THE OHIO STATE UNIVERSITY

Death by Design

The science behind why our streets are so dangerous

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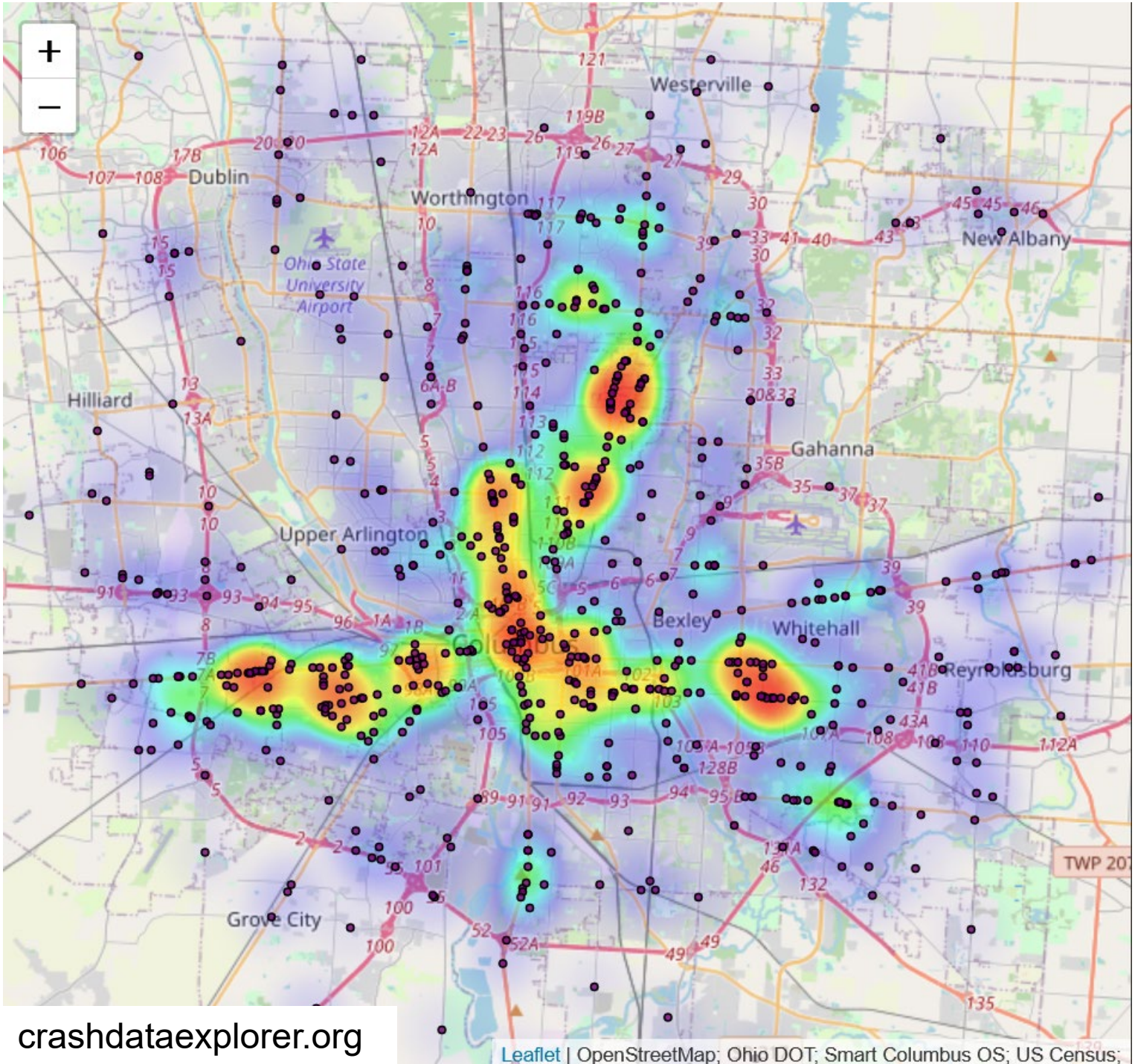
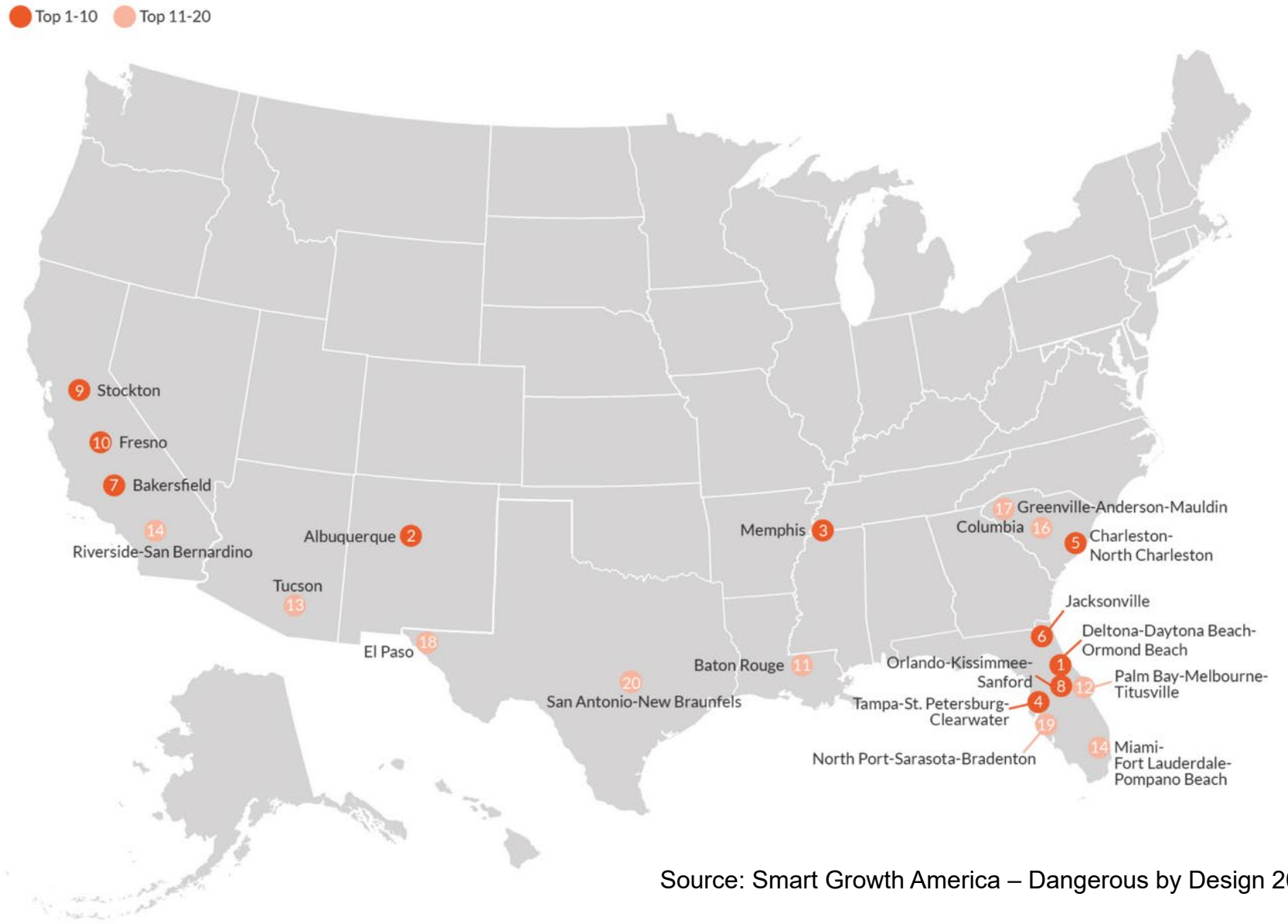
Central Ohio Transportation Safety Forum

