Using Google® Applications to Develop Traffic Data Visualization Tools

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Image Source: Google Ea

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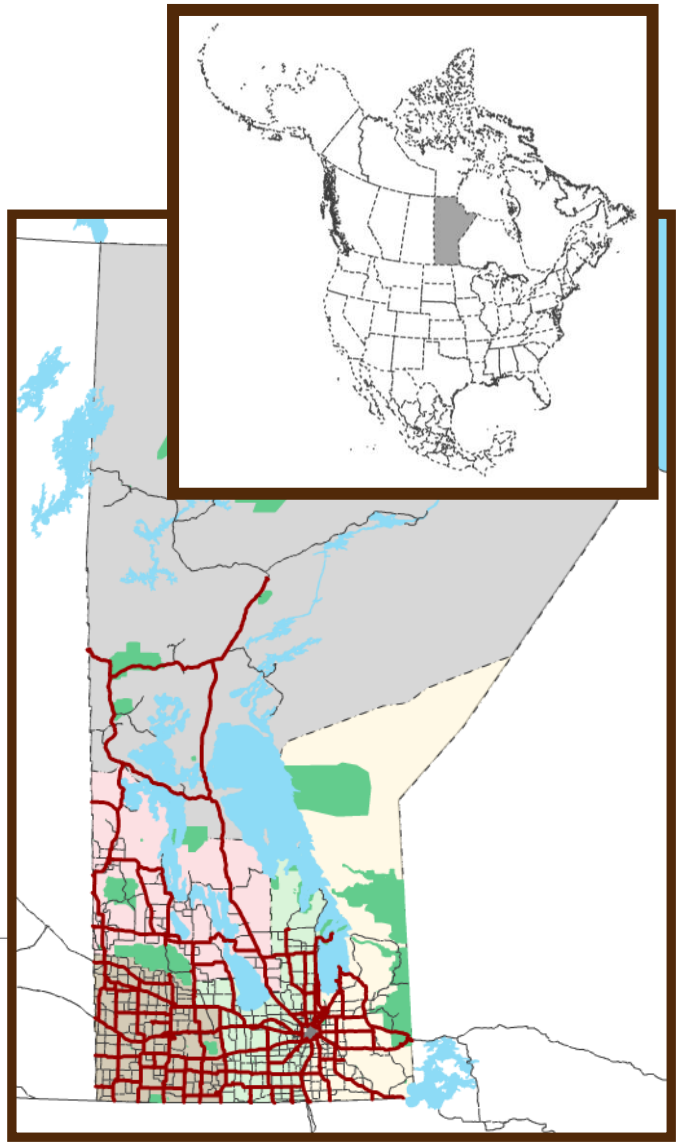
  - Purpose
  - Development
  - Functions
  - Advantages & Disadvantages
- Google Maps JavaScript API Visualization Tool
  - Purpose
  - Development
  - Functions
  - Advantages & Disadvantages
- Summary and concluding remarks

Introduction

- How people want to view and interact with data is changing
- Customers have new priorities:
  - Ease of use
  - Mobility
  - Customization capabilities
  - Real-time or near real-time access
- New tools can help us satisfy these needs

Introduction: MHTIS

- Traffic Flow Map
  - Annually produced tool
  - Describes traffic flow on Manitoba highways
  - Web-based access
  - Some user-interface capabilities including
    - Pre-defined queries
    - Data download
    - Layer visibility control



Google Earth Data Visualization Tool

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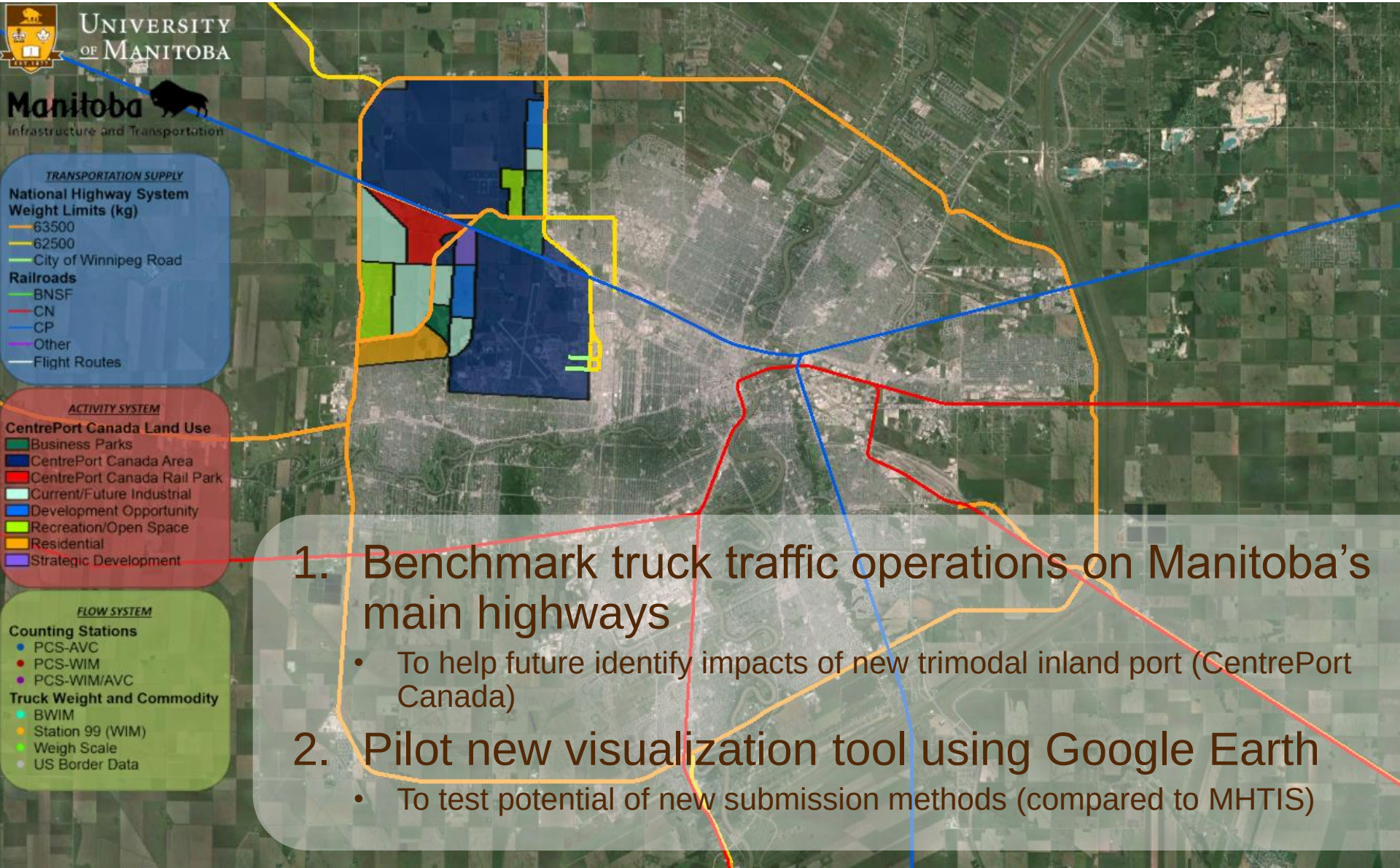
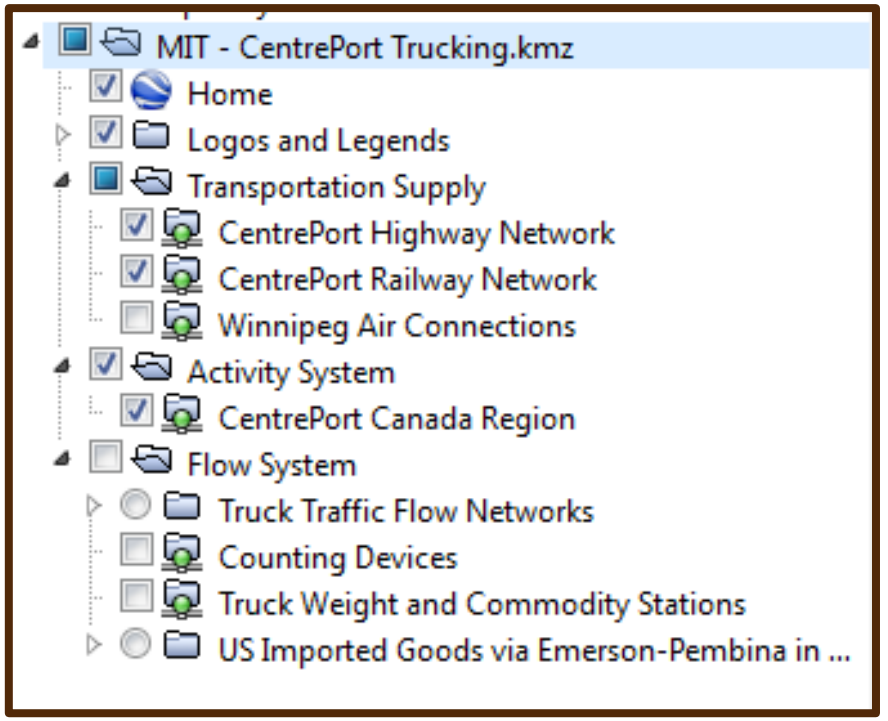
Purpose



