

Urban Heat Islands

Better Housing by Design

City of Portland

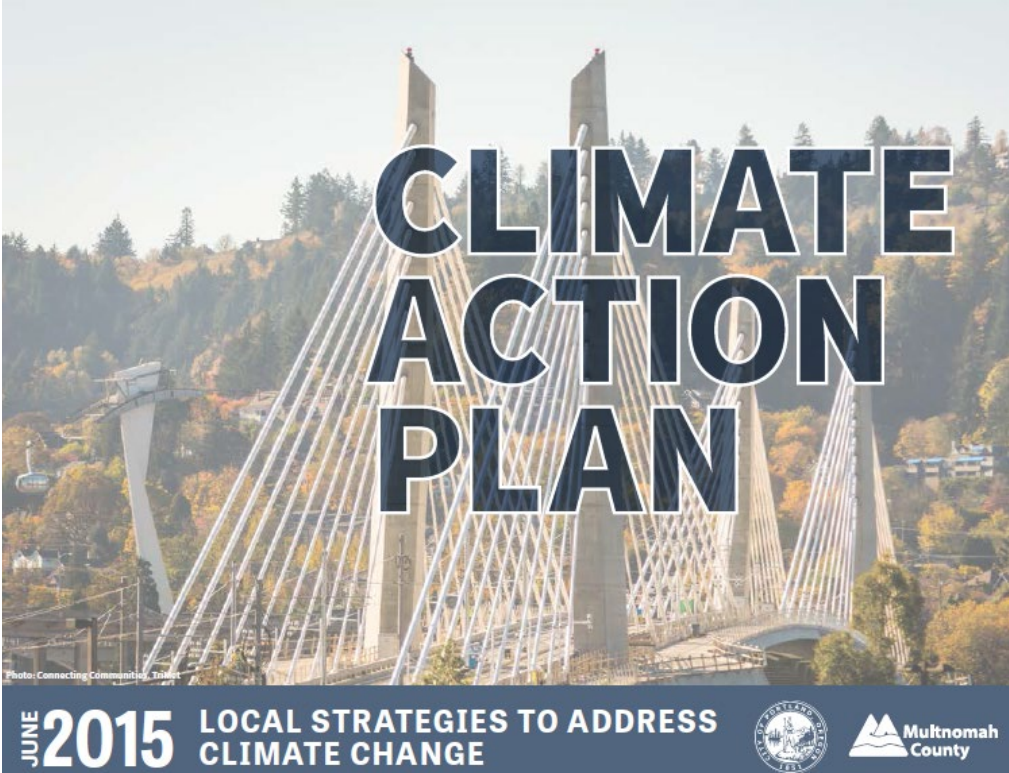
Bill Cunningham, Bureau of Planning and Sustainability

Marc Asnis, Bureau of Planning and Sustainability

Portland State University – Institute for Sustainable Solutions

Dr. Vivek Shandas, Sustainable Urban Places Research Lab

Dr. Yasuyo Makido, Sustainable Urban Places Research Lab



CLIMATE ACTION PLAN

JUNE 2015 LOCAL STRATEGIES TO ADDRESS
CLIMATE CHANGE



2030 Objective:

Reduce risks and impacts from heat, drought, wildfire by preparing for hotter, drier summers with increased incidence of extreme heat days.



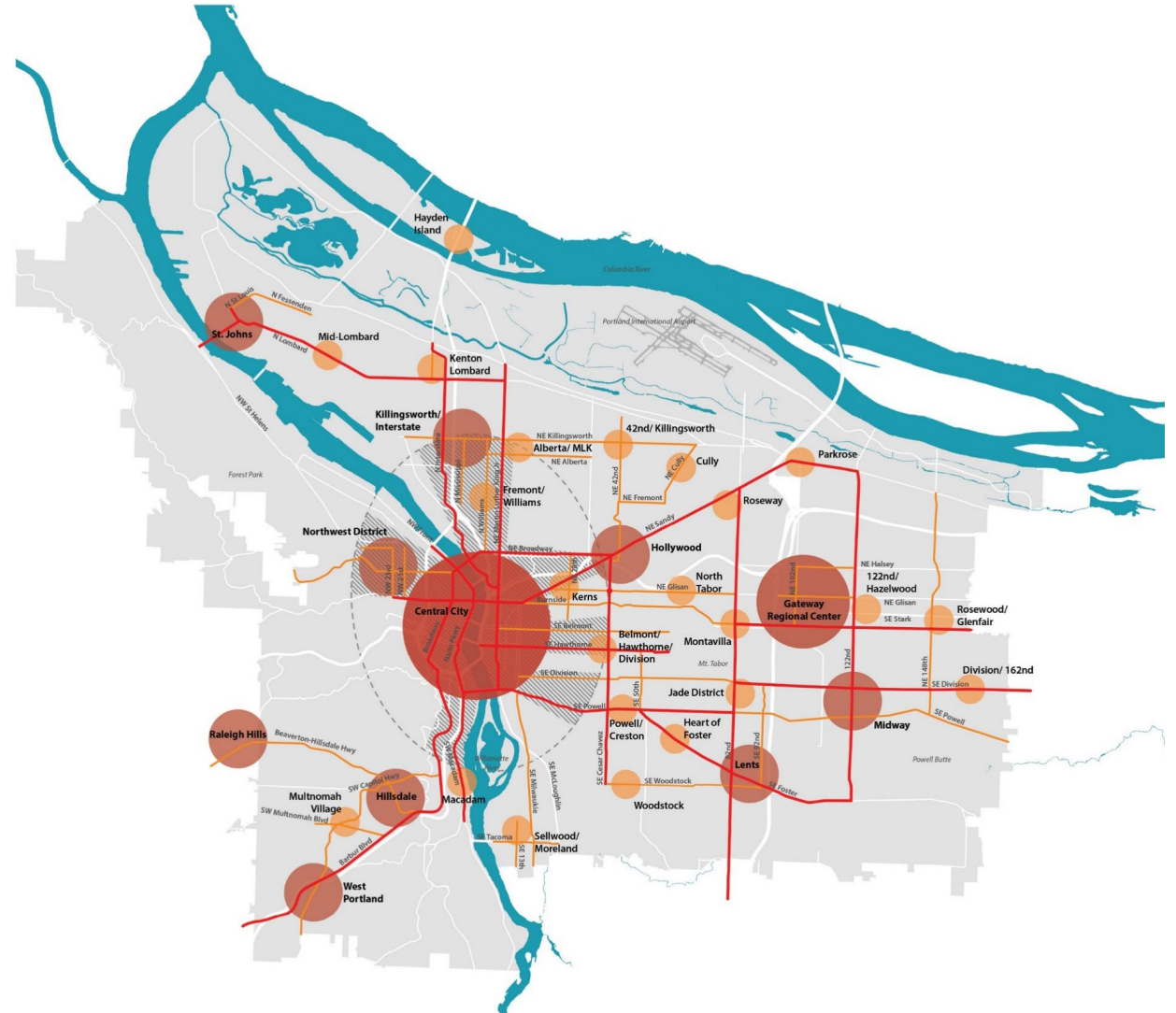
Actions to be completed by 2020:

14A – Decrease Urban Heat Islands

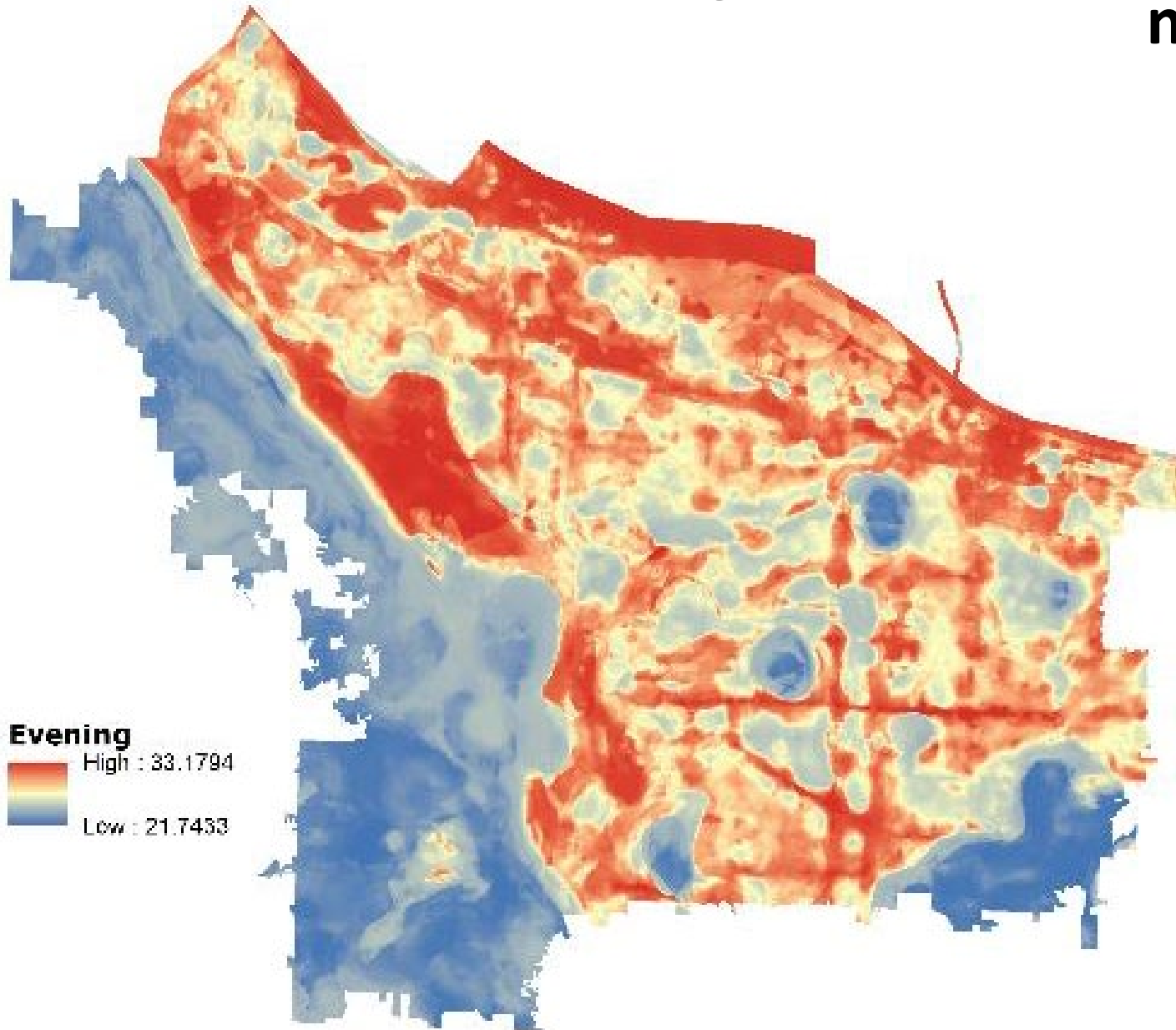
14B – Urban Heat Island Maps

2035 Growth Strategy:

80% of growth focused in and around centers and corridors.

