Measuring, Understanding and Realizing Sustainability, Livability & Social Equity

Informing Policy and Design Decisions

Knowledge is Power!!

Bruce Appleyard, PhD, AICP
Human Dynamics in a Mobile Age (HDMA) Lightning Talk
San Diego State University
San Diego, CA
November 27, 2013

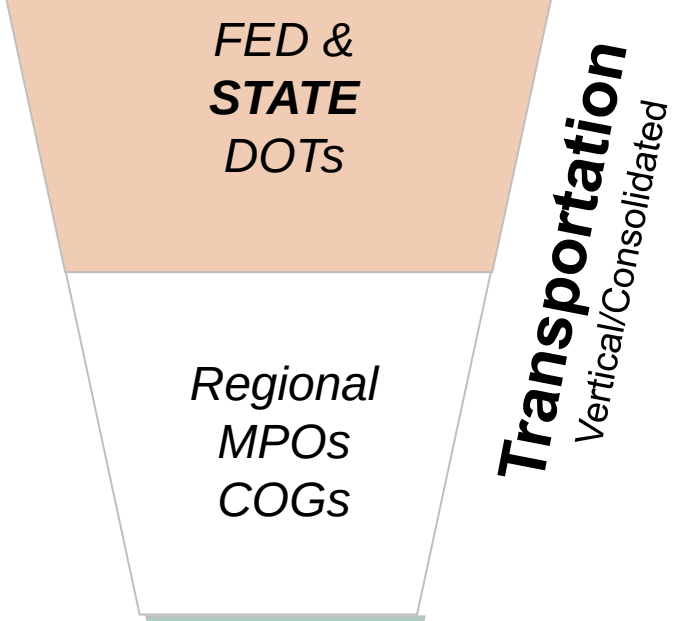
SafeTREC Safe Transportation Research & Education Center

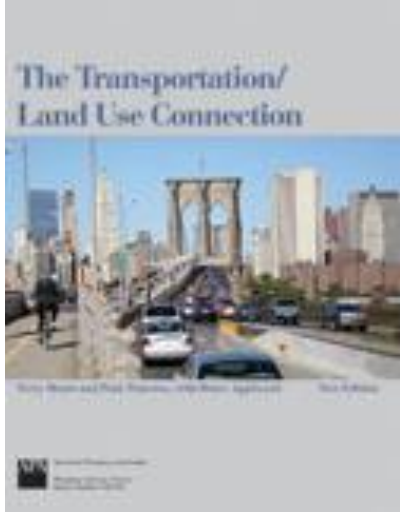
ITSBerkeley TECH TRANSFER

Mineta Transportation Institute

Big Problem: The T LU Imbalance

"Tribal"





Local: City/County

Neighborhood

Site

- Local Governments
- Banks/ Financial Institutions
- Developers
- Realtors
- Customers and/or NIMBYs

Land Use

Horizontal/Fragmented

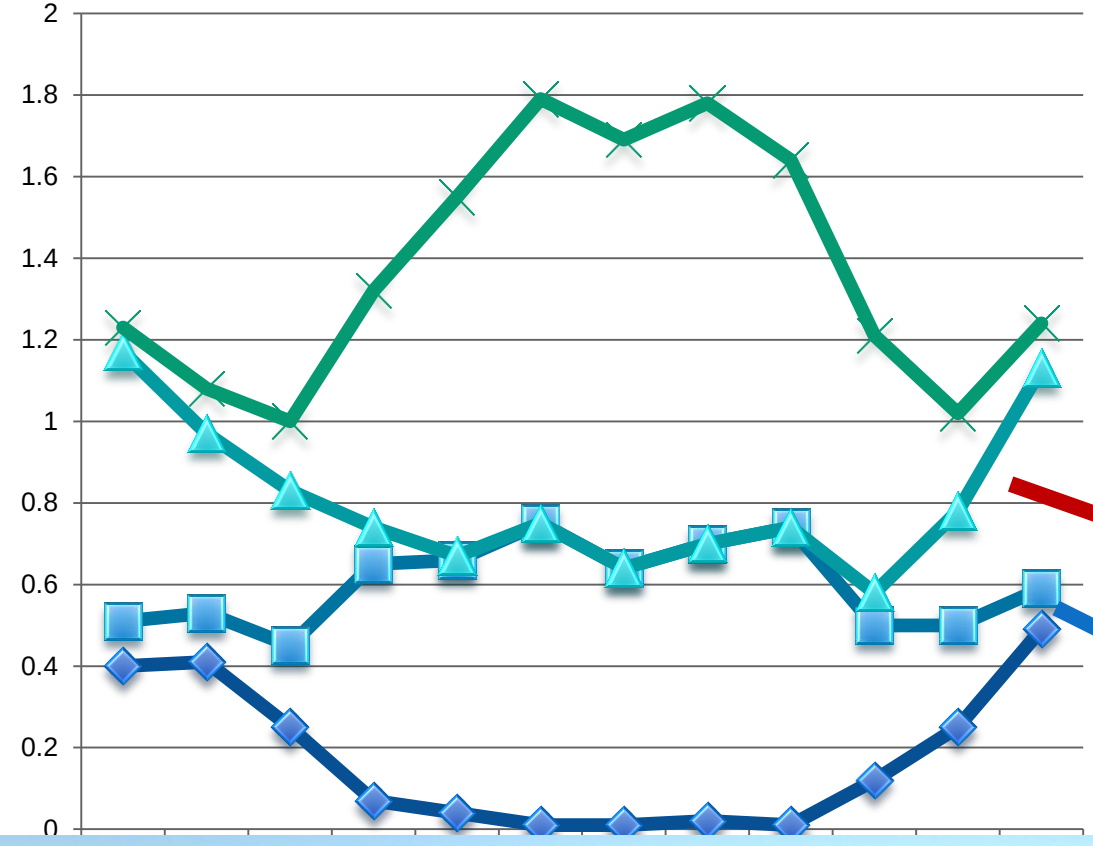
Vicious Cycle

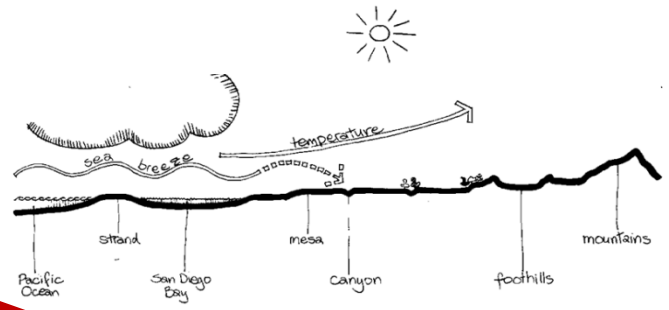
Bruce Appleyard, 2007

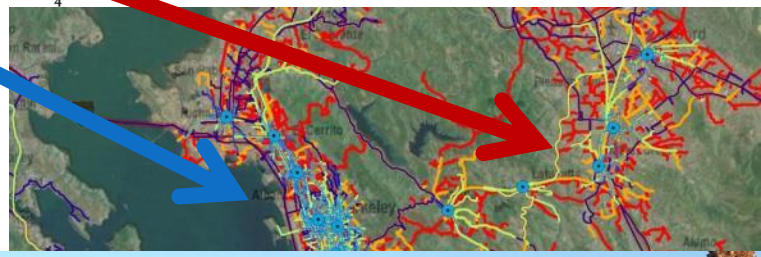
A transportation & land use imbalance leads to auto-dependent sprawl and congestion

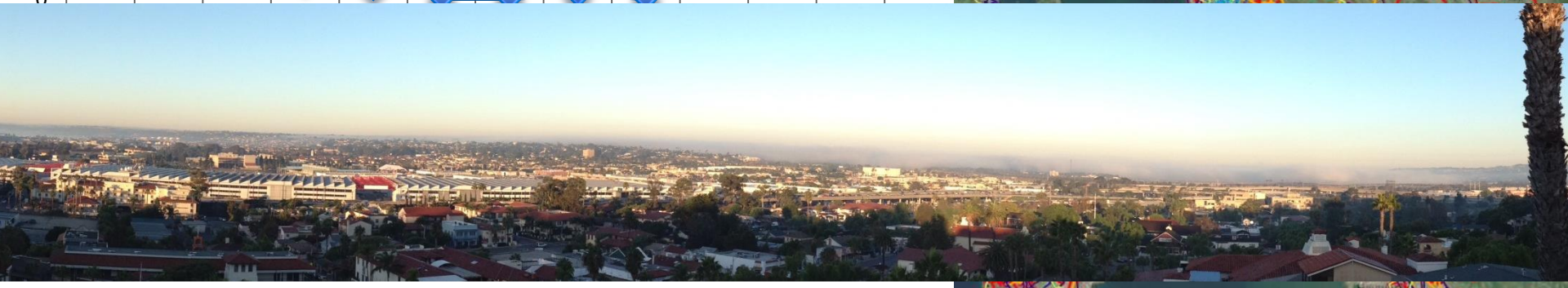
…and to a sub-optimal realization of benefits from transit investments

Future Work:
Housing Energy Consumption by Location









Fundraiser $$$

- Central role in winning research grants grossing over **$2,000,000**
- TCRP H-45: *Measures, Methods and Strategies for Transit Corridor Livability* ($350,000)
  - TCRP H-36 Reinventing the Interstate: A 'New Paradigm' for Multimodal Transportation Facilities ($400,000)
- CalTrans Smart Mobility Framework Implementation Project ($250,000)
- HUD/EPA *Integrating Social Equity into Local and Regional Decision-making* ($400,000)
- TCRP H-46 Quantifying Transit's Impact on GHG Emissions and Energy Use: The Land Use Component ($350,000)
- Human Dynamics in a Mobile Age

Bruce Appleyard, PhD, AICP

DISSERTATION: New Methods to Measure
Urban Environments for Consumer Behavior Research

Dissertation Presentation Overview

- Background
- ***Measure:*** New Methods Development
- ***Understand:*** Analysis
- ***Realize:*** Policy & Design Guidance

