

GIS & Transportation Planning

Special thanks to Kyle Phillips and Barbara Kent for some of the slides/content.

What is Transportation Planning?

“Transportation planning plays a fundamental role in the **state, region or community’s** vision for its future. It includes a comprehensive consideration of possible strategies; an evaluation process that encompasses diverse viewpoints; the collaborative participation of relevant transportation-related agencies and organizations; and open, timely, and meaningful public involvement.”

-United States Department of Transportation

Who Is Involved in Transportation Planning?*



THE CITY OF SAN DIEGO



**NORTH COUNTY
TRANSIT DISTRICT**

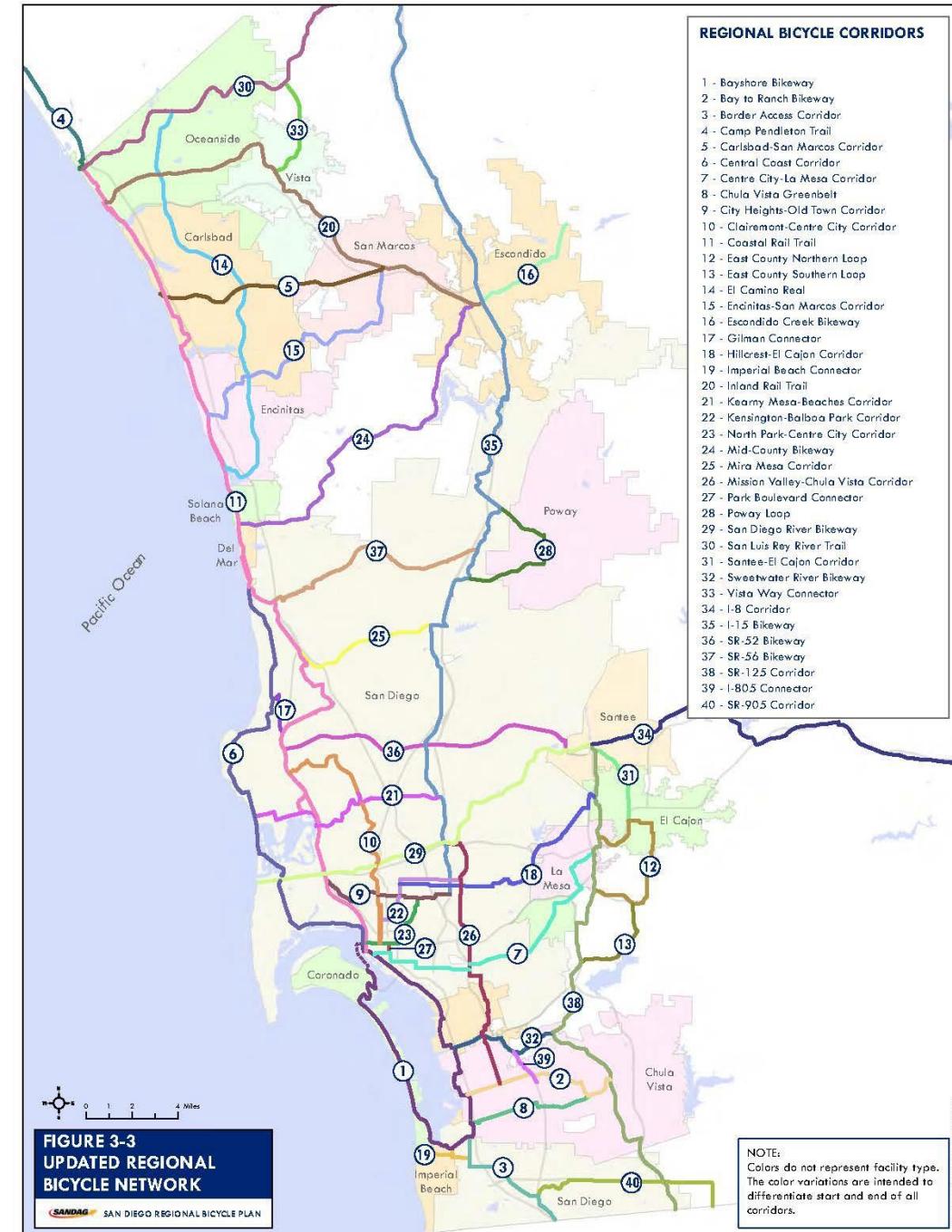


Why do Transportation Planners use GIS?

- To **provide context** on planned projects & issues
- To **analyze trends** and mitigate traffic congestion
- To **study relationships** between two or more data elements/variables
- To **identify areas** that underserved by public transportation
- To **direct growth** and development in strategic locations
- To **determine project impacts** on natural ecological systems
- To **perform site analysis** and/or risk analysis
- To **mitigate impacts** associated with natural disasters/extreme weather events

GIS at the Regional Level

- Enables researchers and staff to perform high level spatial analysis
- Provides context and/or understanding of systemwide impacts/relationships
- Limited in the amount of detail that can be illustrated
- May lead to more detailed analysis at a finer geographic interval



GIS at the Local Level

- Enables researchers and staff to perform detailed spatial analysis
- Covers a finite geographic extent
- Largely dependent on the quality and detail of data available



Walking Times to Purple Line Station Entrances, 2011

With and without proposed station consolidations and additional entrances under the North Red Purple Modernization Plan.



Current
Stations



Foster and
South Blvd
Consolidation



Walking Times

Current

0 - 5 min.

6 - 10 min.

11 - 15 min.

● Current Station Entrance

Consolidated

0 - 5 min.

6 - 10 min.

11 - 15 min.

● Consolidated Station Entrances

Coordinate system for all maps:
NAD83 Illinois State Plane East (Feet)

:: Background layer is World Street Map layer from ESRI Maps & Data website 2011 :: CTA rail files from egov.cityofchicago.org 2010 ::
:: Walking times calculated using ArcMap Network Analyst Extension, assuming 5 kph speed :: Cartography by Brian Derstine, April 25, 2011 ::

Closer to home... Mid-Coast Trolley Project (aka UCSD Blue Line)