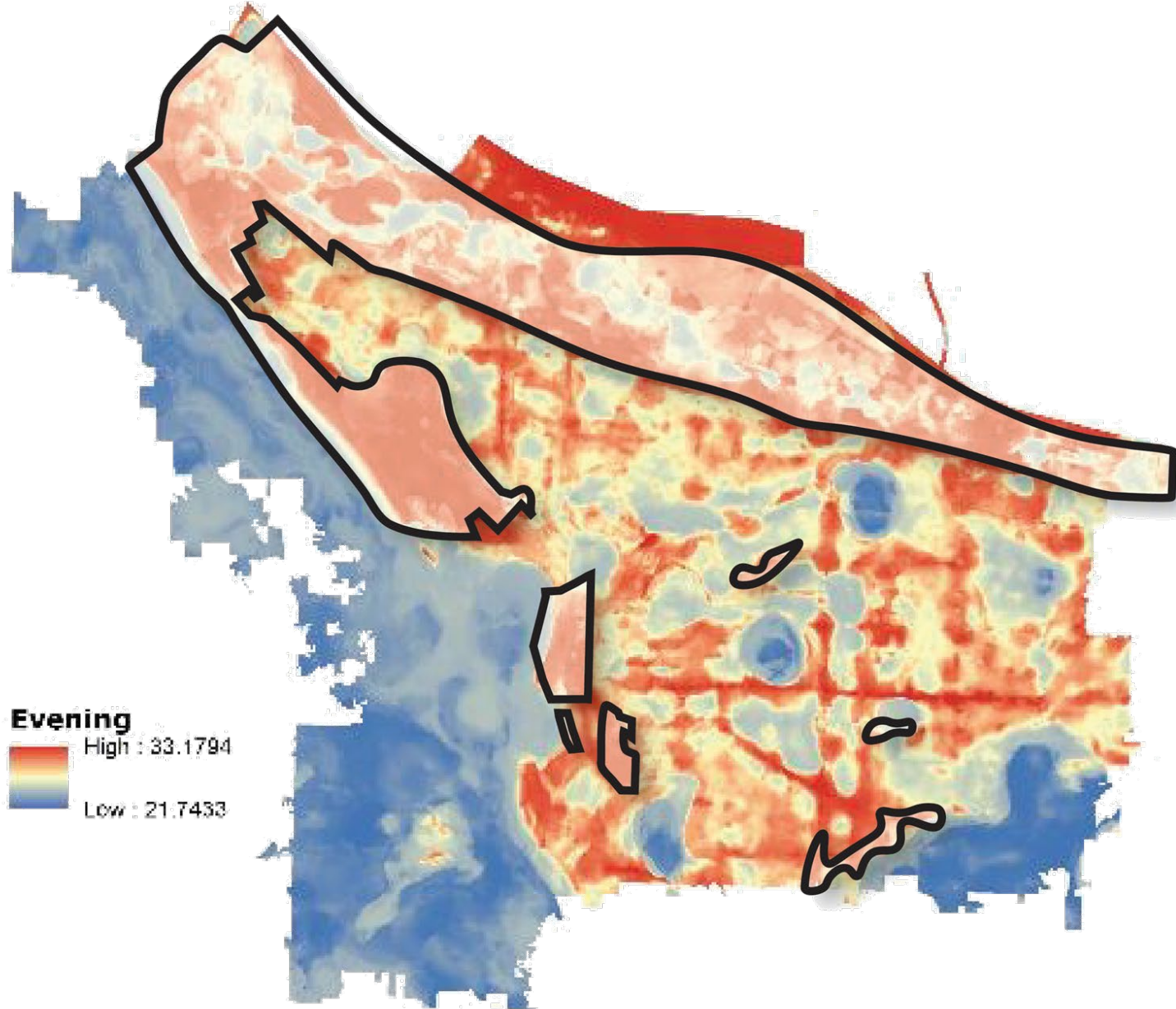


Portland's Primary Risk → Hotter, drier summer with more high-heat days.

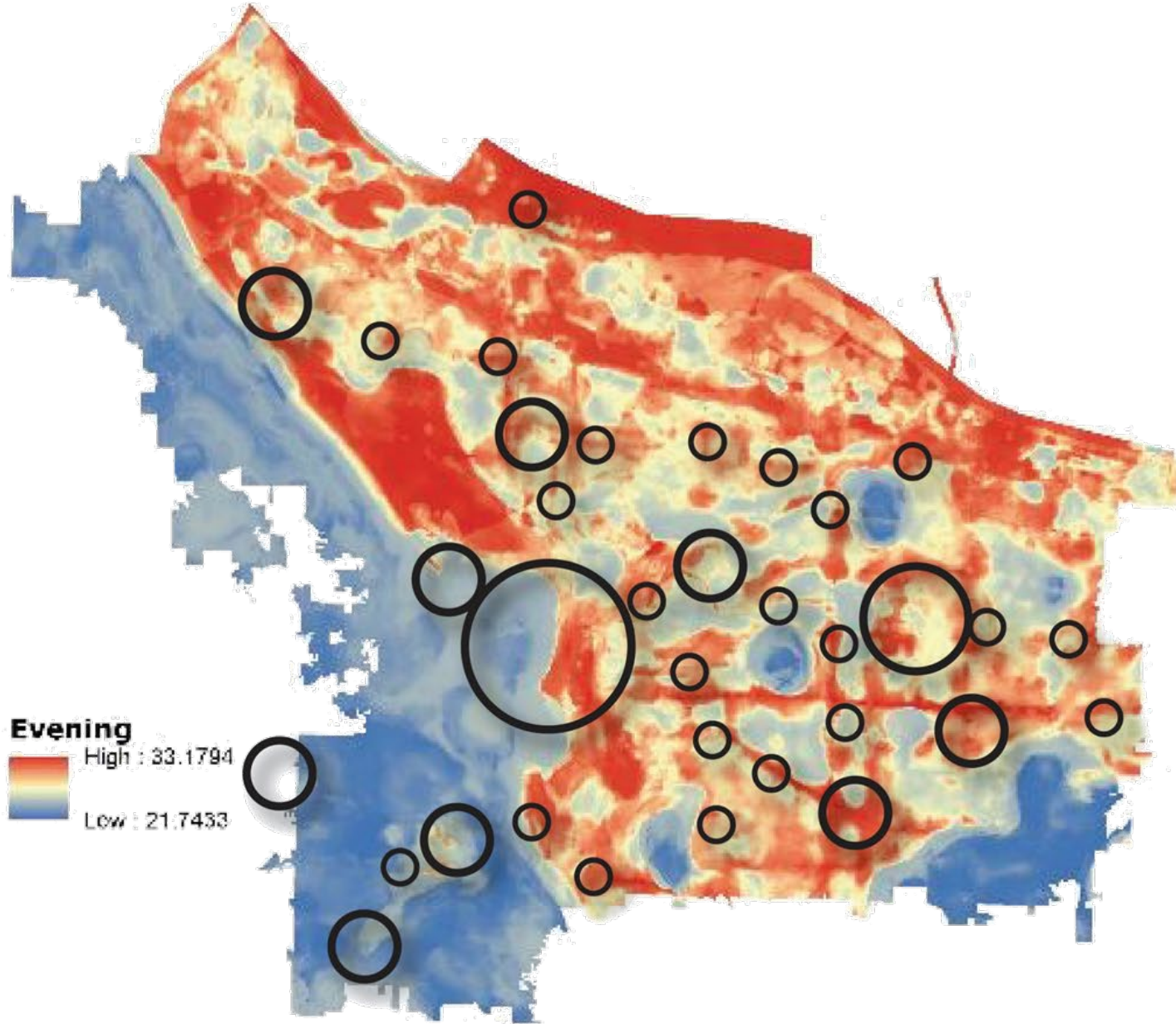


"... temperatures around the city can vary by as much as 20 degrees, depending on tree canopy, surface types and colors of buildings."

