Infrastructure for Self-Driving Vehicles

Group 11

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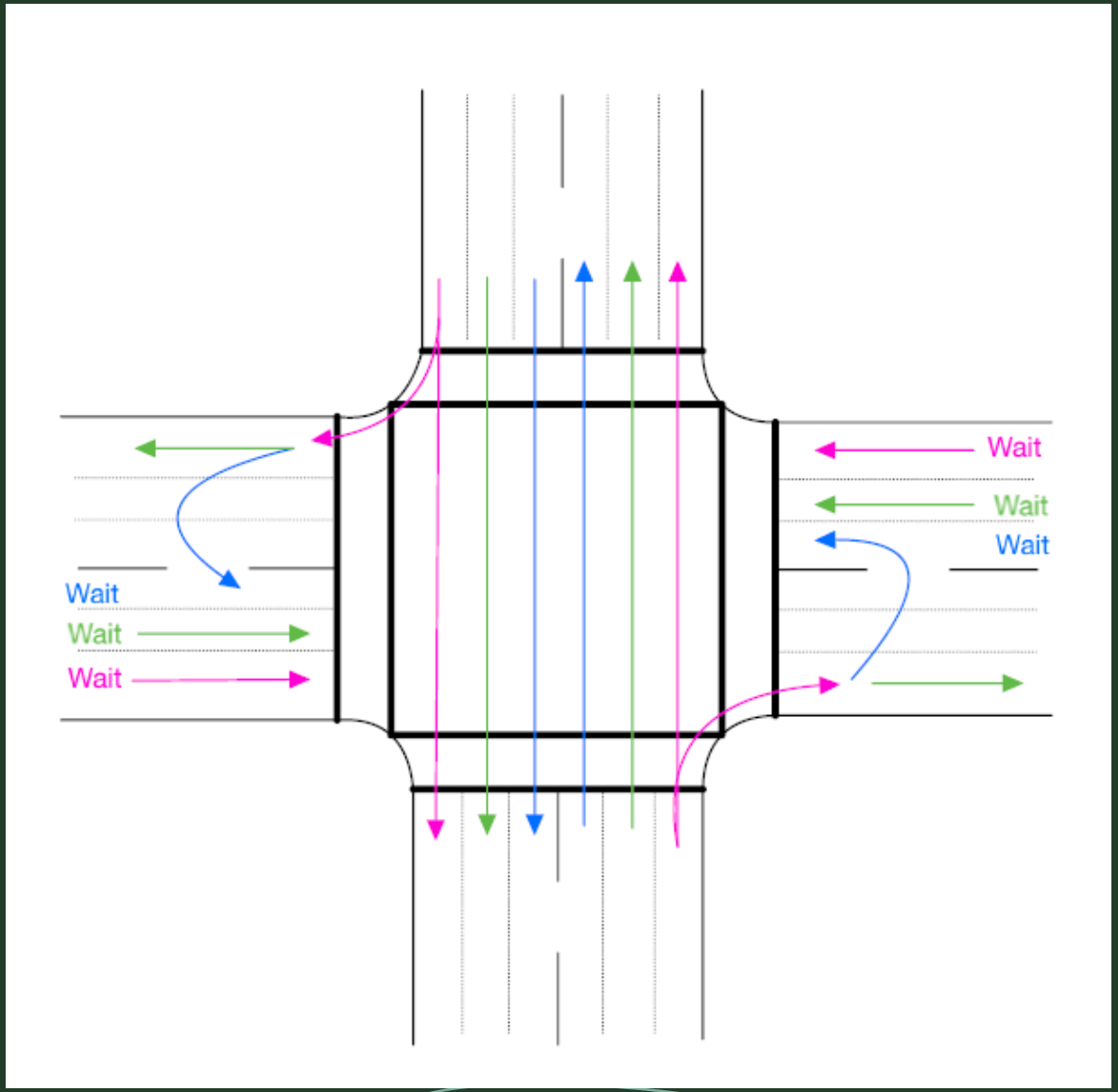
The goal of this project is to design an *efficient*, *safe*, and *adaptable* infrastructure in Hamilton that integrates self-driving vehicles into a four-way intersection. The design will address frustrations associated with current infrastructure, traffic, and safety while satisfying human and self-driven vehicle operators/passengers, pedestrians, lawmakers, and surrounding populations.

