

PALO ALTO HEAT MAPPING

ENCOURAGING URBAN HEAT RESILIENCE

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**BETWEEN 2004 AND
2021, HEAT-RELATED
DEATHS INCREASED
BY 439%¹**

1. USAFacts Team, "How Many People Die from Extreme Heat in the US?," USAFacts, August 22, 2023, <https://usafacts.org/articles/how-many-people-die-from-extreme-heat-in-the-us/>.



Photo credit: City of Palo Alto

OVERVIEW



**BACKGROUND AND
MOTIVATION**



**RESEARCH AND
MAPPING**



CURRENT STRATEGIES



SUGGESTED SOLUTIONS



*Photo credit: City
of Palo Alto*

PASCC

PALO ALTO STUDENT CLIMATE COALITION

- Heat data collection done Aug 27, 2024
- Path taken shown left
- Focus on afternoon high temperature

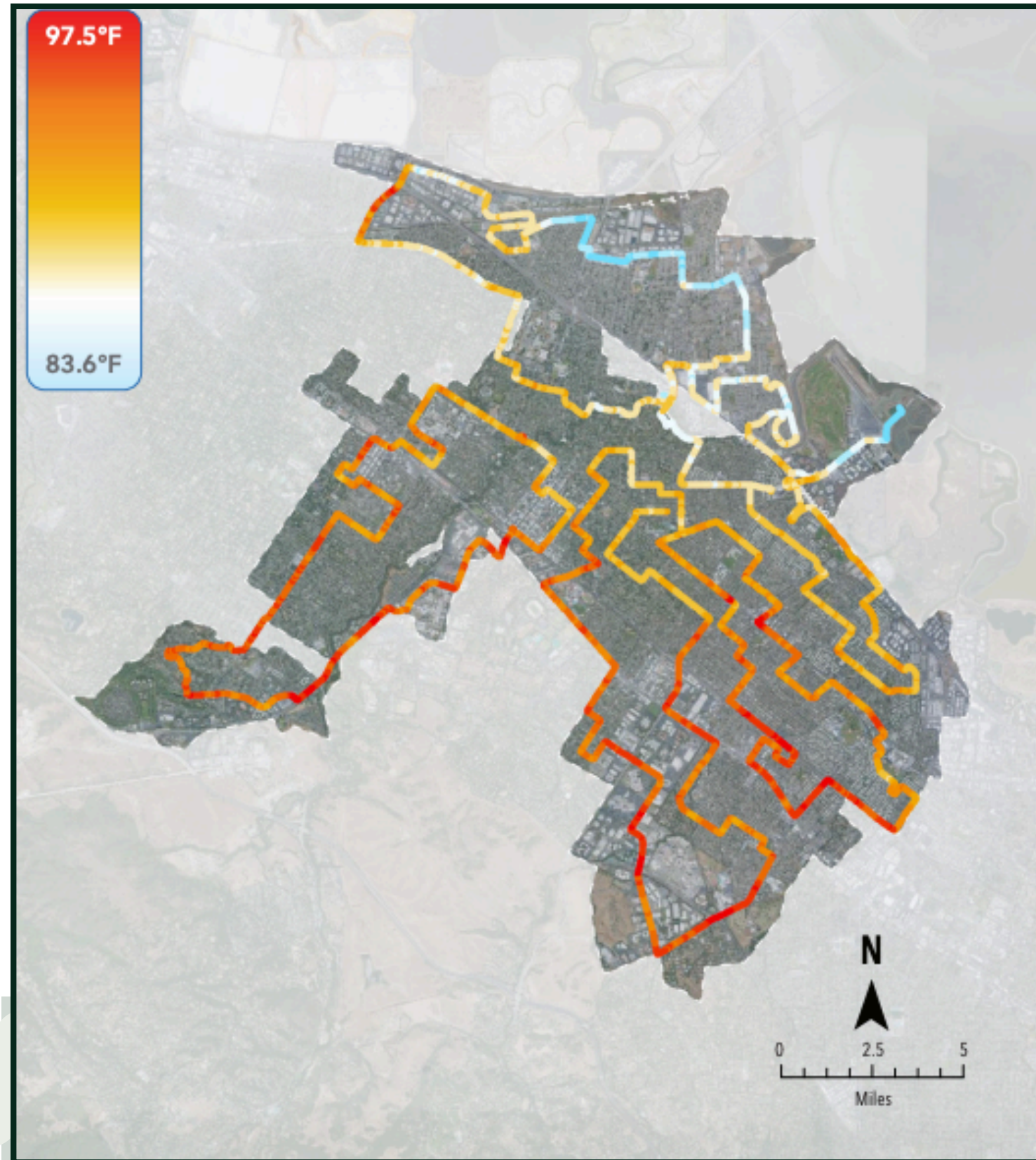


Photo credit: CAPA Strategies Heat Watch Report

