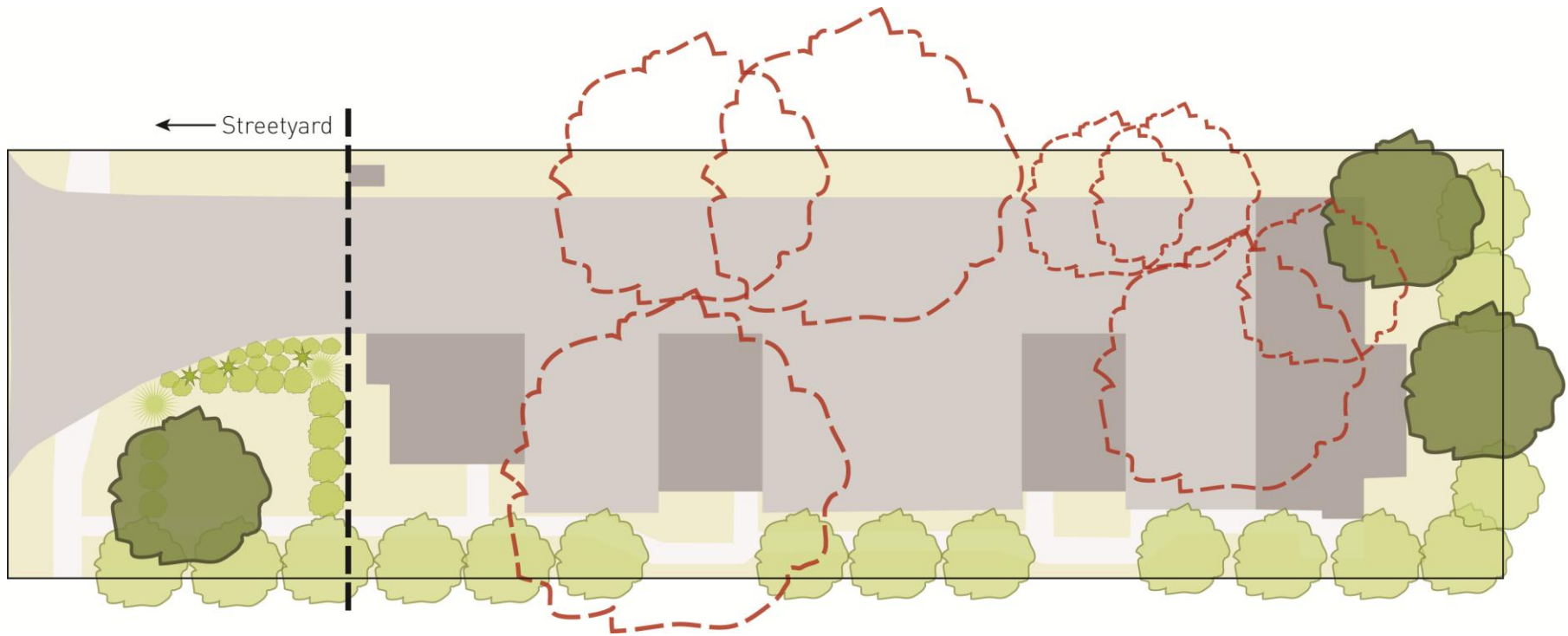


- Original landscaping sparse
- Little new landscaping with remodels
- Poor pedestrian environment



Limited street yard in new development

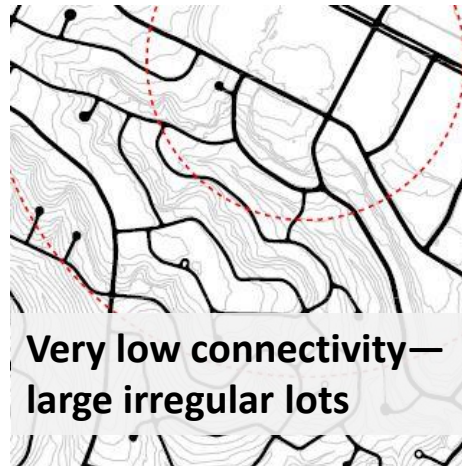




Need to balance density and greenspace

Driveable Suburban

- Current ordinance tailored for this environment
- Makes a provision for landscape
- Requires landscape for 20% of the streetyard



