

Agenda



- 1 Project and Schedule Update
- 2 Needs Analysis Initial Results
 - Equity Factor 9: Communities of Concern
 - Inv. Need Category 1a: Bicycle
 - Inv. Need Category 1b: Pedestrian
 - Equity Factor 6: Cyclists and Pedestrians
 - Inv. Need Category 5: Safety and Security
 - Inv. Need Category 7: Maintenance
- 3 Next Steps

1

Project and Schedule Update

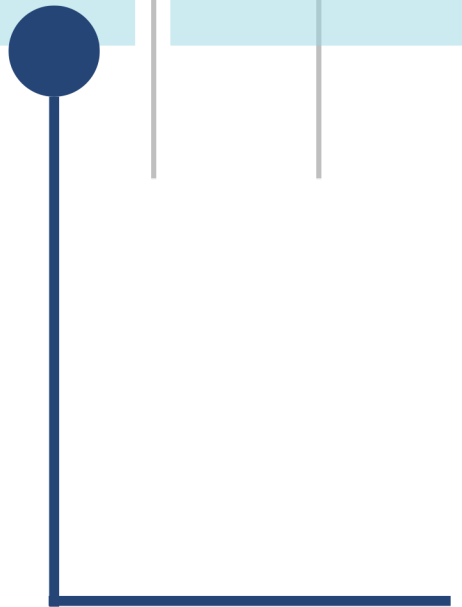
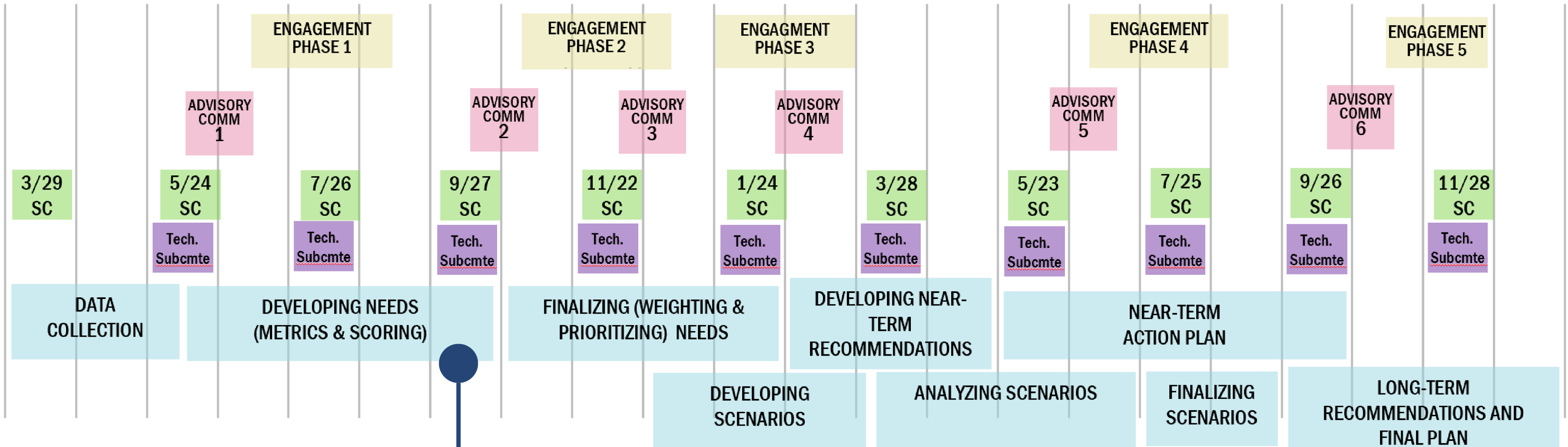


2022

2023



Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec



We are here: Producing first cut of needs scores

Needs Analysis Work Sessions

Thu Sep. 15

9:30 - 11:00

- **EF 9: Communities of Concern**
- **INC 1a: Bicycle**
- **INC 1b: Pedestrian**
- **EF 6: Cyclists & Peds**
- **INC 5: Safety/Security**
- **INC 7: Maintenance**

Fri Sep. 23

2:00 - 4:00

- INC 2: Transit
- EF 7: Transit
- EF 1: Redlining
- EF 2: Dissection of Neighborhoods
- EF 3: Urban Renewal
- EF 4: Inner Ring Suburbs

Tue Sep. 27

3:00 - 4:15

- INC 4: Land Use
- INC 6: Connectivity
- INC 8: Economic Development
- EF 5: Car-centric Planning

Thu Oct. 6

2:00 - 3:00

- INC 3: Freight
- INC 9: Technology
- INC 10: Sustainability
- EF 8: Climate Equity
- EF 10: Climate Resiliency

2

Needs Analysis Initial Results



Today we will cover:

Investment need categories

→ Pedestrian



→ Bike



Transit



Freight



Land Use



→ Safety



Connectivity



→ Maintenance



Economic Development



Technology



Sustainability



Equity Factors

- 1 Improve access to housing, jobs, services, recreation, and education, addressing remaining inequities created by redlining.
- 2 Reconnect and revitalize communities to address inequities created by the highway system's dissection of neighborhoods.
- 3 Improve neighborhood connectivity and revitalize the fabric of the communities negatively impacted by urban renewal.
- 4 Improve access to housing, jobs, services, and education to address the isolation of low-income inner ring suburbs where families are pushed.
- 5 Address gaps in the multimodal network and utilize new planning tools to improve safety and accessibility deficiencies stemming from traditional car-centric planning.
- 6 Equitably increase the safety and comfort of cyclists and pedestrians, connecting communities of concern to opportunities.
- 7 Improve reliability of transit and other non-car services to increase access and remove barriers to opportunities for communities of concern.
- 8 Prioritize the needs of socially vulnerable users and address climate and environmental equity as identified in RVA Green 2050.
- 9 Prioritize densely populated areas of communities of concern including communities of color, low-income communities, senior and limited mobility populations, families traveling with children, and at-risk youth.
- 10 Focus on improving climate resiliency for the most impacted communities.

Equity Factor 9

Prioritize densely populated areas of **communities of concern including communities of color, low-income communities, senior and limited mobility populations, families traveling with children, and at-risk youth.**



Equity Factor 9: Communities of Concern

Prioritize densely populated areas of communities of concern including communities of color, low-income communities, senior and limited mobility populations, families traveling with children, and at-risk youth.

Components:

1. BIPOC
2. Low-income
3. Old age
4. Renters
5. Non-English primary language
6. At-risk youth
7. BIPOC renter
8. Limited mobility

Equity Factor 9: Communities of Concern

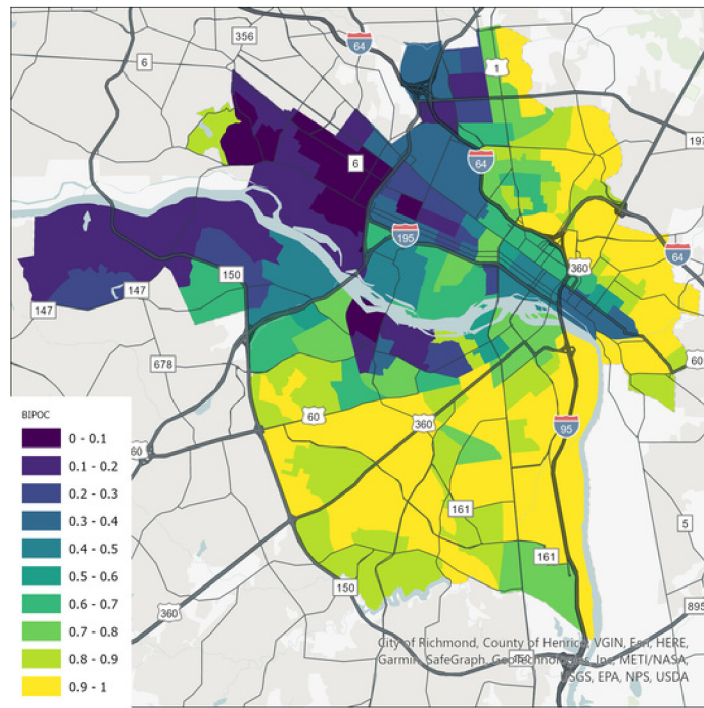
Prioritize densely populated areas of communities of concern including communities of color, low-income communities, senior and limited mobility populations, families traveling with children, and at-risk youth.

Component	Data Source
BIPOC	Replica population synthesis*
Low-income	
Old age	
Renters	
Non-English primary	
At-risk youth	
BIPOC renter	
Limited mobility	VDSS (assisted living facilities); VDH (nursing homes)

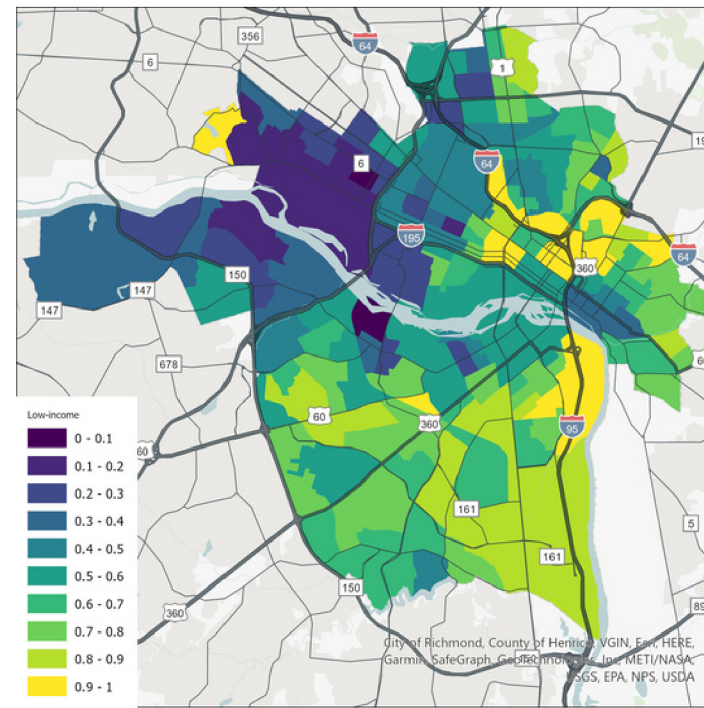
*Replica's population synthesis model incorporates data from US Census ACS, LODES, TIGER, and PUMS; the Census Transportation Planning Products Program (CTPP); the US Department of Education and National Center for Education Statistics; and proprietary building, parcel, and point of interest data

