



GIS Use in Transportation & Infrastructure

Michael See
April 11, 2024



GIS Use in Transportation & Infrastructure

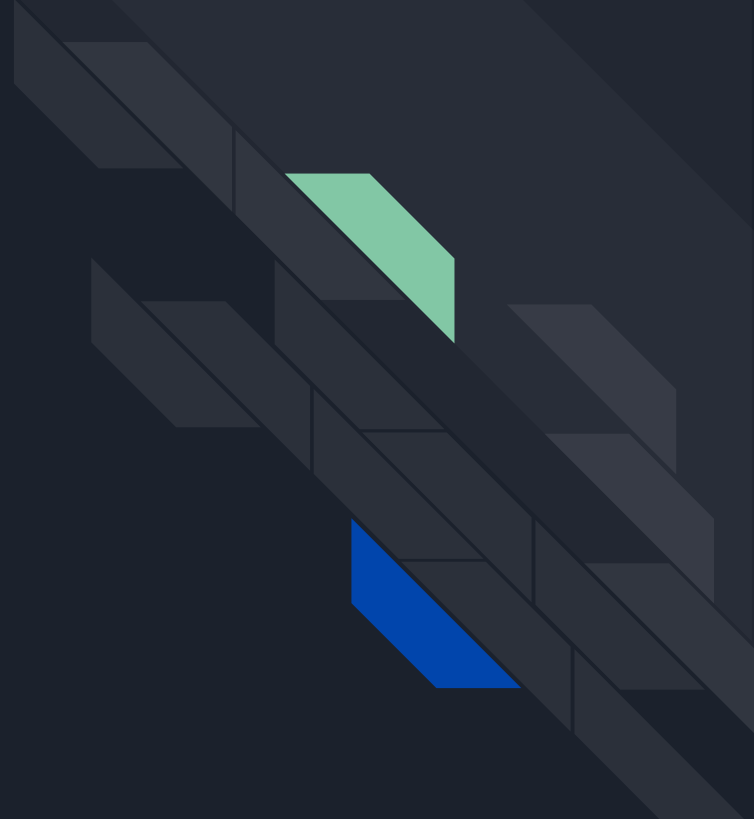
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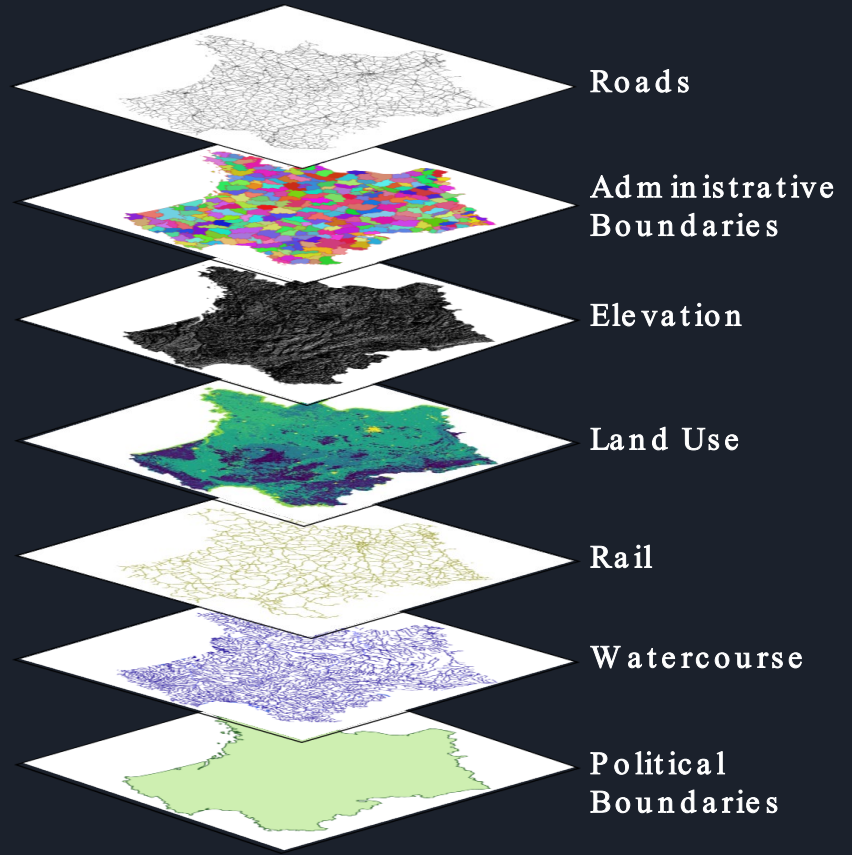
Every Map Lies

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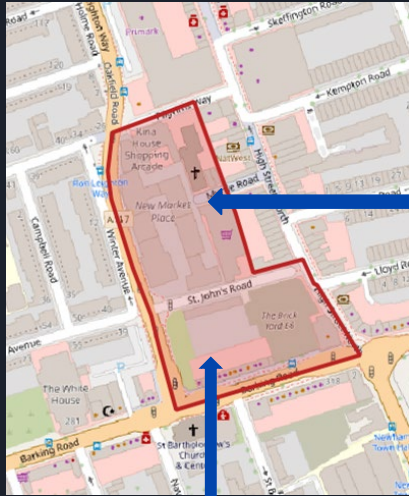
What is GIS?



Layers of Data



Attributes



Spatial Data

Attribute Data

Link

	REGIONNAME	COUNTY	LA_CODE	LA_NAME	SITE_REF	EASTING	NORTHING	AREA
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Data Types

Vector

- Points
- Lines
- Polygons

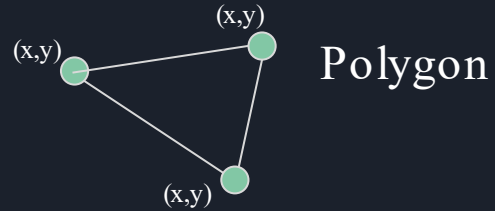
Raster

- Grid of Pixels
- Basemap

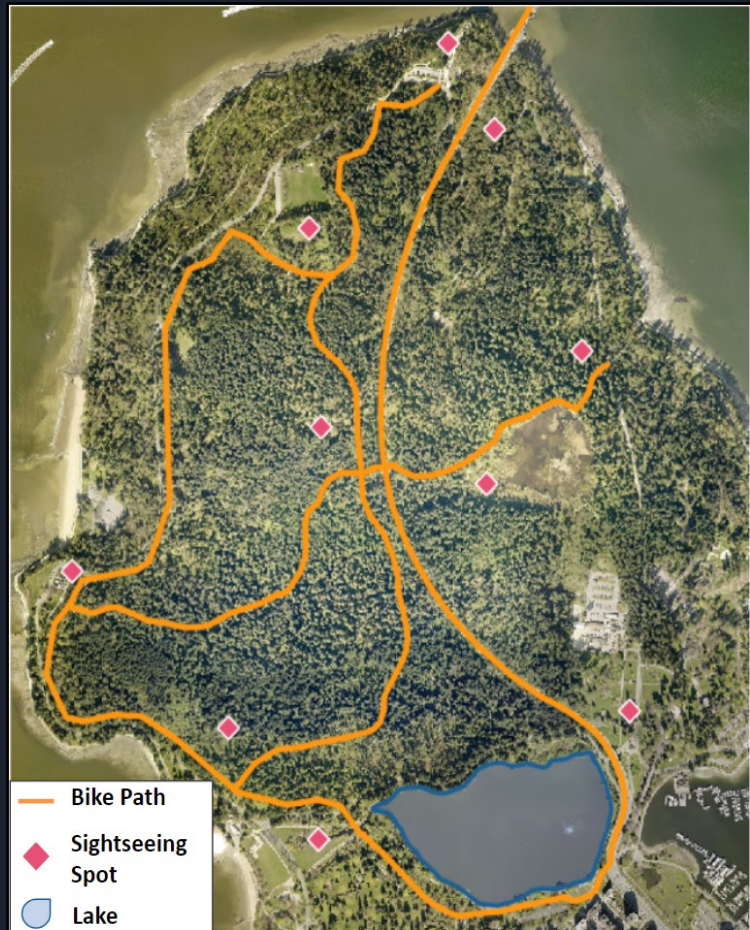
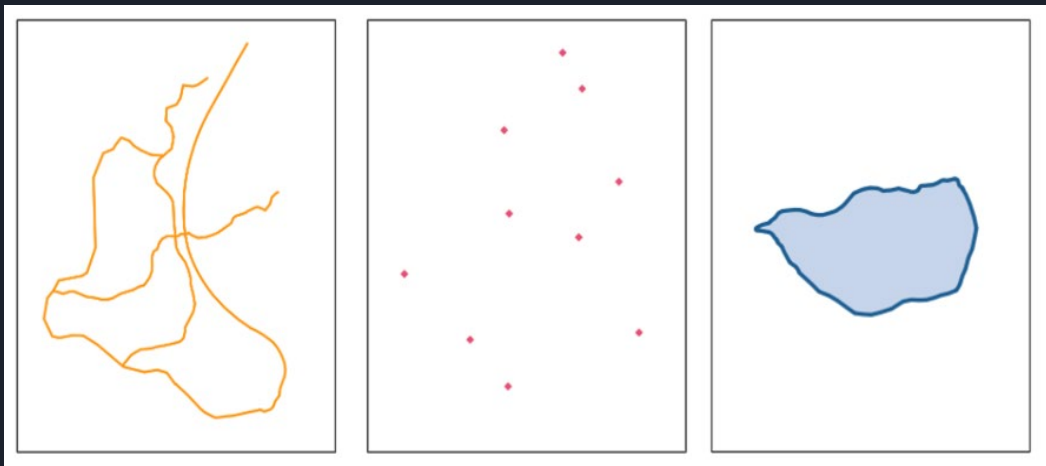


Vector Data

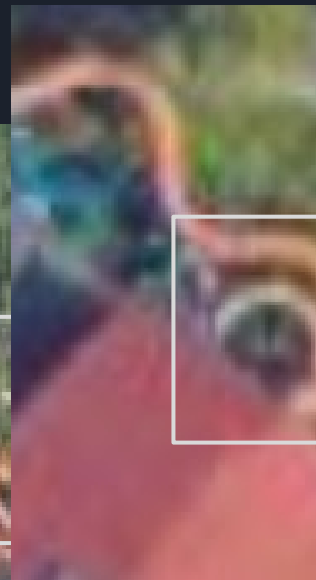
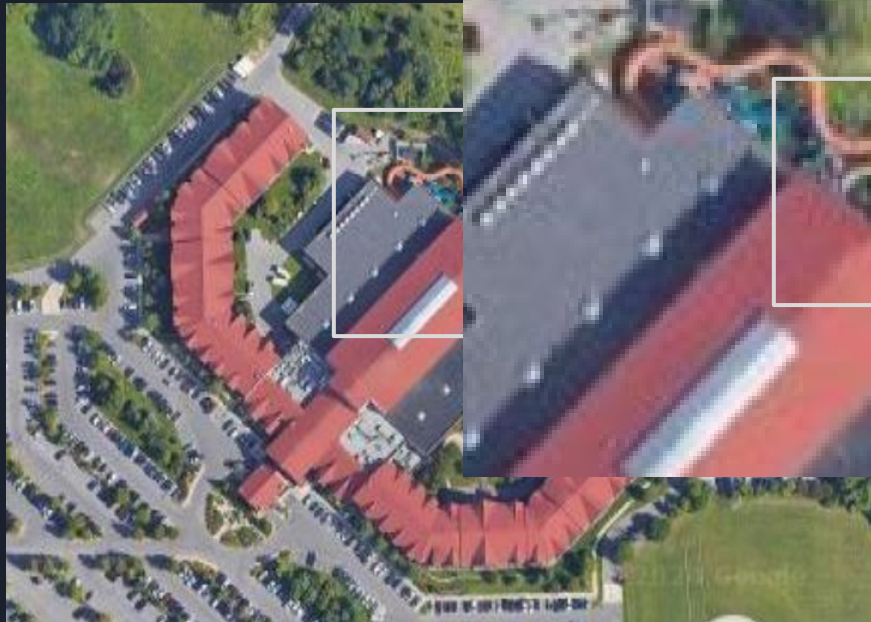
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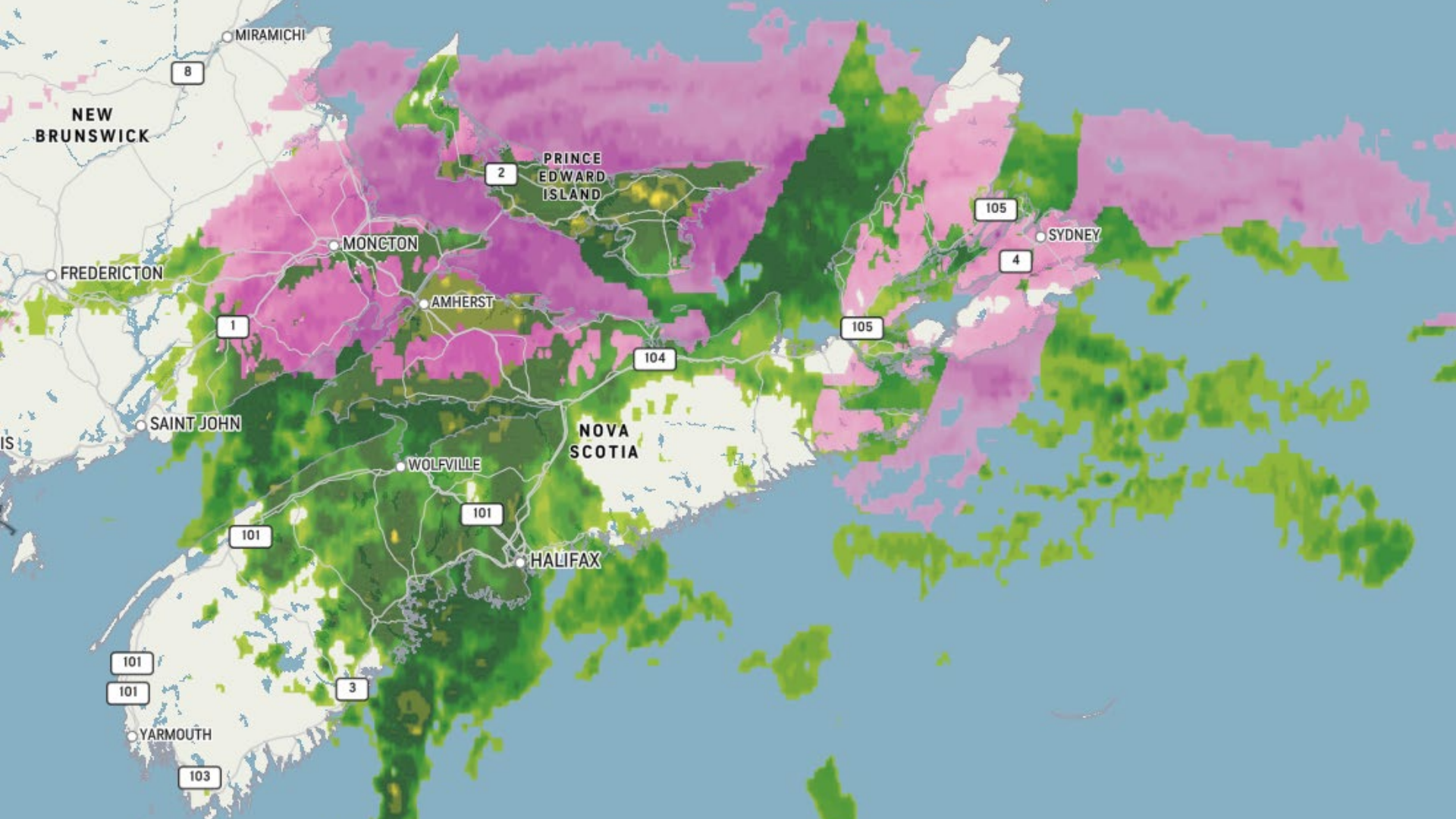


Vector Data



Raster - Basemaps





NEW BRUNSWICK

PRINCE EDWARD ISLAND

NOVA SCOTIA

MIRAMICHI

8

2

105

SYDNEY

4

MONCTON

AMHERST

105

104

FREDERICTON

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SAINT JOHN

WOLFVILLE

101

HALIFAX

101

101

3

YARMOUTH

103

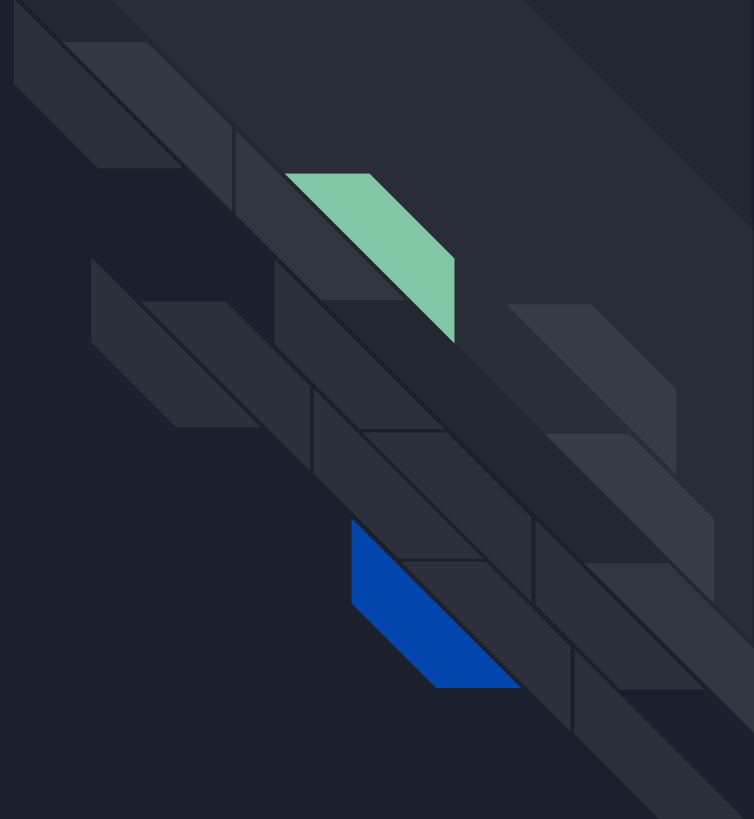
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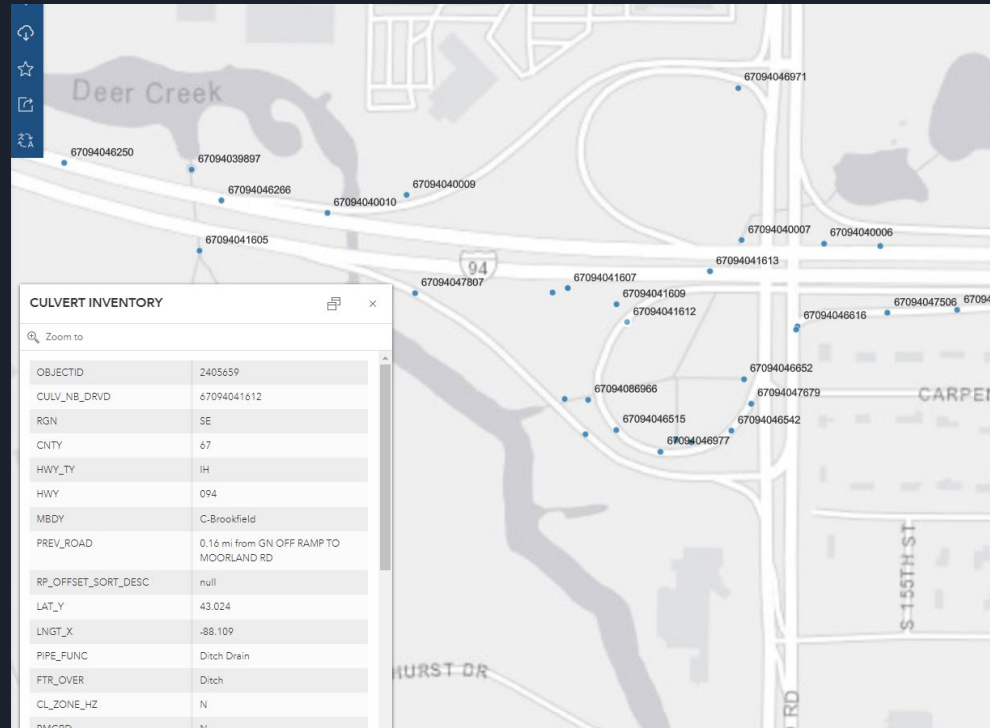


What Can You Do With GIS?