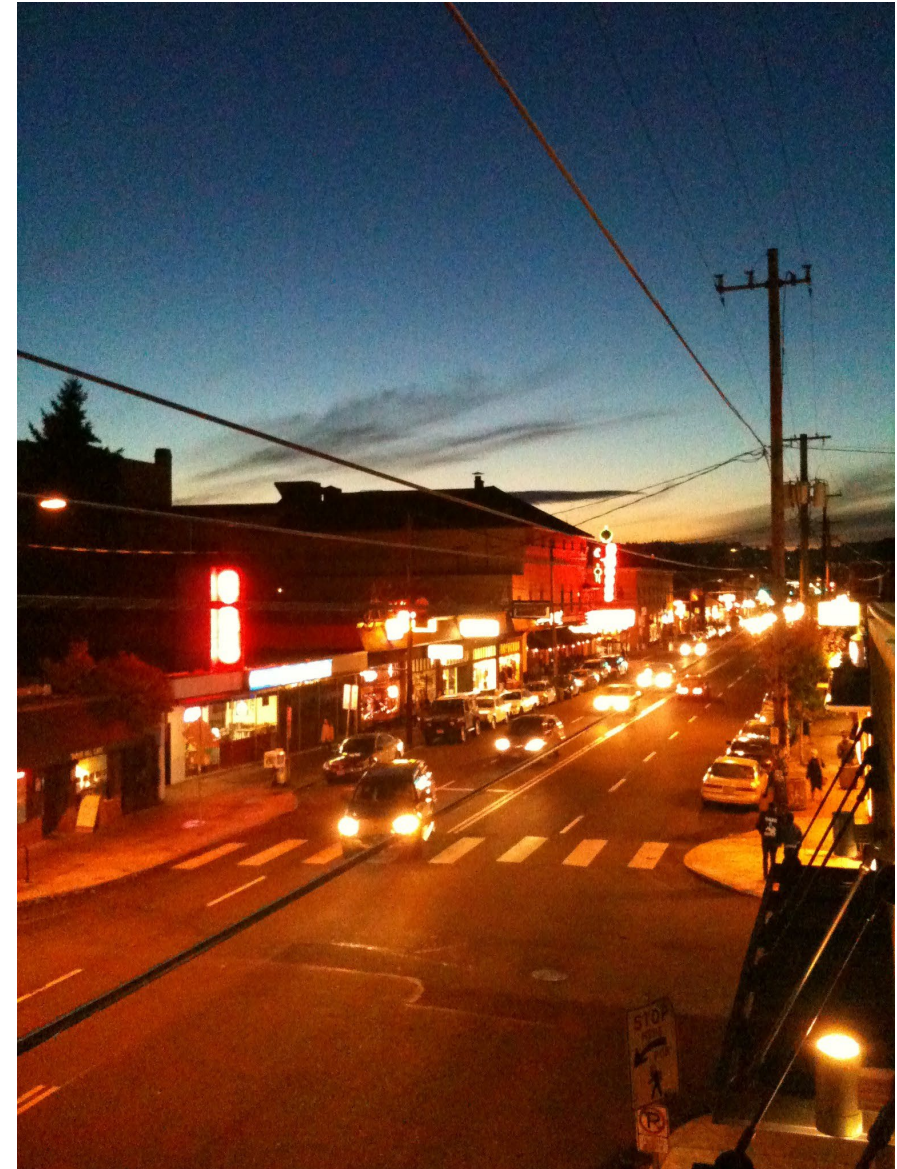
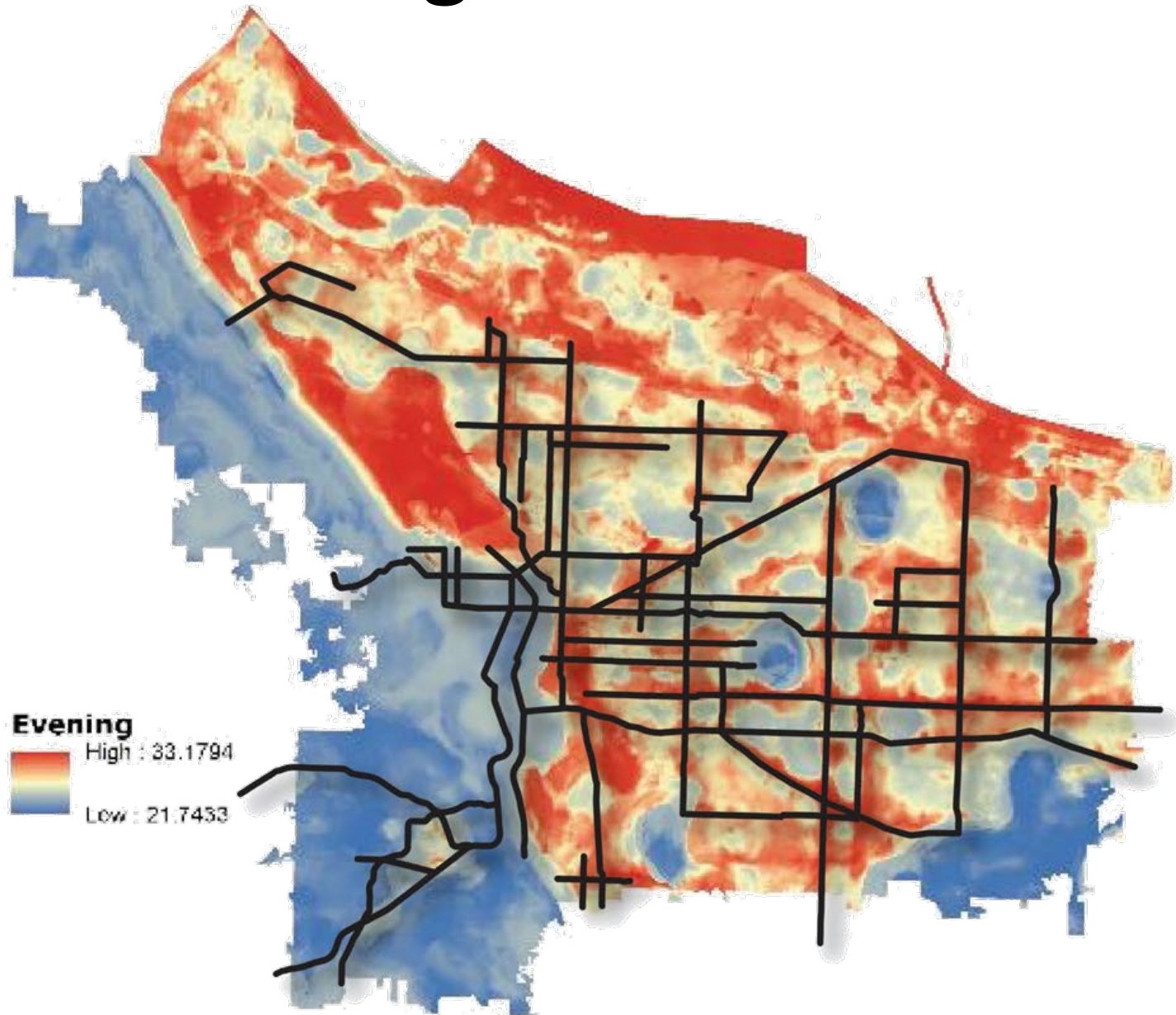
Industrial Areas



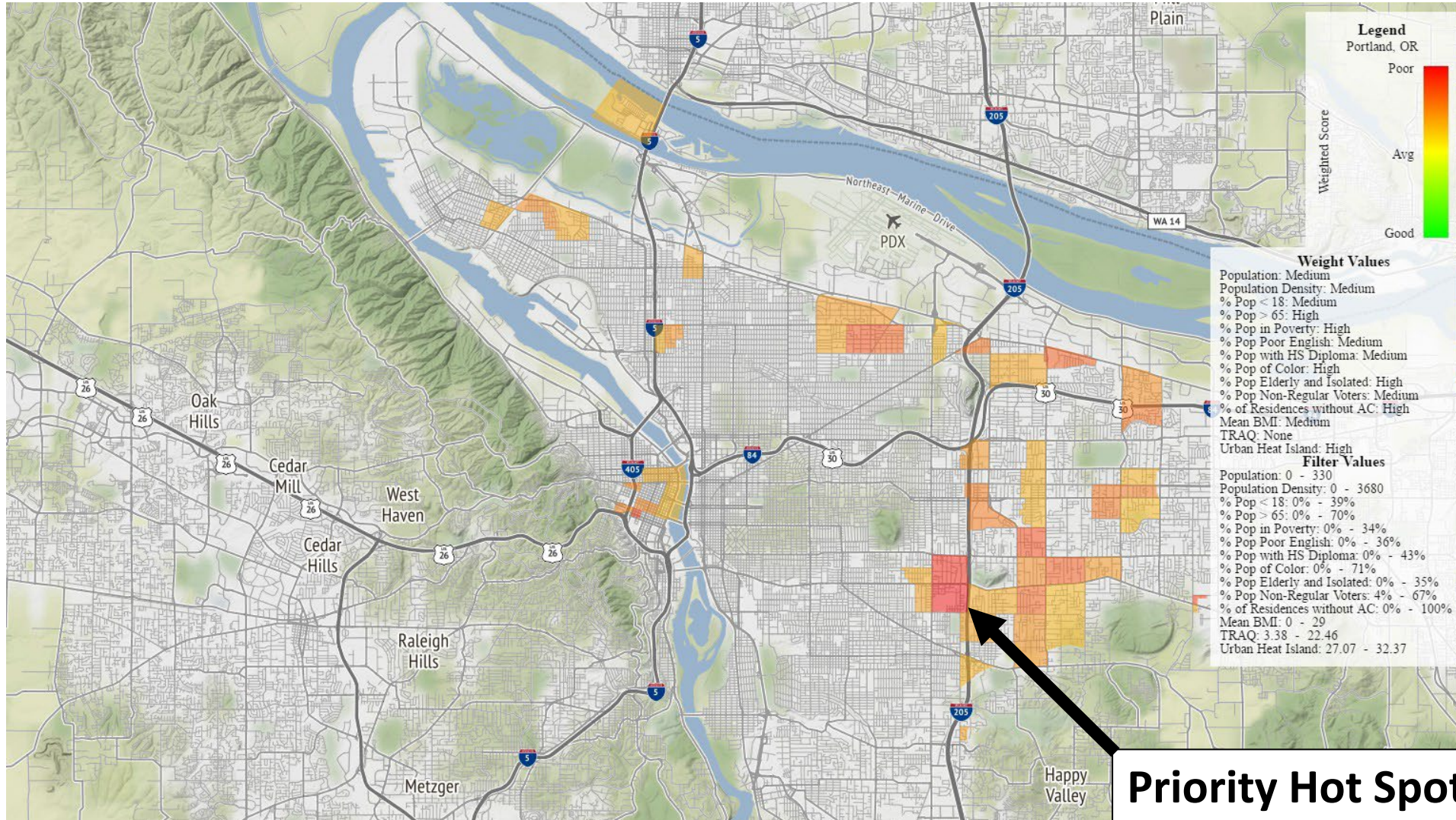
Urban and Neighborhood Centers



Civic + Neighborhood Corridors



Portland's Vulnerability to Heat

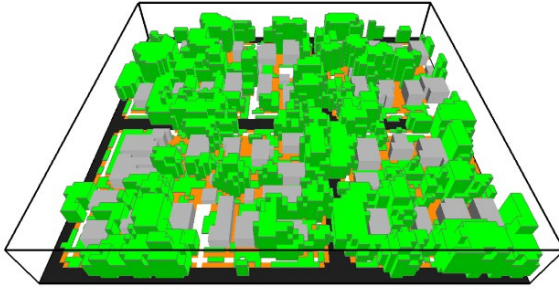


**Priority Hot Spots =
Heat + Vulnerability**

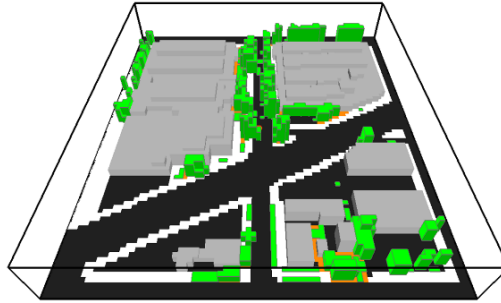
SE Powell and 82nd



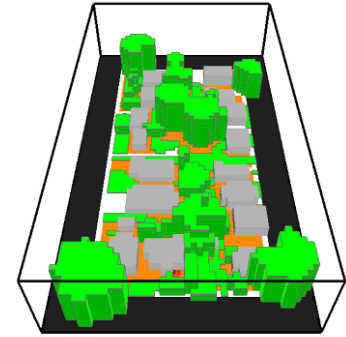
Cluster Analysis: Urban Land Cover Types



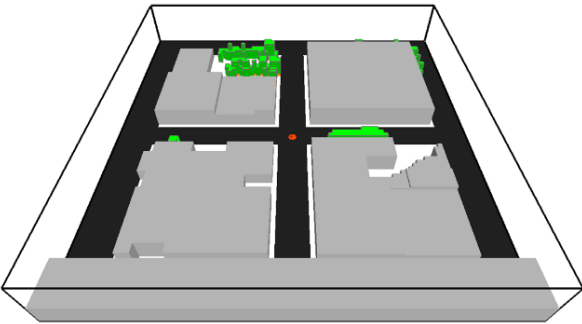
High Canopy (HCN)



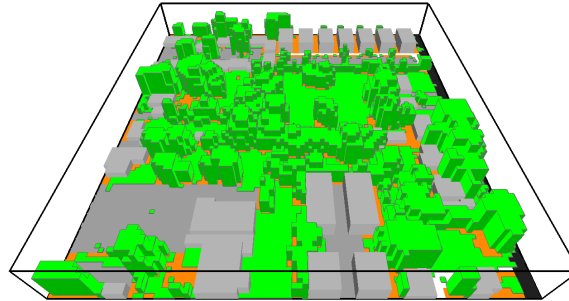
Urban Districts & Corridors (UD)



Medium Canopy Neighborhood (MCN)

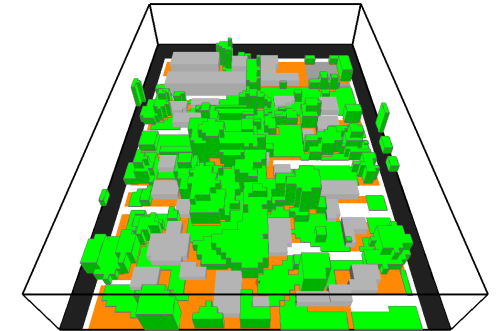


Hardscape Industrial (HI)