Bruce Appleyard, PhD

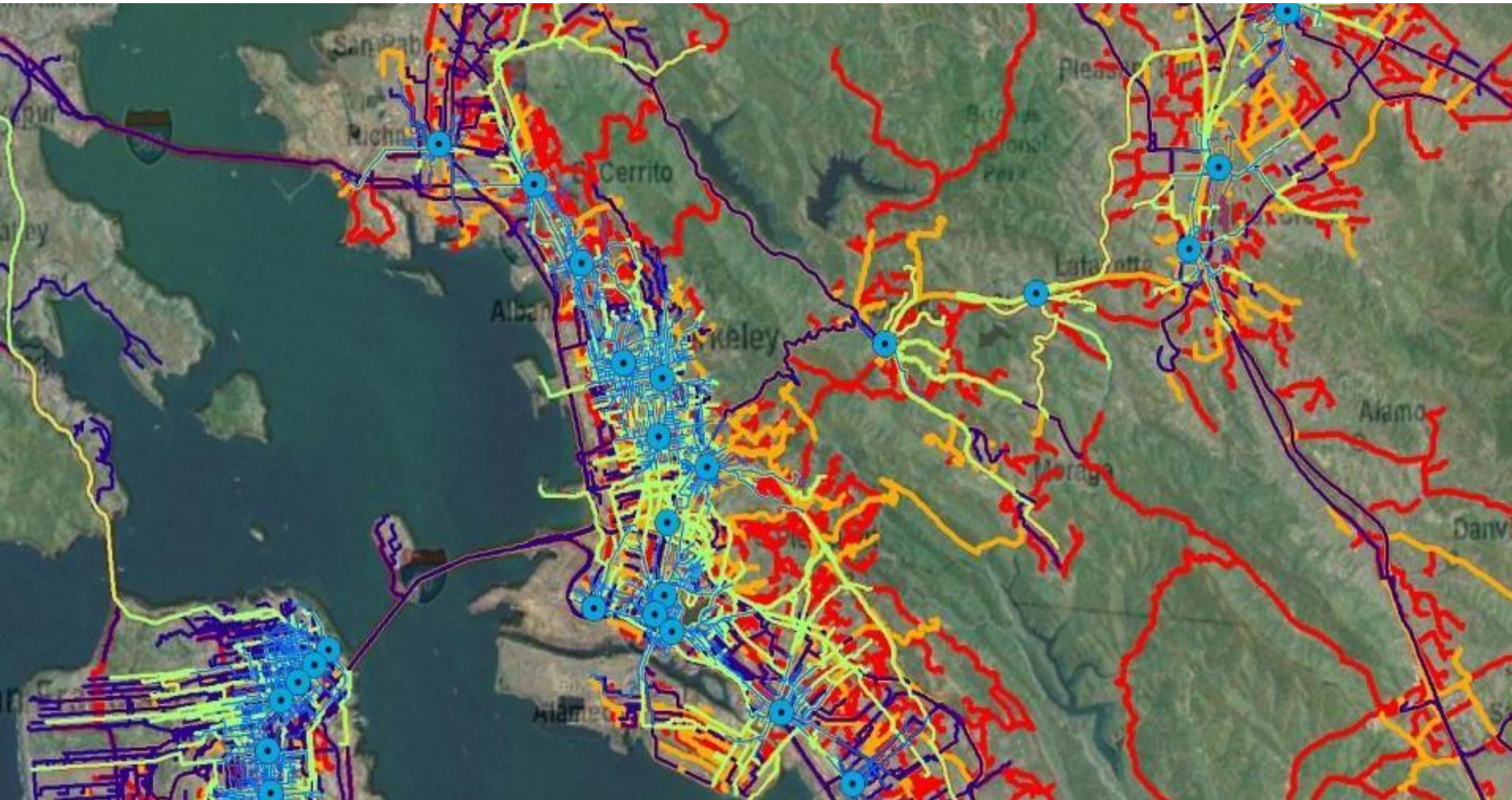
RESEARCH OVERVIEW

Estimated paths for thousands of travel survey respondents…

Using new, **linear** spatial unit of analysis (Individual Access Corridor) +

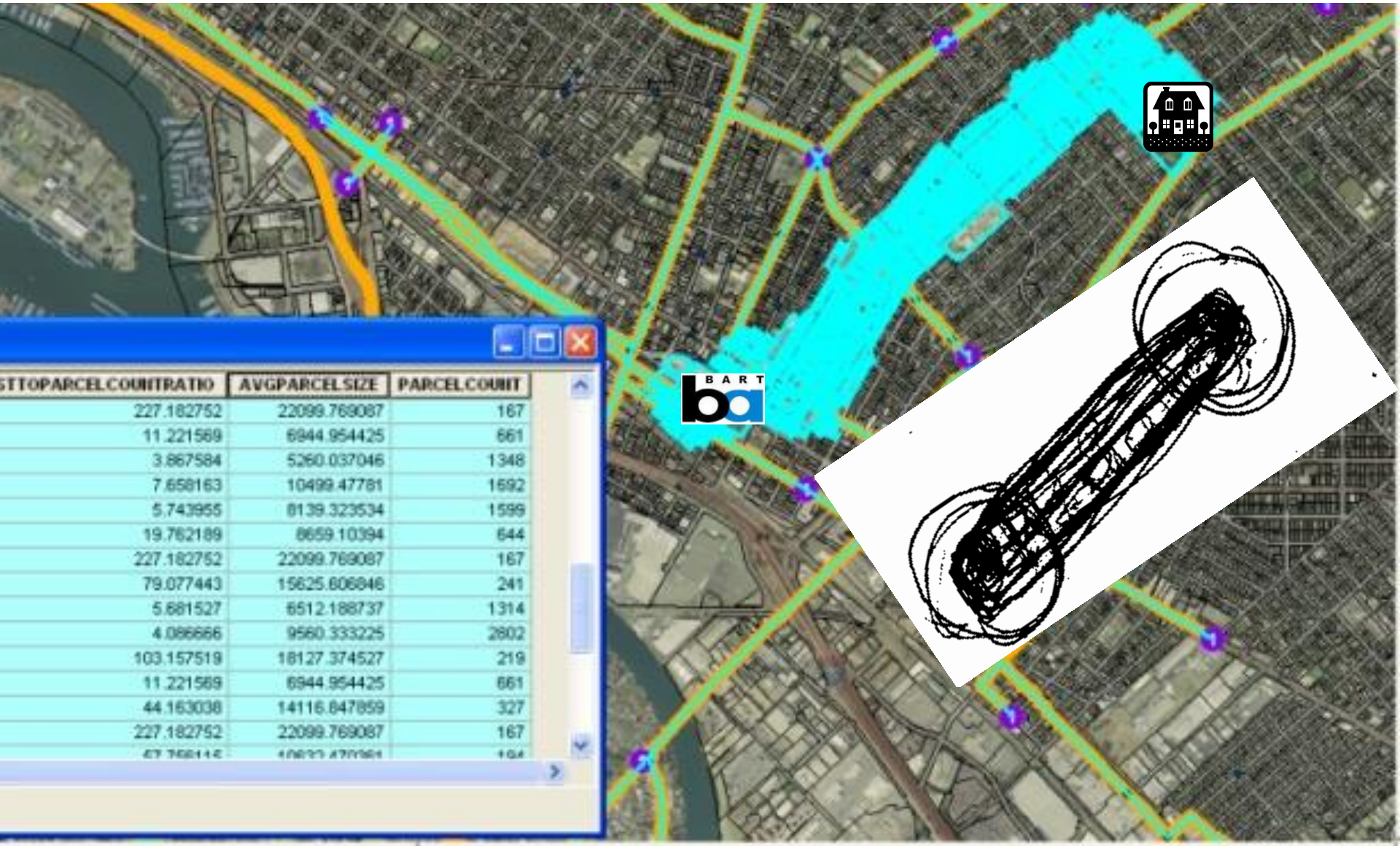
Finer **resolution** BE data (parcel, point, network) =

Paradigm shift for Travel Behavior Research



METHODS to MEASURE: Urban Design (Perceptual Qualities)

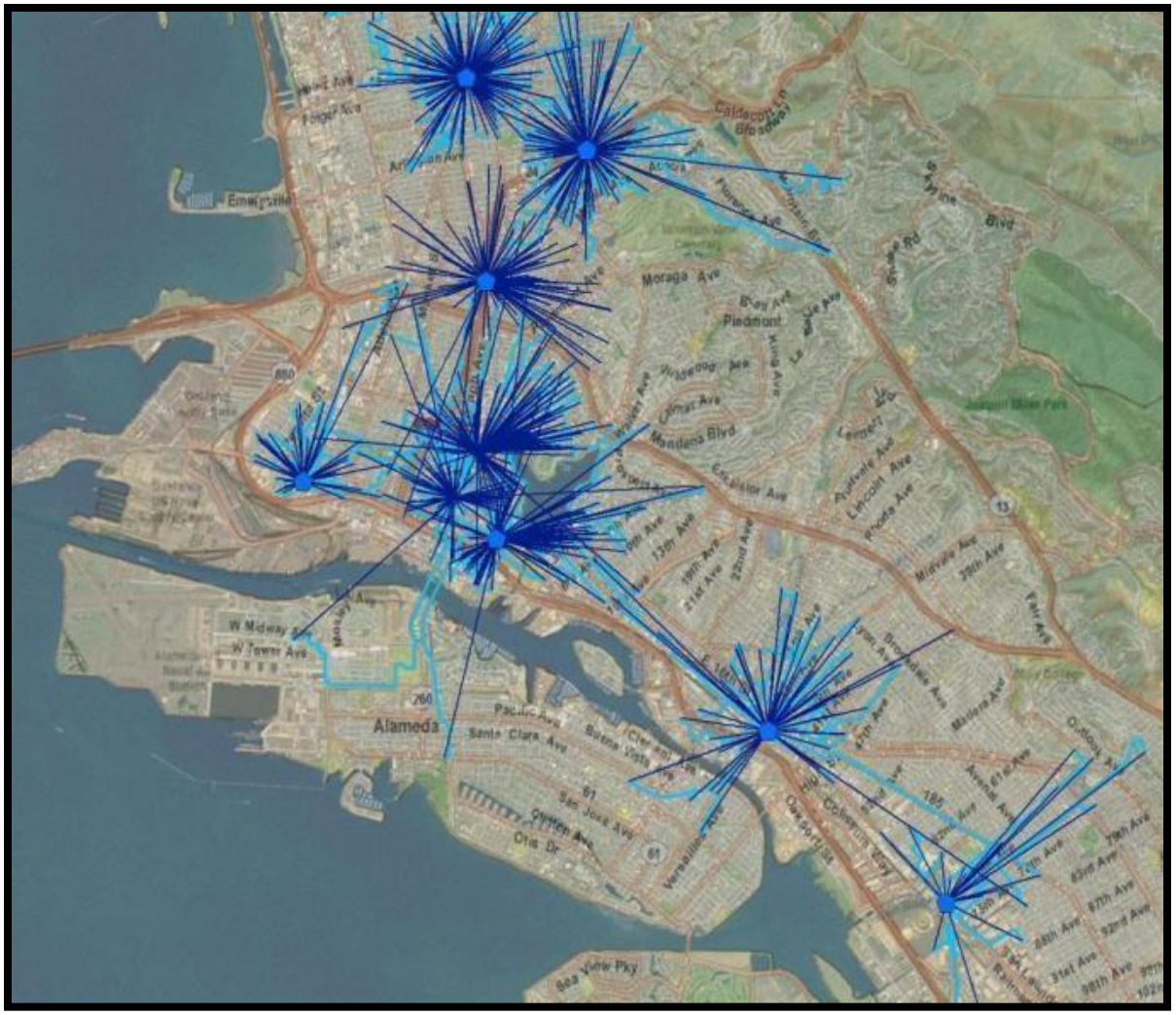
Average Parcel Size

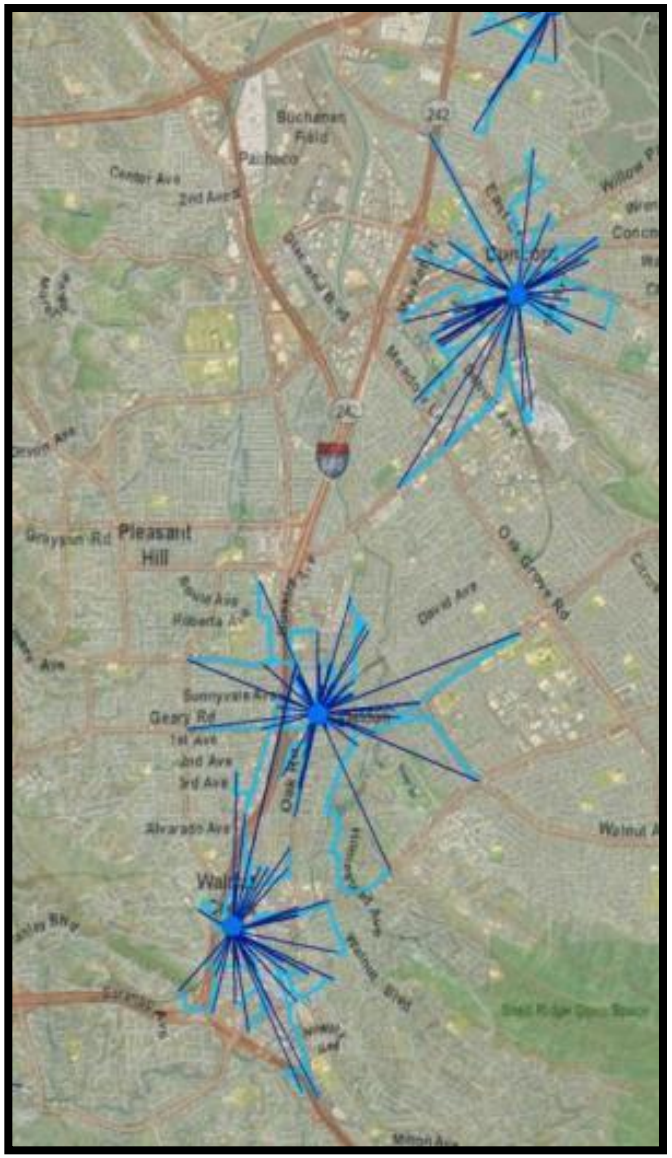


METHODS to MEASURE: TRANSPORT ACCESS

Route Directness

Straight-Line to Network Distance Ratio



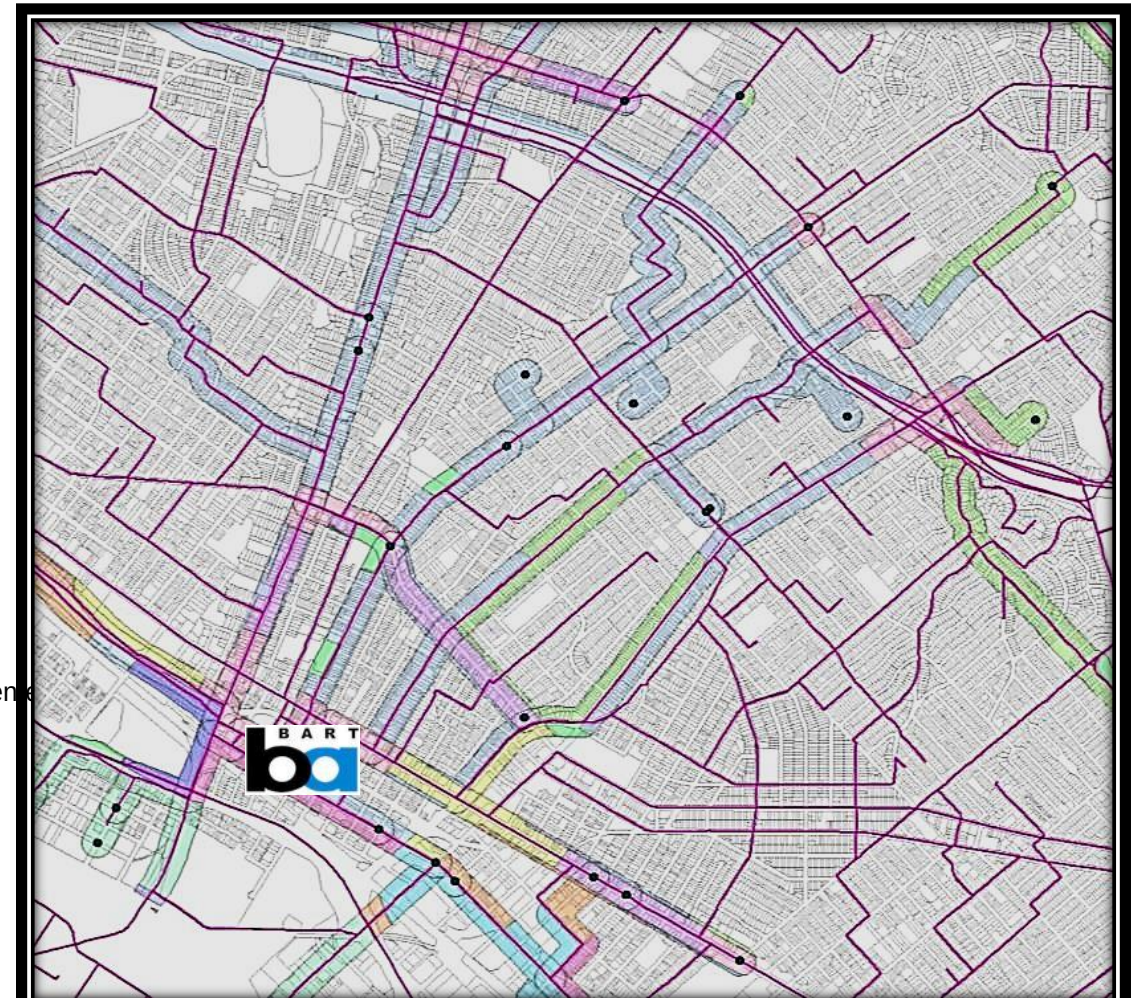


METHODS to MEASURE: Activity

Land Use Activity: Issues Dealing with Detailed Land Use Categories

Complex land use datasets require balancing manageability and meaning (M&M).