Asset Inventories

- Where is the asset?
- What condition is it in?
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- Culverts & Sewers
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- Bridges

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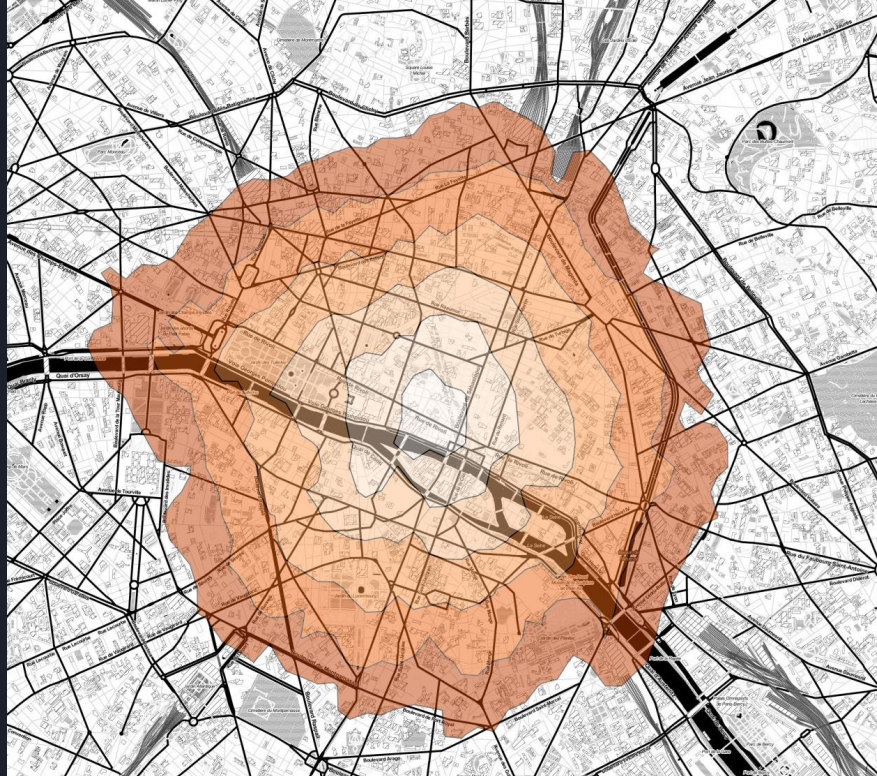


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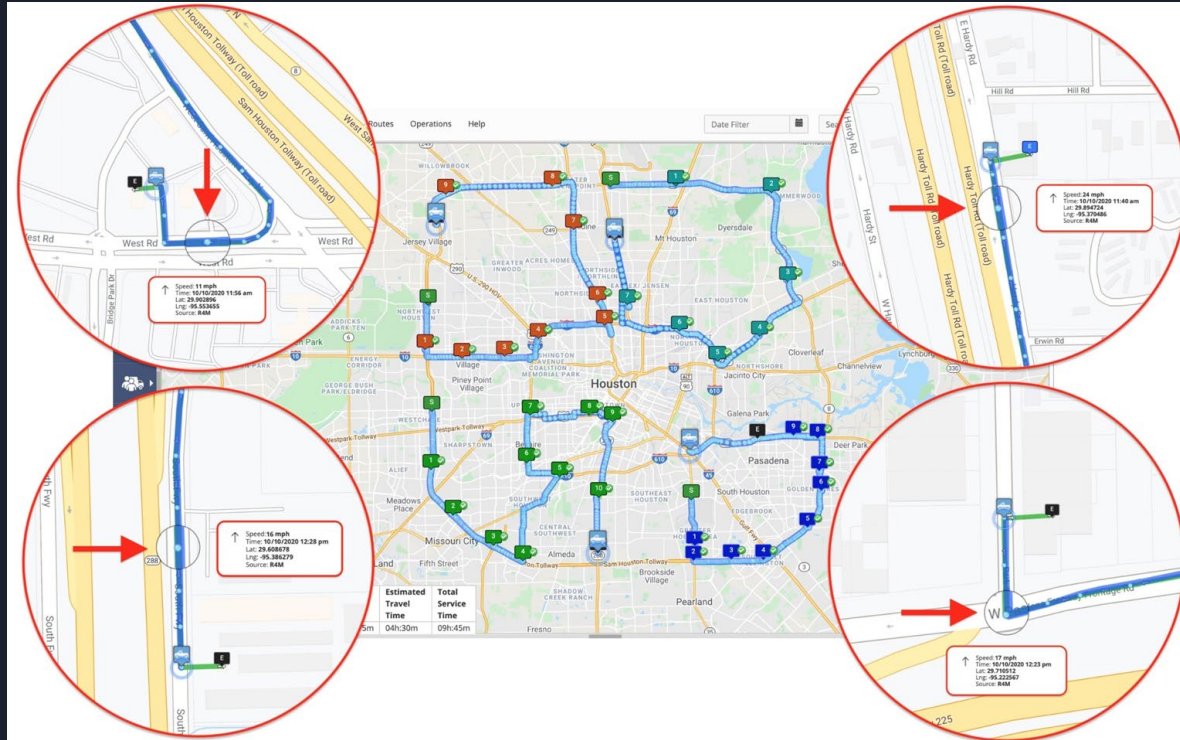


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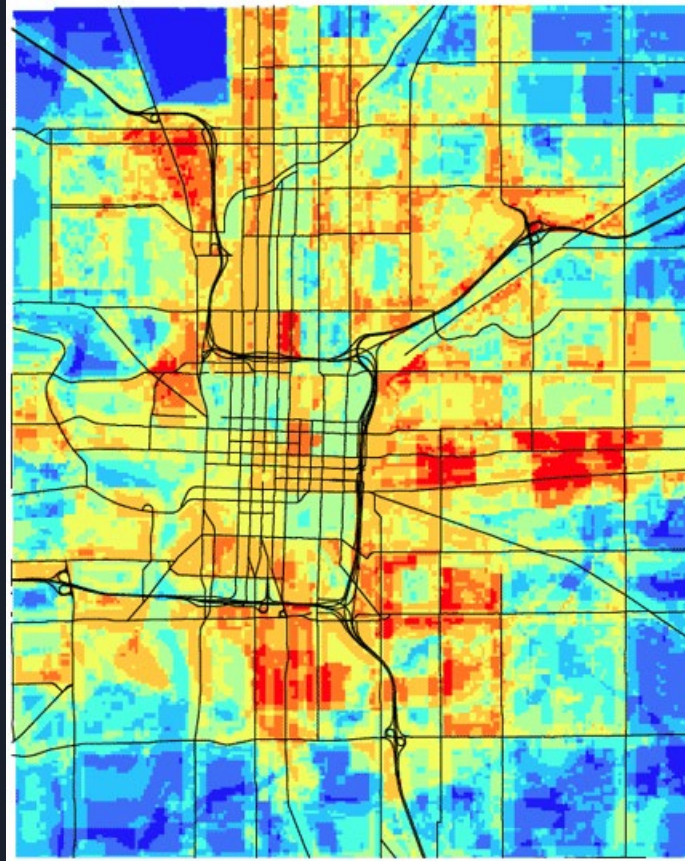
Travel Time Analysis



Route Optimization



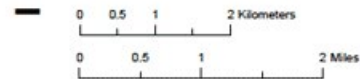
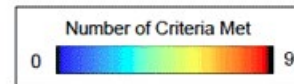
Site Suitability Analysis



Center Township, Indianapolis Site Selection Model

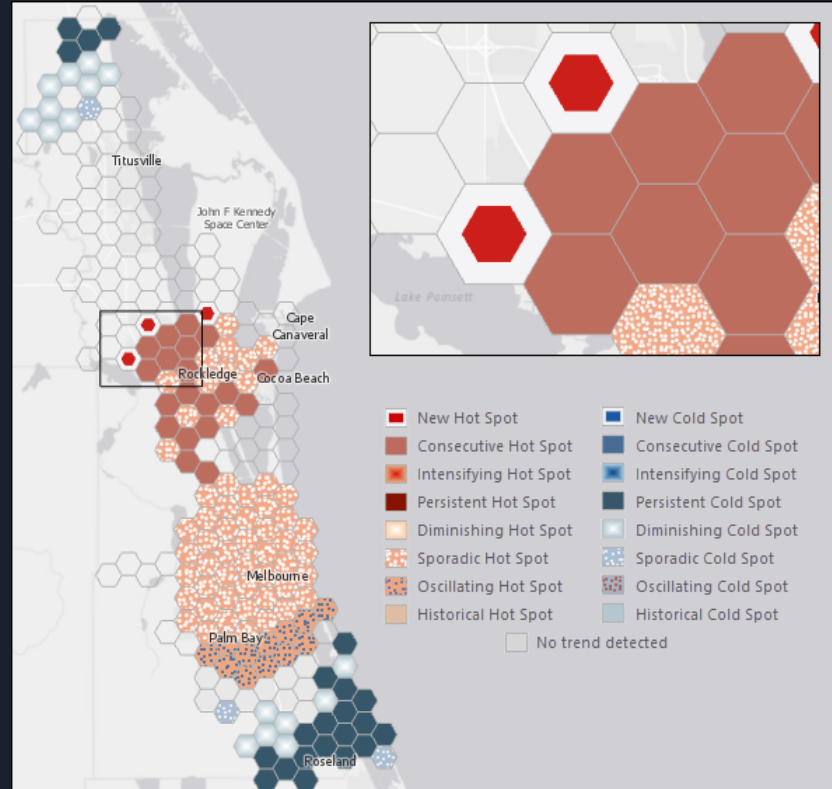
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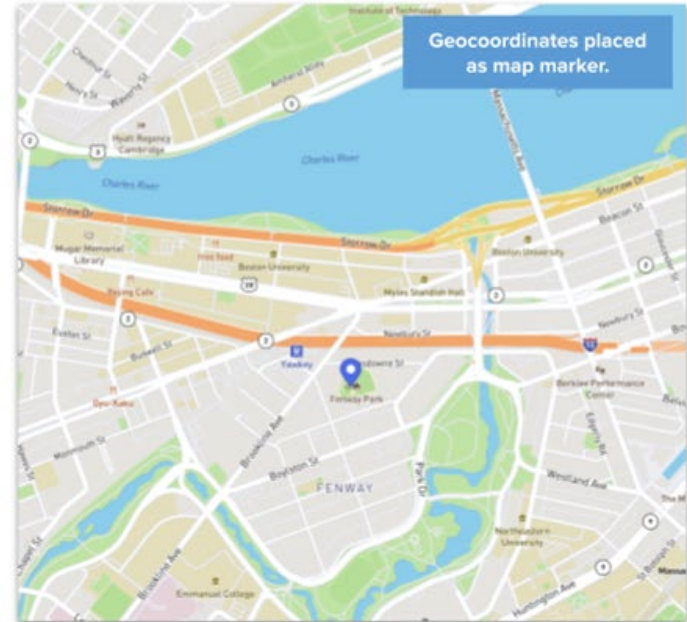
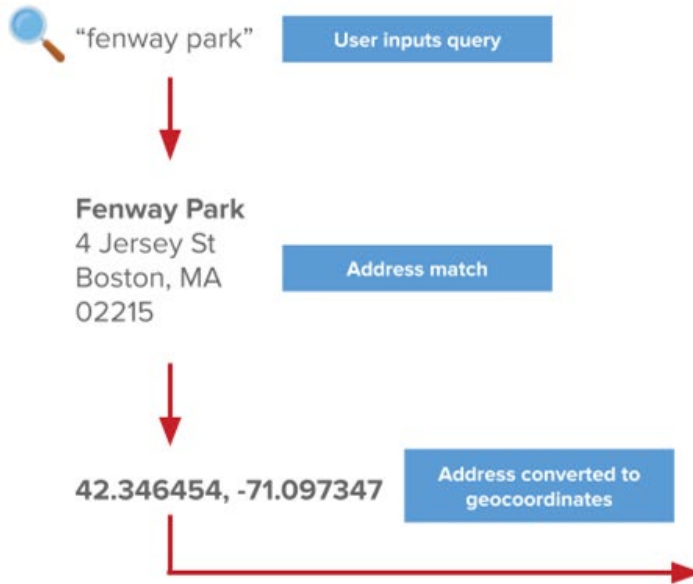
Hot Spot Mapping



Digital Twin



Geocoding

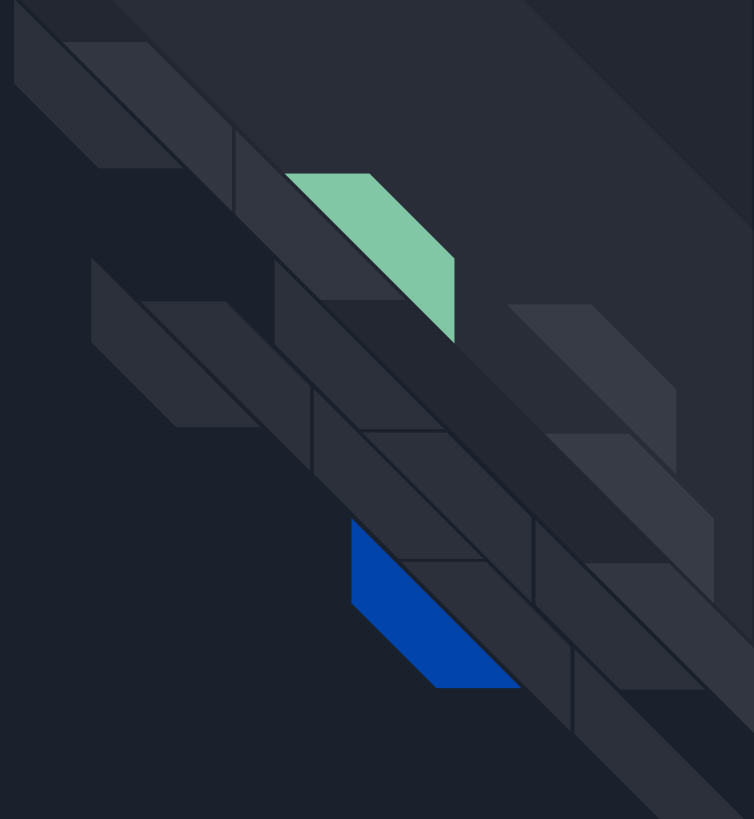


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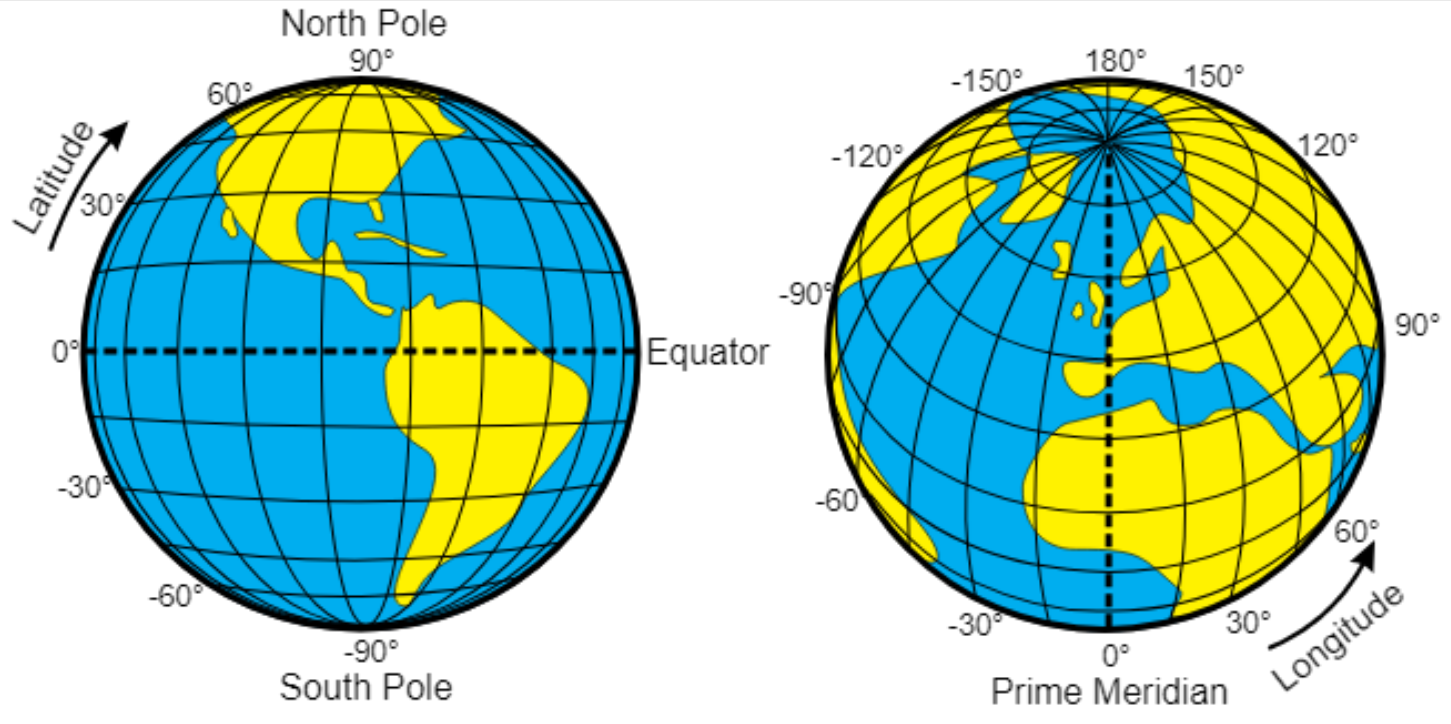


