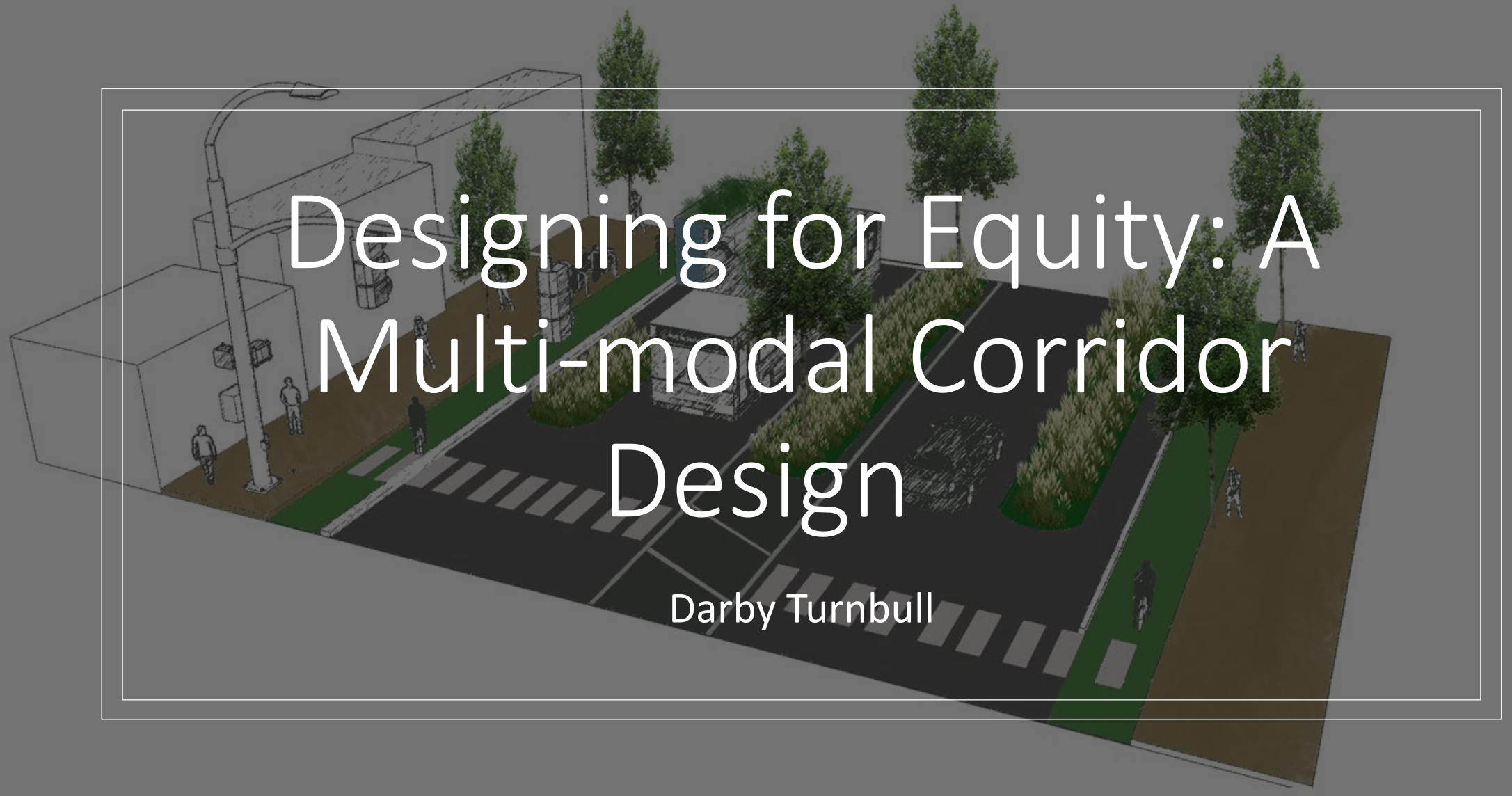


Designing for Equity: A Multi-modal Corridor Design

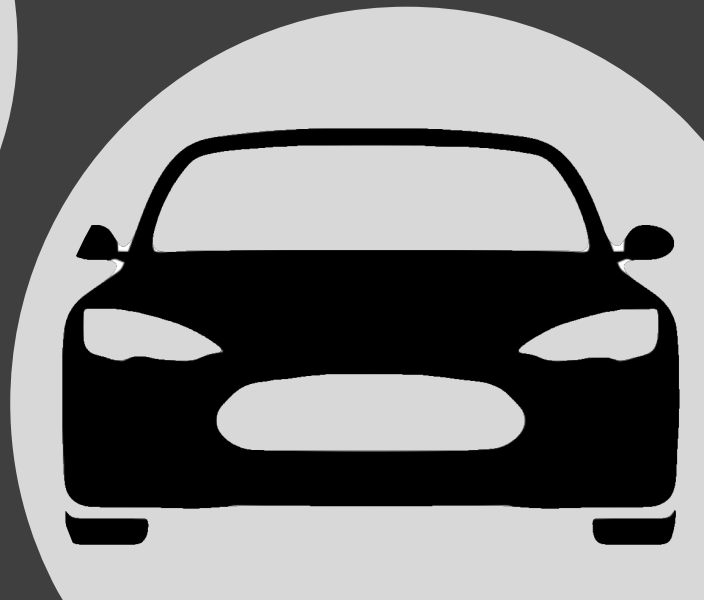
Darby Turnbull

Research Question:

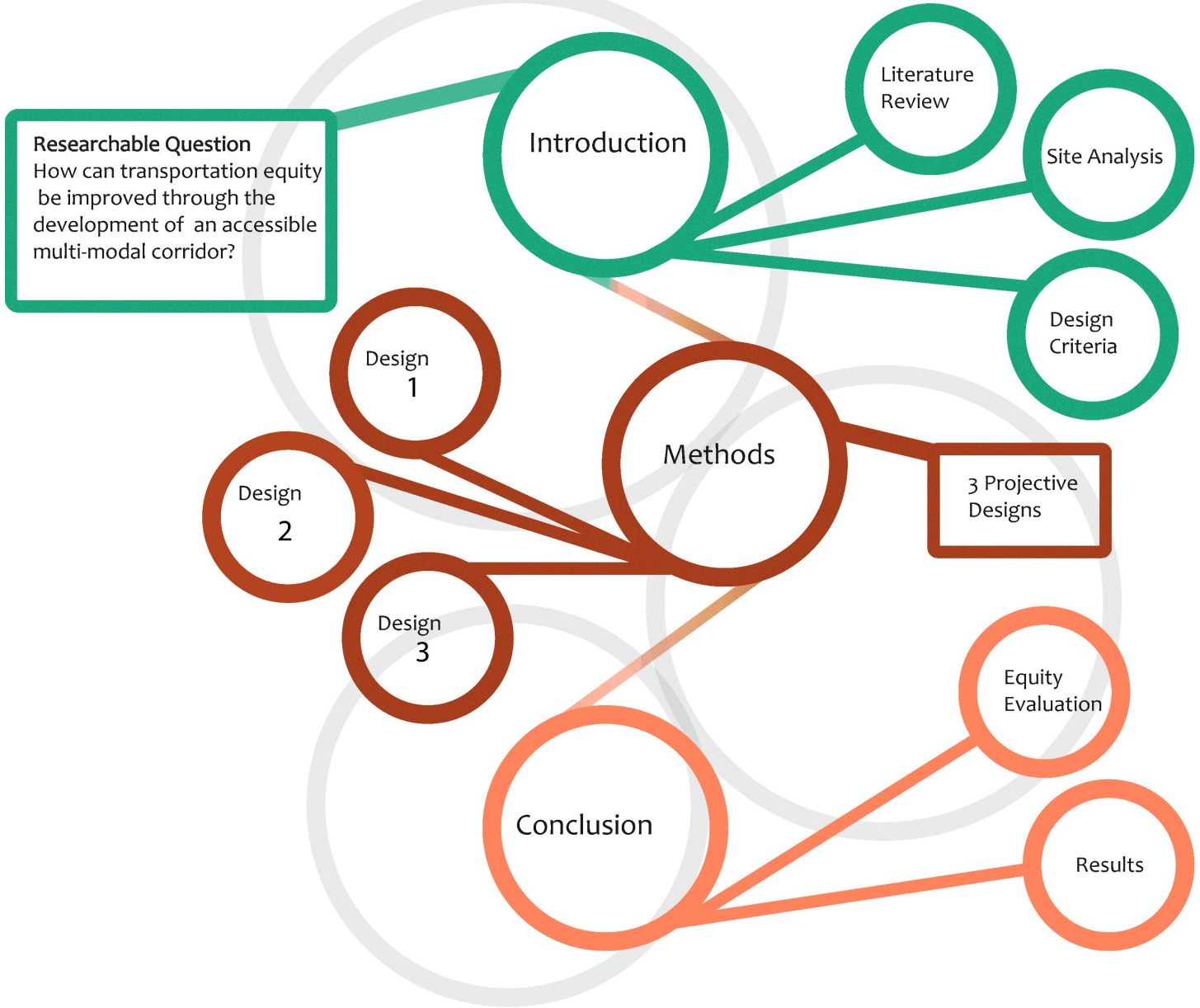
- How can design improve transportation equity through the development of an accessible multi-modal corridor?

Introduction

How will I address the Research Question?

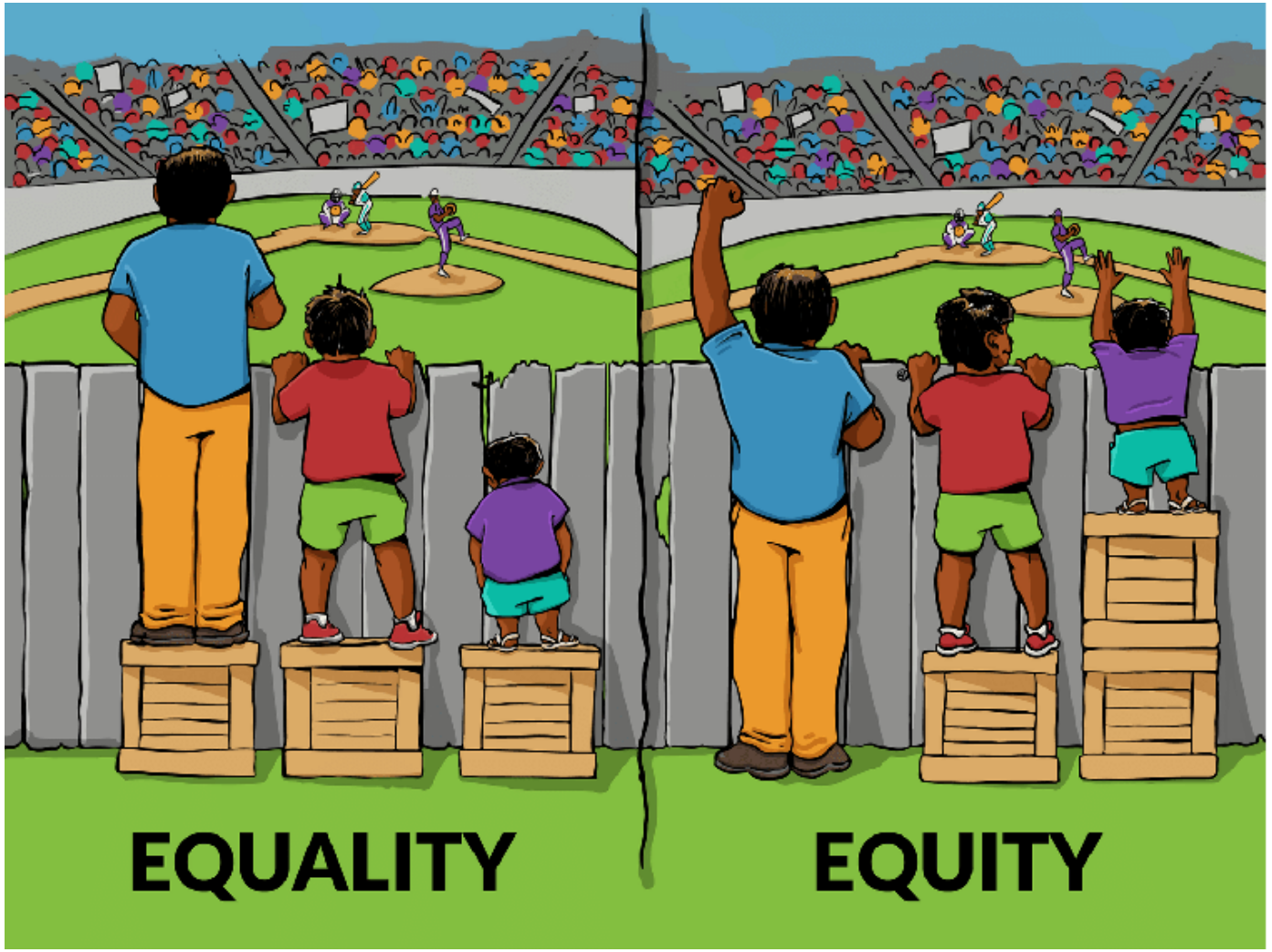


Framework



Project Framework Diagram

What is Equity?