- Simplifying land use categories for model manageability while
- Maintaining land use class integrity so results can meaningfully inform policy



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Bruce Appleyard, PhD

Understand: Analysis

Modeling Methods:
Predictive Multinomial (MNL) Model of Transit Access Mode Choice

$$P(CAR_n) = \frac{e^{V_{CARn}}}{e^{V_{WALKn}} + e^{V_{BIKEn}} + e^{V_{BUSn}} + e^{V_{CARn}} + e^{V_{CARDOn}}}$$

Probability of a person choosing to drive to access rapid transit

Analysis: Results

UE Component	Variables	BIKE		BUS		CAR		CARDO		WALK	
		Parameter	Robust P-value	Parameter	Robust P-value	Parameter	Robust P-value	Parameter	Robust P-value	Parameter	Robust P-value
	Constant	3.00	0.00**	-6.32	0.00*	Base		0.845	0.18**	6.93	0.00**
ACCESS Transport Access/ *Destination* Characteristics	1 = Parking Fees at Station					-0.507	0.00**	-0.260	0.14*		
	1 = Parking Fills AM Commute					0.812	0.00**	-0.200	0.46		
	# Bike Parking Spaces	0.00474	0.00**								
	# Parking Spaces at and ½ mile around Station					0.000862	0.00**	0.000446	0.00**		
	Est. Travel Time of Bus Trip (min.)			-0.00105	0.96						
	Network Distance (miles)	-1.06	0.00**					0.0879	0.09**	-4.01	0.00**
Trans. Acc. (*Design*)	Straight-Line-to-Network-Distance Ratio (closer to 1 = more direct)	0.443	0.27	5.68	0.00**			-0.234	0.57	3.68	0.00**
UD/Perceptual Qs (*Density*)	Average Parcel Size (10,000 sq. ft.)	-.180	0.01**	.0313	0.33			-.0218	0.32	-.109	0.00**
Land Use Activity (*Diversity*)	Retail/Wholesale	0.583	0.45	6.60	0.00**			1.42	0.06**	0.501	0.42
	1 = Res/Mixed Use/Small Retail	0.627	0.00**	-8.26	0.00**			-0.0982	0.62	0.483	0.00**
	Prop. Ed/Relig./Community Instit.	-0.305	0.89	-2.67	0.64			-3.35	0.13*	-4.47	0.01**
	Proportion Employment Centers	-2.10	0.21	-0.600	0.86			-0.389	0.74	1.23	0.37*
LU Activity UD/Perceptual Qs	Proportion Parking Lot	-13.7	0.00**	12.6	0.17*			-2.84	0.52	-9.63	0.01**
	Proportion ROW	0.726	0.20*	3.80	0.06**			0.924	0.07**	-3.42	0.00**
	Proportion Urban Park	2.72	0.32	2.63	0.63			4.04	0.02**	3.13	0.22
ACCESS to Opportunity *(Demographics)*	1 = High Income (Over 75K)	-0.466	0.00**	-0.651	0.15**			-0.0904	0.48	-0.315	0.01**
	1 = Low Income (less than 25K)	1.30	0.00**	1.30	0.00**			0.478	0.04**	0.832	0.00**
	1 = Male	1.39	0.00**	-0.414	0.31			-0.202	0.10**	0.699	0.00**
	Number of People in Household	0.0115	0.40	0.0540	0.61			0.0256	0.06**	0.0112	0.49
	1 = "Car Available for Trip Today"	-2.23	0.00**	-3.02	0.00**			-1.78	0.00**	-2.35	0.00**
	1 = Black or Non-White Hispanic	-1.28	0.00**	-0.105	0.80			0.0730	0.64	-0.0390	0.81

Number of individuals: 5694

Adjusted rho-square: 0.558

† Robust P-Values: ** < 10%; *10% to 20%

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- Background
- ***Measure:*** New Methods Development
- ***Understand:*** Analysis
- ***Realize:*** Policy & Design Guidance
  - *How Do We Realize Our Best Planning Ideas?*
    - *How do we overcome the institutional, technical, psychological barriers?*

Bruce Appleyard, PhD

REALIZE: Policy & Design Guidance

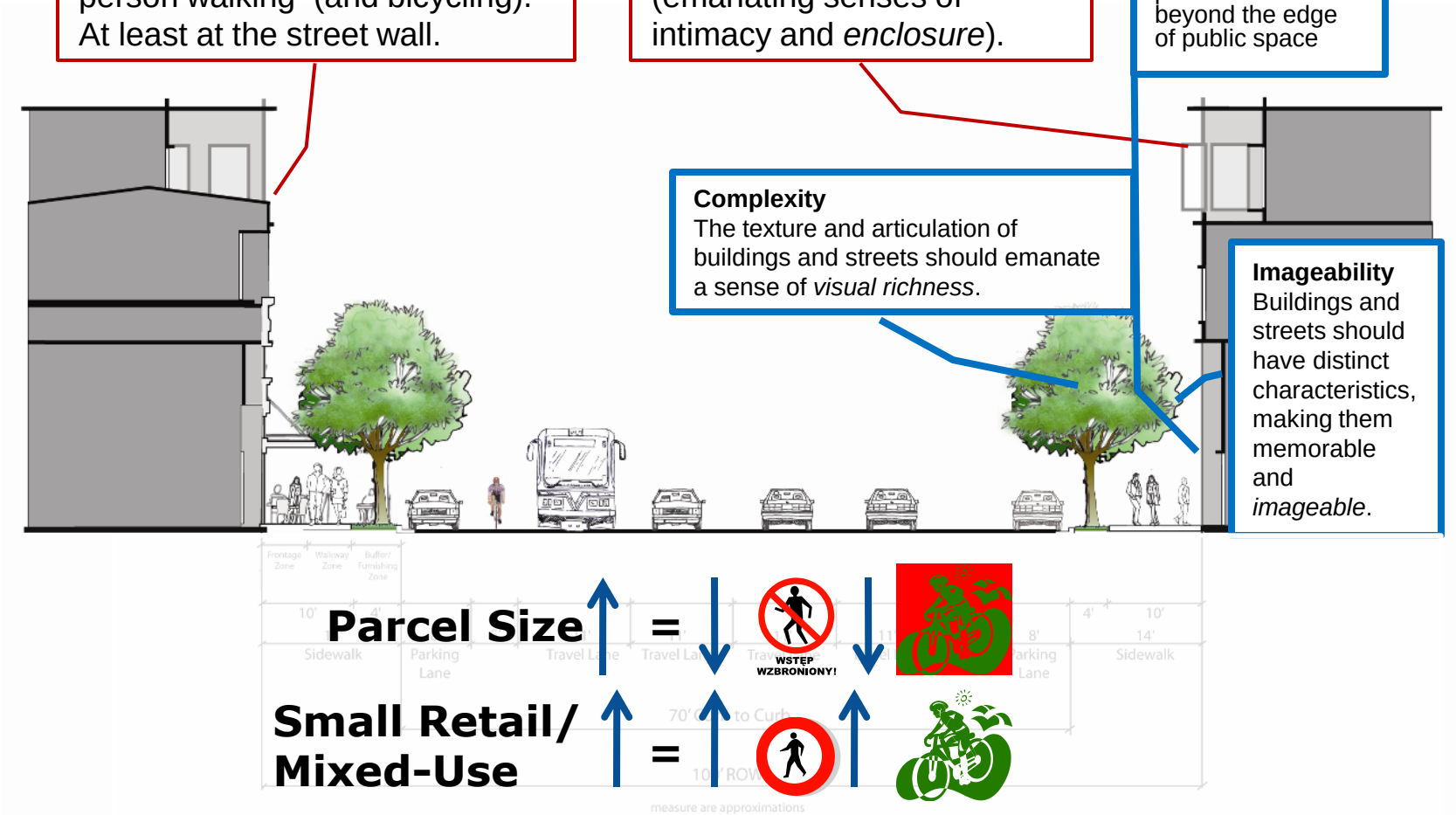
Human Scale
Buildings should match the size, texture and articulation of a person walking (and bicycling). At least at the street wall.

Enclosure:
Buildings should be located closer to the street (emanating senses of intimacy and *enclosure*).

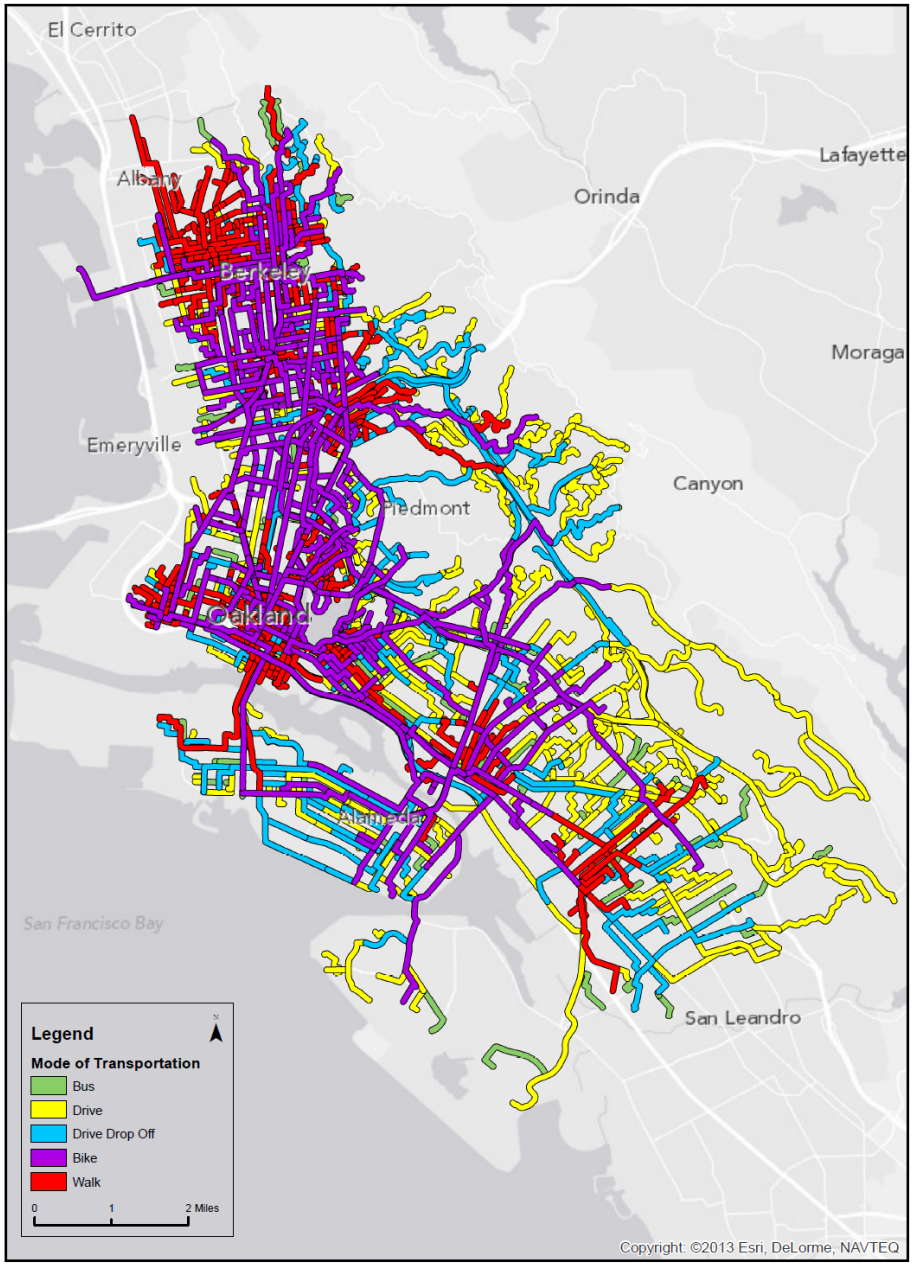
Transparency
Buildings should be designed so people can perceive what lies beyond the edge of public space

Complexity
The texture and articulation of buildings and streets should emanate a sense of *visual richness*.

