

# COMBINING ANALYSIS AND DESIGN FOR MULTIMODAL ARTERIALS

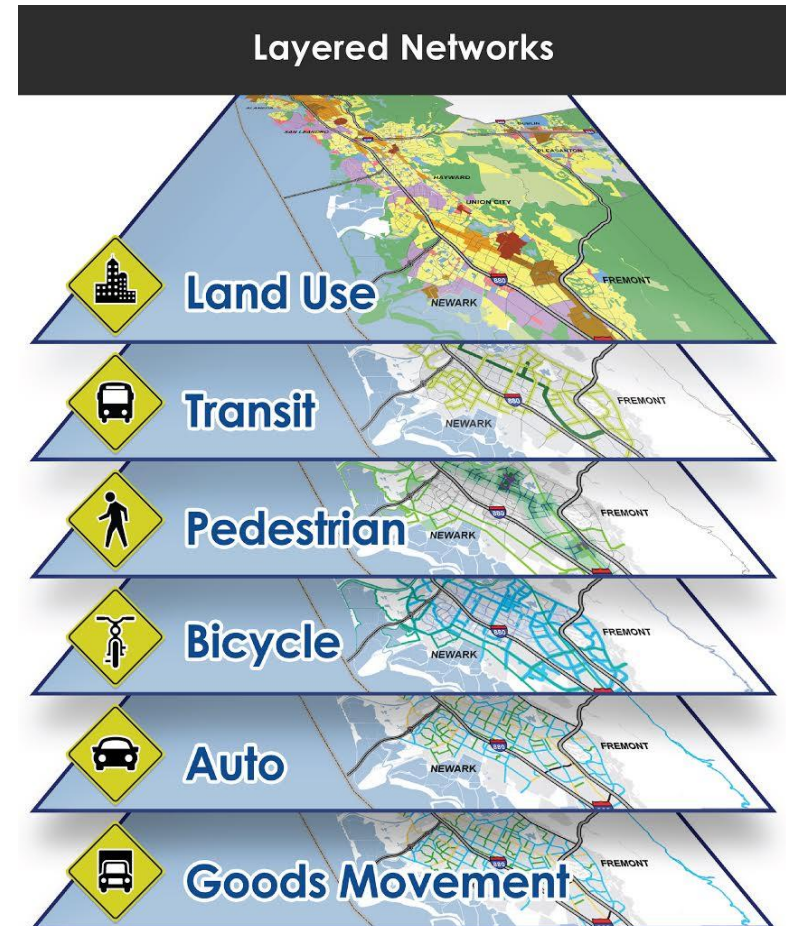
DAVID WASSERMAN

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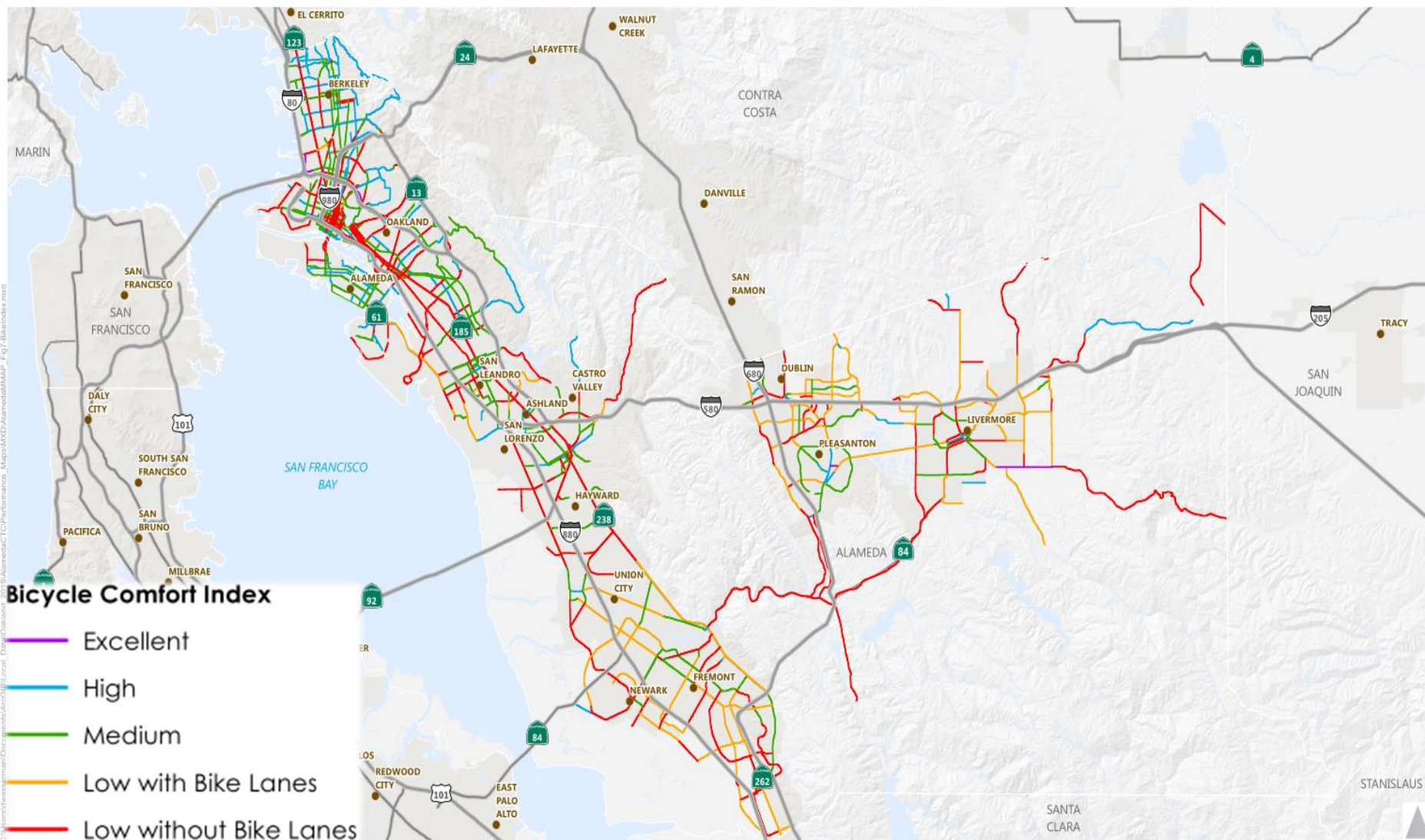


# Layered Analysis

- Performance metrics evaluated transportation conditions for the following scenarios:
  - Existing Conditions
  - 2020 Conditions
  - 2040 Conditions
  - 2040 Connected Vehicles
  - 2040 Demographic Change