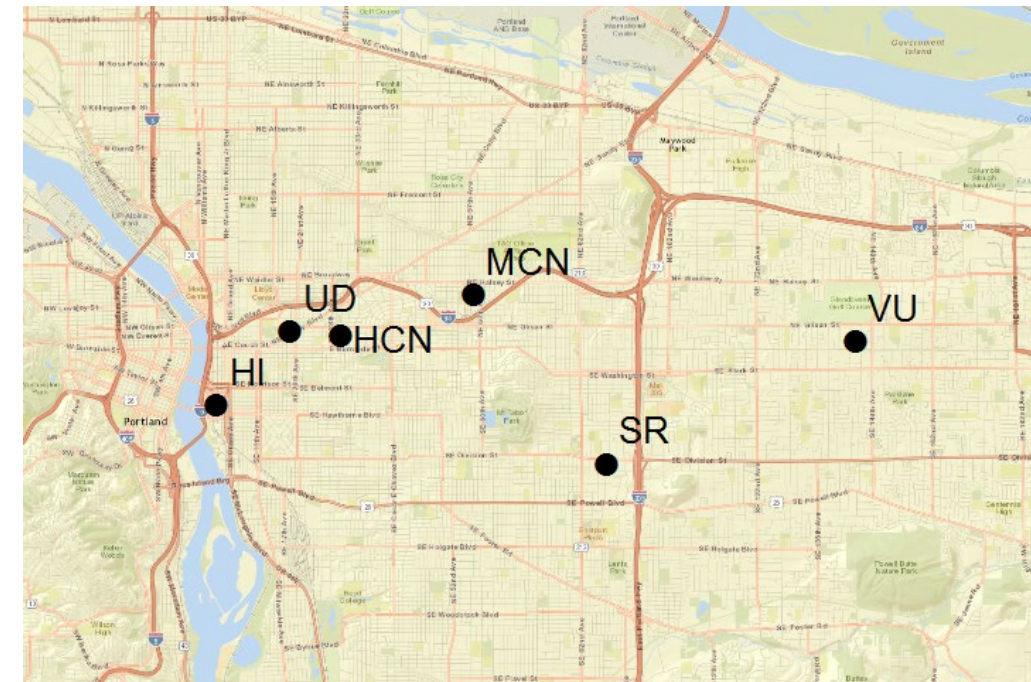
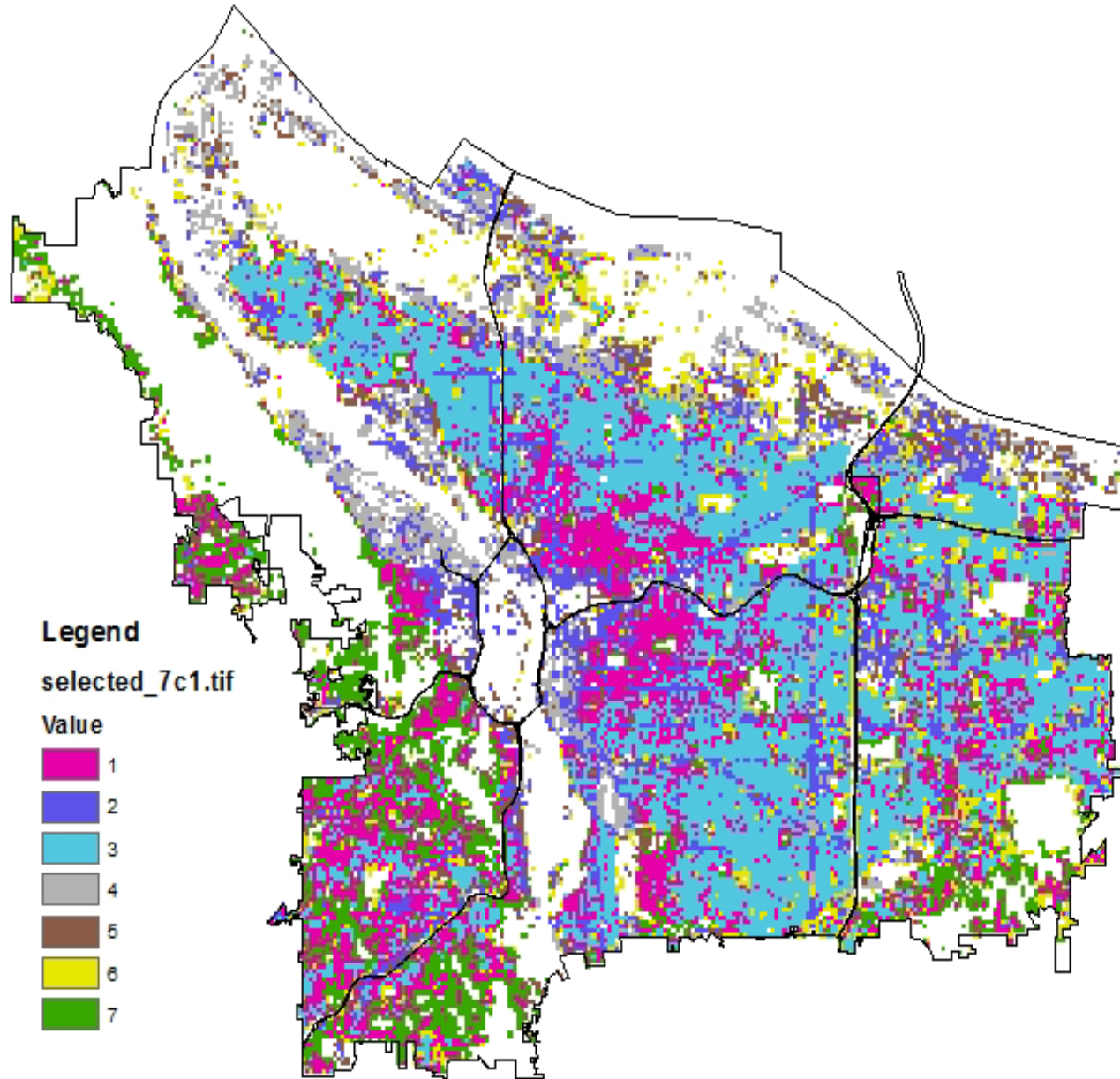
Vegetated Urban (VU)

+ Hillside Forest (HF)



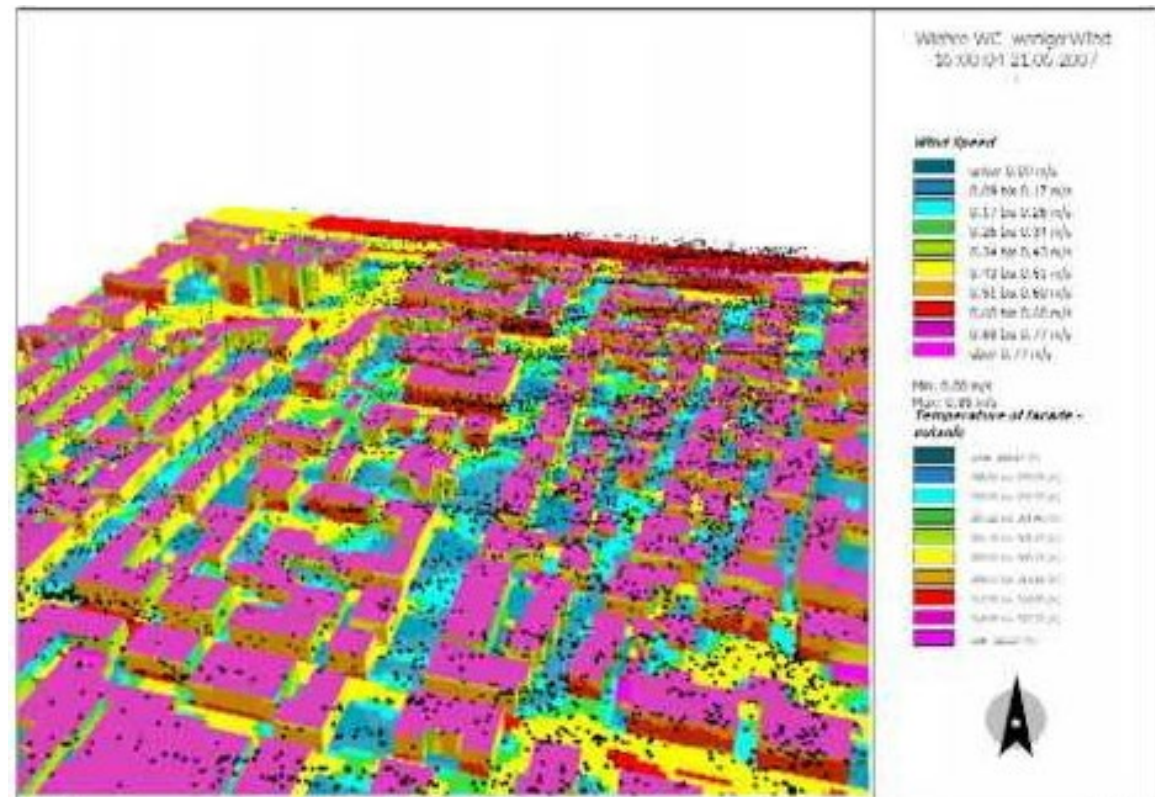
Semi-Rural (SR)

Cluster Analysis: Urban Land Cover Types



ENVI-met 4: High resolution microclimate modelling system

- Fluid mechanics,
- Thermodynamics, and
- Atmospheric physics



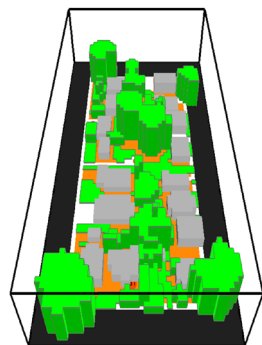
Does Design Matter?

Question: Can we increase housing density, while maintaining (or reducing) pre-development temperatures?