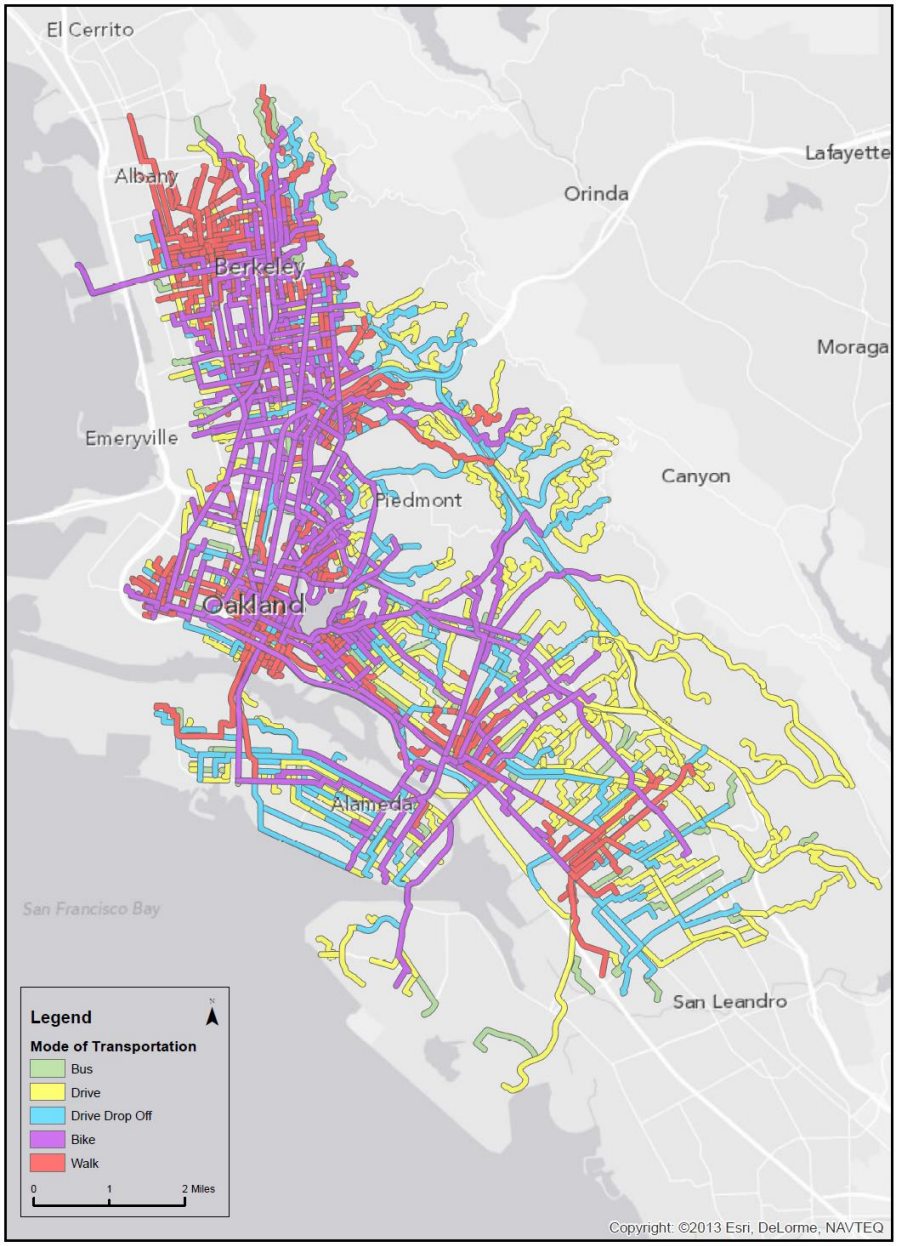
Imageability
Buildings and streets should have distinct characteristics, making them memorable and *imageable*.



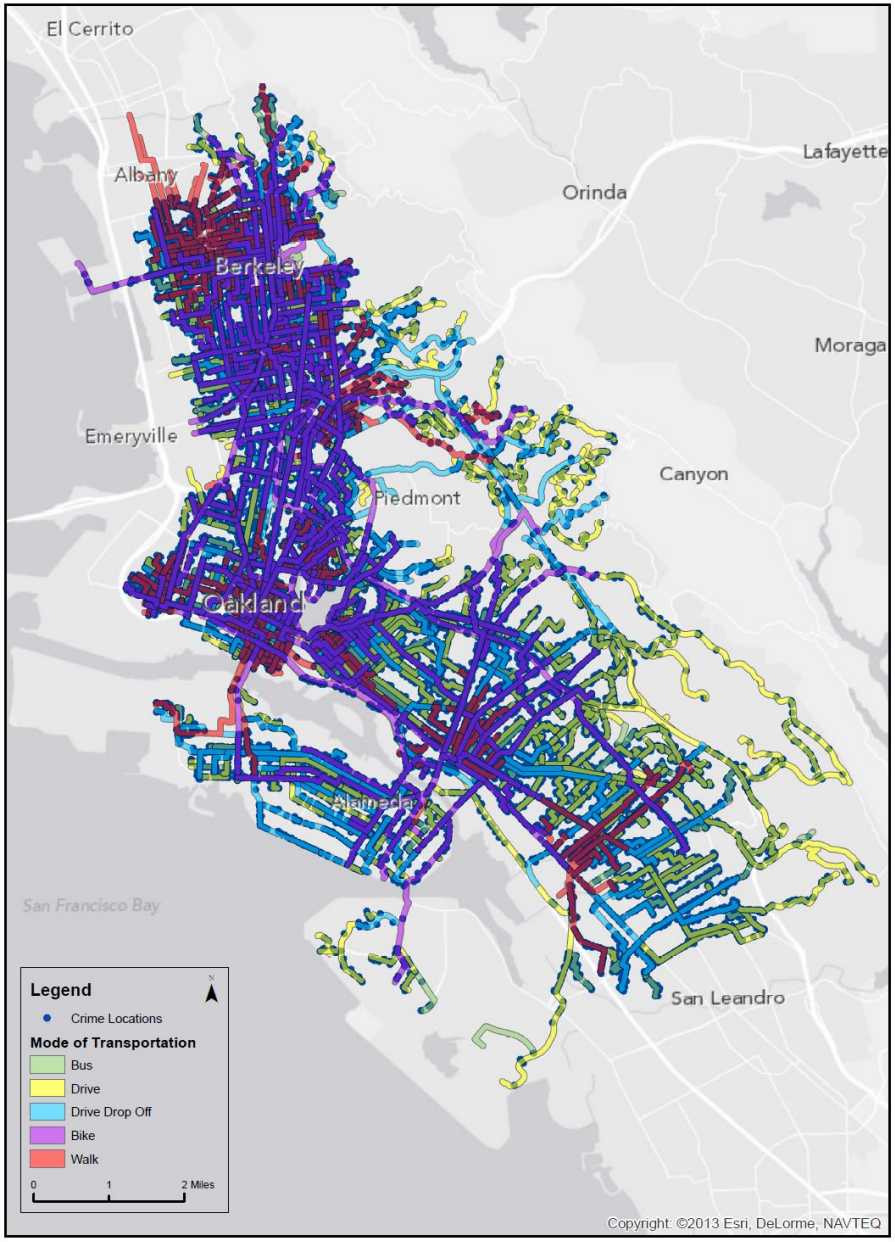
Transit Buffer Zones



Transit Buffer Zones



Crime Locations within Transit Buffer Zone



From Academic Research to Policy Application
Human Dynamics in a Mobile Age (HDMA)

HDMA Center for Spatial Decision Support

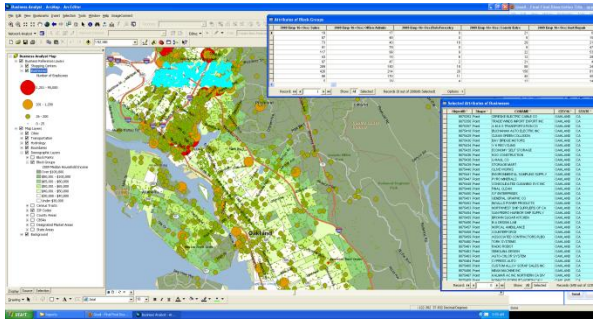
- SB 375, The Sustainable Communities and Climate Protection Act of 2008, effectively mandates public GIS- based scenario planning processes statewide

Existing Built Form: Neighborhood/Street Design

+

Public Processes

+



Future Land Use/Transportation Scenarios

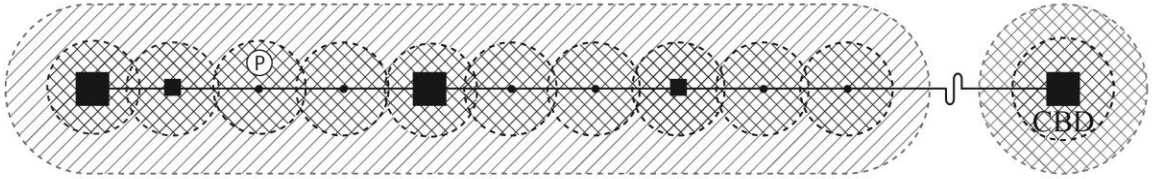
Informing Policy and Design Decisions

Knowledge is Power!!

- Applied, Entrepreneurial, Effective
- Building Partnerships: Public/Private & University Startups
    - SANDAG, Local Governments of San Diego/Tijuana Region

SAN DIEGO STATE UNIVERSITY · 1897 ·

TCRP H-45 Livable Transit Corridors: Methods, Metrics and Strategies



Continuous Transit-Oriented

Interim Panel Meeting

Christopher Ferrell, Ph.D.
Bruce Appleyard, Ph.D.
Matthew Taecker, AICP

Project Overview

- The obvious (but important) objectives:
  - Methods
  - Metrics
  - Strategies
- The not-so-obvious objectives:
  - Definitions:
    - Transit Corridor
    - Transit Corridor Livability
  - Livable Transit Corridor Typology
  - Typology/metrics "thresholds"

Definitions: Partnership's Livability Principles

Partnership for Sustainable Communities' Livability Principles	→	Proposed Transit Corridor Livability Principles
Provide more transportation choices	→	High-quality transit, walking, and bicycling opportunities
Promote equitable and affordable housing	→	Equitable and affordable housing near transit
Enhance economic competitiveness	→	Transit-accessible economic opportunities
Support existing communities	→	Vibrant and accessible community, cultural, and recreational opportunities
Coordinate and leverage federal policies and investments	→	Effective corridor government and social services
Value communities and neighborhoods	→	Healthy, safe, walkable transit corridor neighborhoods

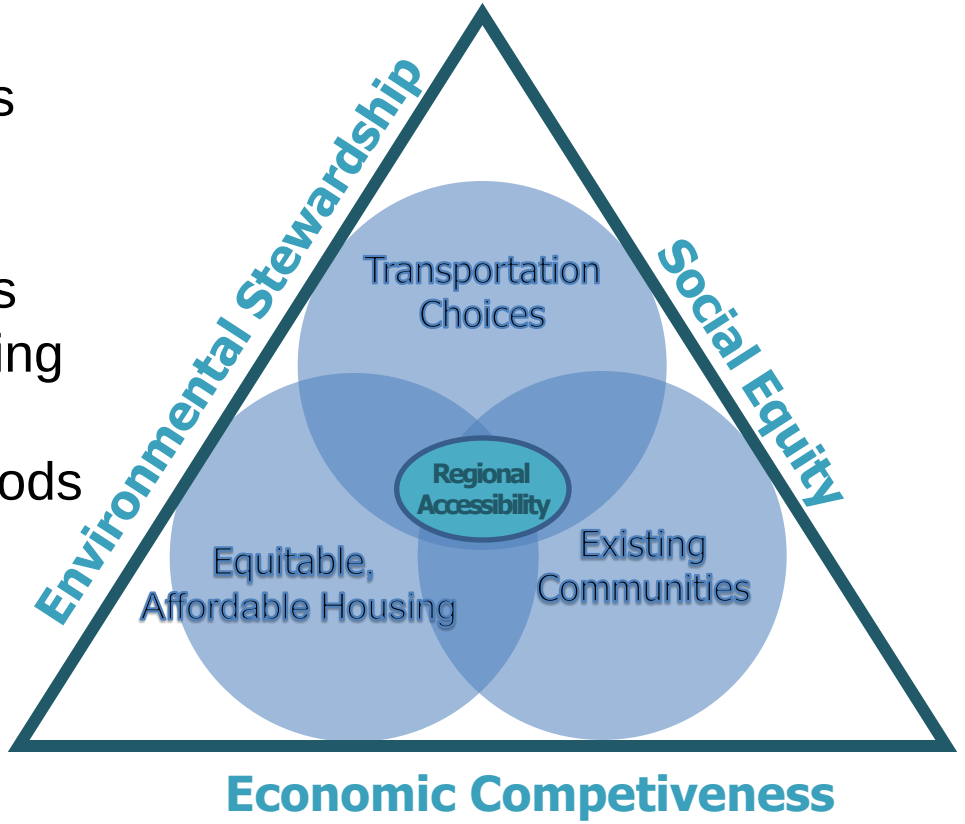
Identify the appropriate performance measures, data needs, and analytic approaches for each **Livability Principle**

From this?

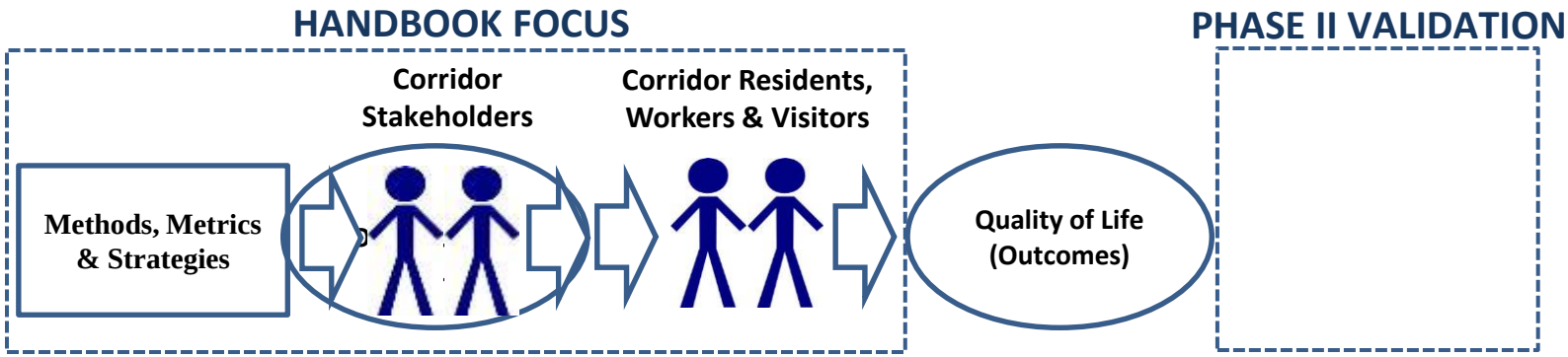
- Enhance economic competitiveness
- Coordinate and leverage federal policies and investment
- Provide more transportation choices
- Promote equitable, affordable housing
- Support existing communities
- Value communities and neighborhoods

To this?