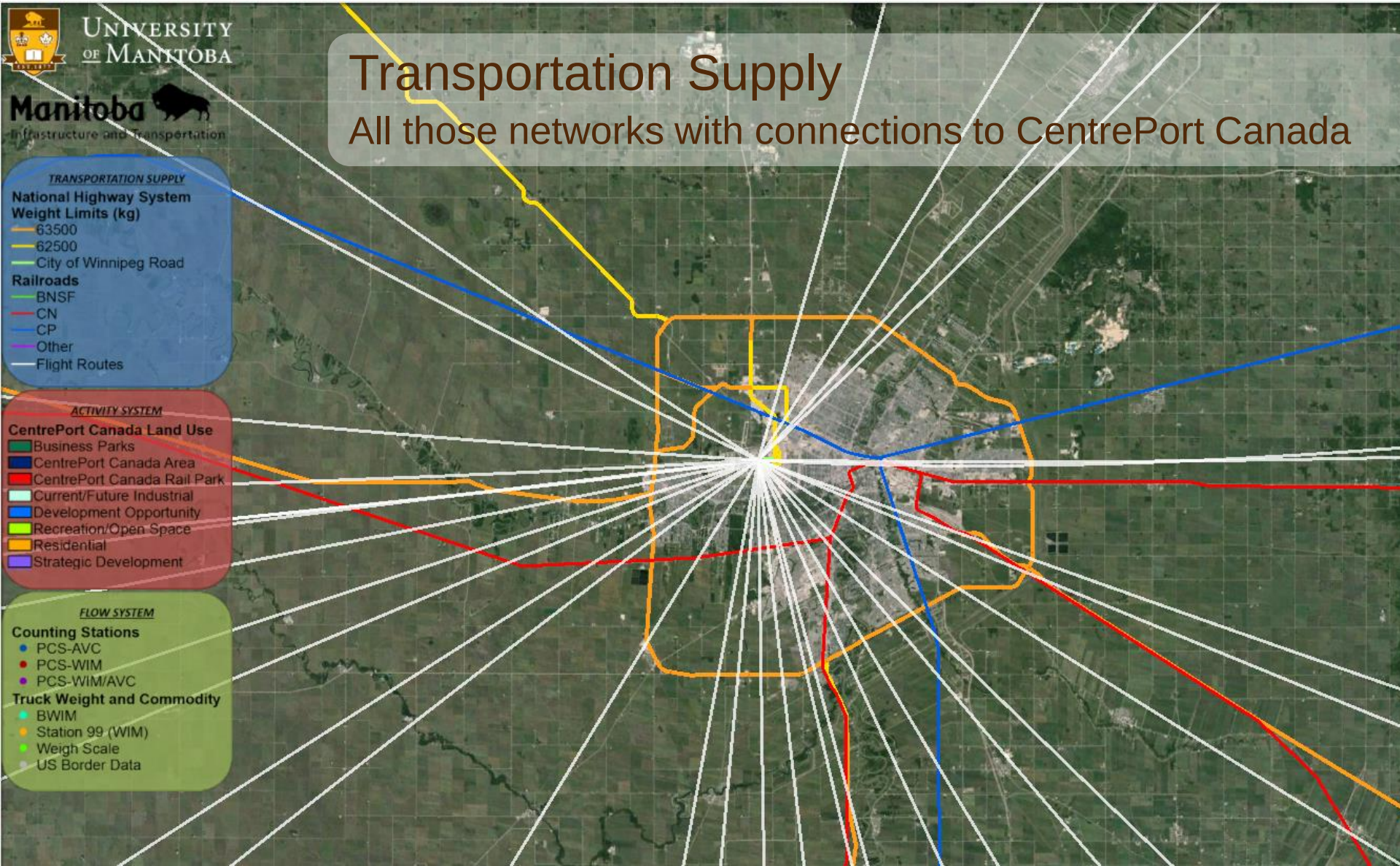
1. Benchmark truck traffic operations on Manitoba's main highways
   - To help future identify impacts of new trimodal inland port (CentrePort Canada)
2. Pilot new visualization tool using Google Earth
   - To test potential of new submission methods (compared to MHTIS)

Development

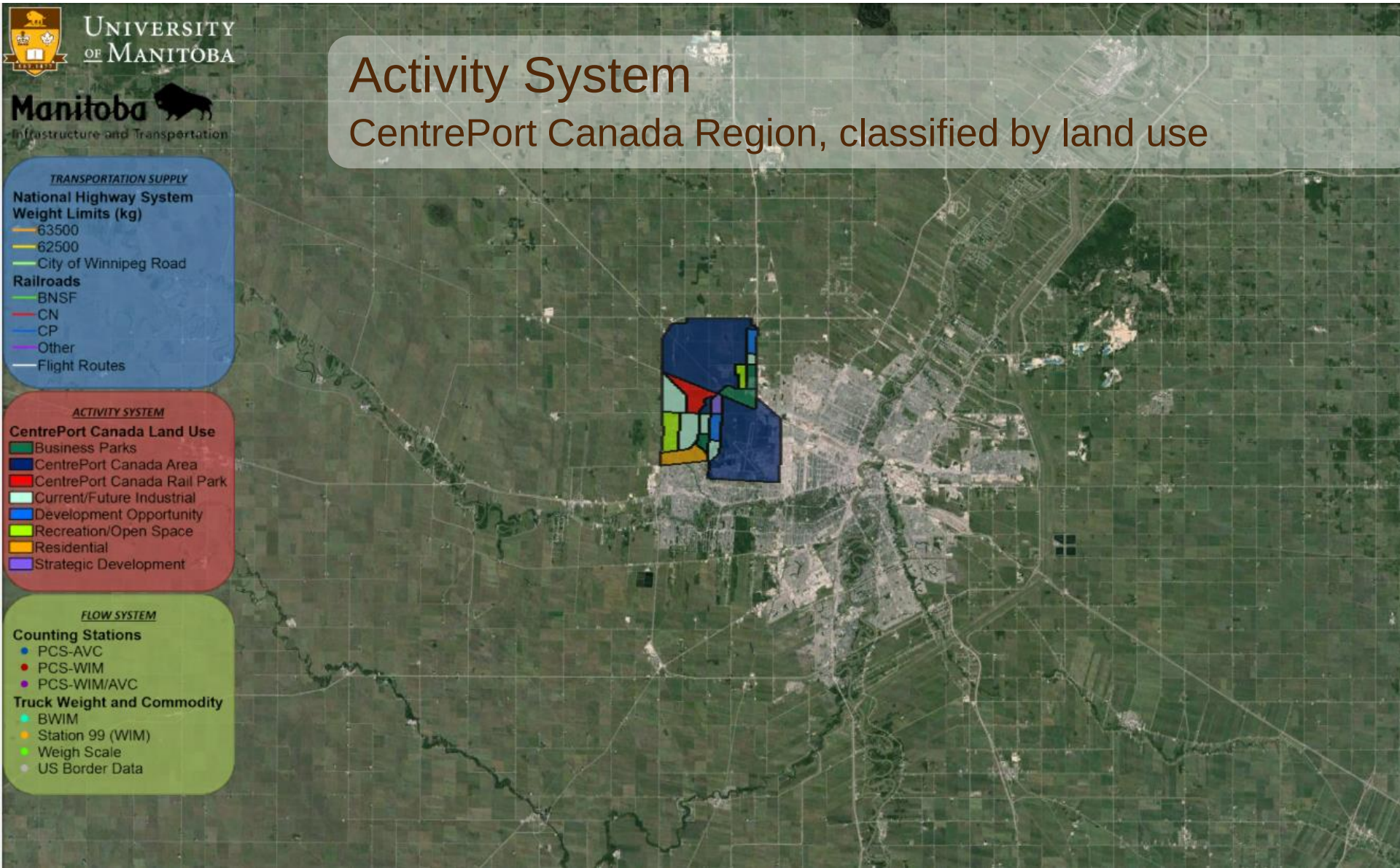
- Map layers created from varied data sources in three categories:
  - Transportation supply (road network, rail network, air connections)
  - Industry activity at inland port
  - Truck traffic flow (including volume, vehicle classification, weight, commodities)



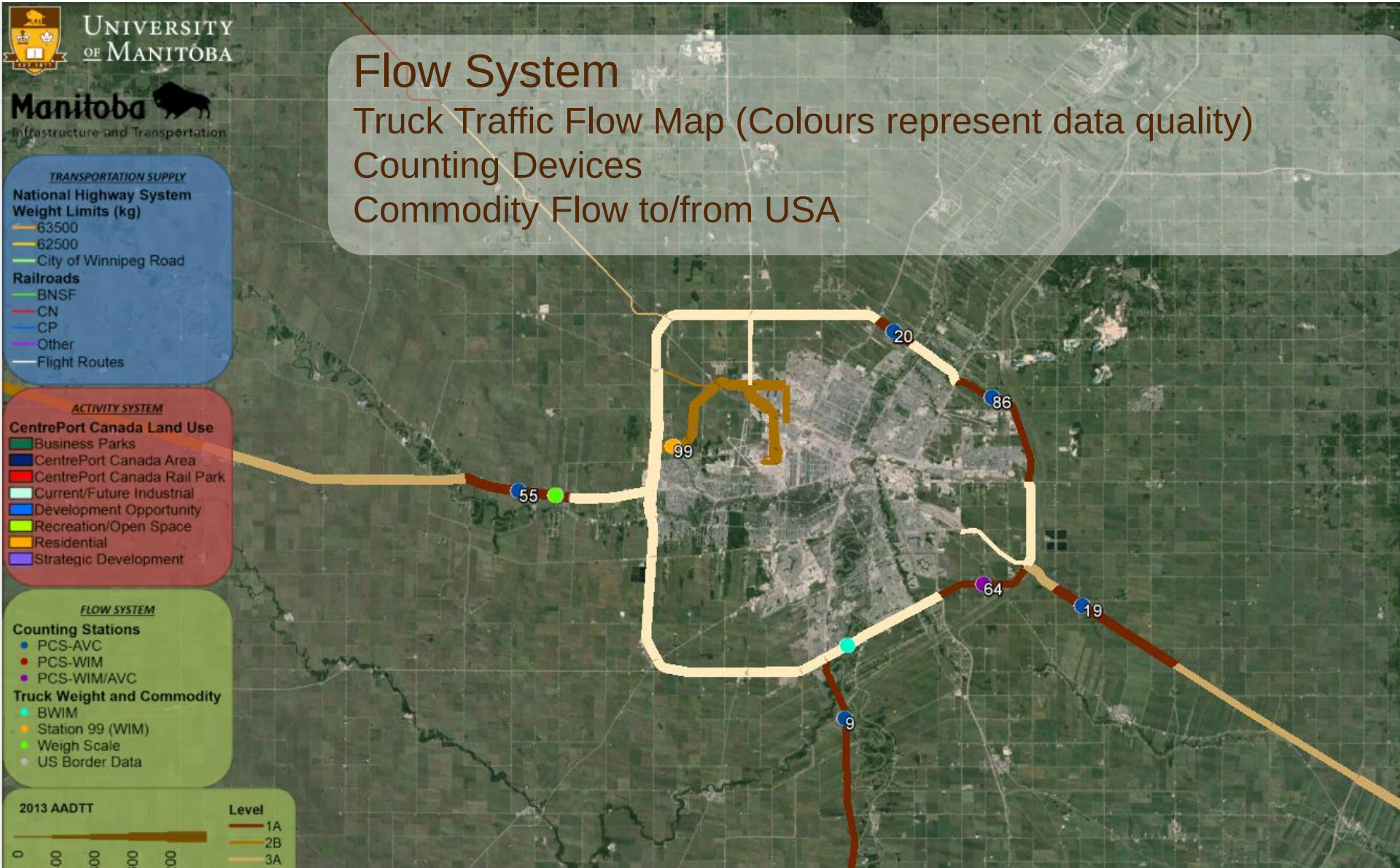
Development



Development



Development



Flow System

Truck Traffic Flow Map (Colours represent data quality)