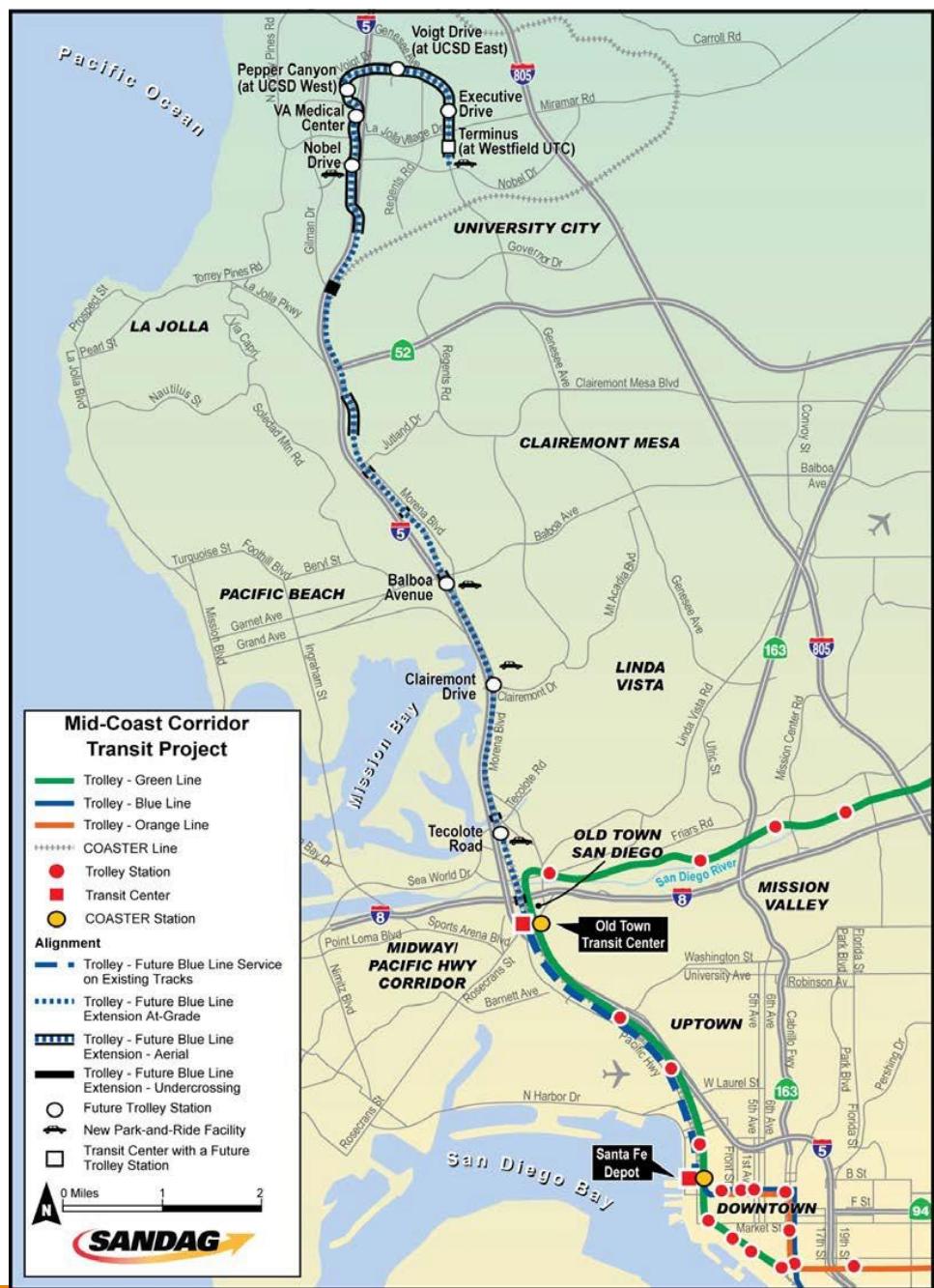
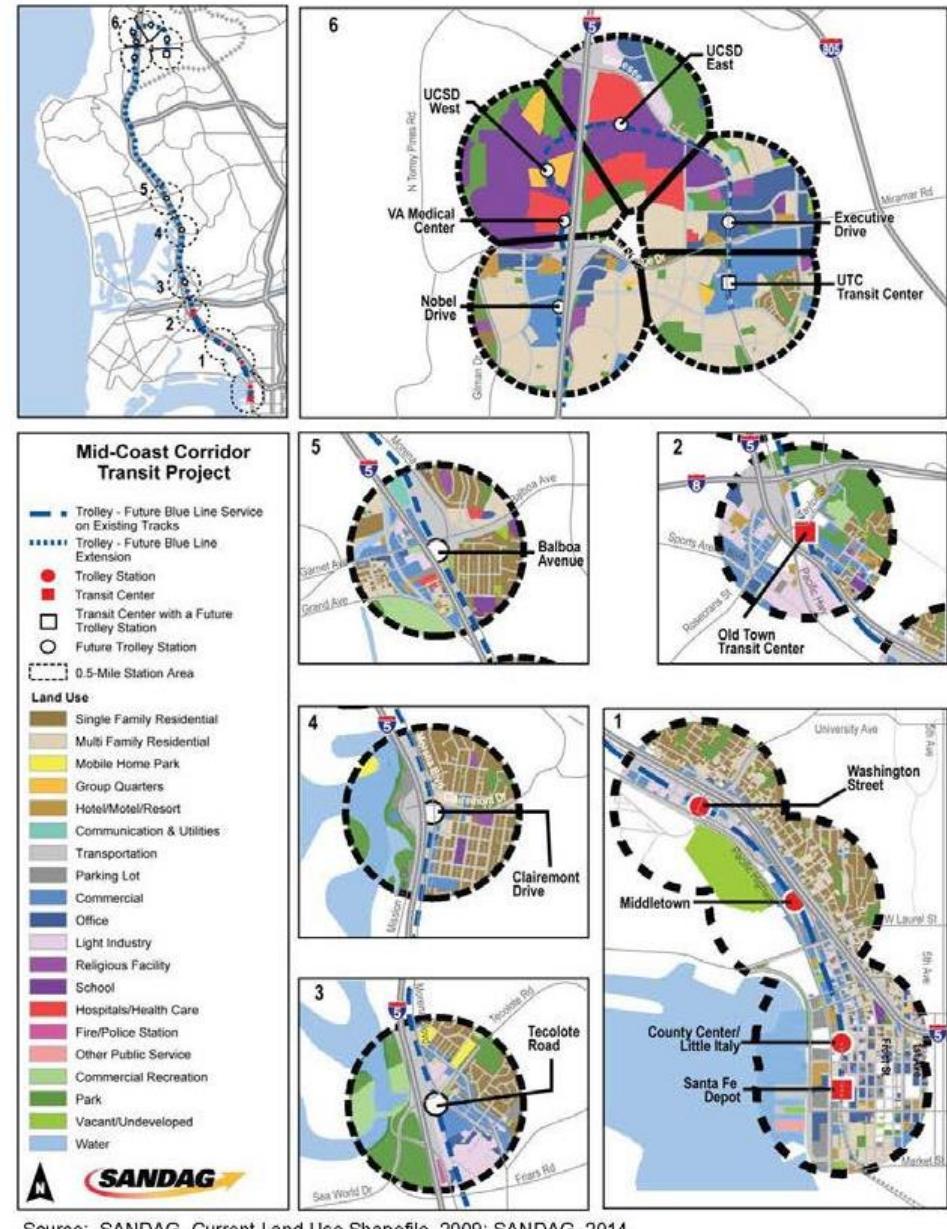


Figure 4-1. Existing Land Uses



What data layers are used in GIS for Transportation Planning?

Points

- Transit Stops
- Crime Data
- Collision Locations
- Street Lights
- Traffic Signals
- Recreation Centers
- Schools

Lines

- Roads
- Freeways
- Bike Routes
- Railroad Lines
- Nature Trails
- Transit Routes
- Utility Infrastructure

Polygons

- Jurisdictional Boundaries
- Parks/Open Space
- Floodplains
- Ecologically Sensitive Areas
- Zoning
- Land Use