Niagara Parks Power Station

Coordinates & Systems



Latitude & Longitude





Latitude: 43.075164

Longitude: -
79.079569

UTM Zone 17 North

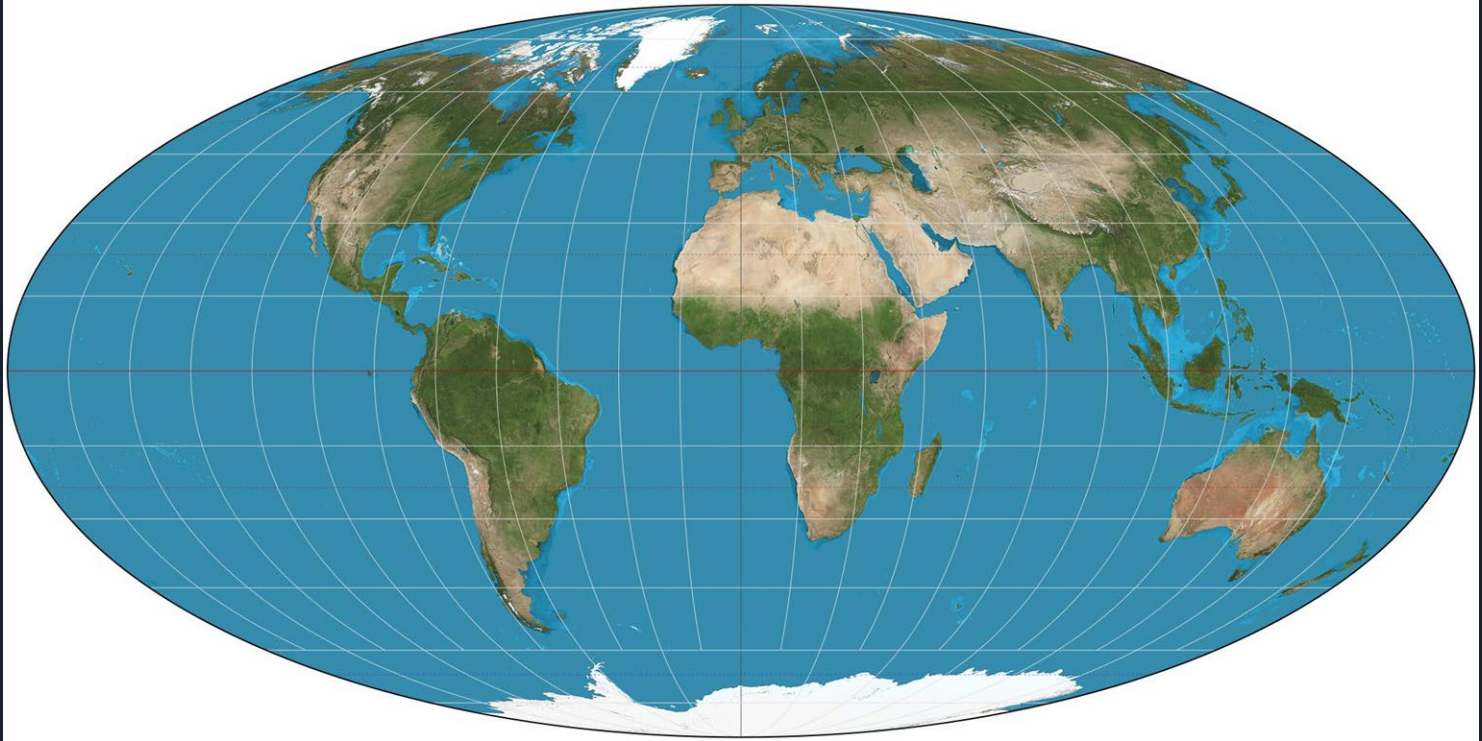
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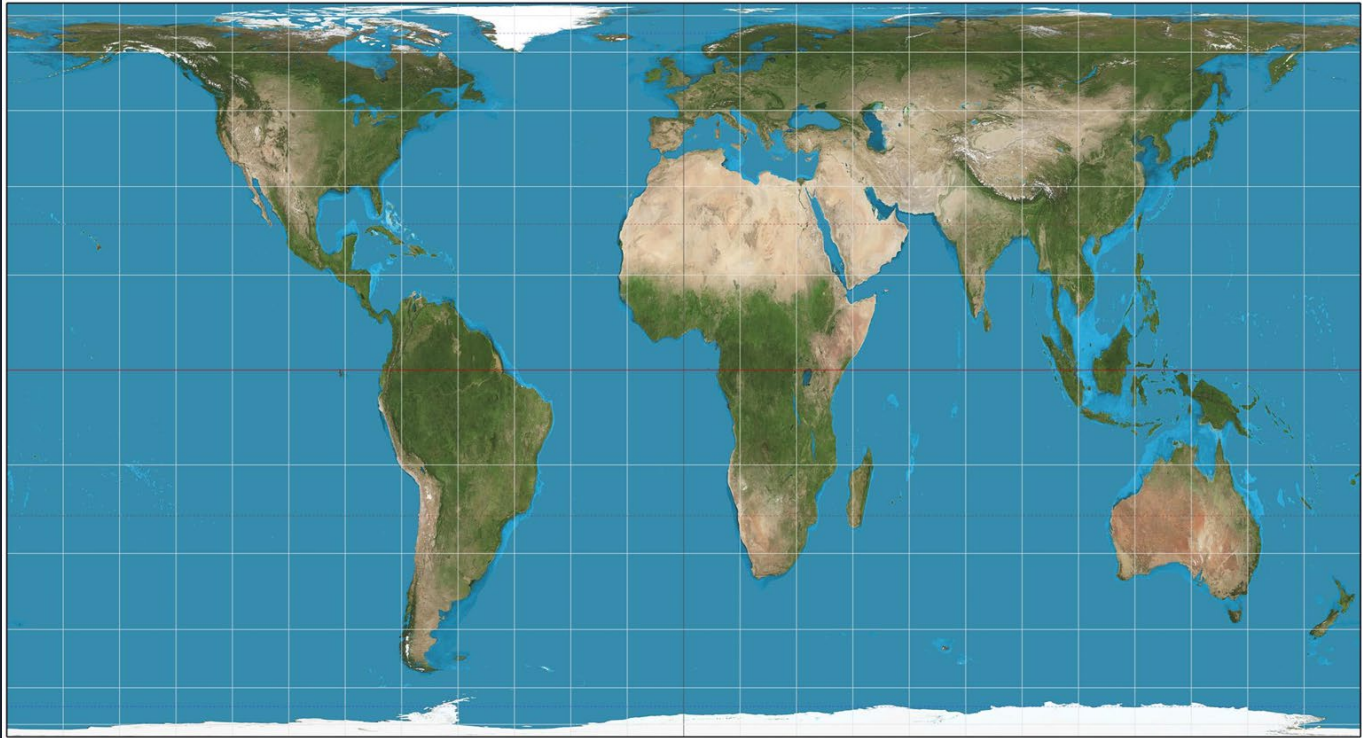
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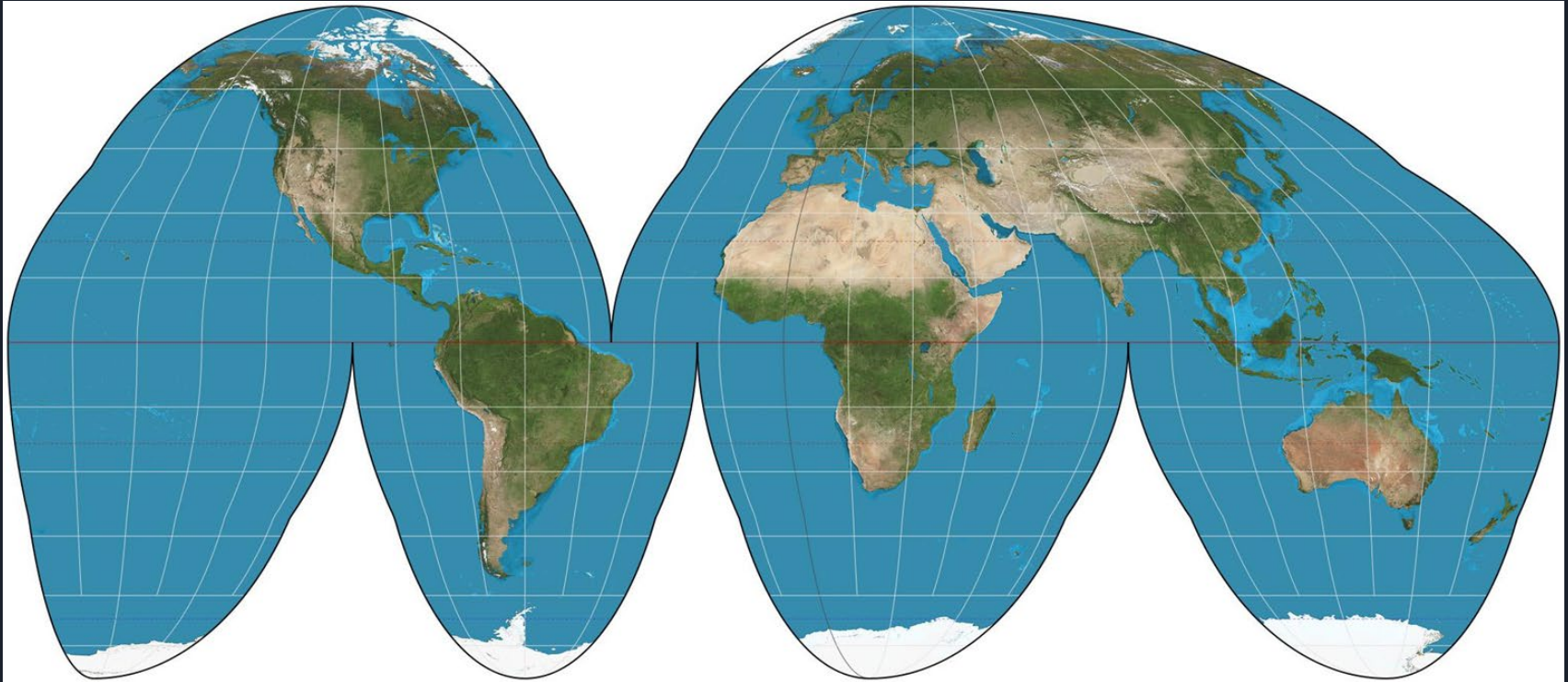
Coordinate Systems

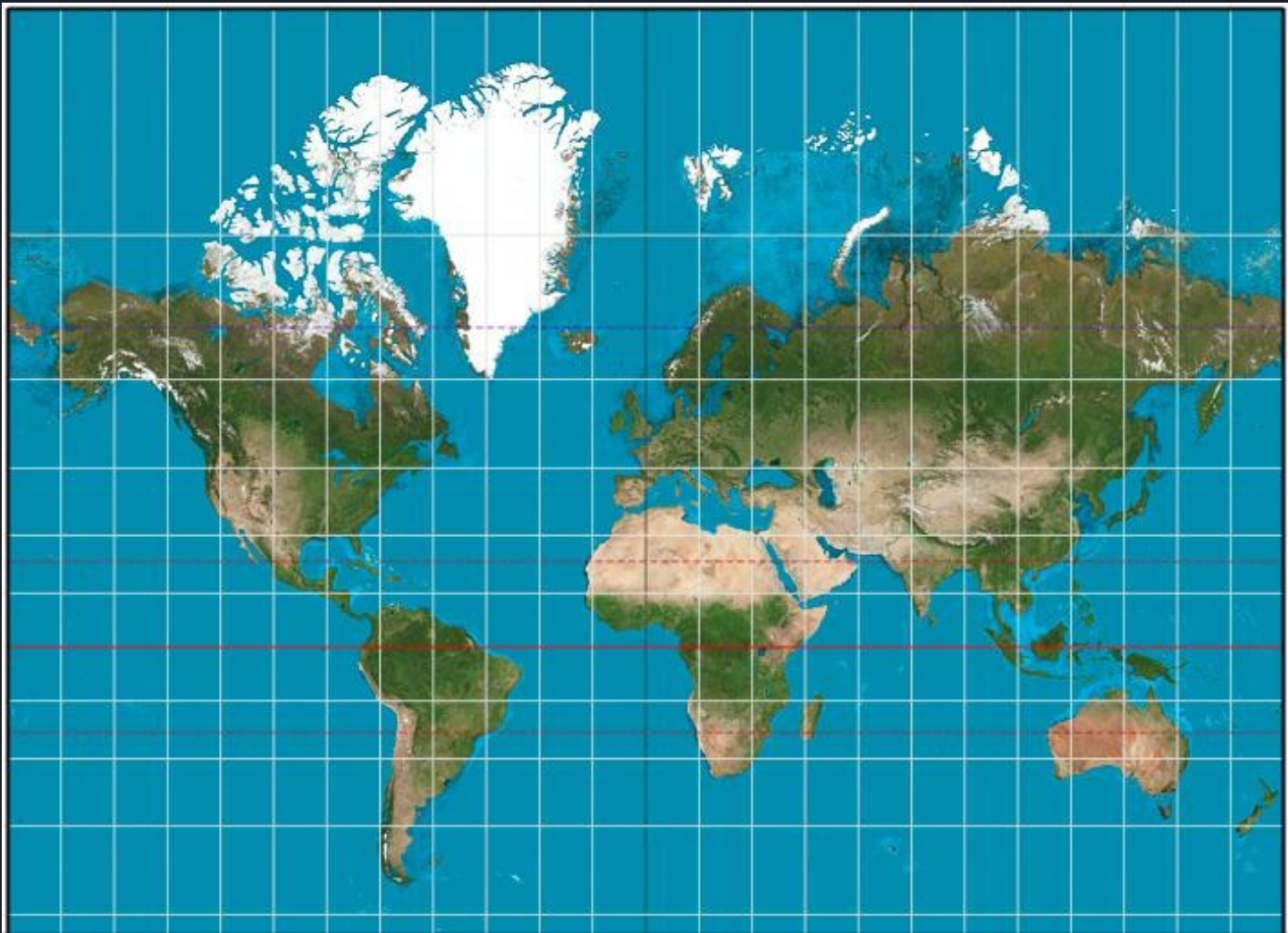


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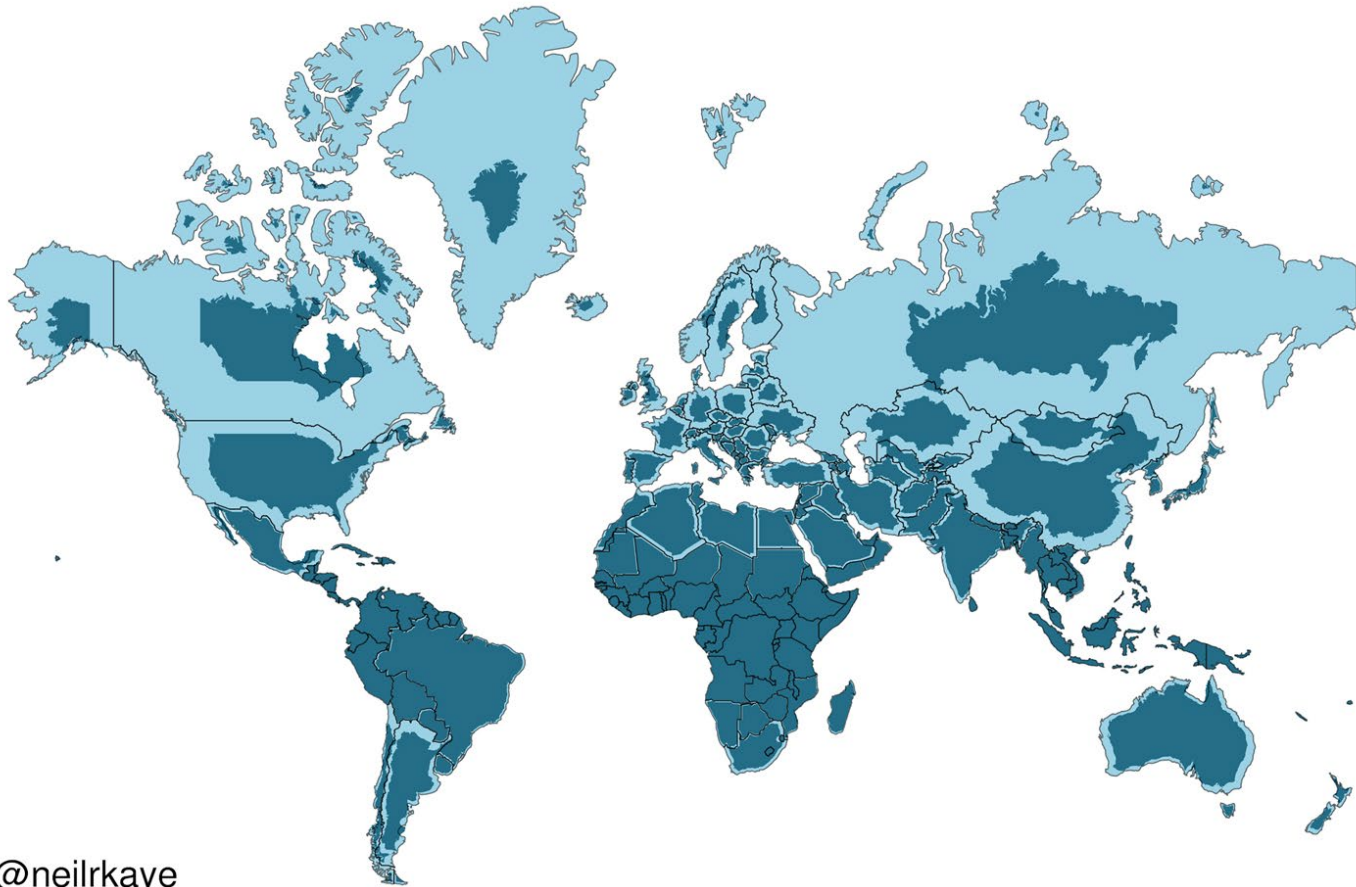