Interactioninstitute.org

What is Equity?

Equality

The assumption is that **everyone benefits from the same supports**. This is equal treatment.

Equity

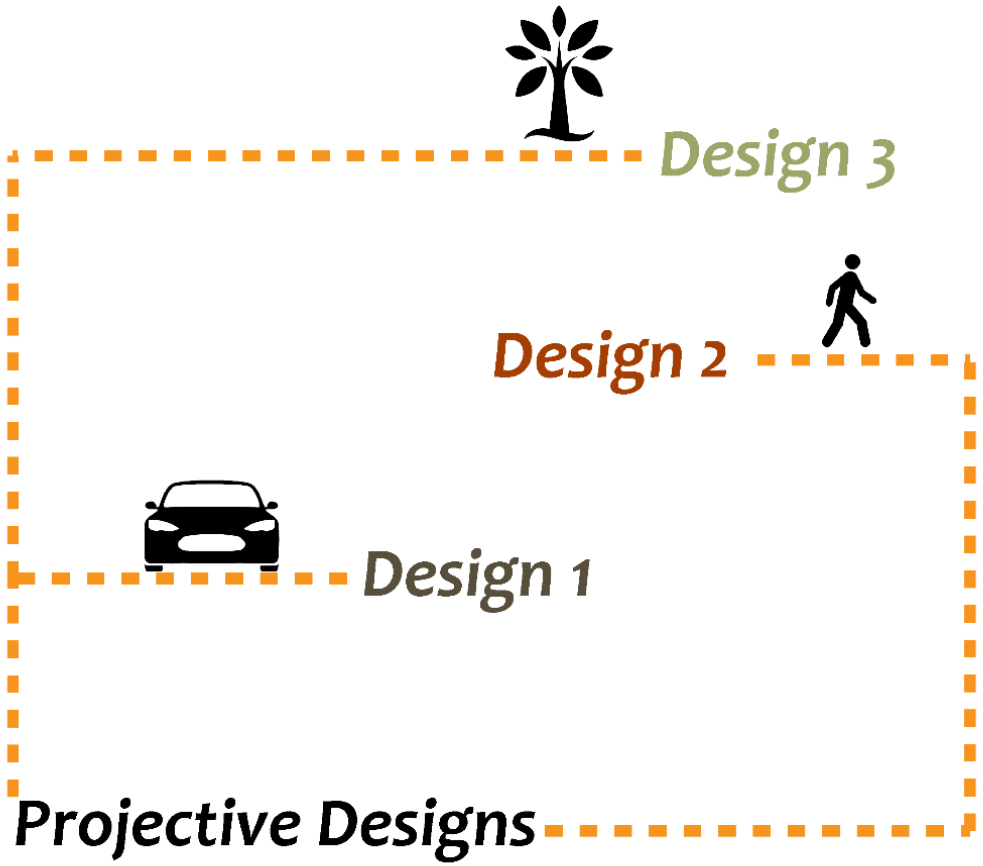
Everyone gets the supports they need (this is the concept of "affirmative action"), thus producing equity.

Justice

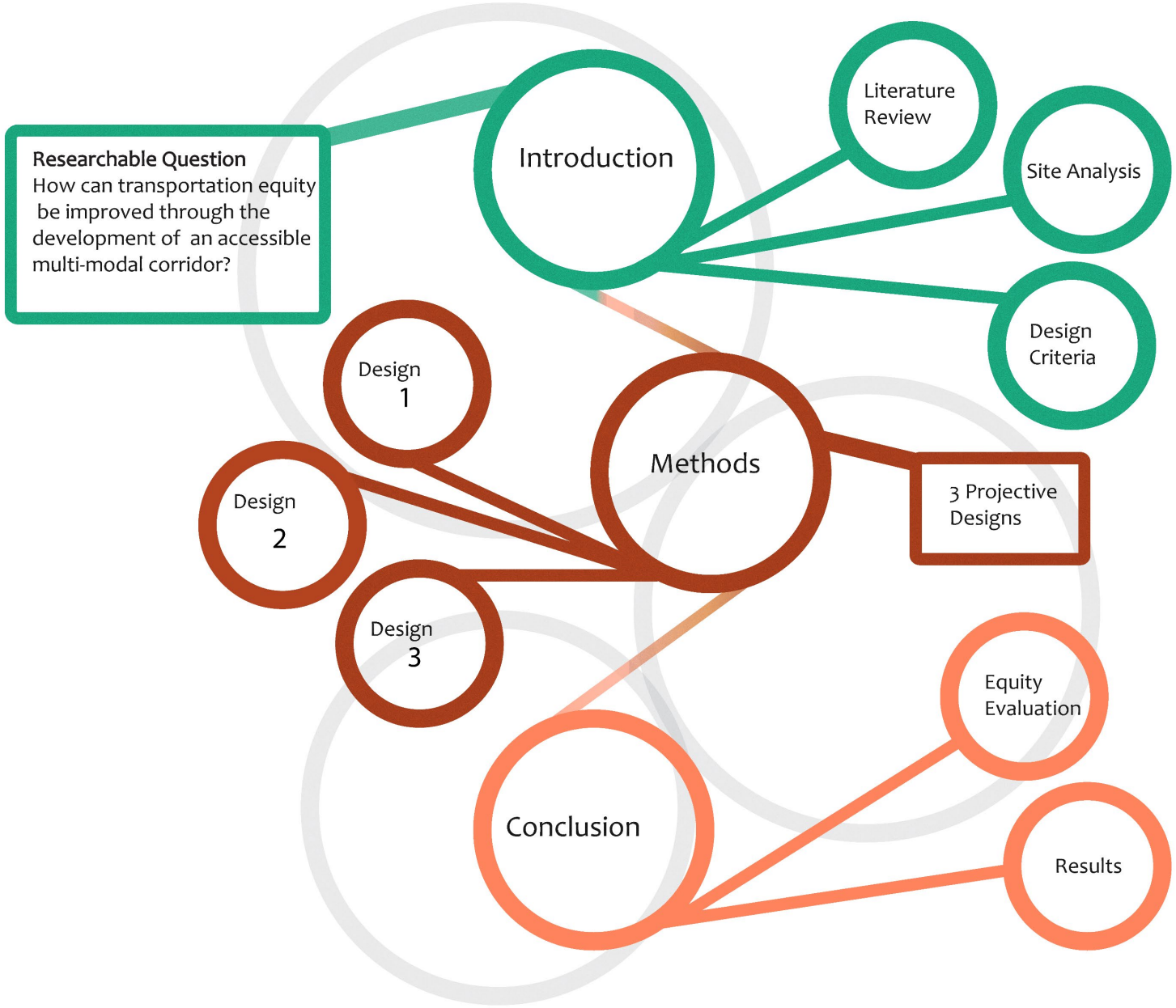
All 3 can see the game without supports or accommodations because **the cause(s) of the inequity was addressed**. The systemic barrier has been removed.

Interactioninstitute.org

What is Projective Design?

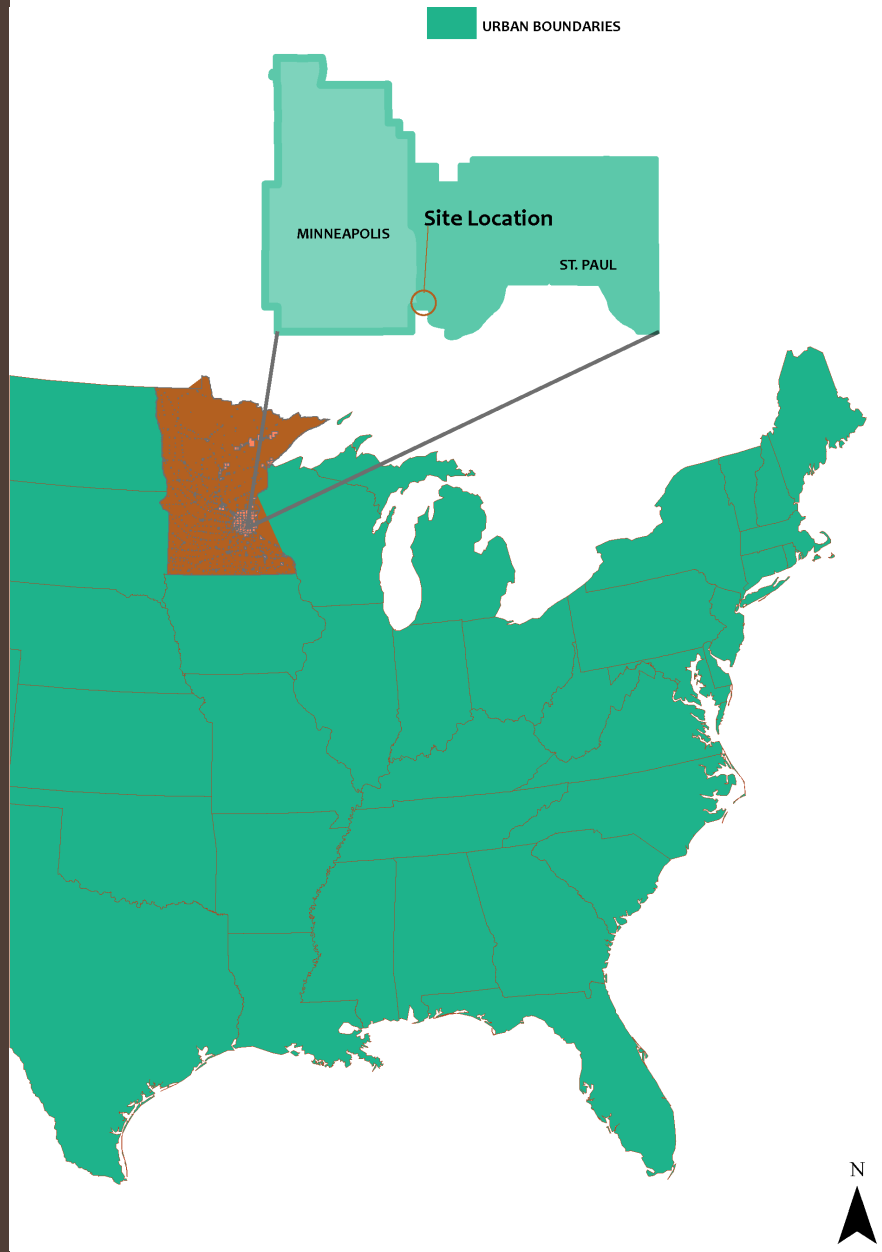


Framework


Researchable Question
How can transportation equity be improved through the development of an accessible multi-modal corridor?
Introduction
Literature Review
Site Analysis
Design Criteria
Methods
Design 1
Design 2
Design 3
3 Projective Designs
Conclusion
Equity Evaluation
Results