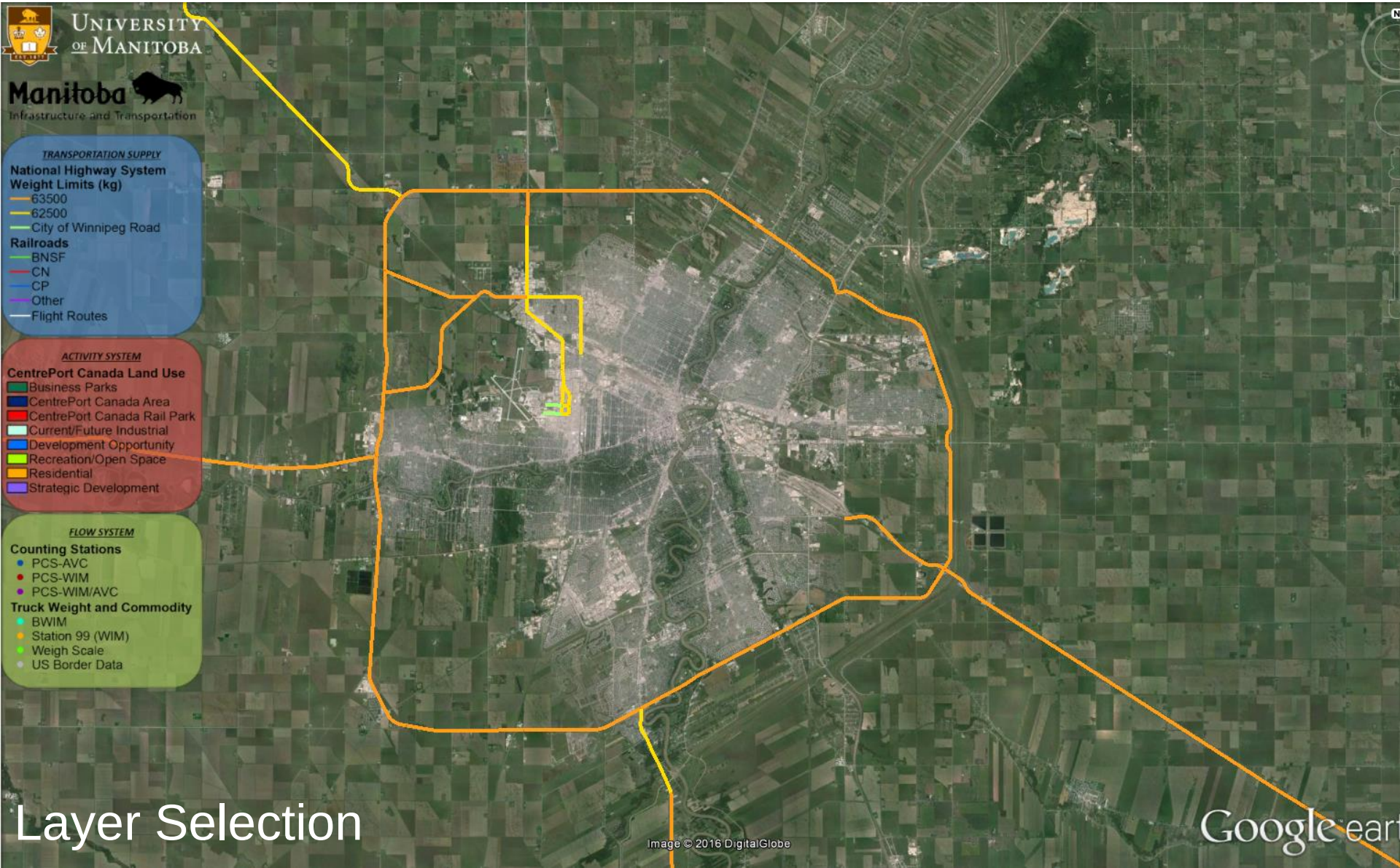
Counting Devices

Commodity Flow to/from USA

Functions

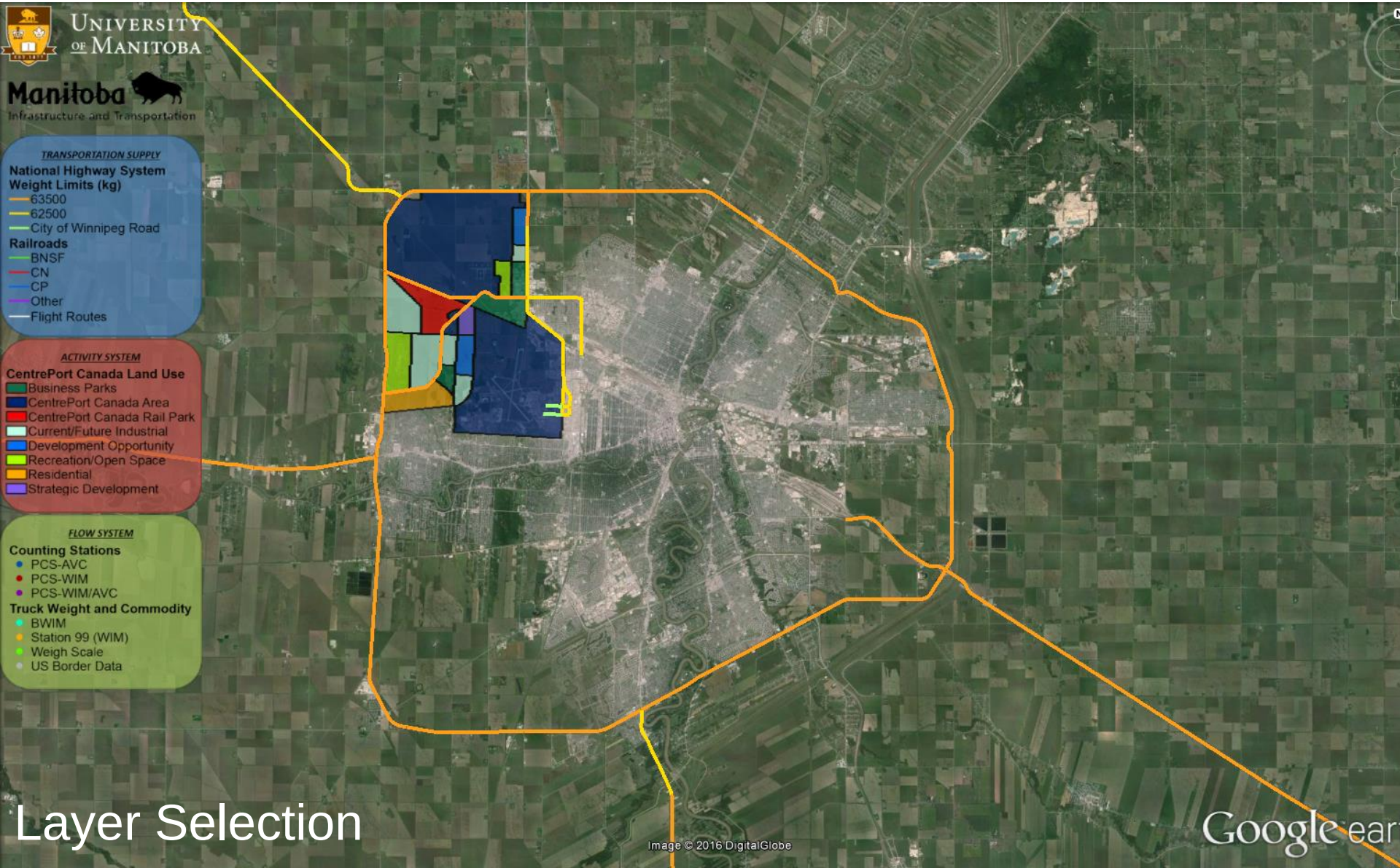
Layer Selection

Functions



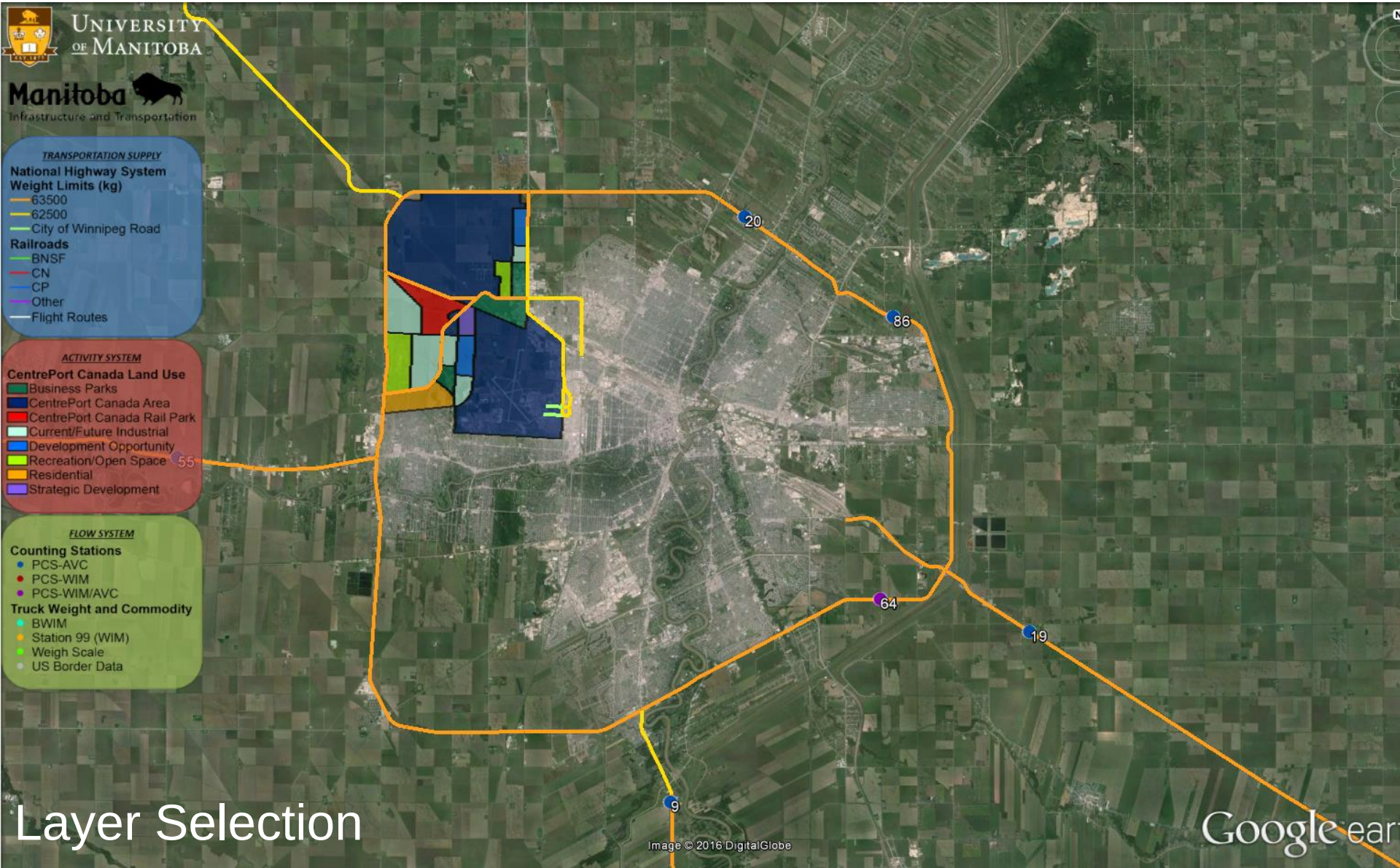
Layer Selection

Functions



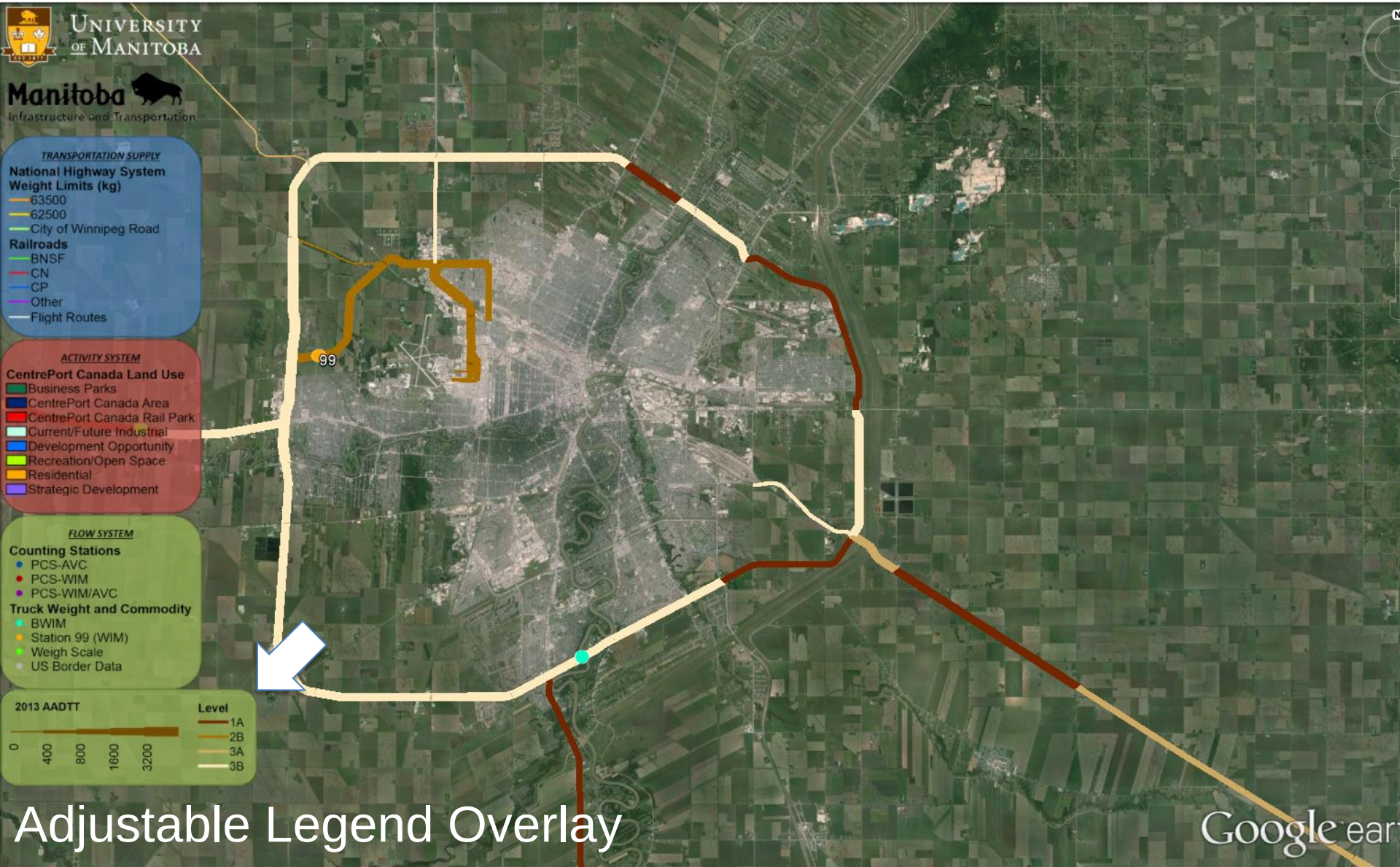
Layer Selection

Functions



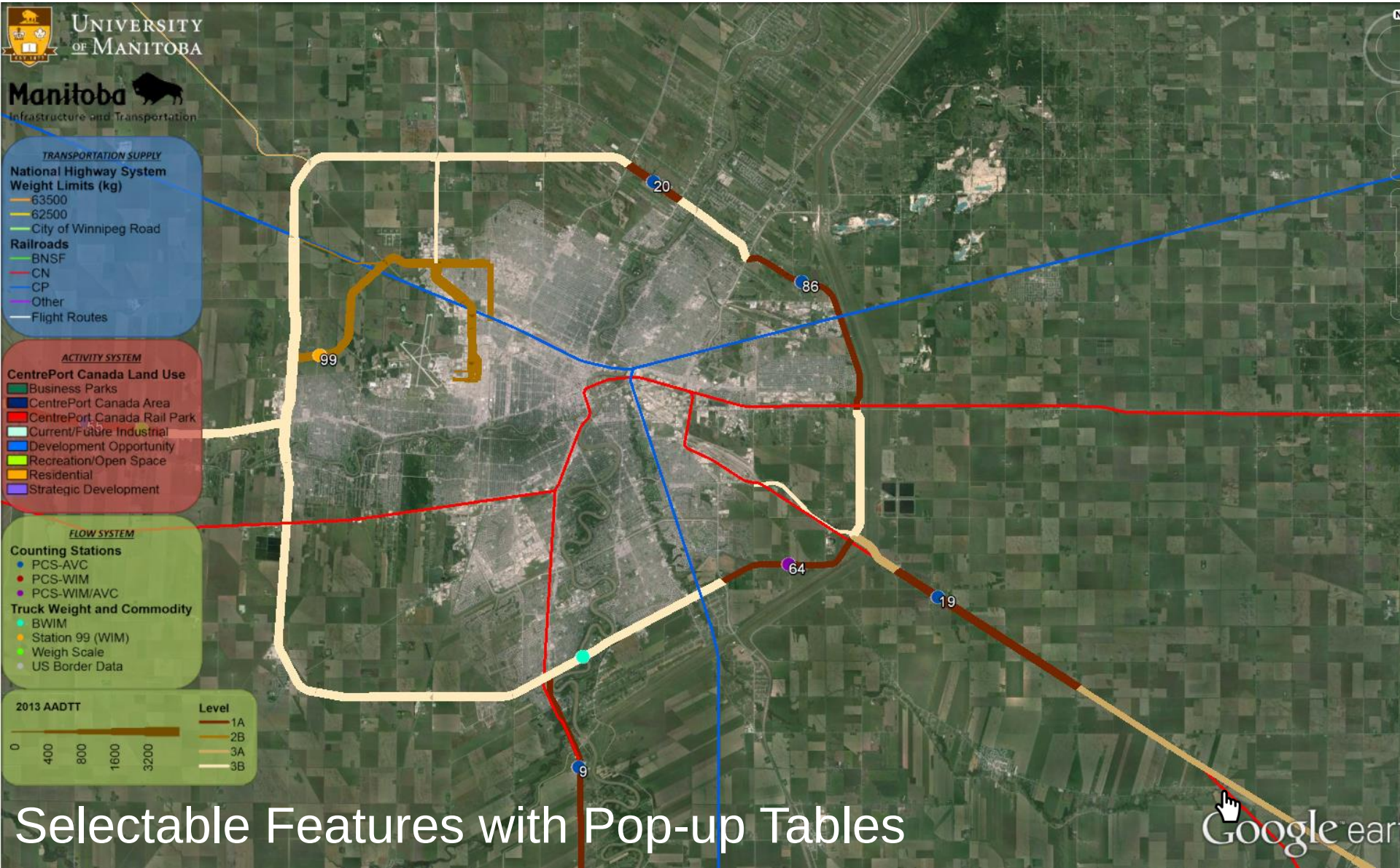