Good Governance "Ethic"
Coordinate and leverage federal policies and investment

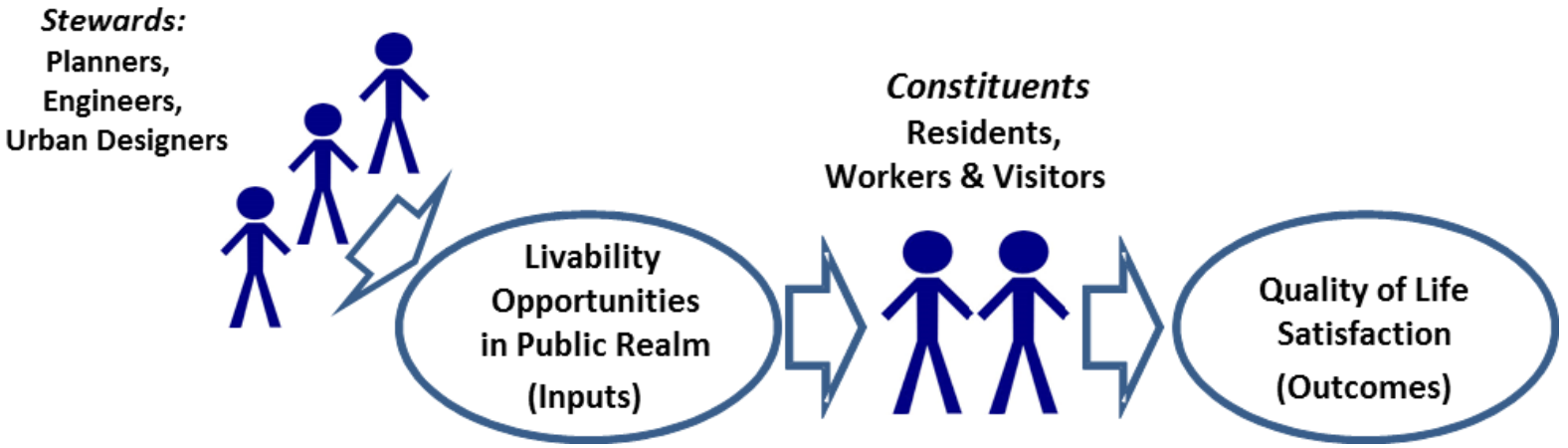


Approach Overview: Definitions

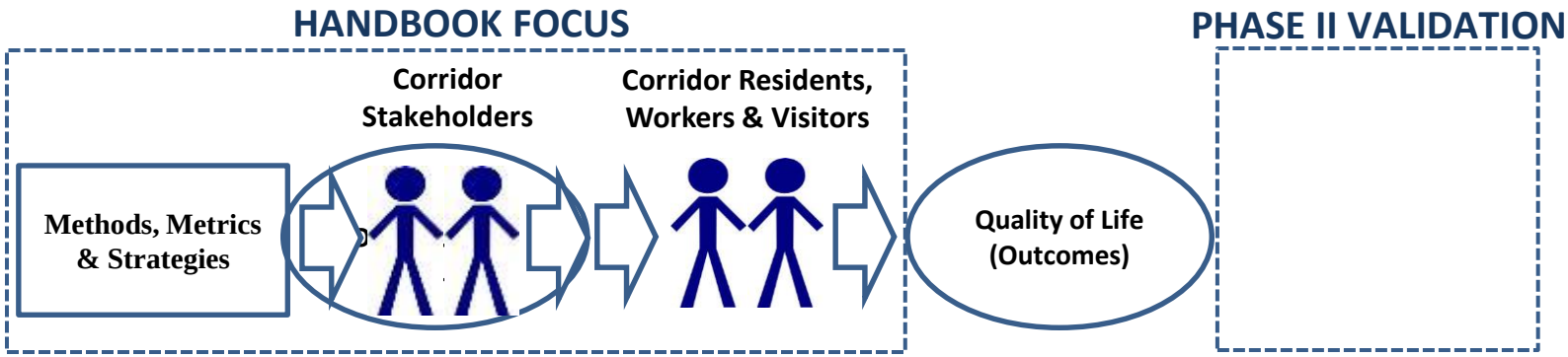


Livability

- People:
  - Key to understanding livability.
  - Convert *Livability Opportunities* into *Quality of Life Outcomes*.
- Handbook: Methods, metrics & strategies focused on enhancing opportunities.


Stewards:
Planners,
Engineers,
Urban Designers
Livability
Opportunities
in Public Realm
(Inputs)
Constituents
Residents,
Workers & Visitors
Quality of Life
Satisfaction
(Outcomes)

Approach Overview: Definitions



Livability

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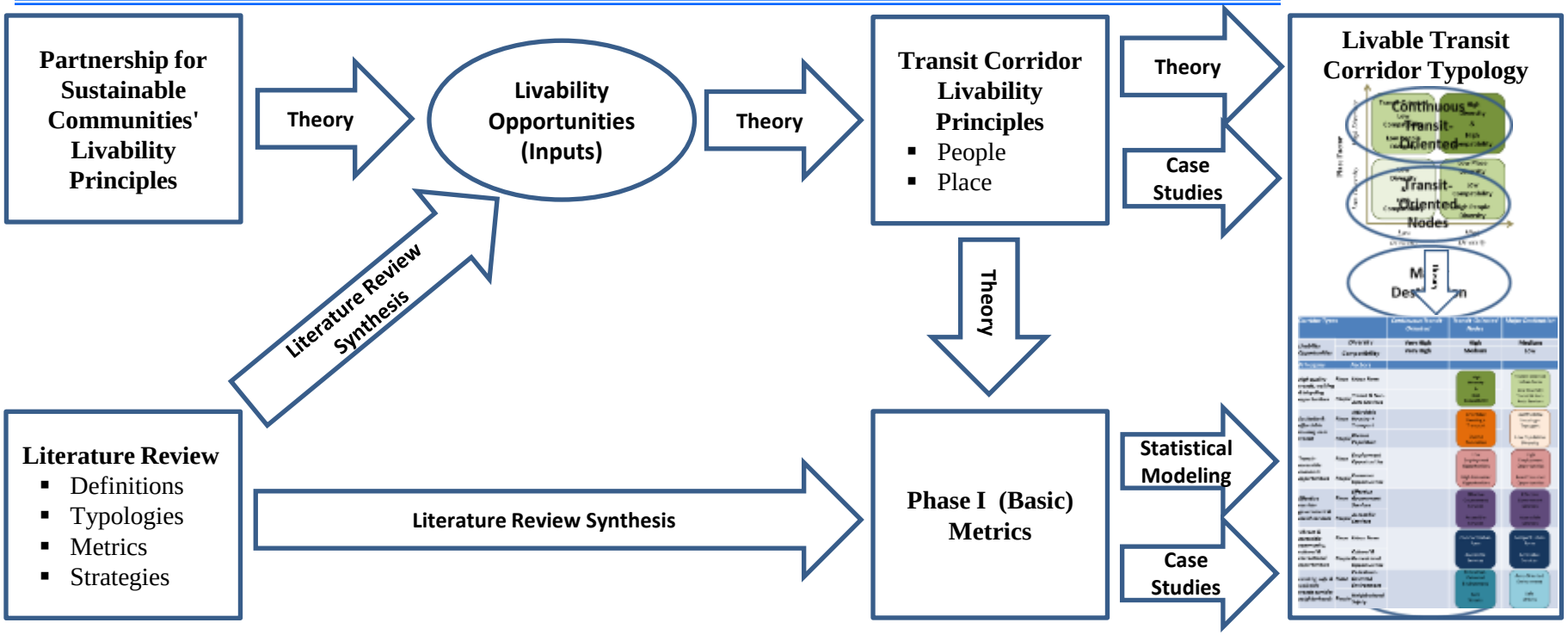
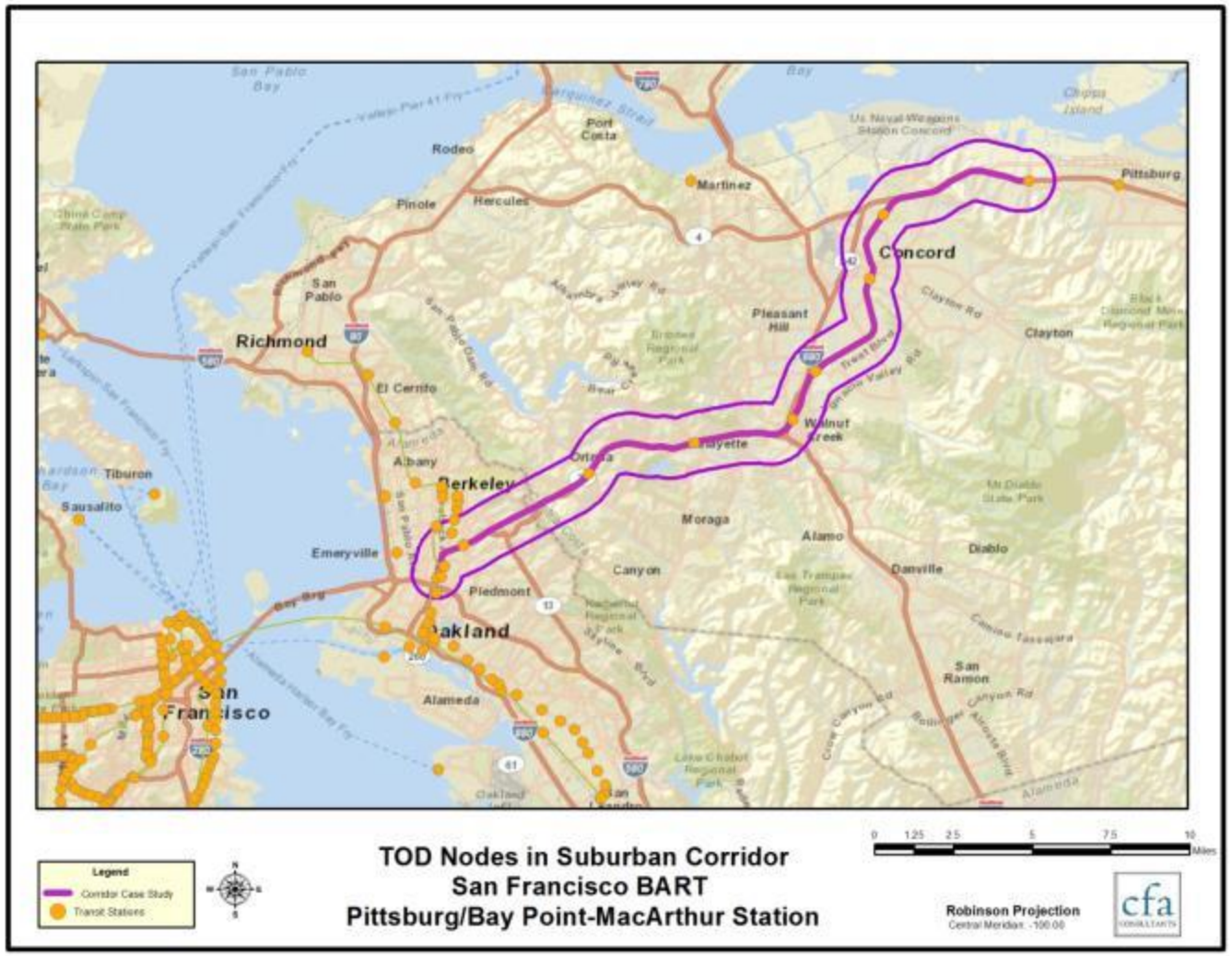
Approach Overview: Typology



Two-Pronged Phase I Approach

- Livability Principles → Transit Corridor Context
- Literature Review → Metrics → Modeling