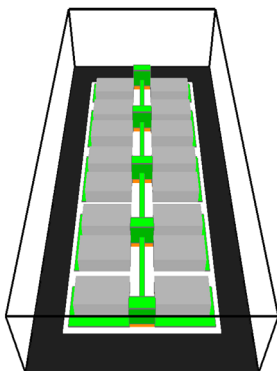
Selected 'Medium Canopy Neighborhood (MCN)' that will increase in density

- Increase the numbers of housing units from 16 to 64
- Varying open parking spaces (asphalt)

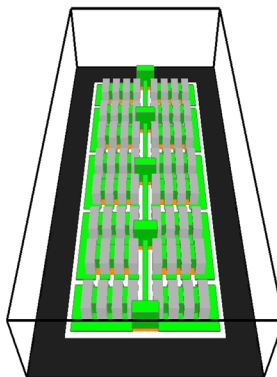
Plan1 (Base)



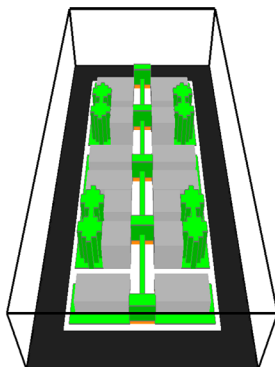
Plan2



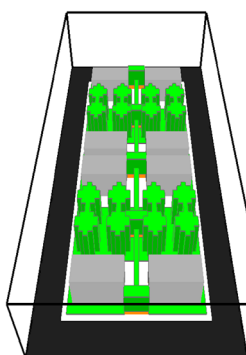
Plan3



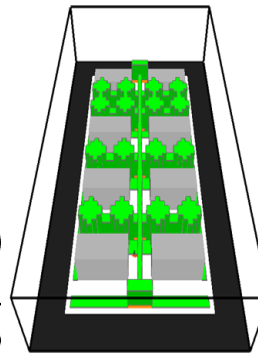
Plan4



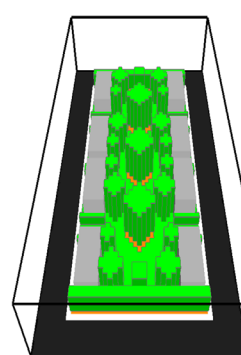
Plan5



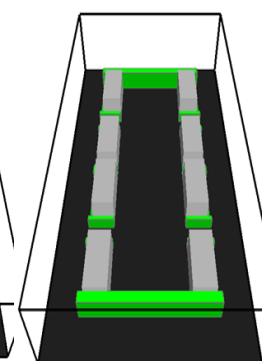
Plan5b



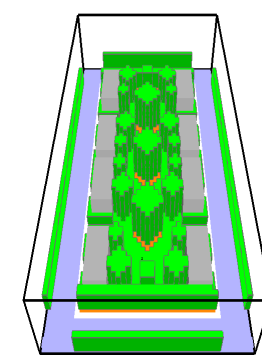
Plan6



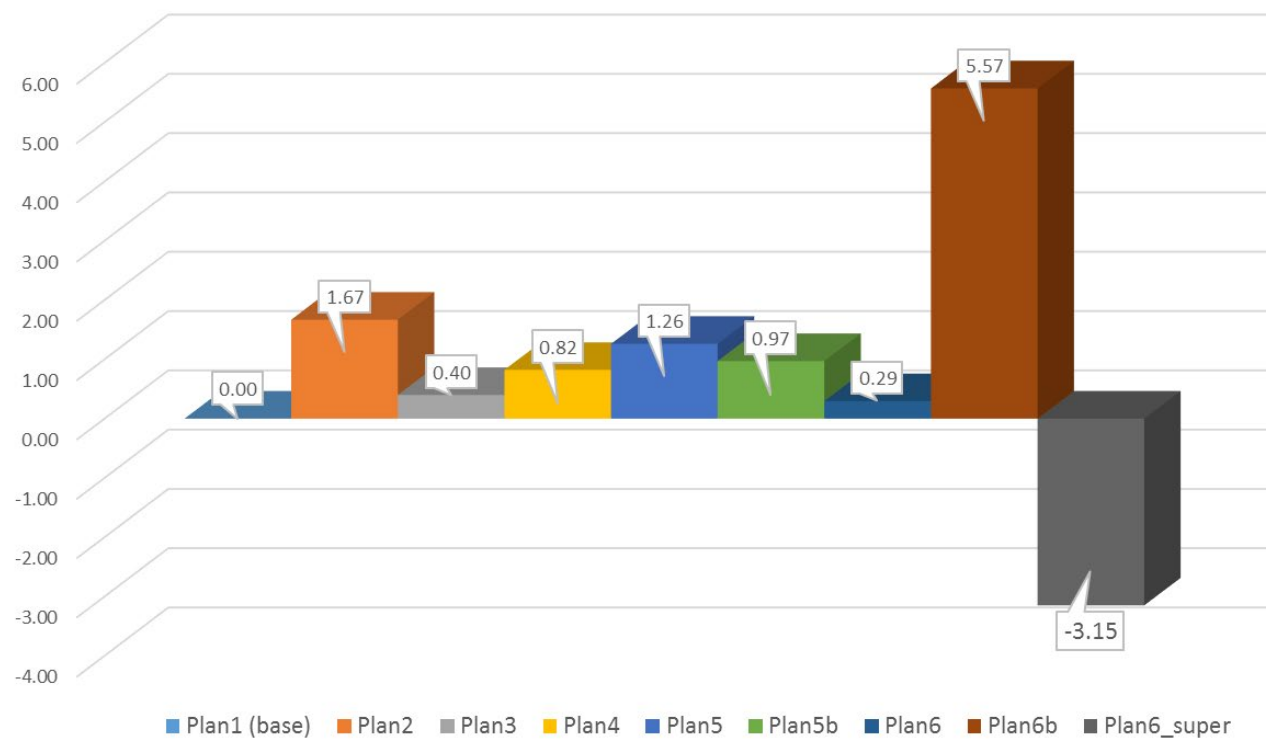
Plan6b

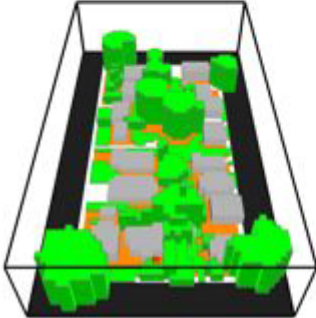
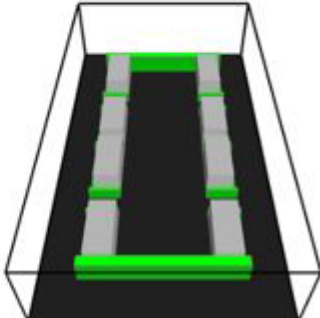
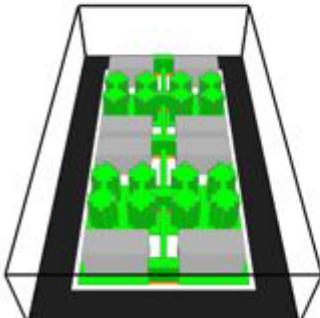
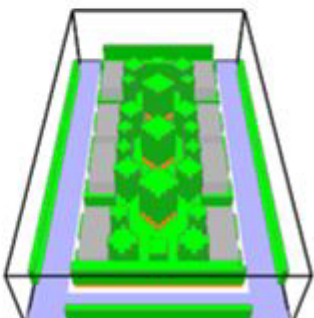
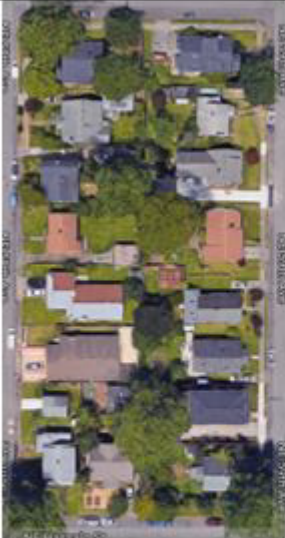


Plan 6S



MCN: Simulation Plans:
Average temperature (F) at H=1.5m(difference to the base case)

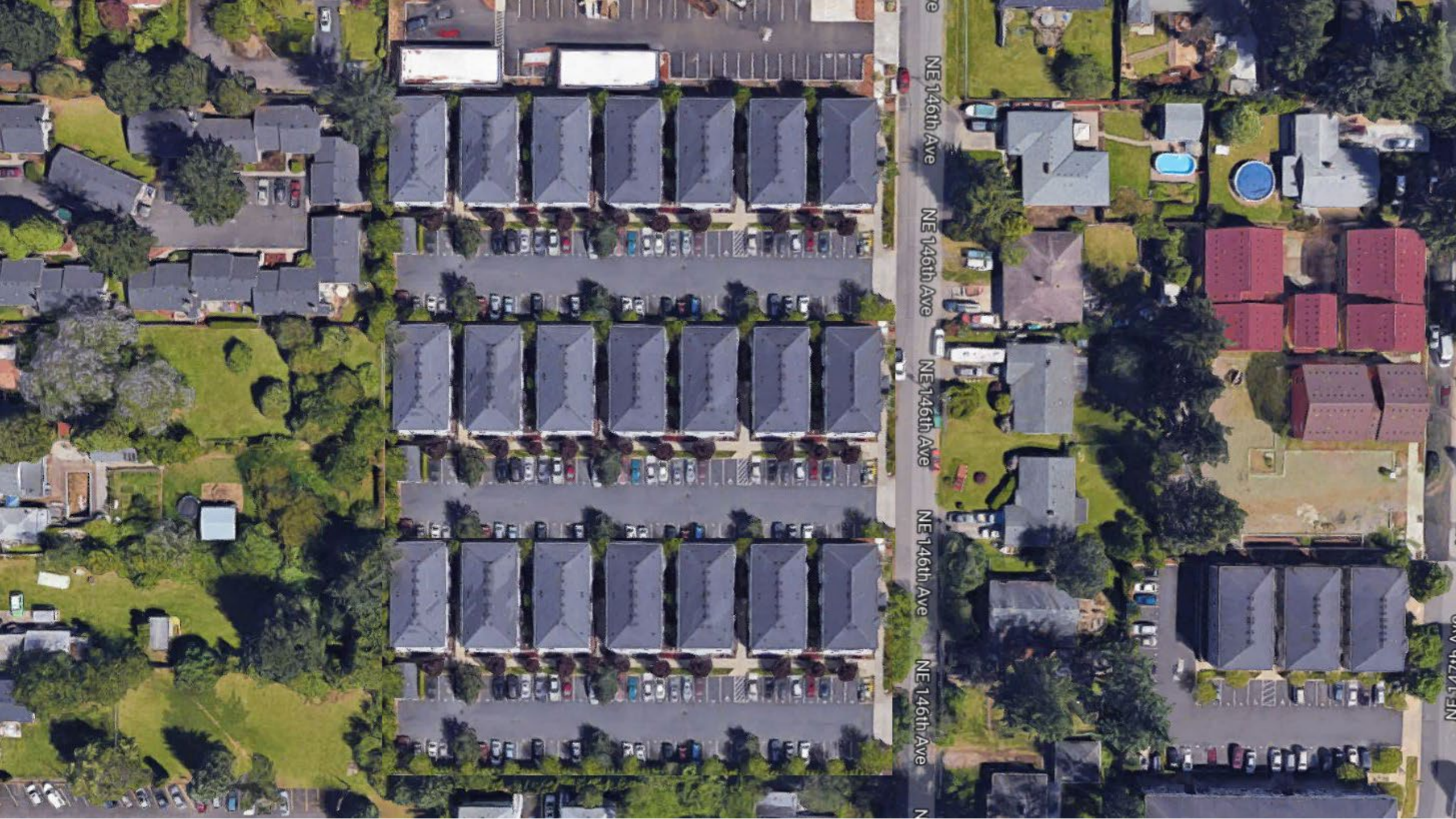


Base case	Prototype A	Prototype B	Prototype C
Existing conditions of a typical neighborhood block, with parking (white) and roads (black), vegetation (green), soil (brown) and buildings (gray).	Multifamily buildings (gray) with large amounts of asphalt paving and surface parking (black), and small amounts of vegetation (green).	Multifamily buildings (gray) with smaller amounts of surface parking (white) and increased vegetation (green).	Multifamily buildings (gray) with surface parking eliminated and vegetation maximized (green). Also, increased reflectivity (albedo) of roadway paving by use of concrete (blue gray).
			