Layer Selection

Functions



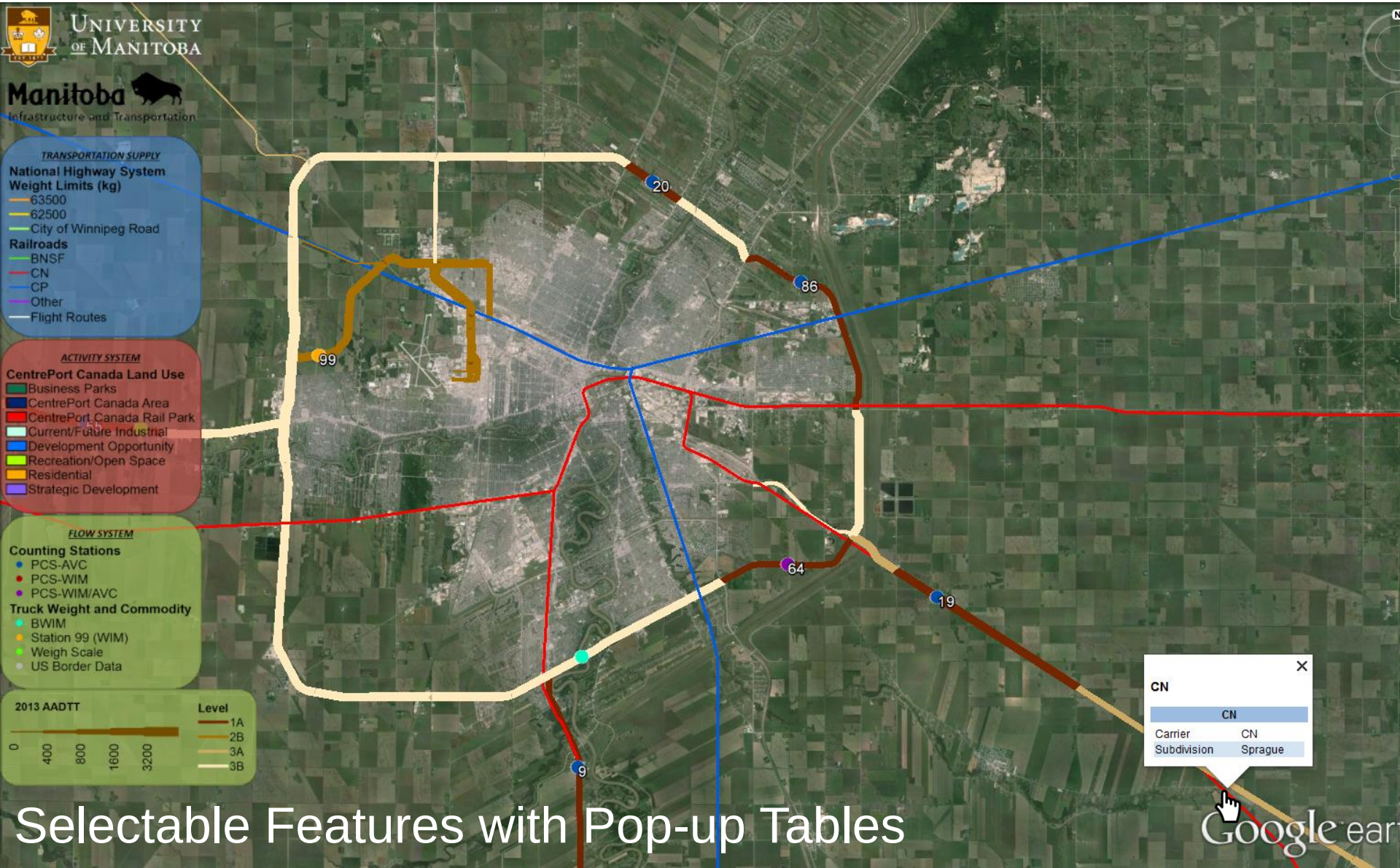
Adjustable Legend Overlay

Functions



Selectable Features with Pop-up Tables

Functions



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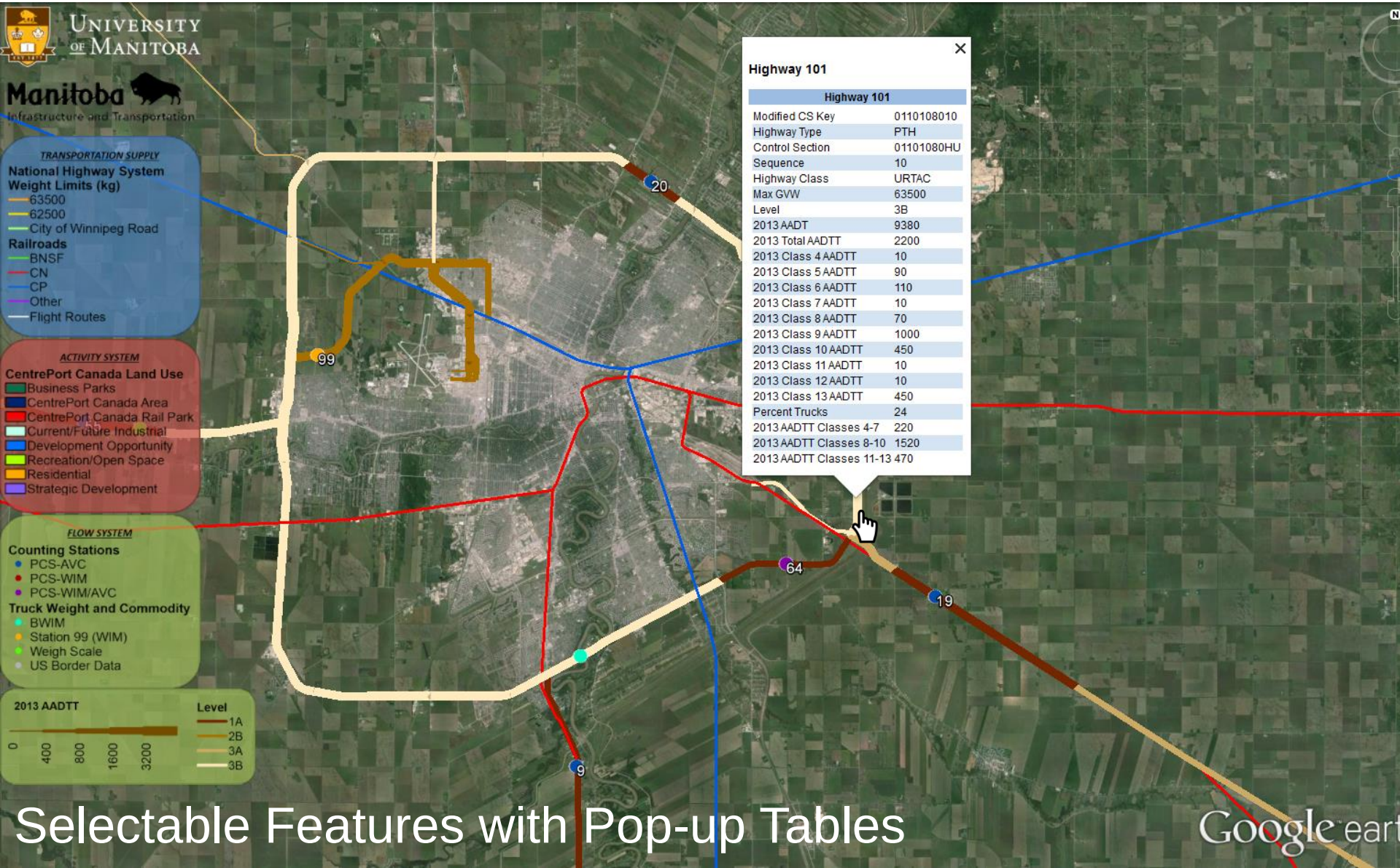


Selectable Features with Pop-up Tables

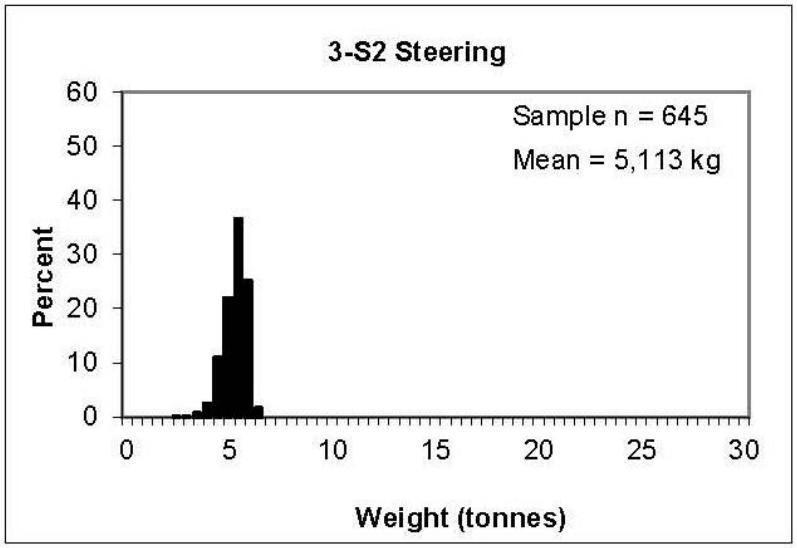