Site Location

Testimonials:



Site Location

- Ford Parkway is located on the South Western side of Saint Paul.
- Adjacent to the Mississippi River


Haskell's
WINE & SPIRITS
ERIK'S

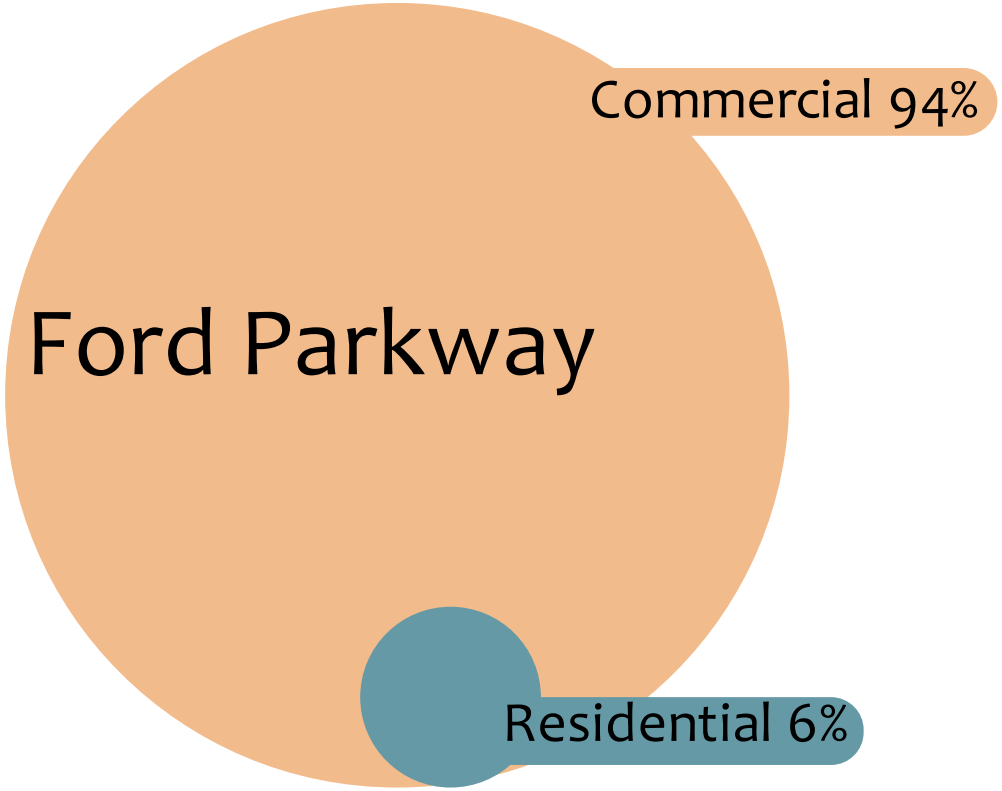

tcf
bank


bakers
square

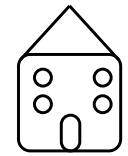

Haskell's
The Wine People!
ERIK'S

Site Photos

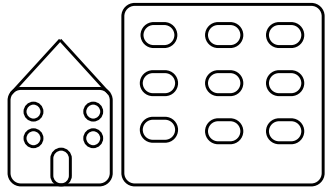
Inventory and Analysis



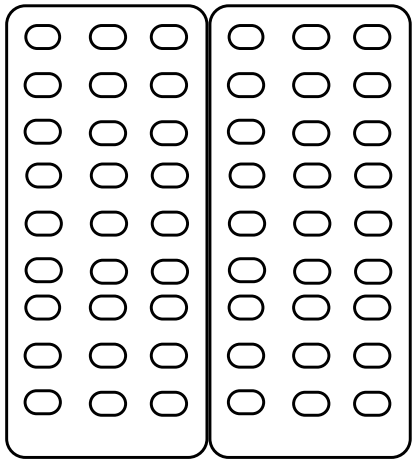
Saint Paul Dwelling Unit Density Standards



Low Density:
<15 dwelling units per acre



Medium - High Density:
15-30 dwelling units/acre



High Density: >30 dwelling units/acre

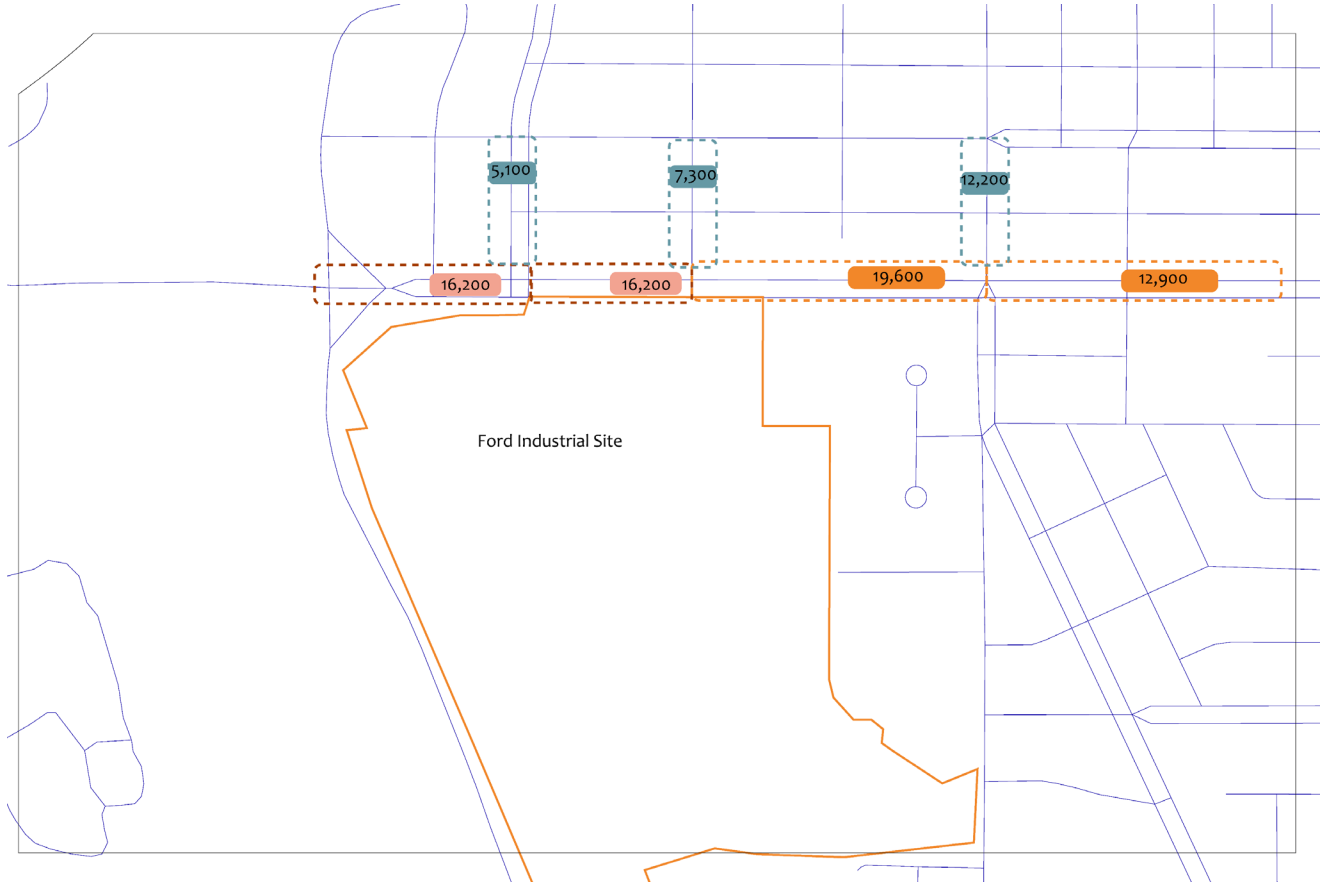
Inventory and Analysis

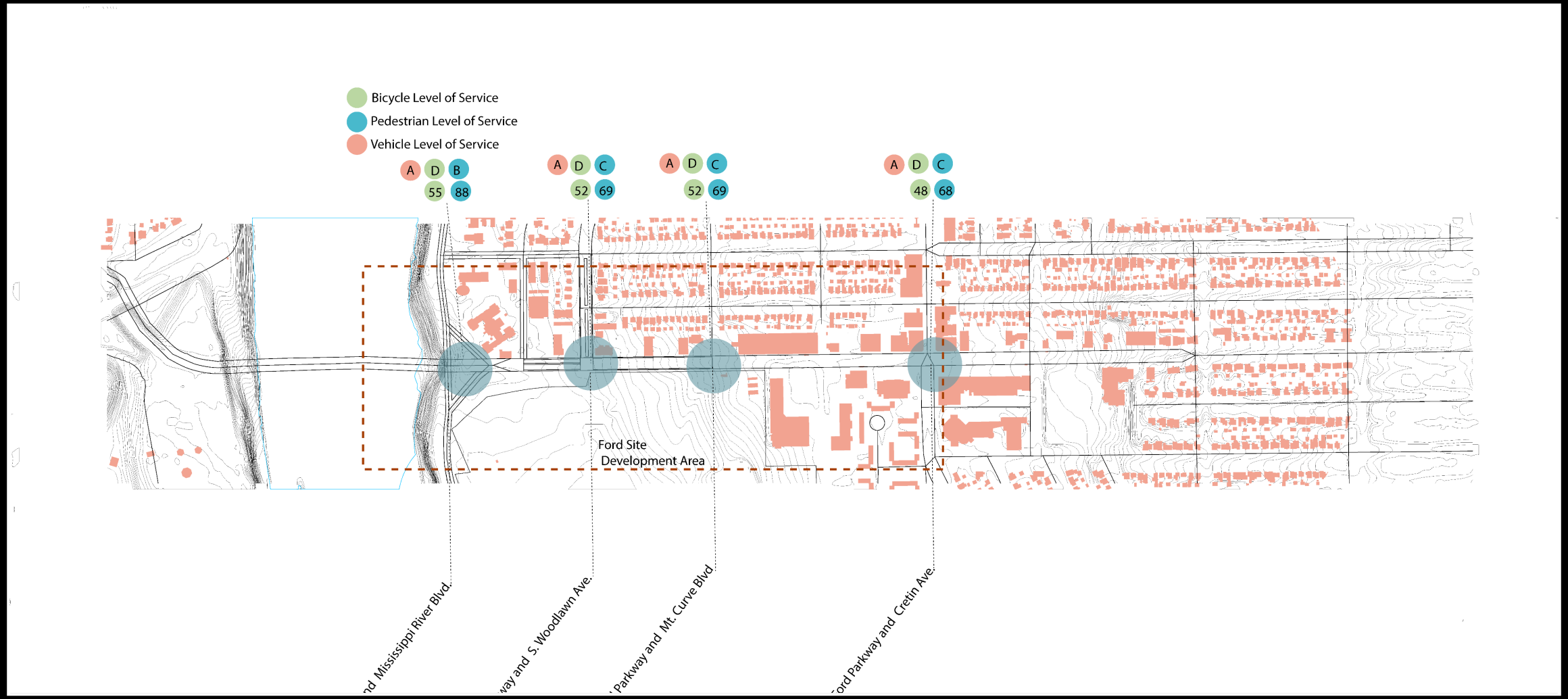
- Ford Site will be 37 dwelling units/acre
- Current surrounding neighborhood is <15 dwelling units per acre