# Bicycle Level of Traffic Stress



# Modal Priority

Land Use  
Context Type



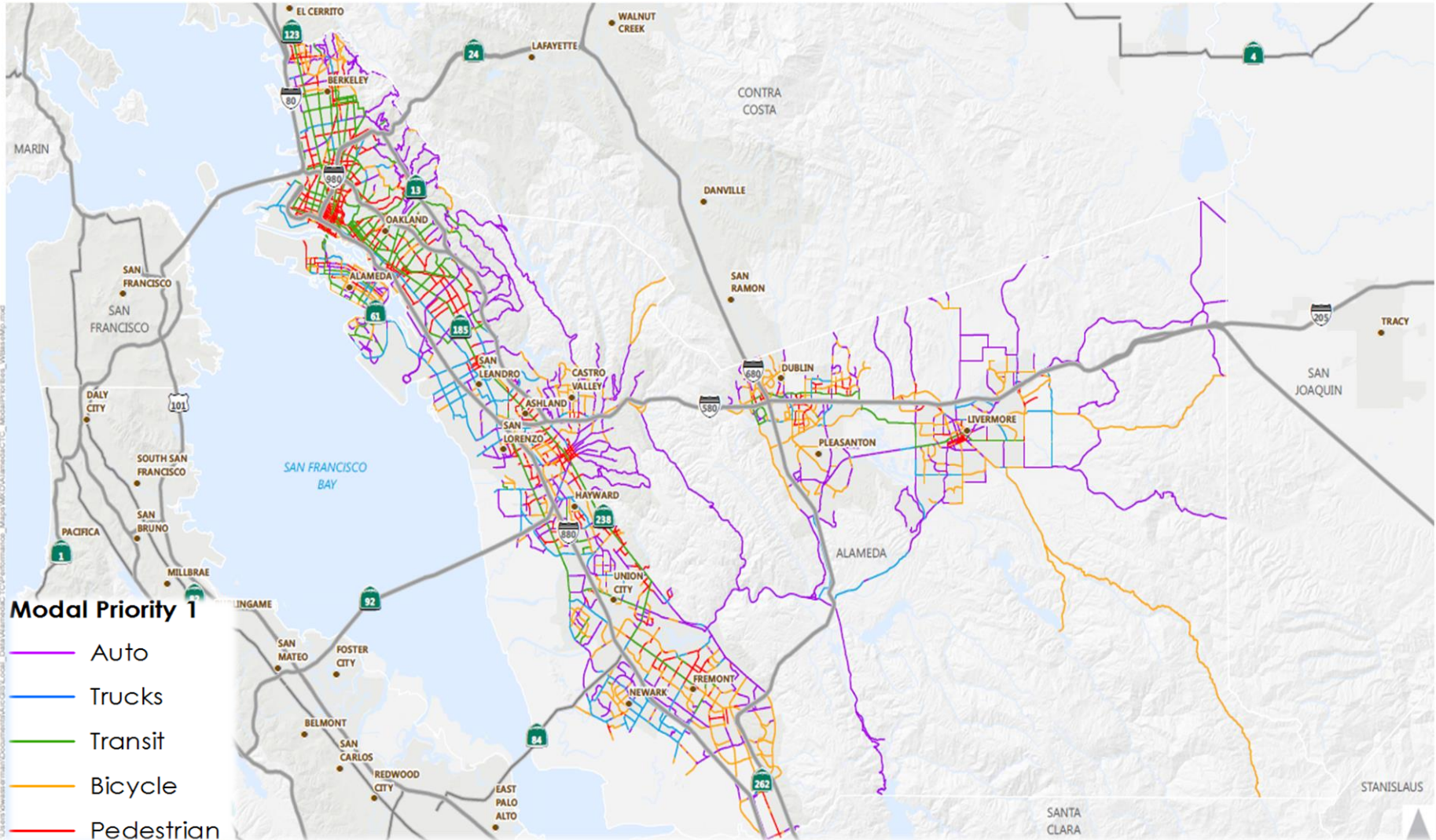
Auto Function



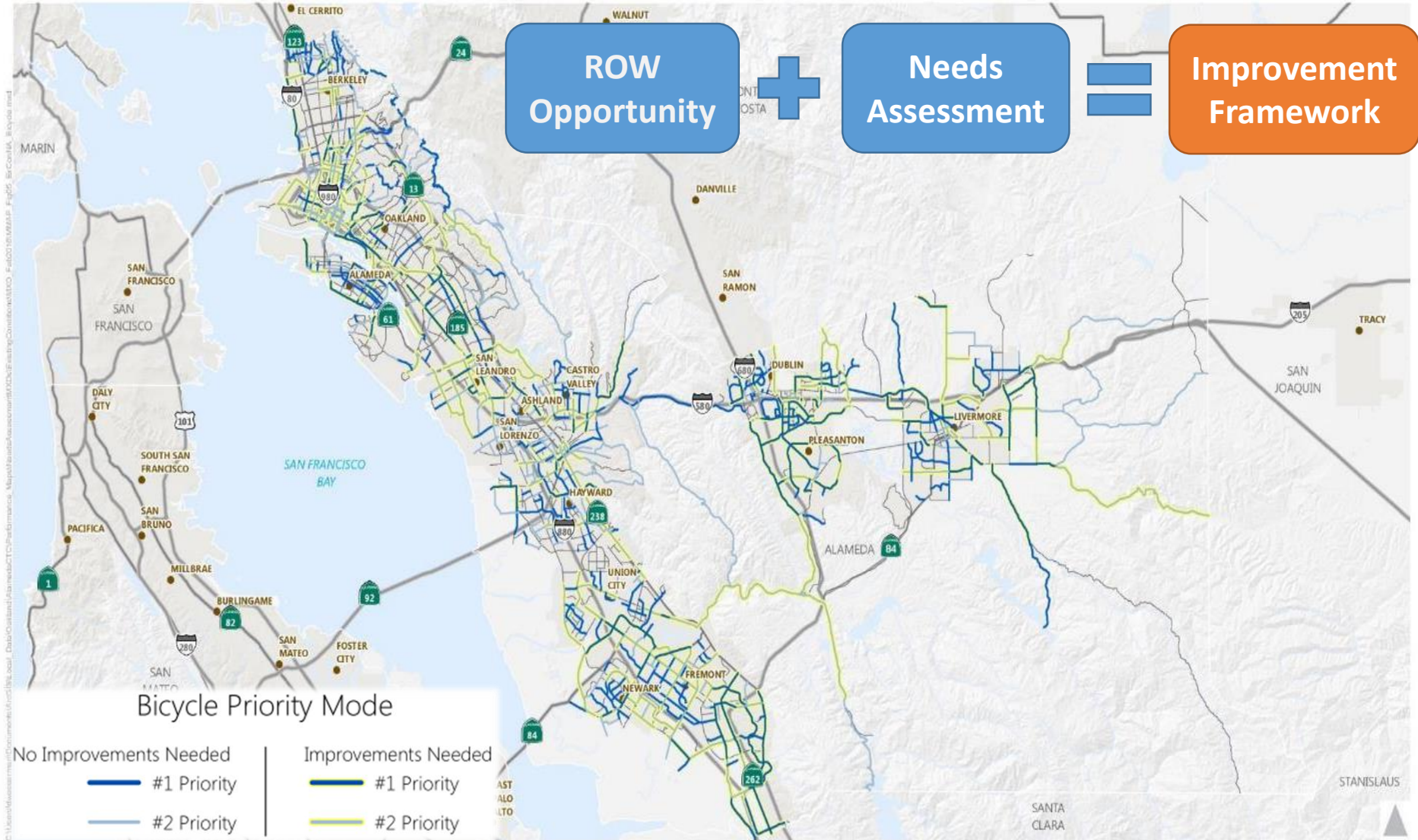
Multimodal  
Function



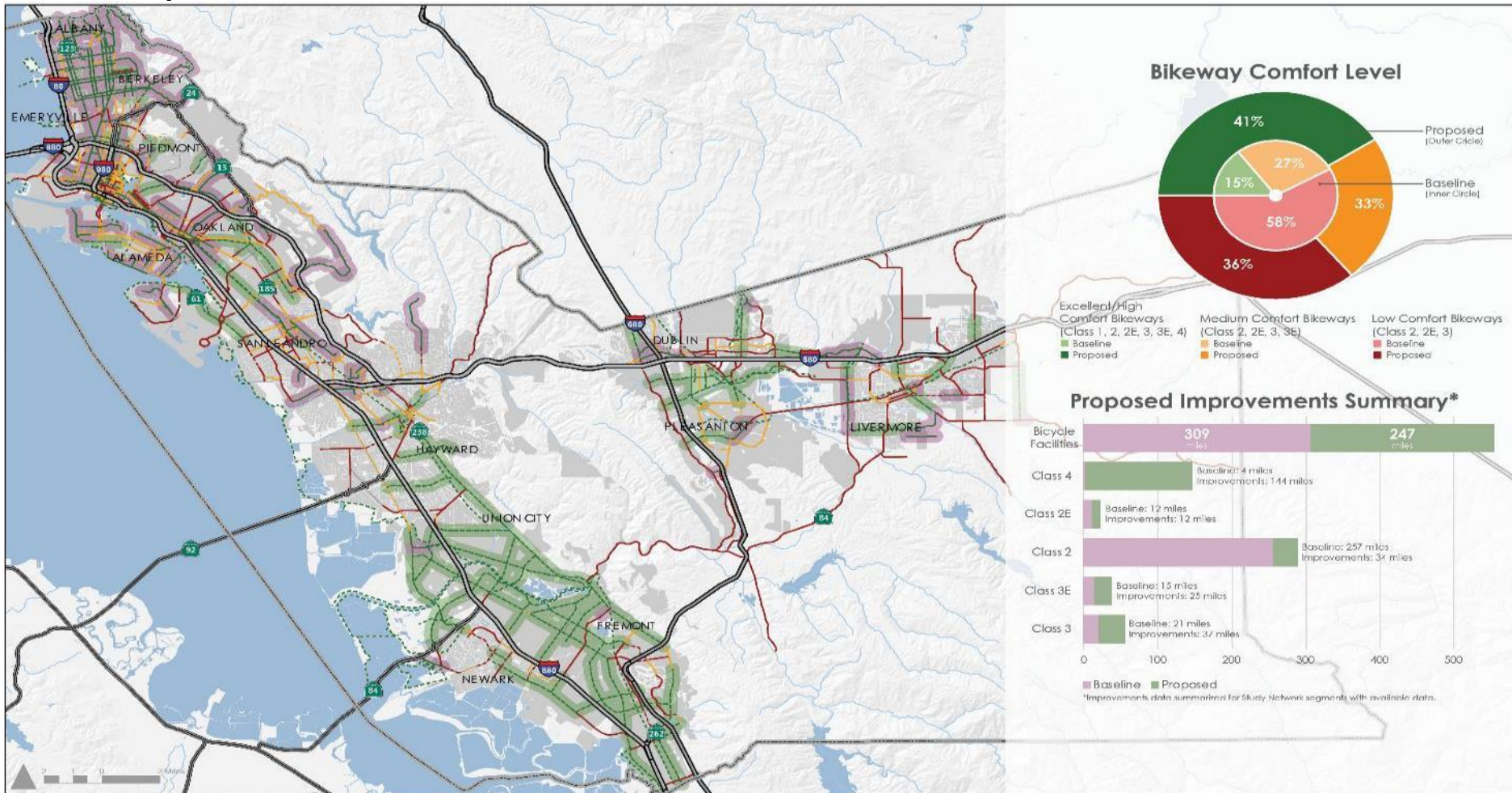