Functions

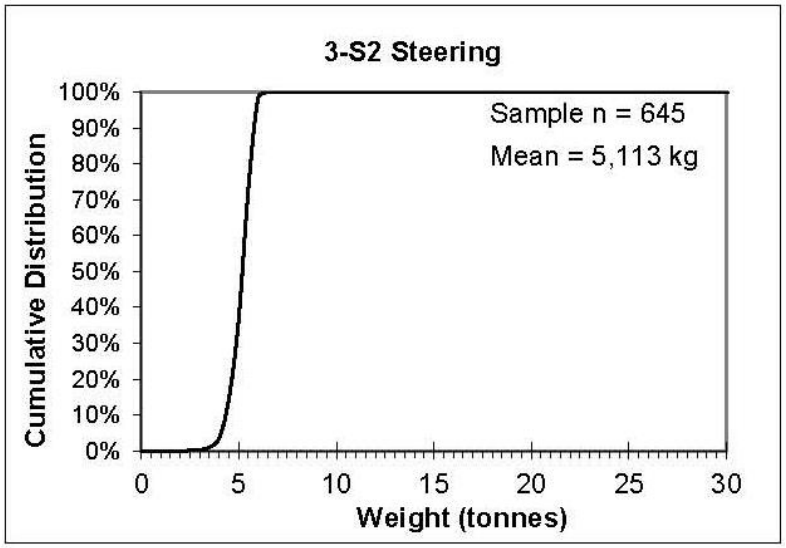
Benchmarking Truck Traffic Operations on the Highway Network Serving Centreport Canada

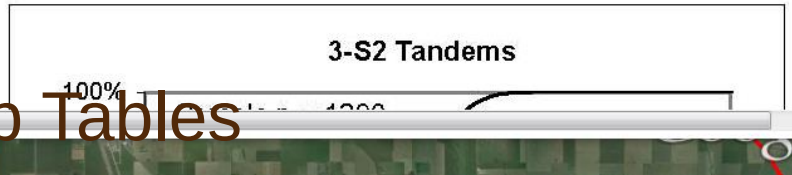
Station 99

Location: MB 190, 1.3 km East of PTH 101

Direction: WB







Selectable Features with Pop-up Tables

Advantages & Disadvantages

Advantages:

- Data can be updated any time
- Layers can be inserted by request
- Easy data transfer
- Google Earth interface is customer-friendly
- Link to (theoretically) limitless amount of information

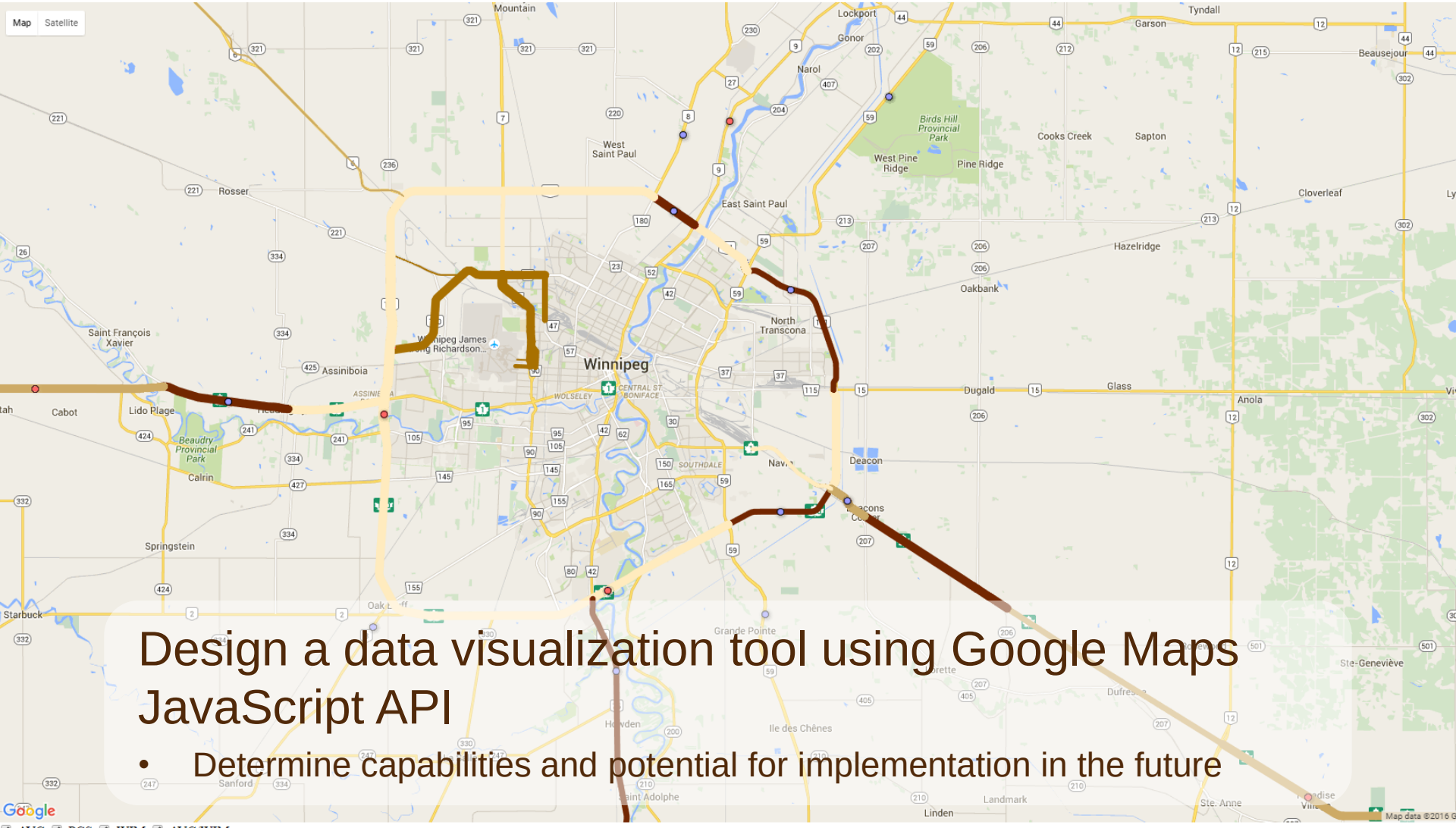
Disadvantages:

- Requires .KMZ file to be downloaded
- Security concerns of online data storage
- Web server requirements can be cumbersome
- Computer programming experience required

Google Maps JavaScript API Data Visualization Tool

University of Manitoba

Purpose



Design a data visualization tool using Google Maps JavaScript API

- Determine capabilities and potential for implementation in the future

Development

What is an API?

- Application Programming Interface
- Toolbox and rulebook for creating applications

Google Maps JavaScript API

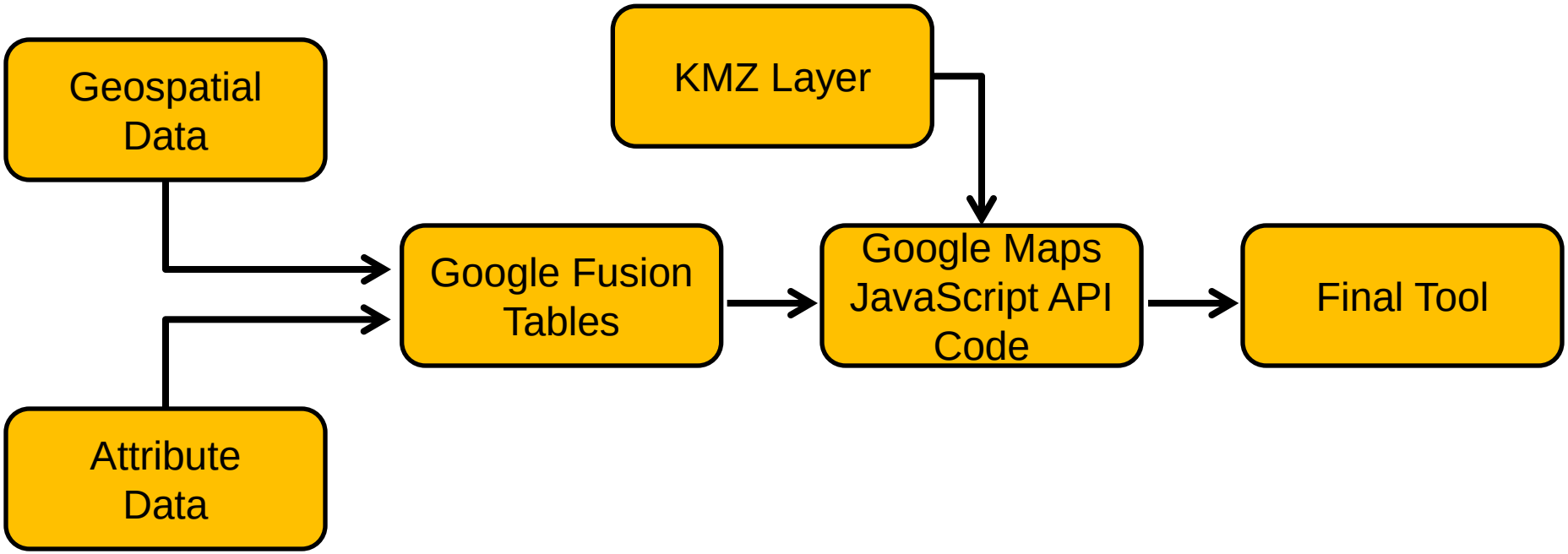
- Code with JavaScript (&HTML)
- Allows for integration of data and maps