Inventory and Analysis

Annual Average Daily Trips

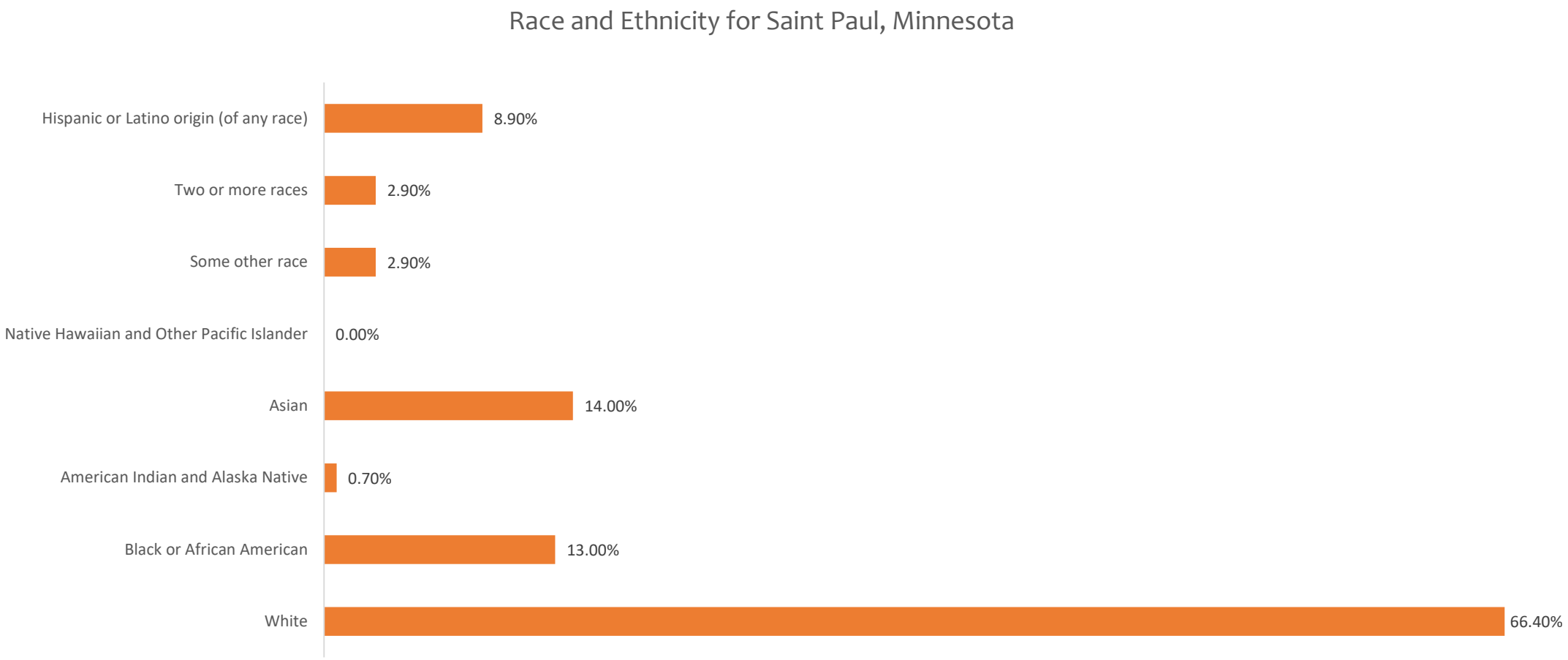
- Projected Daily Trips will be
  - 17,000 – 24,000 Post Development
  - 6,000 Transit Trips
  - 6,000 Non-motorized Trips