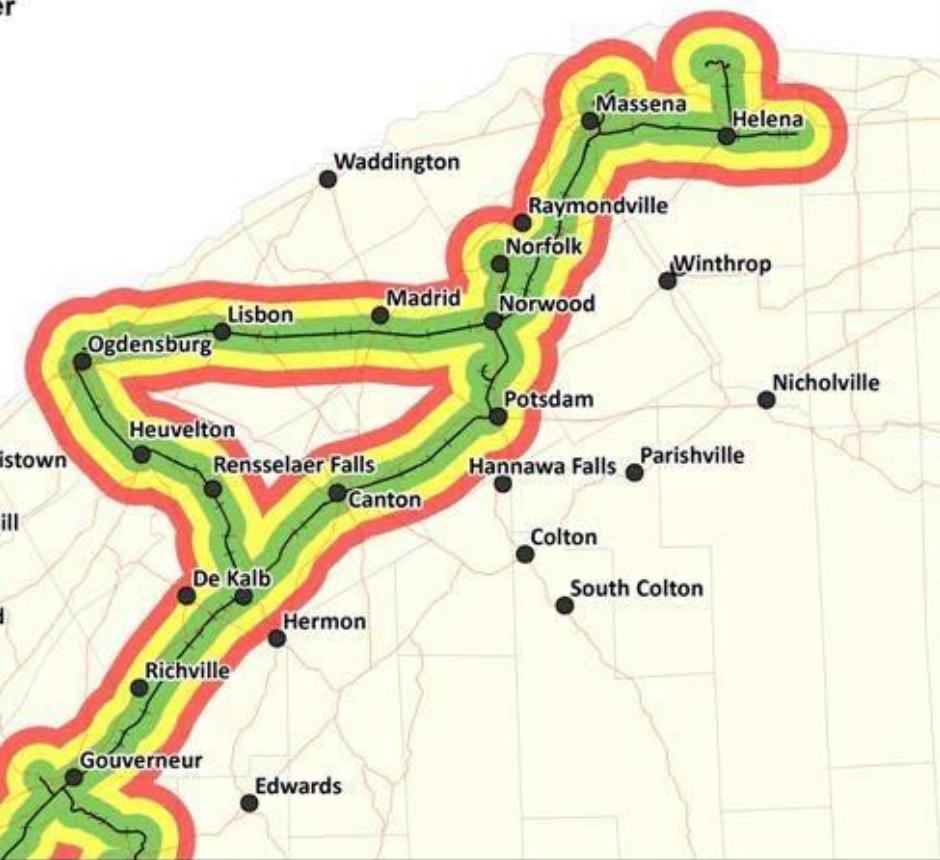
What Geoprocessing tools are commonly used in Transportation Planning?

Buffer

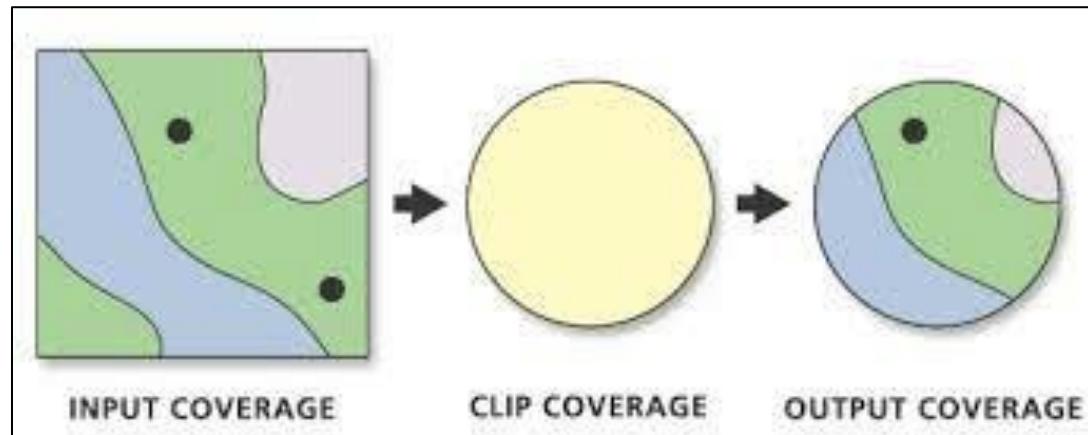
Rail Line Buffer

Distance

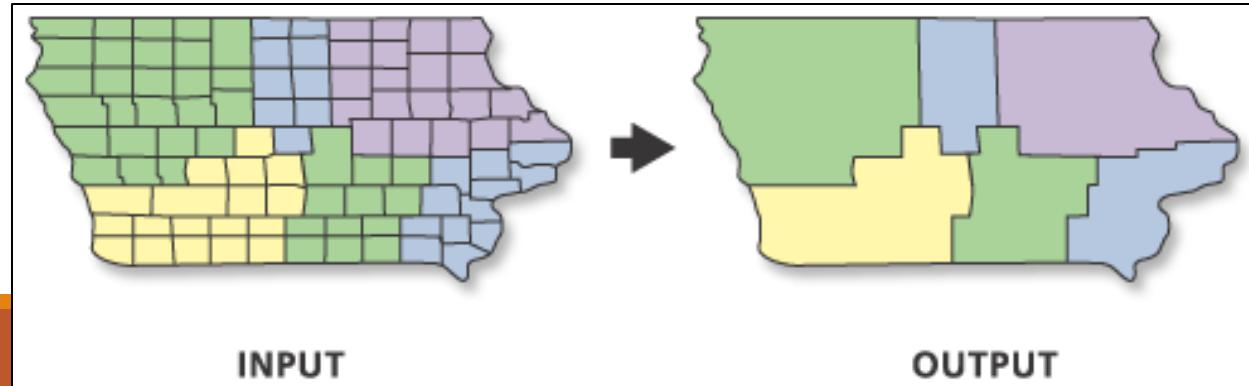
- 1 mile
- 2 miles
- 3 miles



Clip

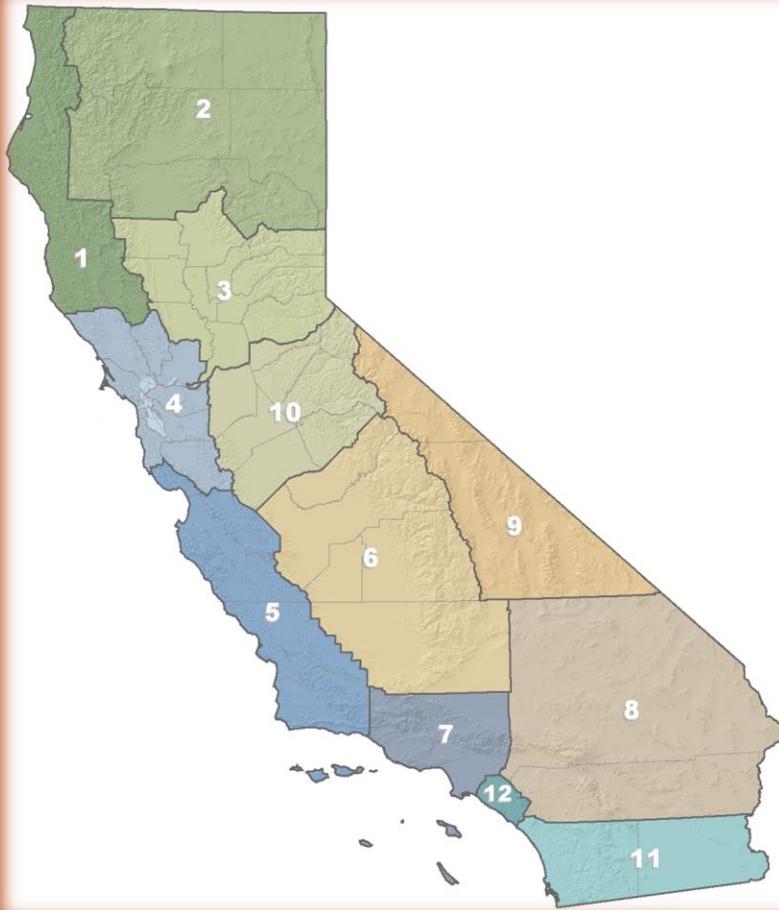


Dissolve



CASE STUDY: CALTRANS

California



- Population – 39.2 million
- Area – 163,696 square miles

CA State Transportation Agency

- California Highway Patrol
- California Transportation Commission
- Department of Motor Vehicles
- High Speed Rail Authority
- Office of Traffic Safety (grants)
- **Department of Transportation**