Modal Priorities



# Existing Bicycle Needs Assessments



# Bicycle Needs After Improvements

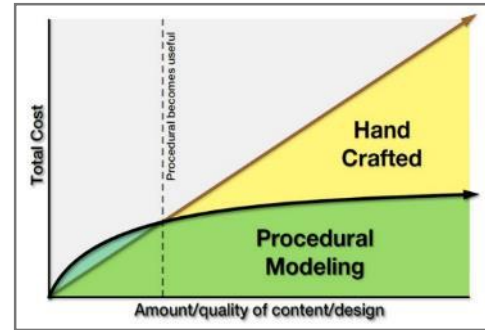


## Legend: Baseline & Proposed Bicycle Comfort Index Network

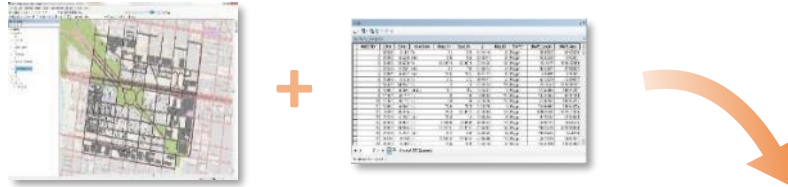
- Excellent/High Comfort Baseline
- Low Comfort Baseline
- Baseline Excellent/High Comfort Influence Area
- Excellent/High Comfort Proposed
- Low Comfort Proposed
- Proposed Excellent/High Comfort Influence Area
- Medium Comfort Baseline
- Medium Comfort Proposed
- Urban Area