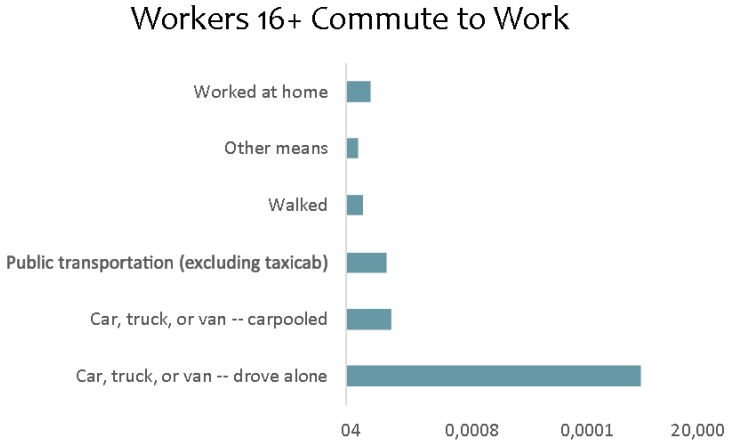
Current Level of Service

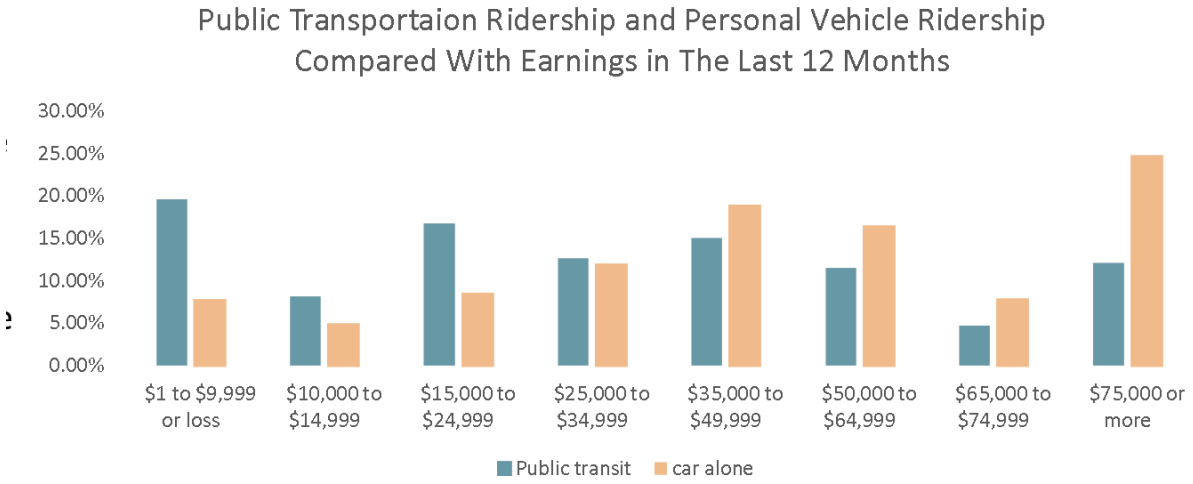
Demographics

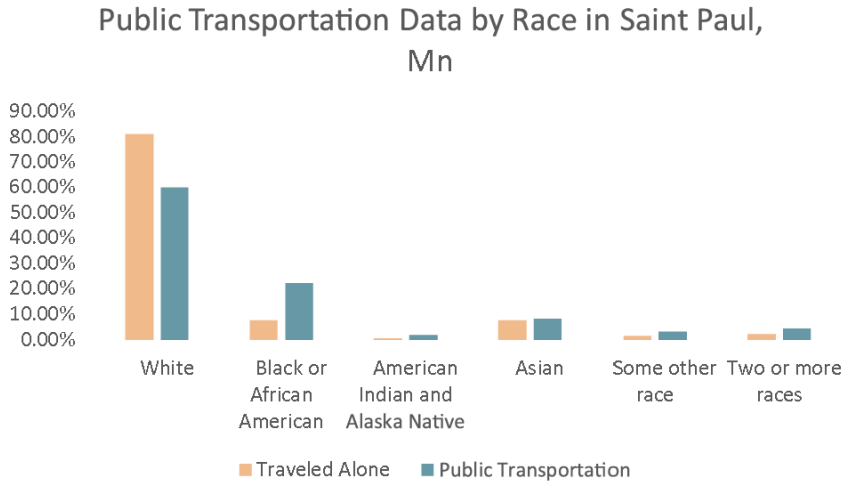


Data: American Fact Finder Census Survey 2018

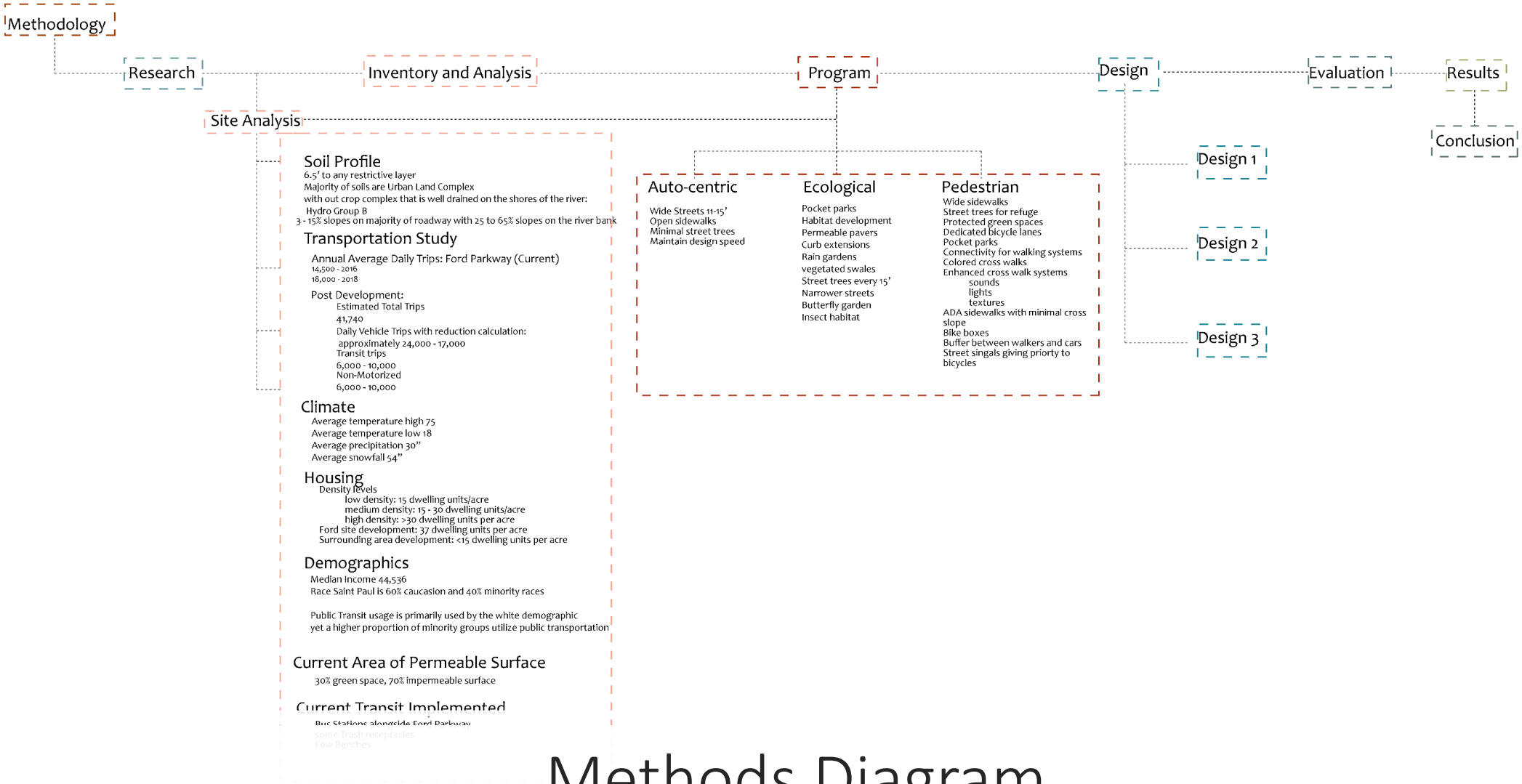
Inventory and Analysis



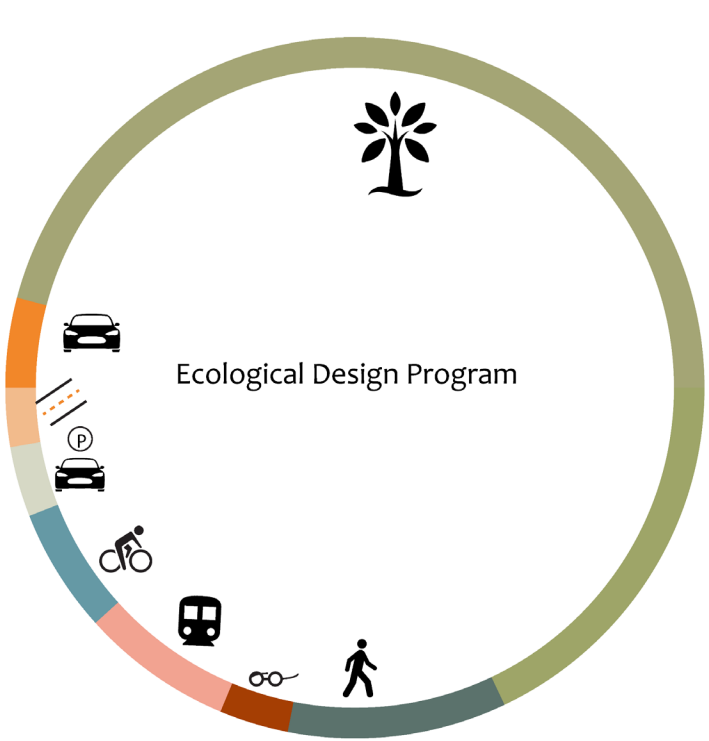


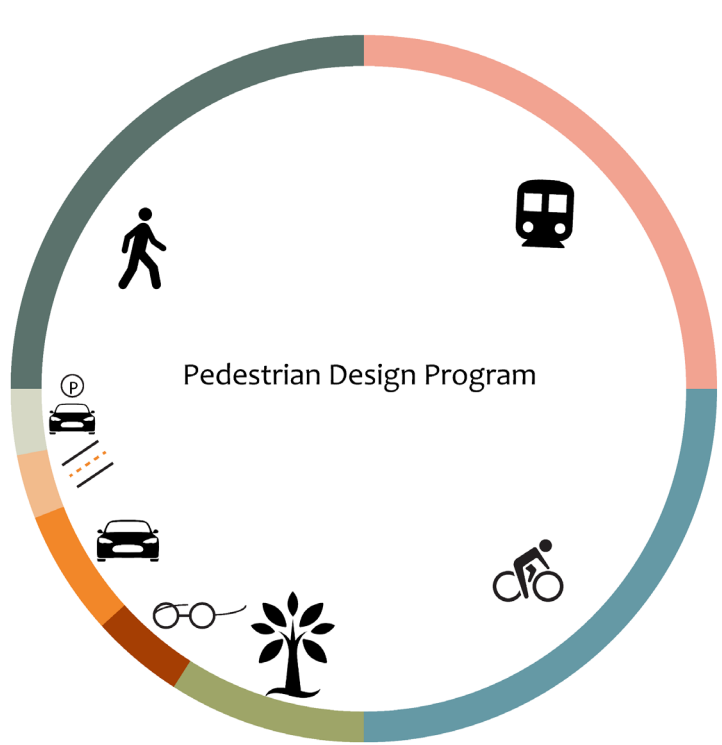


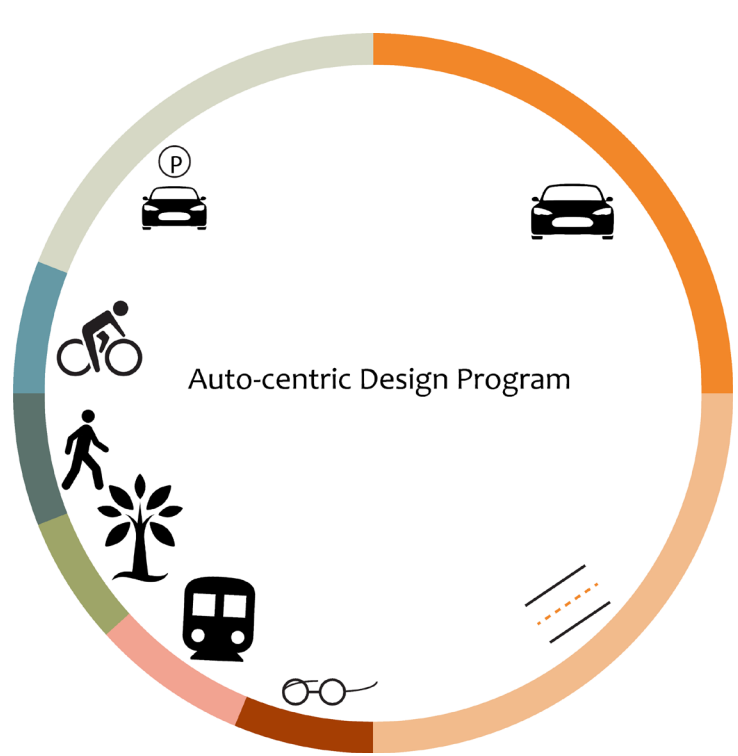
Data: American Fact Finder Census Survey 2018