Equity Factor 9: Communities of Concern

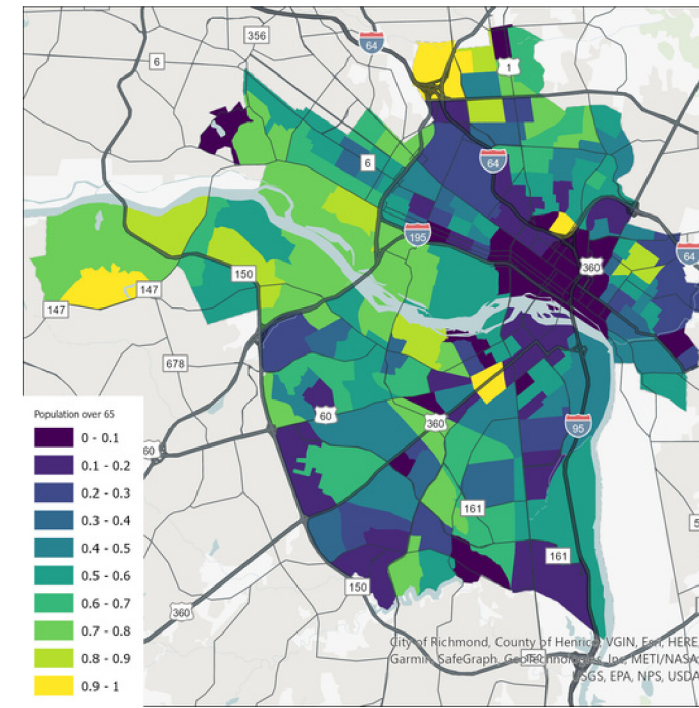
BIPOC



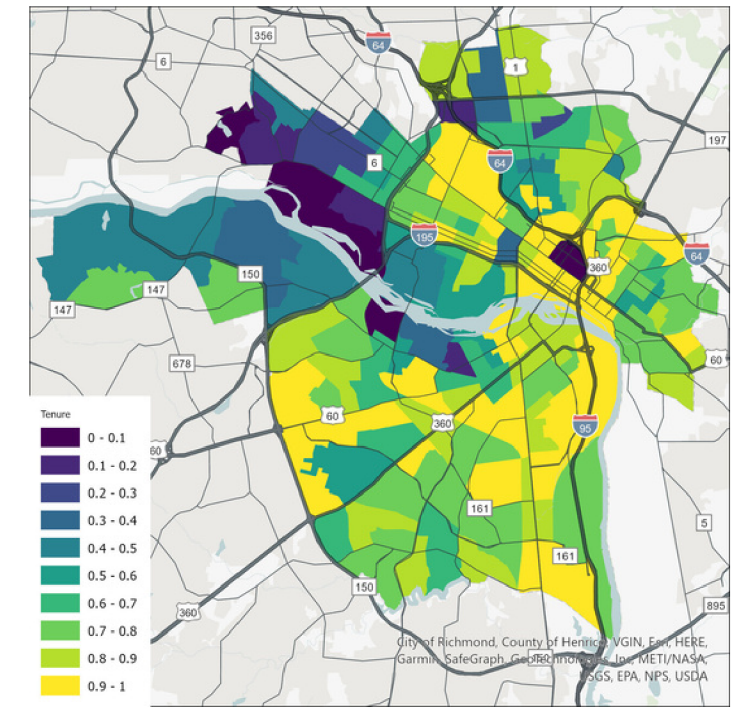
Low-income



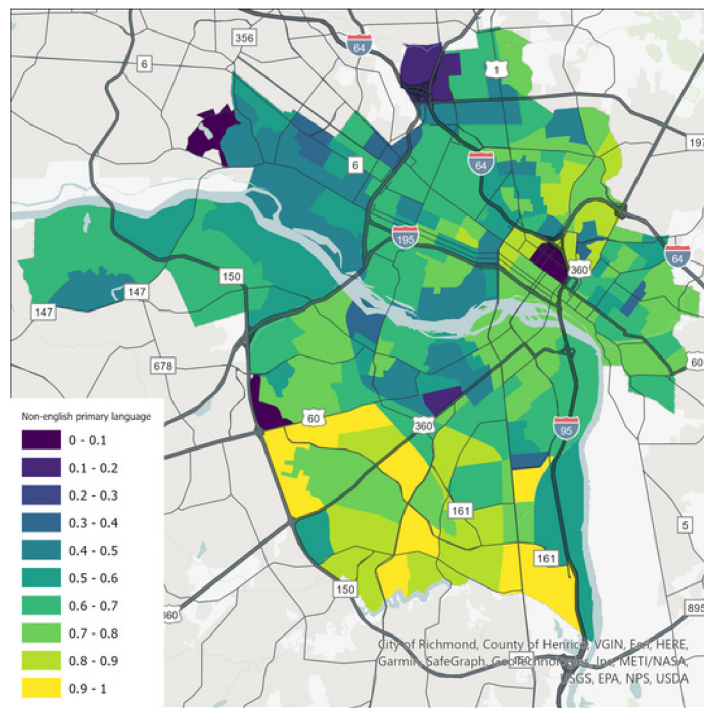
Population over 65



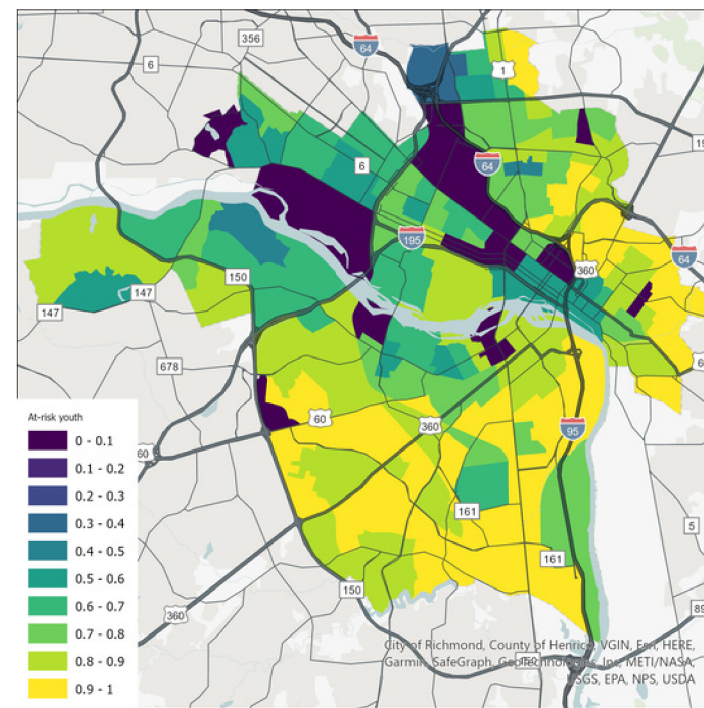
Tenure



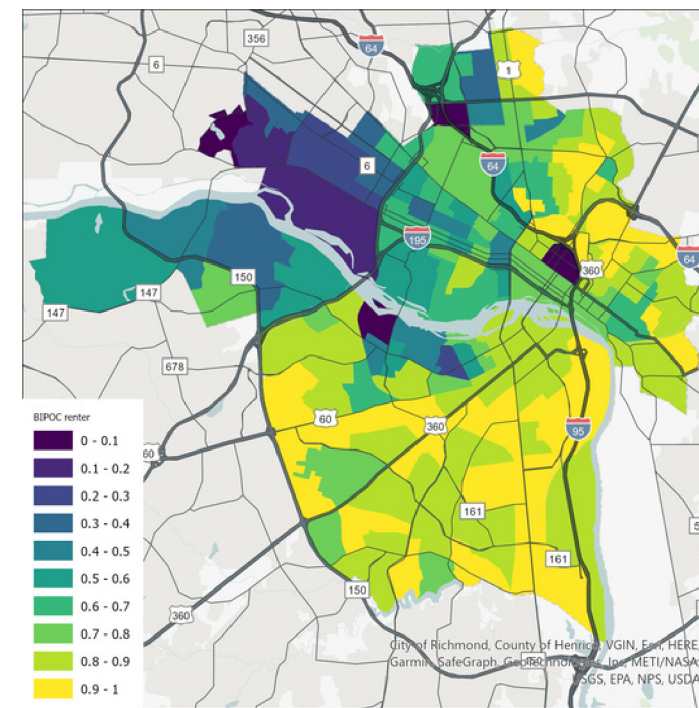
Non-English language



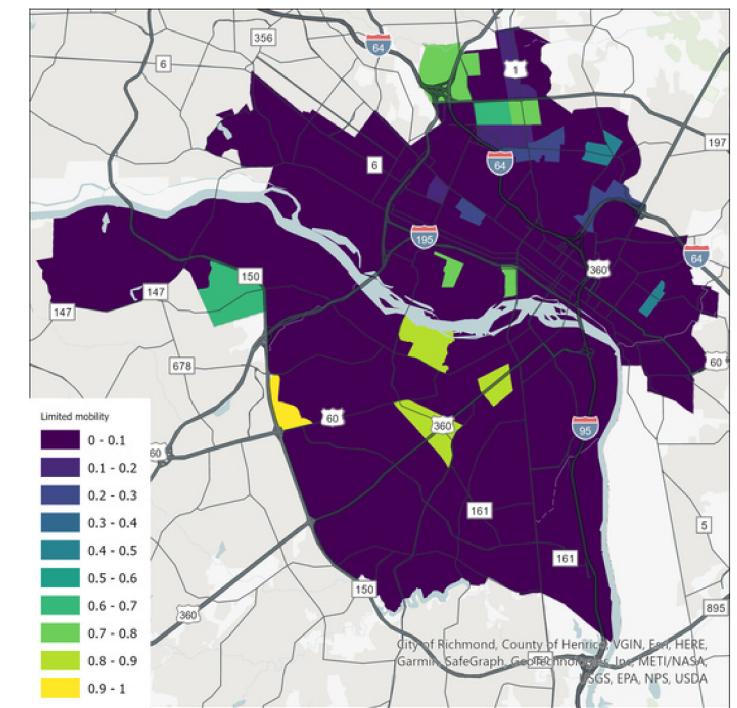
At-risk youth



BIPOC renter



Limited mobility

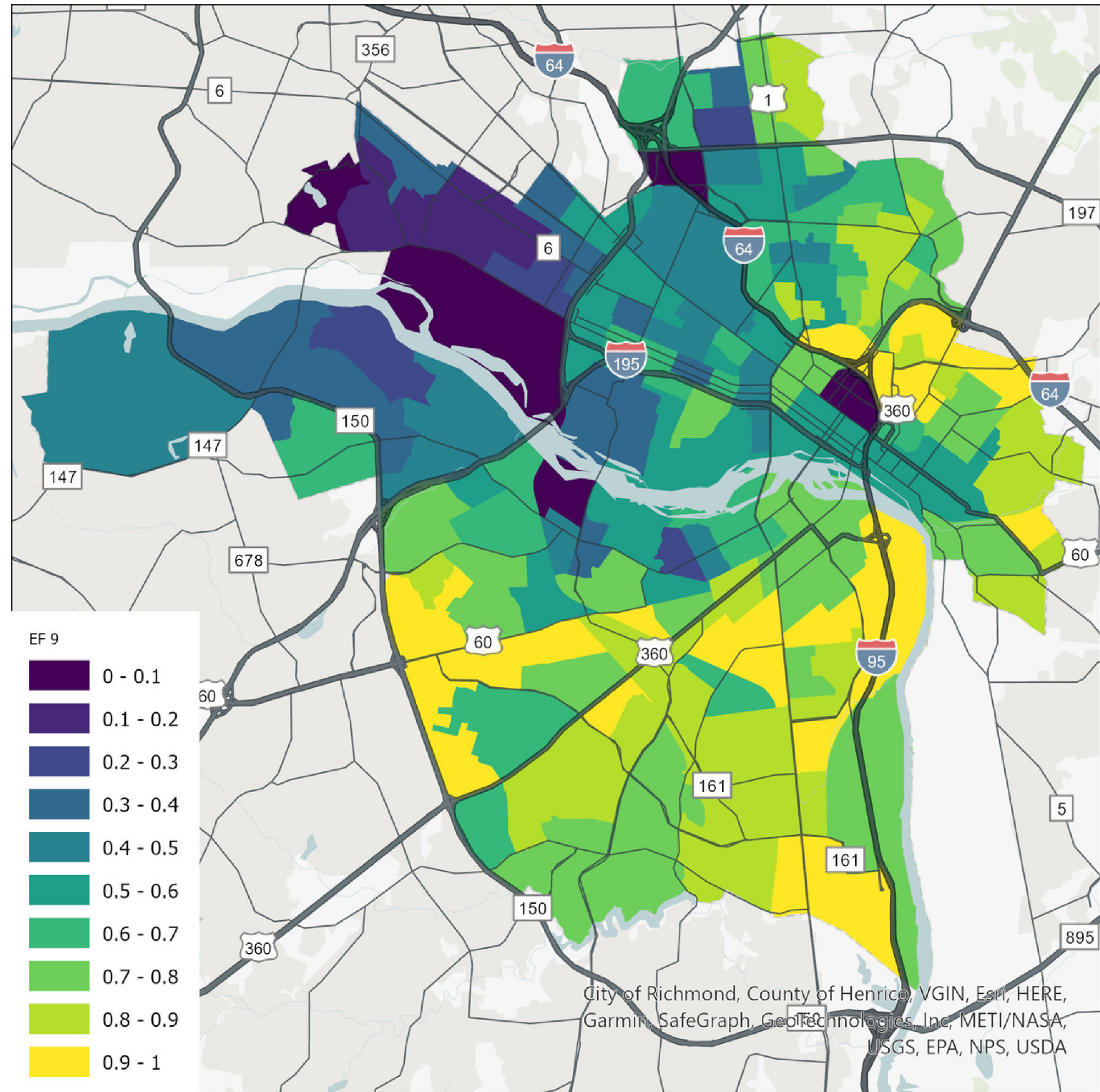


Equity Factor 9: Communities of Concern

Components:

1. BIPOC
2. Low-income
3. Old age
4. Renters
5. Non-English primary language
6. At-risk youth
7. BIPOC renter
8. Limited mobility

High EF9 scores indicate a high concentration of at least 3 communities of concern populations.



Equity Factor 9: Communities of Concern

Prioritize densely populated areas of communities of concern including communities of color, low-income communities, senior and limited mobility populations, families traveling with children, and at-risk youth.

How the components were combined:

- For each combination of any **3** communities of concern elements, calculate a *multivariate quantile* (MVQ) that contextualizes the combination of values within the Richmond region
 - Higher values across all elements will result in higher scores
 - Scores are bounded by [0,1]
 - 56 scores are produced for each block group (8 choose 3 = 56)
- Take the maximum observed MVQ in each block group as the score for EF9

High EF9 scores indicate a high concentration of at least 3 communities of concern populations.

Investment Need Category 1b: **PEDESTRIAN**

A pedestrian need is revealed:

where access is significantly degraded by the absence of pedestrian facilities or the presence of low-quality facilities,

with less tolerance for poor/underperforming accessibility:

- in Richmond 300 Nodes
- along Great Streets
- along streets with existing transit routes
- along the high injury street network

ADA non-compliant ramps on sidewalks connecting to high frequency transit routes was an original component of this need statement, but was excluded due to lack of citywide data on ADA compliance and redundancy with Great Streets and existing transit routes.



Investment Need Category 1b: **PEDESTRIAN**

Components included:

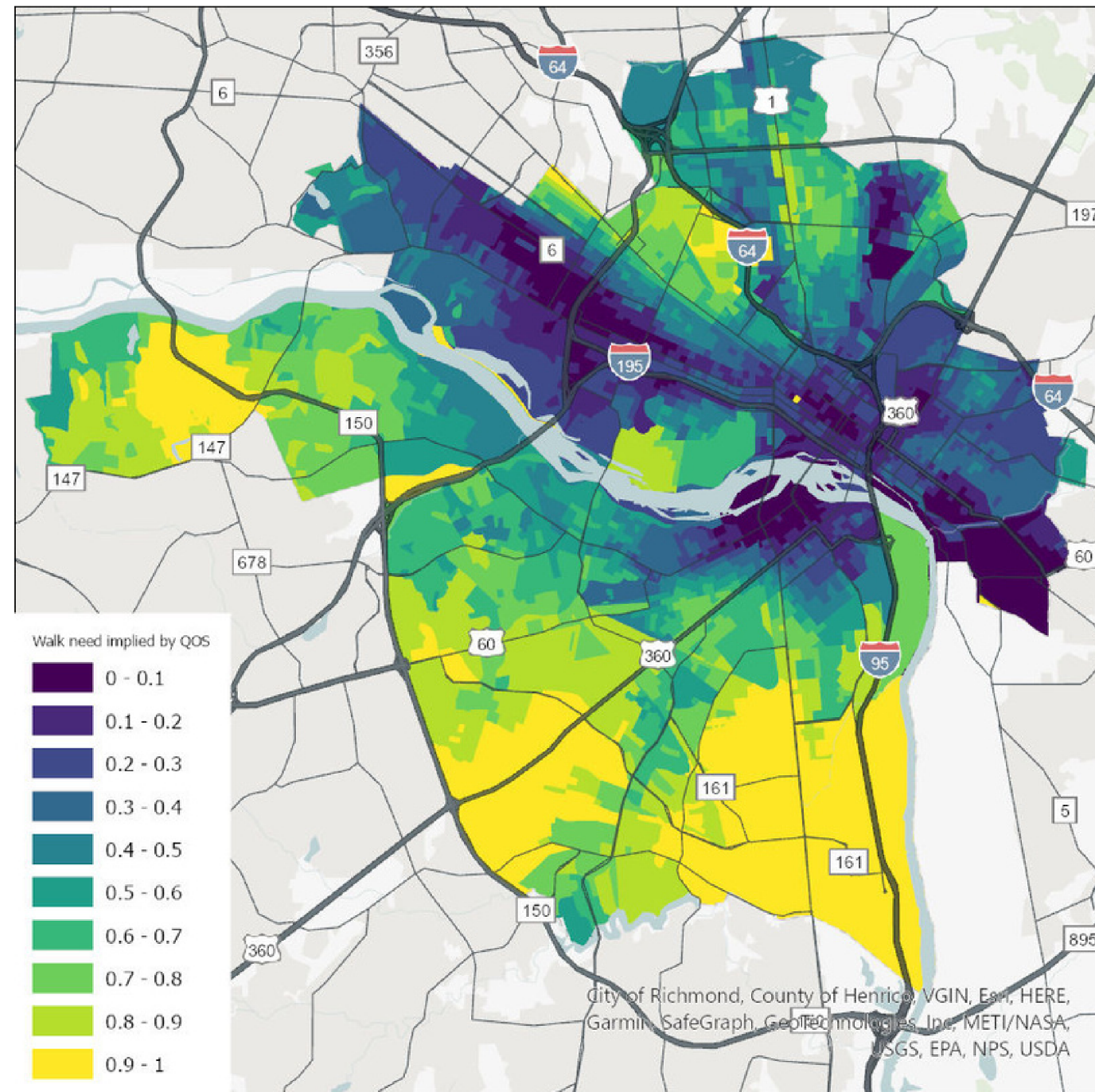
Component	Data Source and Description
Walk accessibility degraded by the absence of pedestrian facilities	Walk accessibility "quality of service" index: This index is the ratio of walk access to destinations from each block in the city under alternative network scenarios. The first reflects existing network conditions, the second models access under the assumption that all segments are comfortable for pedestrians. The index indicates needs where access would be substantially higher if existing facilities provided pedestrians greater comfort.
Walk accessibility degraded by the presence of low-quality facilities	
Richmond 300 Nodes and Great Streets	Designated Great Streets and Nodes from Richmond 300
Streets with transit routes	GRTC Transit routes from September 2021
High injury street network	Richmond's High Injury Street Network is 7 percent of all road mileage in the City and accounts for 62 percent of all fatal and serious injury crashes.

Components considered and removed:

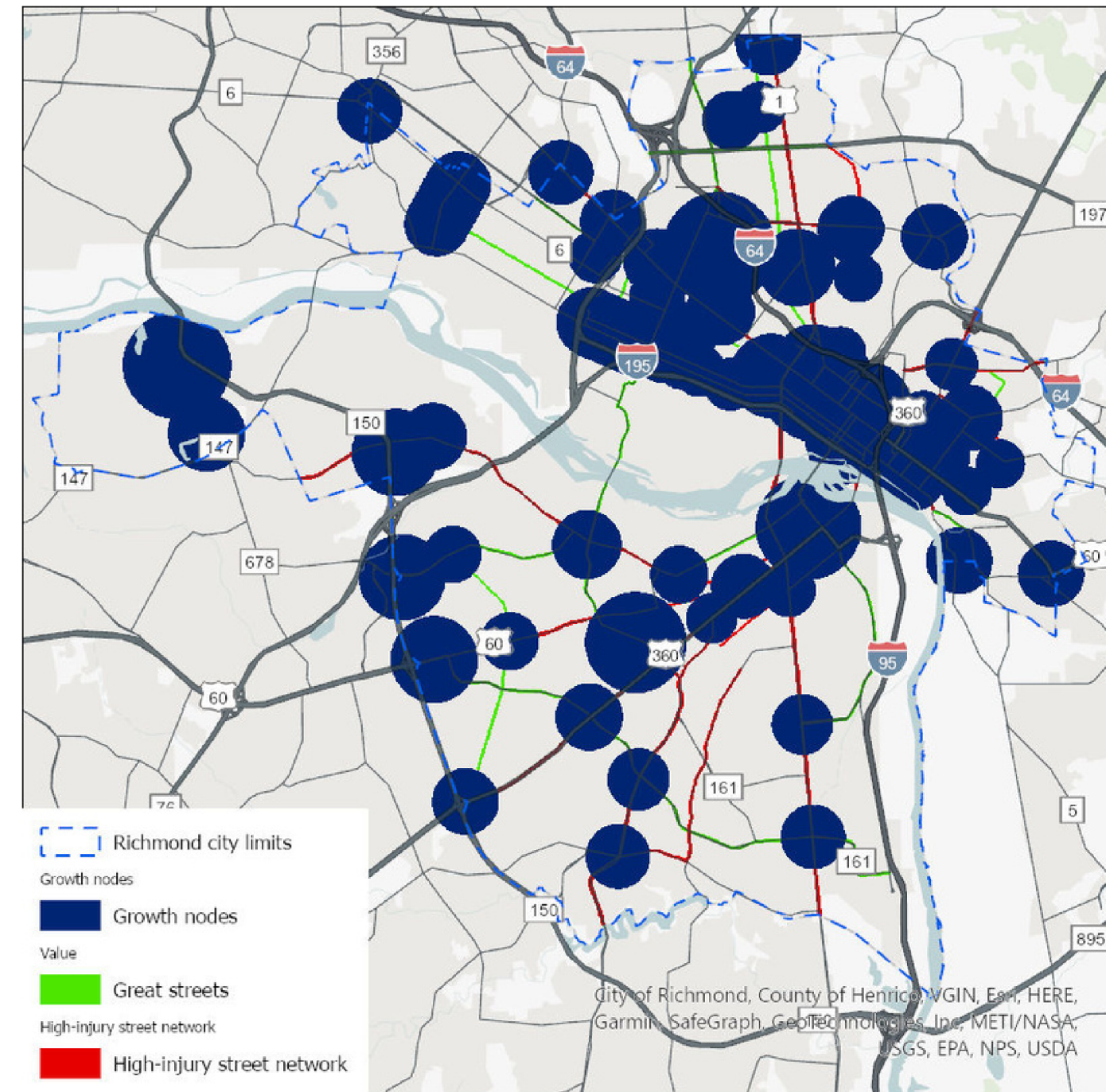
Sidewalks that connect high frequency bus routes and have no ADA compliant ramp	Data on ADA compliant ramps is limited. Everywhere data on ADA compliance exists shows non-compliance. Non-compliance is assumed to be occurring city-wide.
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Investment Need Category 1b: **PEDESTRIAN**