# Application of CityEngine

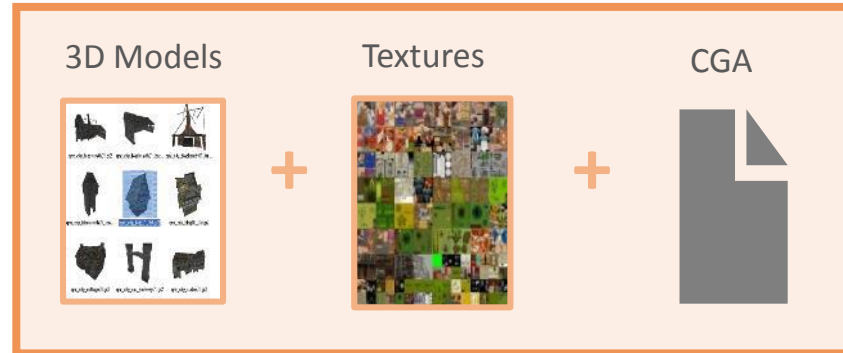
Graphic: ESRI CE Team



## 1. Base Geometry



## 2. Procedural Rules



## 3. Generated 3D Model



Base geometry



Final 3D model

Iterative refinement

# Two 3D Content Paradigms

## City Model Approach

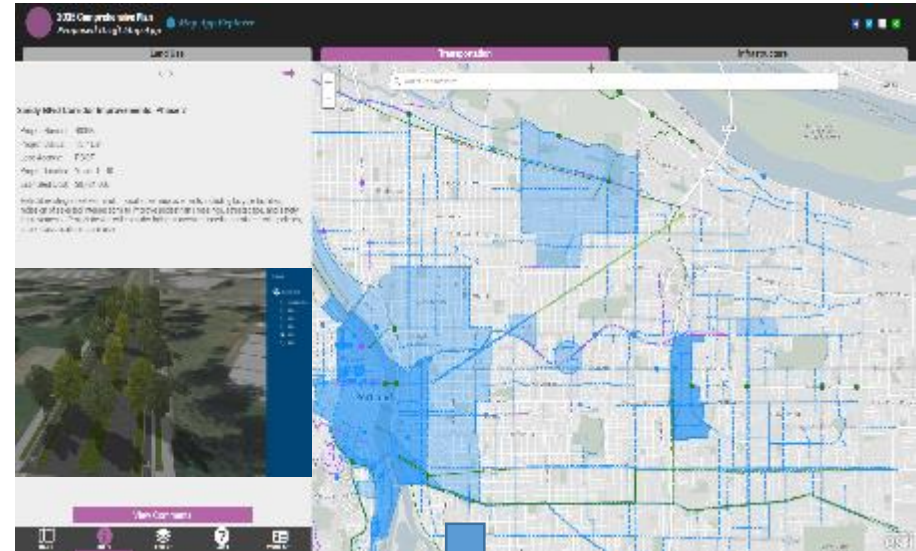


Rochester NY Master Planning

Downloading: 15% (6.34 of 42.46 MB)

[Details](#)

## Record Based Approach



# Complete Street Rule

Diversity of Street Types



Visualization

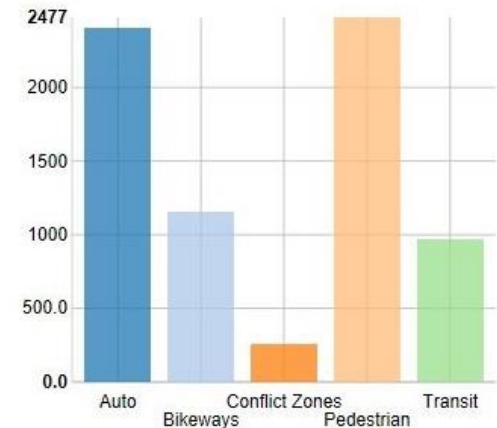


Customization