Design Summary

- 4-way intersection
- 6 lanes, 3 for each direction
- New form of traffic flow

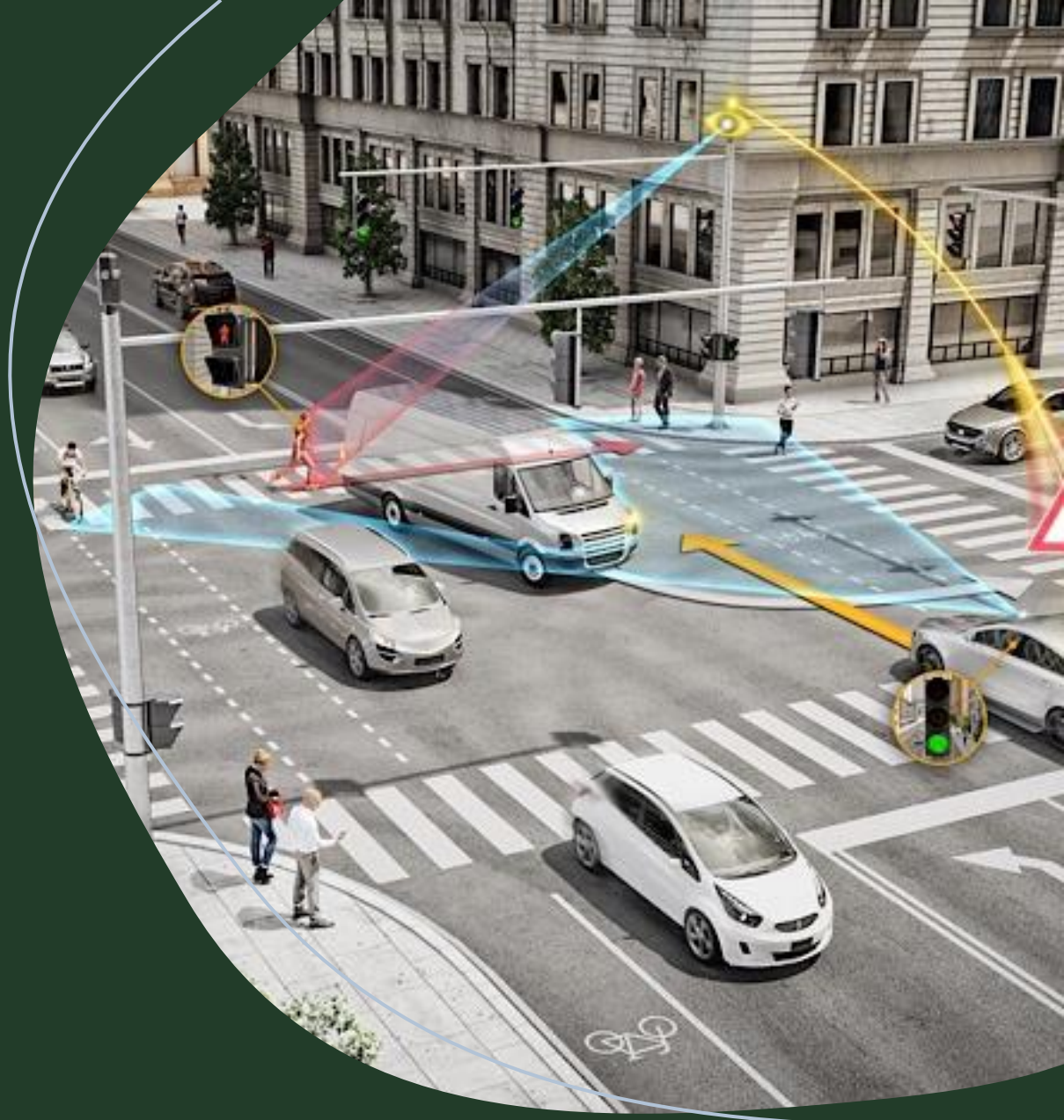


Design Summary

- Traffic lights and signs
- Painted arrows on roads
- Sensors

PERSEID Layers

1. Performance
2. Environment
3. Regulatory
4. Socio-cultural



Performance

- Increased efficiency with high traffic
- Constant flow of traffic (intersection clearing)
- Traffic details taken from self-driven vehicles
- Quickly adaptable for unpredictable situations

Environmental

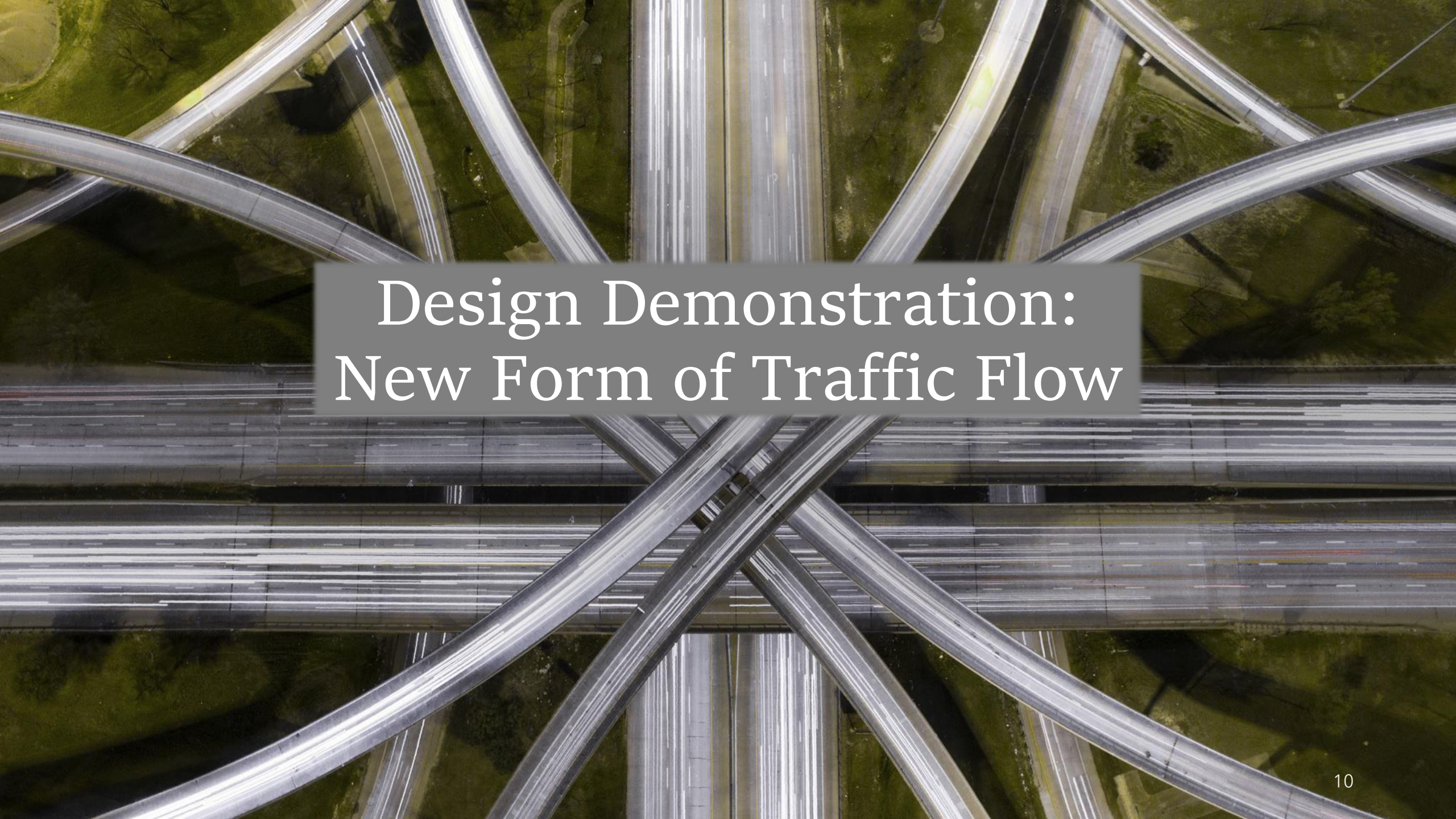
- Short-idling times
  - Reduced energy/fuel consumption
- Easy to implement
  - Less disruption to existing intersections
- Environmentally friendly materials