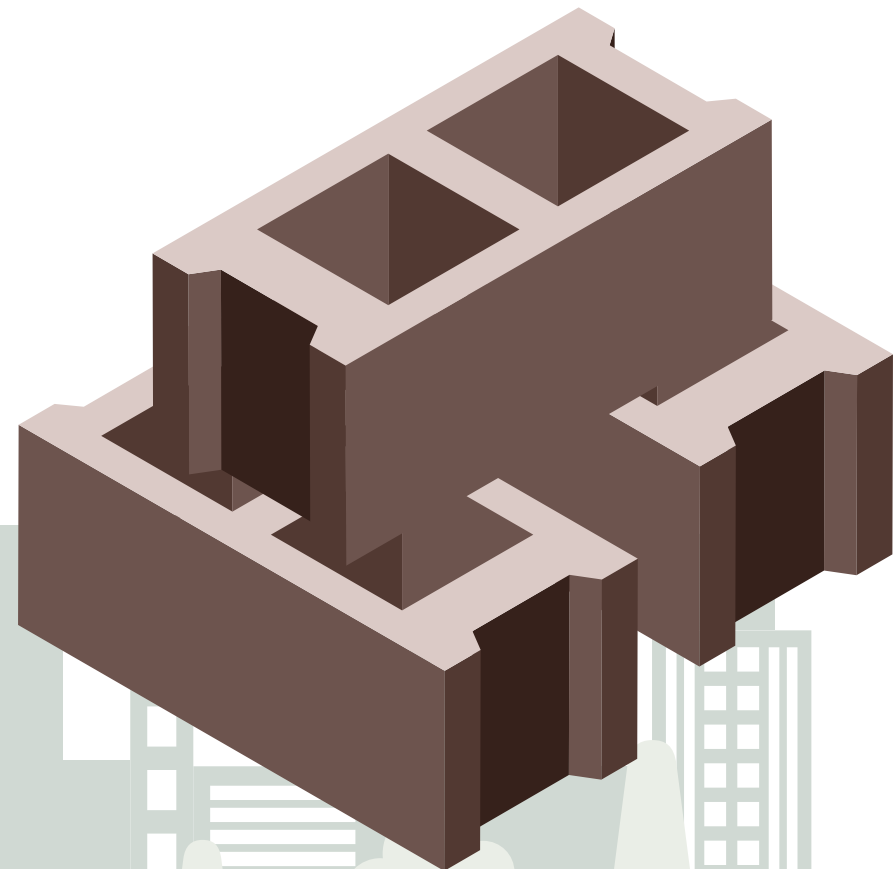


Photo credit: PASCC Instagram

ANALYSIS FOCUS



**TREE
COVER**



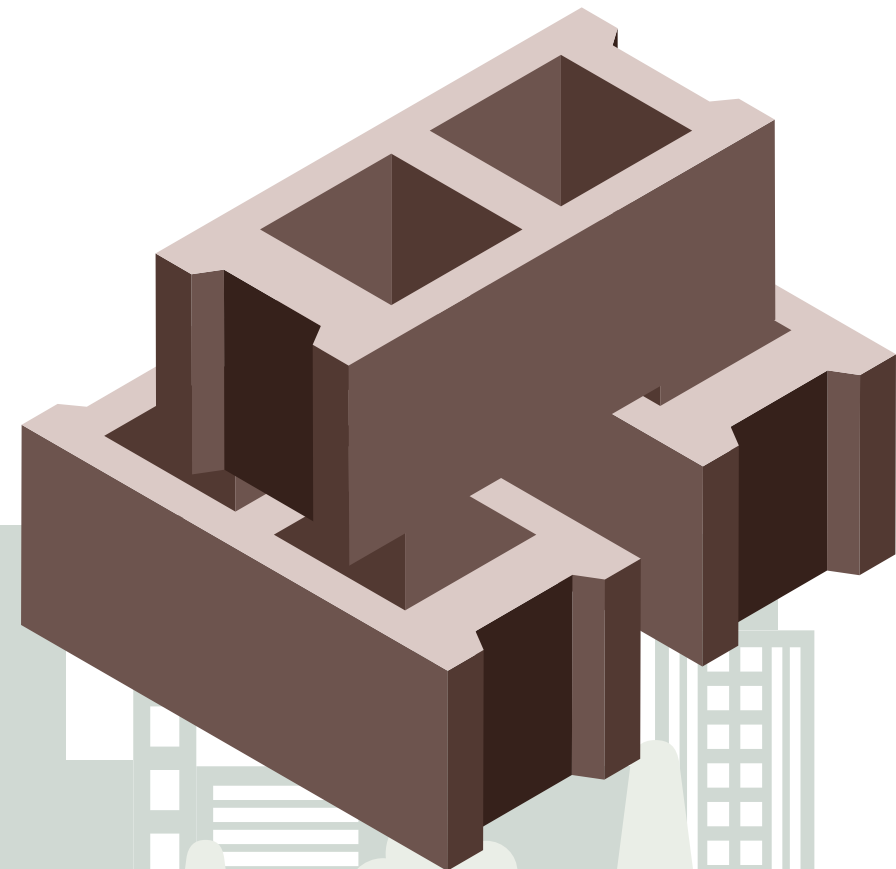
**BUILT
MATERIALS**



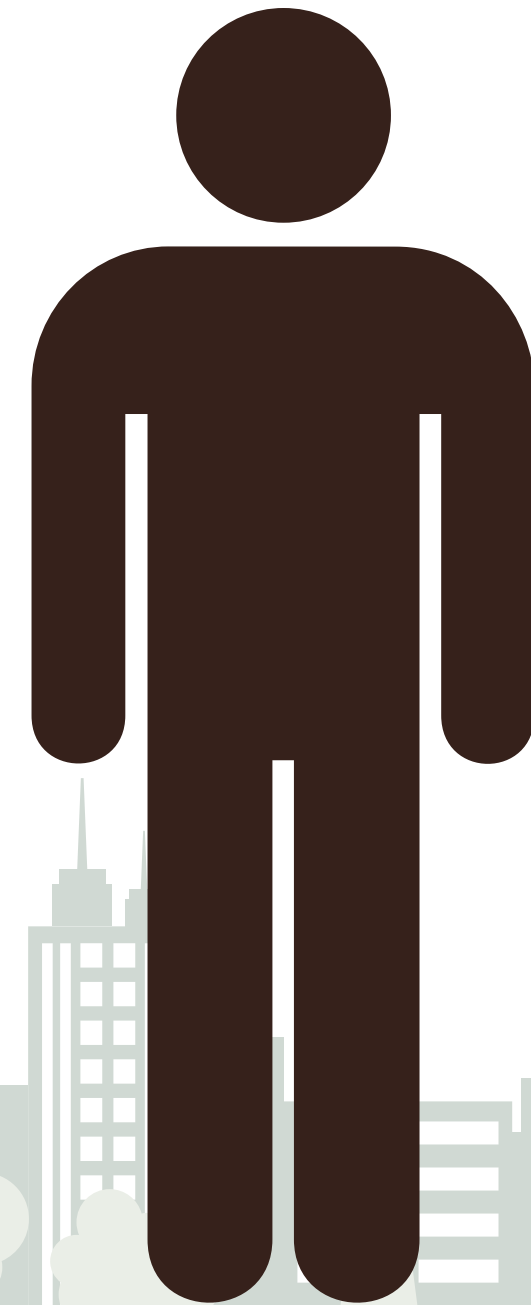
ANALYSIS FOCUS



TREE
COVER



BUILT
MATERIALS



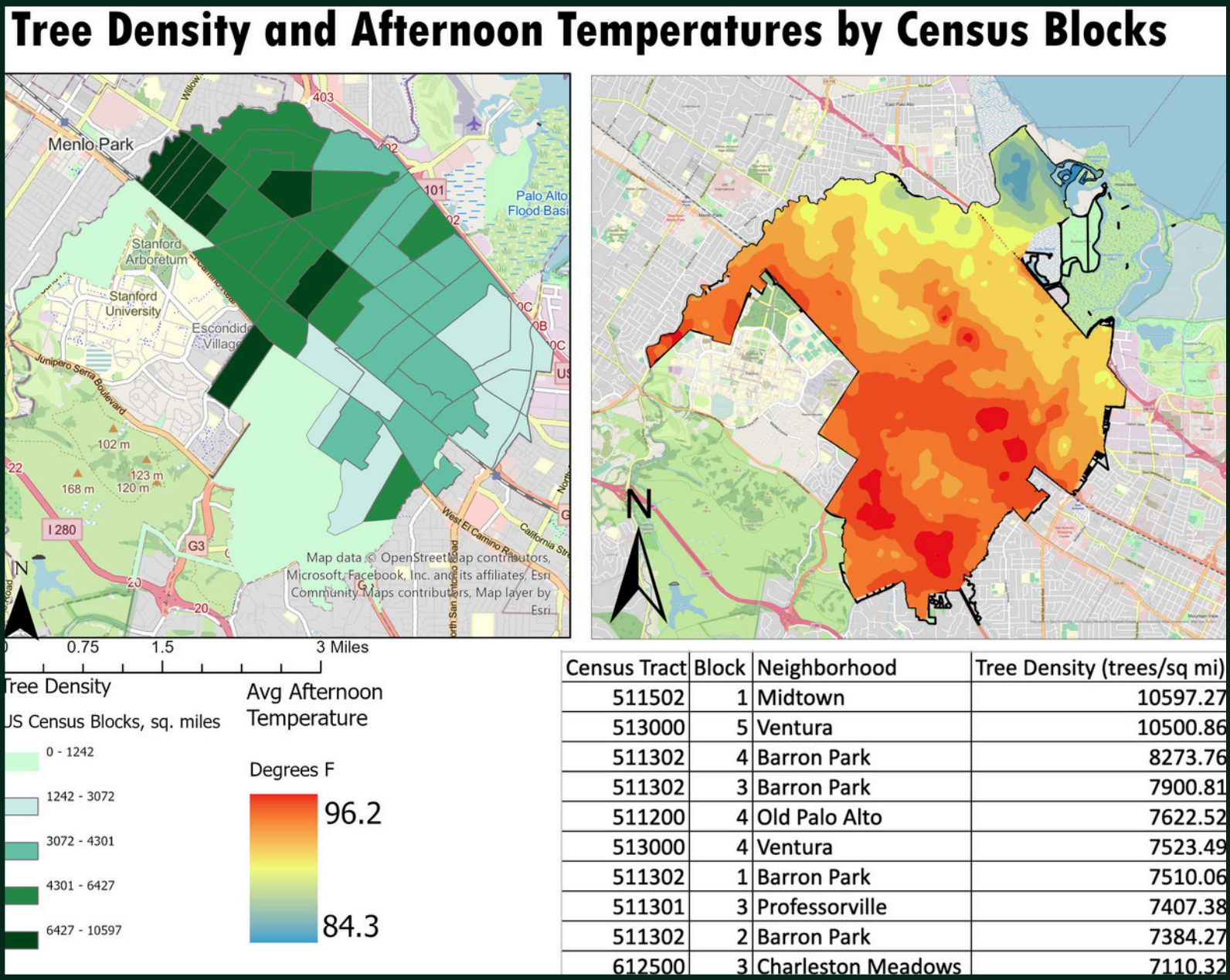
RACE

INCOME

AGE

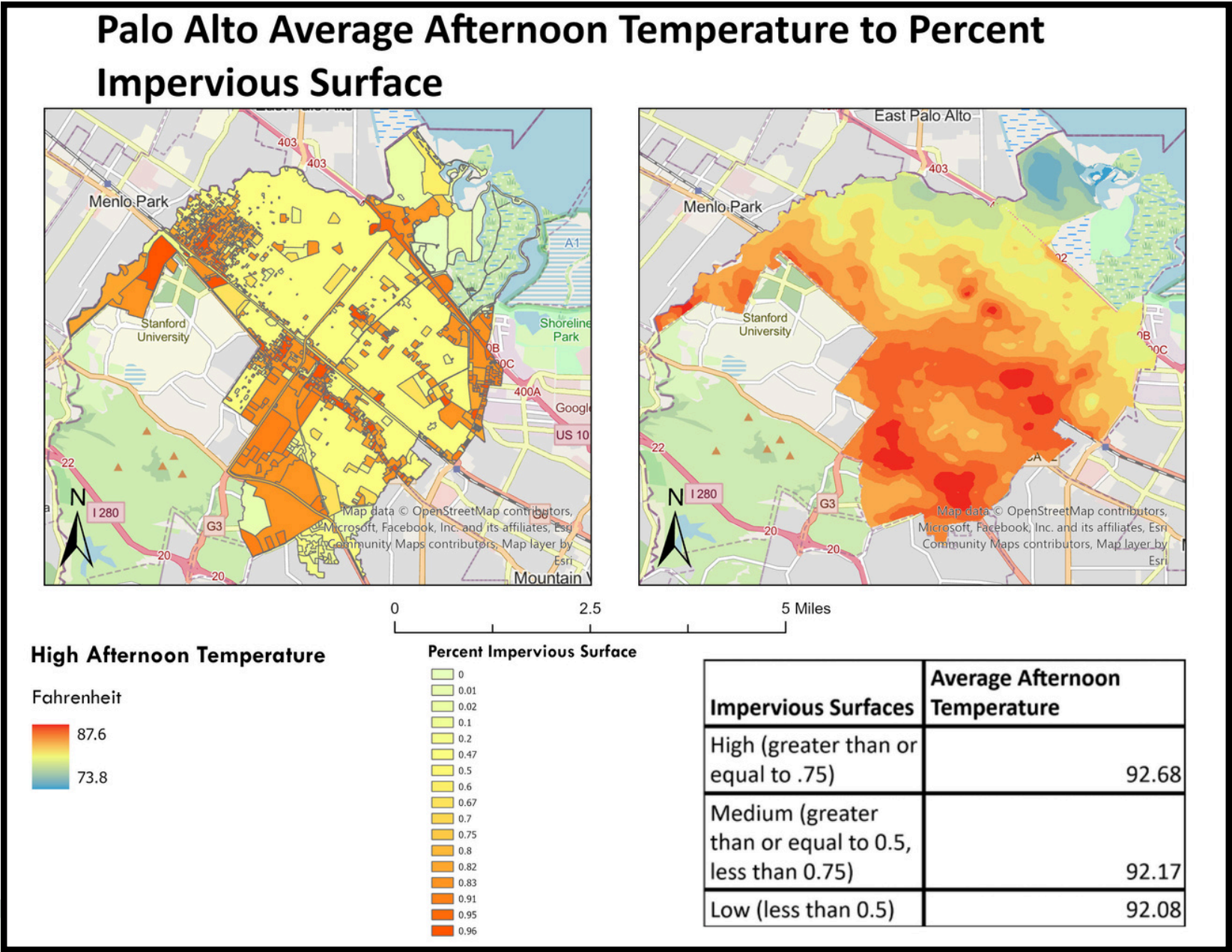
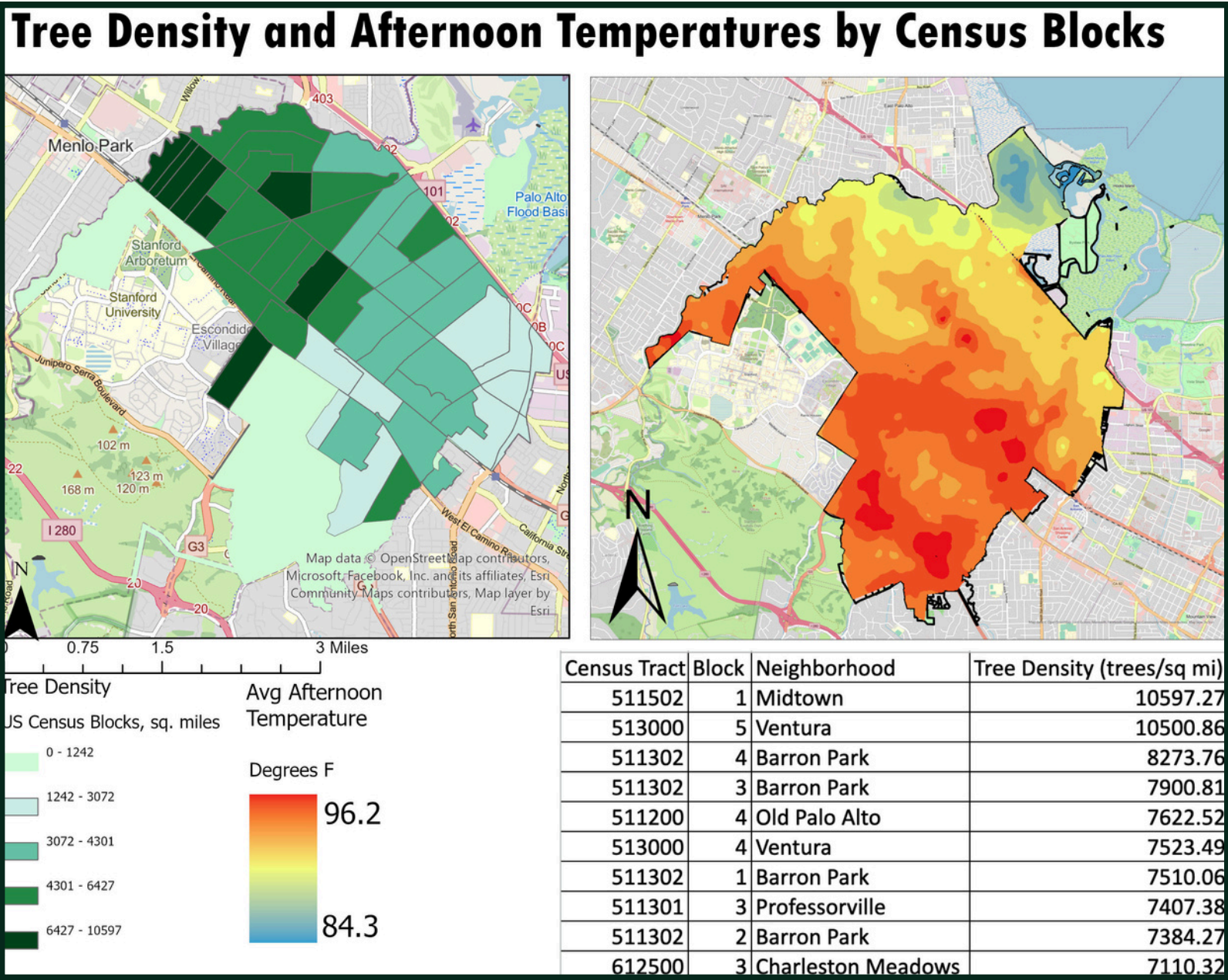
GENDER