Mode Area (m<sup>2</sup>)

Analytics

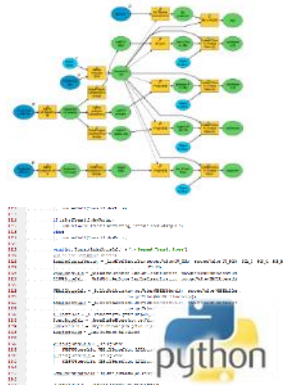


# Process Overview

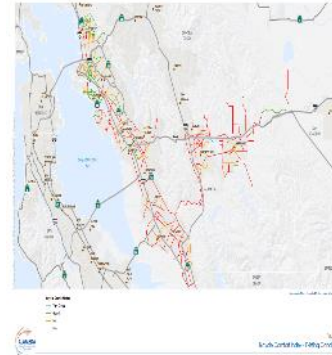
- Data Informed Design:

1. Modal Priority + Improvements + Analysis
2. Geodesign Toolkit Attributes Line Segments
3. GIS Tool translates attributes into 3D models of cross sections.

GIS Analysis



Improvements & Attribution



3D Models



Textures

+



CGA

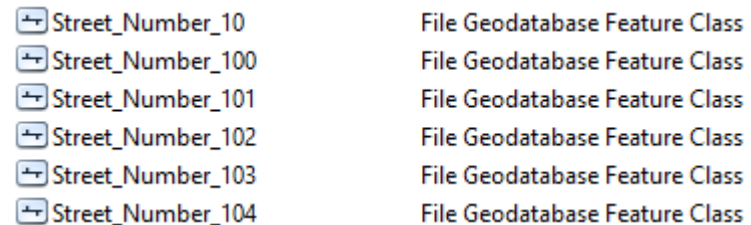
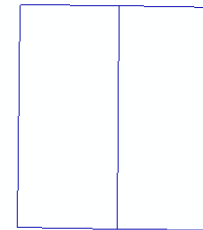
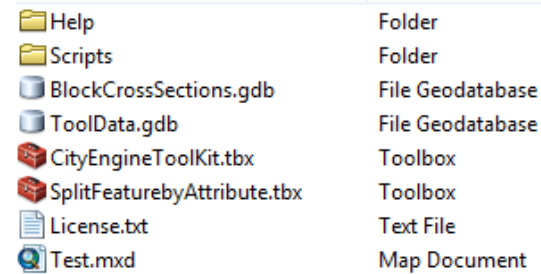
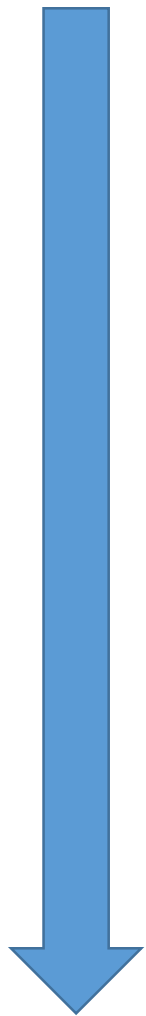