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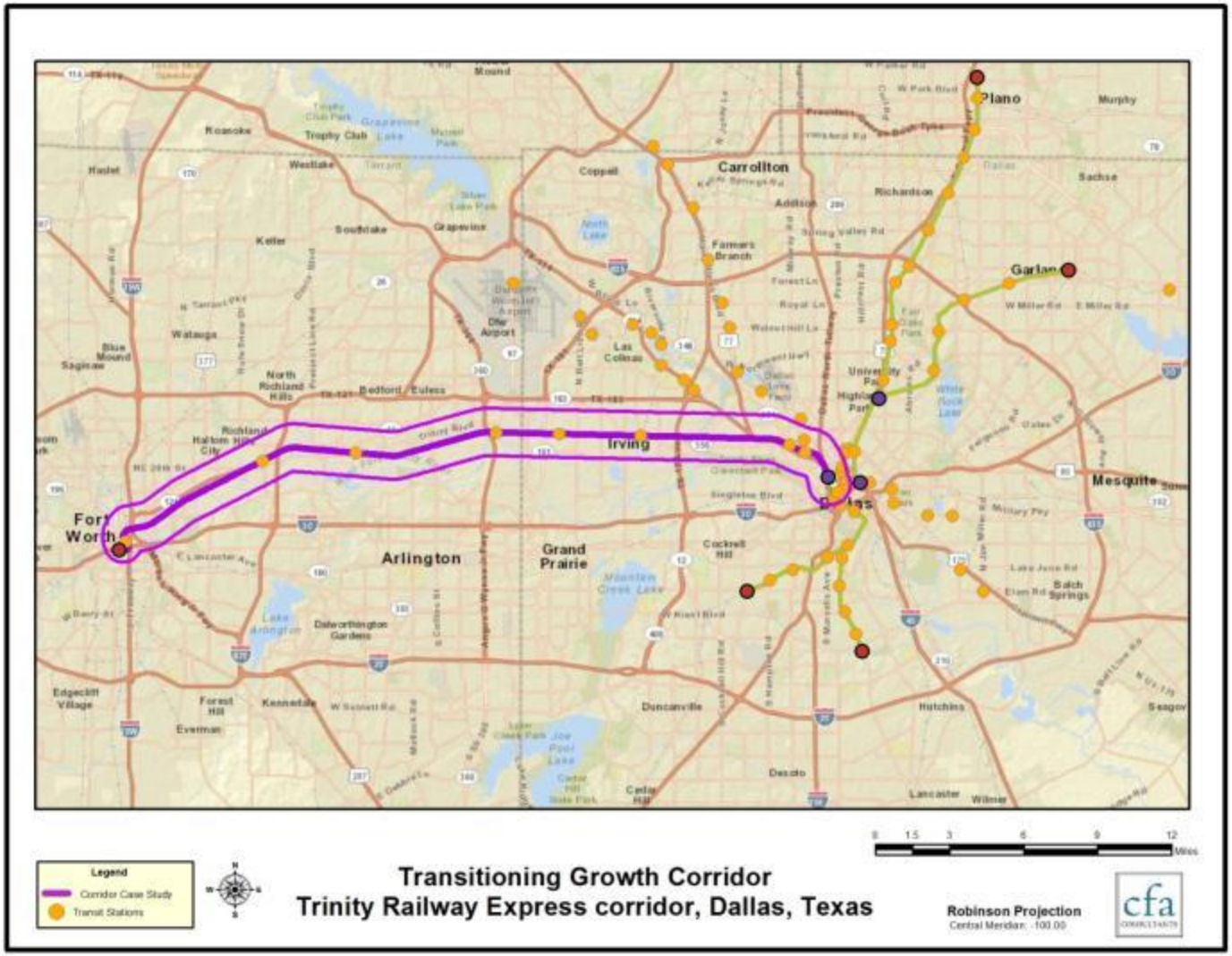

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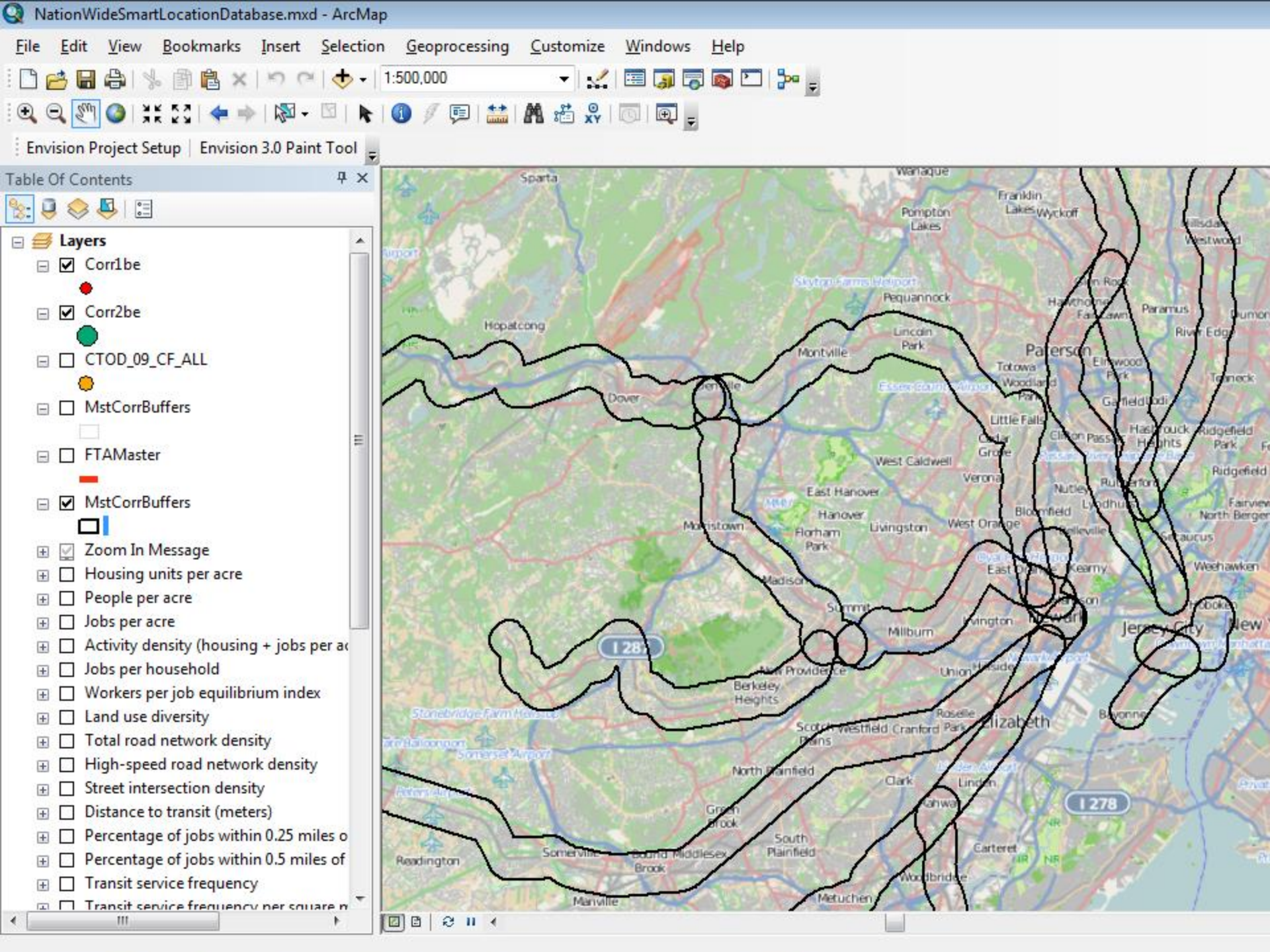
SMART LOCATION DATA

- New York Area
- Study Corridors with Geo-Demographic Data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MstCorrBuffers
FTAMaster
MstCorrBuffers
Zoom In Message
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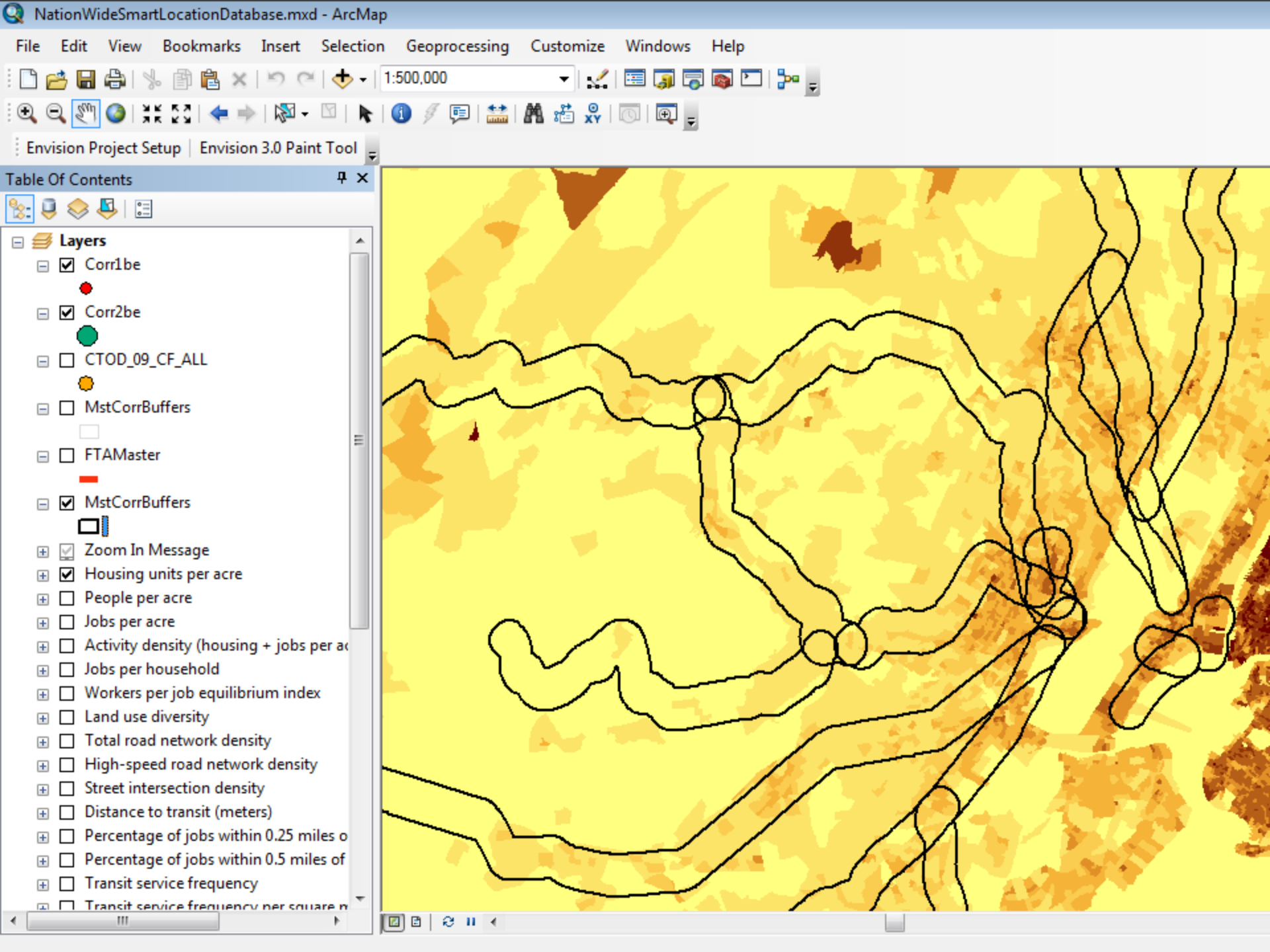
People per acre
Jobs per acre
Activity density (housing + jobs per ac
Jobs per household
Workers per job equilibrium index
Land use diversity
Total road network density
High-speed road network density
Street intersection density
Distance to transit (meters)
Percentage of jobs within 0.25 miles o
Percentage of jobs within 0.5 miles of
Transit service frequency
Transit service frequency per square m
Sparta
Pompton Lakes
Franklin Lakes
Wyckoff
Pequannock
Hopatcong
Lincoln Park
Montville
Paterson
Totowa
Woodland Park
Dover
Little Falls
West Caldwell
East Hanover
Hanover
Florham Park
Morristown
Livingston
West Orange
Verona
Nutley
Bloomfield
Kearny
Weehawken
Madison
Summit
Millburn
Jersey City
I 280
New Providence
Berkeley Heights
Union
Elizabeth
Scotch Plains
Westfield
Cranford
North Plainfield
Clark
Linden
I 278
Green Brook
South Plainfield
Somerville
Raritan
Middlesex
Brook
Carteret
Woodbridge
Readington
Manville
Metuchen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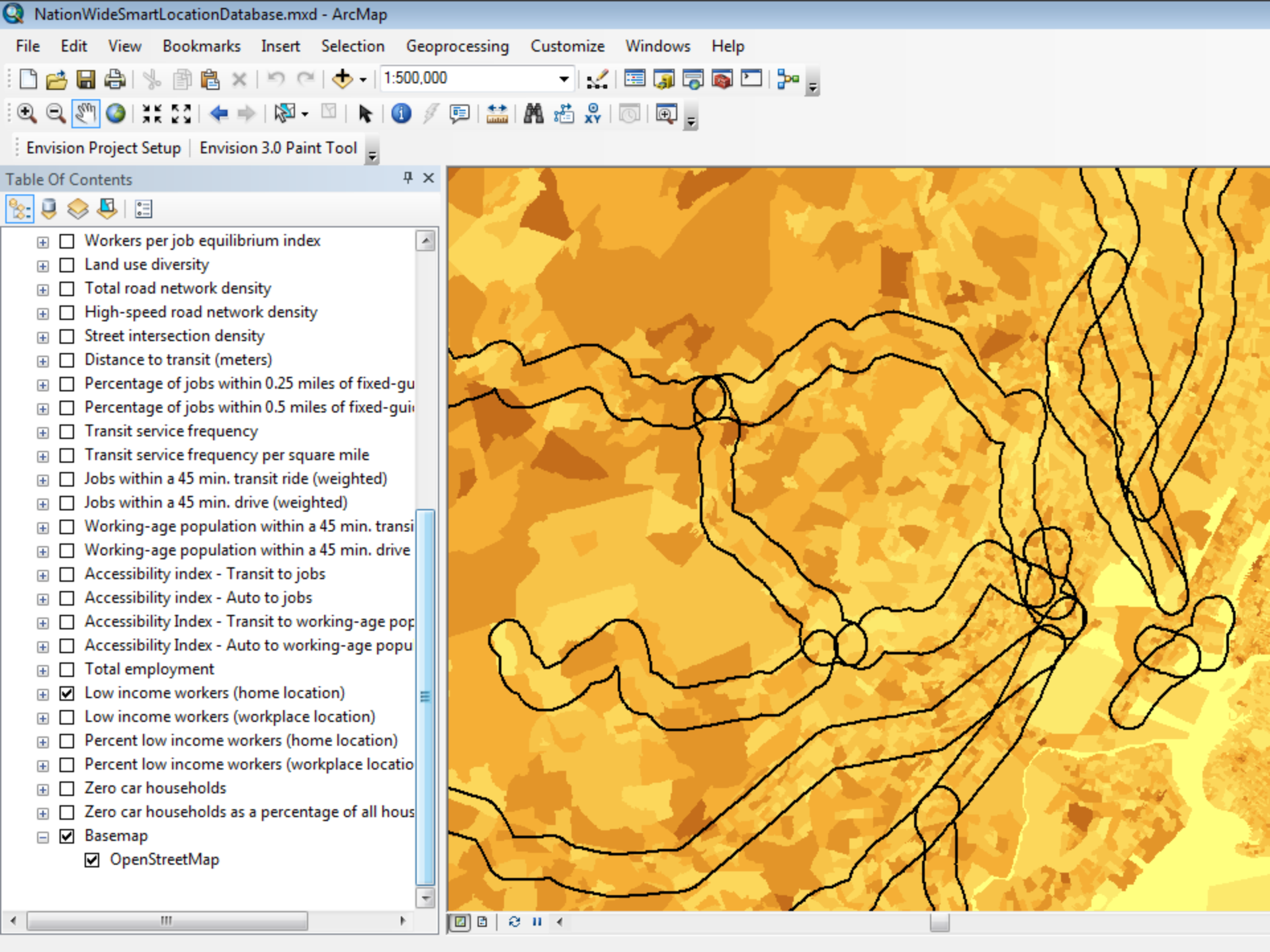
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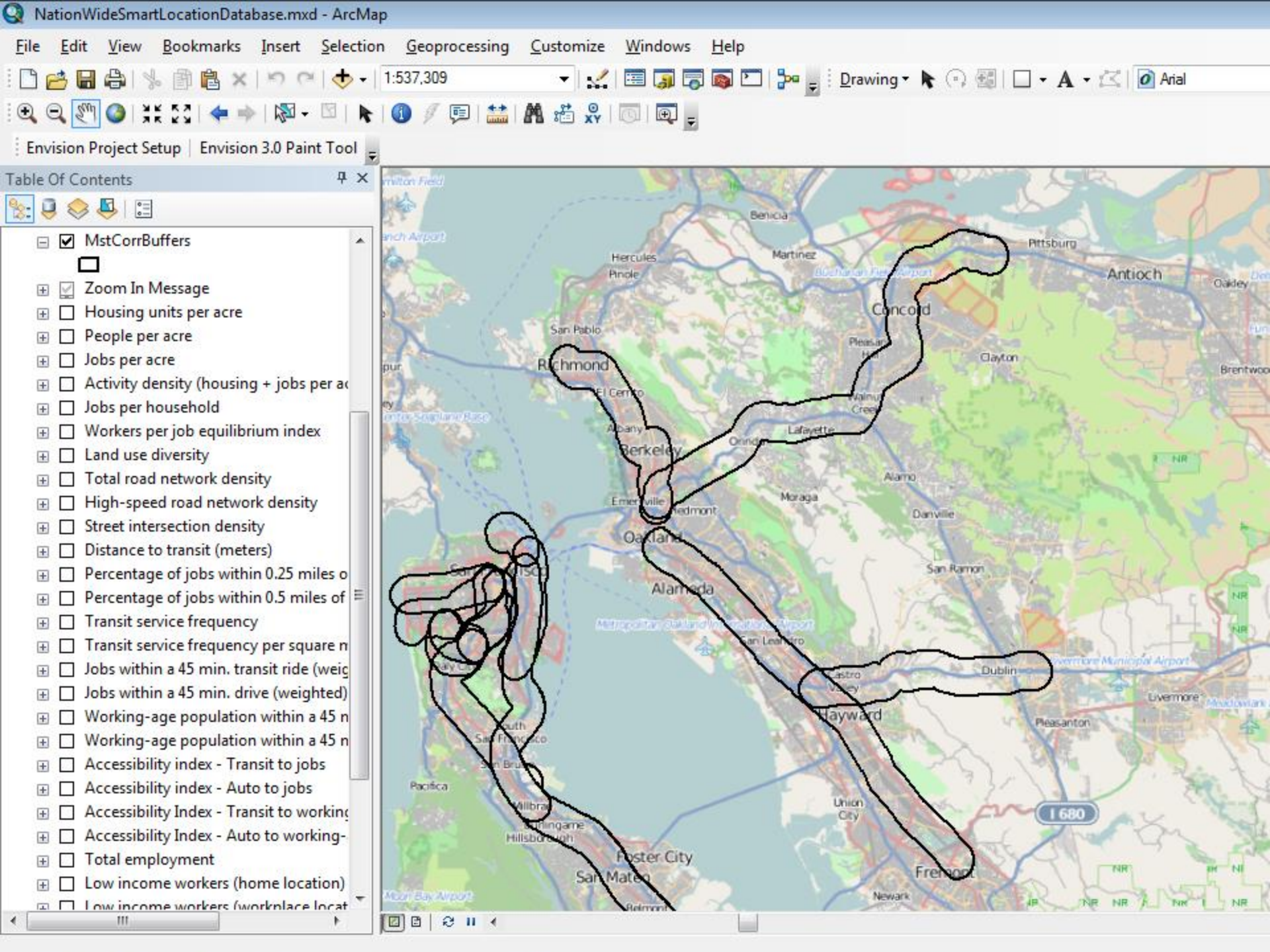
High-speed road network density
Street intersection density
Distance to transit (meters)
Percentage of jobs within 0.25 miles of fixed-gu
Percentage of jobs within 0.5 miles of fixed-gui
Transit service frequency
Transit service frequency per square mile
Jobs within a 45 min. transit ride (weighted)
Jobs within a 45 min. drive (weighted)
Working-age population within a 45 min. transi
Working-age population within a 45 min. drive
Accessibility index - Transit to jobs
Accessibility index - Auto to jobs
Accessibility Index - Transit to working-age pop
Accessibility Index - Auto to working-age popu
Total employment
Low income workers (home location)
Low income workers (workplace location)
Percent low income workers (home location)
Percent low income workers (workplace locatio
Zero car households
Zero car households as a percentage of all hous
Basemap
OpenStreetMap