MAPS: BUILT SPACE



LOWER TREE CANOPY =
HIGHER TEMPRATURE

MAPS: BUILT SPACE

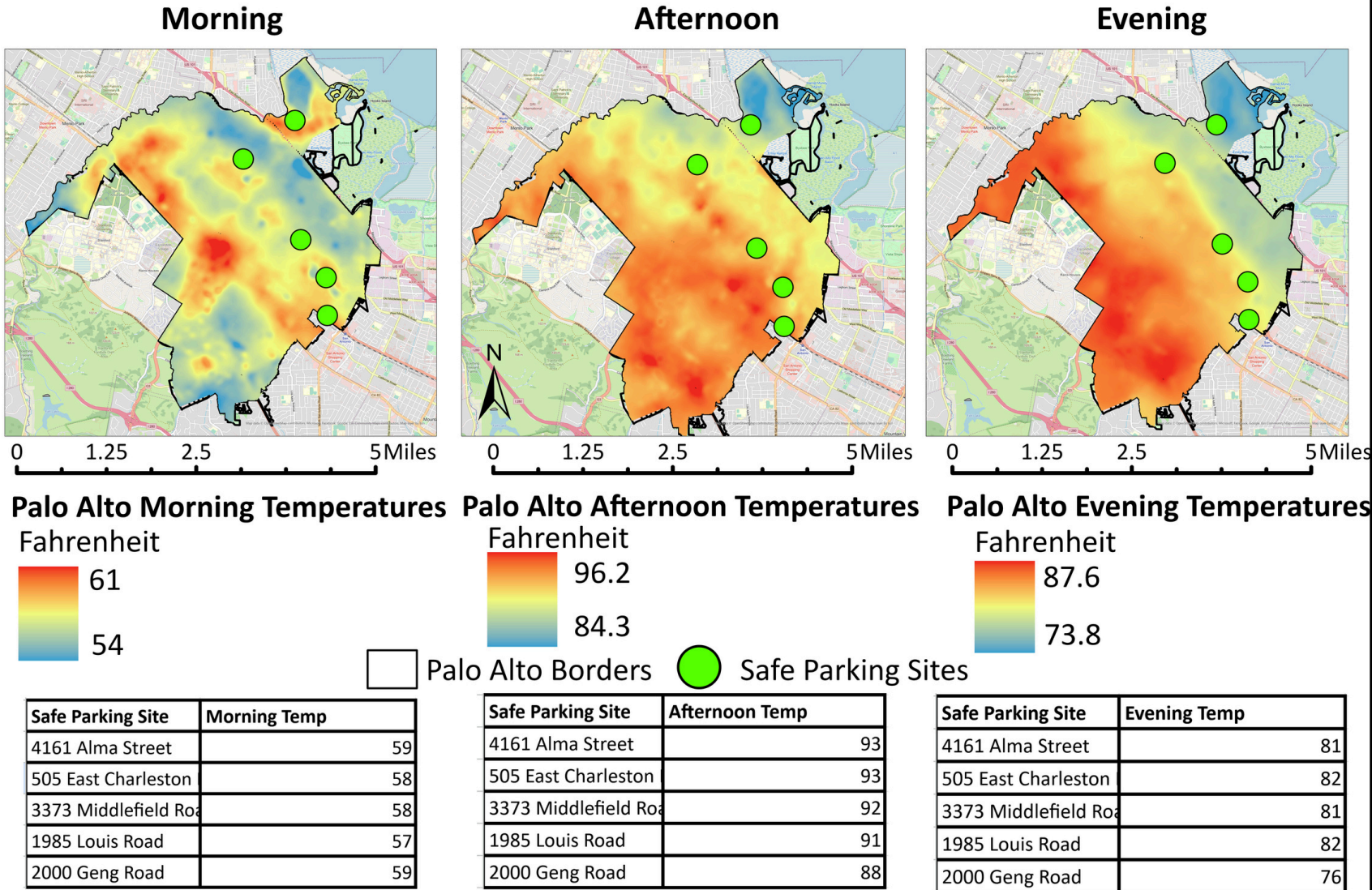


LOWER TREE CANOPY =
HIGHER TEMPRATURE

GREATER % IMPERVIOUS =
HIGHER TEMPERATURE

MAPS: BUILT SPACE

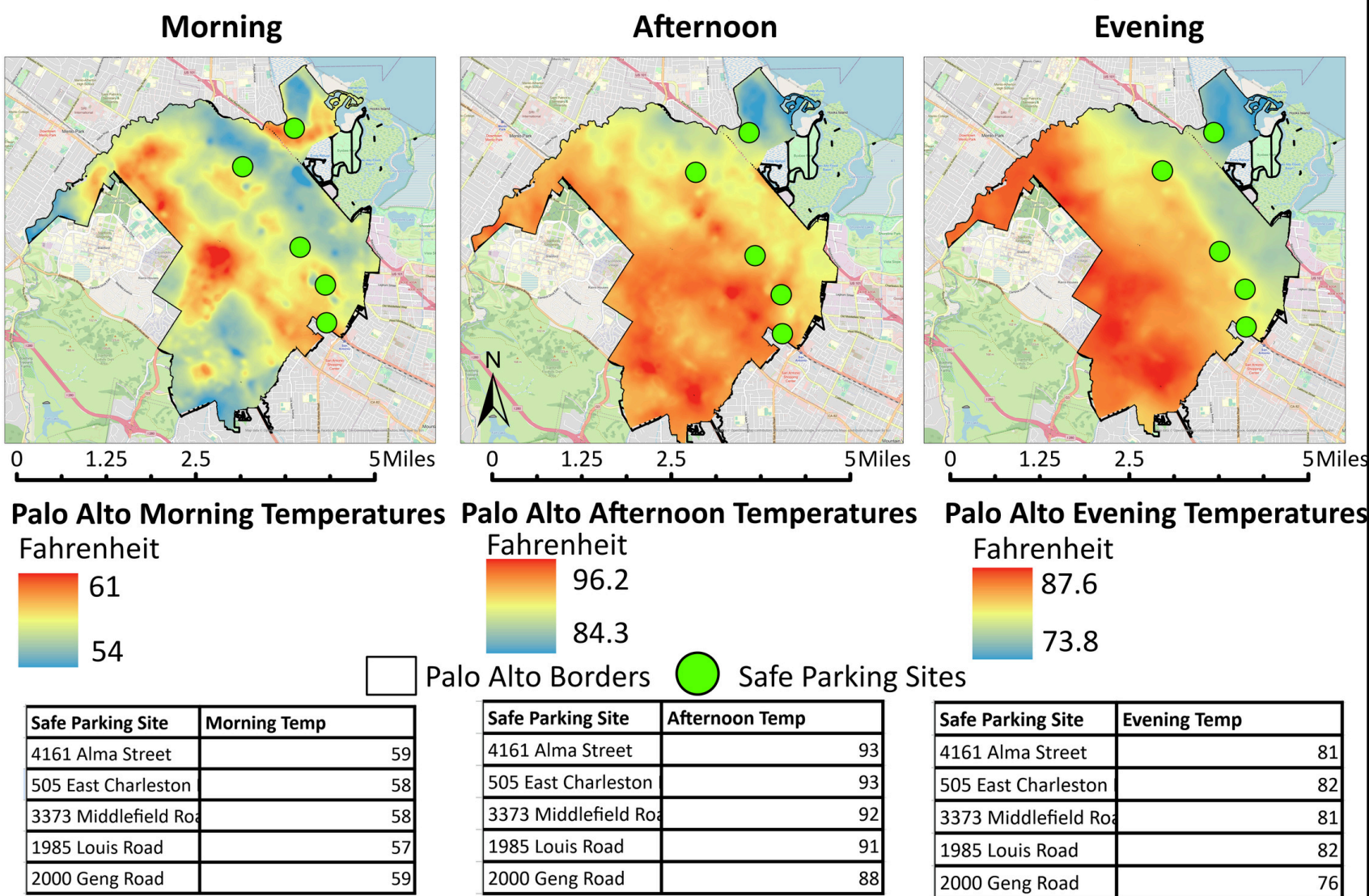
Palo Alto Safe Parking Sites and Temperature