Regulatory

- Design falls within normal road regulations
- Minimizes any restructuring for existing roads
- Traffic lights still used
- Unchanged pedestrians crosswalk
- Left turn only lane familiar to majority of drivers
- Self-driven vehicle will perform riskier moves which may not be within the road regulations

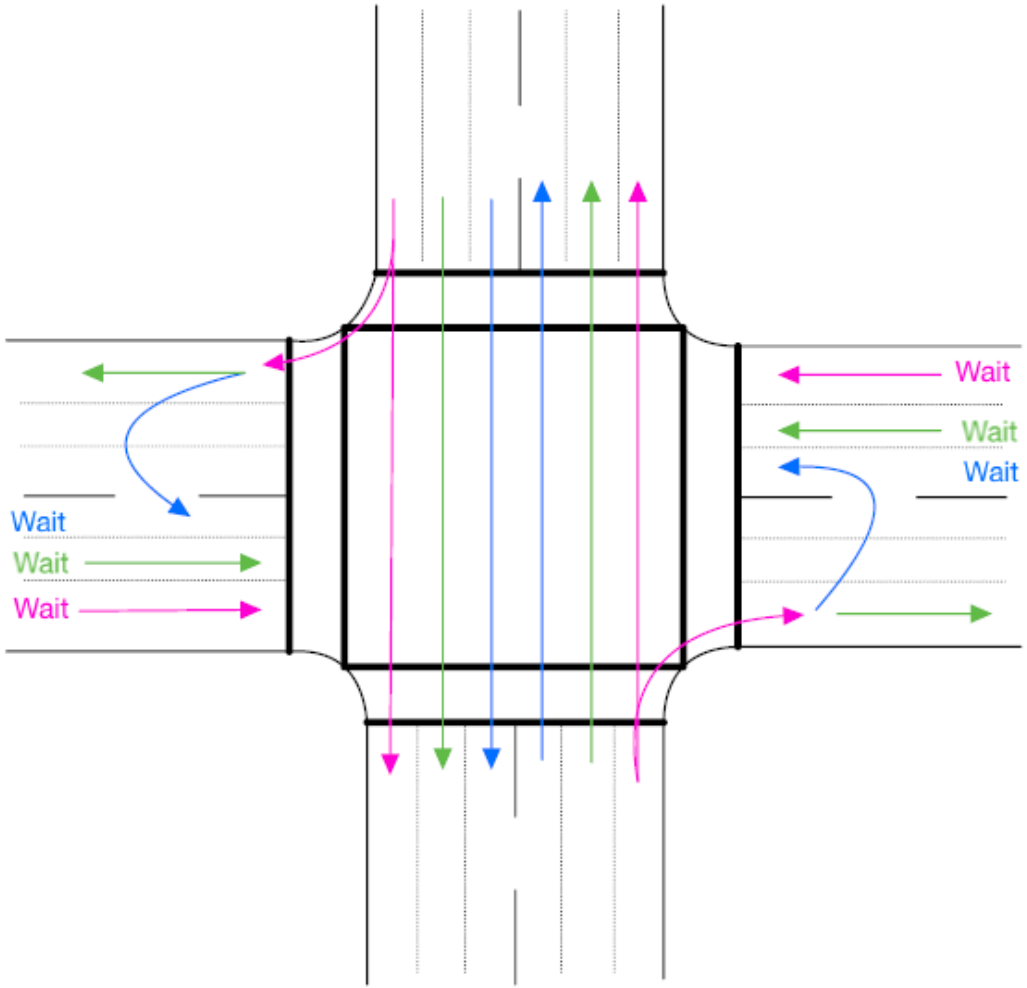
Socio-Cultural

- Due to the increased safety, the community had positive responses/reactions towards the design and the integration of Self-driven vehicles.
- Integrates both self-driven and human-driven vehicles without favouring one or the other
- Crosswalks implemented for pedestrians (timed based on pedestrian speed)