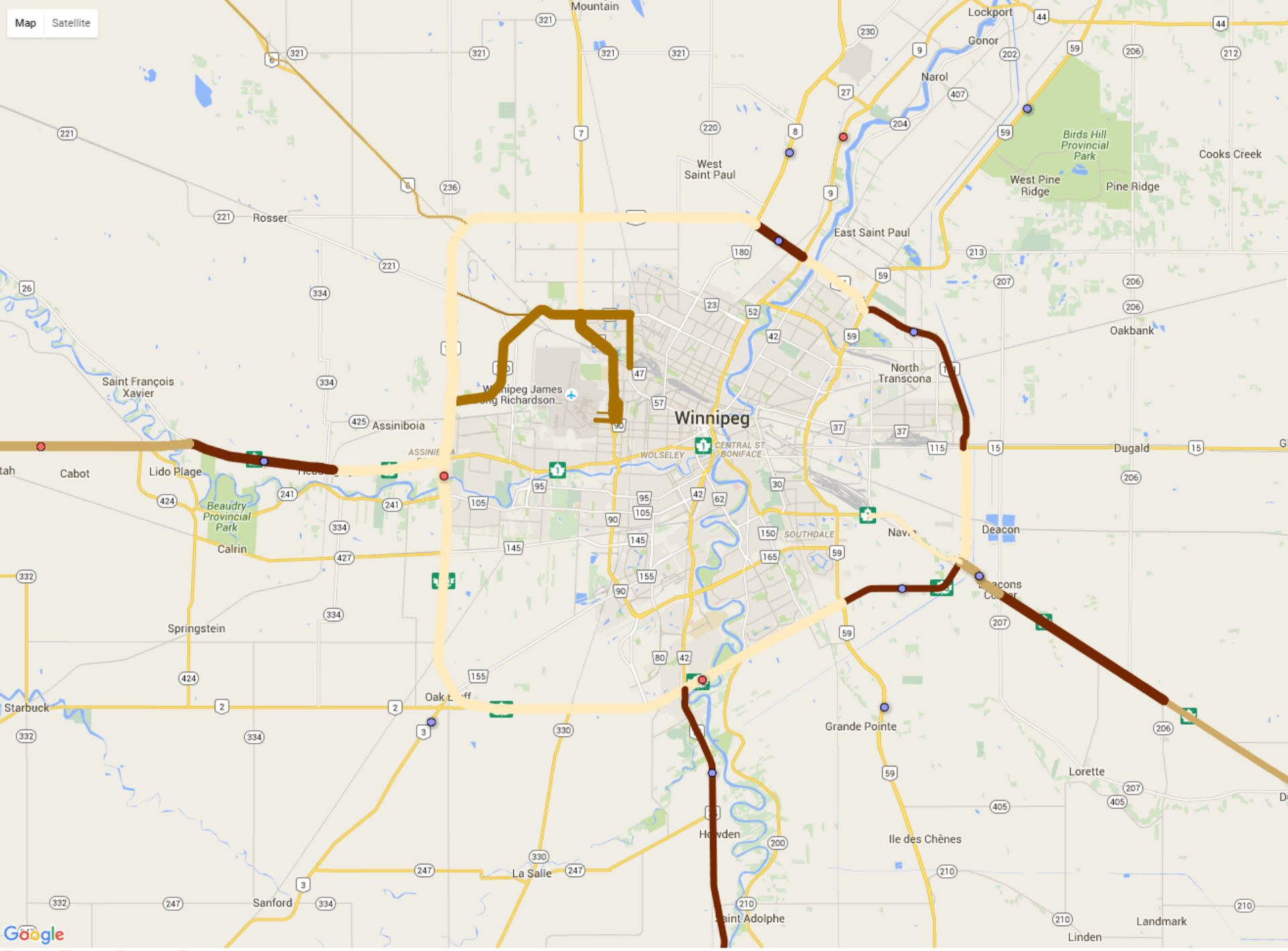
Development

Source Data

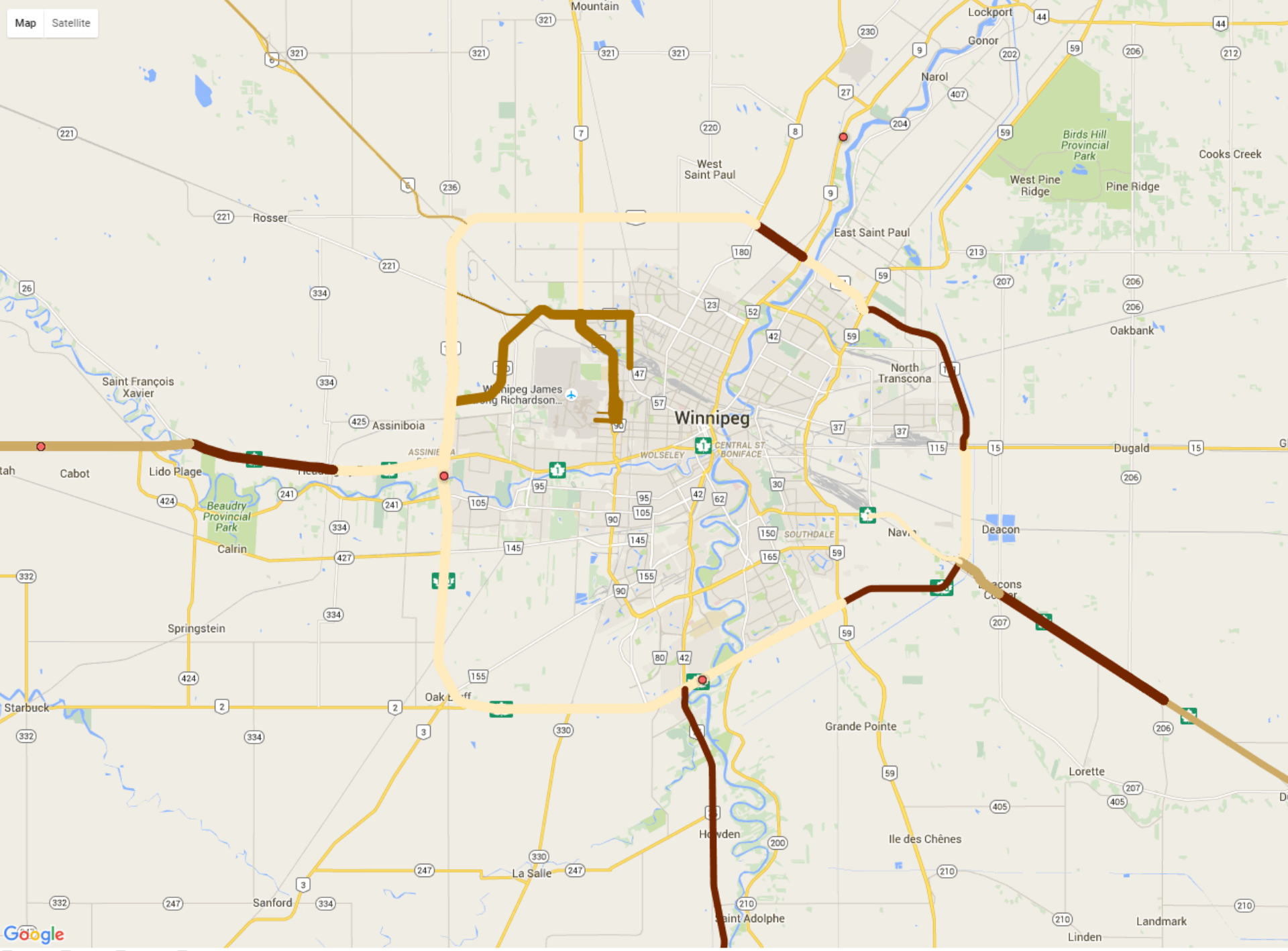
- Manitoba Highway Traffic Information System (MHTIS)
  - Geospatial data of all continuous count stations
  - Binned (hourly) count data a single continuous count station (Station 20)
  - Truck traffic flow map (.kmz)

Development





AVC PCS WIM AVC/WIM



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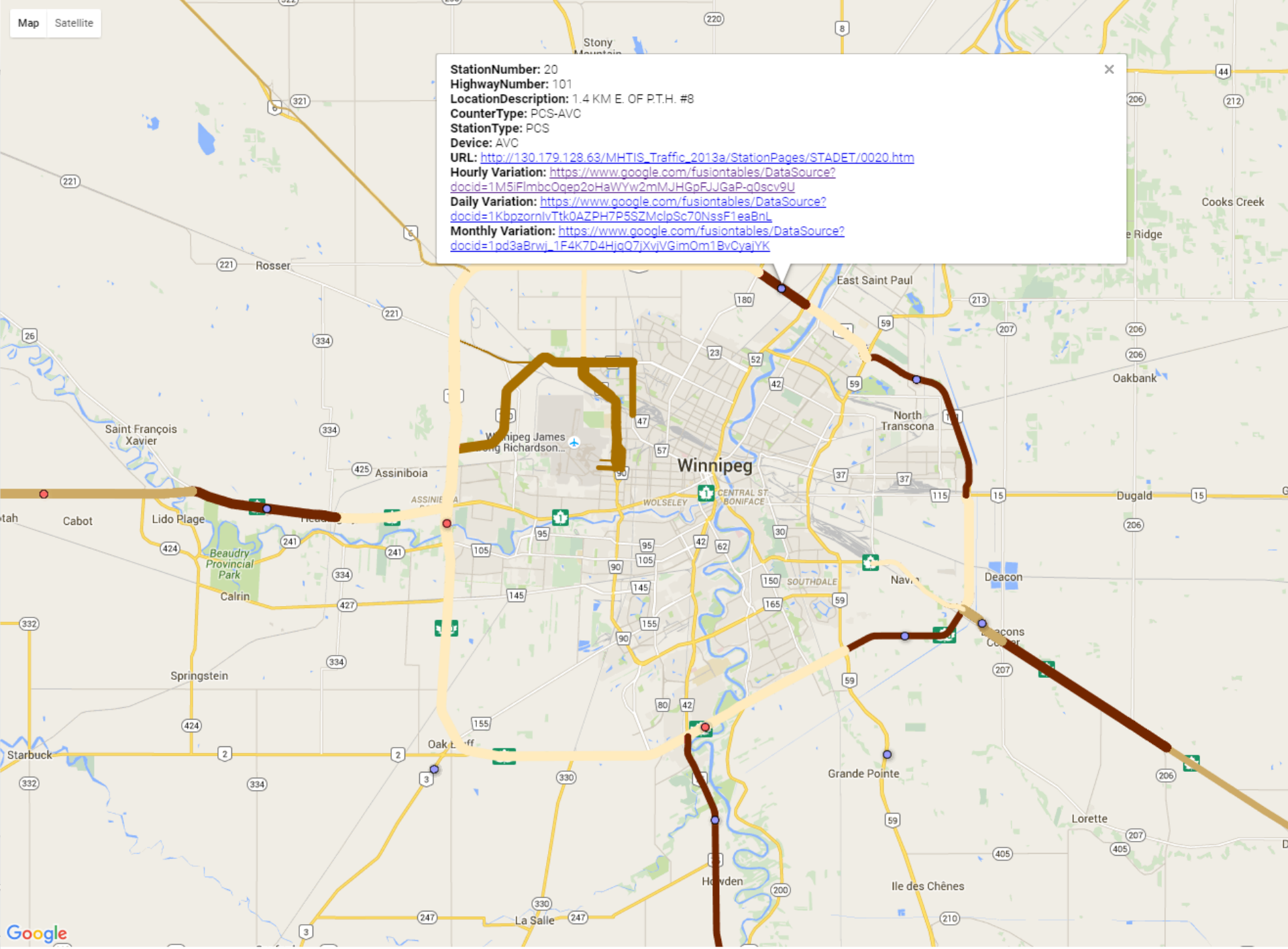