Need implied by walk QOS



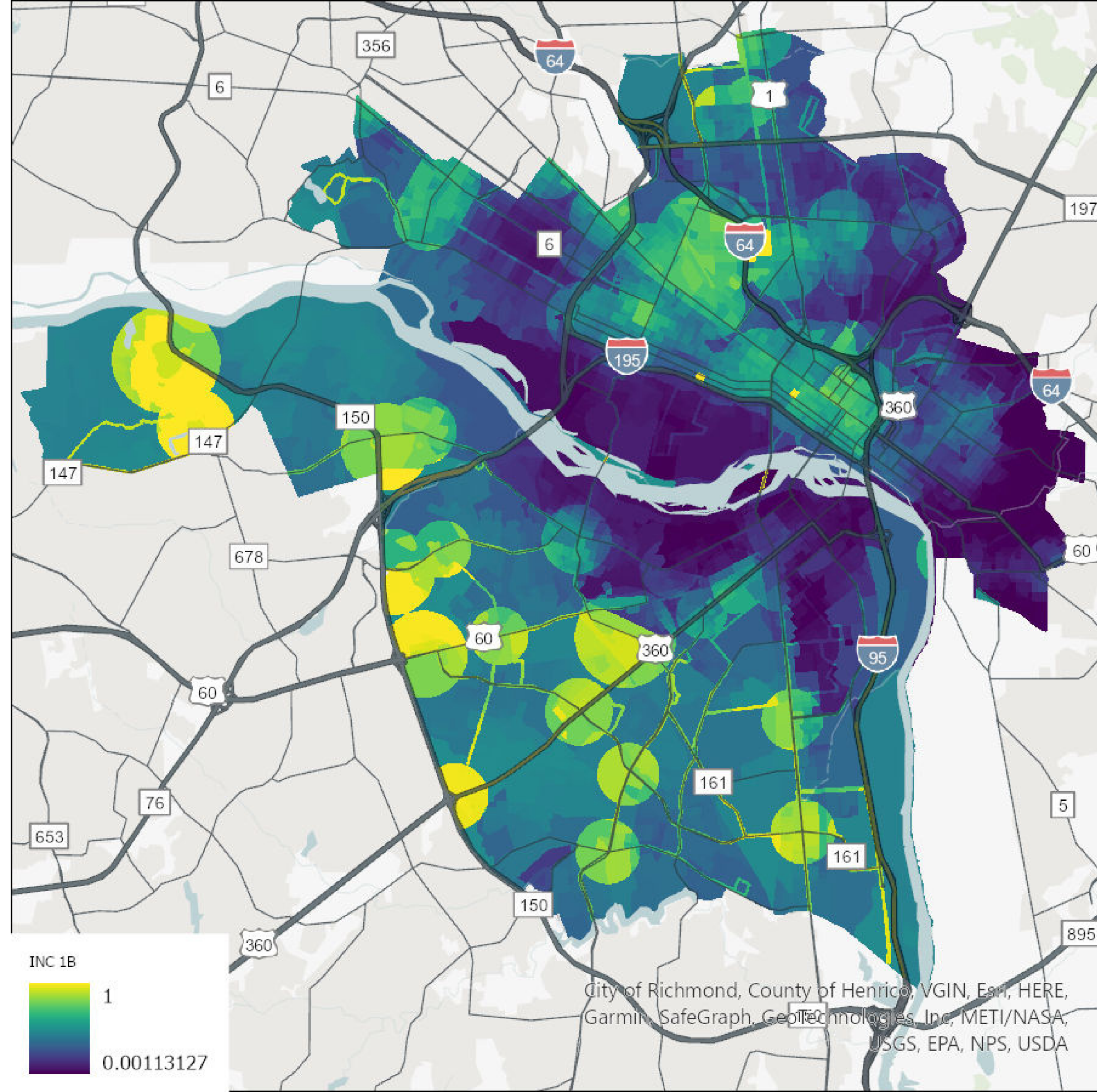
Low-tolerance areas



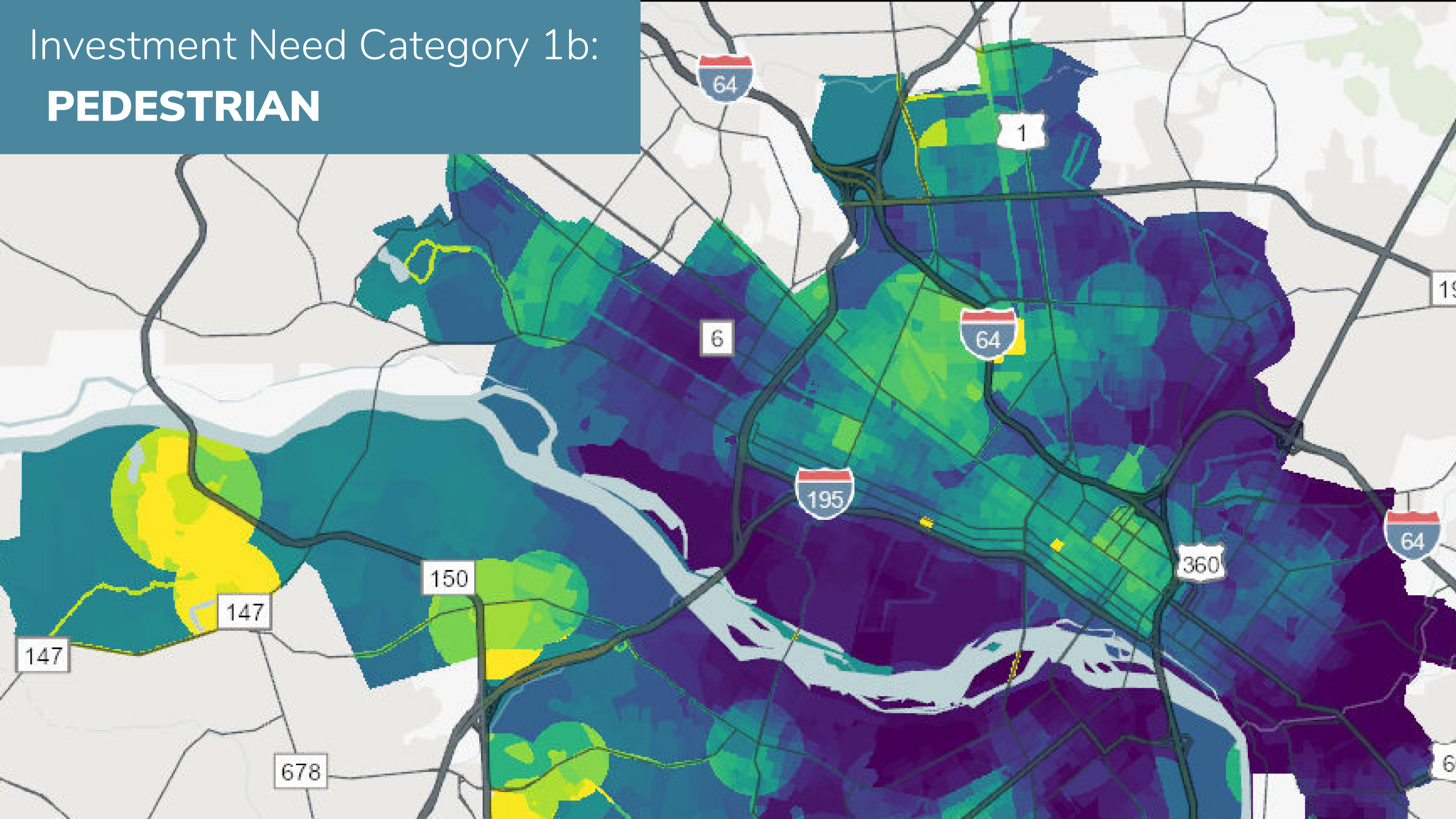
Investment Need Category 1b:

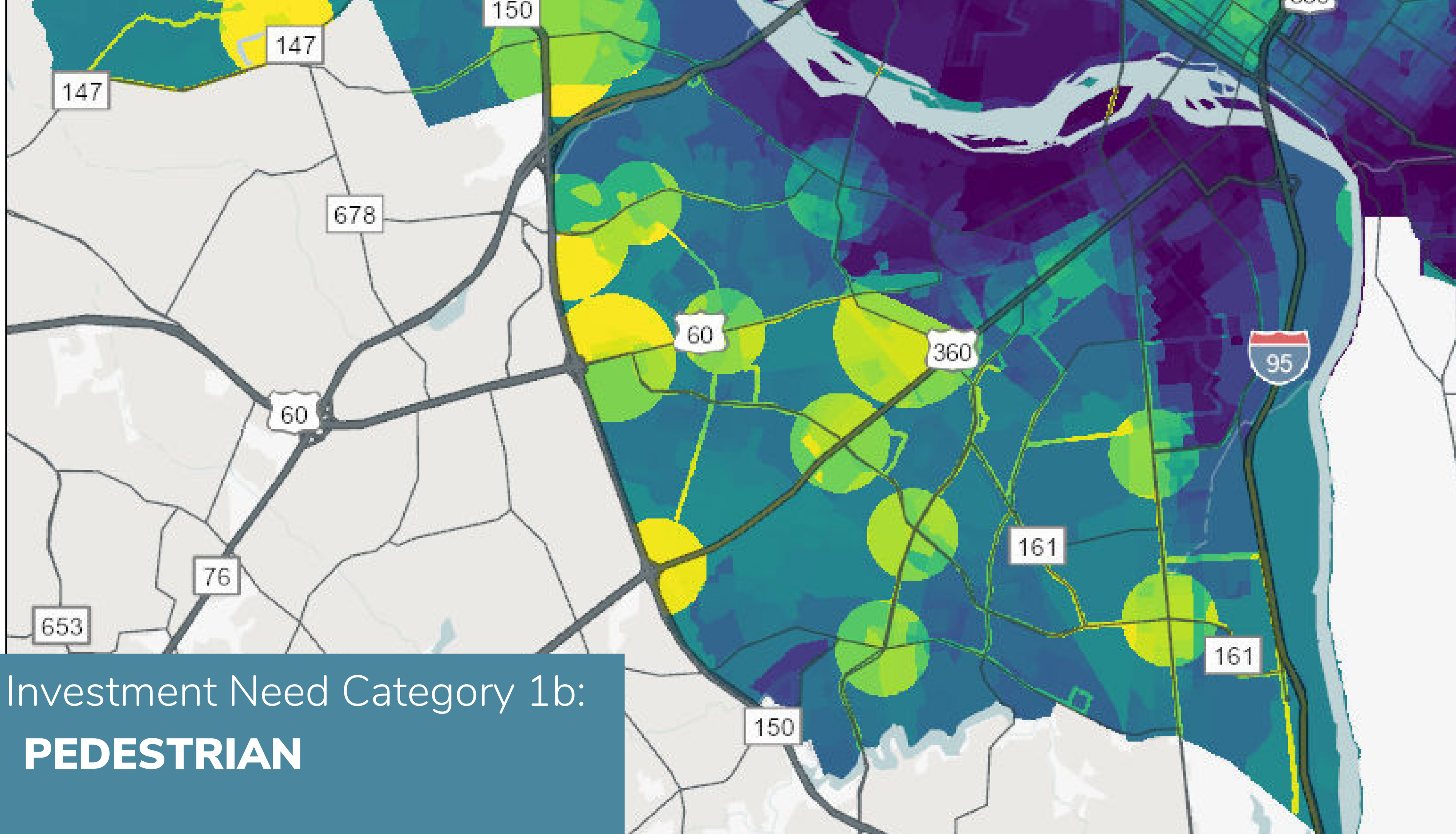
PEDESTRIAN

- R300 Nodes, Great Streets, High Injury Network, transit routes are combined into a "low walk access intolerance area"
- Multipurpose access scores are analyzed to highlight the lowest access across any three travel purposes in a combined QOS index.
- Combined QOS scores are multiplied by 0.5 outside the low walk access intolerance area



Investment Need Category 1b:
PEDESTRIAN





Investment Need Category 1b:
PEDESTRIAN

Investment Need Category 1a: **BICYCLE**

A bicycle need is revealed:

where access is significantly degraded by the absence of bicycle facilities or the presence of low-quality facilities, or

where bike-share facilities are beyond a short walking distance,

with less tolerance for poor/underperforming accessibility in:

- Richmond 300 Nodes
- along Great Streets
- along the high injury street network

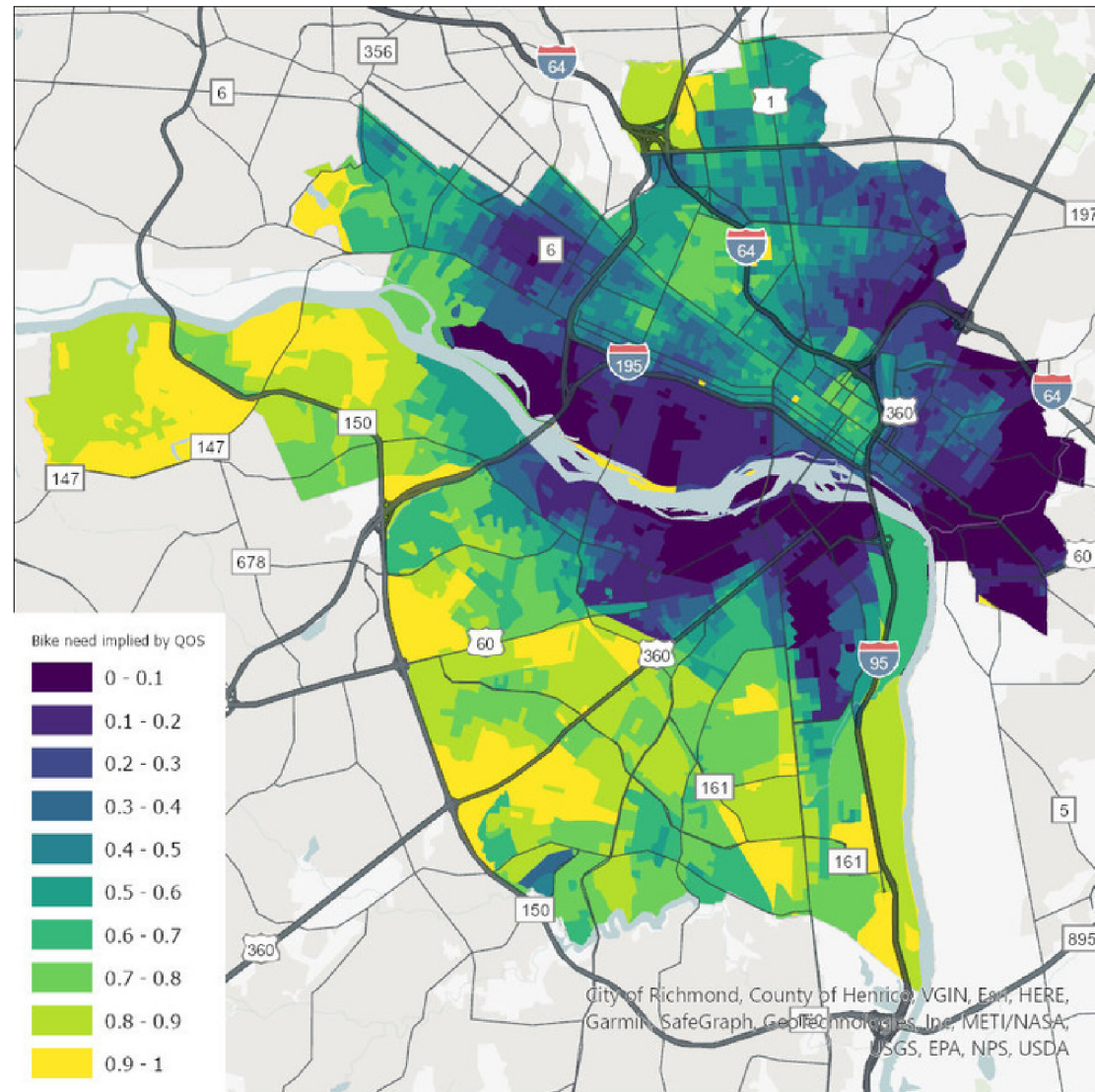


Investment Need Category 1a: **BICYCLE**

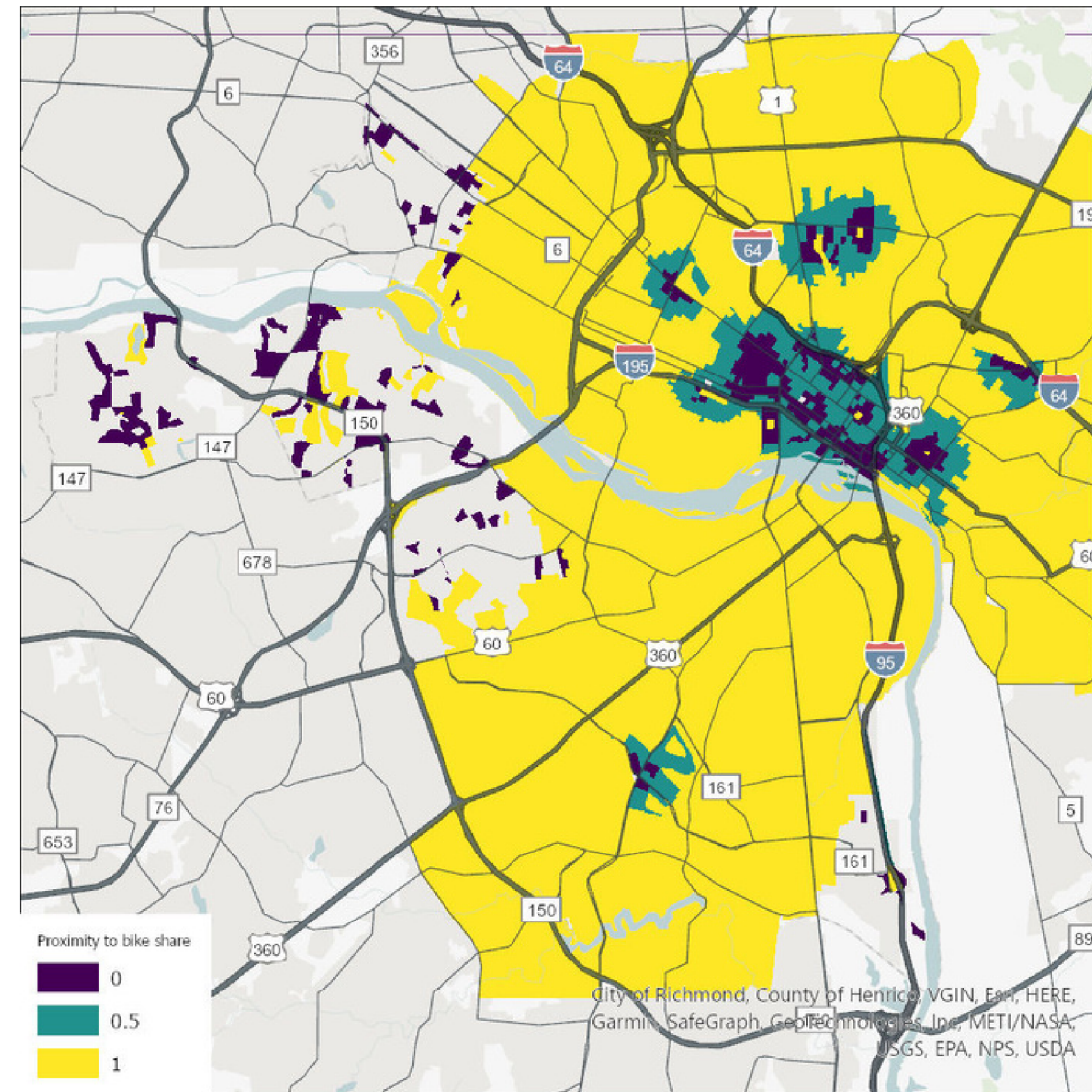
Component	Data Source and Description
Bike accessibility degraded by the absence of bicycle facilities	Bike accessibility "quality of service" index: This index is the ratio of bike access to destinations from each block in the city under alternative network scenarios. The first reflects existing network conditions, the second models access under the assumption that all segments are comfortable for cyclists. The index indicates needs where access would be substantially higher if existing facilities provided cyclists greater comfort.
Bike accessibility degraded by the presence of low-quality facilities	
Bike-share facilities beyond a short walking distance	Walk accessibility to bike-share facilities. Bike-share facilities provided by City of Richmond GIS. Threshold for short walking distance is 10 minutes.
Richmond 300 Nodes and Great Streets	Designated Great Streets and Nodes from Richmond 300
High injury street network	Richmond's High Injury Street Network is 7 percent of all road mileage in the City and accounts for 62 percent of all fatal and serious injury crashes.