Coordinate Systems





World Mercator projection with true country size added



@neilrkaye



Decimal Places	Accuracy
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Two (0.0 1)	1.1 Kilom etres
Three (0.00 1)	110 Metres
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Spatial Data Accuracy

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Garbage In Garbage Out

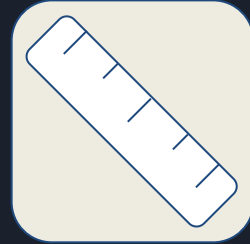
- Data Quality
- Data Integrity Tools
- Data Currency (Freshness)





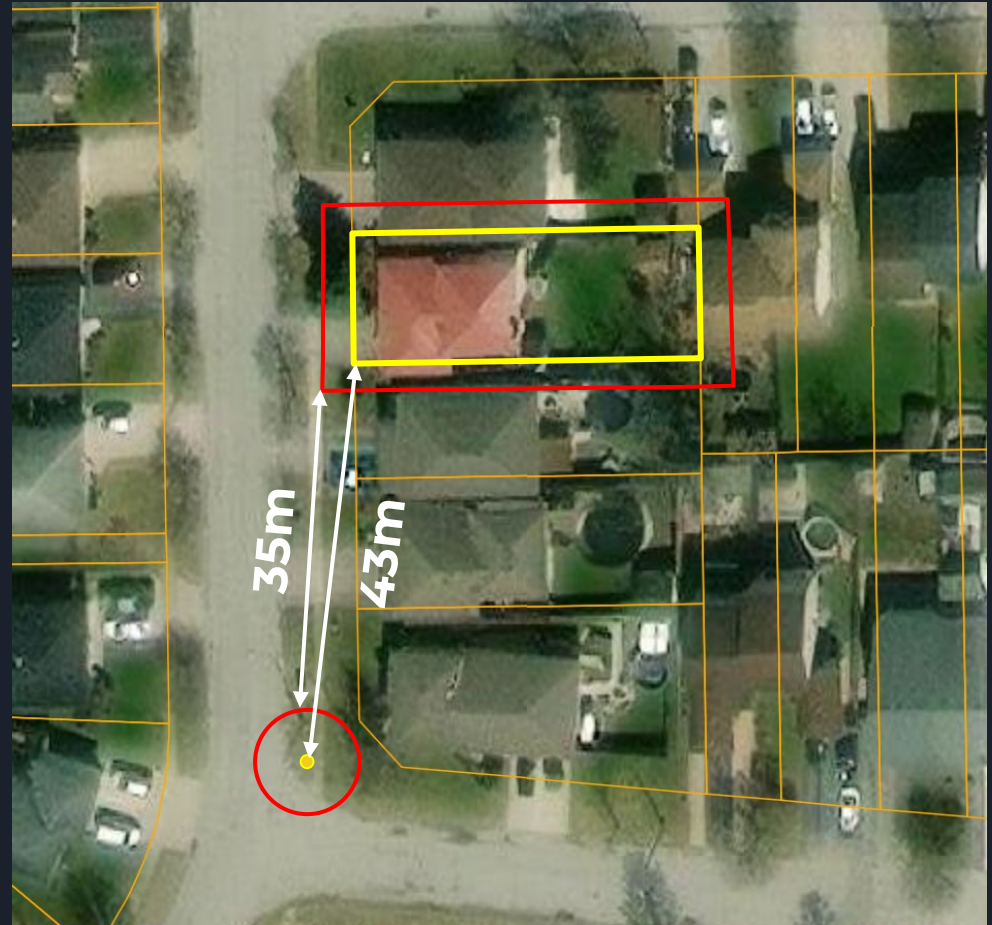
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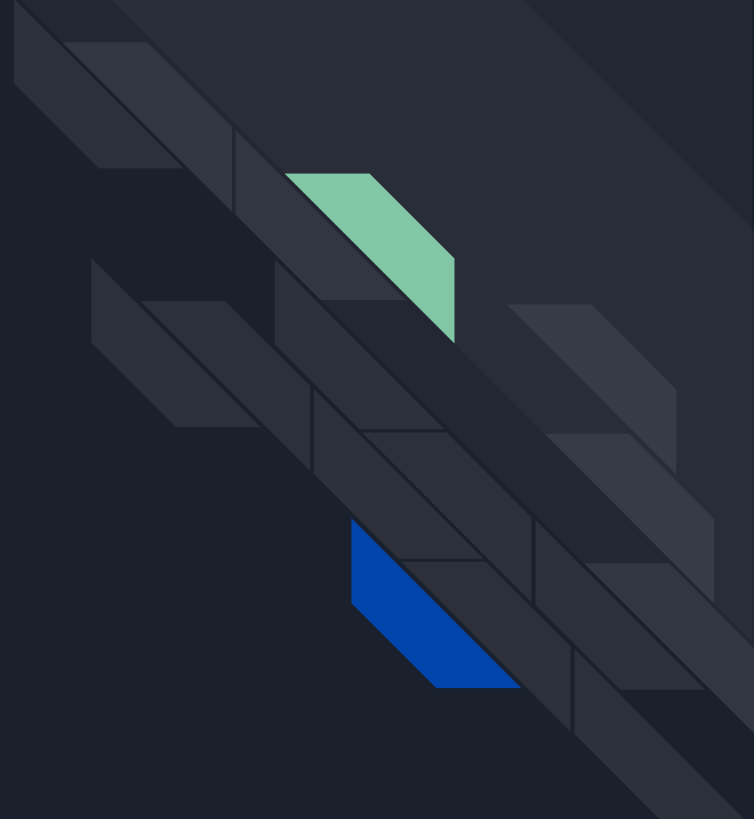


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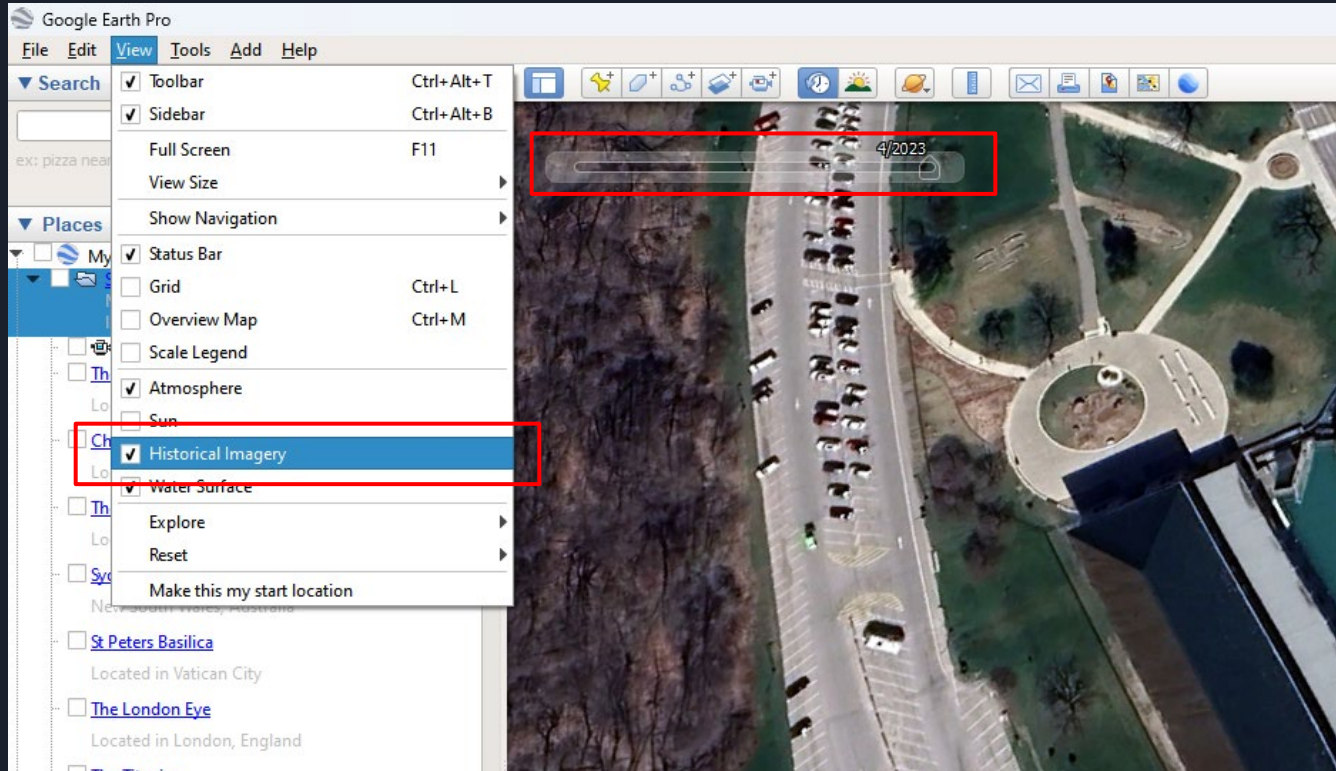
- Parcel and Imagery don't align (~3m?)
- Hydrant picked up with phone GPS (~5m?)



ArcGIS Online



Google Earth Historical Imagery



2023

2023



2013

2013



2011

2011



20 10

2010



2009

2009



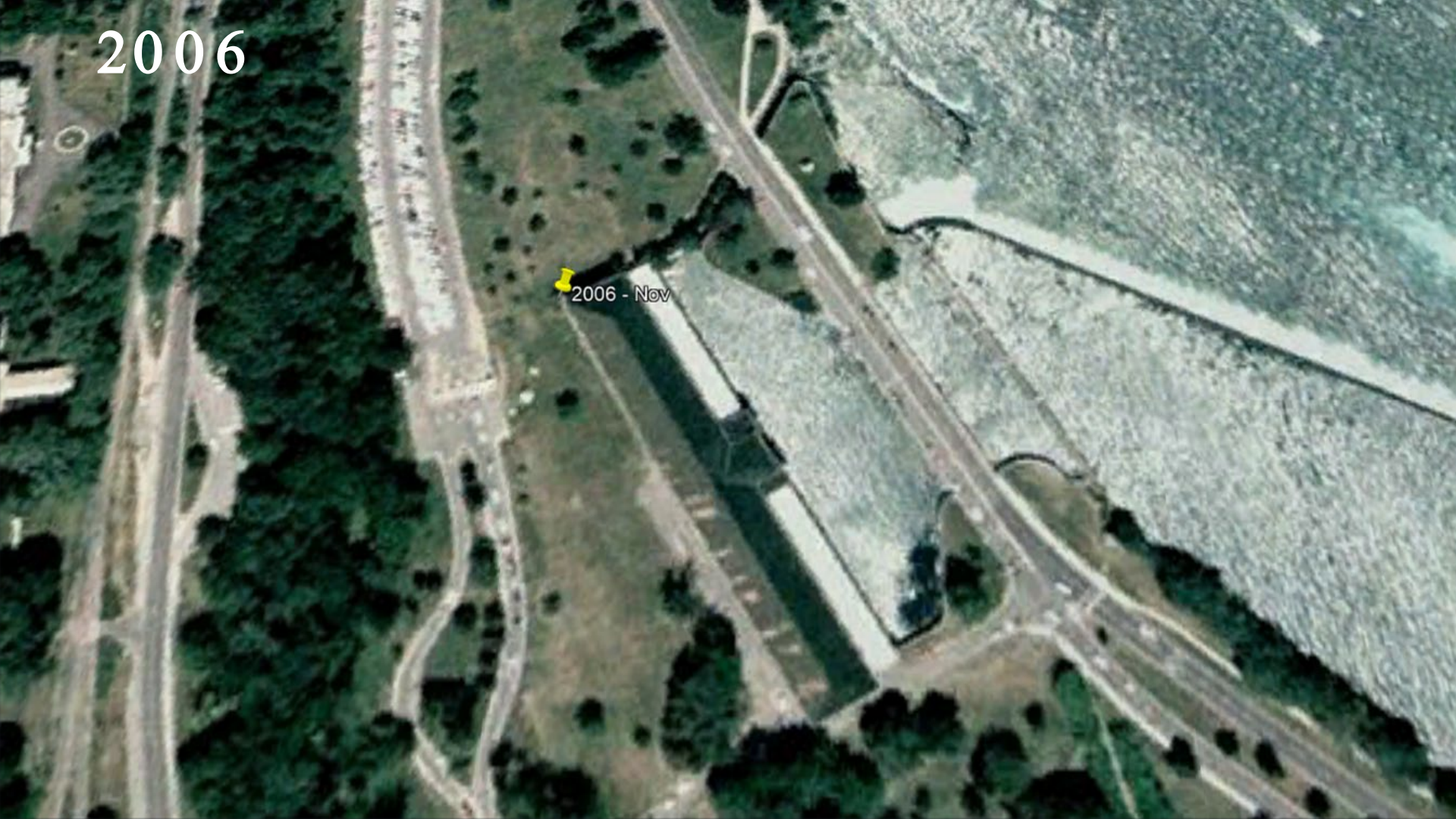
2006

2006 - Apr



2006

2006 - Nov



2005

2005



2002

2002



1995

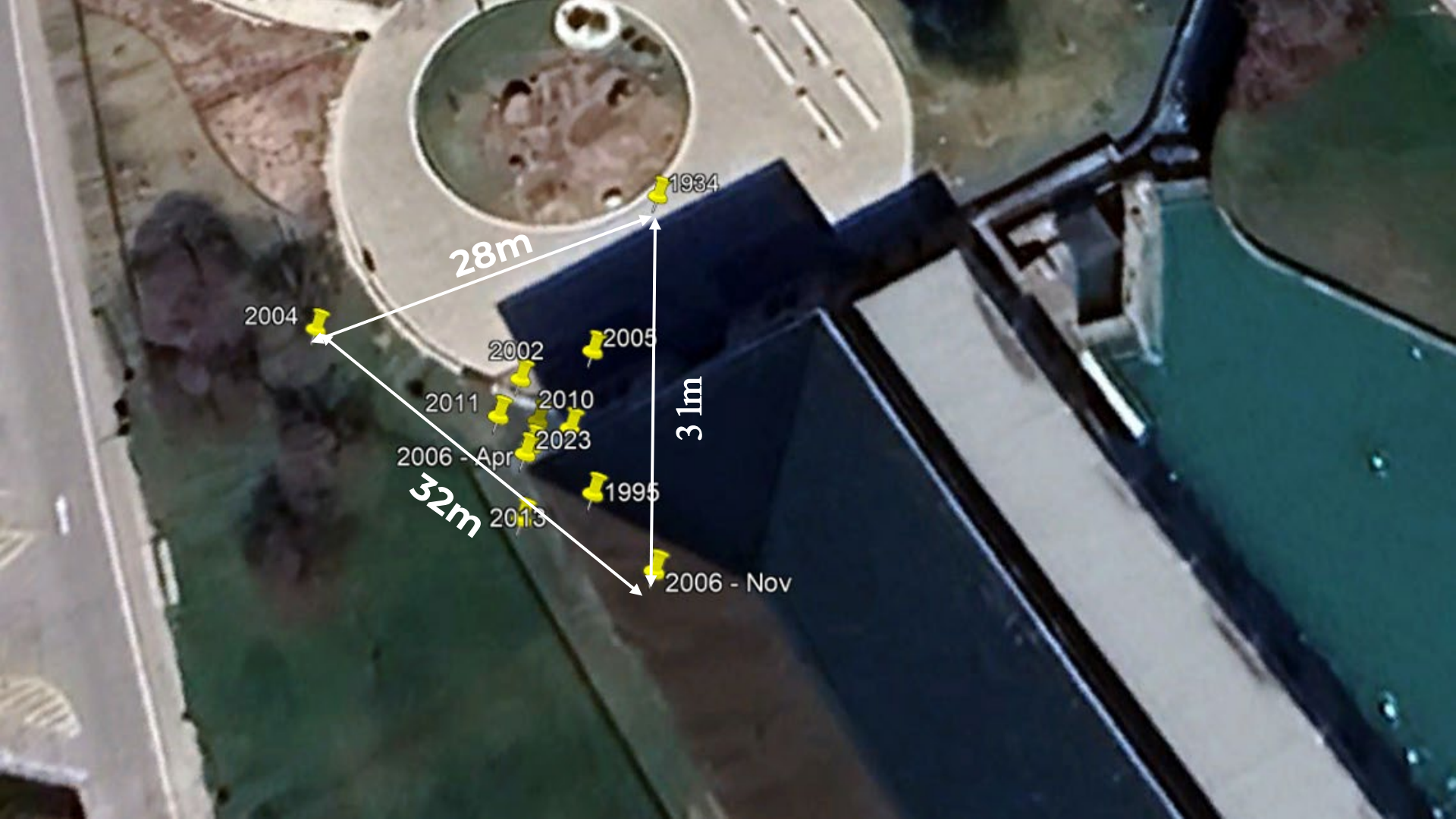
1995



1934

1934





1934

28m

2004

2002

2005

2011

2010

2006 - Apr

2023

31m

32m

2013

1995

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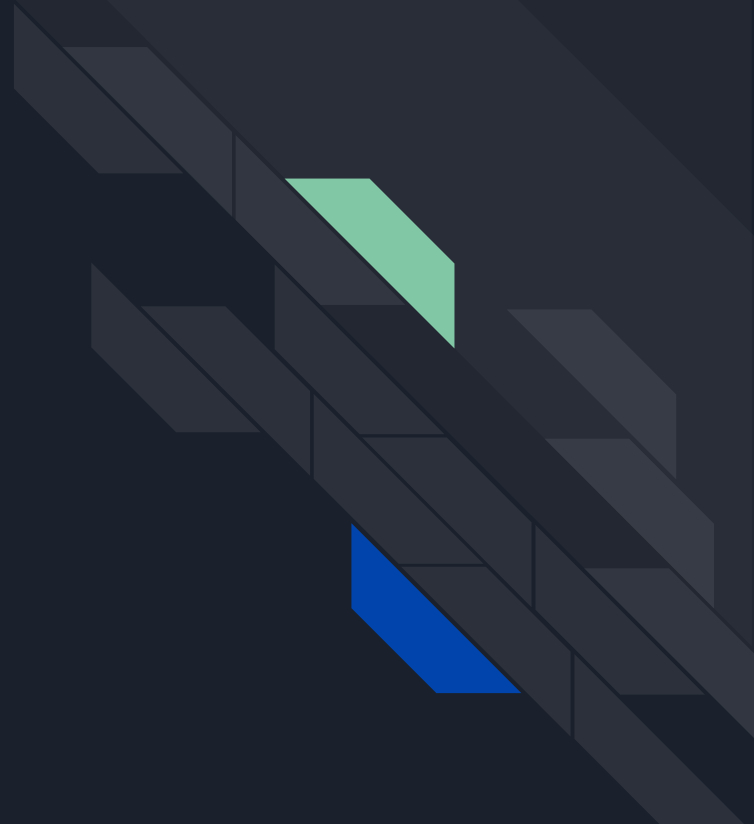
GIS Principles and Use in Infrastructure and Asset Management