21 September 2023


Westerville
Dublin
Worthington
New Albany
Ohio State University Airport
Hilliard
Gahanna
Upper Arlington
Bexley
Whitehall
Reynoldsburg
Grove City
TWP 207
crashdataexplorer.org
Leaflet | OpenStreetMap; Ohio DOT; Smart Columbus OS; US Census;

THE TOP 20

Most dangerous metropolitan areas for pedestrians (2016-2020)



Source: Smart Growth America – Dangerous by Design 2022

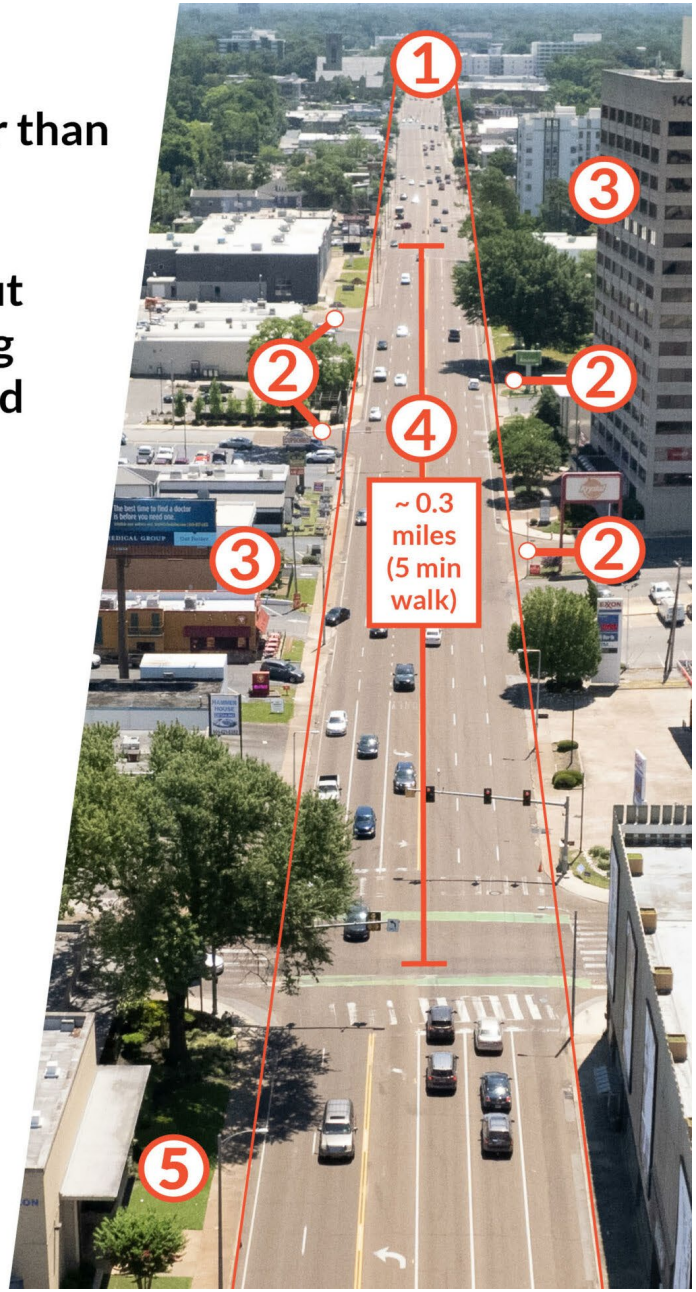
1. Design can be more influential on behavior than speed limits.

2. Other streets regularly intersect Union, but lack crosswalks or signals, because keeping vehicles from stopping (speed) is prioritized ahead of providing frequent crossings (safety).

3. Numerous destinations means that more people will be present.

4. Marked, signalized crosswalks are located as much as 0.4 miles apart, potentially requiring a 10-minute round trip to reach a destination that's directly across the street.

5. Sidewalks exist, but as an afterthought.



Photos by Forever Ready Productions

Source: Smart Growth America – Dangerous by Design 2022

Why design creates danger

Risk Compensation

- Safety improvements lead to riskier behaviors

Safe Systems

- Built environment shapes errors by drivers

Self Explaining Roads

- Drivers are guided by perceptions of road environment

Evolution

- Our brains cannot rationally deal with speed (yet)

This section of Morse Road in Columbus looks like a highway to drivers -- and had a high rate of serious crashes.