Investment Need Category 1a: **BICYCLE**

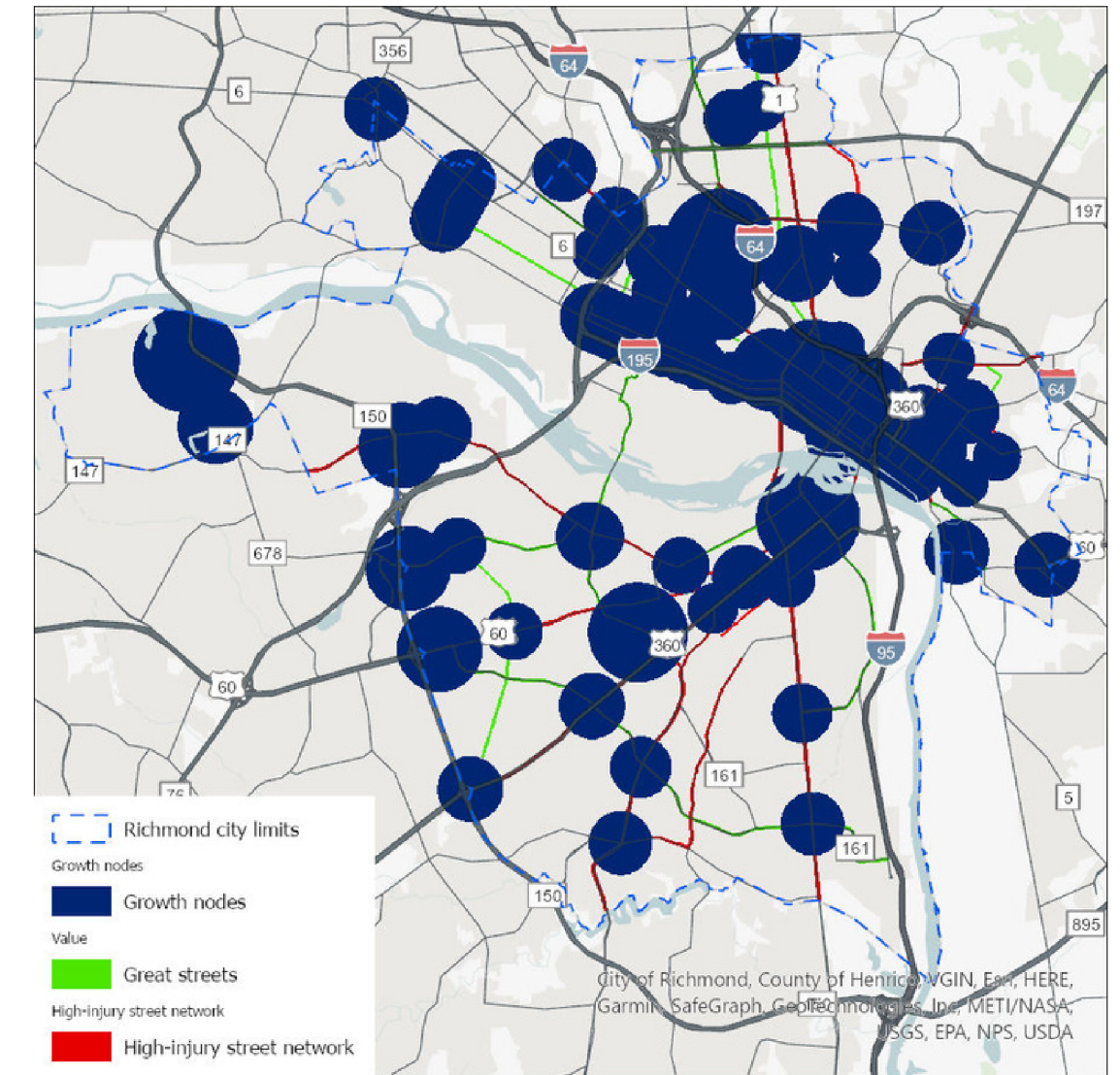
Need implied by bike QOS



Proximity to bike share

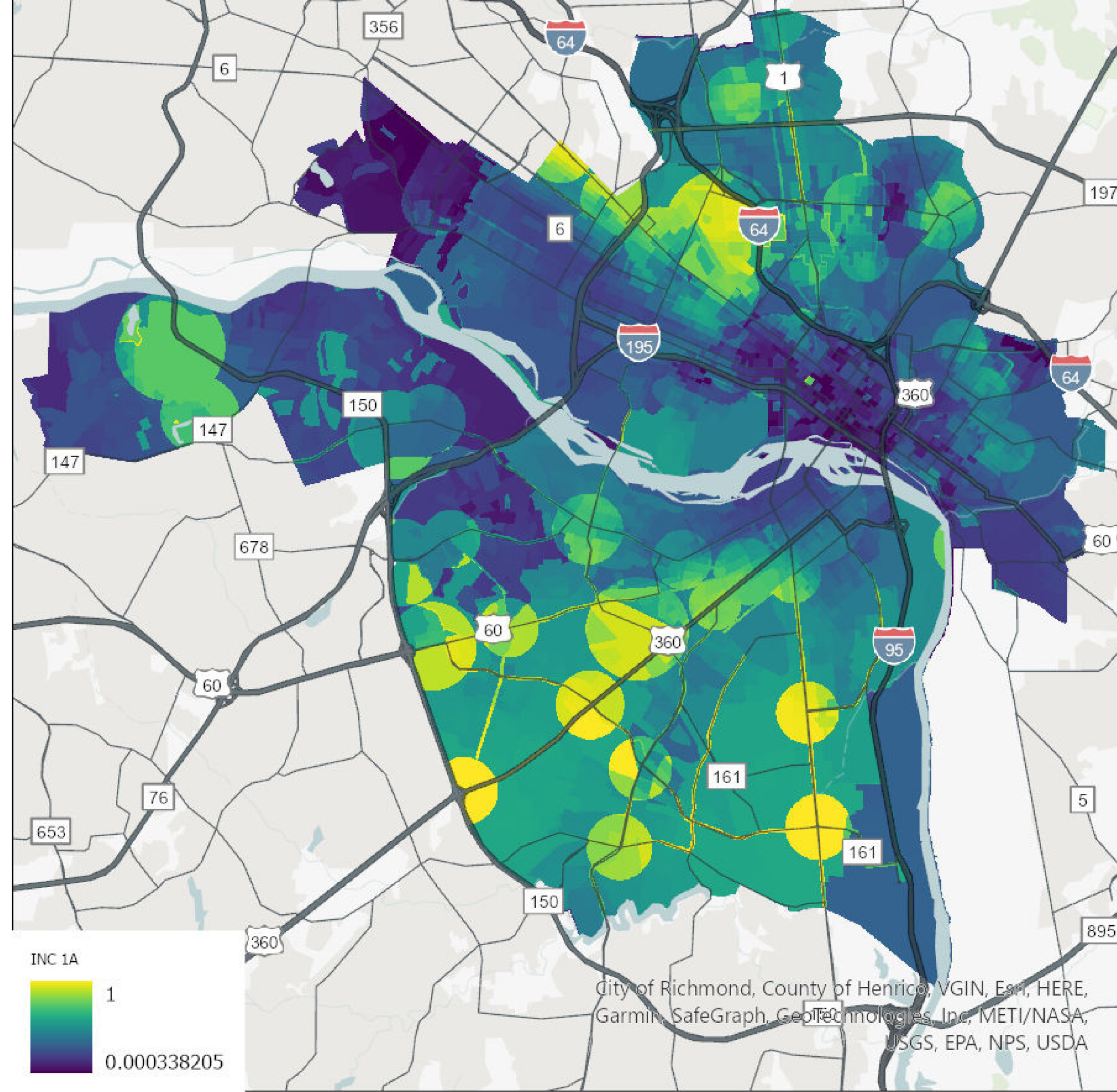


Low-tolerance areas



Investment Need Category 1a: **BICYCLE**

- R300 Nodes, Great Streets, High Injury Network are combined into a "low bike access intolerance area"
- Multipurpose access scores are analyzed to highlight the lowest access across any three travel purposes in a combined QOS index.
- Combined QOS scores are multiplied by 0.5 outside the low walk access intolerance area.
- Areas beyond a 5-minute walk from bike share are increased by 0.1; areas beyond a 10-minute walk from bike share are increased by 0.2



Equity Factor 6

Equitably increase the safety and comfort of **cyclists and pedestrians, connecting communities of concern to opportunities.**



Equity Factor 6: Cyclists and Pedestrians

Equitably increase the safety and comfort of cyclists and pedestrians, connecting communities of concern to opportunities.

Areas highlighted for EF6 are those where:

- safety/security issues for bike/ped users are concentrated OR
- walk/bike accessibility is underperforming due to poor network quality or poor connectivity

AND

- where there is a high density of residents in communities of concern

Equity Factor 6: Cyclists and Pedestrians

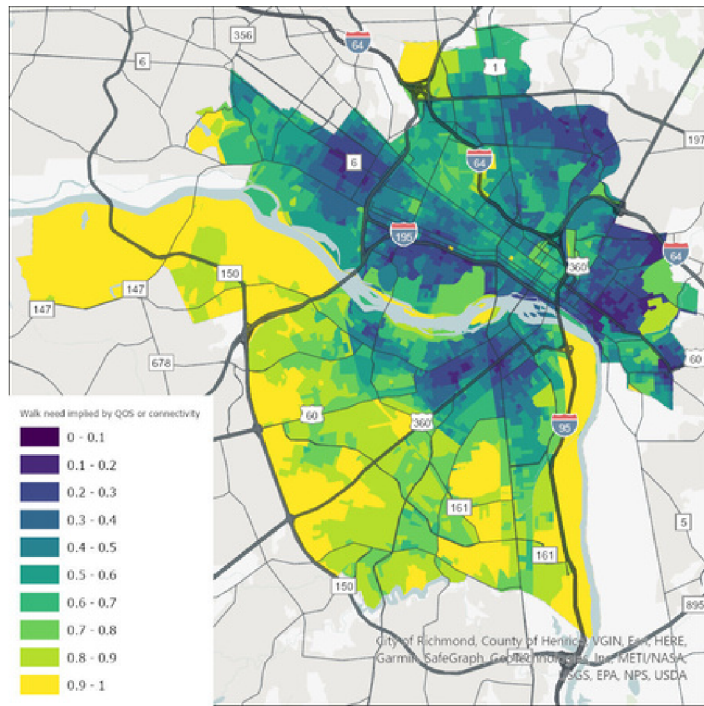
Equitably increase the safety and comfort of cyclists and pedestrians, connecting communities of concern to opportunities.

Component	Data Source and Description
Concentration of safety/security issues for bike/ped users	VDOT crash data
Underperforming walk/bike accessibility due to poor network quality or poor connectivity	Accessibility analysis
Density of residents in communities of concern	Replica population synthesis*

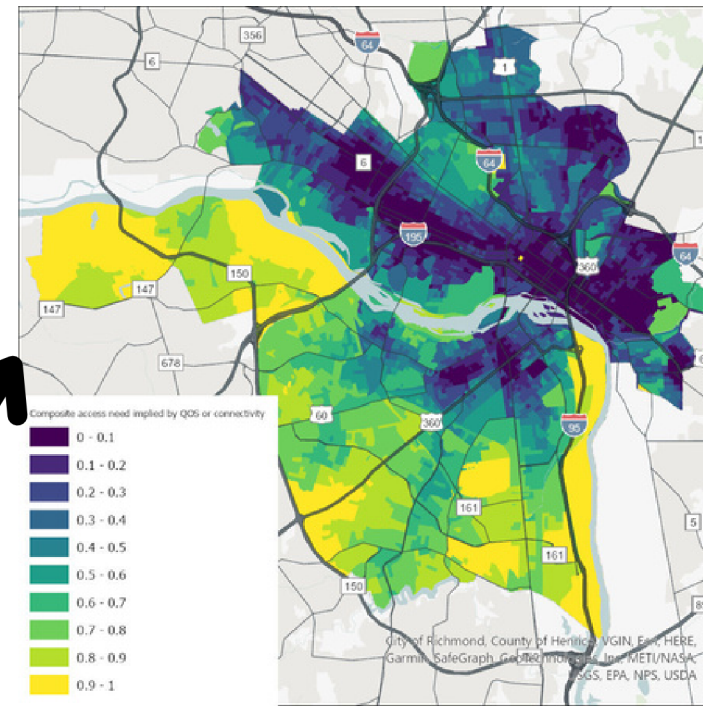
*Replica's population synthesis model incorporates data from US Census ACS, LODES, TIGER, and PUMS; the Census Transportation Planning Products Program (CTPP); the US Department of Education and National Center for Education Statistics; and proprietary building, parcel, and point of interest data