Methods Diagram

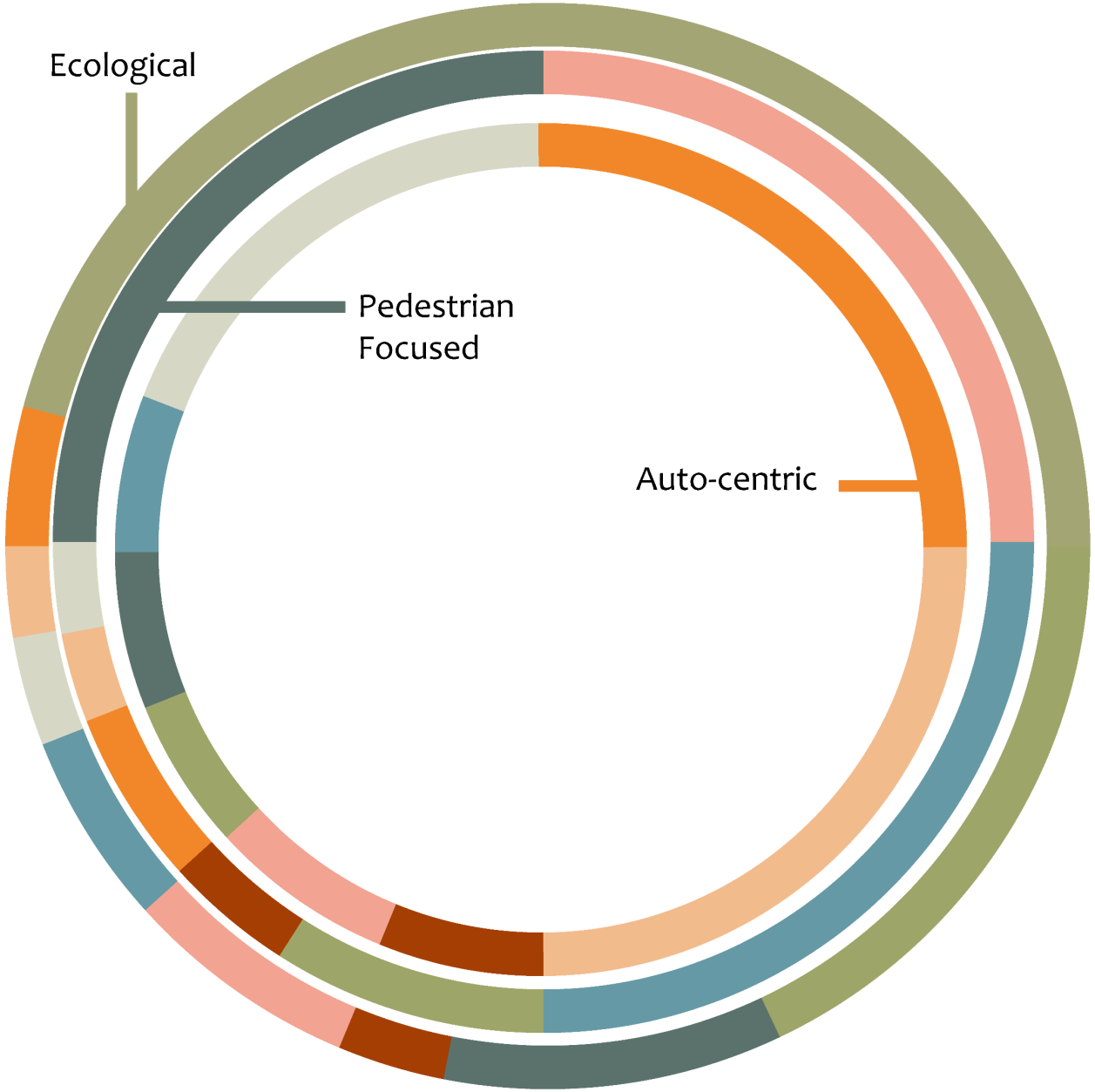






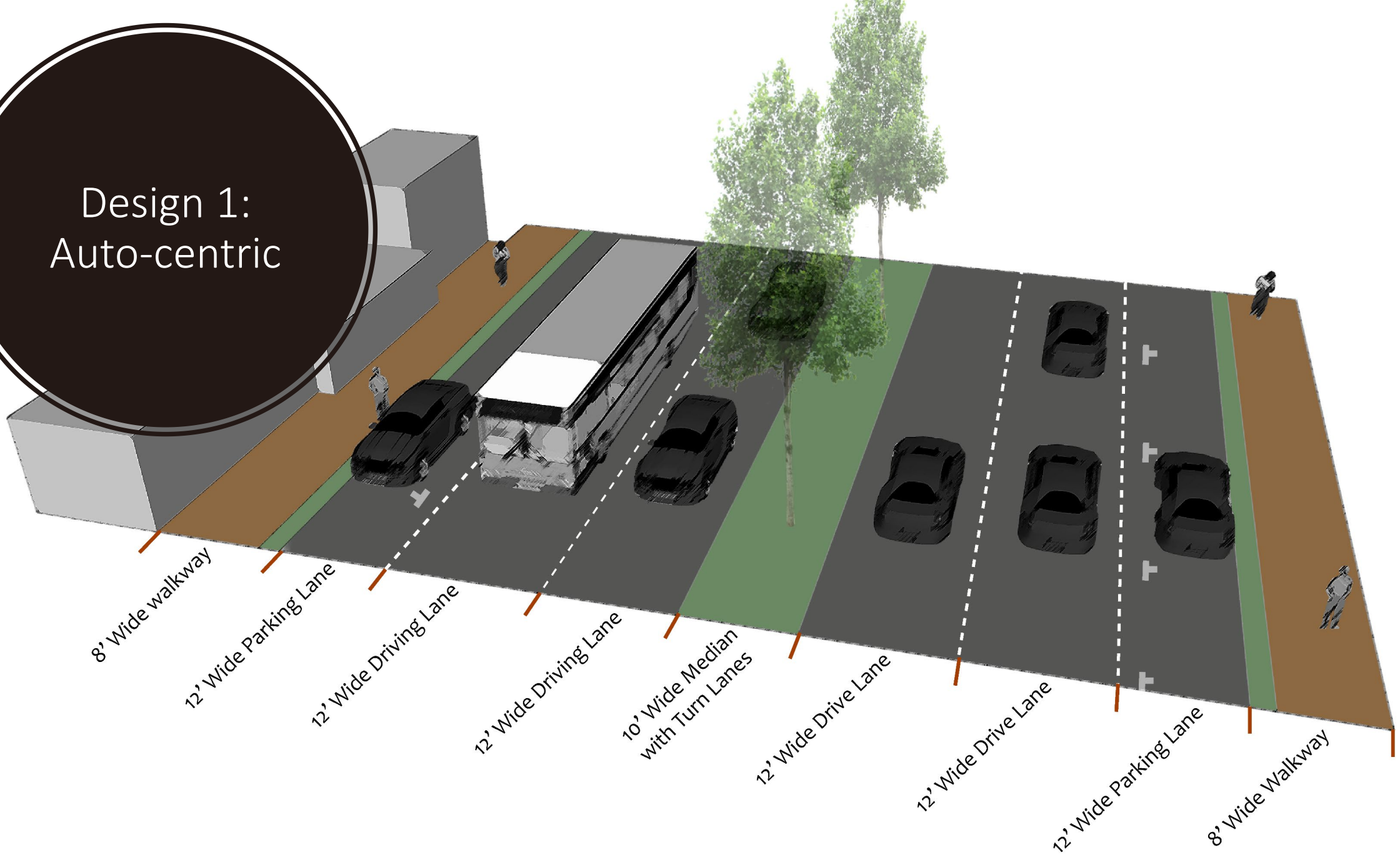
Design Programs

Projective Design Programs

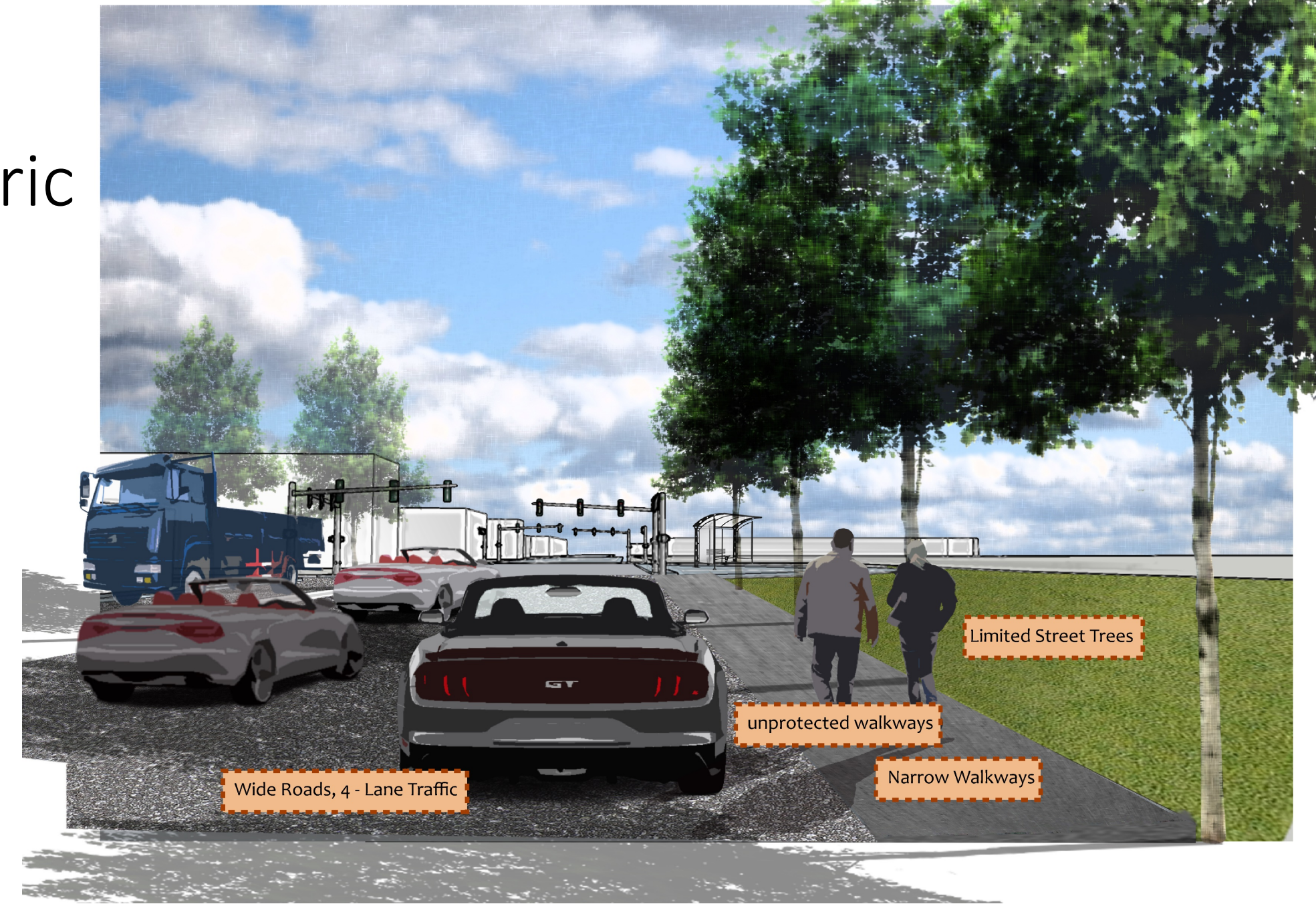


Designs

Design 1: Auto-centric

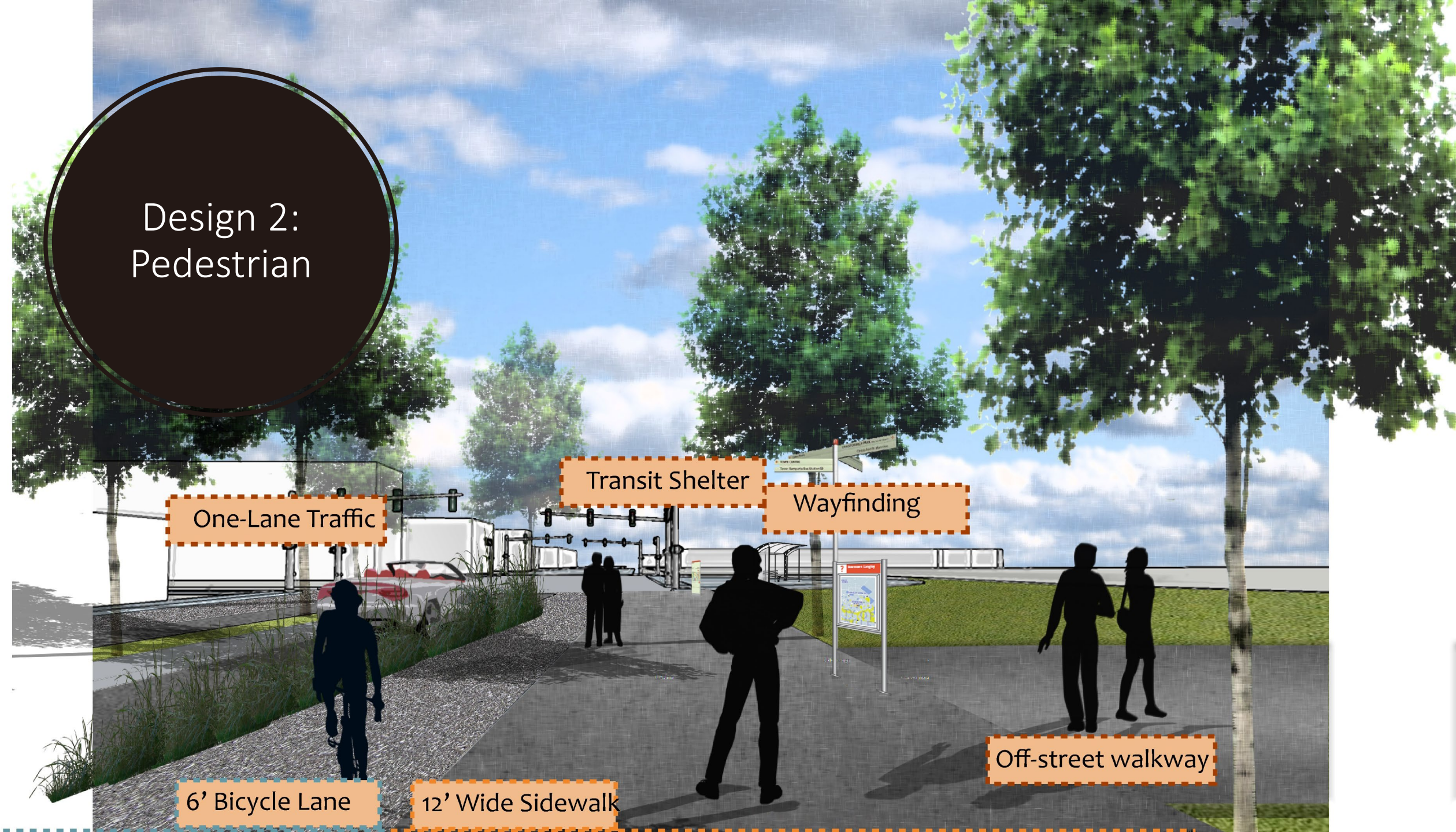


Design 1: Auto-centric

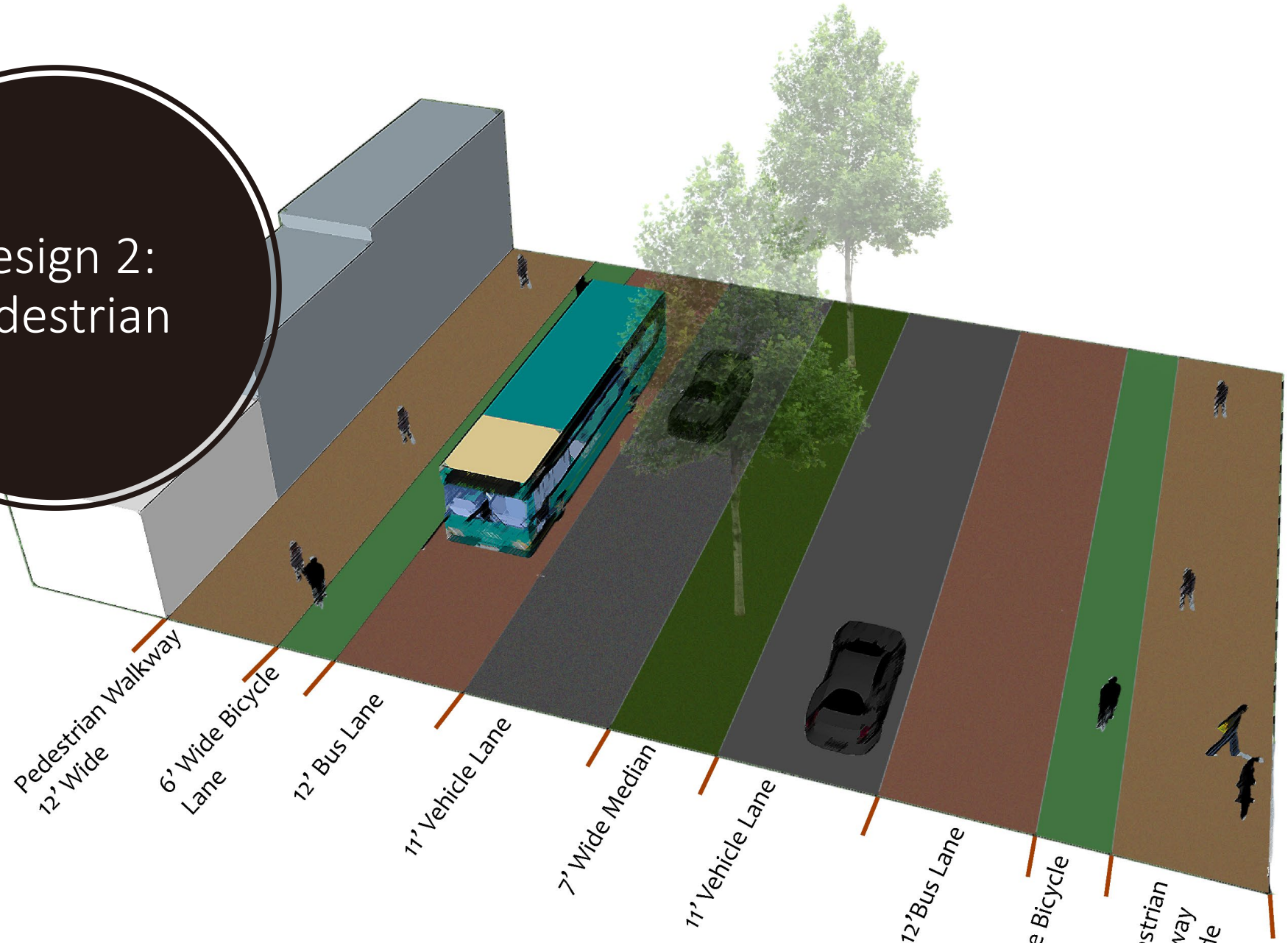


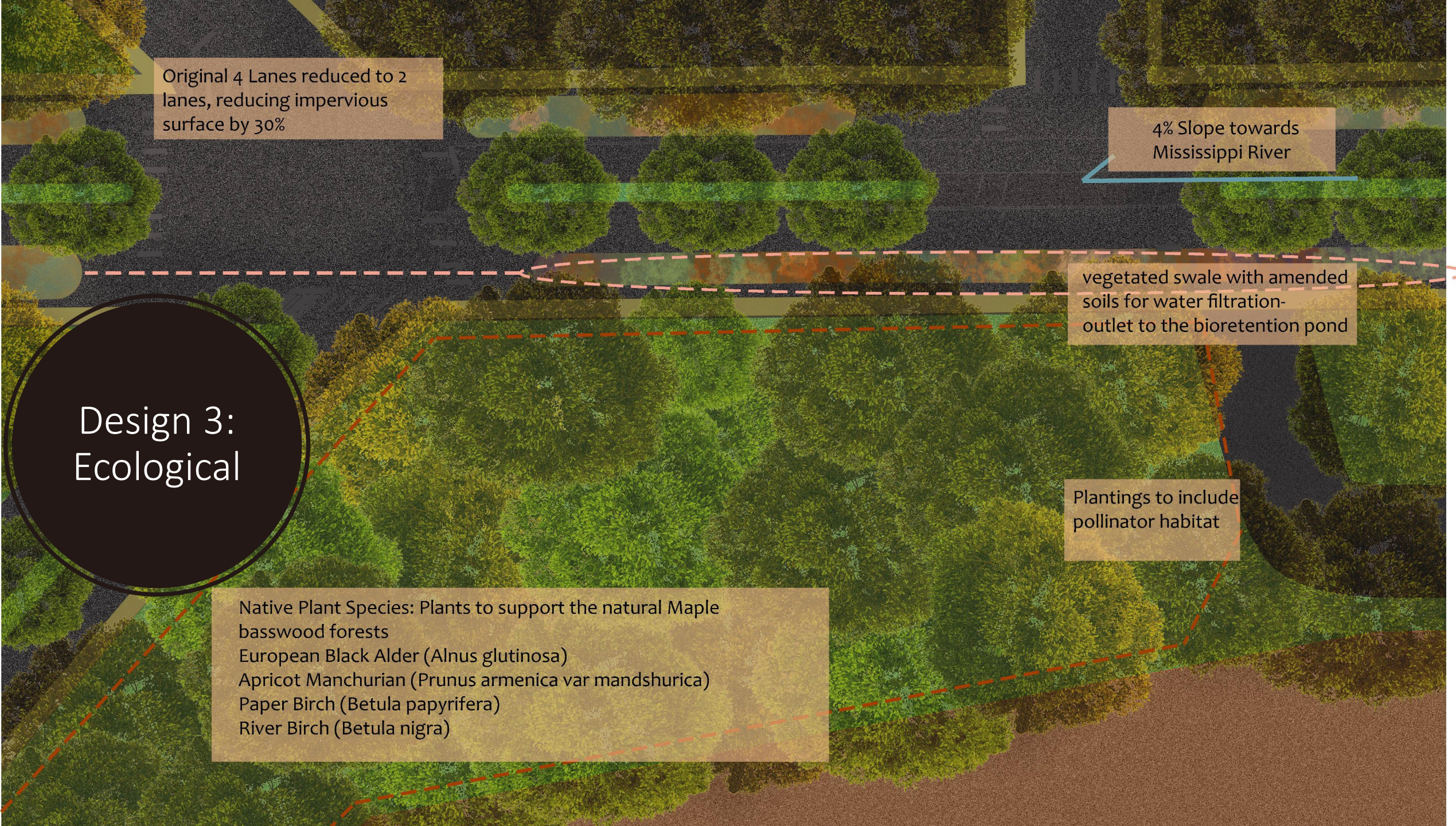

Transit Shelters
Traffic Calming Medians
Bicycle Turn Boxes
Angled Crossings
12’ Wide walkways
6’ Bicycle Lanes
Off-Street Walkways
Design 2: Pedestrian

Design 2: Pedestrian



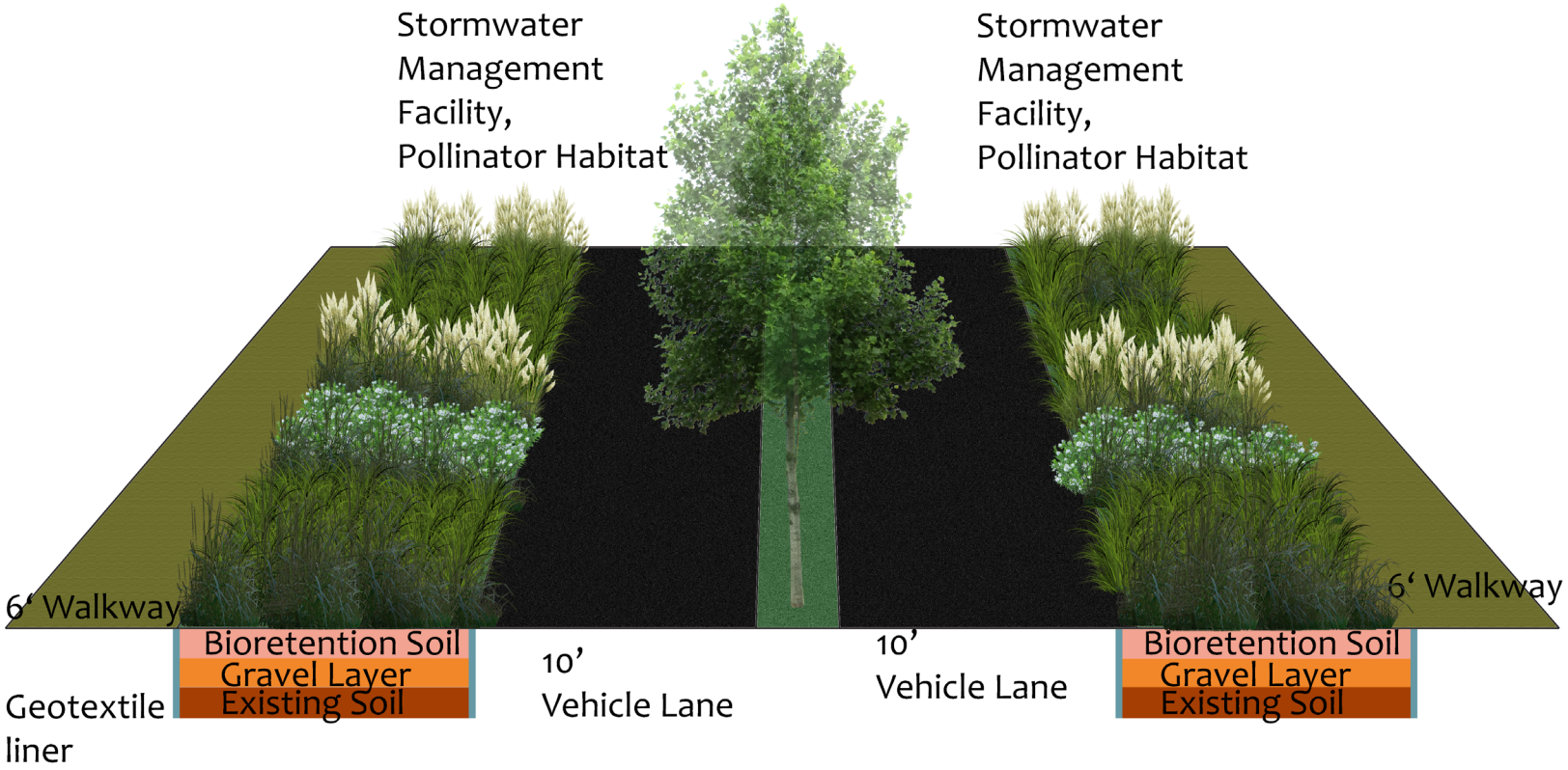
Design 2: Pedestrian




Original 4 Lanes reduced to 2 lanes, reducing impervious surface by 30%
4% Slope towards Mississippi River
vegetated swale with amended soils for water filtration- outlet to the bioretention pond
Design 3: Ecological
Plantings to include pollinator habitat
Native Plant Species: Plants to support the natural Maple basswood forests
European Black Alder (Alnus glutinosa)
Apricot Manchurian (Prunus armenica var mandshurica)
Paper Birch (Betula papyrifera)
River Birch (Betula nigra)


Design 3:
Ecological
Native plant materials to the Southeast/central Minnesota Region
Habitat Support for pollinators and avian species
Vegetated swales with additional plant materials to support pollinators
6’ wide walkways
permeable pavers to allow for infiltration

Design 3: Ecological



Evaluation

Evaluation

- Total Points in Sites Evaluation=200
- Points relating to equity=30
- 15% of the evaluation addresses the needs of the users in regards to equitable space allocation

