JAZ
SMART TRAFFIC LIGHT NETWORK USING COMPUTER VISION

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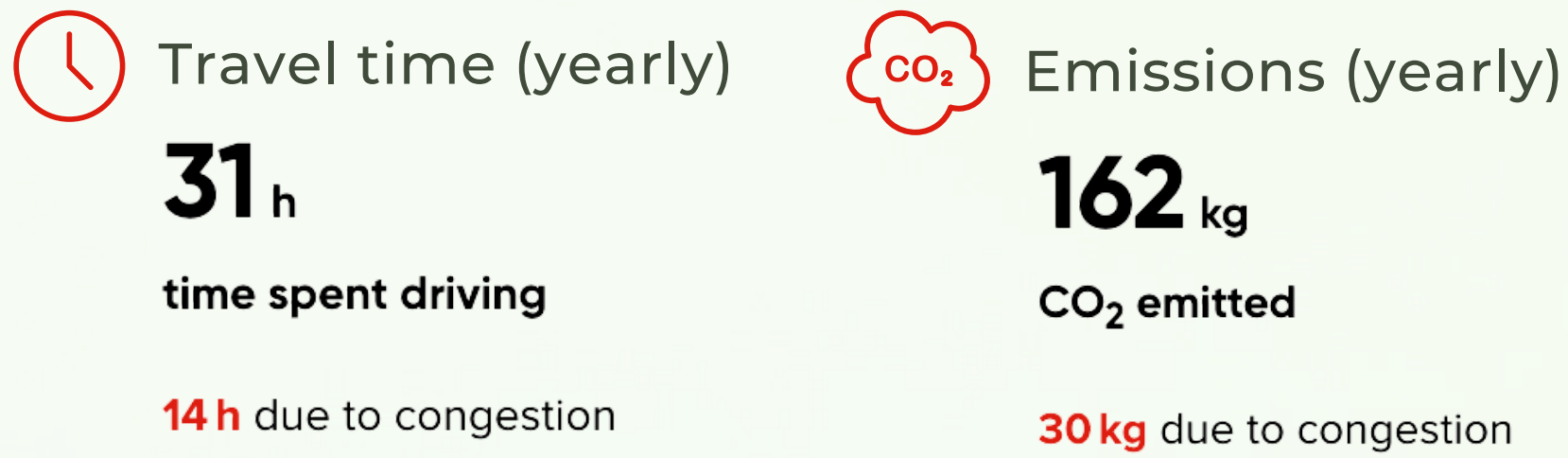Supervisor: Dr. Afnan M. Aldhahri

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ABSTRACT

Many influential countries are competing to provide innovative solutions for better smart cities, and Saudi Arabia is no exception. Congestion is one of the most pressing issues in the transportation sector.

We developed JAZ, a smart traffic light network. Computer vision and mathematics are used to calculate the optimal green signal time while considering other lane at the intersection, update the red signal time, and switch between them. Utilizing artificial intelligence will save people time and facilitate the development of a smart city.