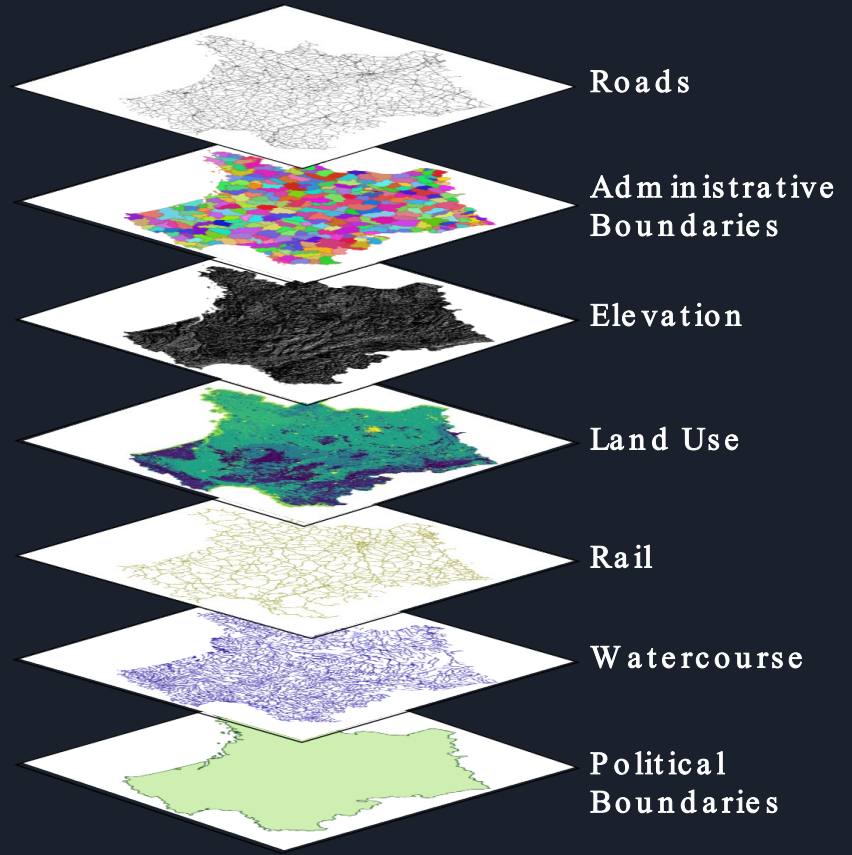
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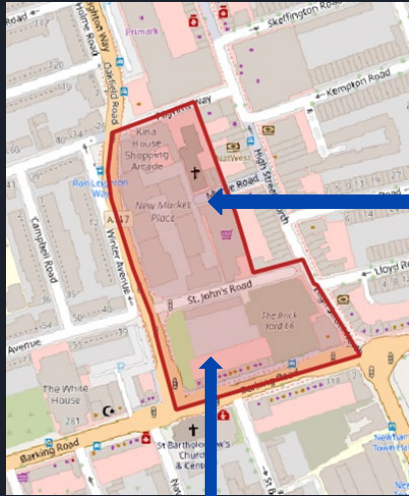
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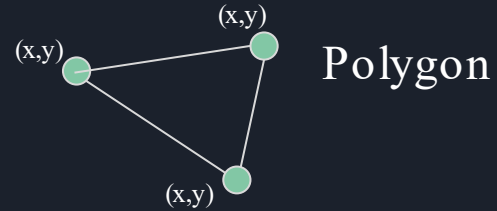
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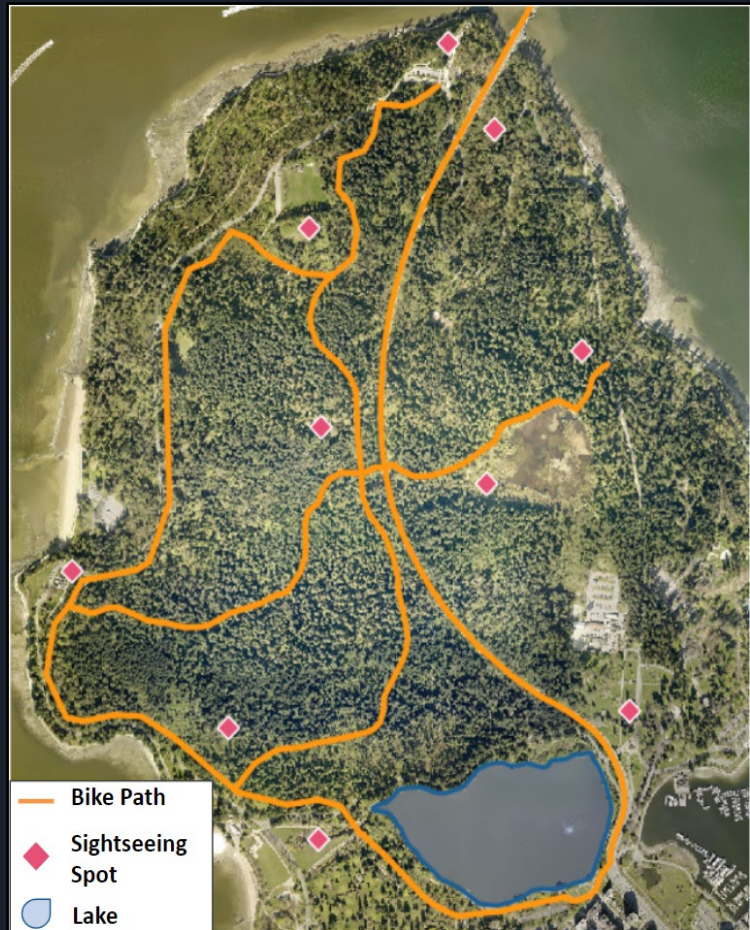
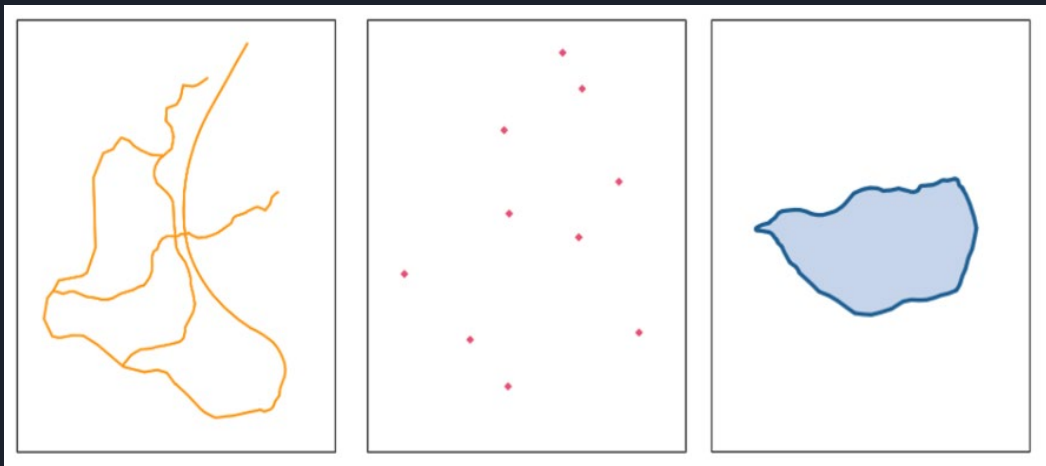
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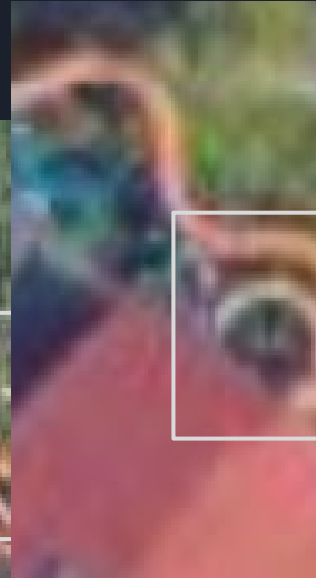
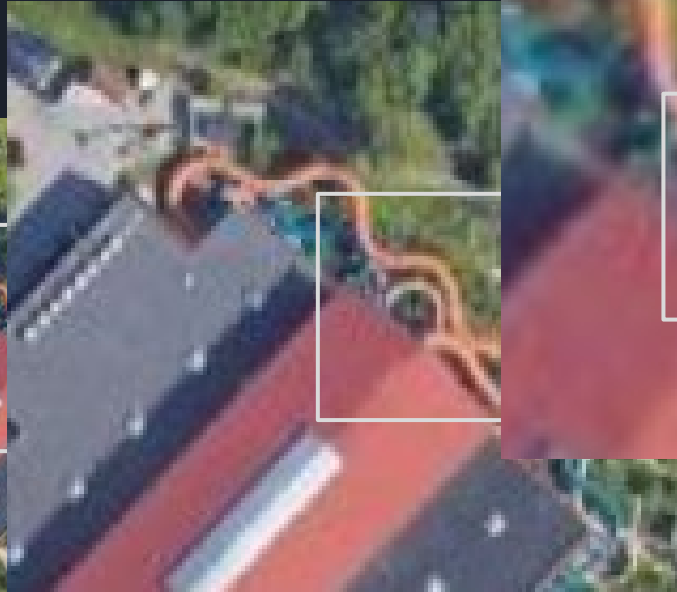
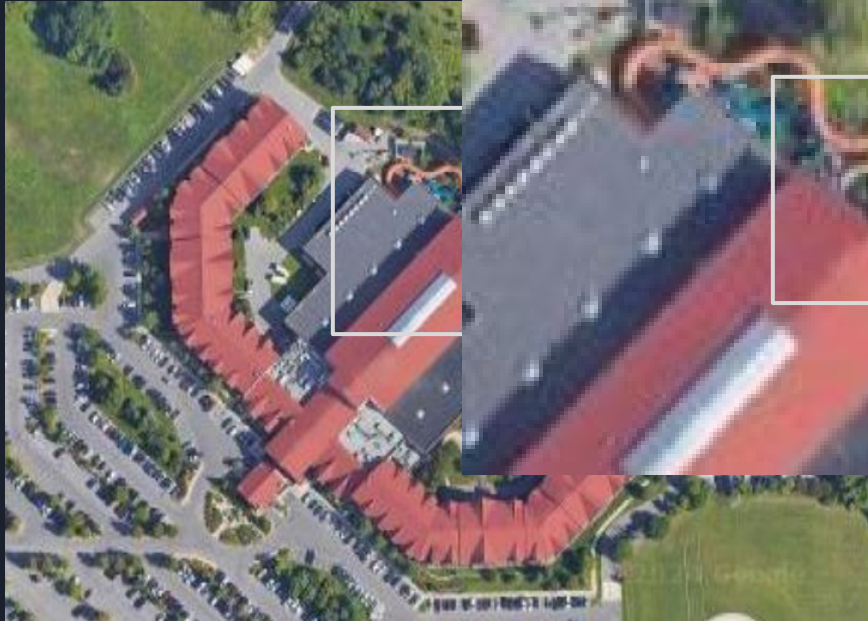
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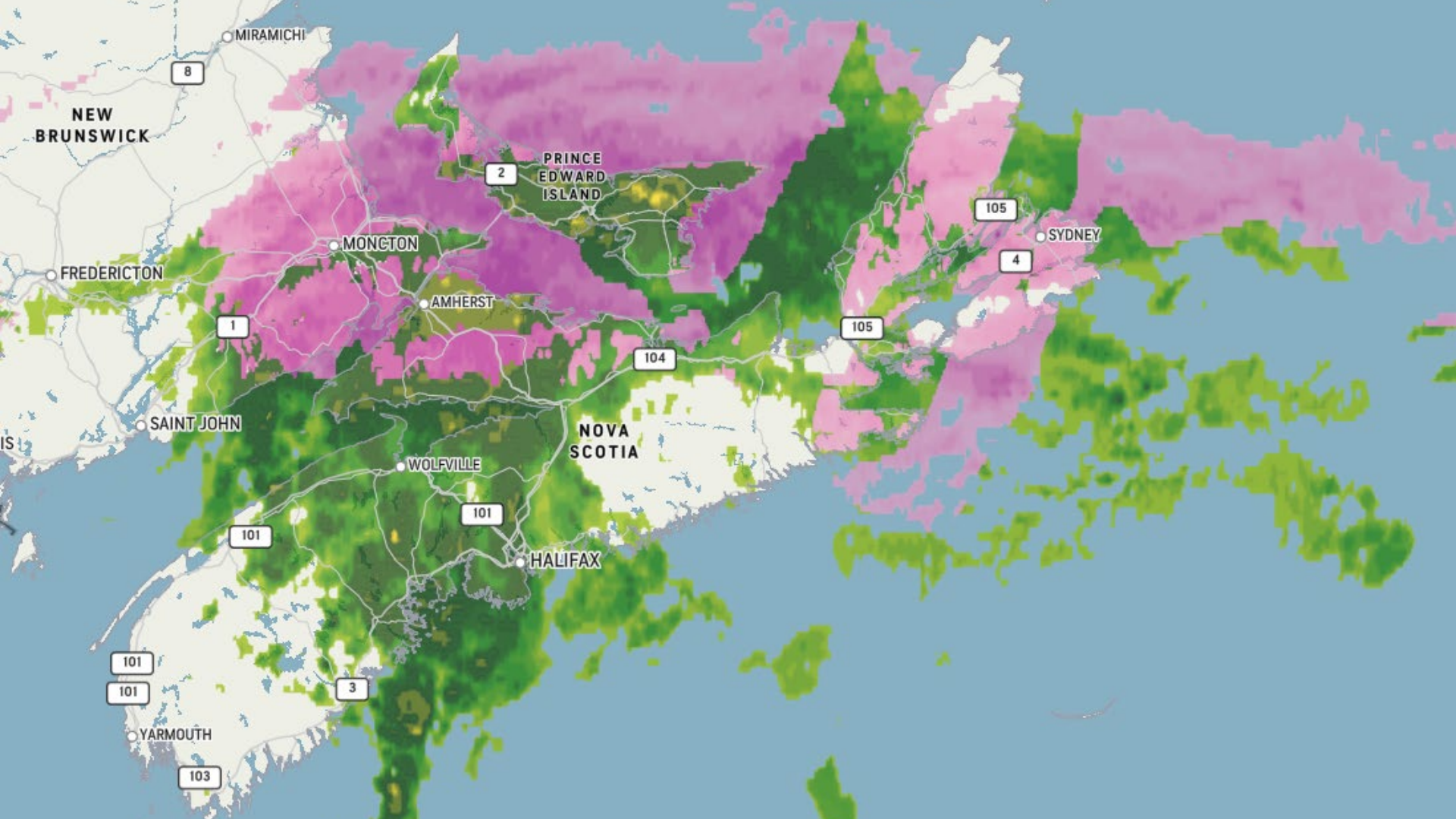