Design Demonstration: New Form of Traffic Flow

1st Frame



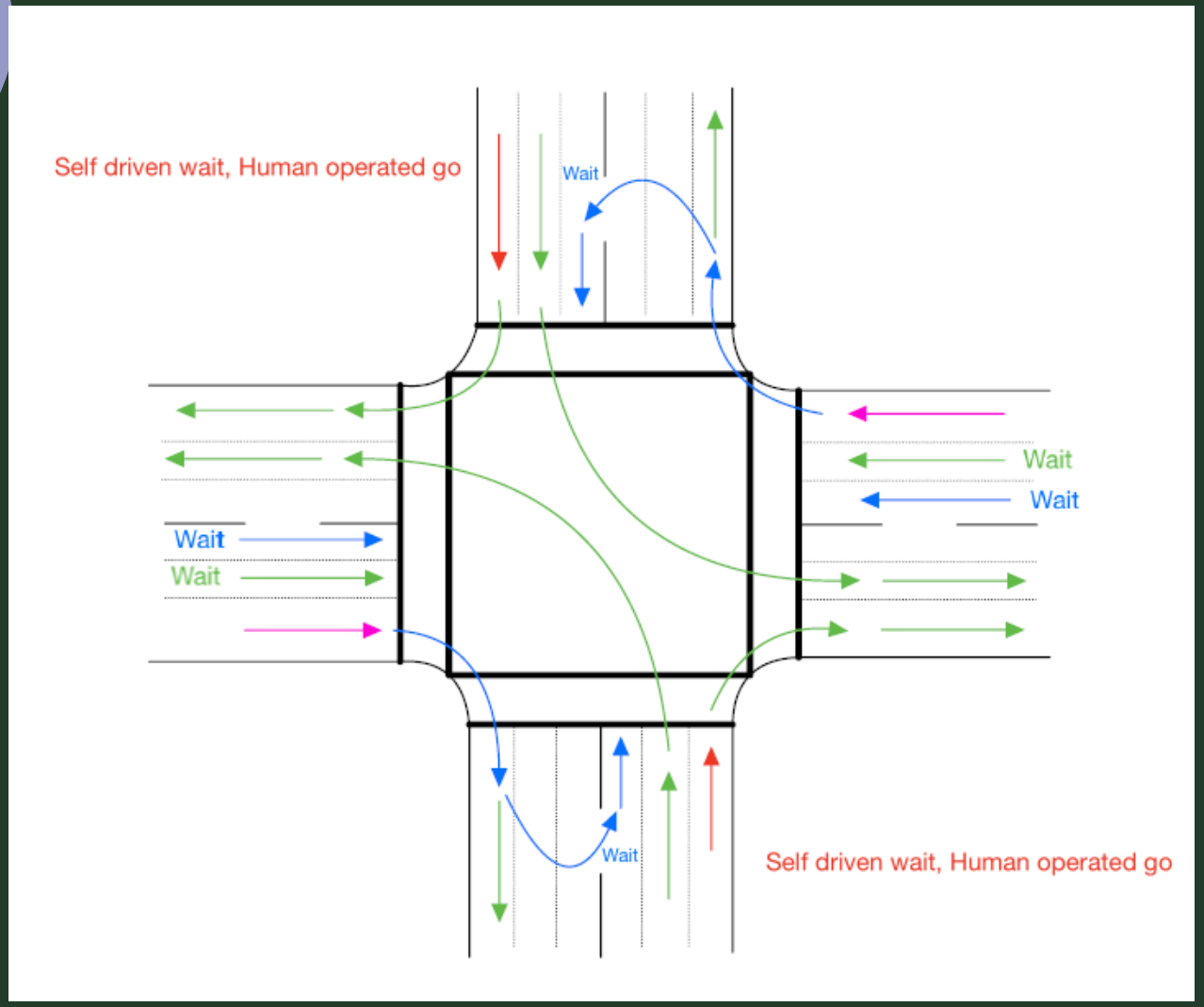
Legend

Blue = Self-Driven Vehicles

Green = Human-Driven Vehicles

Pink = Both Self-Driven and Human Operated Vehicles

2nd Frame



Legend

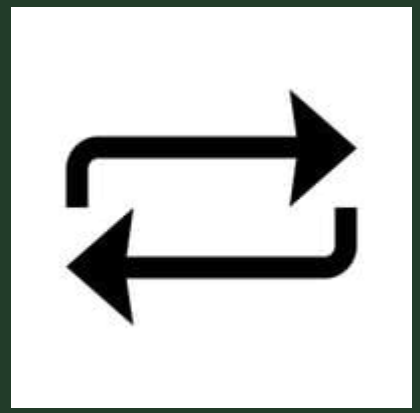
Blue = Self-Driven Vehicles