SMART LOCATION DATA

- San Francisco Bay Area
- Study Corridors with Geo-Demographic Data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Working-age population within a 45 n
Working-age population within a 45 n
Accessibility index - Transit to jobs
Accessibility index - Auto to jobs
Accessibility Index - Transit to working
Accessibility Index - Auto to working-
Total employment
Low income workers (home location)
Low income workers (workplace locat
Benicia
Martinez
Pittsburg
Antioch
Concord
Hercules
Pinole
San Pablo
Richmond
El Cerrito
Albany
Berkeley
Emeryville
Oakland
Alameda
Piedmont
Orinda
Lafayette
Moraga
Alamo
Danville
San Ramon
Dublin
Livermore
Pleasanton
Hayward
Castro Valley
San Leandro
Union City
Fremont
Newark
Foster City
San Mateo
Pacifica
Millbrae
Burlingame
Hillsborough
I 680

NationWideSmartLocationDatabase.mxd - ArcMap

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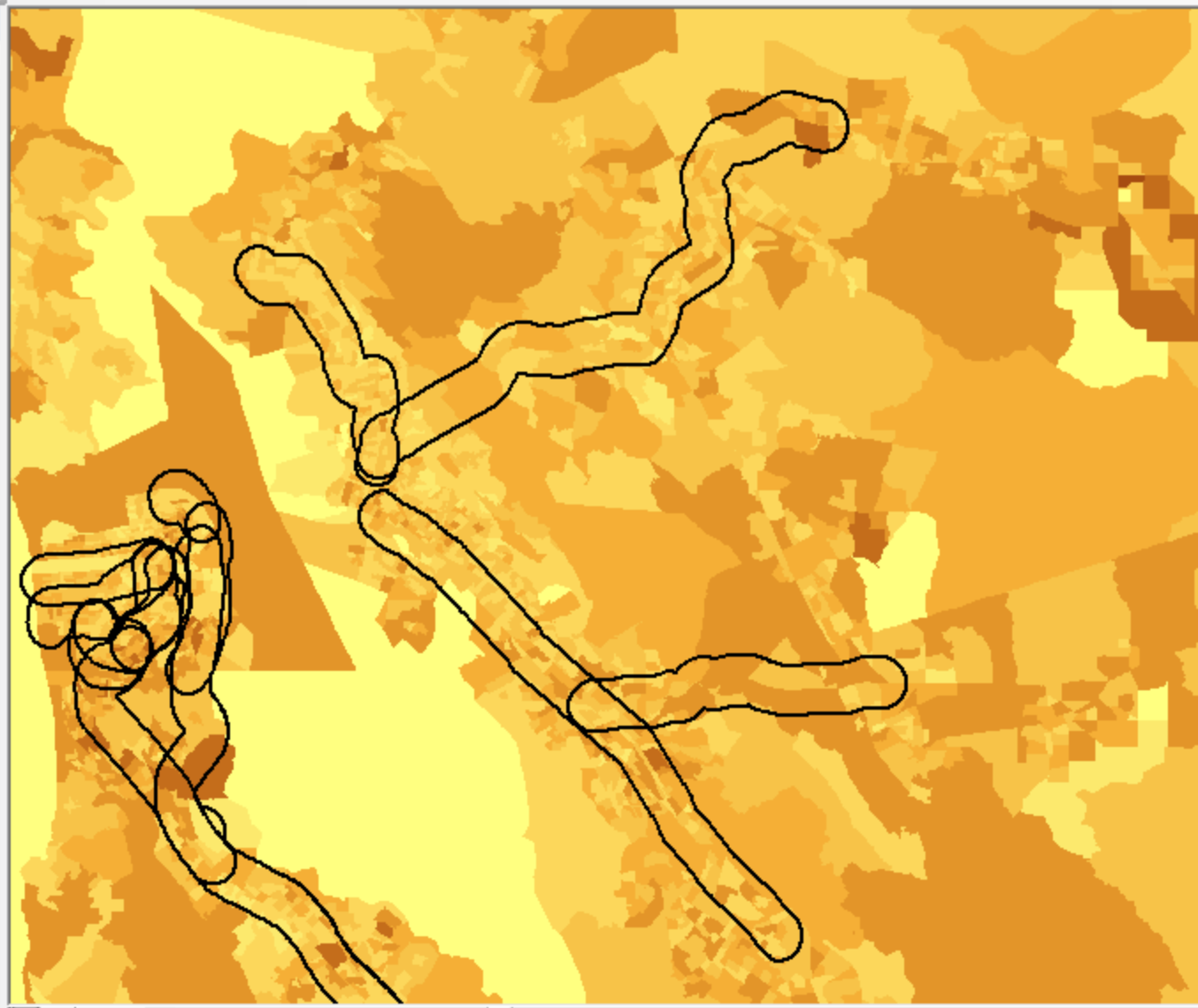
Envision Project Setup | Envision 3.0 Paint Tool

Table Of Contents

- Workers per job equilibrium index
- Land use diversity
- Total road network density
- High-speed road network density
- Street intersection density
- Distance to transit (meters)
- Percentage of jobs within 0.25 miles o
- Percentage of jobs within 0.5 miles of
- Transit service frequency
- Transit service frequency per square m
- Jobs within a 45 min. transit ride (weig
- Jobs within a 45 min. drive (weighted)
- Working-age population within a 45 m
- Working-age population within a 45 m
- Accessibility index - Transit to jobs
- Accessibility index - Auto to jobs
- Accessibility Index - Transit to working
- Accessibility Index - Auto to working-
- Total employment
- [x] Low income workers (home location)
- Low income workers (workplace locat
- Percent low income workers (home lo
- Percent low income workers (workpla
- Zero car households
- Zero car households as a percentage c
- [x] Basemap
  - [x] OpenStreetMap