Caltrans

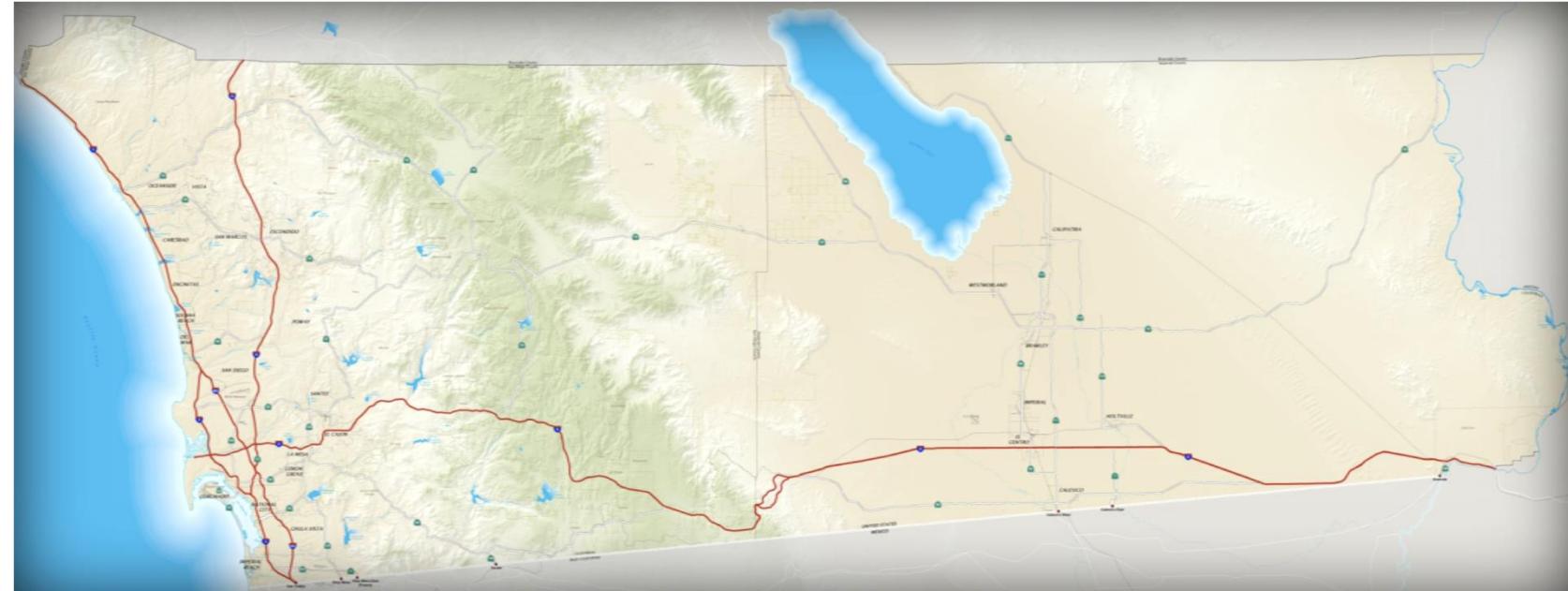
- 12 Districts
- 18,000 (approx.) Employees

State Highway System

- 265 State Highways
- Over 15,000 Centerline Miles
- Over 50,000 Lane Miles

Caltrans – District 11

- San Diego and Imperial Counties
 - Area – 9,000 square miles
 - Population – 3.3 million
 - 6 million in the Binational Region
 - Approximately 1,200 Employees
 - Over 3,400 Lane Miles



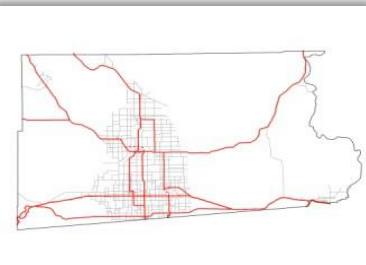
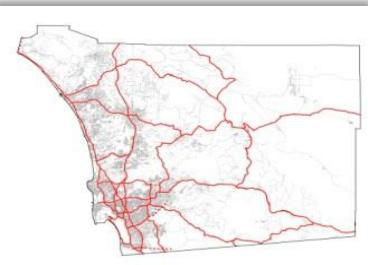
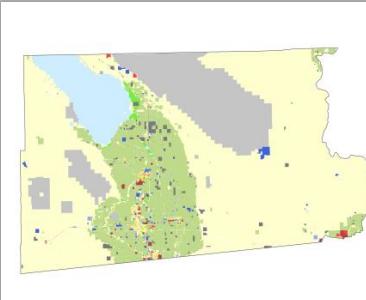
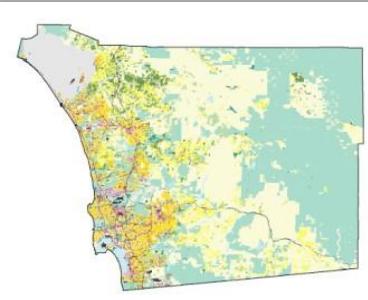
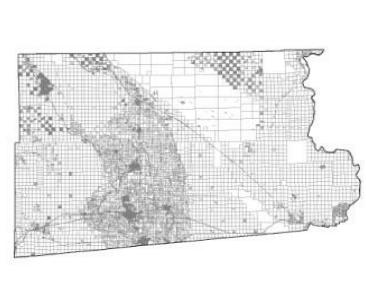
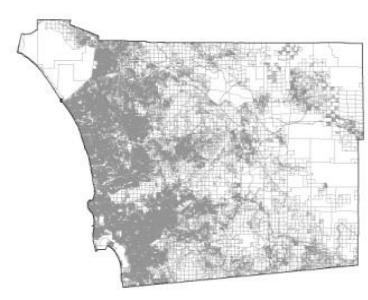
DATA!

Types

- Parcels
- Land Use
- Local Developments
- Transportation Networks
- Transit Systems
- Bike Routes
- Planned Projects
- Planning Documents

Sources

- State
 - Caltrans Sacramento
 - Water Resources
 - Parks
 - Fish & Game
- Regional
 - SanGIS/SANDAG
 - Cities
- Federal
 - Fish & Wildlife Service
 - Census
 - Bureau of Indian Affairs



DATA SOURCES

District 11

- State Highway System
- Park and Rides
- Adopt-A-Hwy
- Culverts
- ITS/Traffic Elements
- Landscape Irrigation System