Vector Data



Raster - Basemaps





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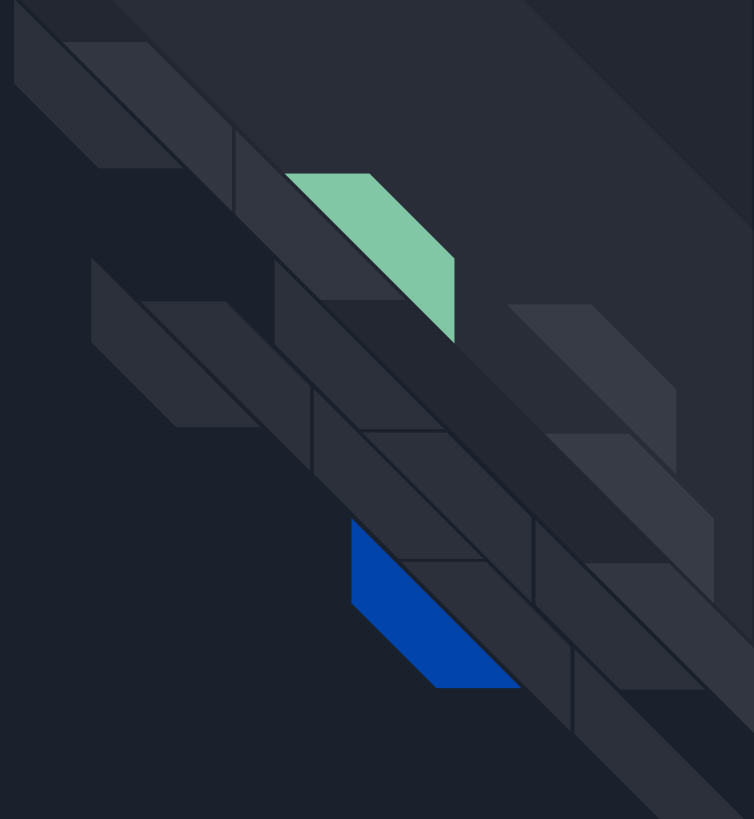
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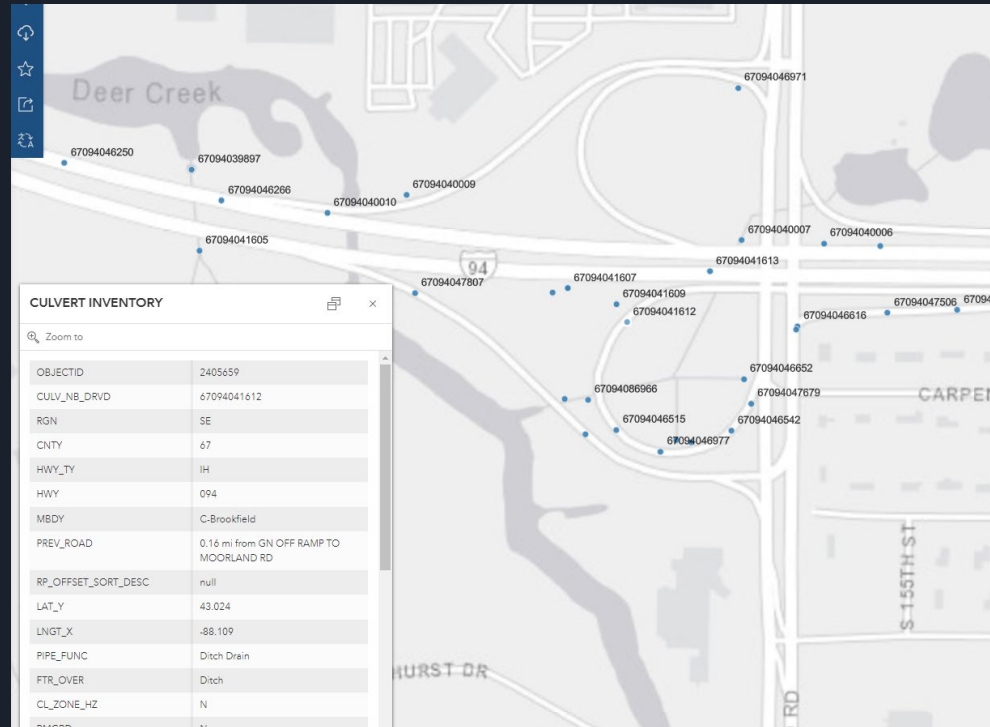


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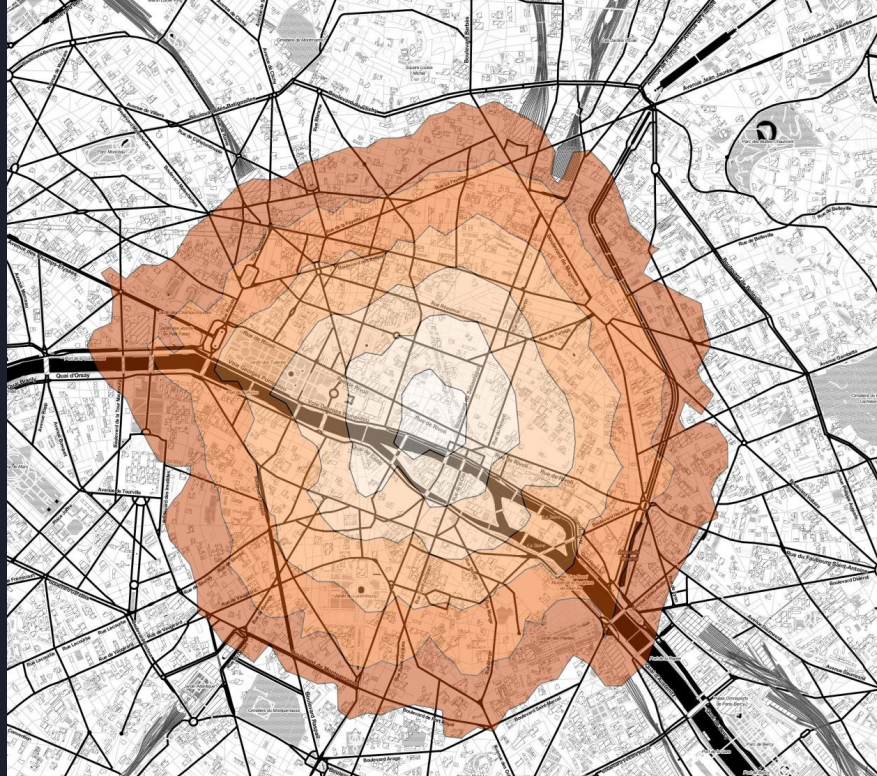


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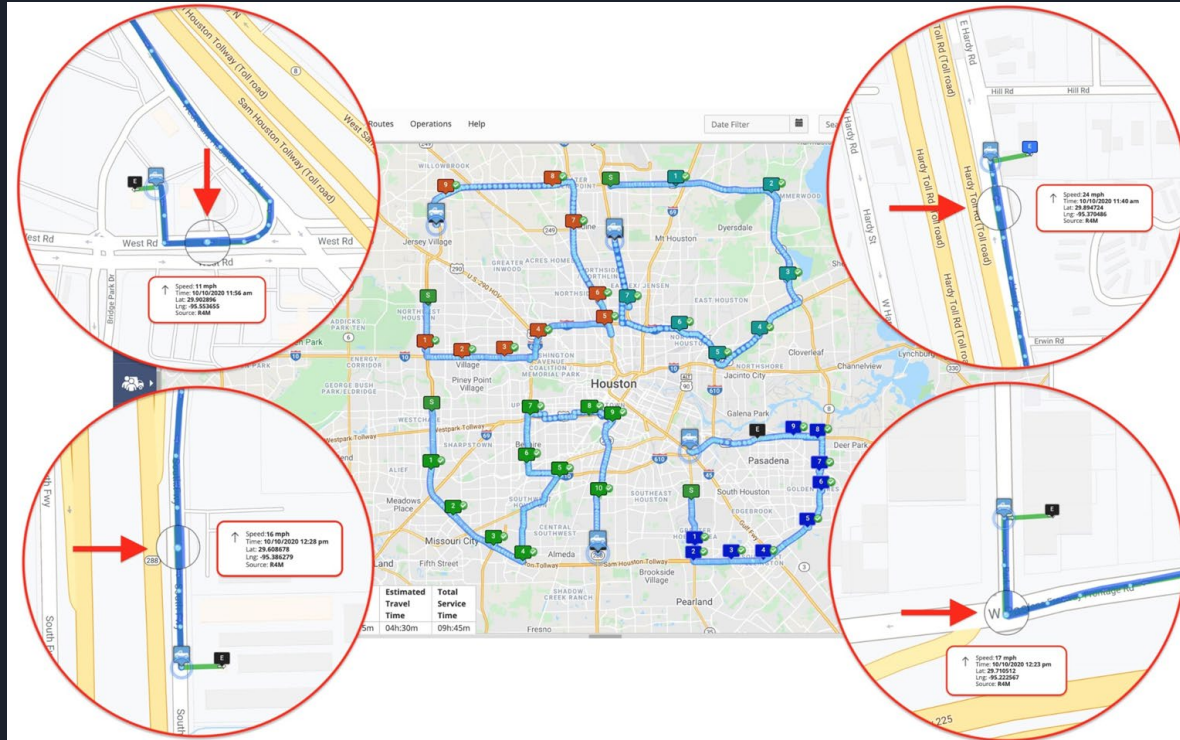


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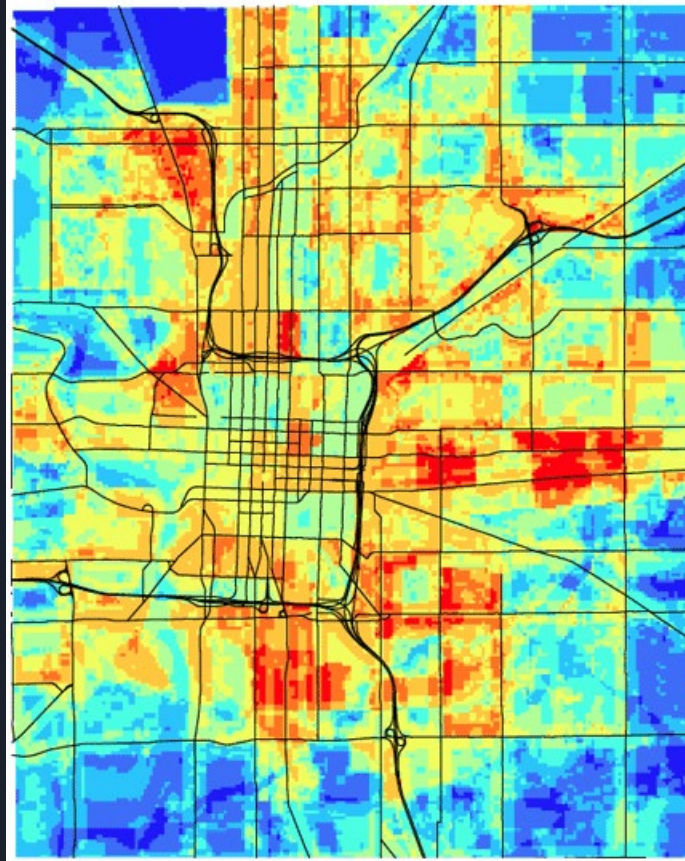
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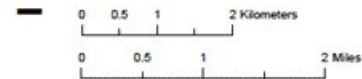
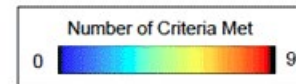
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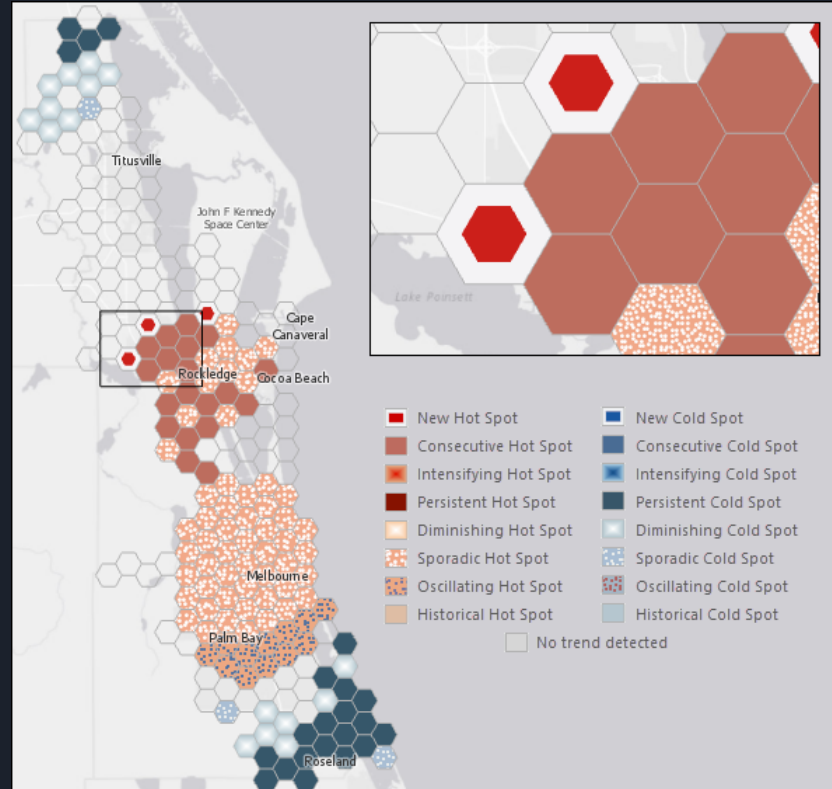
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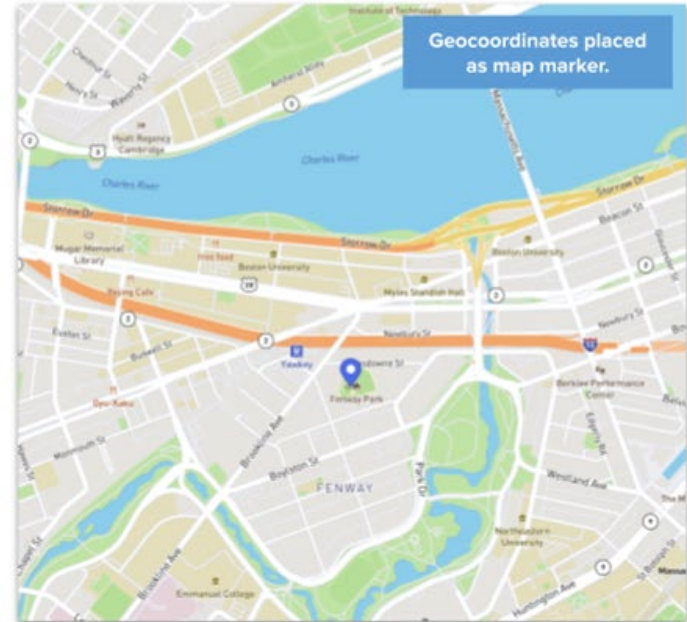
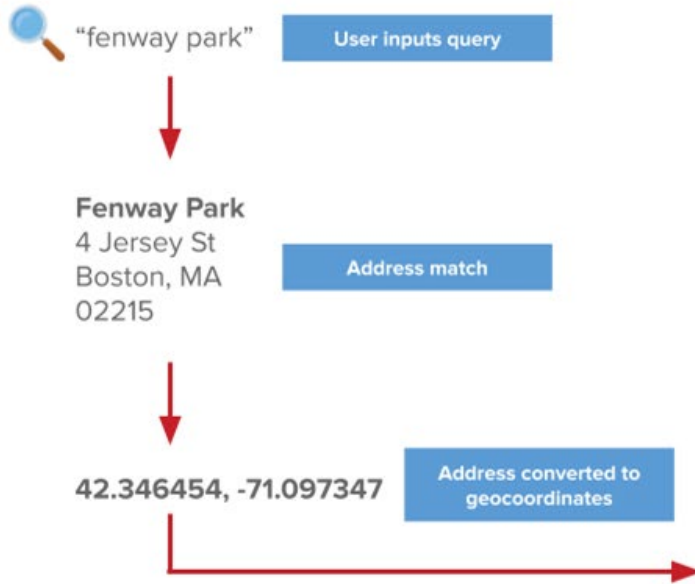
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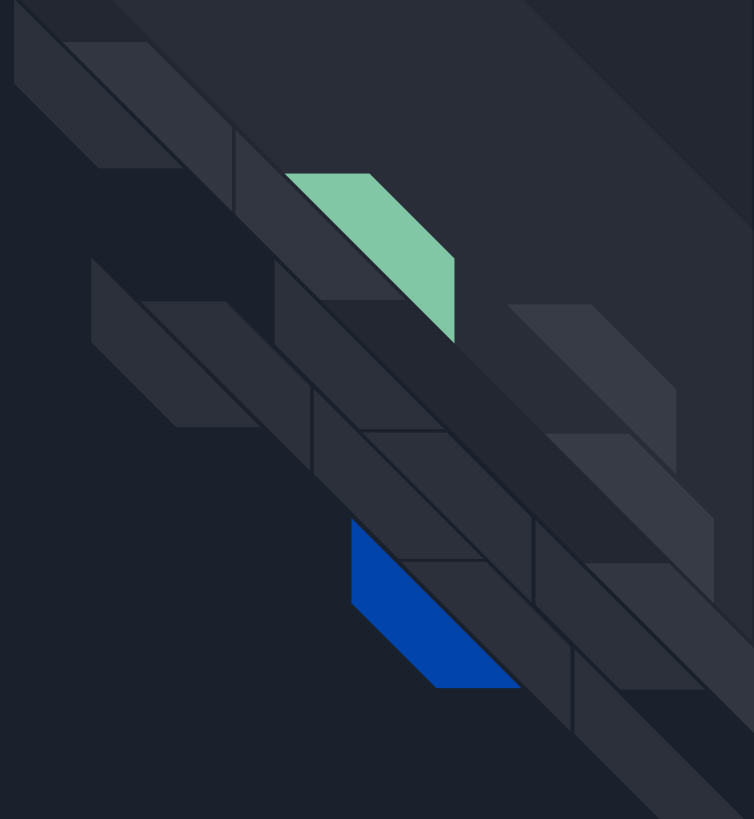