Missed opportunities for onsite infiltration of stormwater





Other National Models

Beaufort, SC

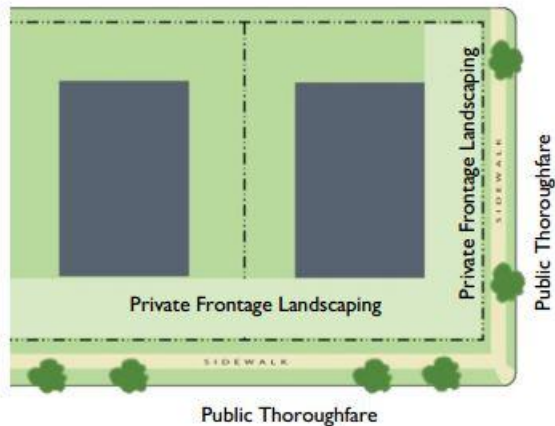
- Recently produced by Opticos
 - Can see integration with Form Based Code
- Coordinates landscape, stormwater, and other environmental regulations
- Extensive use of cross-references to more technical sections

Beaufort County Community Development Code:

<http://www.bcgov.net/departments/Planning-and-Development/planning/cdc/>

5.8.70 Private Frontage Landscaping (Transect Zones)

Table 5.8.70 Private Frontage Landscaping (Transect Zones)



A. Description

Private frontage landscaping is required in the area Extending from the front of the primary structure and Parking lot to the front property lines. On corner lots, private frontage landscaping is also required between the primary structure and parking lot to the secondary street property line.

B. Applicability

A Private Frontage Buffer is required within all transect zones with the exception of single-family residential, and duplexes within T2 Rural Neighborhood Open, T2 Rural Center, T3 Edge, and T3 Hamlet Neighborhood

C. Plant Requirements (per 250 square feet)¹

Overstory Trees	2
Shrubs	5

Notes

¹These planting requirements apply to structures utilizing Common Yard, Porch: Projecting, Porch: Engaged, and Forecourt private frontages. Structures utilizing Stoop, Dooryard, Shopfront, Terrace, Gallery, and Arcade private frontages are encouraged to incorporate planters, window boxes, hanging plants and potted plants.

- Private frontage landscaping required in urban transects
- Does not apply to all frontage types

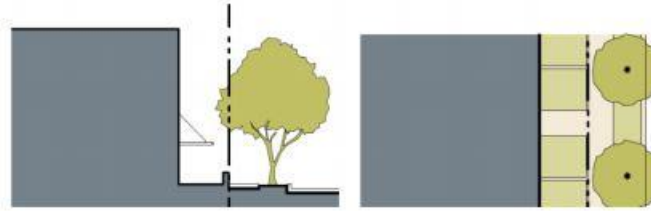
5.2.30.A.: Private Frontages General (continued)

The private frontage is the area between the building facade and the lot line.



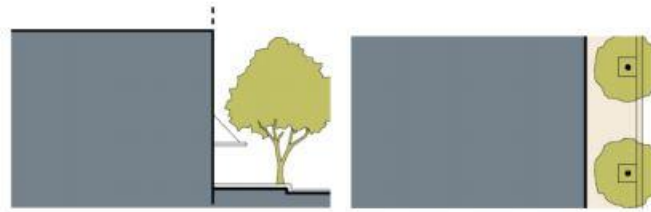
T1 T2 T3 T4

Dooryard. The frontage line is defined by a low wall or hedge and the main facade of the building is set back a small distance creating a small dooryard. The dooryard shall not provide public circulation along a ROW. The dooryard may be raised, sunken, or at grade and is intended for ground floor residential in flex zones, live/ work, and small commercial uses.



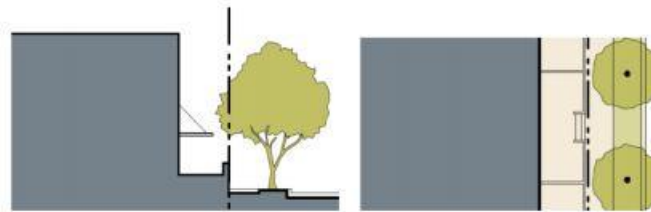
T1 T2 T3 T4

Shopfront. The main facade of the building is at or near the frontage line with an at-grade entrance along the public way. This Type is intended for retail use. It has substantial glazing at the sidewalk level and may include an awning that may overlap the sidewalk. It may be used in conjunction with other frontage types. Syn: Retail Frontage, Awning.