State

- Caltrans Sacramento
- Water Resources
- Parks
- Fish & Game

Regional

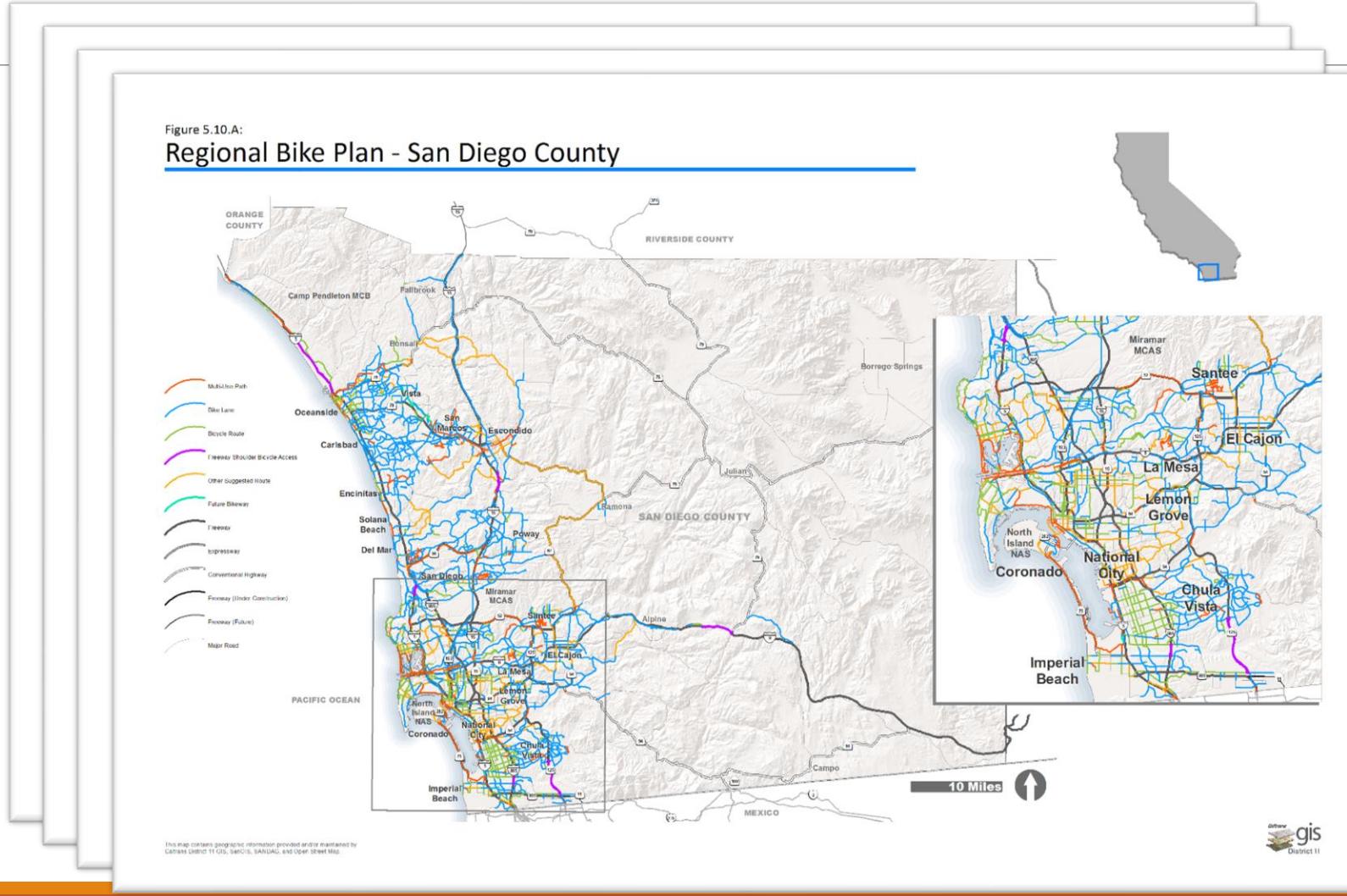
- SanGIS/SANDAG
- Cities

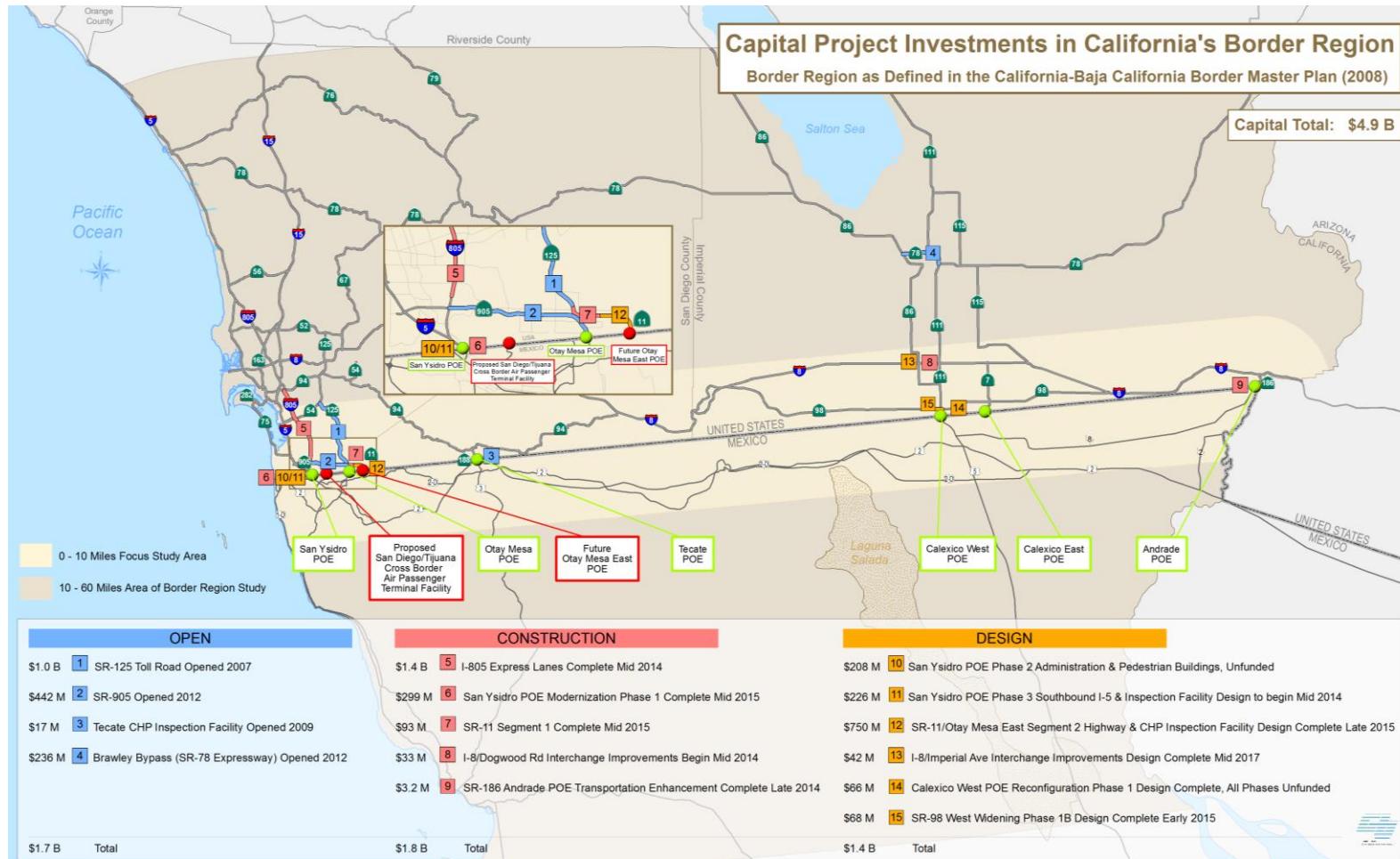
Federal

- Fish & Wildlife Service
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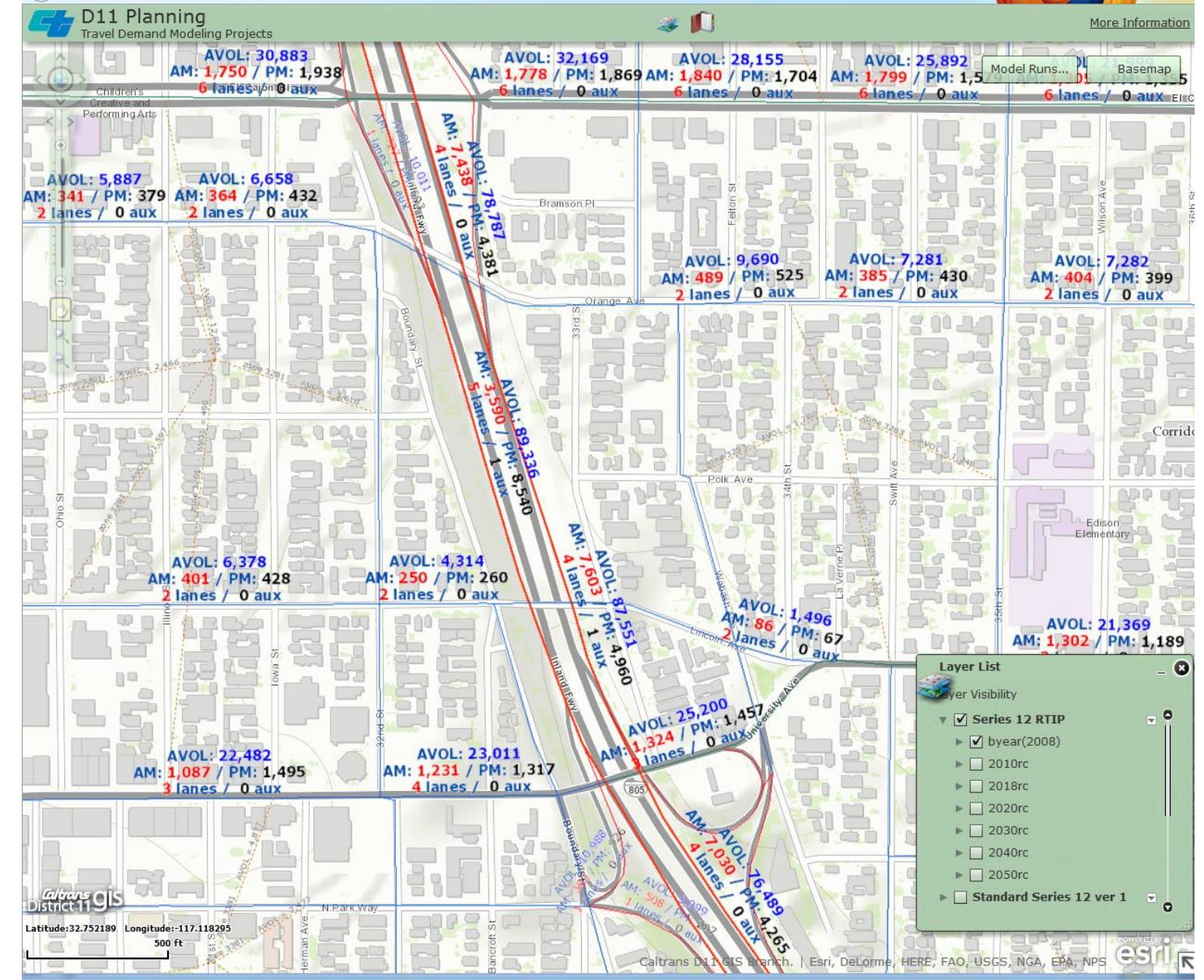
System Planning Reports & Documents