SAFE PARKING SITES OUTSIDE
EXTREME HEAT AREAS

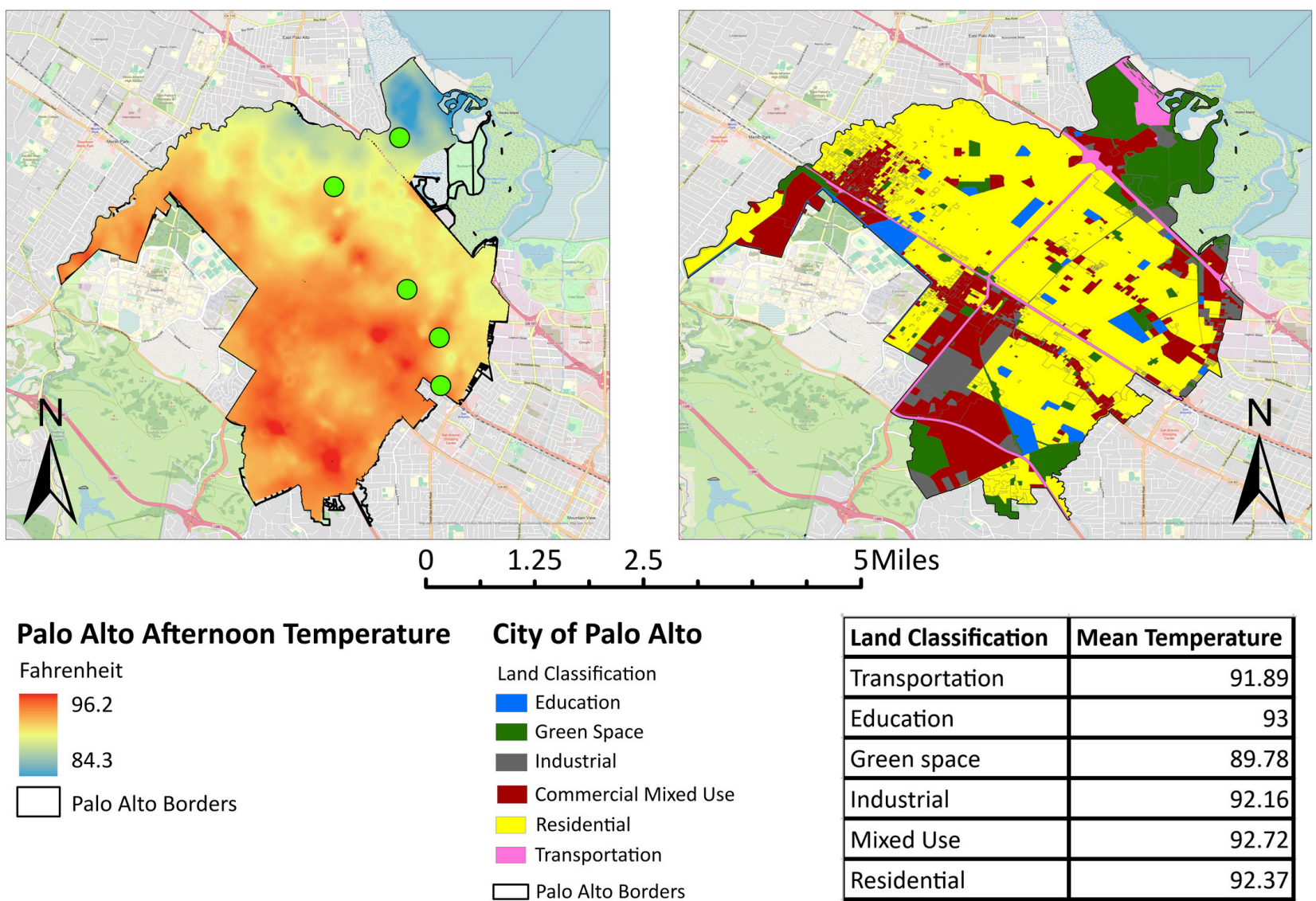
MAPS: BUILT SPACE

Palo Alto Safe Parking Sites and Temperature



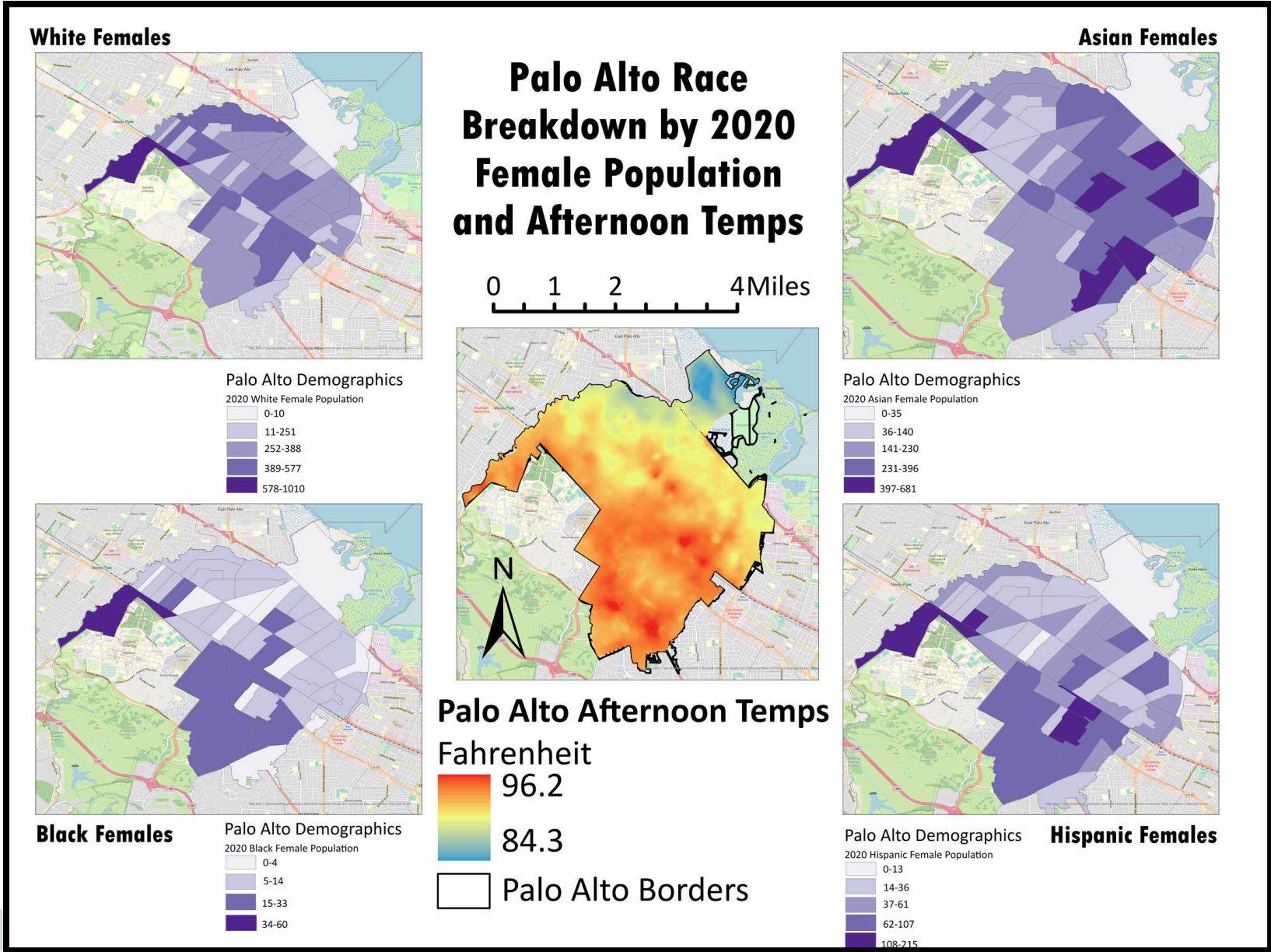
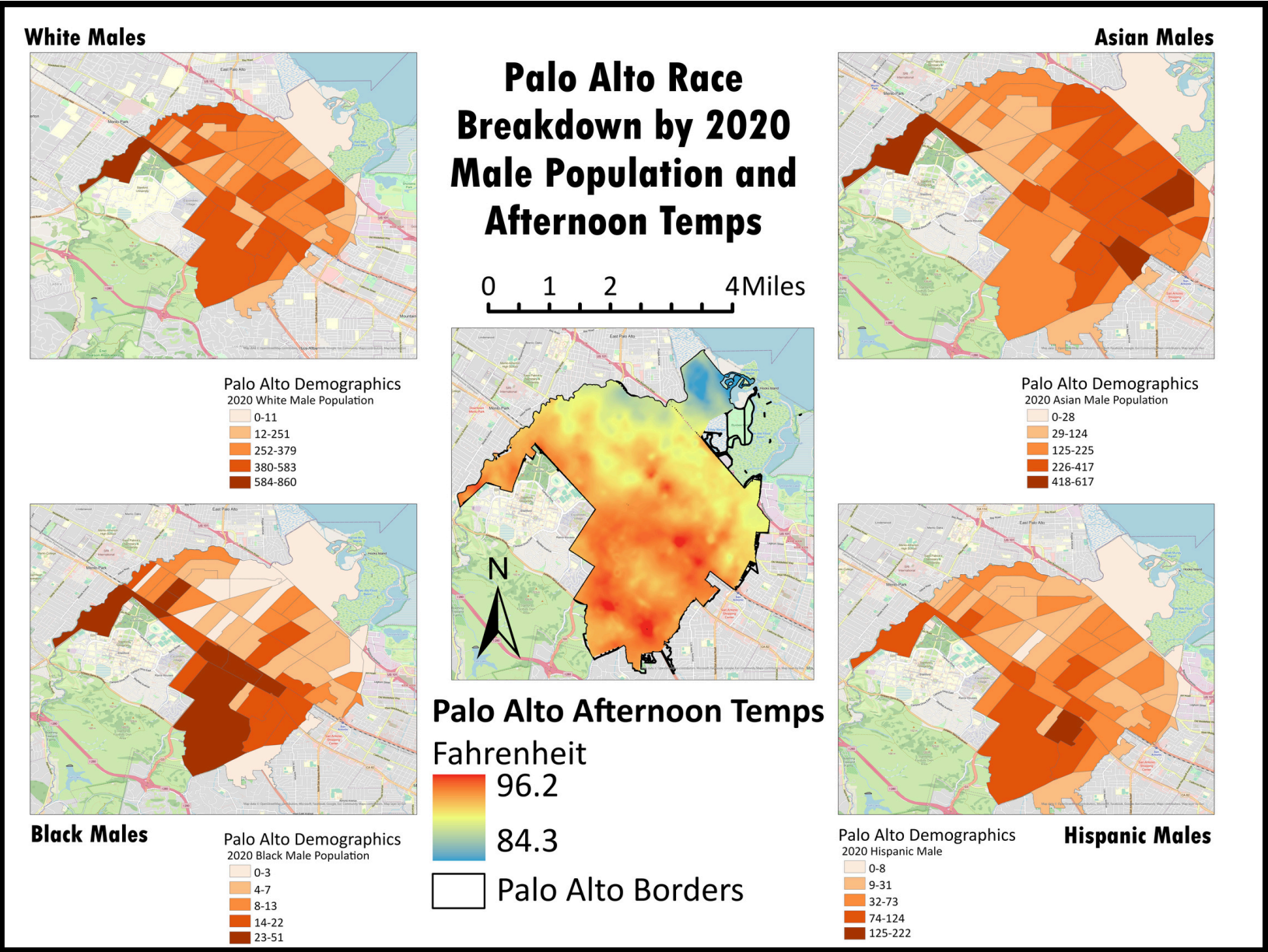
SAFE PARKING SITES OUTSIDE
EXTREME HEAT AREAS