PROBLEM STATEMENT

Travel time (yearly)
31 h
time spent driving
14 h due to congestion

Emissions (yearly)
162 kg
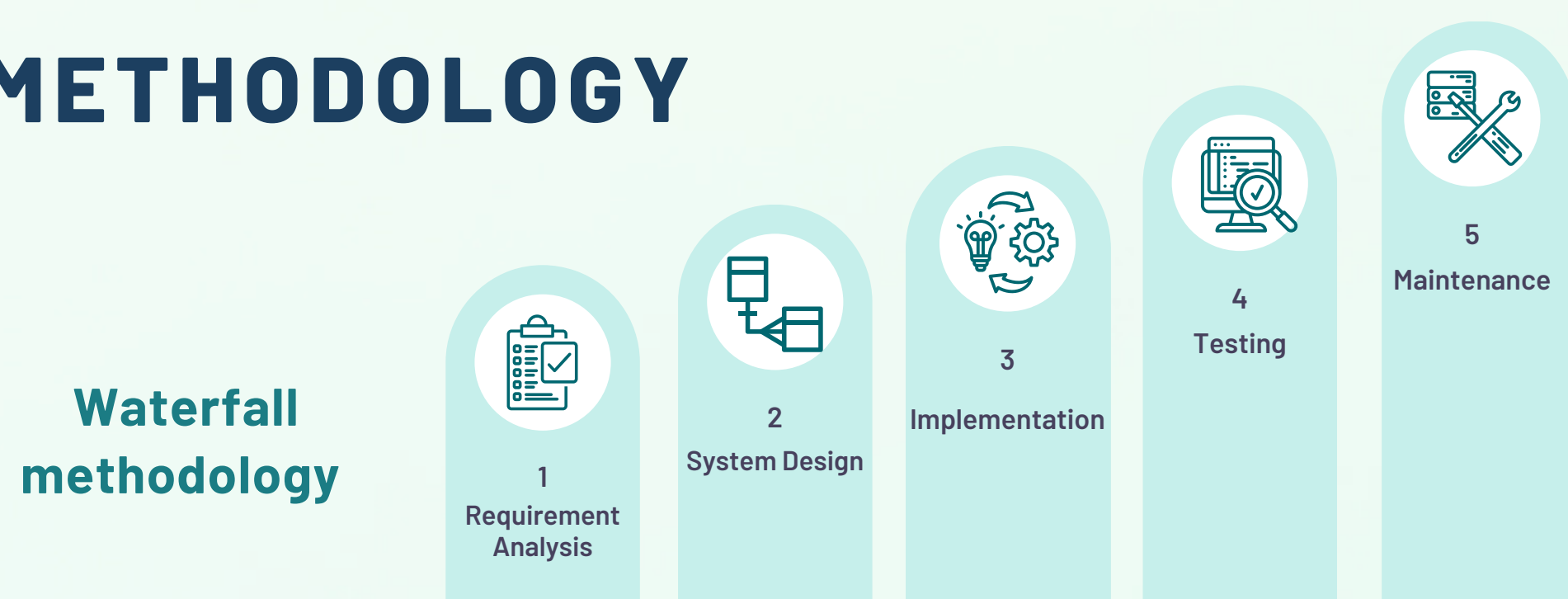**CO_2 emitted**
30 kg due to congestion

RELATED WORK

In Smart control of traffic light using artificial intelligence, researchers used single road density equation to assign the green time. The main limitation of this system is that how long it gives a green light to one lane is not dependent on the traffic in other lanes.

OBJECTIVE

1. Use of AI and Computer Vision **making the traffic light adaptive.**

2. **Mitigate some of the emissions** effects of starting and stopping and urban congestion.