			
Temperature: represents base case for comparisons.	Temperature: Increased 5.57 degrees Fahrenheit above the base case.	Temperature: Increased 1.26 degrees Fahrenheit above the base case.	Temperature: Decreased 3.15 degrees Fahrenheit below the base case.









NE 146th Ave

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Better Housing by Design

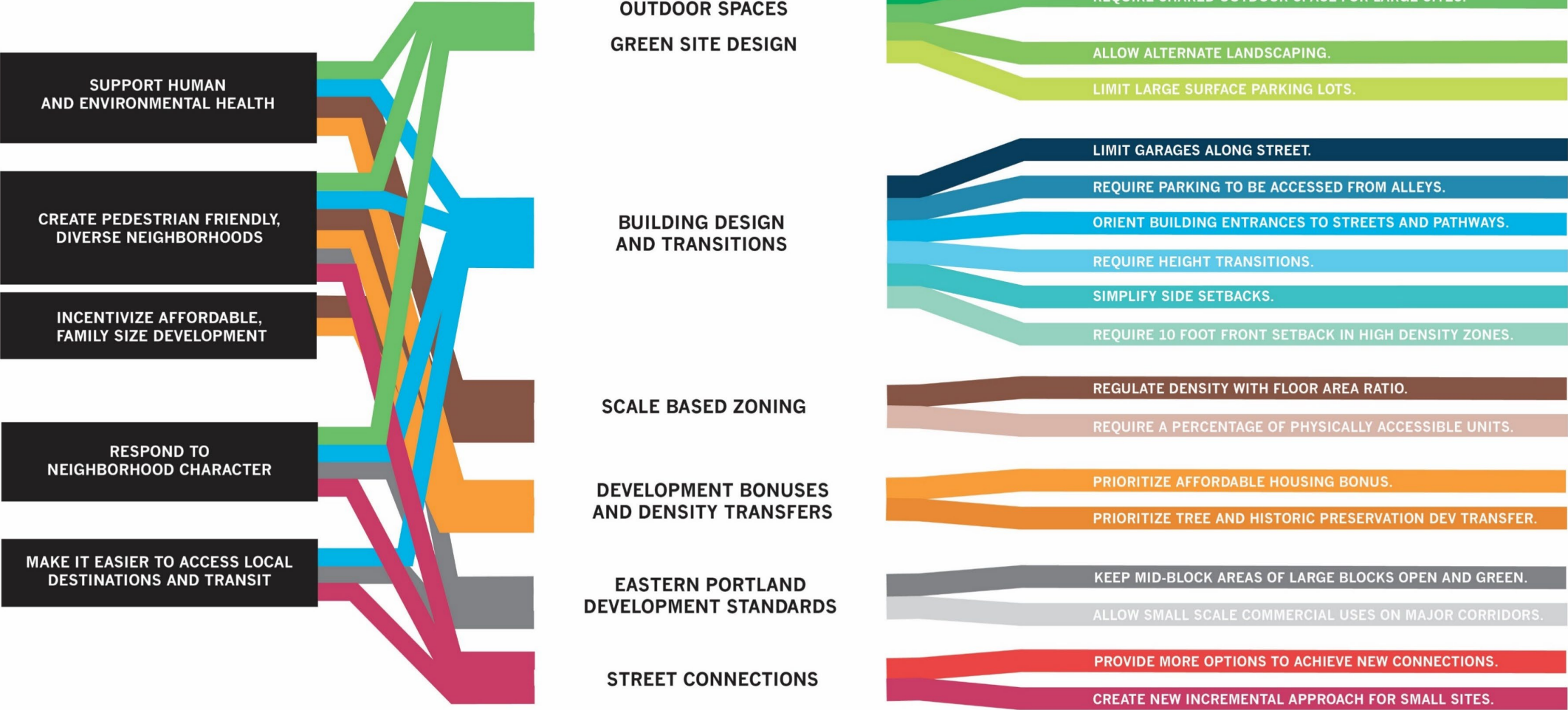
An Update to Portland's Multi-Dwelling Zoning Code



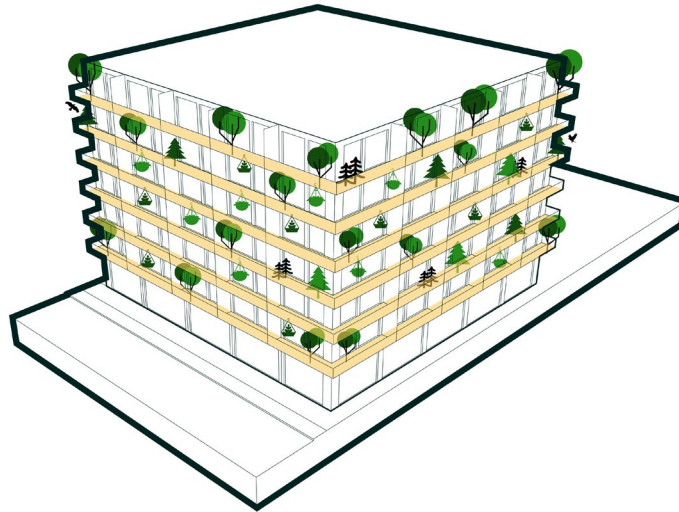
WHAT IS THE GOAL?



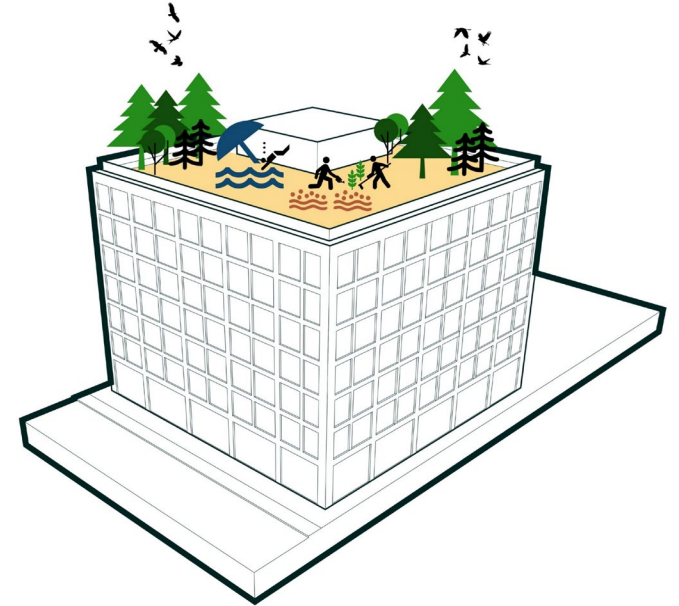
HOW DO WE ACHIEVE IT?



Concept 1: Require Residential Outdoor Space in the RH Zone



Require 48 square feet per unit.



Shared outdoor space is allowed.

Concept 2: Require Shared Outdoor Space for Larger Sites

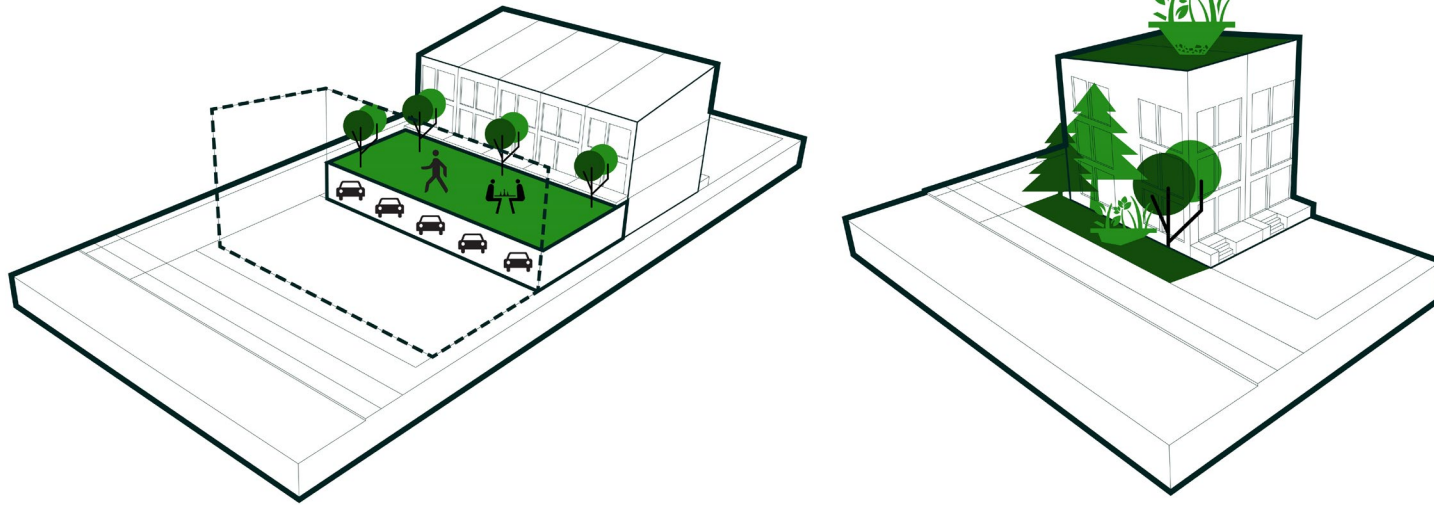
Requirement for sites 20,000 feet or larger.

Percentage of site area for shared outdoor space could be 5 - 10 percent of site area.



Concept 3: Allow Alternatives to Conventional Landscaping

Allow Ecoroofs, raised courtyards, and raised stormwater planters to be used to meet a portion of the landscaping requirement.

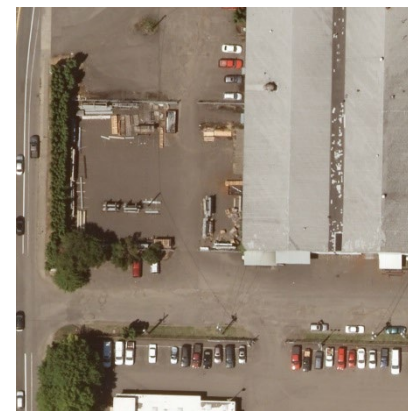
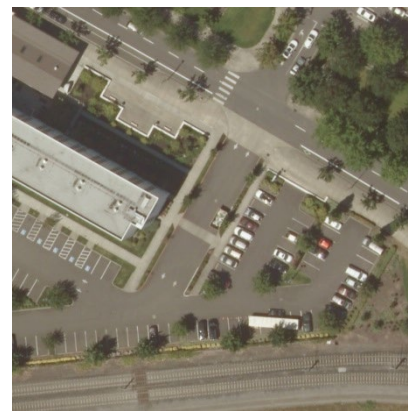
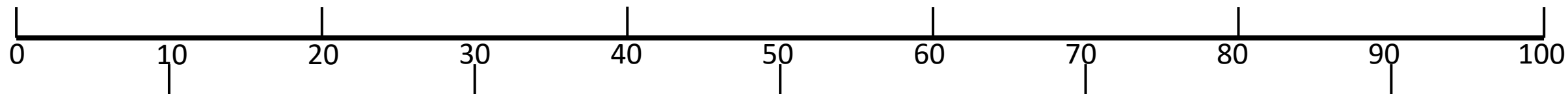
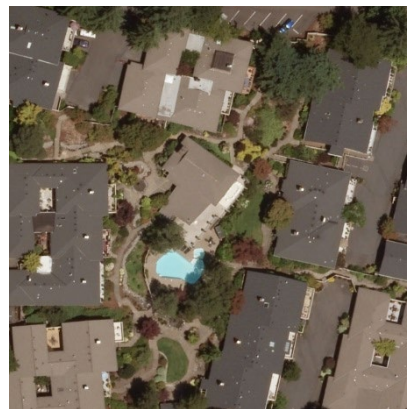


Concept 4: Limit Large Surface Parking Lots

Limit the amount of ground level area that can be devoted to impervious surfaces, such as surface parking lots and driveways.