Equity Factor 6: Cyclists and Pedestrians

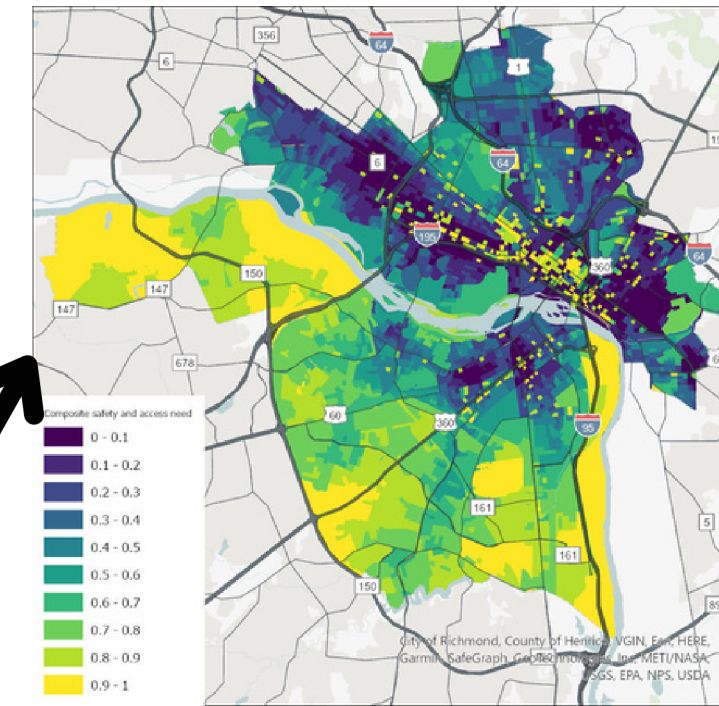
Walk need



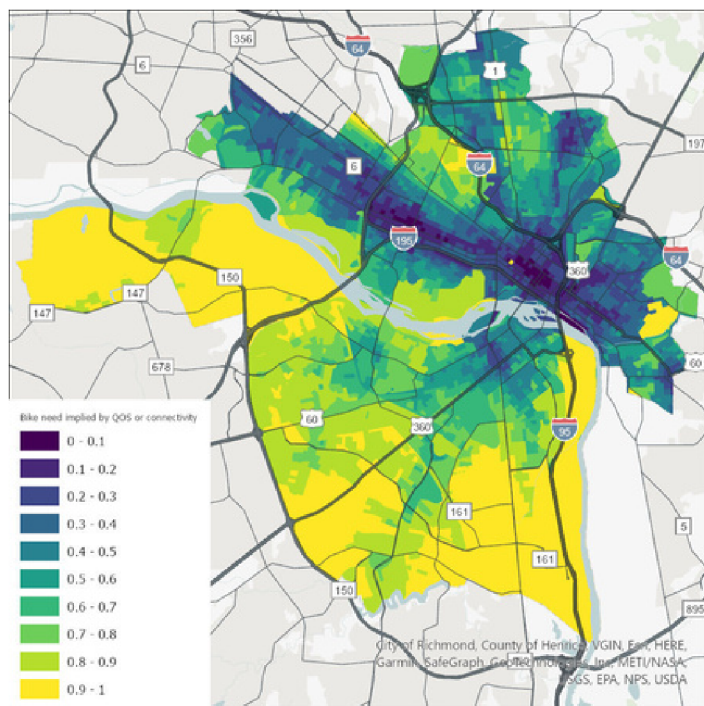
Access need



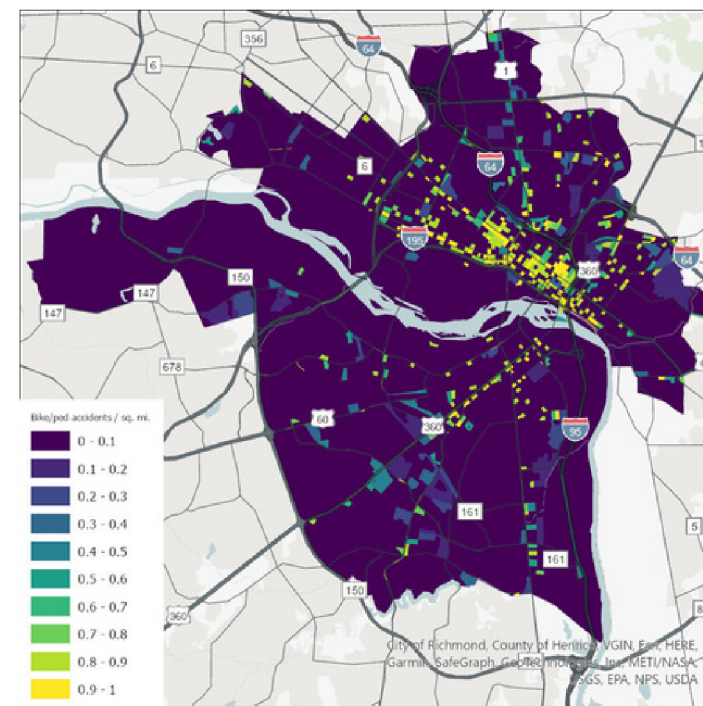
Access and crash need



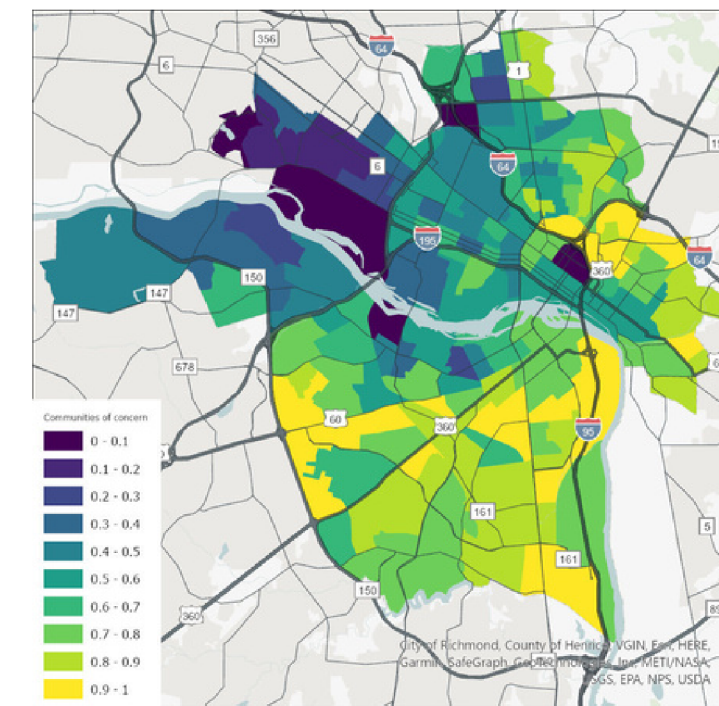
Bike need



Bike/ped crashes

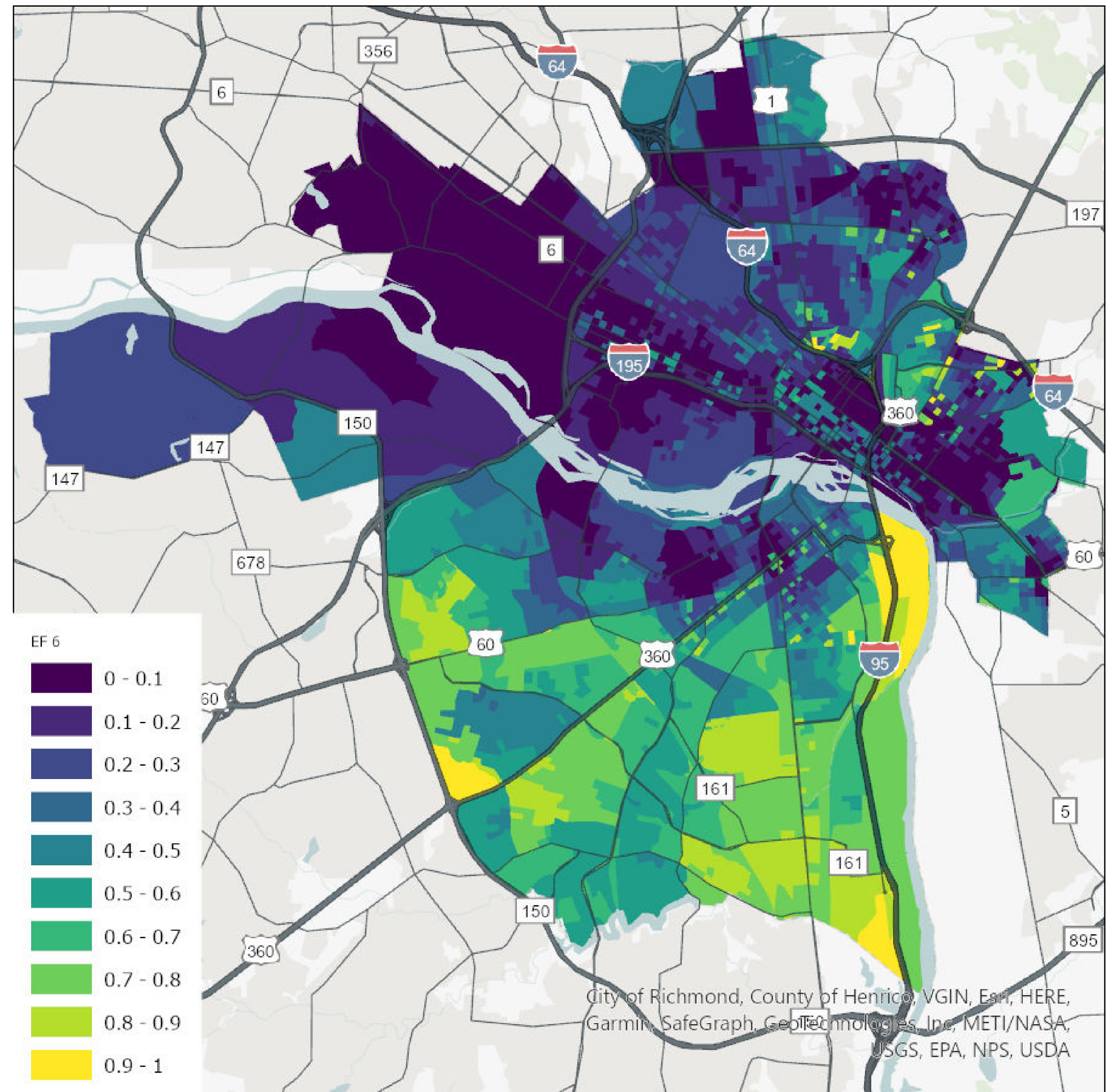


Communities of concern



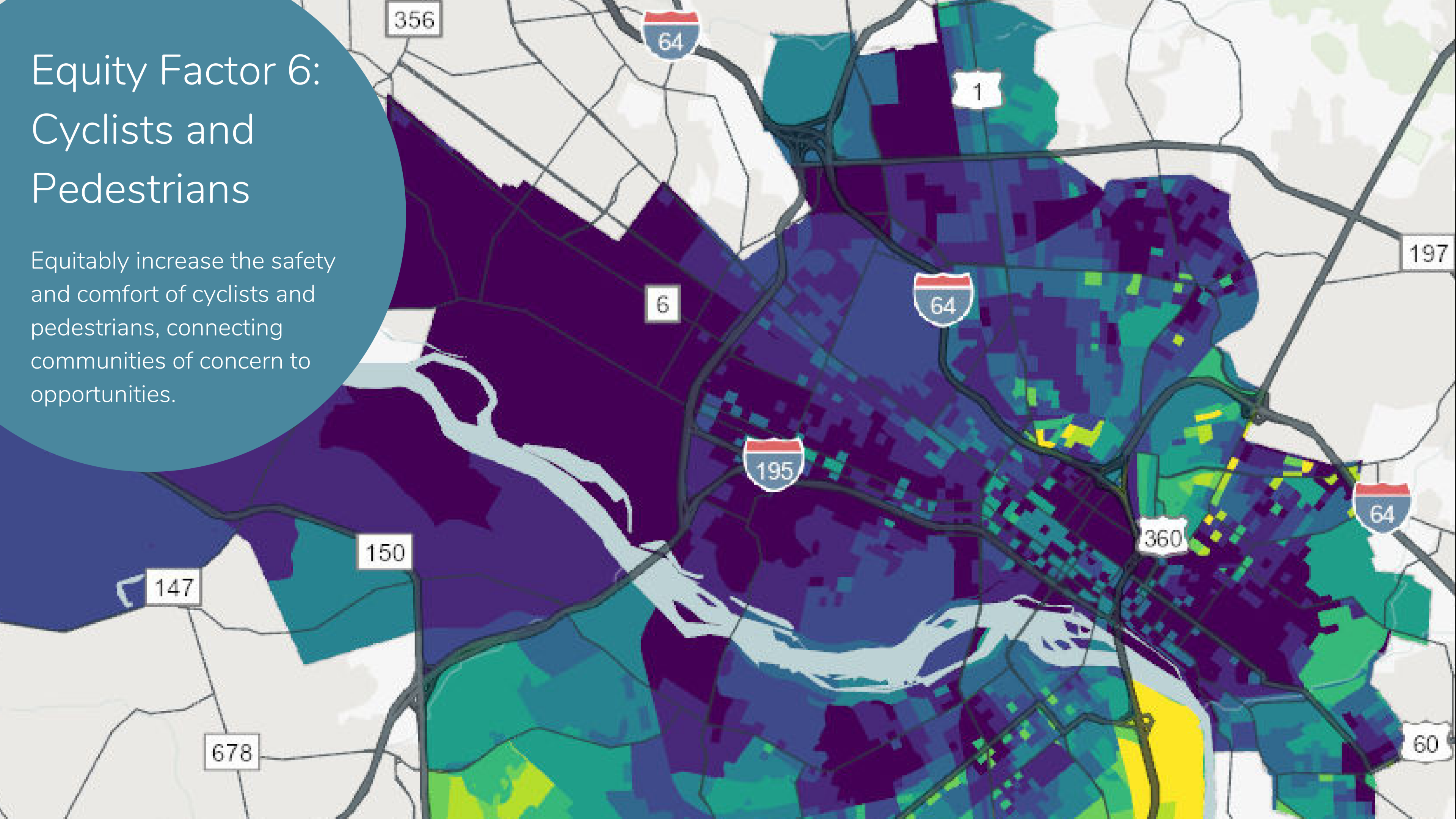
Equity Factor 6: Cyclists and Pedestrians

Equitably increase the safety and comfort of cyclists and pedestrians, connecting communities of concern to opportunities.



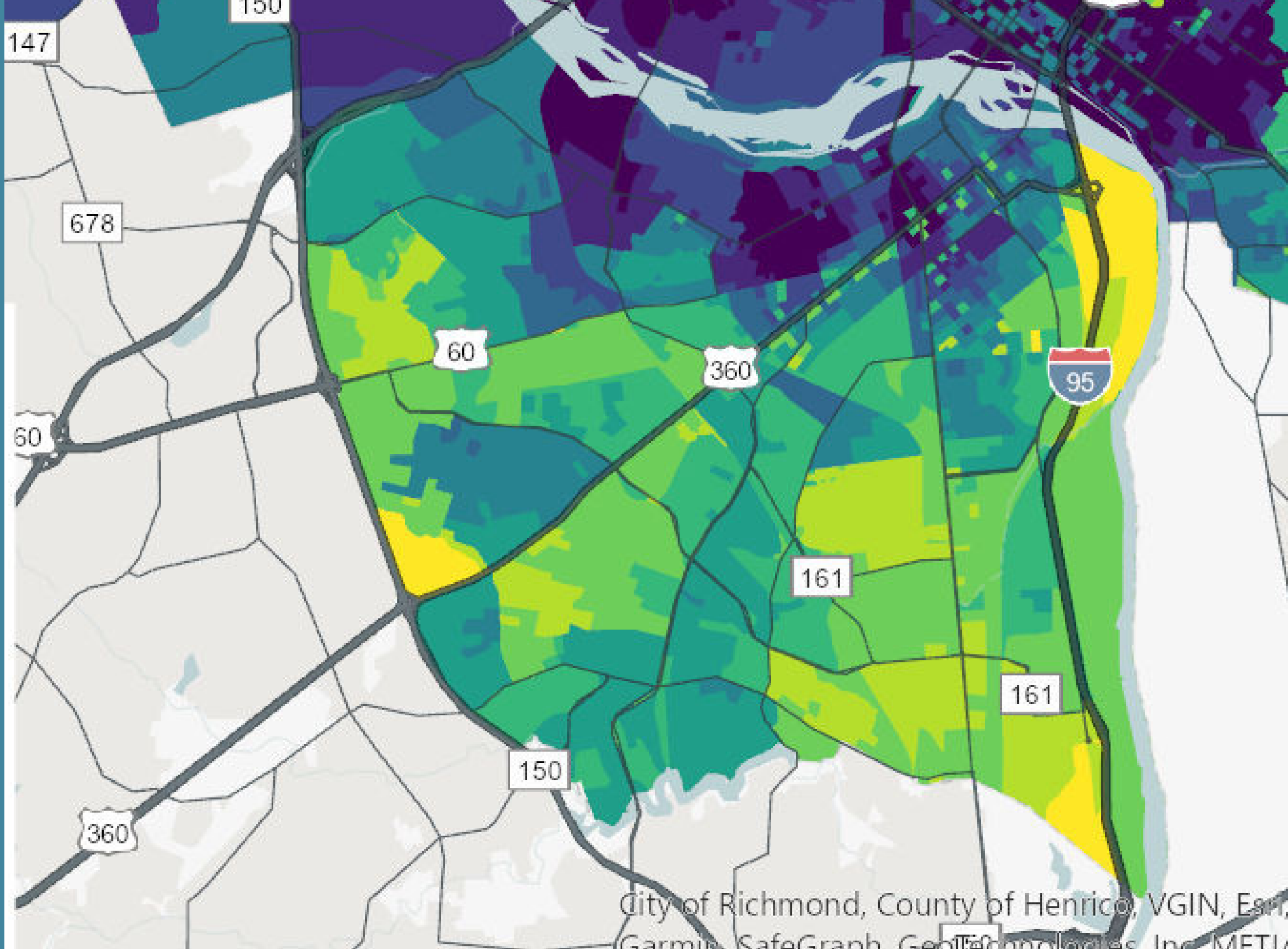
Equity Factor 6: Cyclists and Pedestrians

Equitably increase the safety and comfort of cyclists and pedestrians, connecting communities of concern to opportunities.



Equity Factor 6: Cyclists and Pedestrians

Equitably increase the safety and comfort of cyclists and pedestrians, connecting communities of concern to opportunities.



Equity Factor 6: Cyclists and Pedestrians

Equitably increase the safety and comfort of cyclists and pedestrians, connecting communities of concern to opportunities.

- Identify areas where walk and bike accessibility are underperforming with respect to quality of service or connectivity using MVQ
- From the results in step 1, identify areas where high walk need and high bike need coincide using MVQ
- Identify areas with high bike/ped crash rates using simple quantiles
- Take the maximum of the walk/bike need (step 2) and crash rate scores (step 3) as a composite access/safety score
- Identify areas where high composite access/safety need coincide with communities of concern using MVQ

High EF6 scores indicate the confluence of high communities of concern density and one of poor non-motorized access, or high non-motorized safety concerns

Investment Need Category 5: **SAFETY/SECURITY**

A safety need is revealed:

where non-interstate crashes leading to fatality or serious injury is high

OR

in highly walkable (high accessibility) areas with moderate concentrations of violent crime incidents or high concentrations of property crime incidents.