Data Driven Decisions



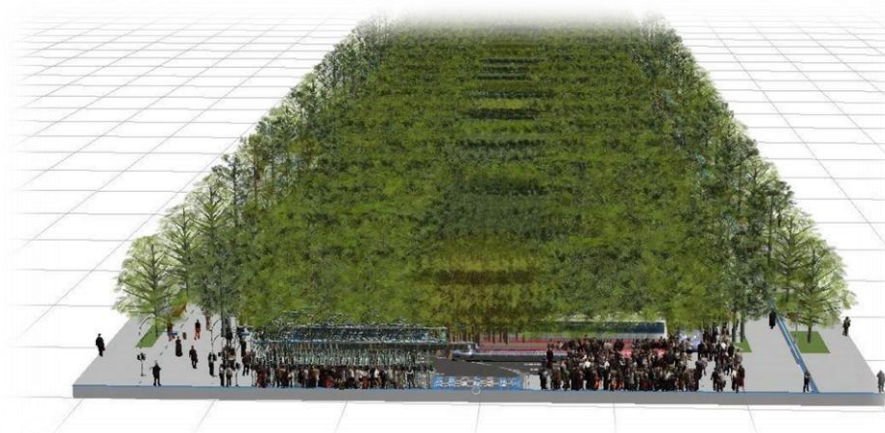
# Geodesign Toolkit Workflow

1. Translator Script
  - Data Model → Street Rule Attributes
2. Geometry Association
  - Record Geometry → Single Line(s)
3. Split Feature Class
  - Records → Individual Feature Classes
  - Future workflow: Improved to skip this step.
4. CE Batch Export Scripts
  - Raw Data → Data Driven Cross Sections



# “Big Content” Challenges

- 900+ Records with CS Data ~ 250 Million Polygons
- Needed “procedural chunking”