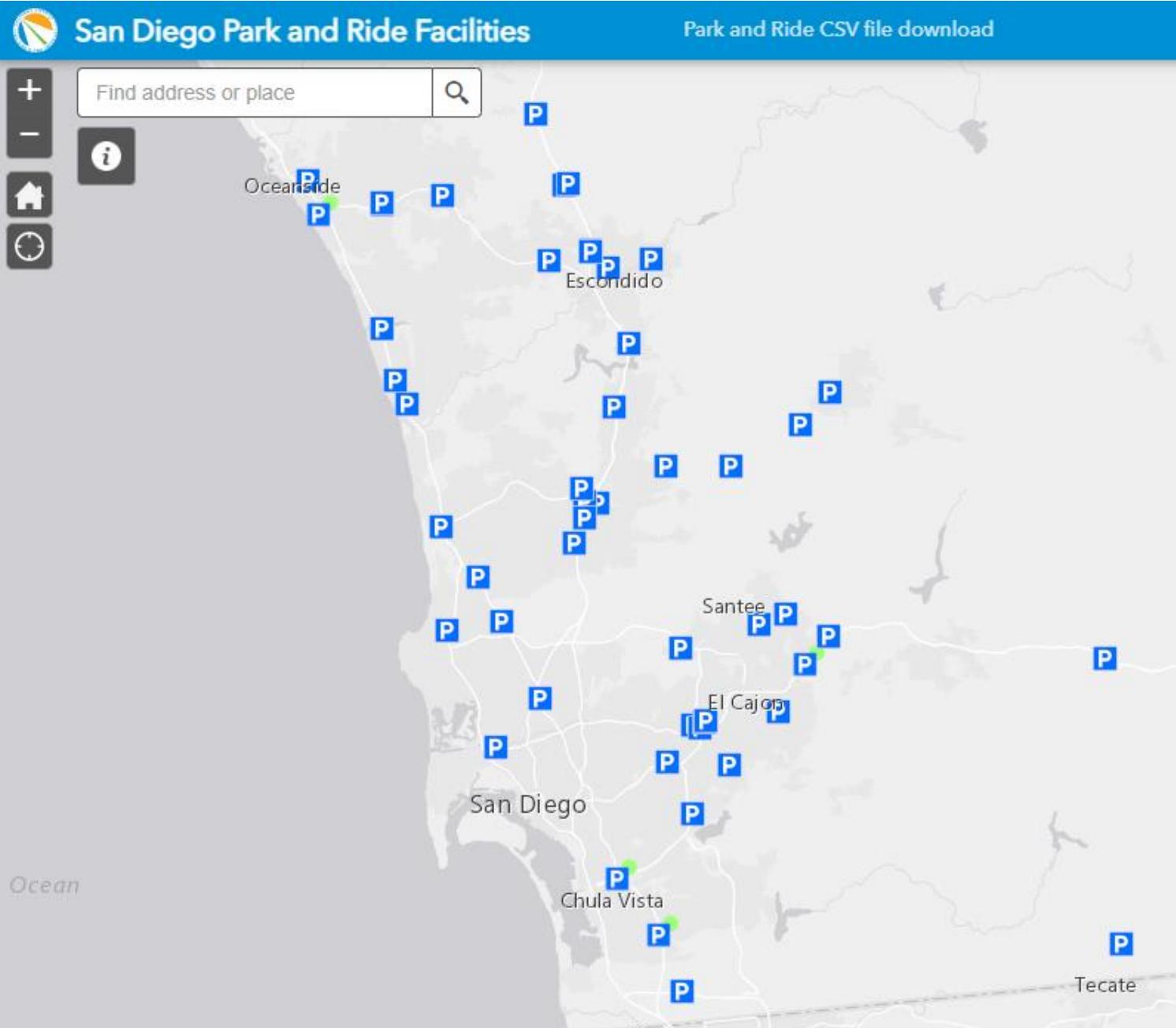




Conducting cross-border studies

Travel Demand Model

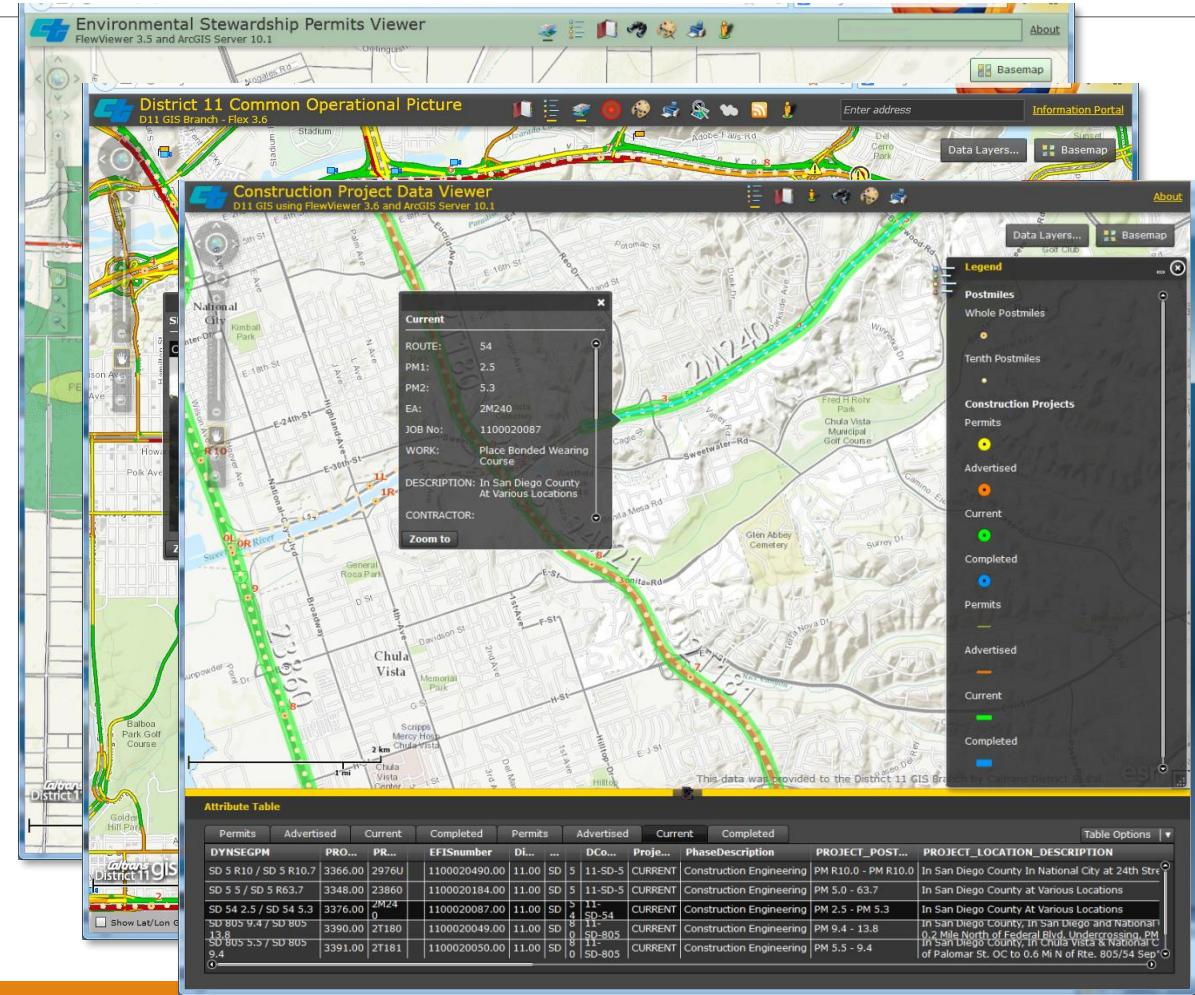




Park & Ride Web Map

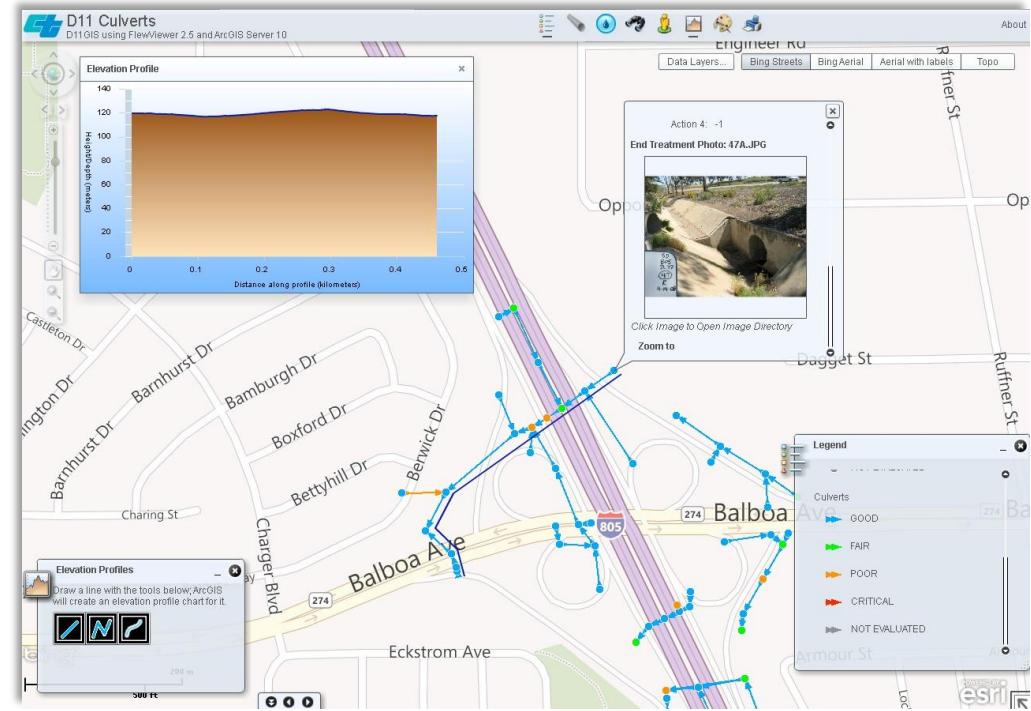
Other Caltrans GIS Tools

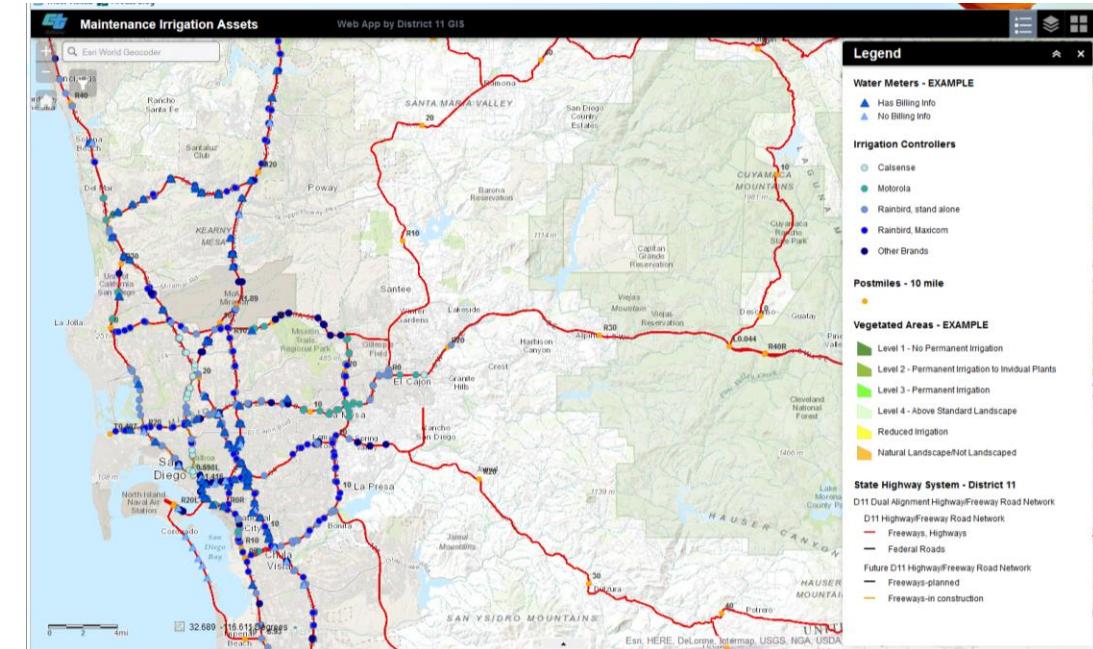
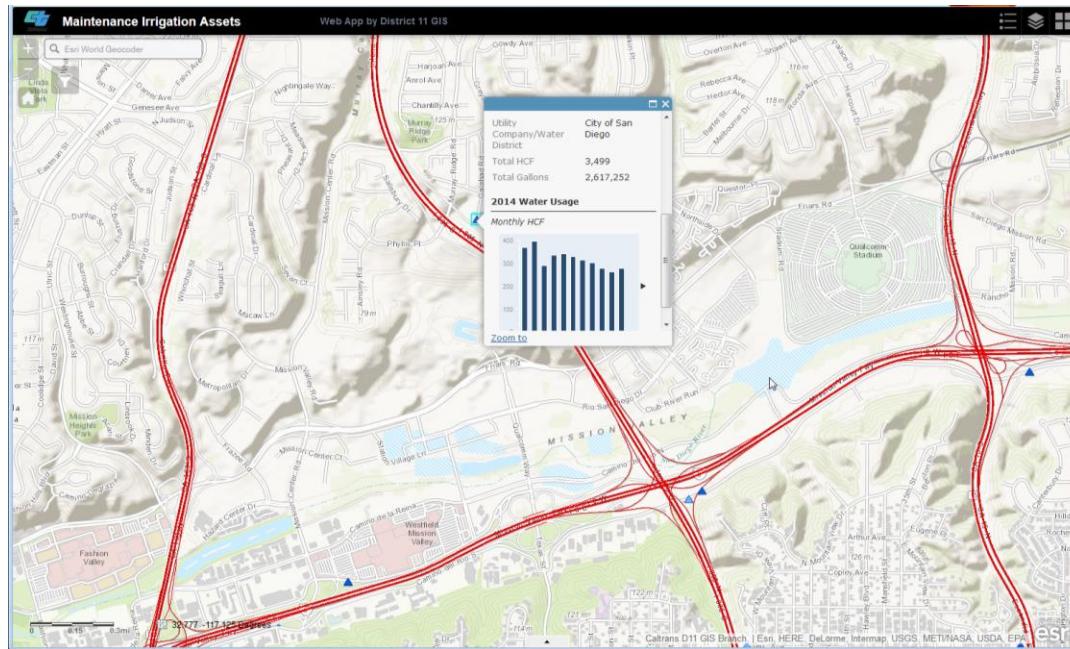
- ❖ Environmental Stewardship Permits Viewer
 - used for making maps and reference info for permits
- ❖ Emergency Common Operational Picture
 - real time map to show situational awareness during regional disasters/events
- ❖ Construction Project Data Viewer