Photo: Google

May 12, 2022

The deadly impact of urban streets that look like highways

More crashes on roads where drivers think they can drive fast

Stiles, J., Li, Y. and Miller, H.J. (2022) "How does street space influence crash frequency? An analysis using segmented street view imagery," ***Environment and Planning B: Urban Analytics and City Science***, 49, 2467-2483.

How street space influences crash frequency

Research questions

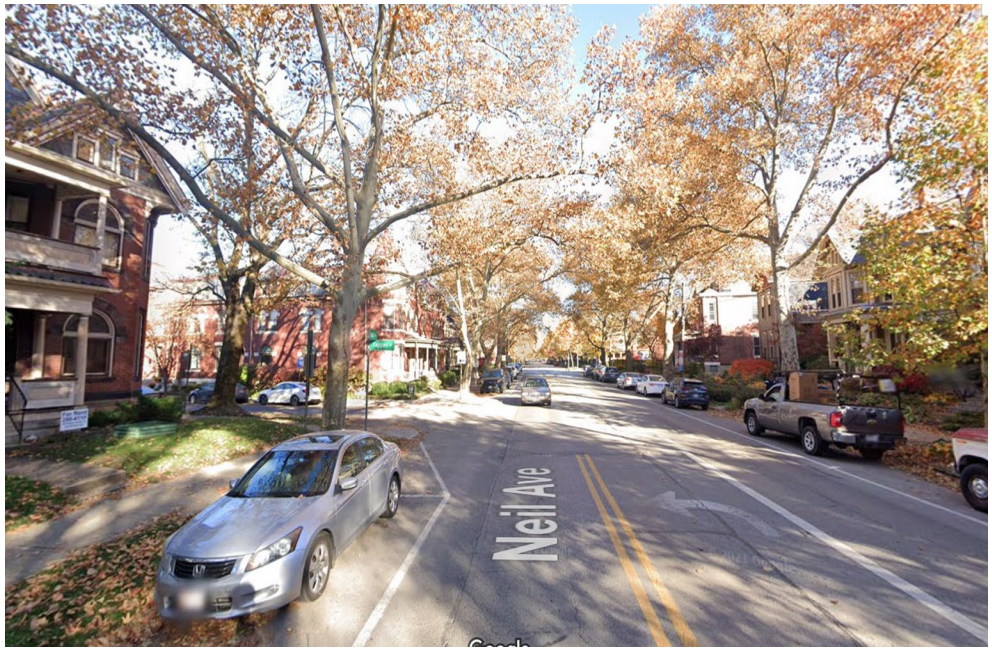
1. How do specific street space features influence serious crash frequency?
2. How do street space features combined (forming visual built environments) influence serious crash frequency?

Data

- Google Street View imagery
- Land use, infrastructure and crash data
- Columbus, Ohio 2018-2019