Green = Human-Driven Vehicles

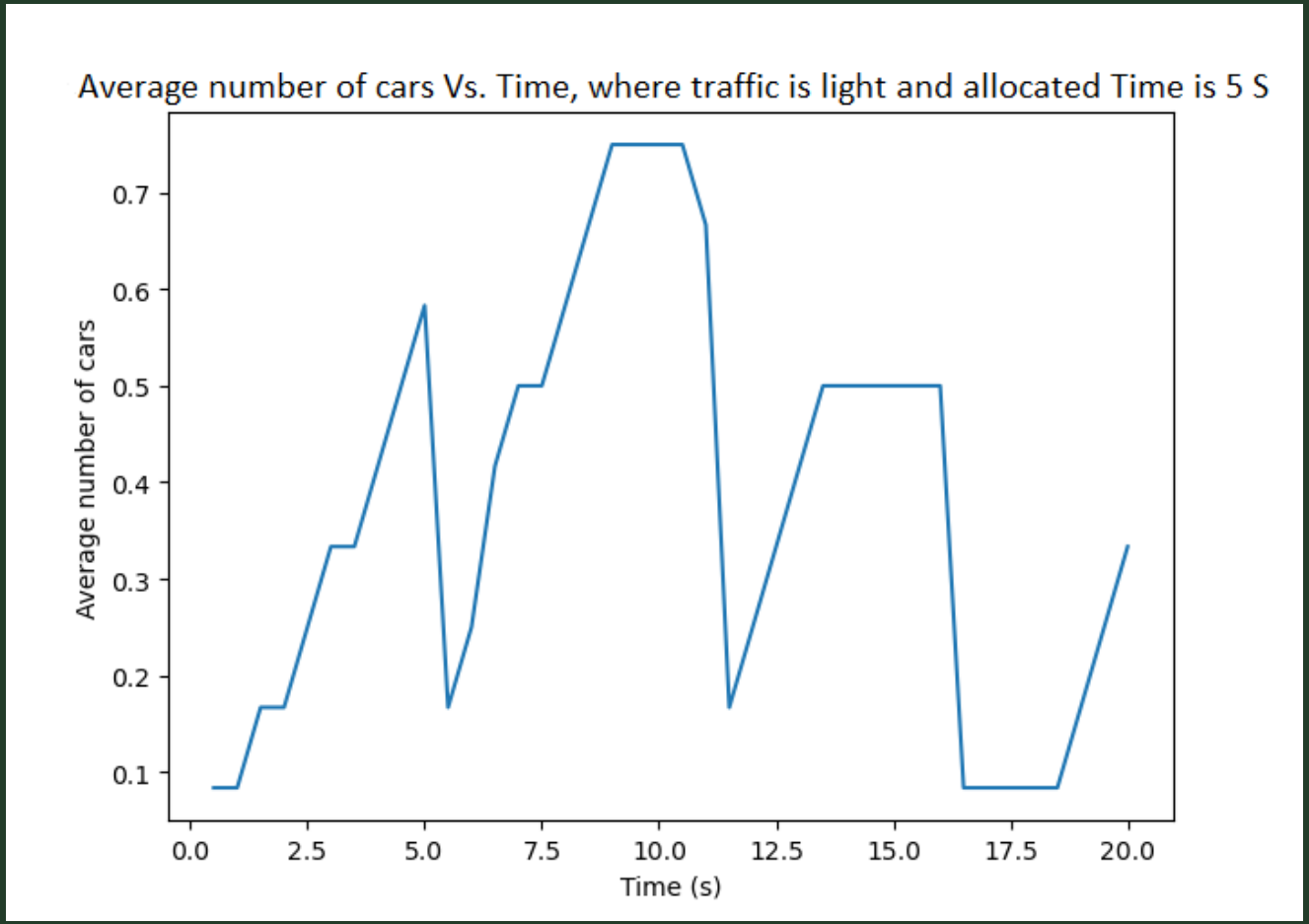
Pink = Both Self-Driven and Human Operated Vehicles

Red = If Human-Driven: go; If Self-Driven: stop

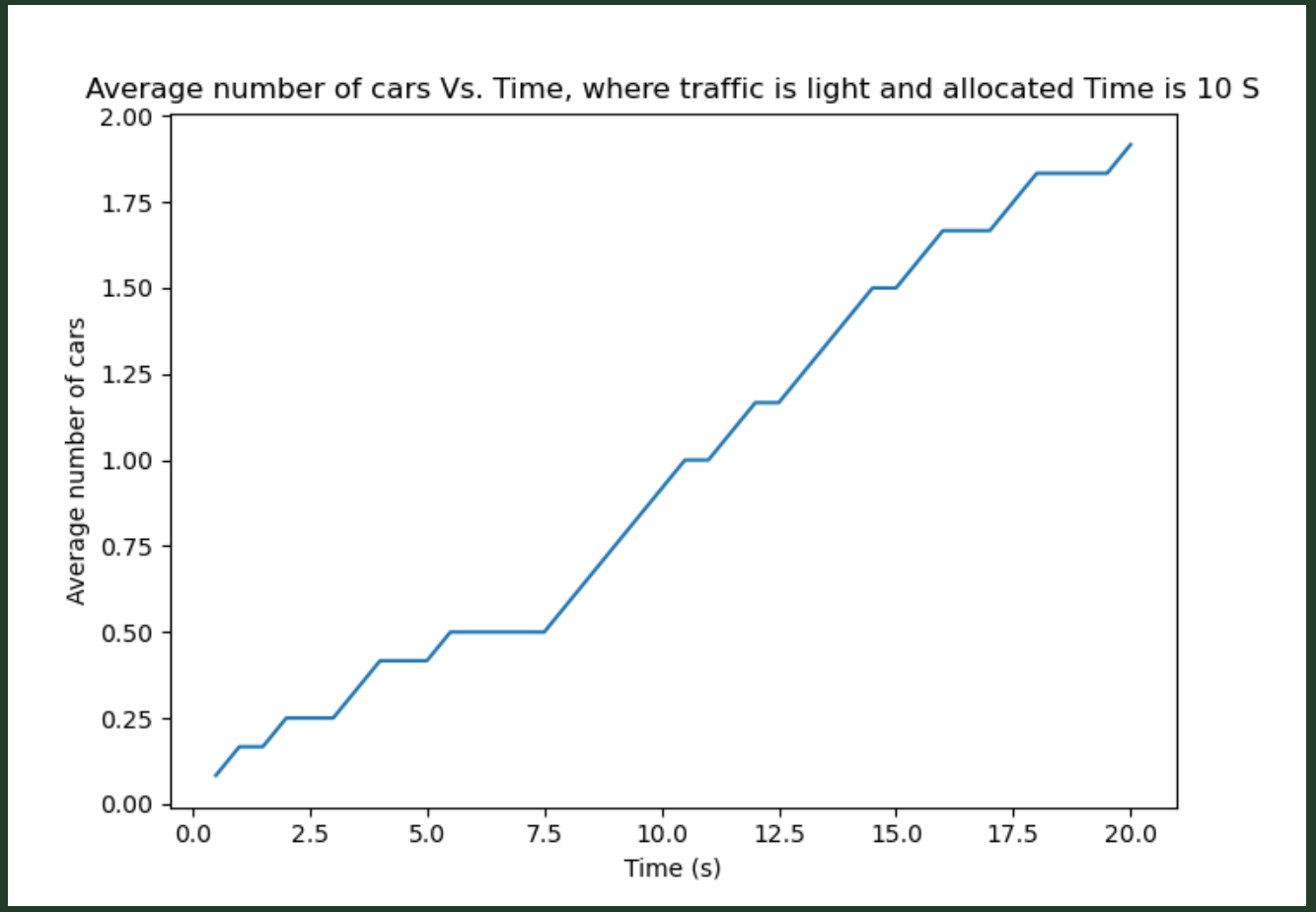
The same traffic flow will duplicate for the East and West direction i.e: (3rd and 4th frames)