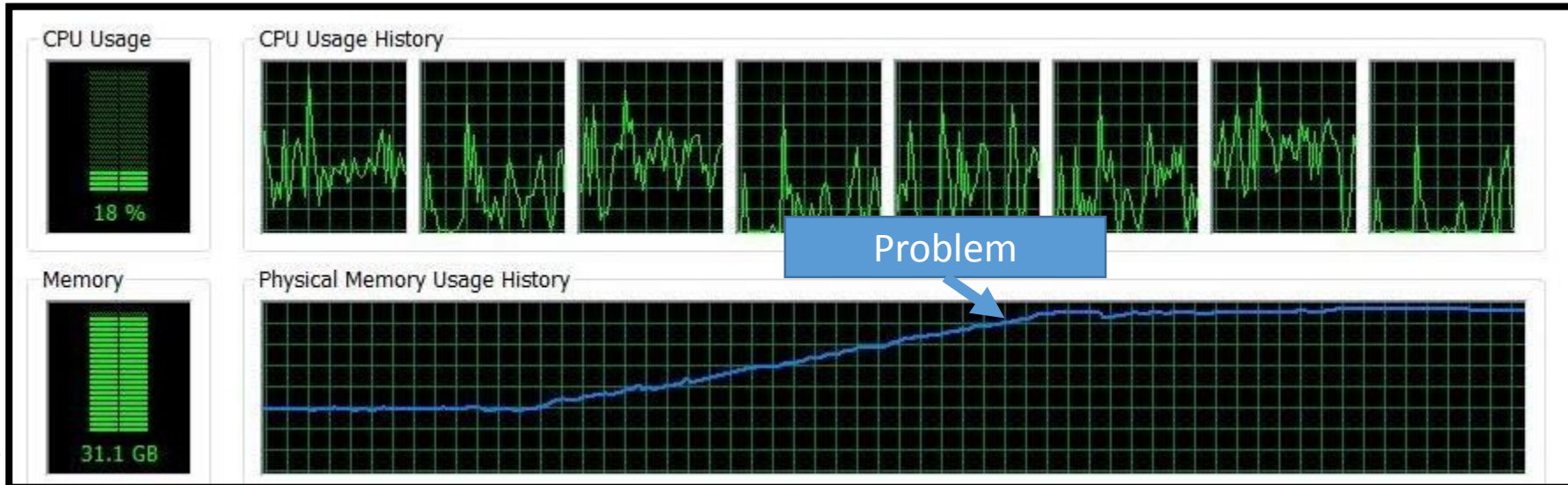
Windows Task Manager

File Options View Help

Applications Processes Services Performance Networking Users

| Image Name     | User Name  | CPU | Memory (P... | Description    |
|----------------|------------|-----|--------------|----------------|
| CityEngine.exe | dwasser... | 95  | 5,299,116 K  | CityEngine ... |

Processes: 140 CPU Usage: 100% Physical Memory: 37%



# Complete Streets @ Scale



## PERFORMANCE MEASURE COMPARISON FOR MISSION BLVD

- Rise of Regional Scale Capabilities
  - 1000+ Infographics
- Scenario based analysis and visualization integration

### BASELINE CONDITIONS



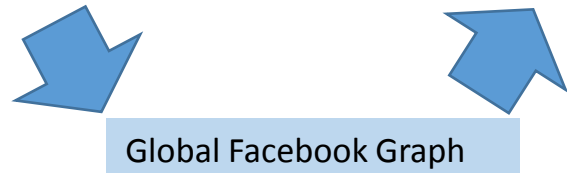
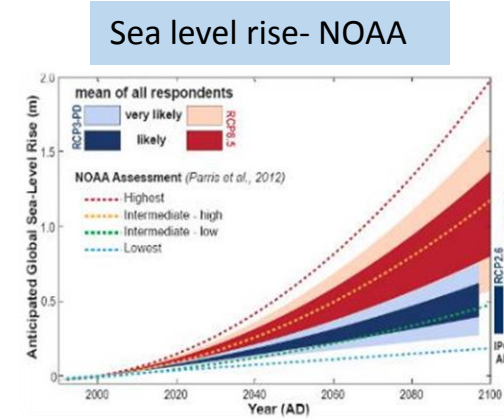
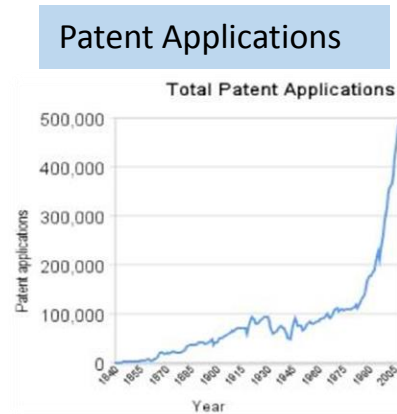
### PROPOSED IMPROVEMENTS



|                              |                        |  |   |  |                        |                              |
|------------------------------|------------------------|--|---|--|------------------------|------------------------------|
| Transit Reliability:<br>0.53 | Congested Speed:<br>11 | Infrastructure Index:<br><b>Very Good</b>              |   | Infrastructure Index:<br><b>Very Good</b>              | Congested Speed:<br>11 | Transit Reliability:<br>0.51 |
|                              | VC Ratio:<br>1.44      | Congested Speed:<br>12                                 |  | Congested Speed:<br>12                                 | VC Ratio:<br>1.44      |                              |
|                              |                        | Bicycle Comfort Index:<br><b>Poor</b>                  |  | Bicycle Comfort Index:<br><b>Very Good</b>             |                        |                              |
|                              |                        | Pedestrian Comfort Index:<br><b>Fair</b> <sub>14</sub> |  | Pedestrian Comfort Index:<br><b>Fair</b> <sub>14</sub> |                        |                              |
|                              |                        | Truck Accomodation Index:<br><b>Very Good</b>          |  | Truck Accomodation Index:<br><b>Very Good</b>          |                        |                              |

# Where are we heading?

- We are moving into a dynamic, interconnected, and uncertain 21<sup>st</sup> Century.
  - Data-hungry adaptive plans and designs.
  - Cooperation among disciplines, stakeholders crucial
  - Budgets are tight; expectations for fast, informed decisions are high; importance of communication is critical.



# Questions?

FEHR & PEERS

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