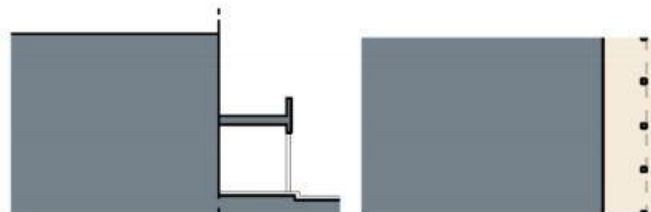
T1 T2 T3 T4

Terrace. The main facade is at or near the frontage line with an elevated terrace providing public circulation along the facade. This Type can be used to provide at-grade access while accommodating a grade change. Frequent steps up to the terrace are necessary to avoid dead walls and maximize access. This Type may also be used to mimic historic loading docks.



T1 T2 T3 T4

Gallery. The main facade of the building is at the frontage line and the gallery element overlaps the sidewalk. This Type is intended for buildings with ground-floor commercial uses and may be one or two stories. The gallery should extend far enough from the building to provide adequate circulation for pedestrians and extend close enough to the curb so that a pedestrian cannot bypass it.



Key

T# Allowed

T# Not Allowed

Urban frontage types

Private landscape not required



Stormwater Integration

- Stormwater control measures that are integrated with the landscape count towards civic and open space set asides
- Provisions for rain gardens, rainwater cisterns, bioswales, and green roofs in landscape section (cross-referenced to stormwater section)



Riffle Pools. Connected landscapes provide retention of runoff by integrating intermittent vertical drops and damming in a watercourse. The retained runoff is then allowed to infiltrate into the groundwater table or conveyed for further treatment.

T1	T2	T3	T4
C3	C4	C5	S1



Flow-through Planters are landscape features that also provide stormwater runoff control and treatment. Flow-through planters are sealed on all sides and fitted with an underdrain. They only absorb as much water as soil and plants in the planter can accommodate. Once the planter is at capacity, water is then discharged through the underdrain. They are ideal for receiving roof runoff from downspouts and can be incorporated into foundation walls.

T1	T2	T3	T4
C3	C4	C5	S1



Infiltration Trenches are subsurface facilities designed to provide on-site stormwater retention in areas of good infiltration by collecting and recharging stormwater runoff into the ground. Trenches filter pollutants to improve water quality and contribute towards groundwater recharge. They are relatively low maintenance and can be easily retrofitted into existing sidewalk areas and medians.

T1	T2	T3	T4
C3	C4	C5	S1

Key

T# Allowed

T# Not Allowed



Green Roofs are a way of managing stormwater in urban areas with limited space for more land intensive BMPs. Green roofs are able to store stormwater in the soil medium during rain events, helping to detain runoff. Some of the stormwater will be taken up by the roots of the plants and some will be evaporated from the soil medium, reducing the amount of runoff from the roof.

T1	T2	T3	T4
C3	C4	C5	S1



Pervious Paving Systems allow water to pass freely through the interstitial space ingrained throughout the paving matrix, thereby transforming traditionally impervious surfaces. Several examples are pervious concrete and asphalt, interlocking pavers, and reinforced gravel and grass paving.

T1	T2	T3	T4
C3	C4	C5	S1



Rain Gardens are flat-bottomed landscaped depressions that can be built to any size or shape. Also known as 'bioretention cells', they are designed to allow water to settle and infiltrate into the soil. They reduce the peak discharge rate from a site via detention. Water quality improvements are achieved through particle settling, nutrient uptake, and filtration as water soaks into the ground.

T1	T2	T3	T4
C3	C4	C5	S1



Disconnected Downspouts. In lower density residential areas downspouts should be disconnected from storm drain systems and directed towards landscaped areas or other BMP devices. This reduces the burden on the storm drain network and allows runoff to slow and infiltrate before overflowing to storm drains.