AVC PCS WIM AVC/WIM

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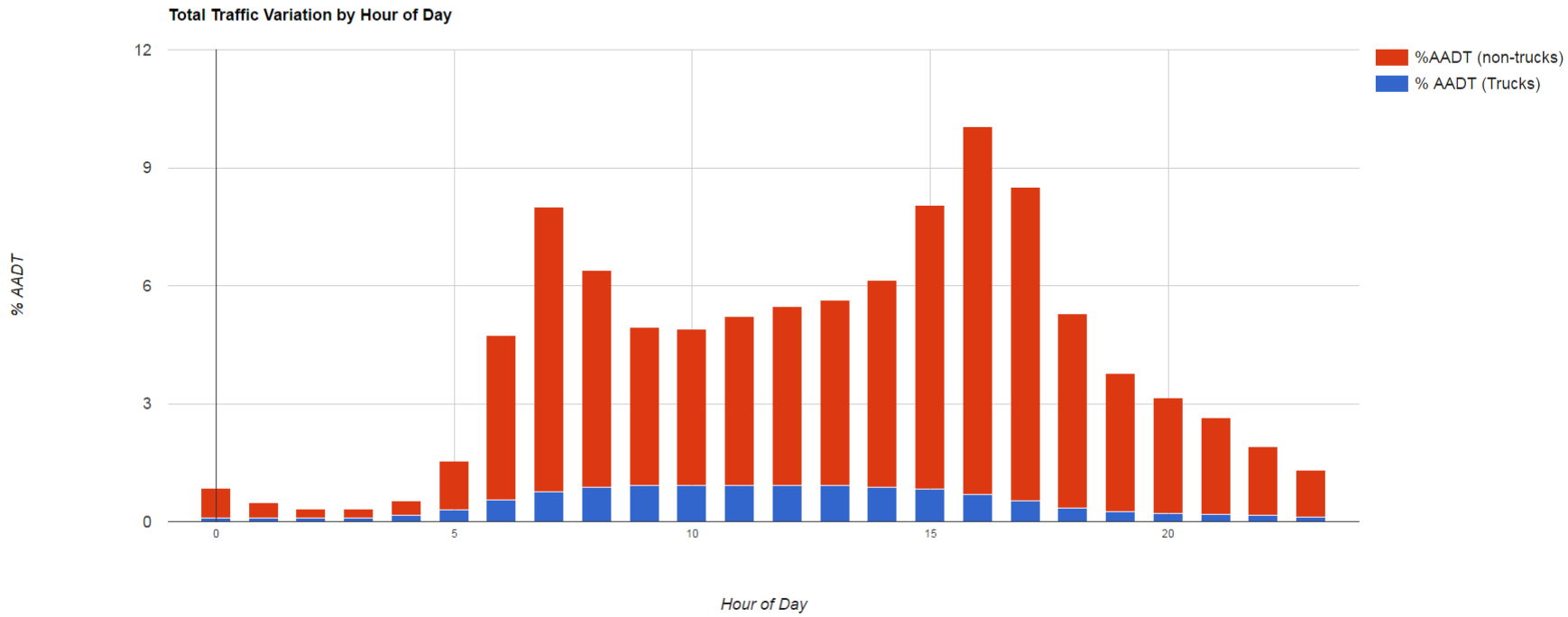
Station 20 Hourly Data

Hourly %AADT (non-truck & truck) and %AADTT

Attribution unknown - Edited on 2015 March 30

File Edit Tools Help | Data | Cards 1 | **Hourly Total Traffic Variation** | Hourly Truck Traffic Variation

Filter | No filters applied. Sorted by Hour | Not saving | 24 rows



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Station 20 Hourly Data

Hourly %AADT (non-truck & truck) and %AADTT

Attribution unknown - Edited on 2015 March 30

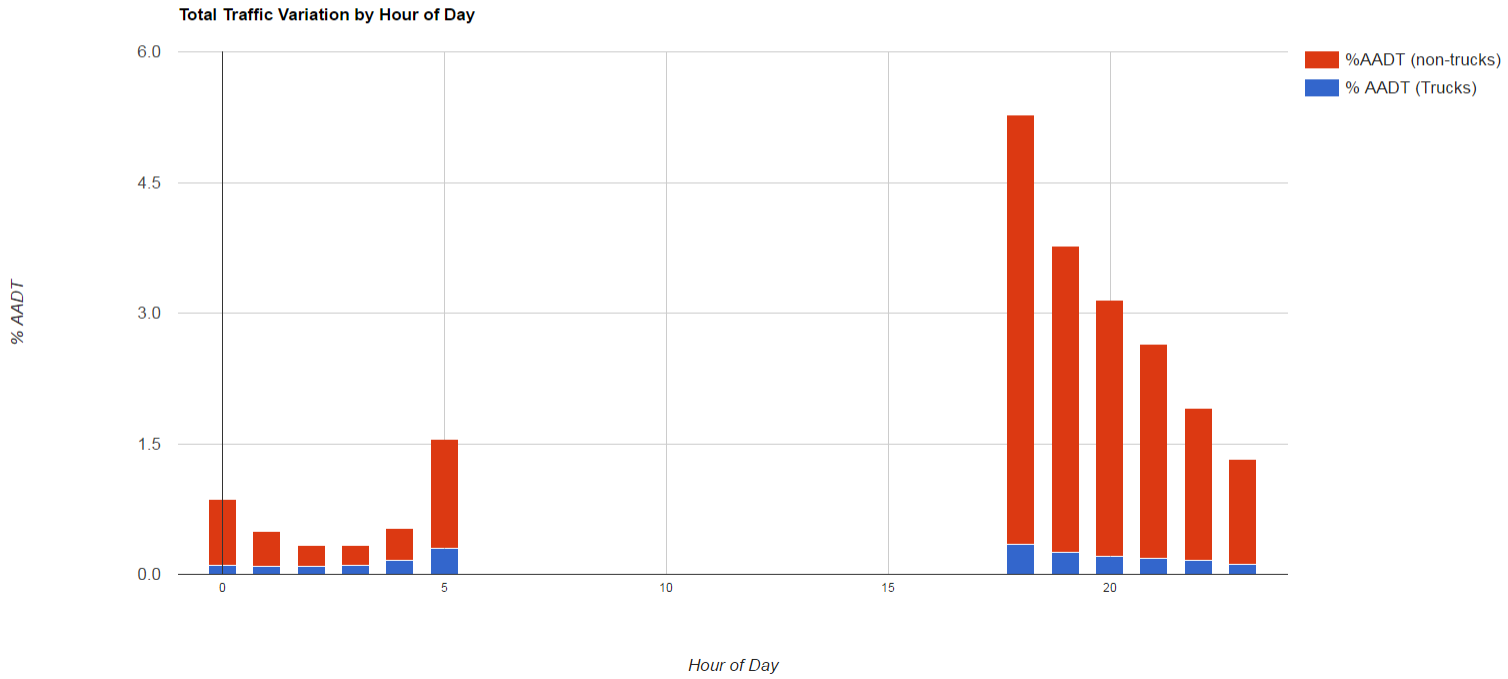
File Edit Tools Help | Data | Cards 1 | Hourly Total Traffic Variation | Hourly Truck Traffic Variation

Filter '% AADT (Trucks)' >= 0 AND '% AADT (Trucks)' <= 0.5. Sorted by Hour — Not saving — 12 rows

% AADT (Trucks)

0 - 0.5 Find

24 values from 0.09 through 0.93



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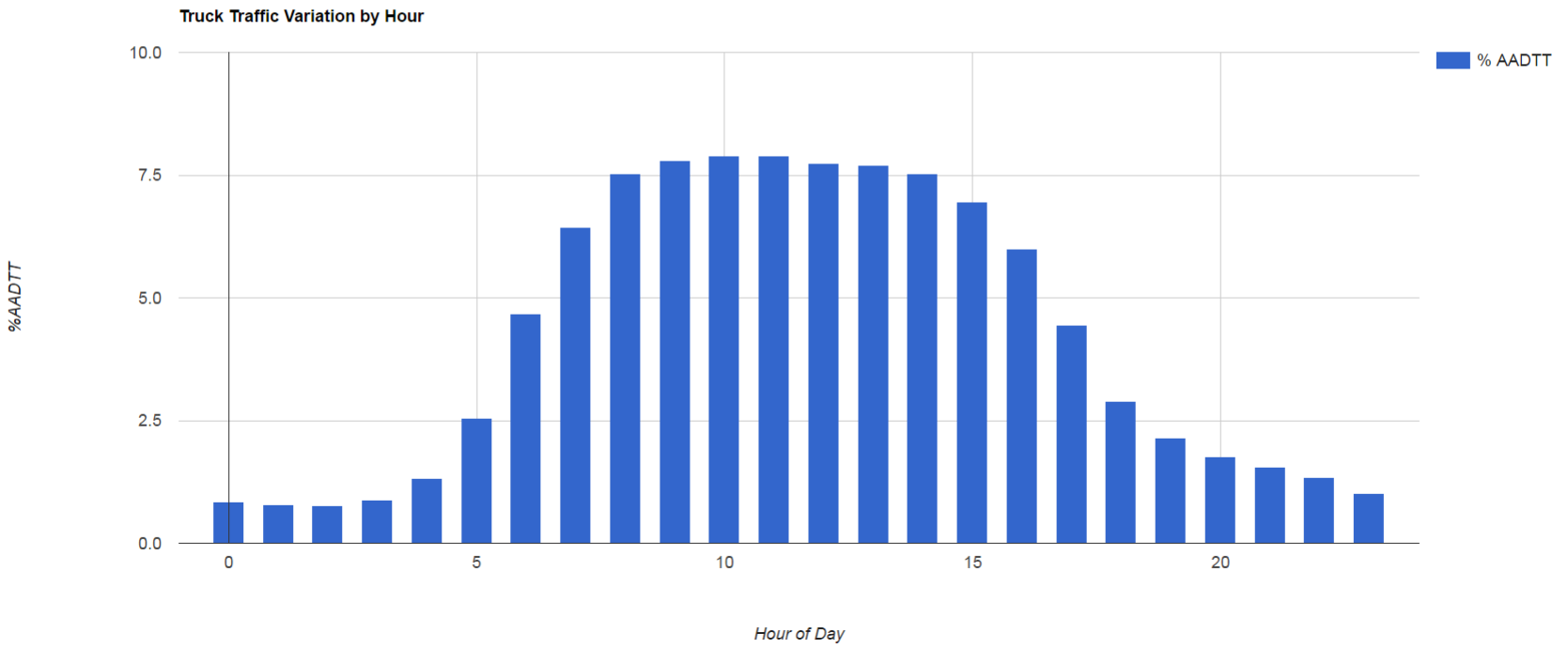

Advantages & Disadvantages

Advantages:

- Data can be easily updated by the developer
- Can be customized based on user preference
- Easily accessible via the Internet
- Easy to use: well known Google Maps interface

Disadvantages:

- Complex (not user intuitive) coding required
- Application limitations

Summary and concluding remarks

Criteria	Google Earth	Google Maps JavaScript API
Ease of Development	-	✗
Updateability	✓	✓
Customizability	✓	✓
Accessibility	✓	✓
Cost	✓	✓
Ease of Use	✓	✓
Interactivity	✓	✓
Security	-	✓
Reliability	-	✓

✗ Low
- Medium
✓ High

Summary and concluding remarks

- Google applications for traffic data visualization:
  - Convenient methods of displaying location-based traffic information
  - Require experience to develop
  - Can improve customer experience and understanding

- Future work
  - Improved interactivity (e.g., customer querying, chart-building tools)
  - Real-time data validation, processing, and dissemination

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