Palo Alto Average Afternoon Temperature by Land Classification



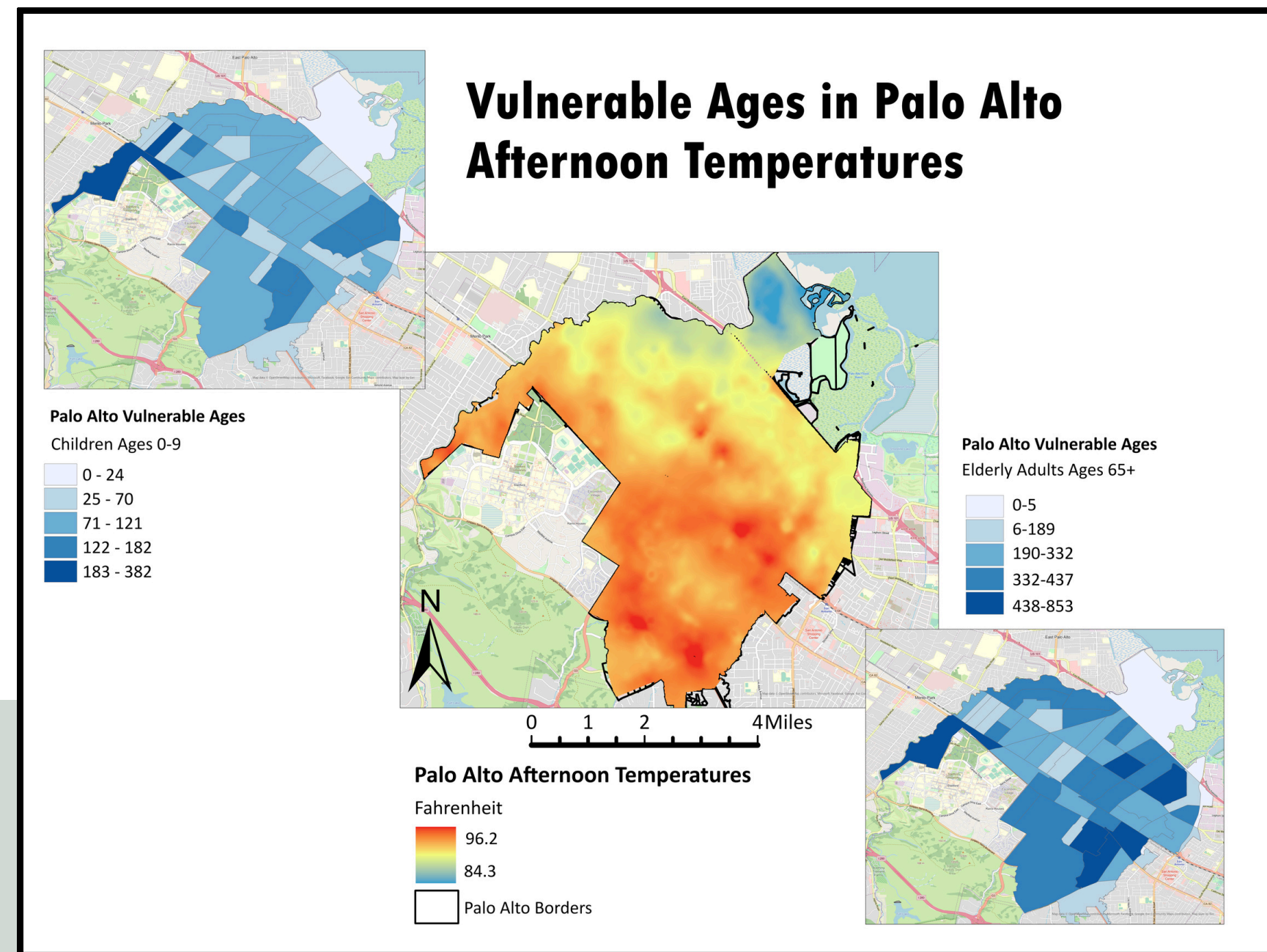
HIGHEST TEMPERATURE IN
COMMERCIAL AREAS

MAPS: RACE/GENDER



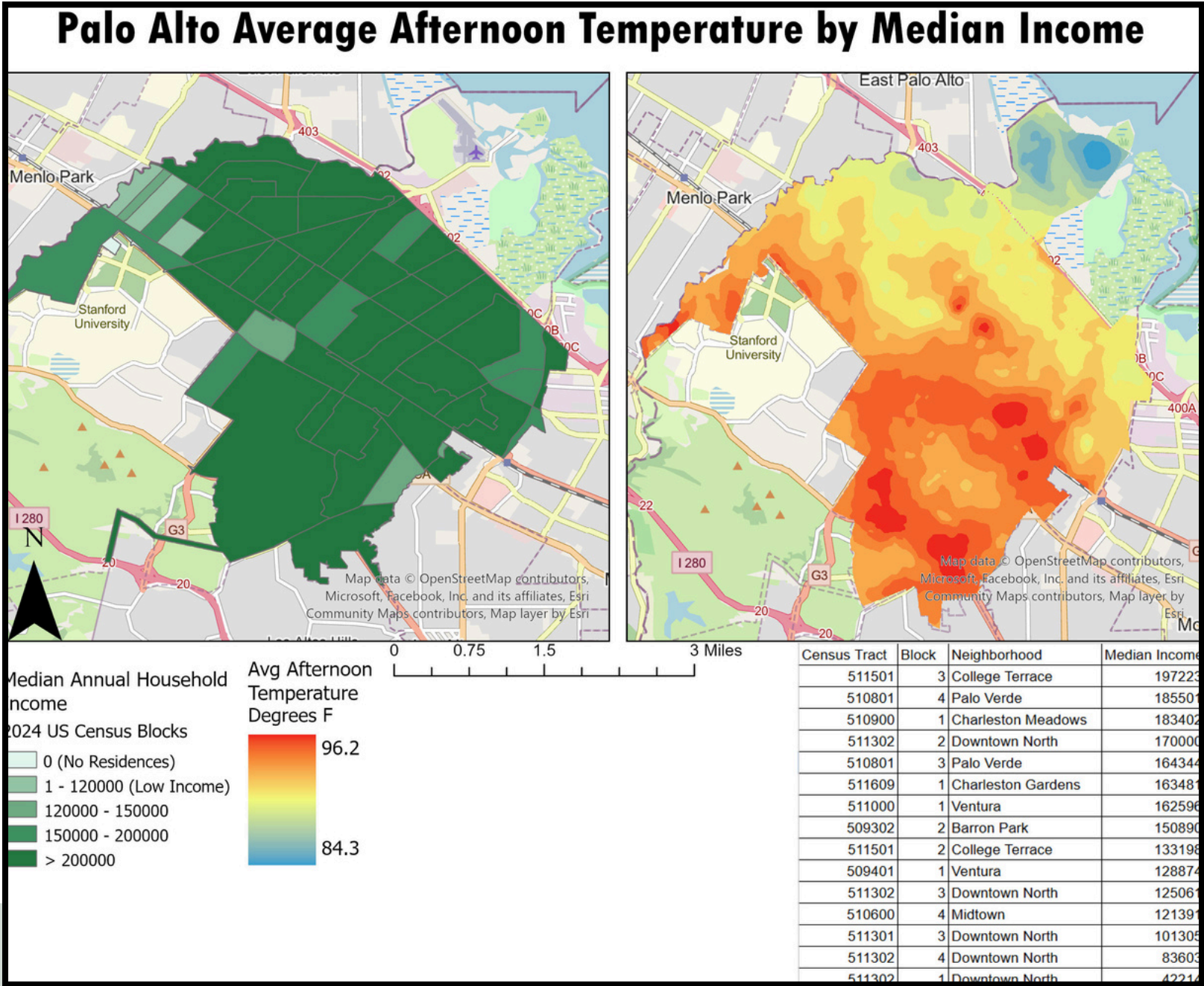
BLACK AND HISPANIC POPULATIONS LIVE IN THE HOTTEST AREAS

MAPS: AGE AND HEAT



ELDERLY ADULTS CONCENTRATED IN HOTTER AREAS.
CHILDREN ARE IN LESS HOT AREAS

MAPS: INCOME



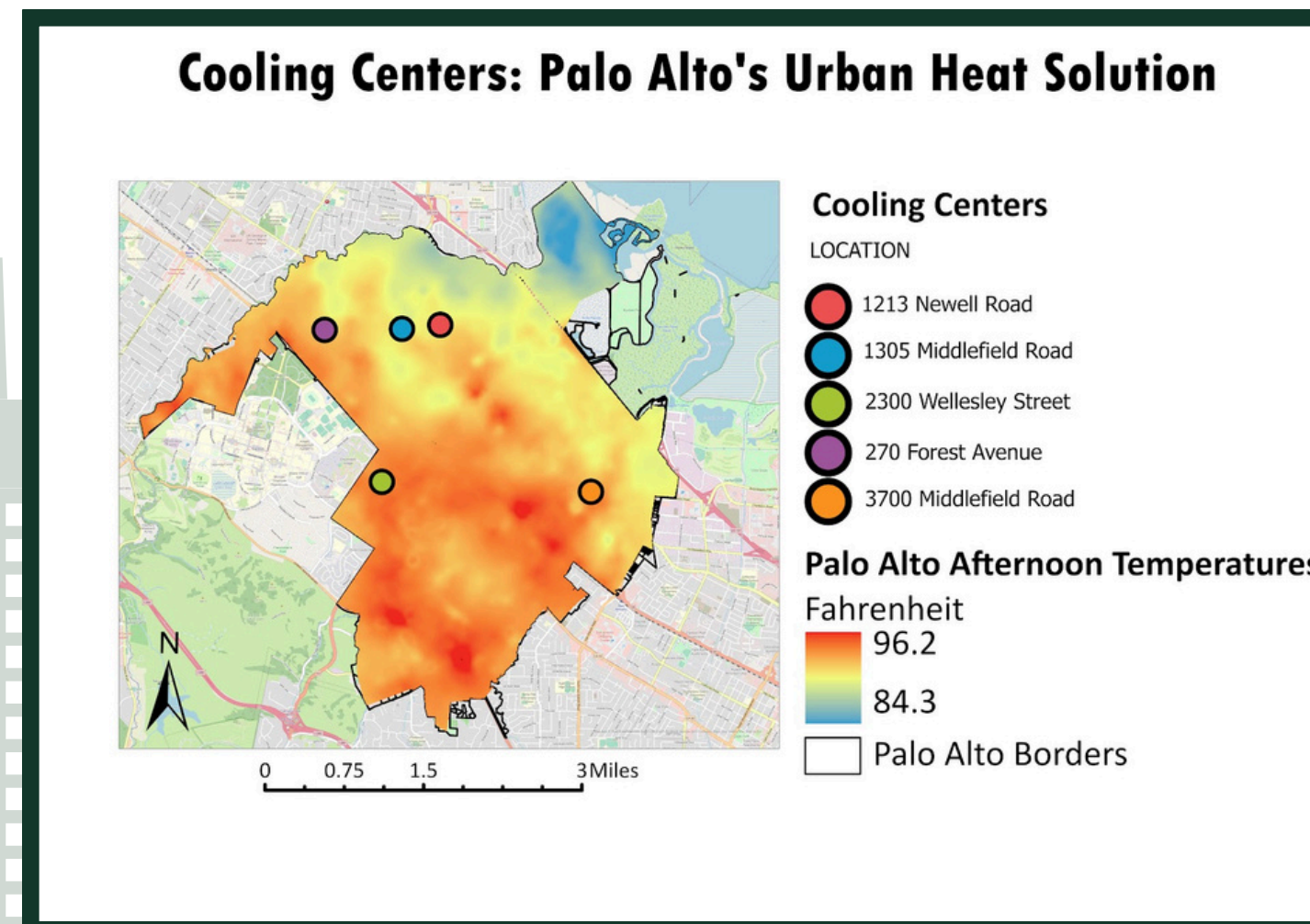
MOST RESIDENTS CAN AFFORD RETROFITTING

CURRENT SOLUTIONS: COOLING CENTERS

- 5 locations
- open during business hours
- not in hottest areas



Photo credit: KRON4



COOLING SOLUTIONS

Source: "Sustainable Cooling Handbook..."

Cool Roofs

- coating or shingles with high solar reflectance
- white coating has up to 90% reflectance
- 50 degrees cooler than a conventional roof

When sunlight hits a black roof:



heats the atmosphere



heats the city air

5%



4.5%

heats the building

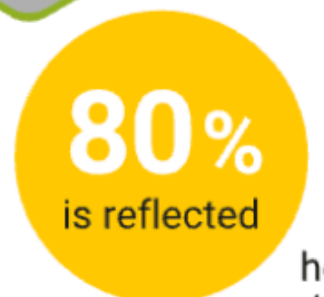
When sunlight hits a white roof:



10%



8%



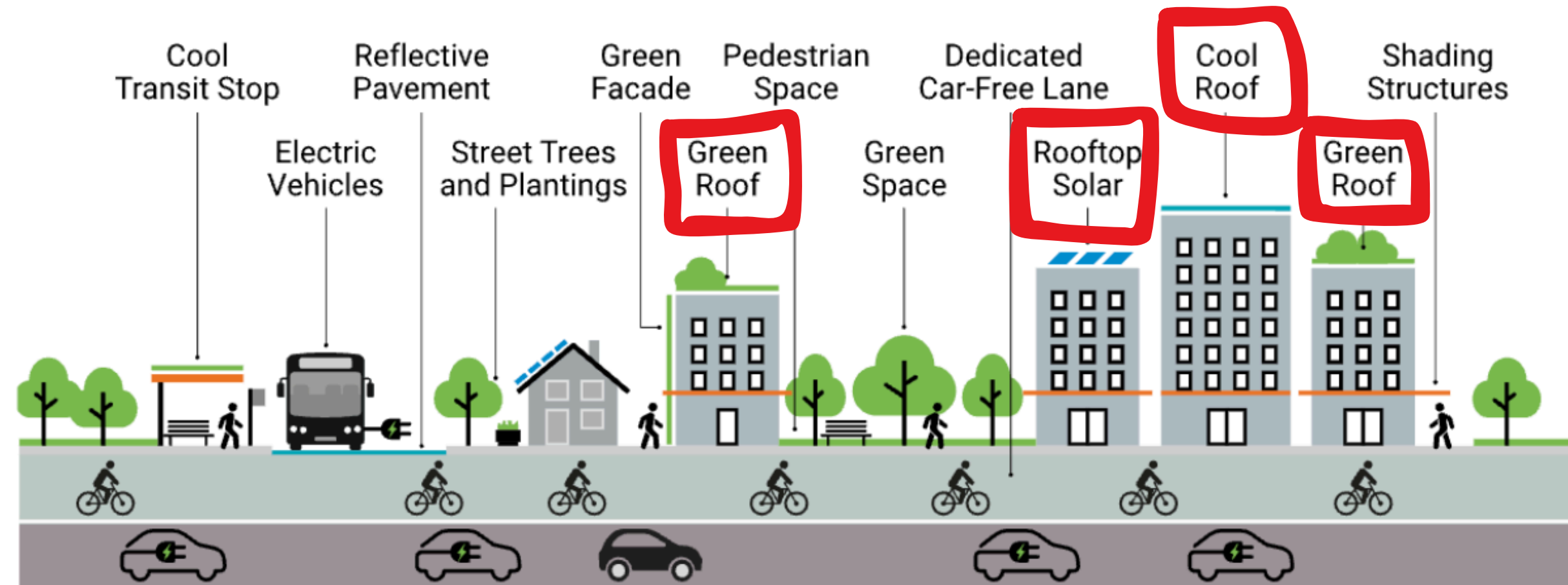
1.5%



COOLING SOLUTIONS

Cool Roof Benefits

- reduces energy needs, refrigeration emissions, and energy costs
- reduces heat island effect
- lowers peak electricity demand



Source: "Sustainable Cooling Handbook..."

COOLING SOLUTIONS

Cool Roof Costs

- coating: \$0.15 to \$2.50 per sq. ft
- membrane: \$1.50 to \$3 per sq. ft
- cool shingles costs vary 
- Payback time: 0-8 yrs
- Cost-benefit analysis: 4.2-8.2 (Source: ["What are cool roofs..."](#))

Roofing Material	Cost (per Sq. Ft.)
Asphalt shingles	\$0.70-\$4
Metal shingles	\$4-\$30
Wood shakes	\$4-\$6
Terra cotta	\$5-\$10
Concrete	\$2-\$4

Source: ["What are cool roofs..."](#)



COOLING SOLUTIONS

Cool Roofs in PA

- PA has ideal climate for cool roofs: warm and dry
- Expand on existing residential cool roof requirement to include commercial and educational buildings

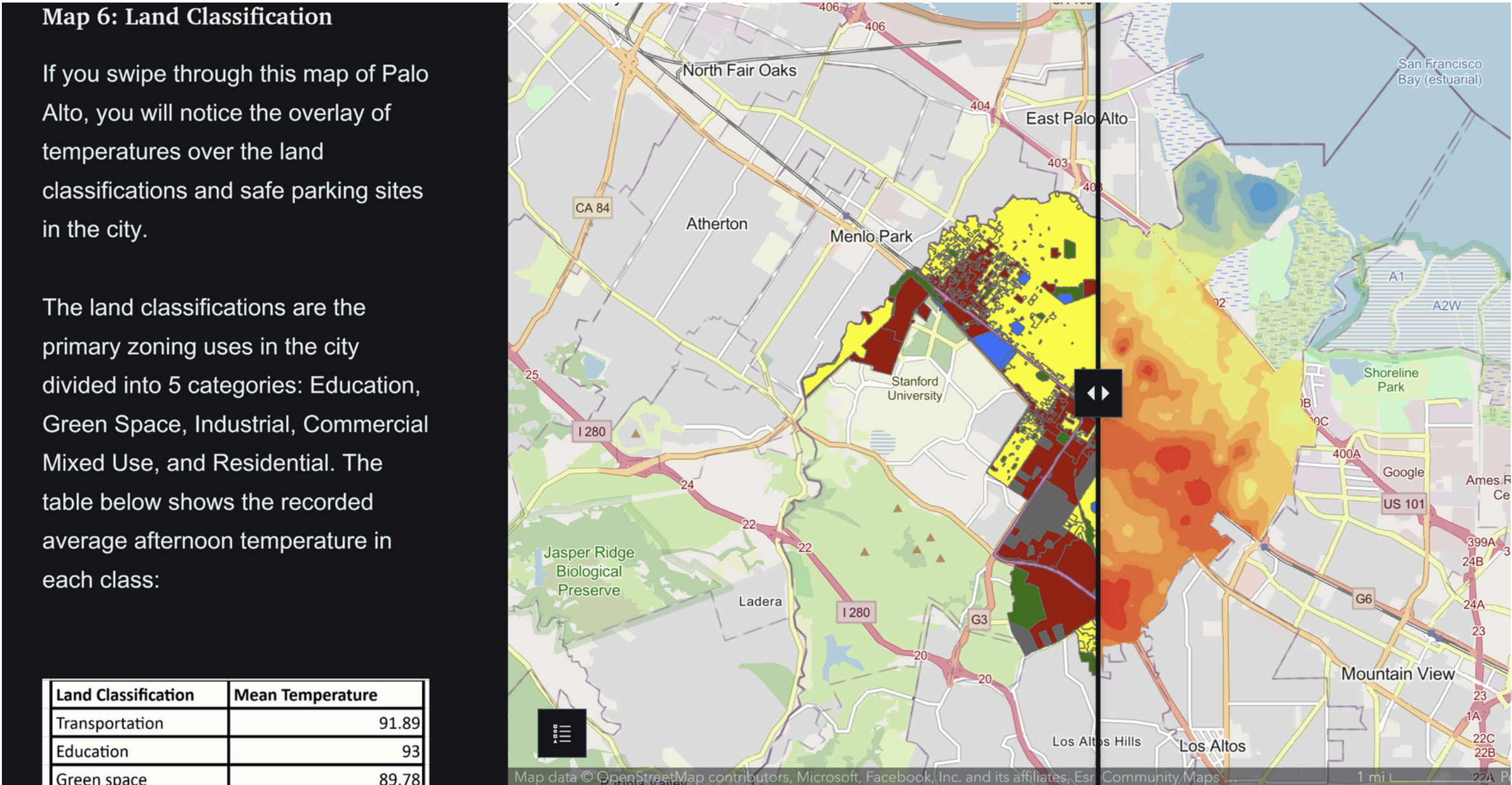


Source: ["Downtown Palo Alto"](#)



STORYMAP

- ESRI's interactive tool for map communication
- swipe over maps to compare data
- similar format to this presentation, but much more replicable



CONCLUSIONS



BLACK, HISPANIC,
AND ELDERLY
POPULATIONS ARE
MOST AT RISK



COOLING
CENTERS ARE
EFFECTIVE
STRATEGIES
BUT COULD BE
EXPANDED



COOL ROOFS
ARE ONE
EFFECTIVE
STRATEGY TO
MITIGATE THE
EFFECT OF
EXTREME
HEAT

THANK YOU!
QUESTIONS?



CITATIONS

- C40 Cities Finance Facility. Durban Metro Hydrological Vulnerability Assessment by Modelling as a Demonstration Prototype to Assist in the Rehabilitation of Rivers in the Metro. October 2020, <https://c40.my.salesforce.com/sfc/p/#36000001Enhz/a/1Q0000001poV/4qoS5CMFocrdhxvPzVteJb7XgCgdDYipLNzJwvxDkls>.
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- Hot Weather Safety Tips & cooling centers to support community health – city of Palo Alto, CA, August 30, 2022. <https://www.paloalto.gov/News-Articles/City-Manager/Hot-Weather-Safety-Tips-Cooling-Center-Locations-to-Support-Community-Health>.
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- Ogletree, Allie. "What Is a Cool Roof and How Does It Work?" Angi, 3 Mar. 2025, <https://www.angi.com/articles/beat-heat-energy-efficient-cool-roof.htm>.
- USAFacts Team. "How Many People Die from Extreme Heat in the US?" USAFacts, August 22, 2023. <https://usafacts.org/articles/how-many-people-die-from-extreme-heat-in-the-us/>.