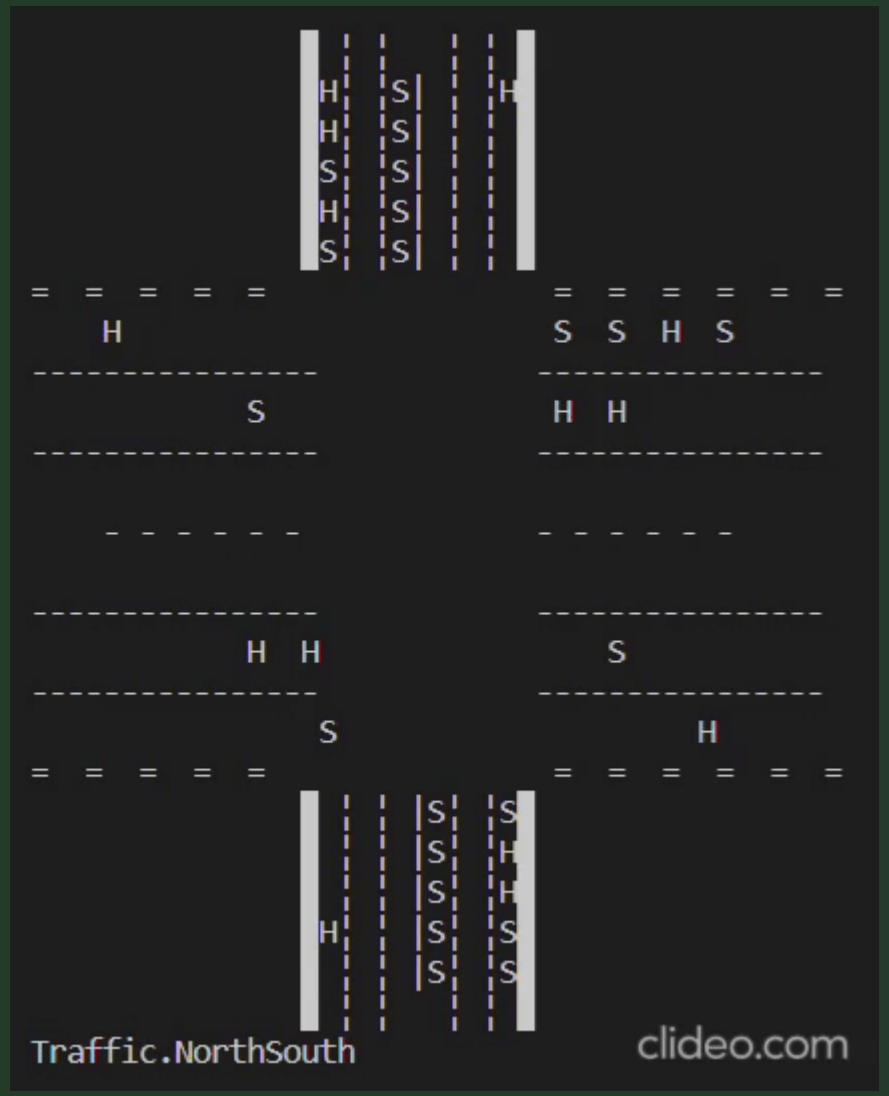
Traffic is light and the allocated time is 5 s