Street views in Columbus, Ohio

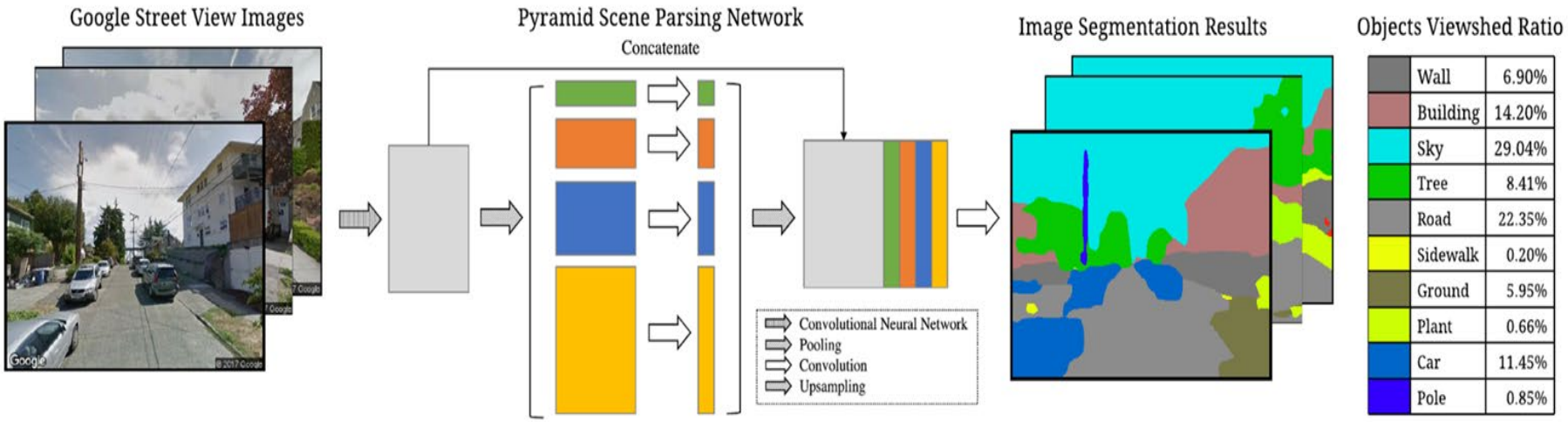
Broad Street in The Hilltop

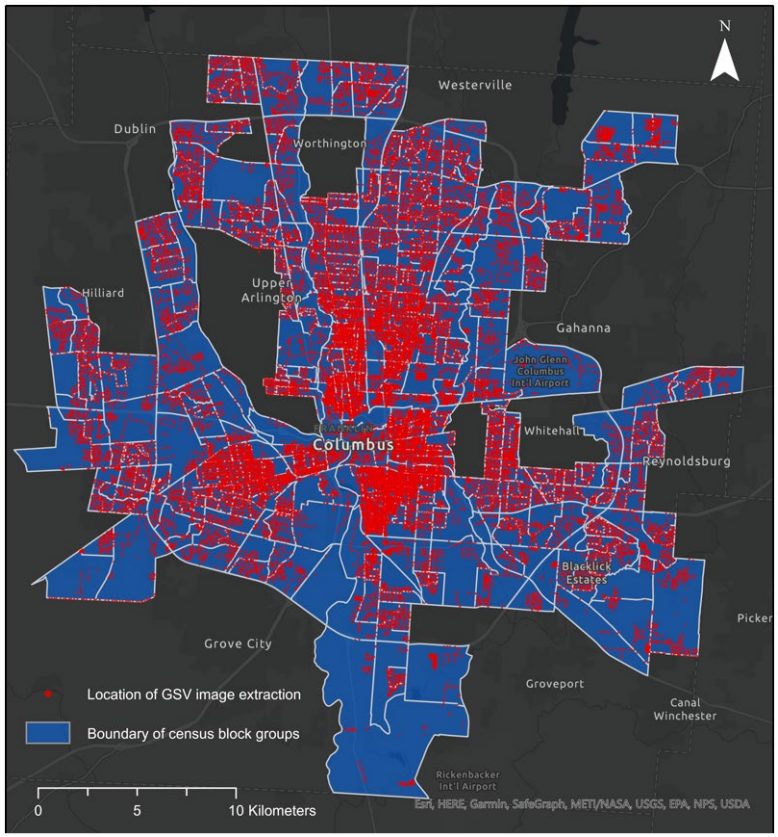


Neil Ave in Victorian Village

Street views segmented into data by PSPNet

Machine learning algorithm

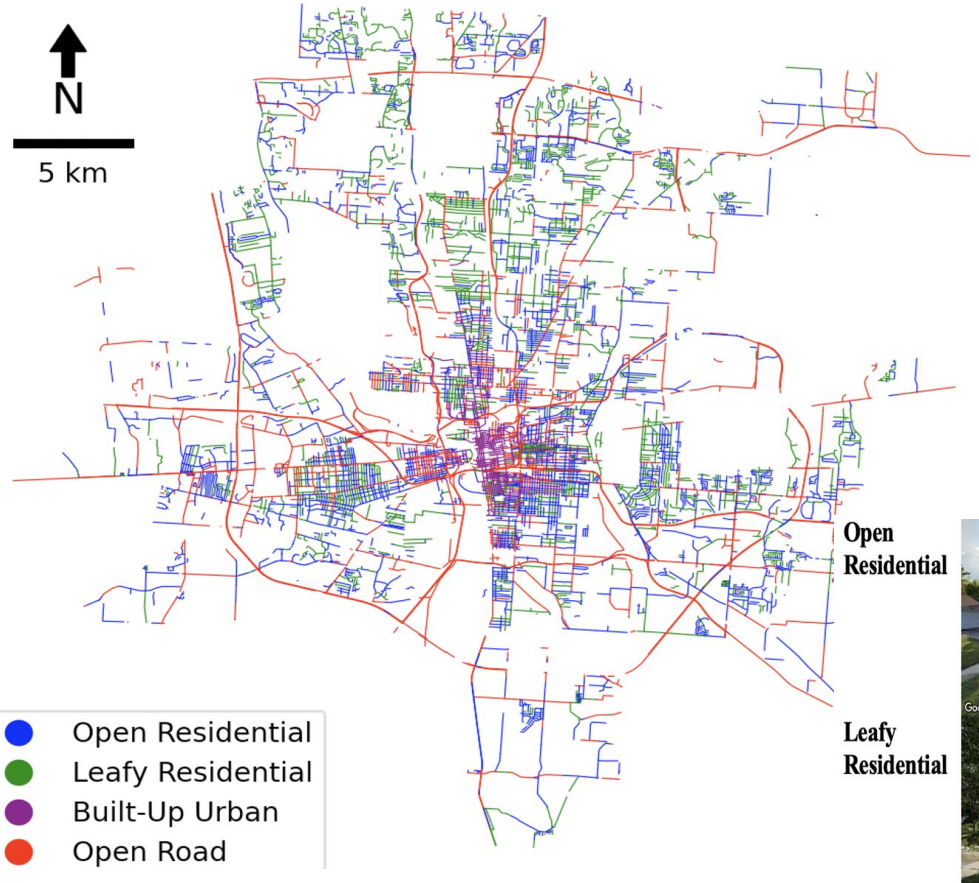




Google Street View Images

Most common street space elements on Columbus road segments (n=5997)

1. Sky (27.9%)	6. Sidewalk (2.3%)	11. Wall (0.76%)	16. Pole (0.14%)	21. Stairs (0.05%)
2. Road (24.6%)	7. Earth (1.8%)	12. Path (0.77%)	17. Sign (0.11%)	22. Trashcan (0.04%)
3. Tree (18.0%)	8. Car (1.6%)	13. Fence (0.69%)	18. Floor (0.10%)	23. Dirt (0.04%)
4. Grass (12.1%)	9. House (1.1%)	14. Field (0.31%)	19. Truck (0.07%)	24. Mountain (0.03%)
5. Building (6.1%)	10. Plant (0.94%)	15. Ceiling (0.15%)	20. Bridge (0.05%)	25. Van (0.03%)



Four Types of Street Spaces

Associated with Increased Crashes	Associated with Decreased Crashes
Controls • Highways, arterial, collector roads ** • Number of lanes** • Number of commercial land uses** • Number of bus stops** • Area population density**	**Controls** • Presence of medians** • Shoulder width** • Area household income** • Mixed area use residential+commercial**
Street features • Signs**	**Street features** • Trash cans**
Visual environment • Open Road** • Built-up Urban*	**Visual environment** • Leafy Residential*

*** Significant at the p<0.01 level; * Significant at the p<0.05 level;*

Discussion

"Stroads"

Charles Marohn, StrongTowns.org

The unsafe hybrid of a **street** (for people)
and a **road** (for fast movement)

Discussion

Ways to improve safety on "open roads"

1. Reduce width available to motor vehicles: Replace with protected bike/ped infrastructure
2. Add street trees: Trees are the answer!
3. Buildings in front, cars in back: Reconsider access and parking to create more enclosed streetscapes
4. Complexity ***or*** speed: Streets ***or*** roads – no "stroads"

What can we do more generally?

- Update archaic design protocols and standards that assume we can design for rational and error-free driving at high speeds

- Replace with
  - **Safe systems approach:** Errors happen!
  - **Complete Streets**: Design streets for all users
  - **New standards**: Less AASHTO more NACTO

AASHTO: American Association of State Highway and Transportation Officials
NACTO: National Association of City Transportation Officials

Thank you!

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