 - track projects at different phases



Asset Management – Culvert Inspection Program

- Field Data Collection & Inspection
- GIS Products & Services
 - Web Application
 - End Treatment and Culverts
 - Inspection Status (by Route/Corridor)
 - As-built (Image Services)
 - Photo Access (via URL)
- CIP Workflow & Coordination
 - Pre-planning
 - GIS Coordination
 - Maintenance Coordination
 - Reporting Requirements





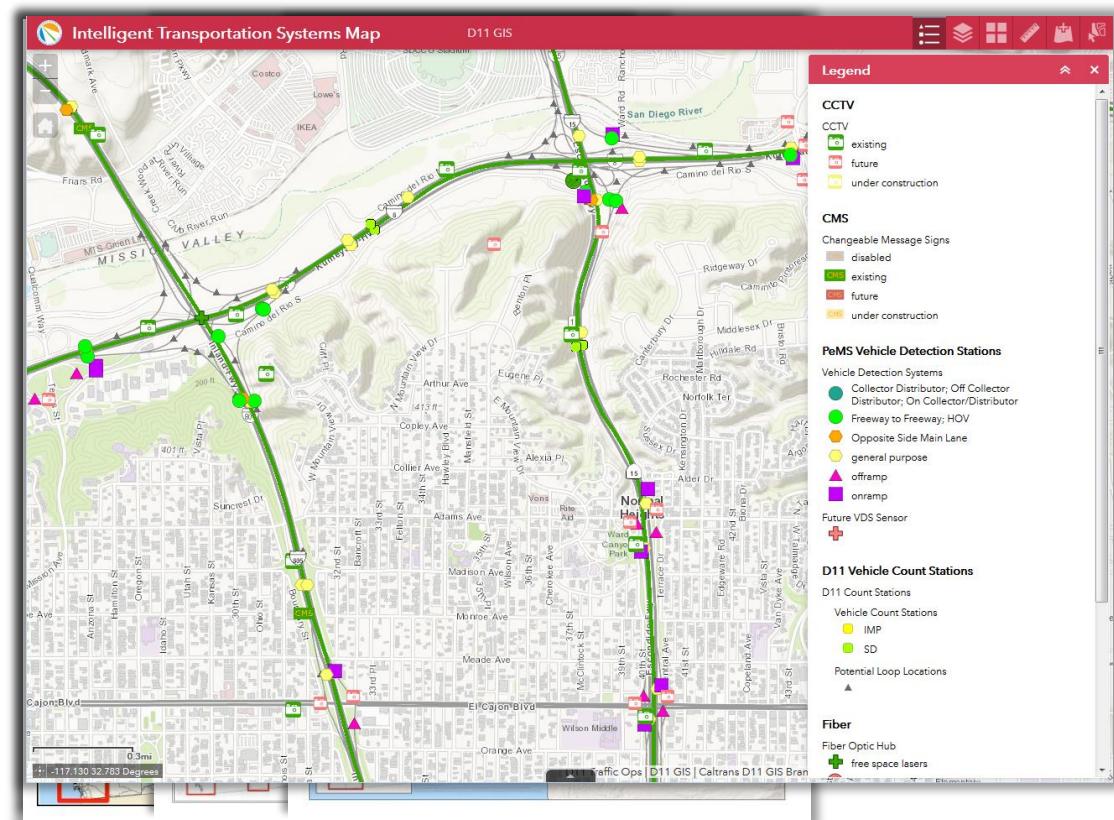
Water Management & Usage Tracking



GIS Program Focus Areas

Asset Management - Traffic Operations

- Traffic Operations Field Elements
 - CCTV
 - Changeable Msg Signs
 - Ramp Meters
 - Vehicle Detection
 - Fiber-optic Lines
 - Traffic Signals
- Data Development
 - Linear Reference System
 - Field Data Collection
- Products
 - Web Services with Real-Time Data
 - Used in emergency response app



Discussion: Are transportation options equitable across schools in San Diego County?

- What data layers do we need?
 - Are these points, lines or polygons?
 - What is the geographic unit that will be analyzed?
- What analysis would help us understand the issue?
 - HINT: How might you use the buffer tool?