0	0	0	**6: SITE DESIGN - HUMAN HEALTH + WELL-BEING**	**Possible Points:**	**30**
			HHWB C6.1	Protect and maintain cultural and historic places	**2 to 3**
			HHWB C6.2	Provide optimum site accessibility, safety, and wayfinding	**2**
			HHWB C6.3	Promote equitable site use	**2**
			HHWB C6.4	Support mental restoration	**2**
			HHWB C6.5	Support physical activity	**2**
			HHWB C6.6	Support social connection	**2**
			HHWB C6.7	Provide on-site food production	**3 to 4**
			HHWB C6.8	Reduce light pollution	**4**
			HHWB C6.9	Encourage fuel efficient and multi-modal transportation	**4**
			HHWB C6.10	Minimize exposure to environmental tobacco smoke	**1 to 2**
			HHWB C6.11	Support local economy	**3**

Evaluation: LEED

- This highlights where LEED addresses components of equitable streets.
- 41/110=37% of the Neighborhood design criteria for this portion of the evaluation:
- Neighborhood Development

0	0	0	Neighborhood Pattern & Design		41
Y			Prereq	Walkable Streets	Required
Y			Prereq	Compact Development	Required
Y			Prereq	Connected and Open Community	Required
			Credit	Walkable Streets	9
			Credit	Compact Development	6
			Credit	Mixed-Use Neighborhoods	4
			Credit	Housing Types and Affordability	7
			Credit	Reduced Parking Footprint	1
			Credit	Connected and Open Community	2
			Credit	Transit Facilities	1
			Credit	Transportation Demand Management	2
			Credit	Access to Civic & Public Space	1
			Credit	Access to Recreation Facilities	1
			Credit	Visitability and Universal Design	1
			Credit	Community Outreach and Involvement	2
			Credit	Local Food Production	1
			Credit	Tree-Lined and Shaded Streetscapes	2
			Credit	Neighborhood Schools	1

Evaluation

Total: 71 Points
Auto-centric: 10
Pedestrian: 45
Ecological: 37

High Performing Design: 47-71
Moderate Performing Design: 24-46
Low Performing Design: 0 - 24

Equity			Automobile	Pedestrian	Ecological	Total Allotted
Rest Areas	**1 to 3**		**1**	**3**	**1**	**3**
Maintain current seating		1				
Additional seating at every bus stop		2				
multiple seating options along multi-modal pathway		3				
Shelter	**1 to 2**		**0**	**2**	**1**	**2**
Additional Shade Trees for Shelter		1				
Additional Structure for Shelter		2				
Water Fountains	**1 to 3**		**0**	**3**	**0**	**3**
Add an Additional Water Fountain		1				
Water Fountains at every transit stop		2				
Water Fountains at every rest area		3				
Green Space	**1 to 4**		**1**	**2**	**4**	**4**
Preserve Current		1				
Additional 20%		2				
Additional 50%		3				
Additional 75%		4				
Walkway Distance From Vehicles	**1 to 4**		**1**	**4**	**4**	**4**
Separate Walkway from Vehicles		1				
3' distance from vehicles		2				
buffer between pedestrians and vehicles		3				
Separted walkway from vehicles with vegetated buffer		4				
Support mental restoration		**2**	**0**	**1**	**2**	**2**
Support physical activity		**2**	**0**	**2**	**0**	**2**
Support social connection		**2**	**0**	**2**	**0**	**2**
Provide on-site food production	**3 to 4**		**0**	**0**	**3**	**4**
1: Food Production		3				
2: Food production and regular distribution		4				
Reduce light pollution		**4**	**0**	**0**	**4**	**4**
Encourage fuel efficient and multi-modal transportation		**4**	**0**	**4**	**0**	**4**
minimize exposure to environmental tobacco smoke	**1 to 2**		**0**	**0**	**0**	**2**
Support Local economy		**3**	**0**	**0**	**3**	**3**
wayfinding	**1 to 3**		**1**	**3**	**1**	**3**
Maintain existing signage		1				
additional signage at pedestrian crossings		2				
additional kiosks/brochures/interactive displays/models		3				
Accessibility	**1 to 2**		**1**	**2**	**1**	**2**
ADA compliance on pedestrian infrastructure		1				
ADA compliance w/ limited cross slope		2				
Languages	**0 to 1**		**0**	**1**	**0**	**1**
Signage compliant with english as a 2nd language		1				
Visually or Hearing Impaired	1 to 3		0	3	0	3
Signage include textures/brail		2				
signals include auditory and visual stimuli		3				
Width of sidewalk	1 to 3		1	3	1	3
meet minimum sidewalk code requirements		1				
exceed requirements 1-2'		2				
exceed requirements 3+		3				
width of buffer	1 to 3		1	2	3	3
meet minimum code requirements		1				
exceed minimum provide vegetated buffer		2				
exceed minimum provide vegetated buffer designed for stormwater		3				
signalized intersections	1 to 2		**0**	**2**	**1**	**2**
priotity provided to the pedestrian		1				
extensive signage and improved visibility provided		2				
visibilty and site lines		1	**1**	**1**	**0**	**1**
open and able to see on coming people		1				
Conserve healthy soils and appropriate vegetation		1	**0**	**0**	**1**	**1**
Conserve special status vegetation		1	**1**	**1**	**1**	**1**
Conserve and use native plants		1	**0**	**0**	**1**	**1**
Conserve and restore native plant communities		1	**0**	**0**	**1**	**1**
Optimize biomass		1	**0**	**0**	**1**	**1**
Reduce urban heat island effects		1	**0**	**0**	**1**	**1**
Use vegetation to minimize building energy use	1 to 4		**0**	**0**	**1**	**4**
Access to Transit		1	**1**	**1**	**0**	**1**
Transit stops within 1/4 walking distance		1				
Bicycle Infrastructure		2	**0**	**2**	**0**	**2**
Bicycle racks		1				
Bicycle lanes		1				
Reduced Parking Spaces		1	**0**	**1**	**1**	**1**

Results

Results

Total: 71 Points

Auto-centric: 10

Pedestrian: 45

Ecological: 37

Results

- Auto-centric
  - No bicycle infrastructure
  - Narrow unprotected walkways
  - No stormwater management for clean green spaces
  - No protected crossings
  - No amenities for people to utilize

- Pedestrian
  - No stormwater management facilities
  - Limited Vegetation
  - No attention to native plant species
  - No Soil conservation
  - No effort to maximize green area potential

- Ecological
  - Limited Pedestrian infrastructure
  - Limited visibility
  - No signalized crossings
  - No medians for safety

Conclusion

Comprehensive Design

Conclusion

- Integration of Designs
- Designers need to advocate for the users
- Evaluation for Equity
- Inclusive Design

Final Thoughts

- High need for an evaluation metric that addresses equity in design
- Designers need to be the advocate for the public space

Limitations

TIME

FUNDING

Next Steps

Community engagement

Surveys

More scenarios

Evaluate the Evaluation

Resources

Belzer, D., & Autler, G. (2002). Countering Sprawl with Transit Oriented Development. *Issues in Science and Technology*, 51-58.

Benfield, K. (2019, 10 21). *ten techniques making cities more walkable*. Retrieved from City Lab: https://www.citylab.com/solutions/2012/12/10-techniques-making-cities-more-walkable/4047/

Bullard, R. D. (2004). Addressing Urban Transportation Equity in The United States. *Fordham Urban Law Journal*, 1183-1210.

Calthorpe, P., & Poticha, S. (n.d.). The Next American Metropolis: Ecology, Community and the American Dream. *Princeton Architectural Press.*

Danish Government. (2018). *Ørestad.* Retrieved from BY&HAVN.

EPA. (2019, 09 18). *Vegetated Roofs*. Retrieved from werf.org: https://www.werf.org/liveablecommunities/toolbox/vegroof.htm

File:Streetscape planted in CU structural soil.jpg. (2019, October 30). Retrieved from Minnesota Stormwater Manual : https://stormwater.pca.state.mn.us/index.php?title=File:Streetscape_planted_in_CU_structural_soil.jpg

Frumkin, H., Frank, L., & Jackson, R. (2004). *Urban Sprawl and Public Health: Designing, Planning, and Building for Healthy Communities.* Island Press.

Gunawardena, K., Wells, M., & Kershaw, T. (2017). Utilising green and bluespace to mitigate urban heat island intensity. *Science of the Total Environment*, 1040-1055.

Lewyn, M. (2008). Why pedestrian-friendly street design is not negligent. *University of Louisville Law Review*, 339-371.

LSC Transportation Consultants. (2019, 11 16). *Appendix C level of service definitions*. Retrieved from Lsccs.com: http://www.lsccs.com/projects/rifle/Final/AppendixC.pdf

Mcann, B., & Rynne, S. (2010). Creating Complete Streets: Design Principles and Features. In B. Mcann, & S. Rynne, *Complete Streets: Best Policy and Implementation Practices* (pp. 79 - 99). Chicago: American Planning Association.

Melo, F. (2017). St. Pauls Former Ford Plant Site Hits Market. *Pioneer Press.*

Metro Transit. (2019, 5 1). *Metro Transit 2018 Facts*. Retrieved from Metro Transit: https://www.metrotransit.org/facts

Nelson, Nygaard, SRF, Utile, IL. (2017). *Saint Paul Ford Site: Multimodal Transportation Study and Report.* Saint Paul.

Paul, C. o. (2018). *Saint Paul for All 2040 Comprhensive Plan.* St. Paul: Official Public Hearing Draft.

permeable pavers. (2019, October 30). Retrieved from chiroassociates: http://chiroassociates.us/22954/permeable-pavers/impressive-design-permeable-pavers-amazing-permeable-pavers/

Resnik, D. B. (2010). Urban Sprawl, Smart Growth, and Deliberative Democracy. *American Journal of Public Health, 100*(10), 1852-1856. Retrieved 11 25, 2018, from https://ncbi.nlm.nih.gov/pmc/articles/pmc2936977

Resources, M. D. (2019, April 30). *Minneapolis/St. Paul Climate Data*. Retrieved from Minnesota Department of Natural Resources: https://www.dnr.state.mn.us/climate/twin_cities/snowfall.html

Southworth, M. (2005). Designing the Walkable City. *Journal of Urban Planning and Development*, 246-257.

Timothy F.Welch, S. M. (2013). A measure of equity for public transit connectivity. *Journal of Transport Geography*, 29-41.

transportation.gov. (2019, 10 21). *Expand and Improve Pedestrian Bicycle Infrastructure*. Retrieved from transportation.gov: https://www.transportation.gov/mission/health/Expand-and-Improve-Bicycle-and-Pedestrian-Infrastructure

Tumlin, J. (2003). How to Make Transit Oriented Development Work. *Planning*, 14-19.

Tumlin, J. (2012). *Sustainable transportation planning: tools for creating vibrant, healthy, and resilient communities (wiley series in sustainable design;16).* Hoboken, N.J: Wiley.

Vojnovic, I. (2012). *Urban Sustainability A Global Perspective.* East Lansing : Michigan State University Press.

Wheeler, S. (2013). *Planning for Sustainability: Creating Livable, Equitable and Ecological Communities.* Hoboken: Taylor and Francis.

Wiewel, W., & Persky, J. (2015). *Suburban sprawl: Private decisions and public policy (Cities and contemporary society).* . Oxfordshire, England: Routledge.

Wolman, H., Wial, H., Pindus, Nancy, Weir, & Margaret. (2012). *Urban and Regional Policy and its Effects Building Resilient Regions.* Washington D.C: Brookings Institution Press.

Zavestoski, S., & Agyeman, J. (2015). *Incomplete streets: Processes, practices, and possibilities (Routledge, equity, justice, and the sustainable city series).* New York, NY: Routledge, Taylor and Francis.