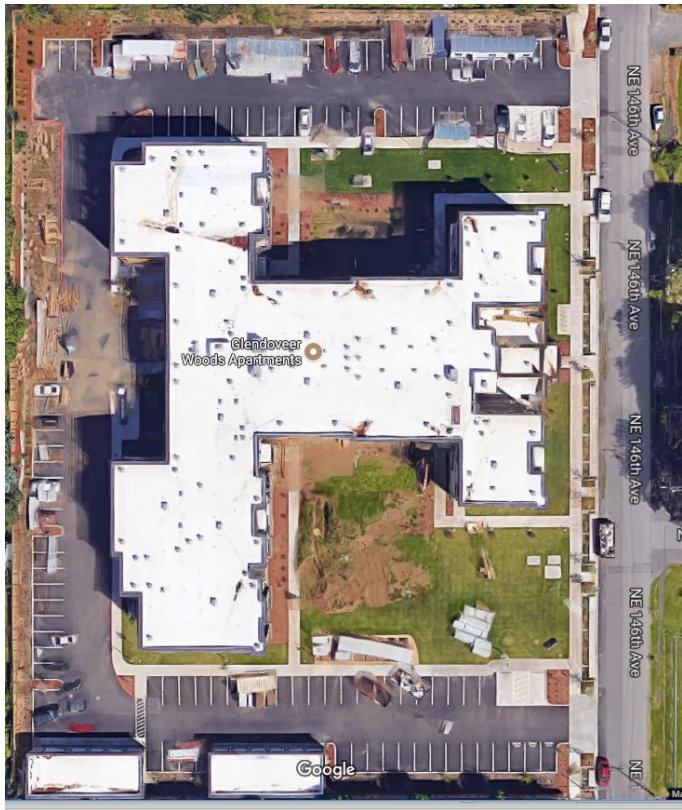


Proposal: 30% Impervious Surface Threshold

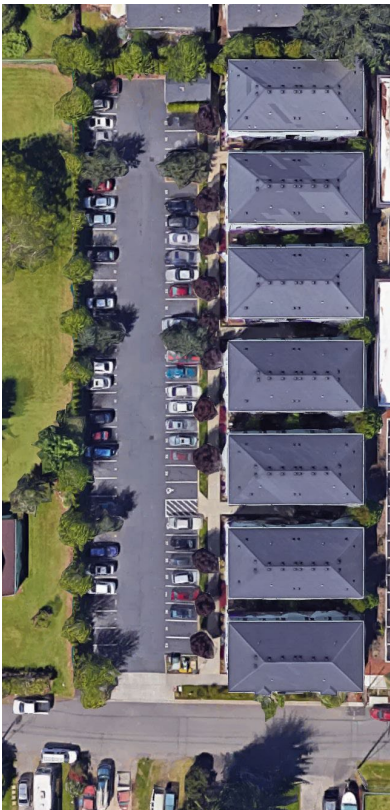


Rosewood

Glendoveer Apts – 29%



Jenna's Place – 36%



Stacey Lee Apts – 39%



Jade District

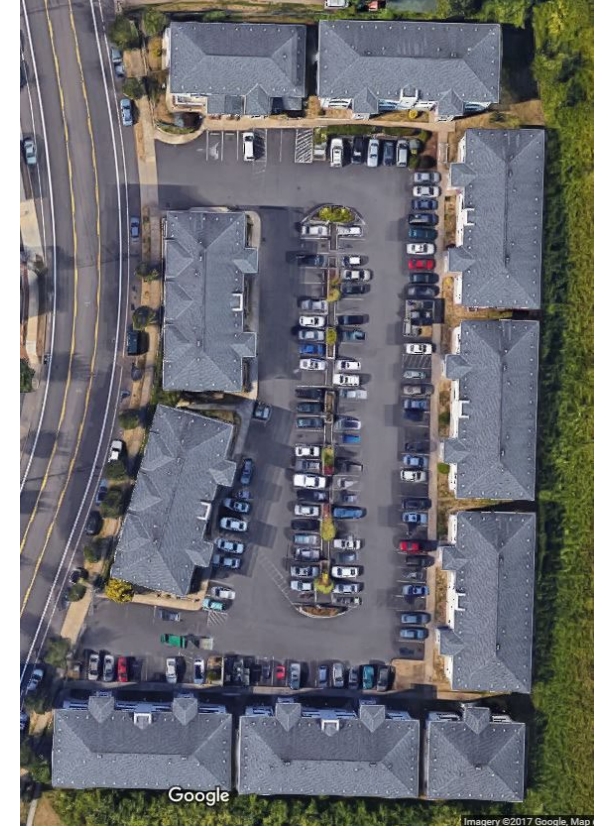
Tabor View Court – 34%



Len's Oak – 39%

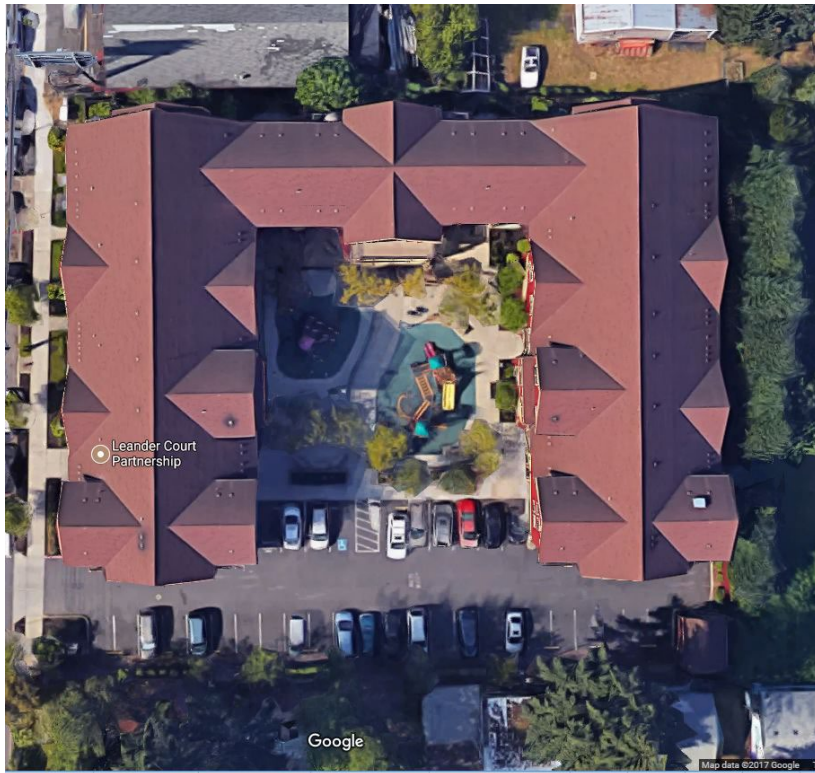


Parkland Apts – 37%

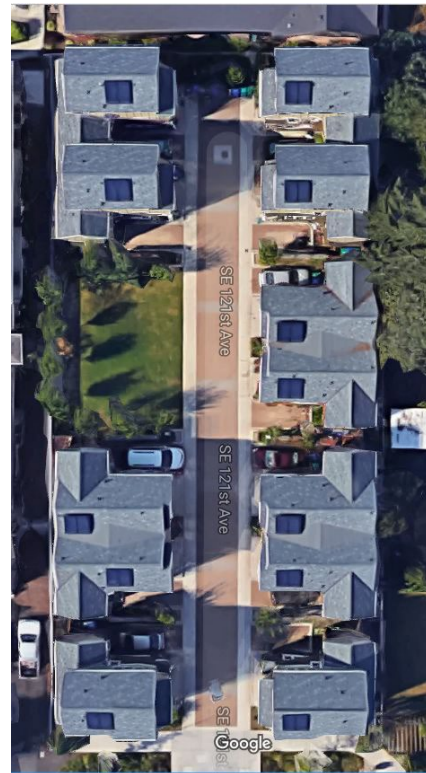


Division-Midway

Leander Court– 20%

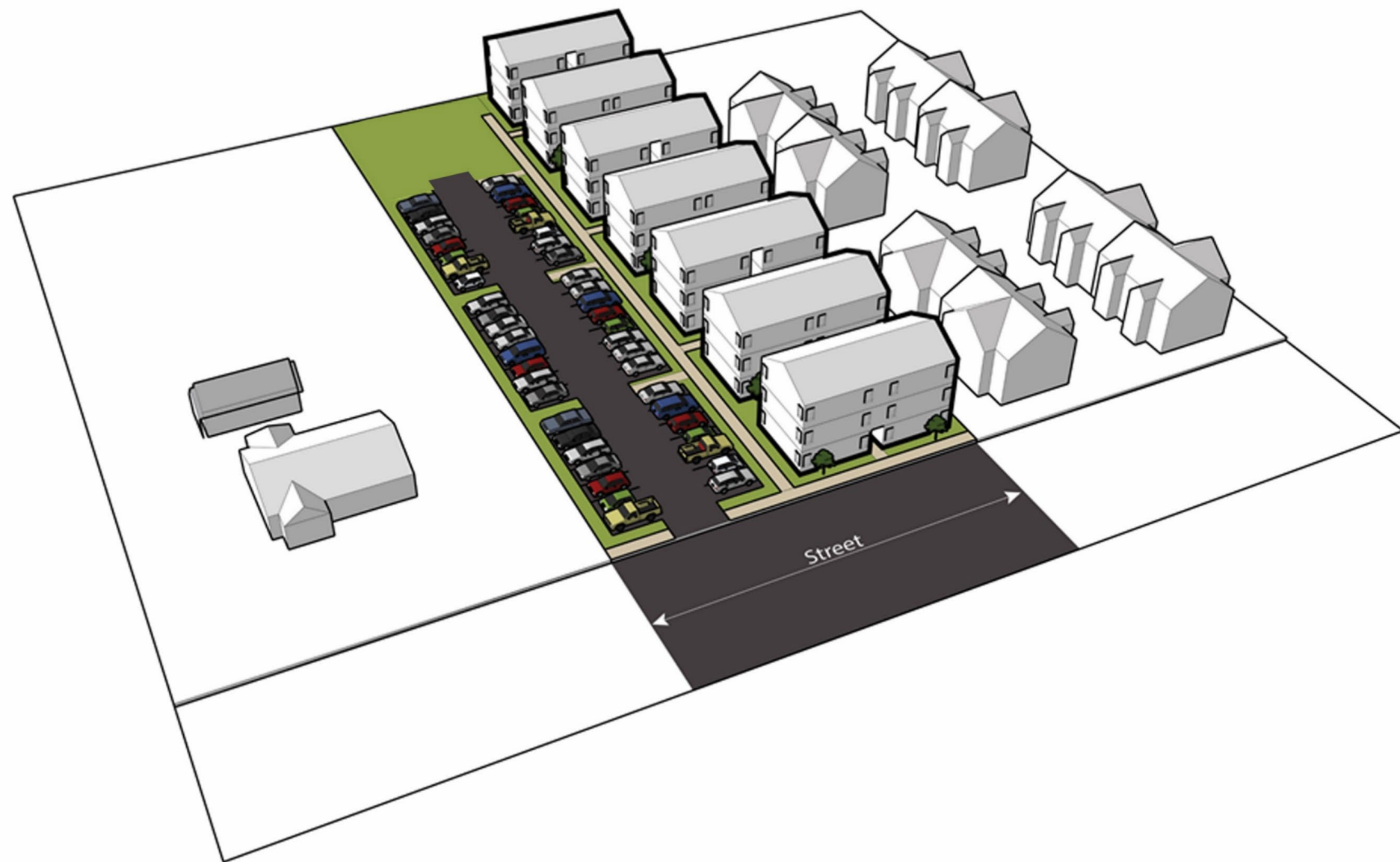


Svaboda Court – 7.7%

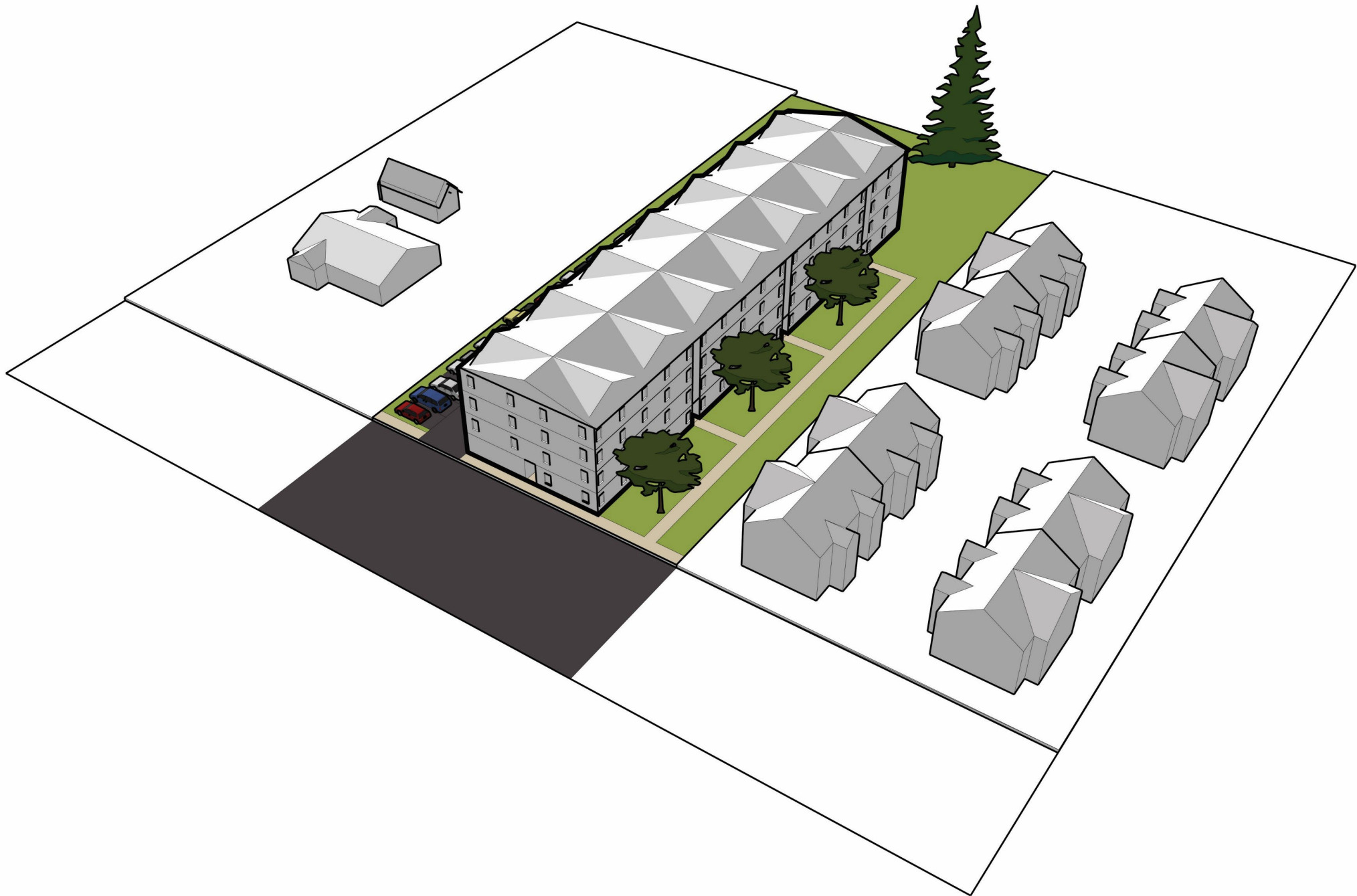


Design Options











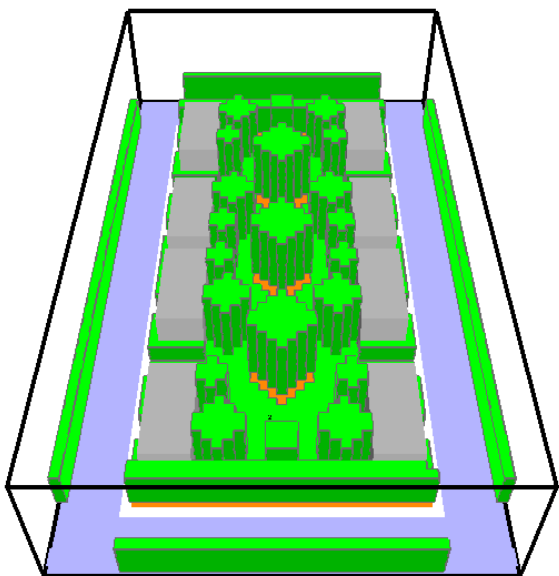