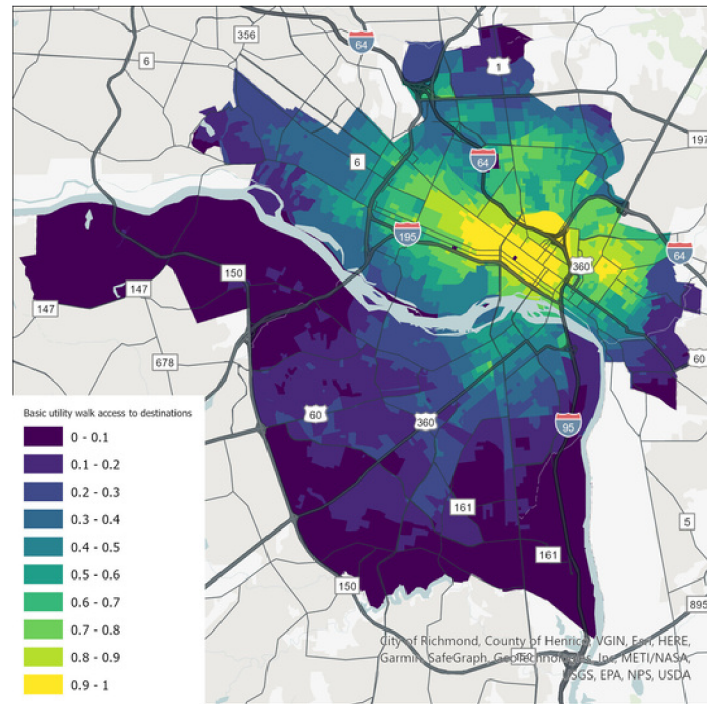


Investment Need Category 5: **SAFETY/SECURITY**

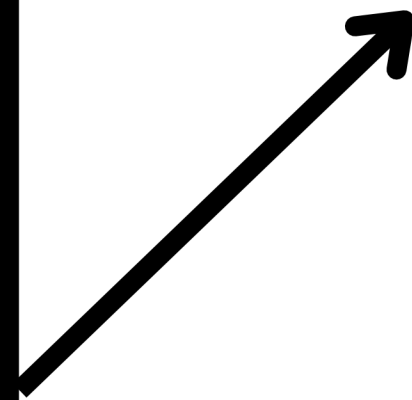
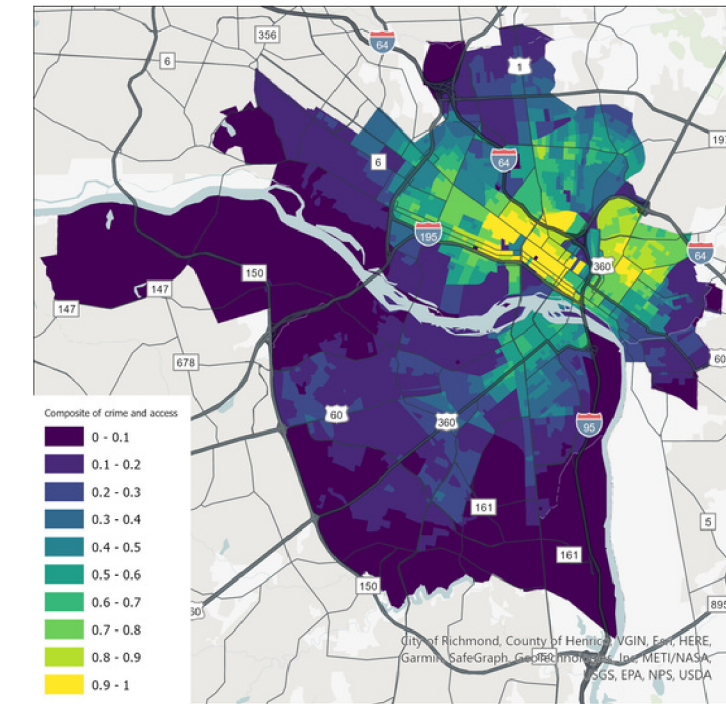
Component	Data Source and Description
Non-interstate crashes leading to fatality or serious injury	VDOT Crash Data 1/1/2015 - 6/30/2022
Highly walkable areas	Accessibility analysis
Moderate concentrations of violent crime incidents	RPD Crime Incident Information Center 1/1/22 - 6/21/22 (homicides, sex offenses, robberies, assaults)
High concentrations of property crime incidents	RPD Crime Incident Information Center 1/1/22 - 6/21/22 (burglaries, vice crimes, theft, vehicle theft)

Investment Need Category 5: **SAFETY/SECURITY**

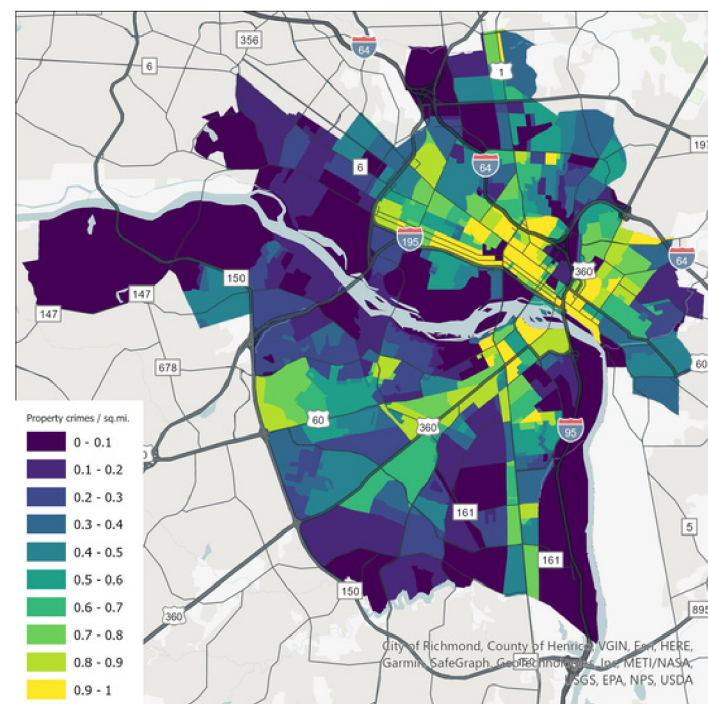
Basic utility walk access to jobs



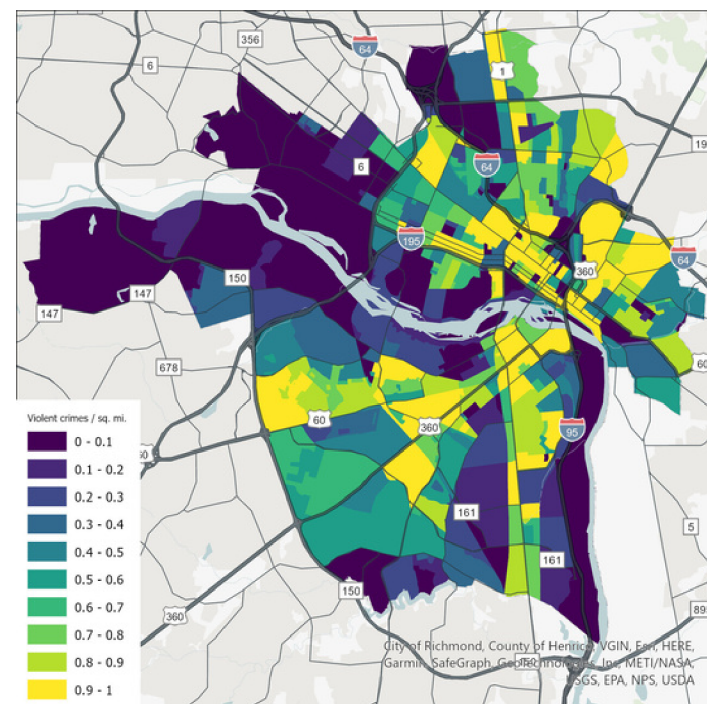
Composite of access and safety



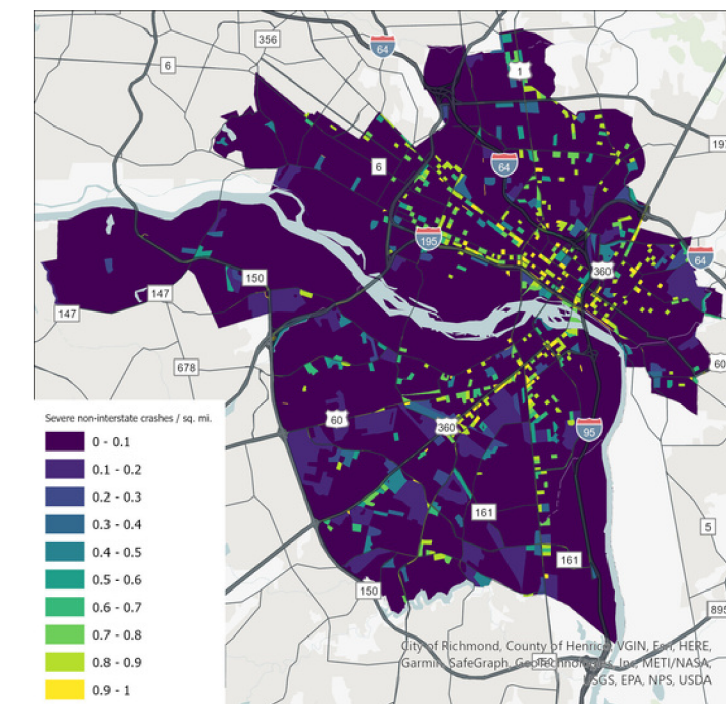
Property crimes / sq. mi.



Violent crimes / sq. mi.



Non-interstate crashes / sq. mi.

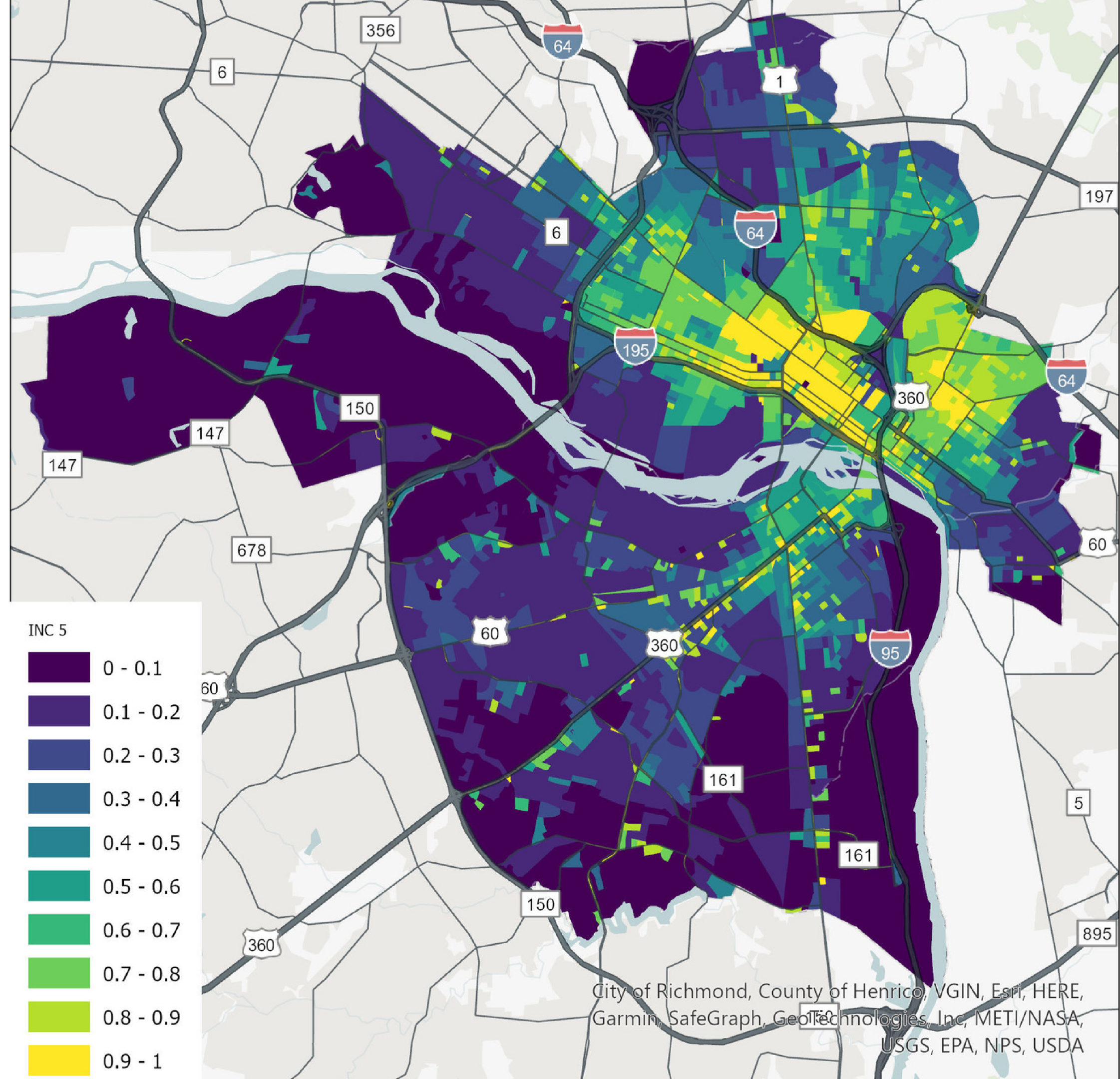


Investment Need Category 5:

SAFETY/SECURITY

This map combines:

- Highly walkable areas
- Moderate concentrations of violent crime
- High concentrations of property crime
- Non-interstate crashes



Investment Need Category 5: **SAFETY/SECURITY**

How the components were combined:

- Identify areas where access is high for at least 3 (of 6) trip purposes using MVQ
- Identify areas where high access (step 1) coincides with high property crime rates or moderate violent crime rates using MVQ
- Identify areas with high crash rates using simple quantiles
- Take the maximum of the composite access/crime score (step 2) and the crash score (step 3)

High INC5 scores indicate the confluence of high accessibility and high crime, or high non-interstate crash rates

Investment Need Category 7: **MAINTENANCE**

A maintenance need is revealed:

where sidewalk condition, pavement condition, or bridge condition is below 'good' rating, or *where 311 request or maintenance need is noted on survey*, with less tolerance for poor condition in high volume areas.

OR

where fleet (COR & GRTC) vehicle age or mileage, transit stop facilities, signal infrastructure, and parking payment infrastructure is within 20% of 'useful life' of the vehicle/feature.



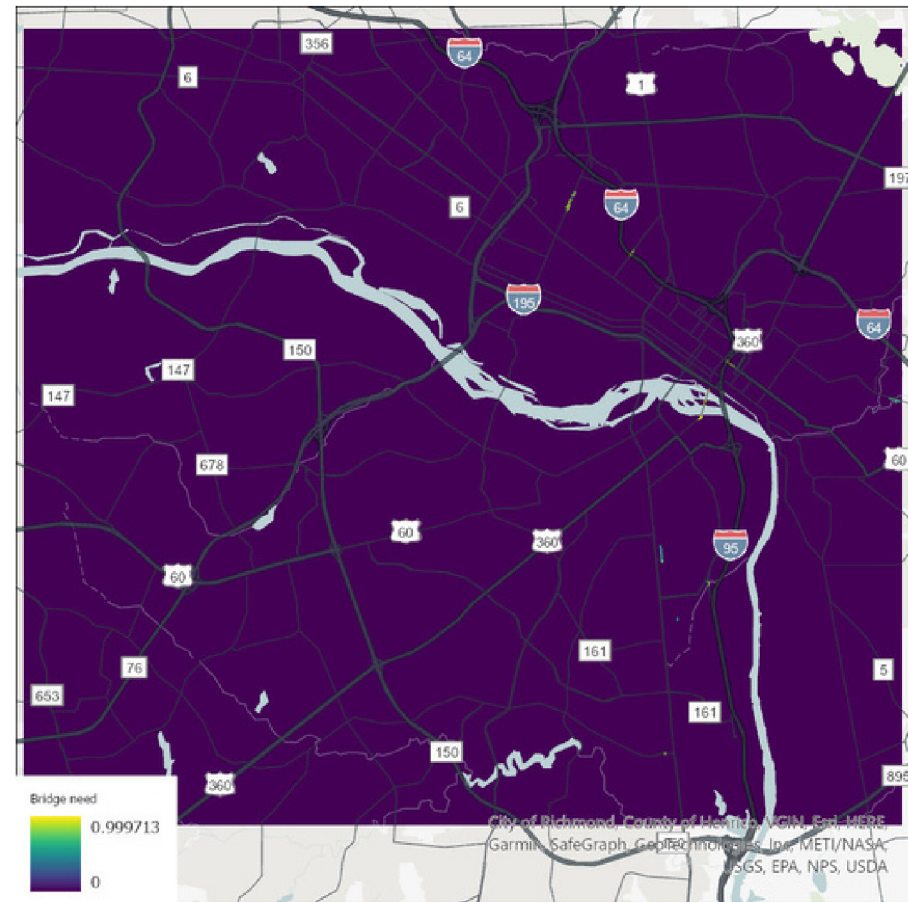
Investment Need Category 7: **MAINTENANCE**

Component	Data Source and Description
Sidewalk condition	City of Richmond Dept. of Public Works
Pavement condition	City of Richmond Dept. of Public Works
Bridge condition	City of Richmond Dept. of Public Works
High volume areas	Replica -Synthetic typical full weekday travel
Signal infrastructure age	City of Richmond Dept. of Public Works

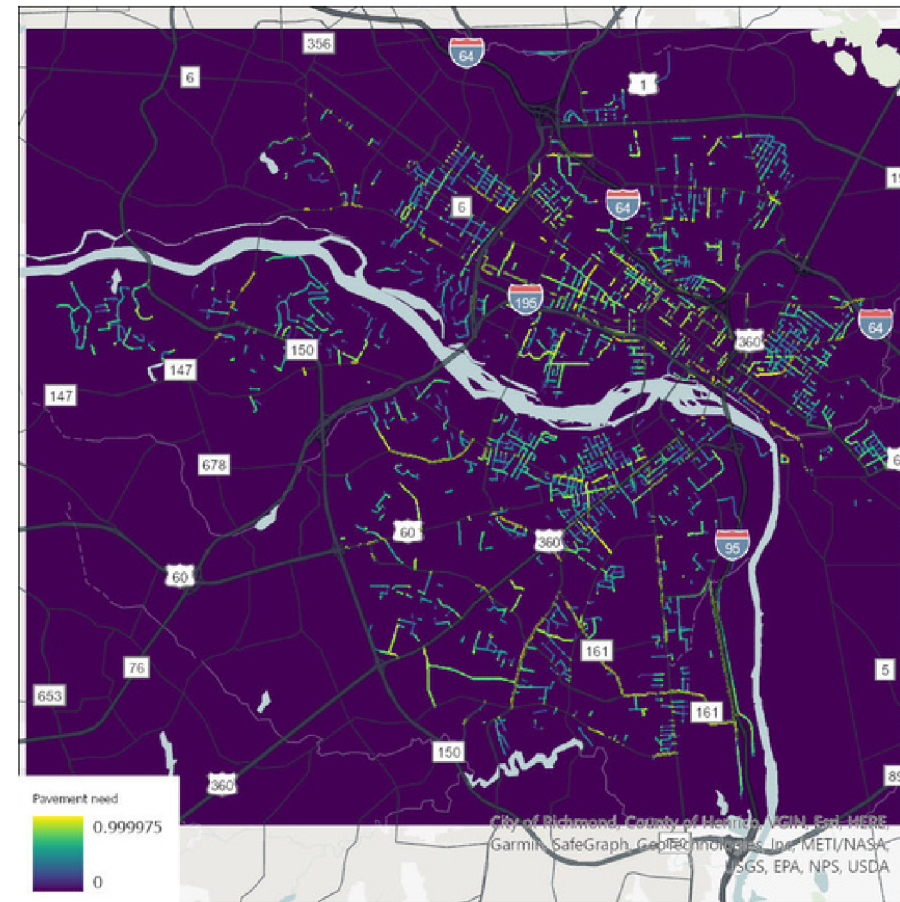
Considered and removed or not mapped:	
City of Richmond fleet vehicle age and mileage	City of Richmond Dept. of Public Works - noted but not mapped
GRTC fleet vehicle age and mileage	GRTC fleet summary data - noted but not mapped
Transit stop facility age	Data on condition of transit stops not available
Parking payment infrastructure	City of Richmond Dept. of Public Works - condition data indicated all infrastructure in good condition or null
311 Data	This was determined to be not useful as maintenance request are handled quickly and this map changes frequently since the public can add to it at any time. May consider in public comments analysis.