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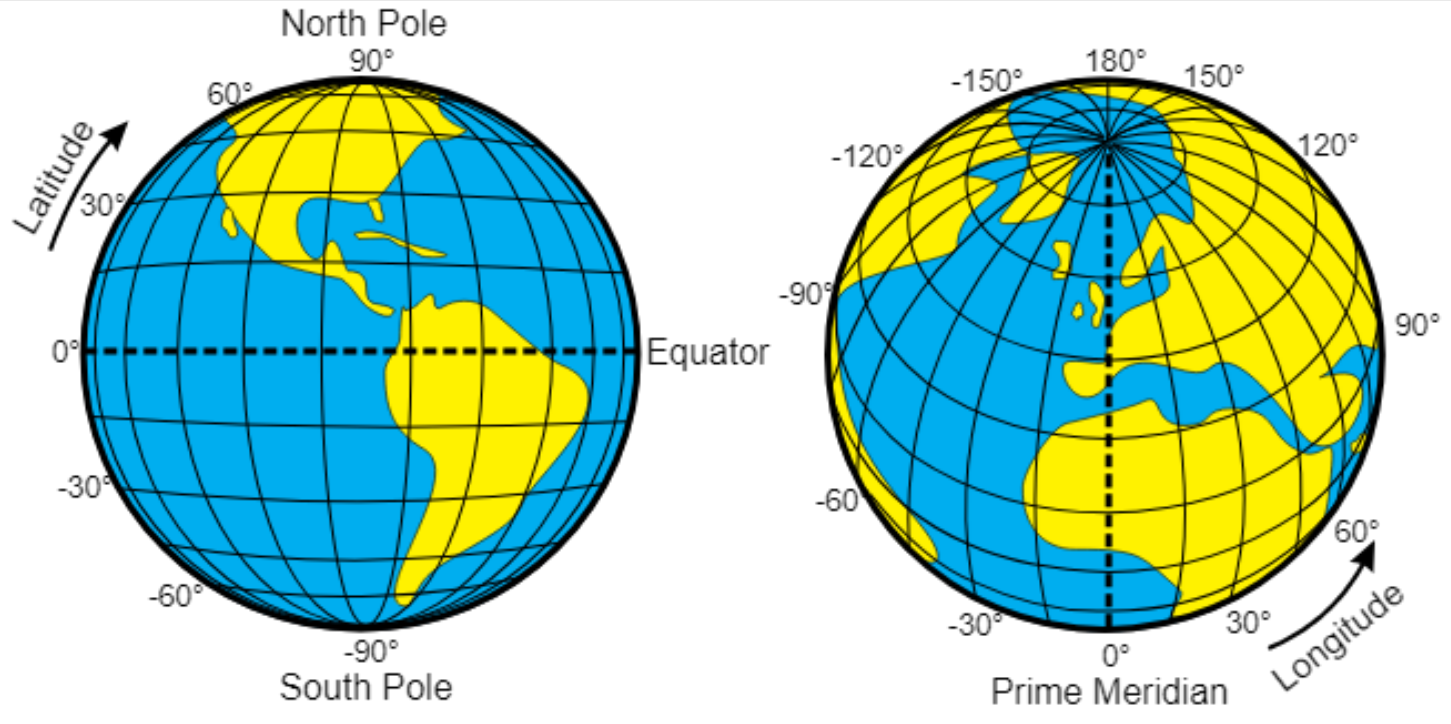


Niagara Parks Power Station

Coordinates & Systems



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UTM Zone 17 North

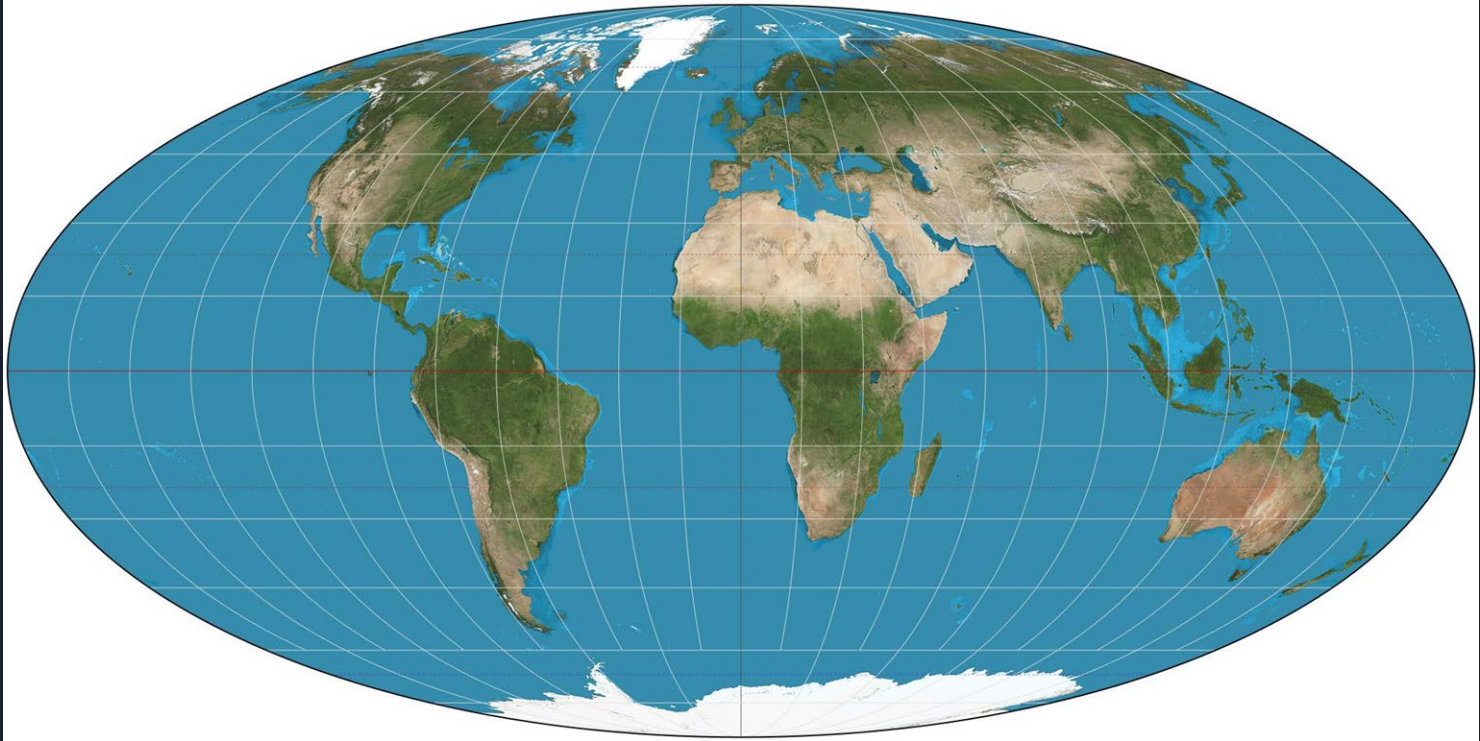
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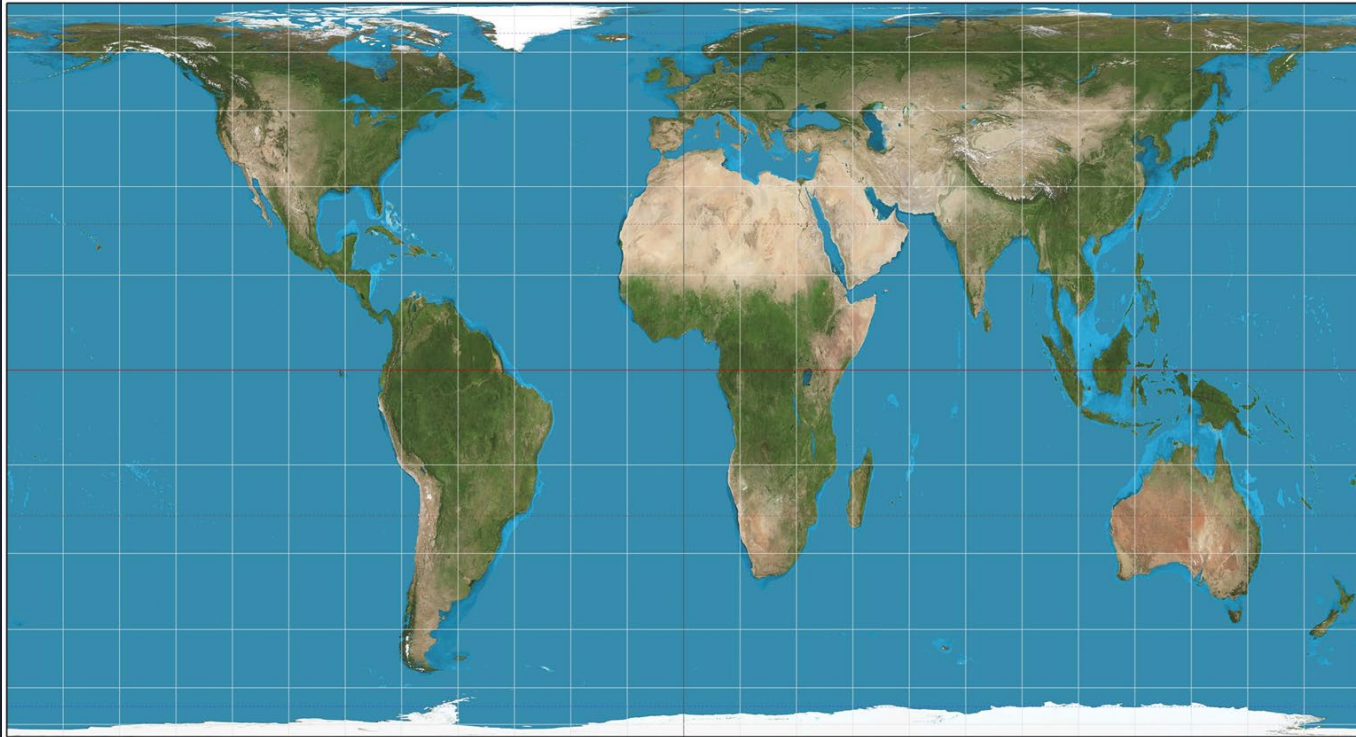
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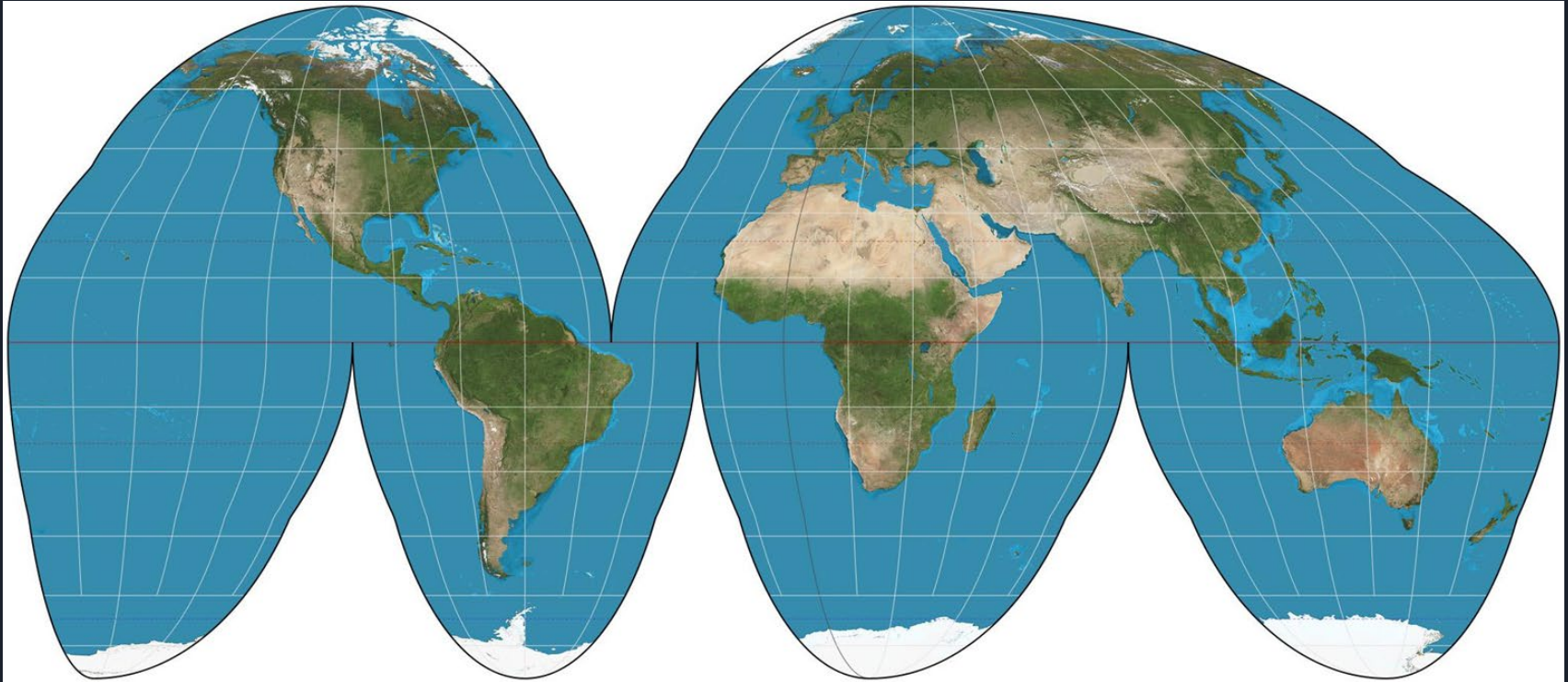
Coordinate Systems

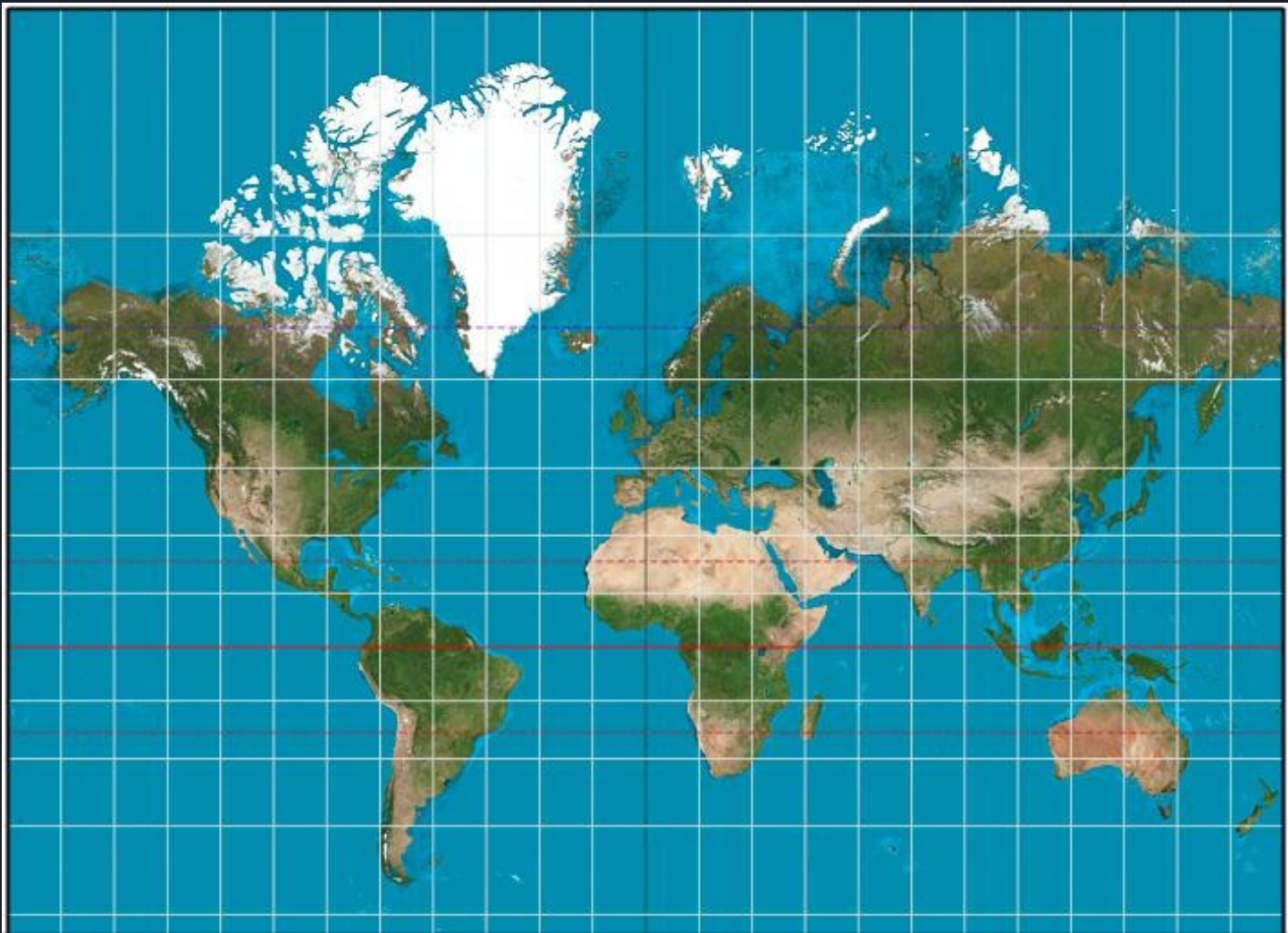


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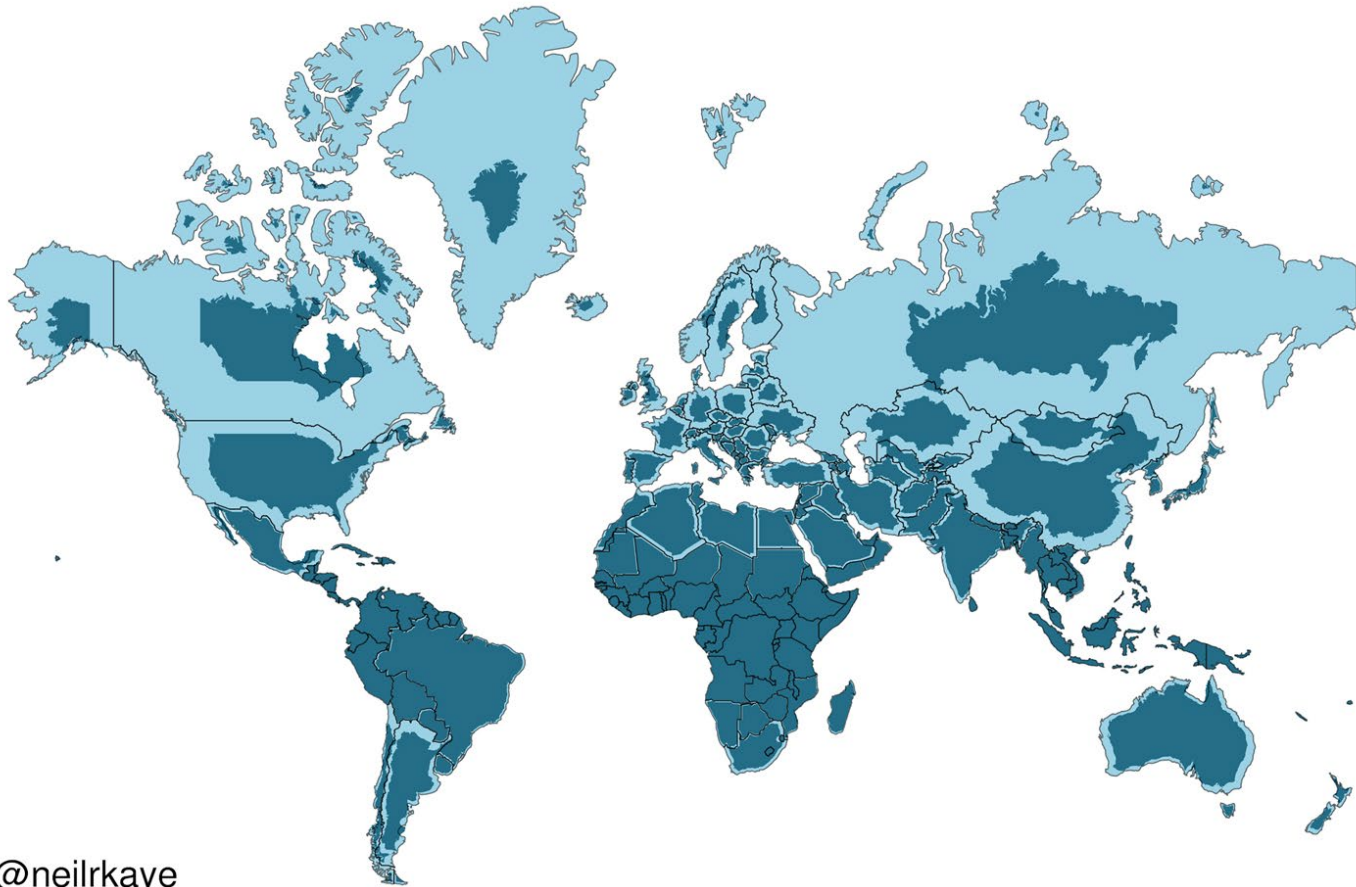