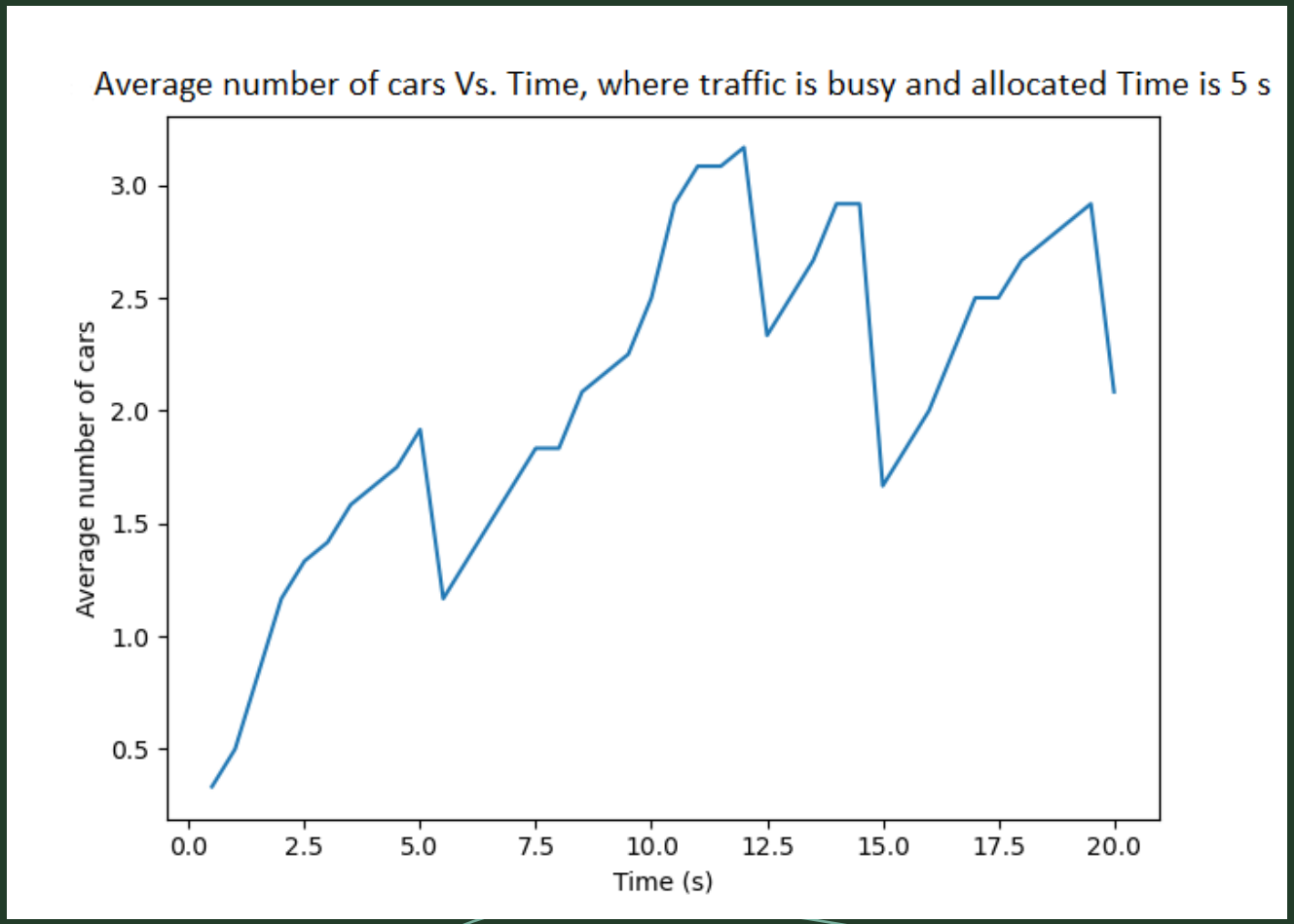


Traffic is light and the allocated time is 10 s

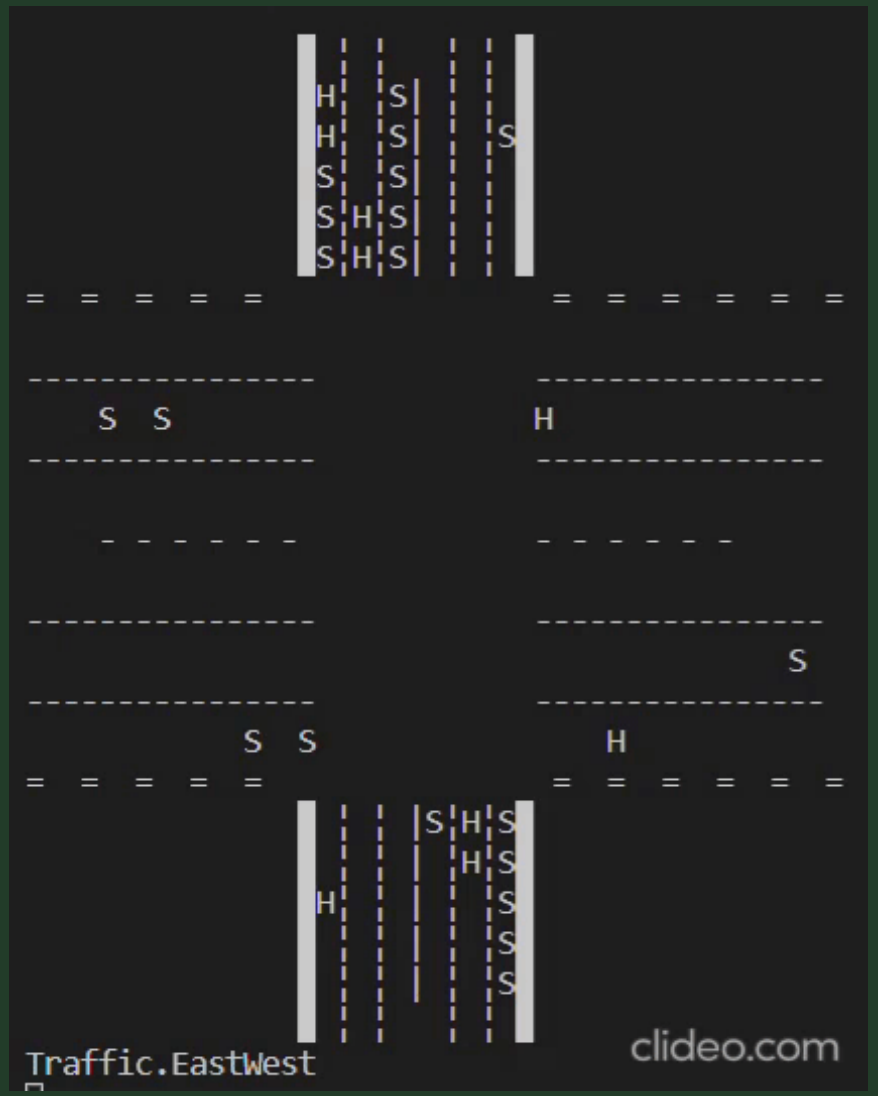


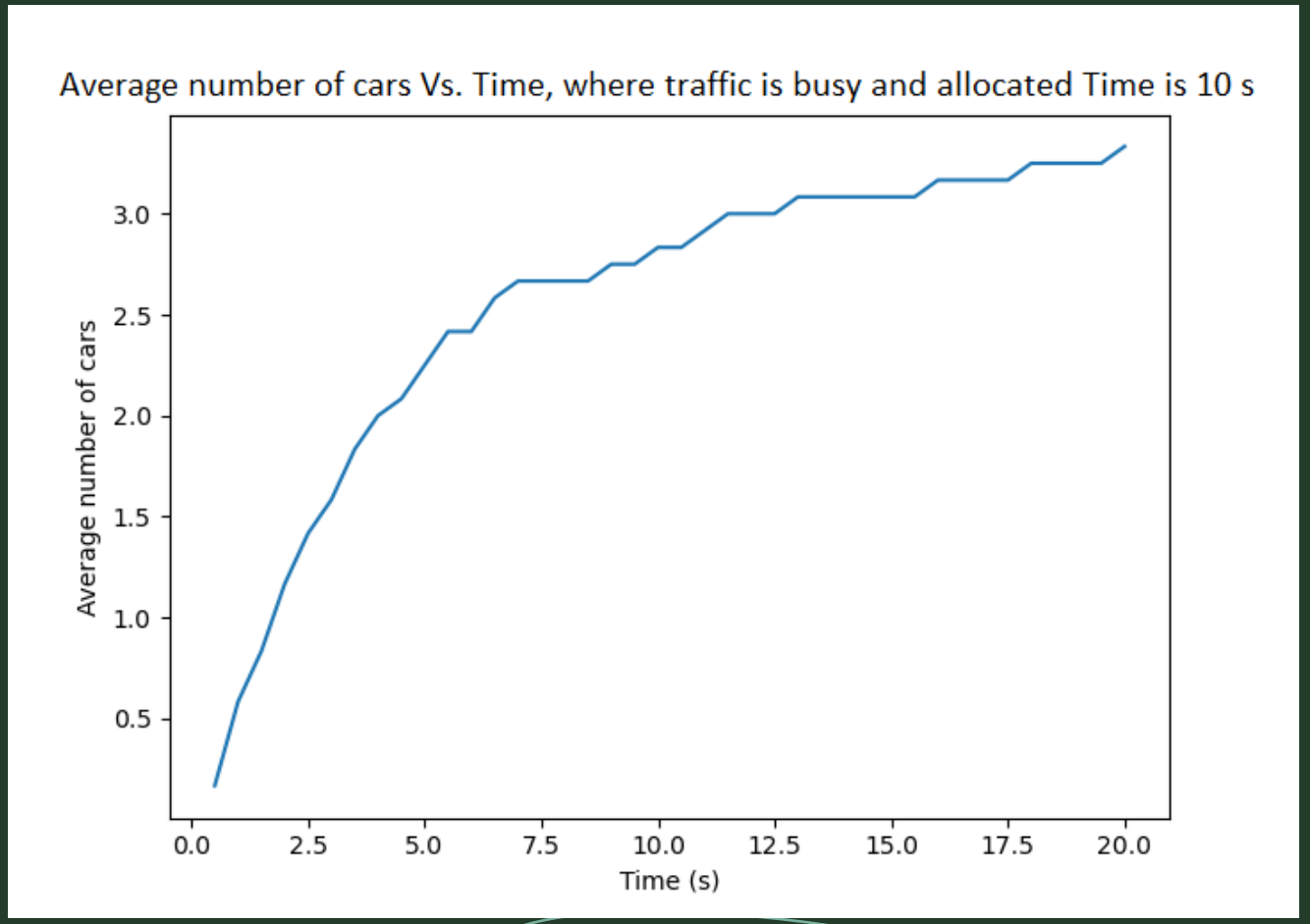
Traffic is busy and the allocated time is 5 s





Traffic is busy and the allocated time is 10 s





Overview: Why This Design?

- Design finds a balance between the PERSIED layers and minimizes the conflict between them
- An efficient, improved infrastructure
  - ✓ Boasts high performance
  - ✓ Reduces environmental strain
  - ✓ Holds safety at a high standard
  - ✓ Ensures equal access
- As time progresses, and self-driven vehicle proportions increase, efficiently and performance follow

Questions?