Investment Need Category 7: **MAINTENANCE**

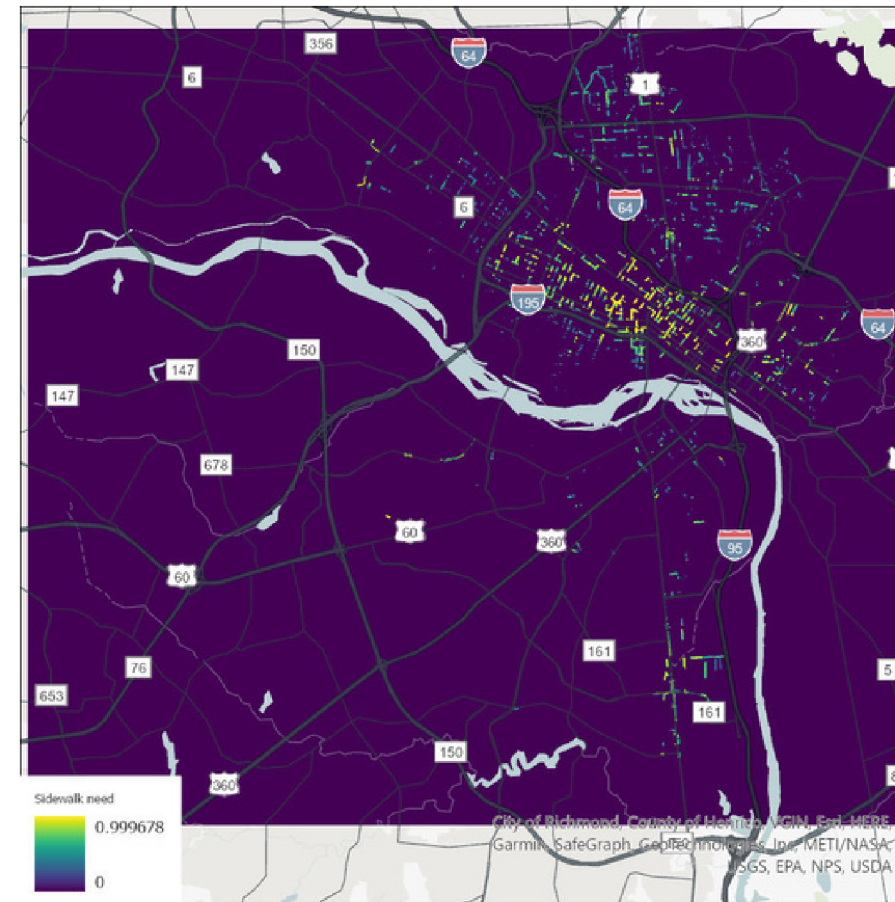
Bridge need



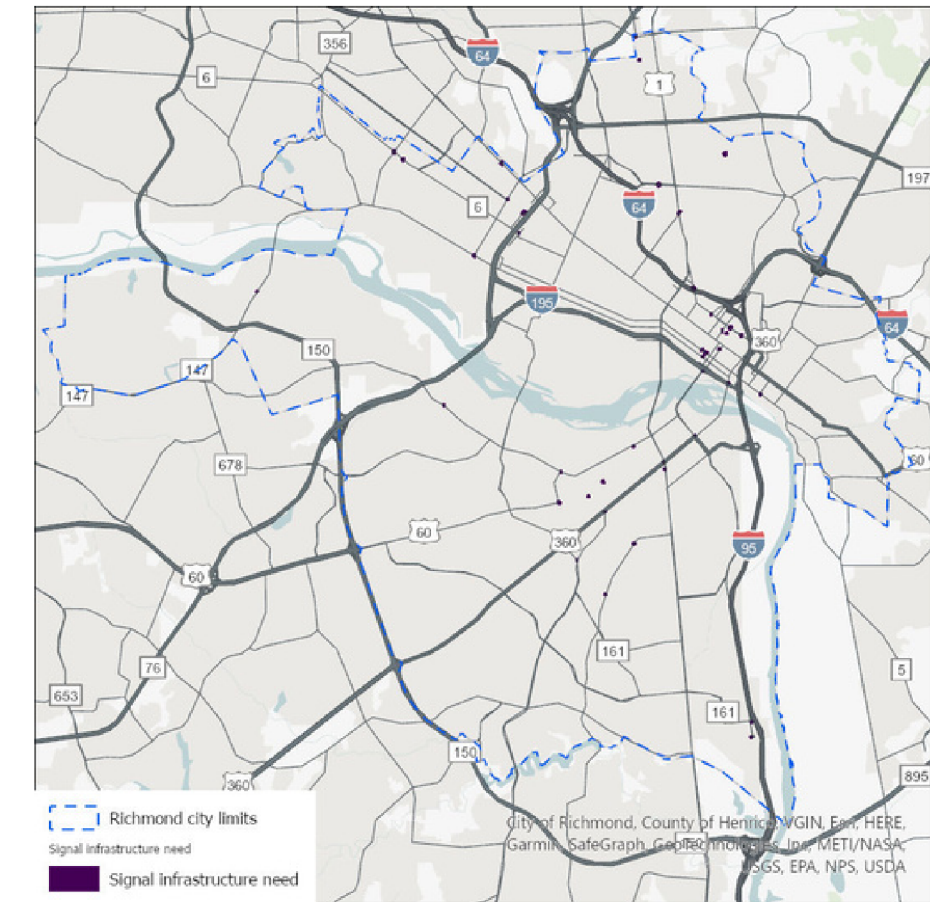
Pavement need



Sidewalk need



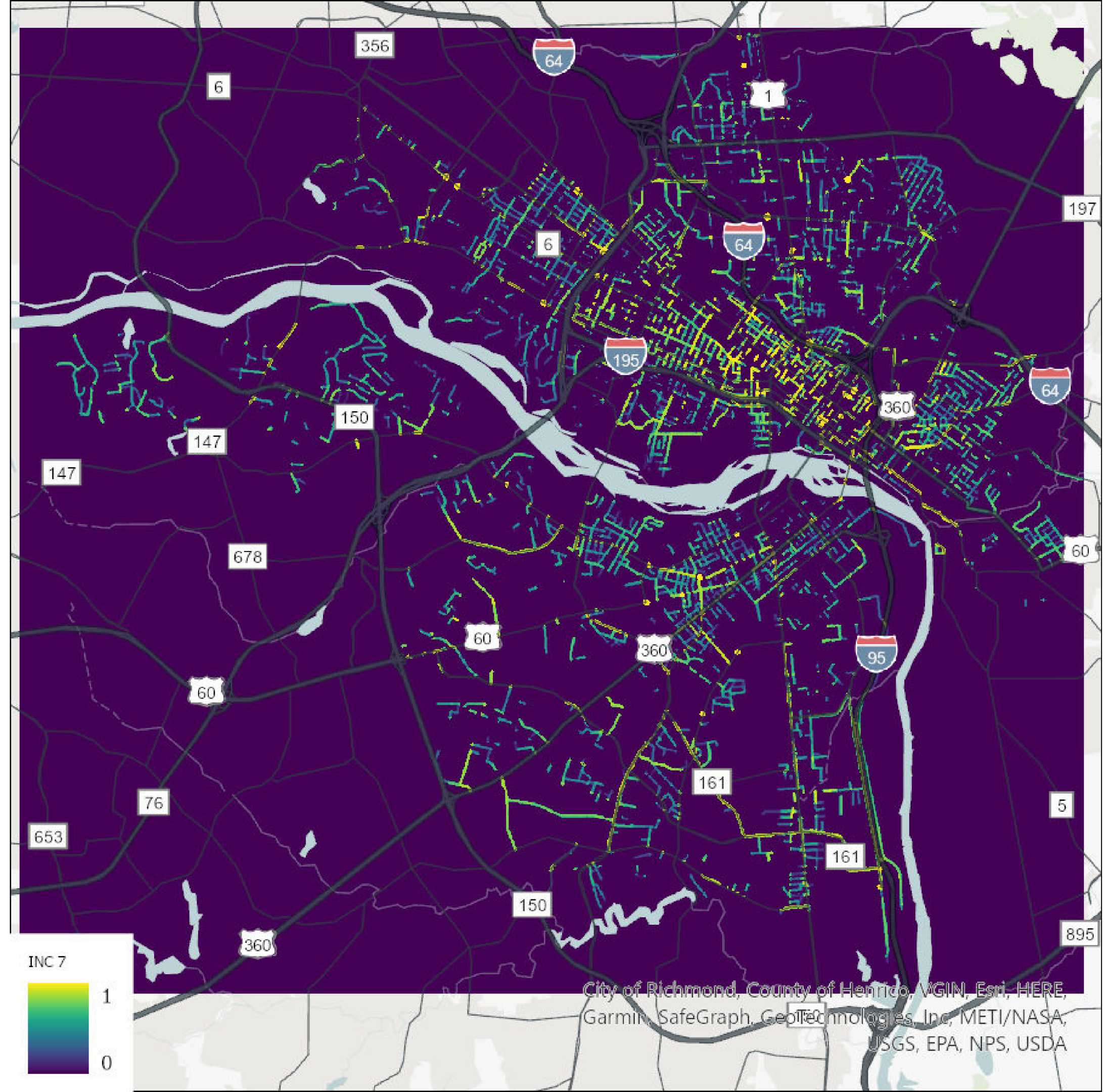
Signal infrastructure



Investment Need Category 7: **MAINTENANCE**

Facilities in poor condition are differentiated from each other based on the relevant travel volumes along/near each facility:

- Sidewalks: pedestrian trips
- Pavement: car, bike, transit trips
- Bridges: total person trips
- Signals: no weighting by volume



Investment Need Category 7:

MAINTENANCE

Facilities in poor condition are differentiated from each other based on the relevant travel volumes along/near each facility:

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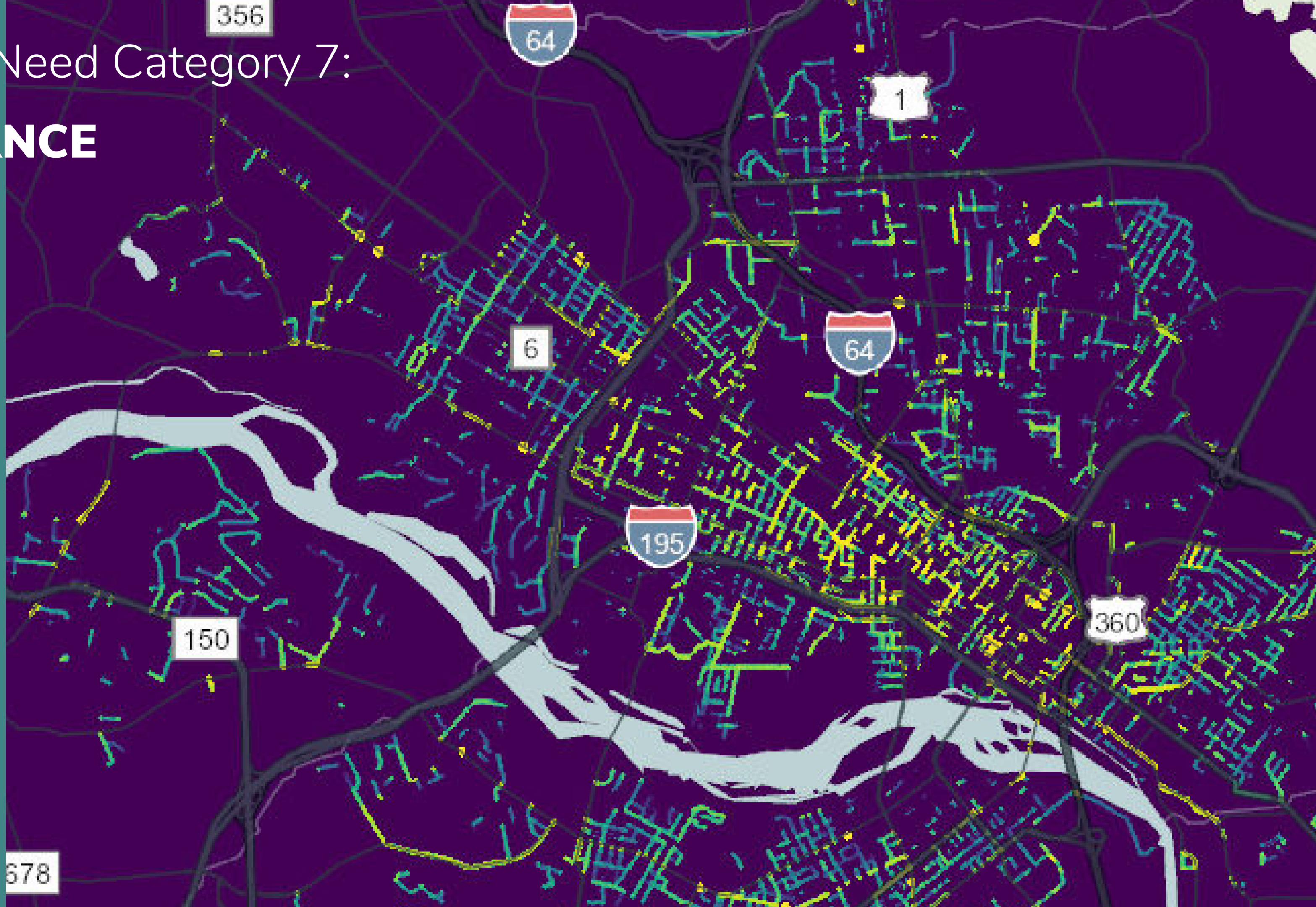


Investment Need Category 7:

MAINTENANCE

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- Sidewalks: pedestrian trips
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- Bridges: total person trips
- Signals: no weighting by volume



Questions & Discussion



3



Next Steps

Needs Analysis Work Sessions

Tue Sep. 13

2:30 - 4:30

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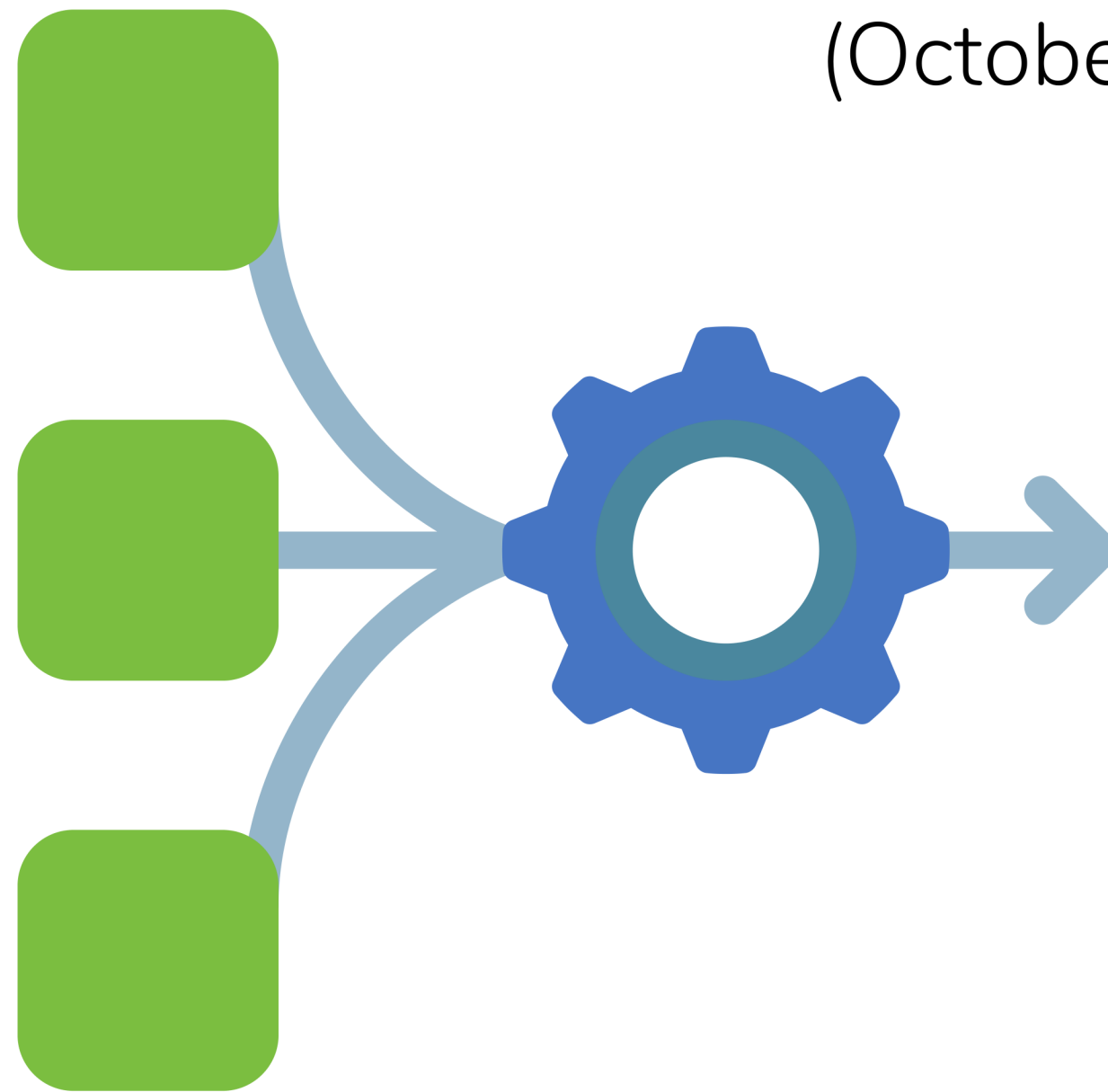
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Next Process Steps