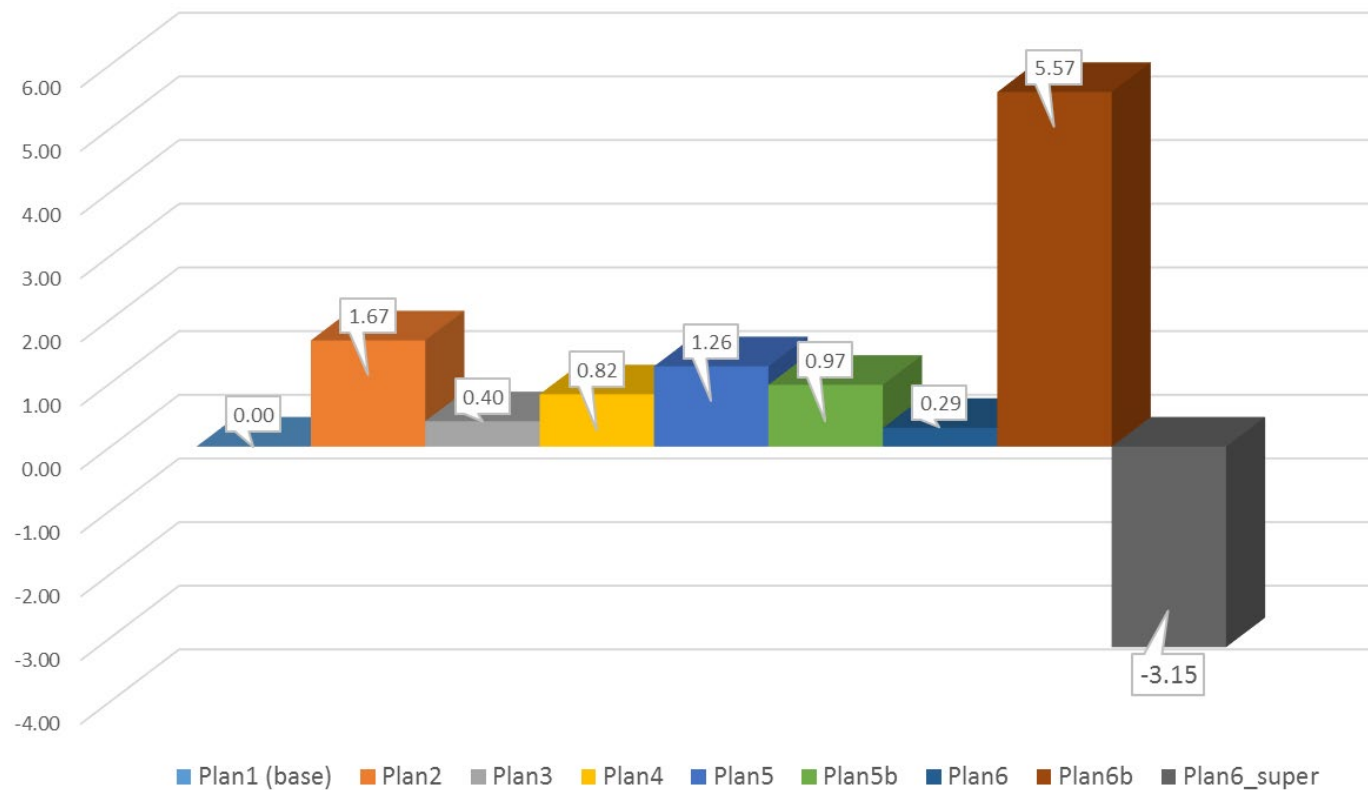




Plan 6S



MCN: Simulation Plans:
Average temperature (F) at H=1.5m(difference to the base case)





LA Street Services

@BSSLosAngeles

Follow

Today Los Angeles became the first place in California to install a cool pavement treatment on a public street! Ten deg cooler on summer aft



10:54 AM - 20 May 2017

56 Retweets 129 Likes



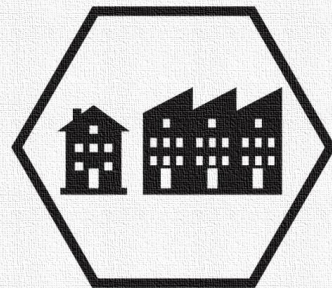
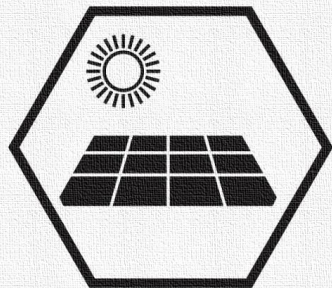
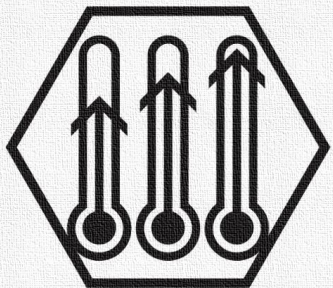
Nazario Saucedo, Greg Spotts, Bob Blumenfeld and 4 others

10

56

129





Questions