Coordinate Systems





World Mercator projection with true country size added



@neilrkaye



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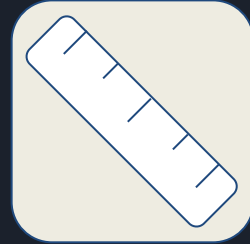
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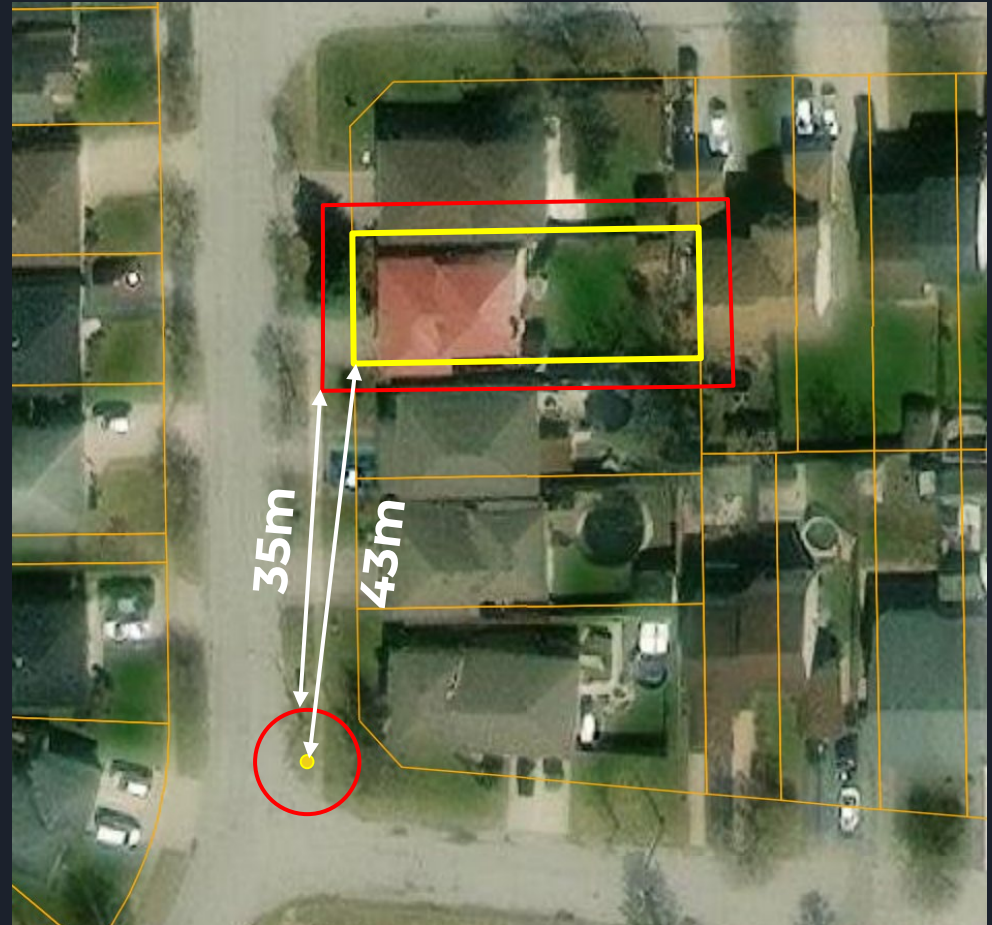
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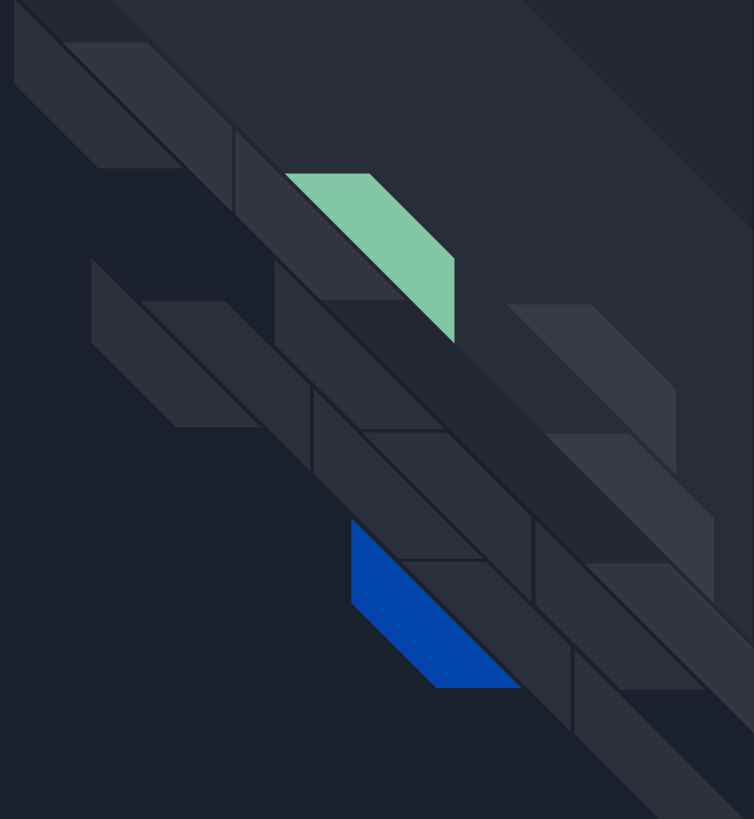


Measuring

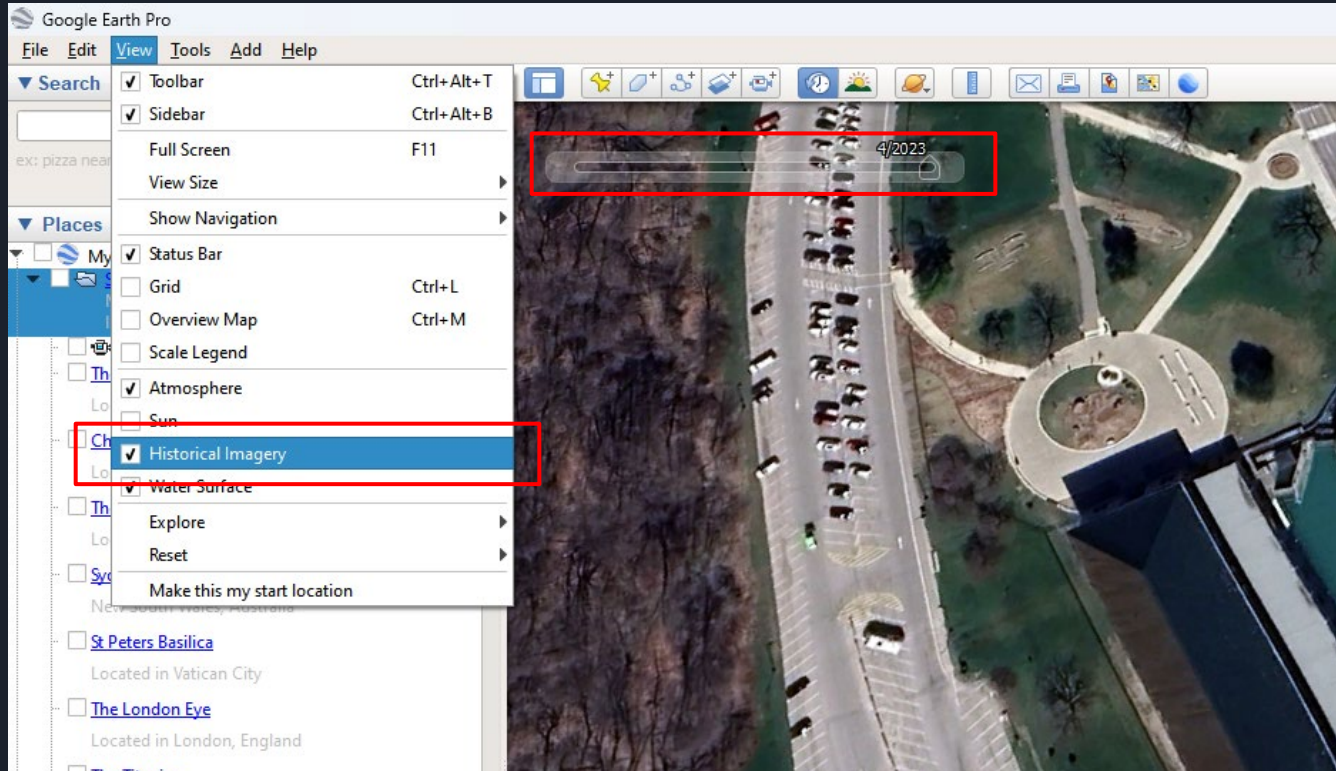
- Parcel and Imagery don't align (~3m?)
- Hydrant picked up with phone GPS (~5m?)



ArcGIS Online



Google Earth Historical Imagery



2023

2023



2013

2013



2011

2011



20 10

2010



2009

2009



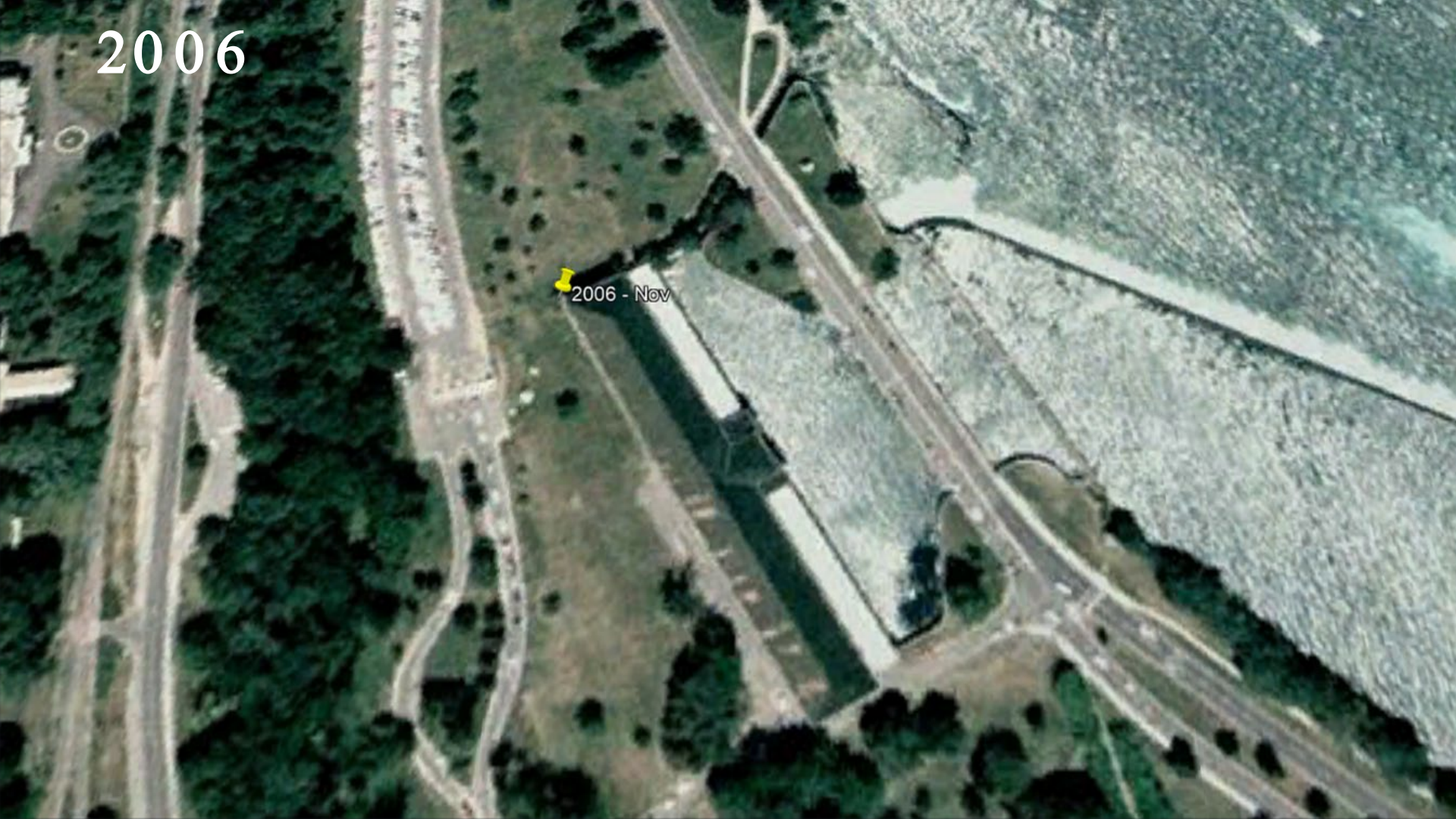
2006

2006 - Apr



2006

2006 - Nov



2005

2005



2002

2002



1995

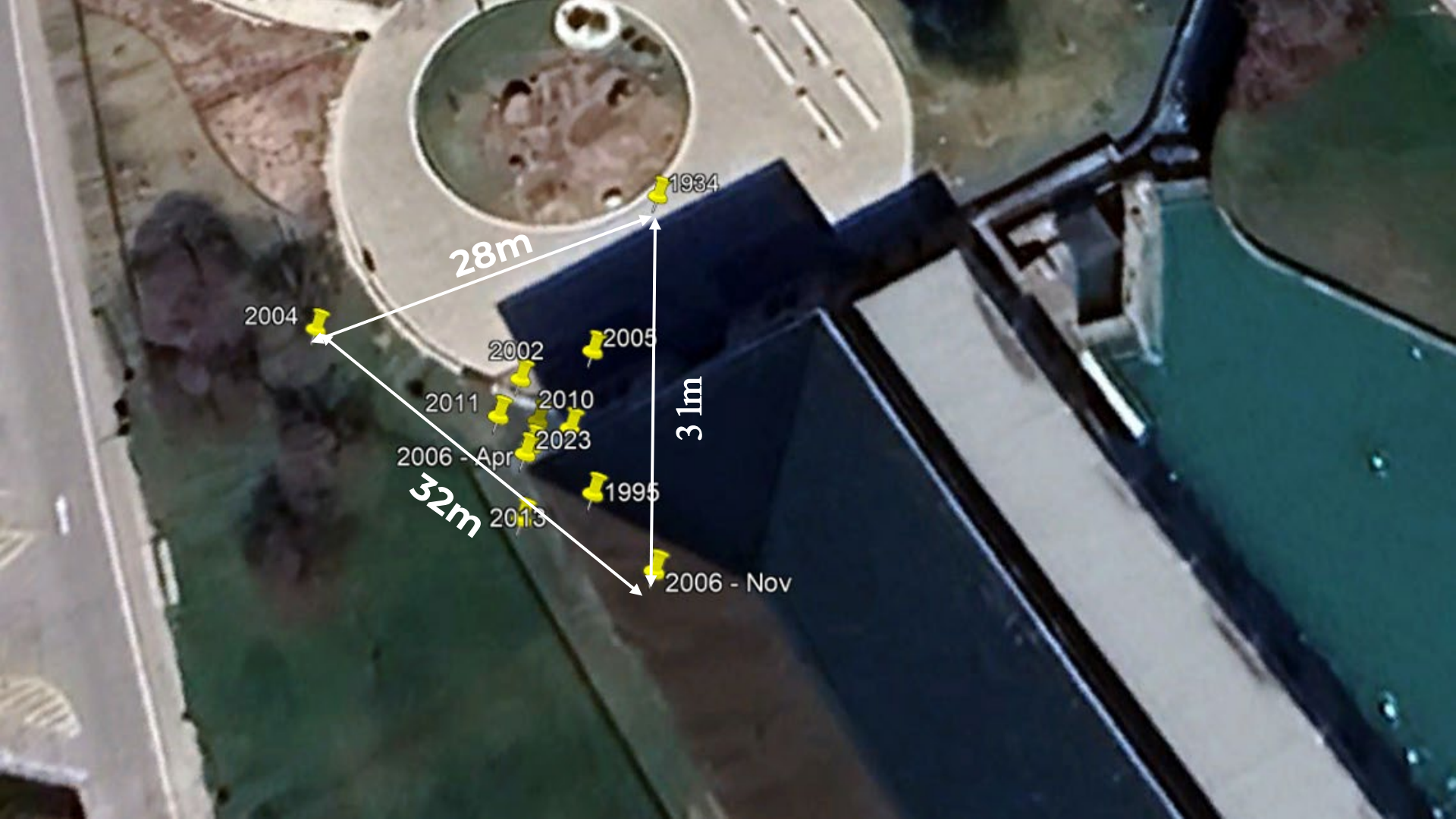
1995



1934

1934





1934

28m

2004

2002

2005

2011

2010

2006 - Apr

2023

31m

32m

2013

1995

2006 - Nov



GIS Principles and Use in Infrastructure and Asset Management