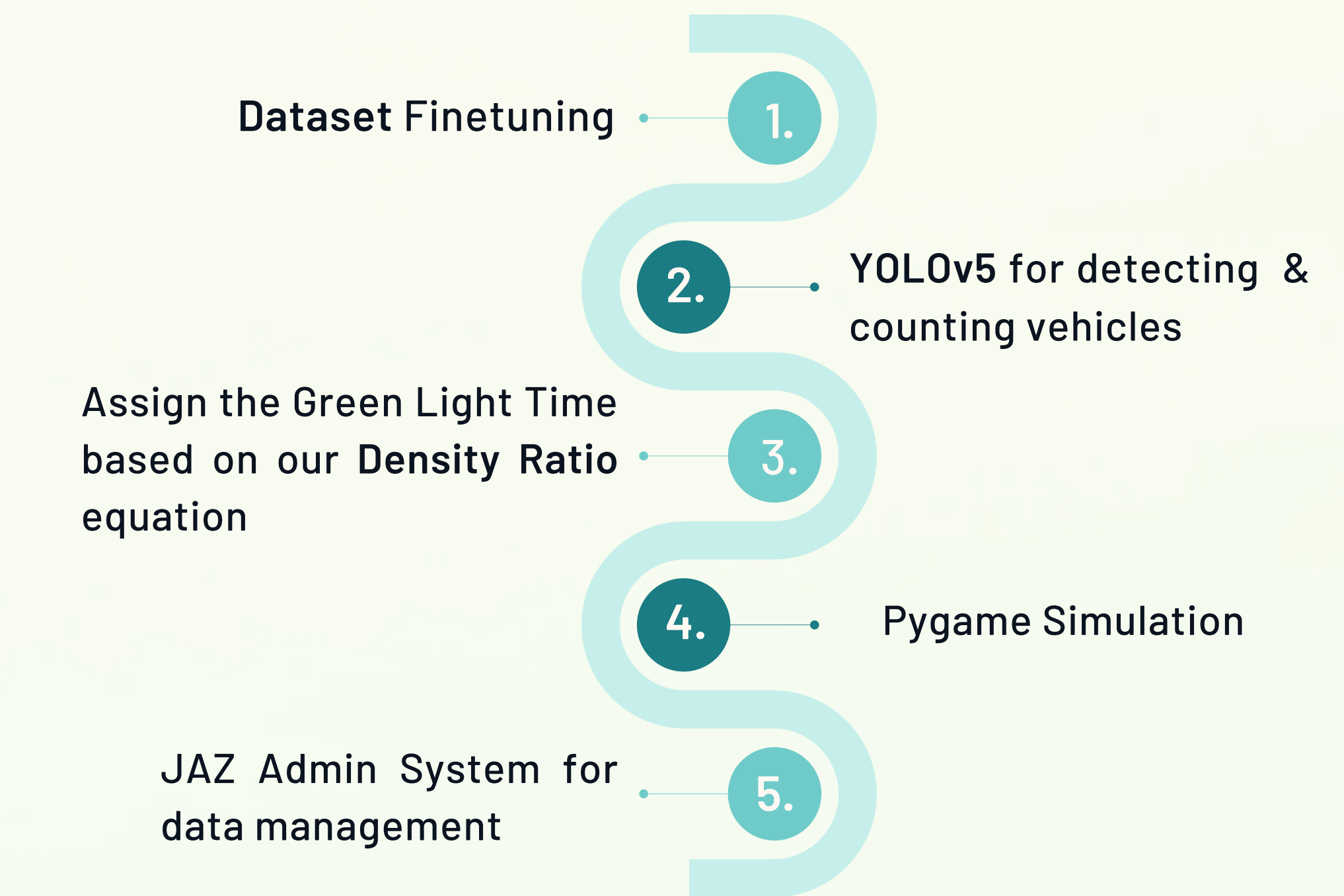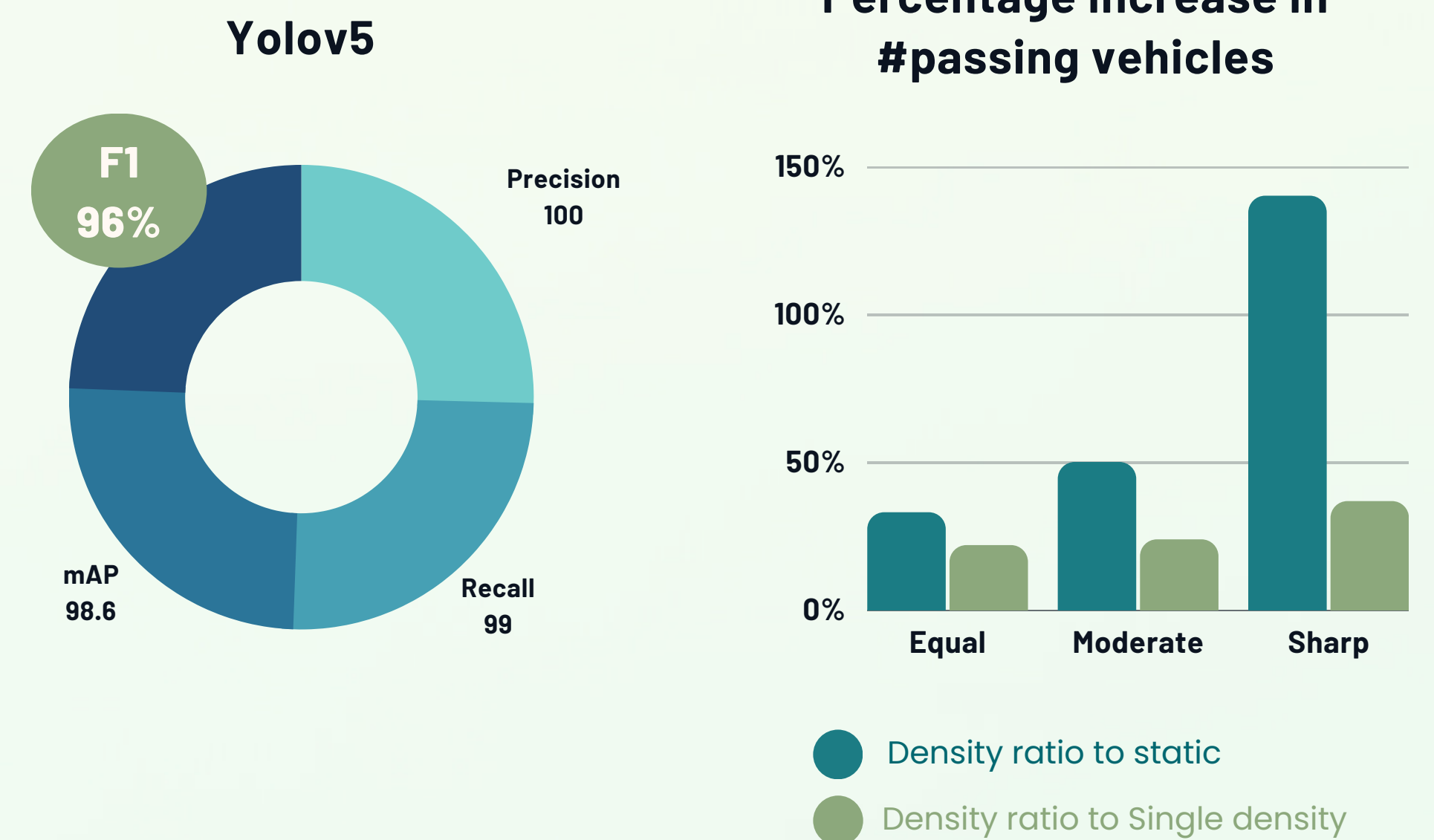3. Improvement of traffic flow **relative to other lanes**

METHODOLOGY

Waterfall methodology

1 Requirement Analysis
2 System Design
3 Implementation
4 Testing
5 Maintenance

TOOLS

CO + (Google Drive) Flutter Visual Studio Code

JAZ SYSTEM

1. Dataset Finetuning
2. **YOLOv5** for detecting & counting vehicles
3. Assign the Green Light Time based on our **Density Ratio** equation
4. Pygame Simulation
5. JAZ Admin System for data management

RESULT & COMPARISION

Yolov5
F1 96%
Precision 100
mAP 98.6
Recall 99

Percentage Increase in #passing vehicles

150%
100%
50%
0%
Equal   Moderate   Sharp

● Density ratio to static
● Density ratio to Single density

CONCLUSION

Jaz smart traffic light management, aims to improve the effectiveness of traffic signal control systems via the use of newer methods, technologies, and tools. By using density ratio equation to set the green light time, we get the advantage from the information and data from the whole intersection after obtaining it from the detection model.

FUTURE WORK

- Weather-responsive traffic lights
- Enhance the traffic flow for larger region
- Special controls for emergency services vehicles
- Give priority to public transport and improve scheduling