Turn the crank and
present raw needs
maps (September)



Combine people and
network needs maps
(October)

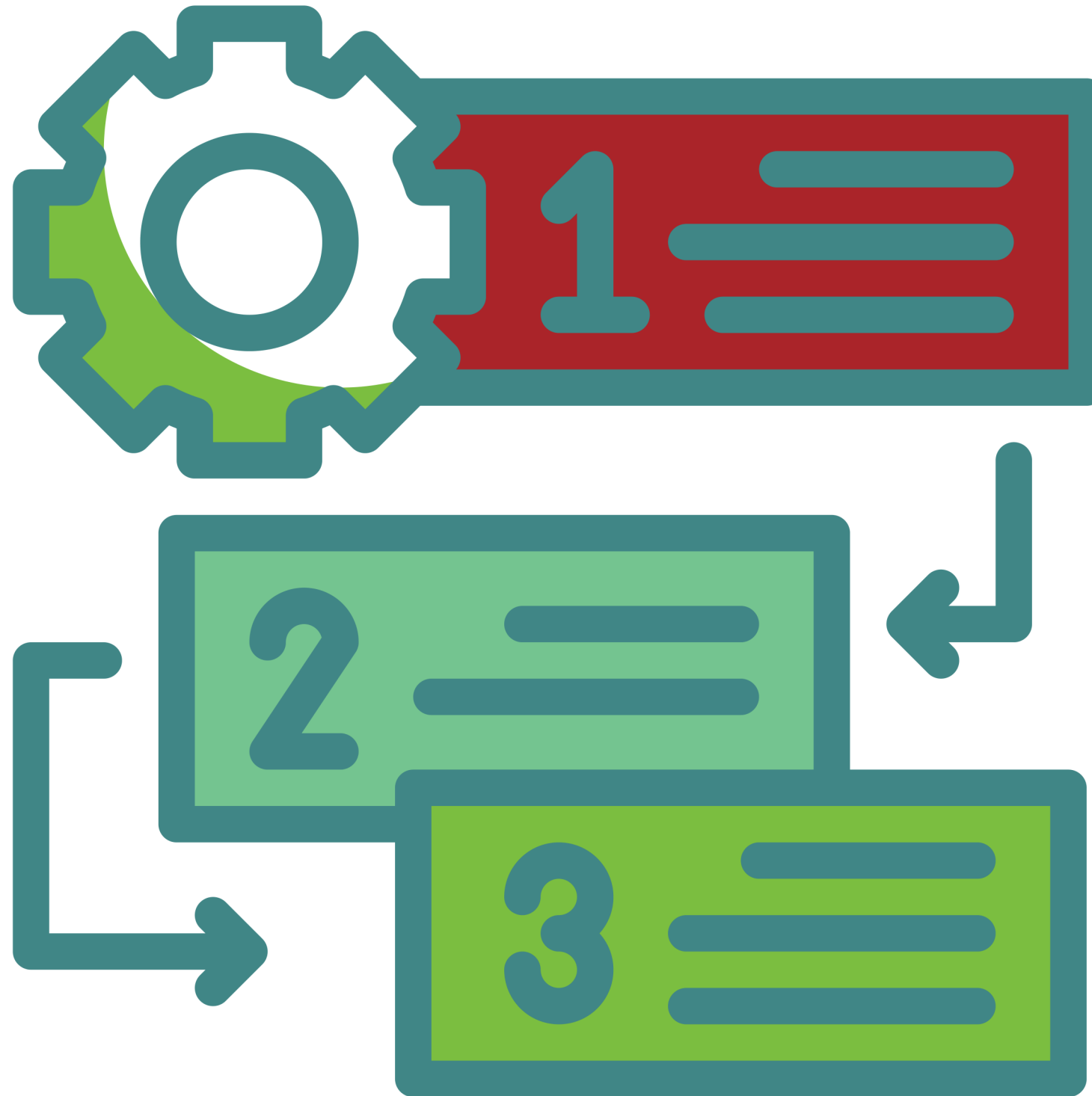
Take draft equity
embedded maps to
public (November)



Next Process Steps



Set thresholds for
to stratify and
prioritize needs

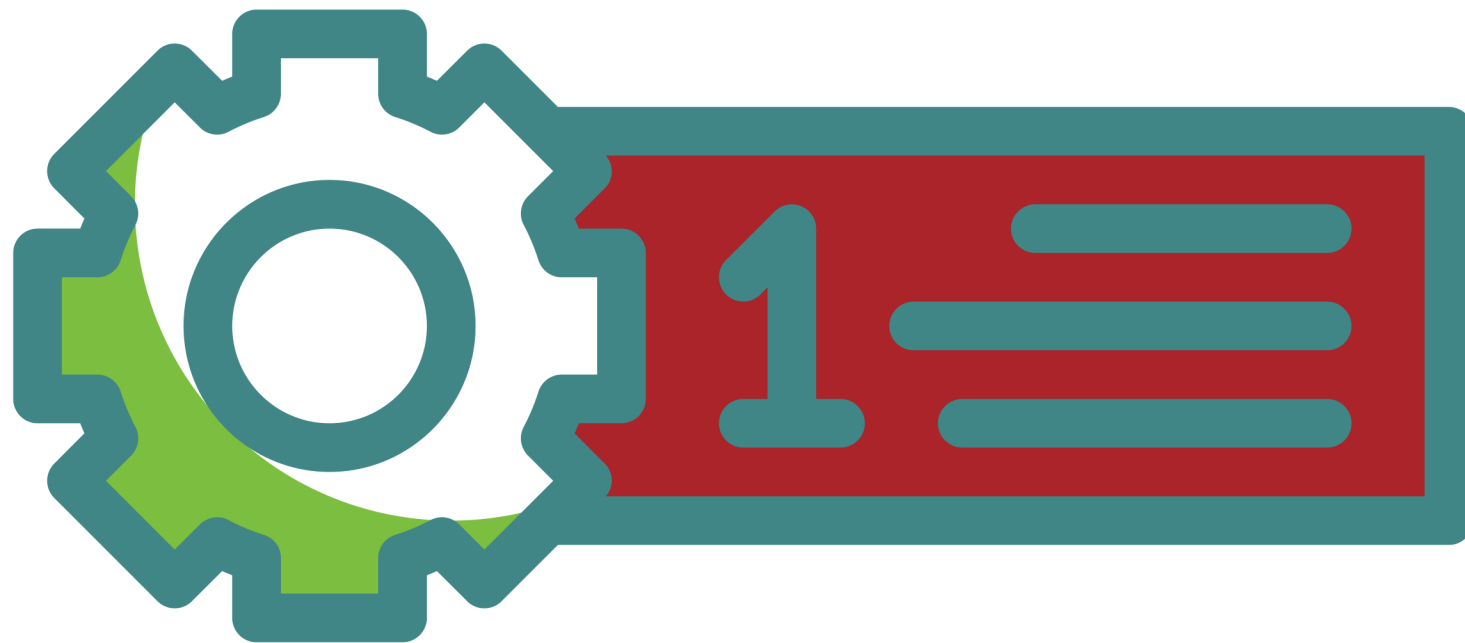


Next Process Steps

Top needs
finalized

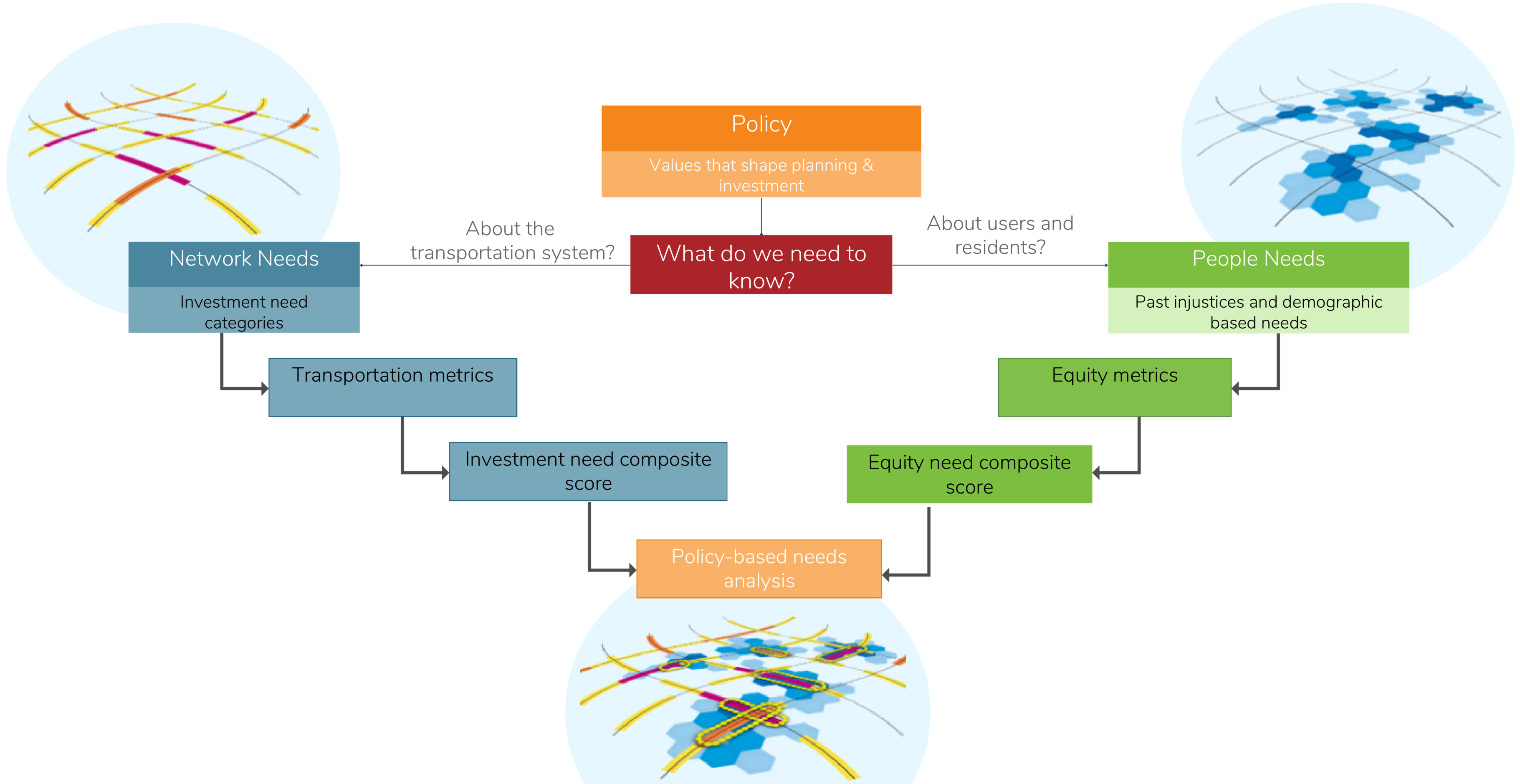


Projects identified
to meet top needs

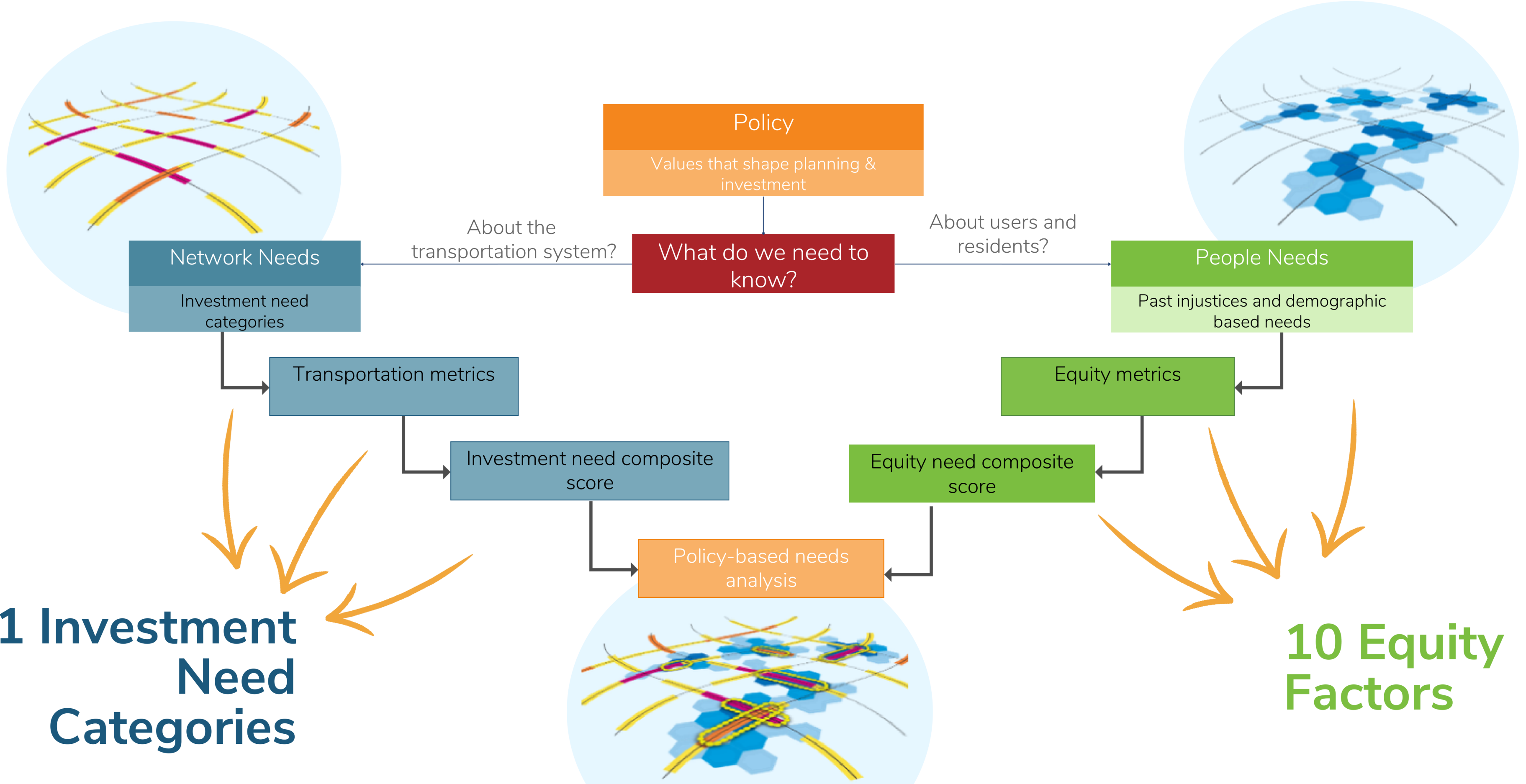


Reference Slides

Needs Analysis Framework



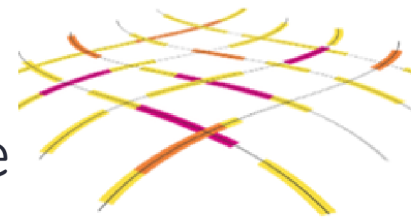
Needs Analysis Framework



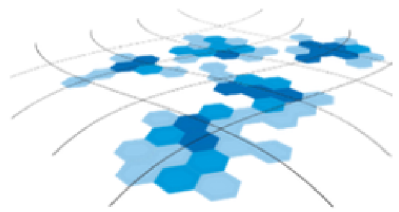
Ultimate Outcome

11 Integrated Needs Maps by Investment Need Category

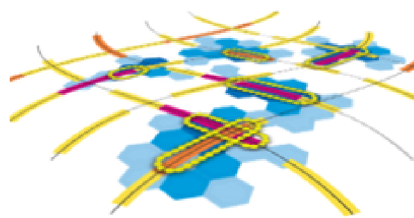
11 Investment
Need Category Composite
Maps



10 Equity Factor
Composite Maps








11 INC * 10 EFs = 11
integrated Maps



Simplify and pull out segments where top needs are located, lose background noise and present as 11 integrated needs maps

Ultimate Outcome

11 Integrated Needs Maps by Investment Need Category enriched with significance from Equity Factor Composite Maps

Investment need categories	
Pedestrian	
Bike	
Transit	
Freight	
Land Use	
Safety	
Connectivity	
Maintenance	
Economic Development	
Technology	
Sustainability	



Ultimate Outcome

11 Integrated Needs Maps by Investment Need Category



These maps will
reveal the needs:







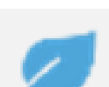
What?

Where?

Who is
impacted?

11 Investment Needs Categories and 10 Equity Factors

are the foundation of the needs analysis

Investment need categories	
Pedestrian	
Bike	
Transit	
Freight	
Land Use	
Safety	
Connectivity	
Maintenance	
Economic Development	
Technology	
Sustainability	

Equity Factors

- 1 Improve access to housing, jobs, services, recreation, and education, addressing remaining inequities created by redlining.
- 2 Reconnect and revitalize communities to address inequities created by the highway system's dissection of neighborhoods.
- 3 Improve neighborhood connectivity and revitalize the fabric of the communities negatively impacted by urban renewal.
- 4 Improve access to housing, jobs, services, and education to address the isolation of low-income inner ring suburbs where families are pushed.
- 5 Address gaps in the multimodal network and utilize new planning tools to improve safety and accessibility deficiencies stemming from traditional car-centric planning.
- 6 Equitably increase the safety and comfort of cyclists and pedestrians, connecting communities of concern to opportunities.
- 7 Improve reliability of transit and other non-car services to increase access and remove barriers to opportunities for communities of concern.
- 8 Prioritize the needs of socially vulnerable users and address climate and environmental equity as identified in RVA Green 2050.
- 9 Prioritize densely populated areas of communities of concern including communities of color, low-income communities, senior and limited mobility populations, families traveling with children, and at-risk youth.
- 10 Focus on improving climate resiliency for the most impacted communities.