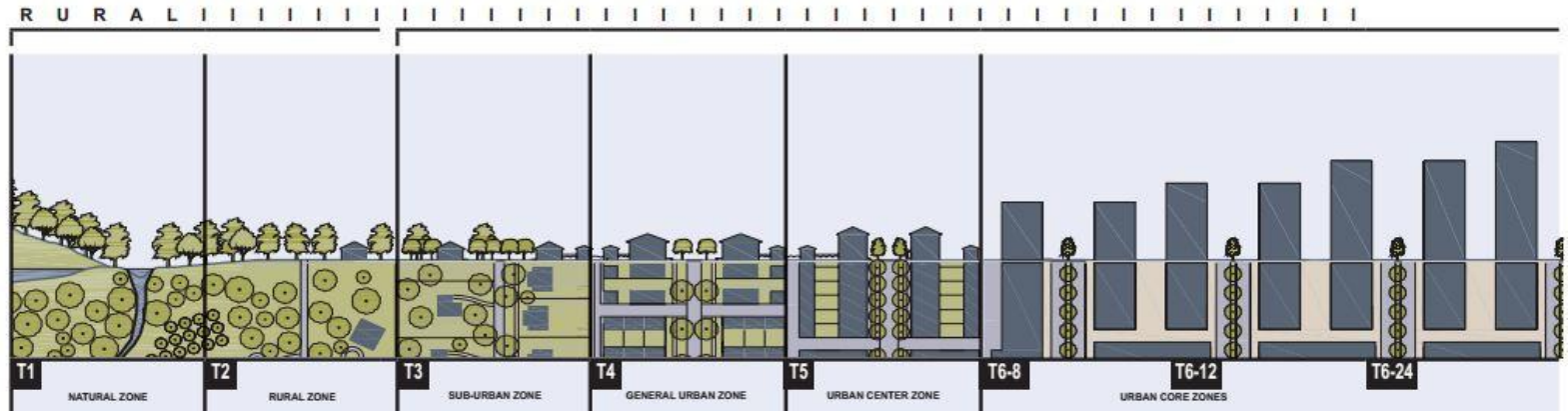
T1	T2	T3	T4
C3	C4	C5	S1

Key

T# Allowed

T# Not Allowed

Miami, FL



BUILDING SETBACK

a. Principal Front			20 ft. min.	10 ft. min.	10 ft. min.	10 ft. min.	10 ft. min.	10 ft. min.
b. Secondary Front			10 ft. min.	10 ft. min.	10 ft. min.	10 ft. min.	10 ft. min.	10 ft. min.
c. Side			5 ft. min.**	0 ft. min. / 5 ft. min.**	0 ft. min.**	0 ft. min.**	0 ft. min.**	0 ft. min.**
d. Rear			20 ft. min.	20 ft. min.	0 ft. min.**	0 ft. min.**	0 ft. min.**	0 ft. min.**
f. Green / Open Space Requirements			25% Lot Area min.	15% Lot Area min.	10% Lot Area min.	10% Lot Area min.	10% Lot Area min.	10% Lot Area min.

- 10 ft minimum setbacks in urban transects
- Impervious pavement is limited to 30% and 40% of the setback in T3 and T4
- T4: 10% of the setback must be landscaped
- T5: the setback must be paved and landscaped to match the public frontage

New Orleans, LA

- A minimum of 50% of all required landscaped areas shall be designed, constructed, and maintained as green stormwater infrastructure features
- Parking islands must be designed to allow the flow and access of stormwater



Tucson, AZ

Commercial Rainwater Harvesting Ordinance

- All new commercial development must include a rainwater harvesting system constructed according to an approved rainwater harvesting plan
- No later than three years from the date of issuance of a final certificate of occupancy, 50% of the estimated yearly landscape water budget shall be provided by rainwater harvested on-site.
- A rainwater harvesting landscape water-use budget report is submitted annually to Tucson Water.

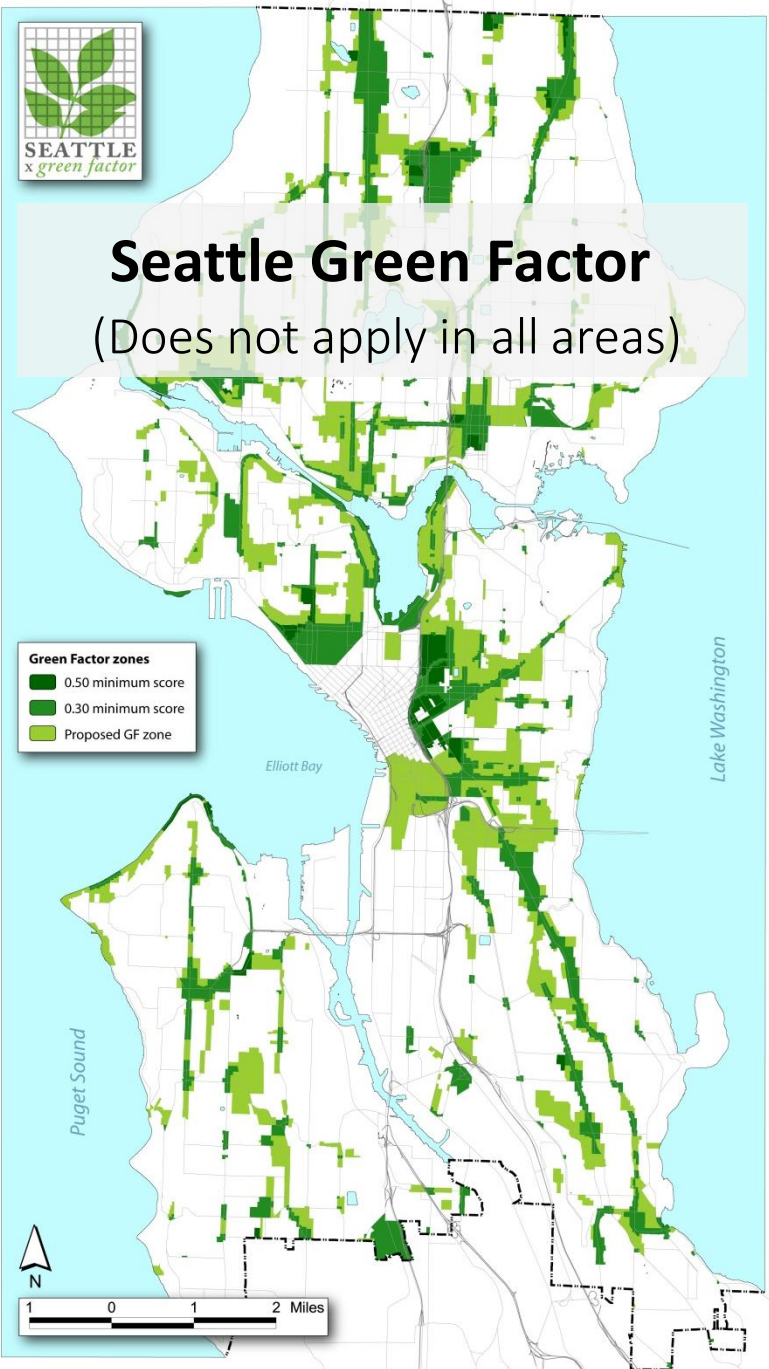
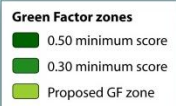
Seattle, WA & Washington D.C.

- Zoning establishes a minimum Green Factor or Green Area Ratio (e.g., 0.3)
- Desired landscaping elements are assigned weights and included in a “menu”
- A site calculates its Green Factor/Ratio by multiplying the square footage of each element by its weight, and then dividing the product by the site area



Seattle Green Factor

(Does not apply in all areas)



Green Factor Landscape Elements	Multiplier
A. Planted Areas (choose one of the following for each planting area)	
1. Planted areas with a soil depth of less than 24 inches	0.1
2. Planted areas with a soil depth of 24 inches or more:	0.6
3. Bioretention facilities meeting standards of the Stormwater Code, Title 22 Subtitle VIII of the Seattle Municipal Code	1.0
B. Plants	
1. Mulch, ground covers or other plants normally expected to be less than 2 feet tall at maturity.	0.1
2. Large shrubs or other perennials at least 2 feet tall at maturity	0.3
3. Small trees	0.3
4. Small/medium trees	0.3
5. Medium/large trees	0.4
6. Large trees	0.4
7. Preservation of existing large trees at least 6 inches in diameter	0.8
C. Green roofs	
1. At least 2 in but less than 4 in of growth medium	0.4
2. At least 4 inches of growth medium	0.7
D. Vegetated walls	
E. Water features using harvested rainwater and under water at least six months per year	
F. Permeable paving	
1. At least 6 in and less than 24 in of soil and/or gravel	0.2
2. At least 24 inches of soil and/or gravel	0.5
G. Structural soil	
H. Bonuses applied to Green Factor landscape elements:	
1. Landscaping that consists entirely of drought- tolerant or native plant species	0.1
2. Landscaping that receives at least 50% of its irrigation through the use of harvested rainwater	0.2
3. Landscaping visible from adjacent rights-of-way or public open space	0.1
4. Landscaping in food cultivation	0.1

Questions for Group Discussion

- How do we integrate nature into the Walkable Urban and Transition contexts?
- Are improvements needed in the Driveable Suburban context?
- Discuss: Public vs. private provision of green areas.
 - In denser areas, is it acceptable to have landscaping only in the right-of-way?
 - What if green areas are provided off-site (e.g., open space at Mueller)?

Green Infrastructure Working Group Schedule

Kickoff	Jan. 30
Land Cover & Natural Function	Feb. 20
Integrate Nature into the City	Mar. 13
Beneficial Use of Stormwater	Apr. 10
Stormwater Options for Redevelopment & Infill	Apr. 24
Wrap Up	May 15

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