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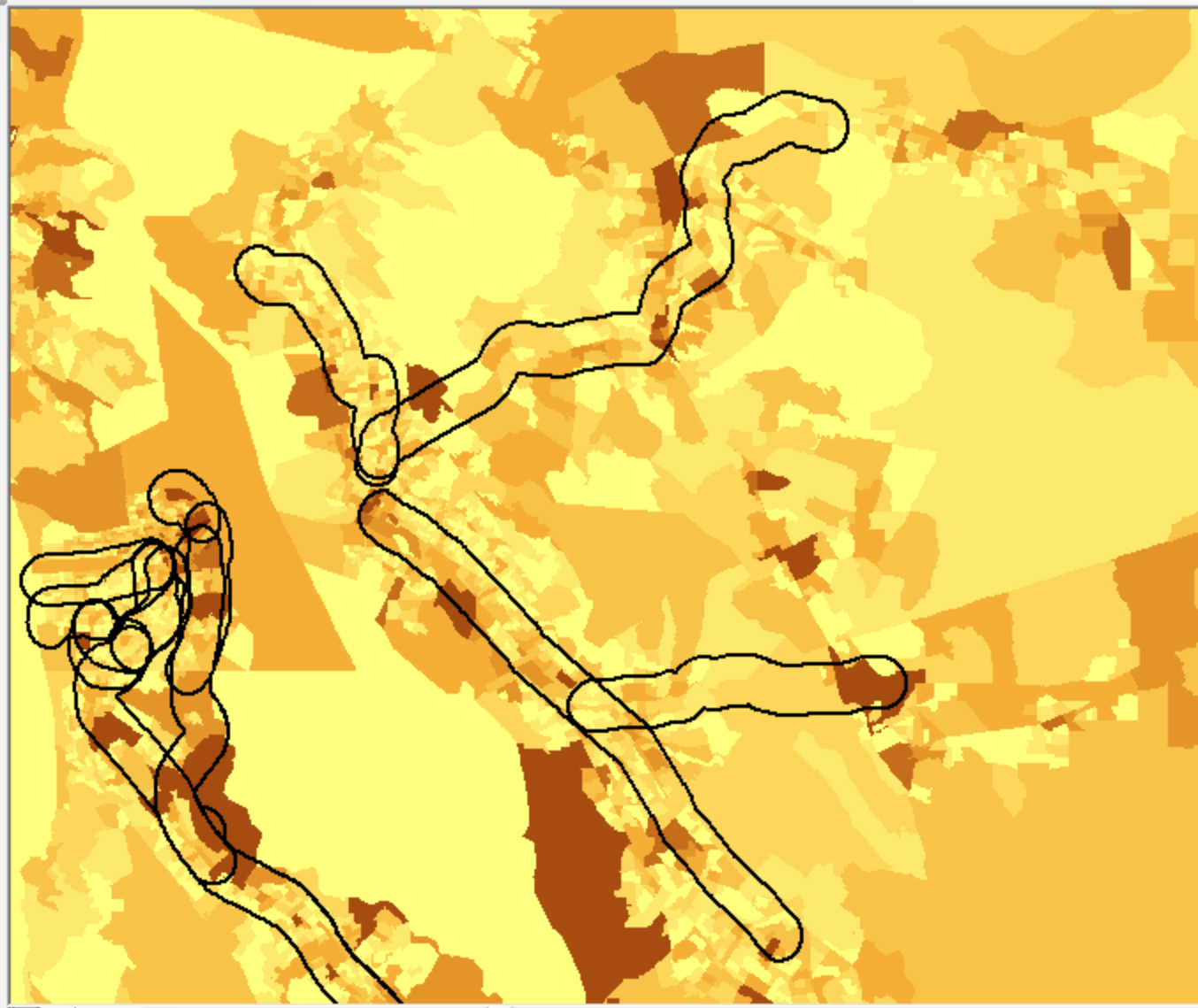
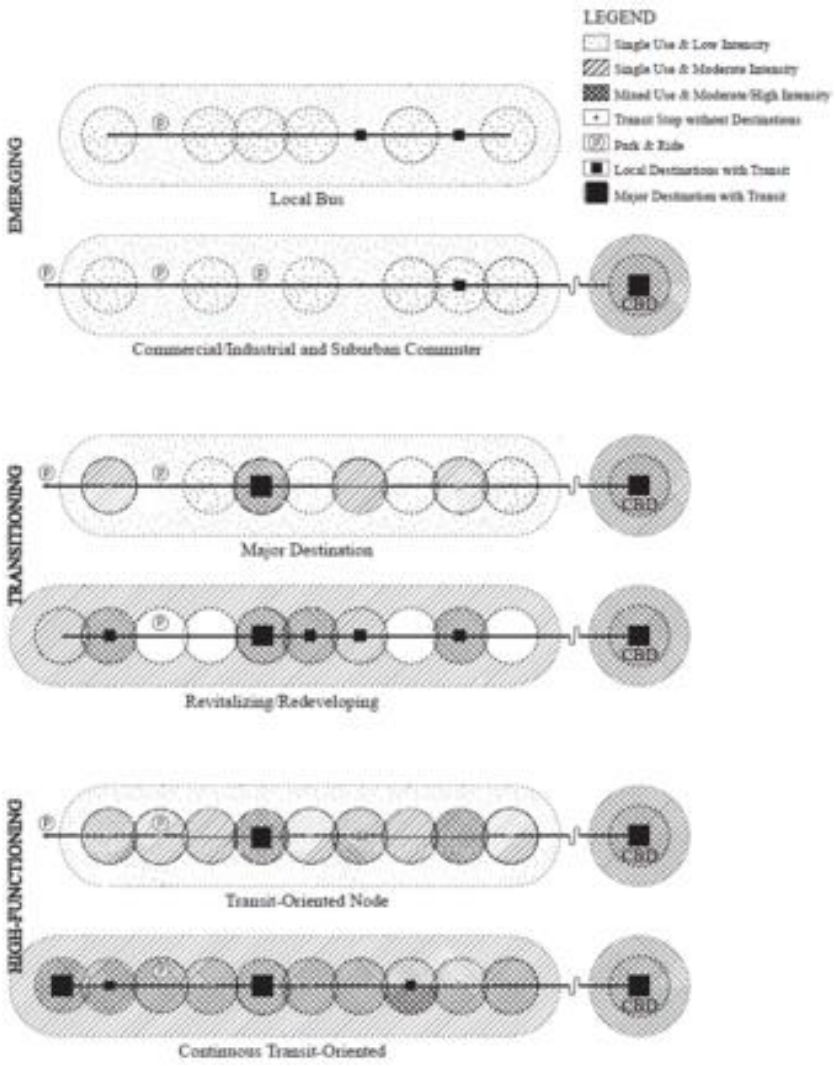


Corridor Types



Key Issues:

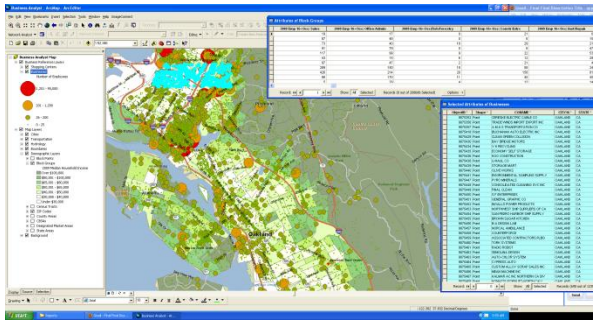
- Homogeneous corridors are rare.

Smart Mobility Framework Implementation Study

- SB 375, The Sustainable Communities and Climate Protection Act of 2008, effectively mandates public GIS- based scenario planning processes statewide

Existing Built Form: Neighborhood/Street Design

Public Processes

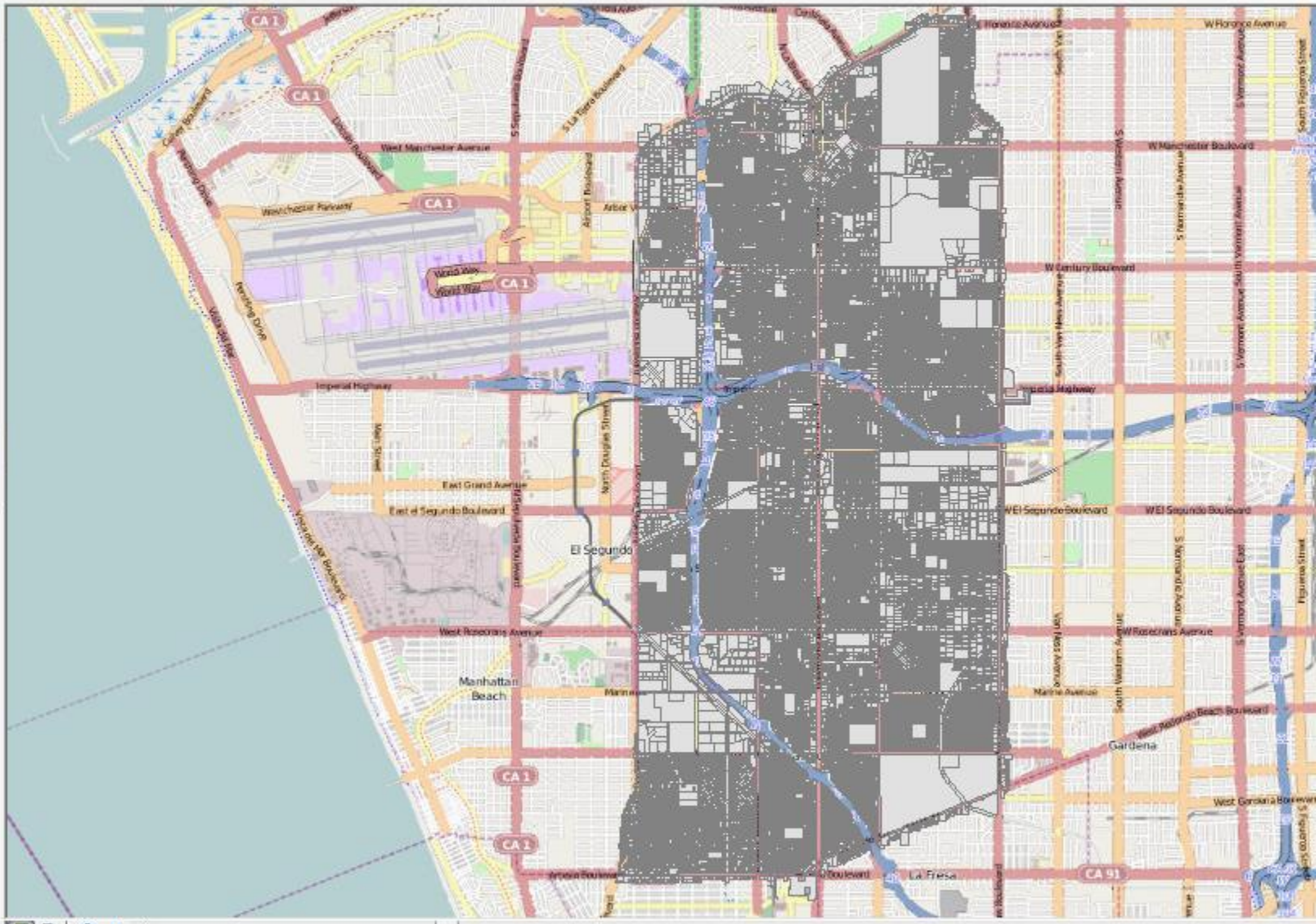


Future Land Use/Transportation Scenarios

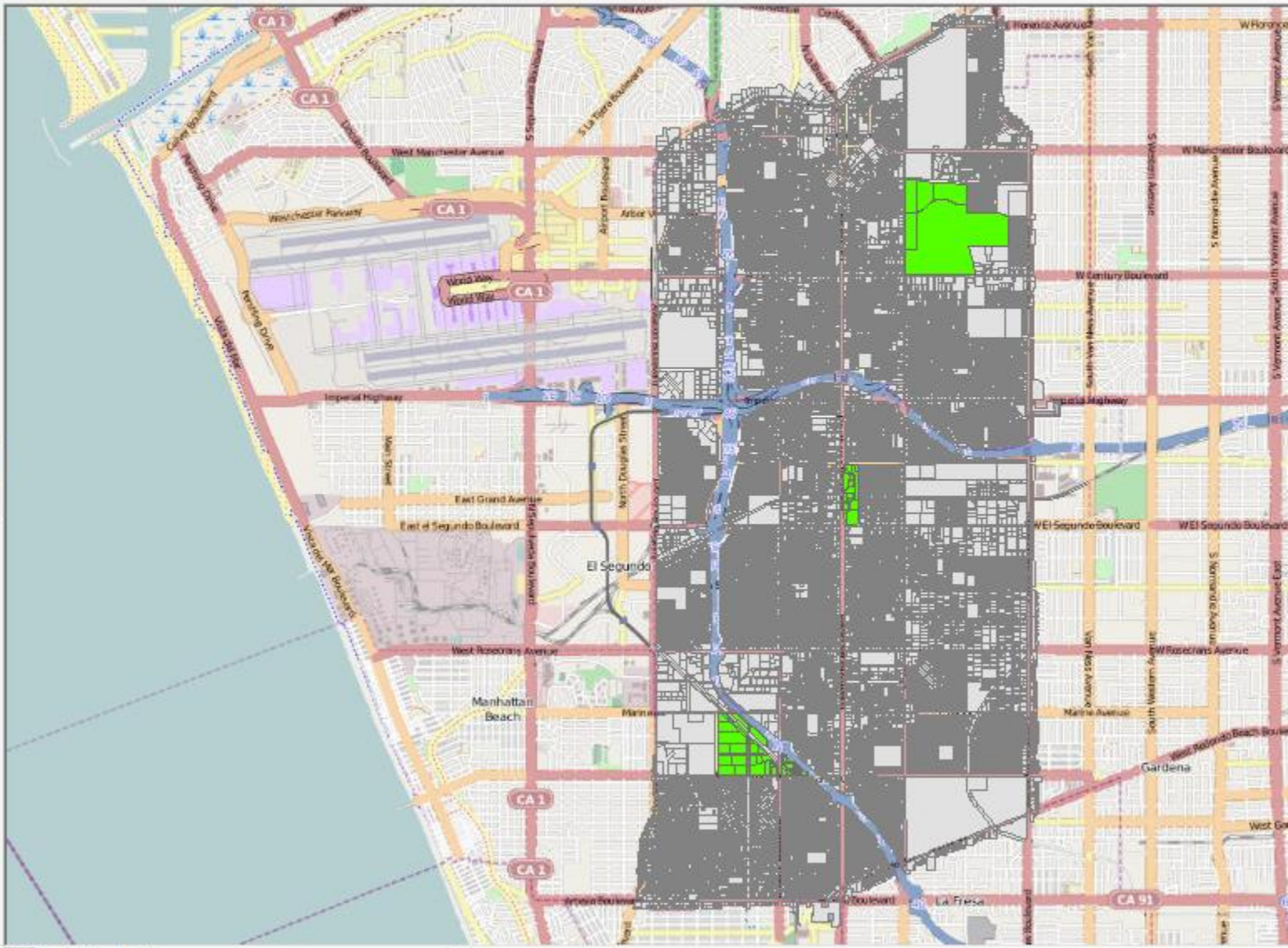
Informing Policy and Design Decisions

Knowledge is Power!!

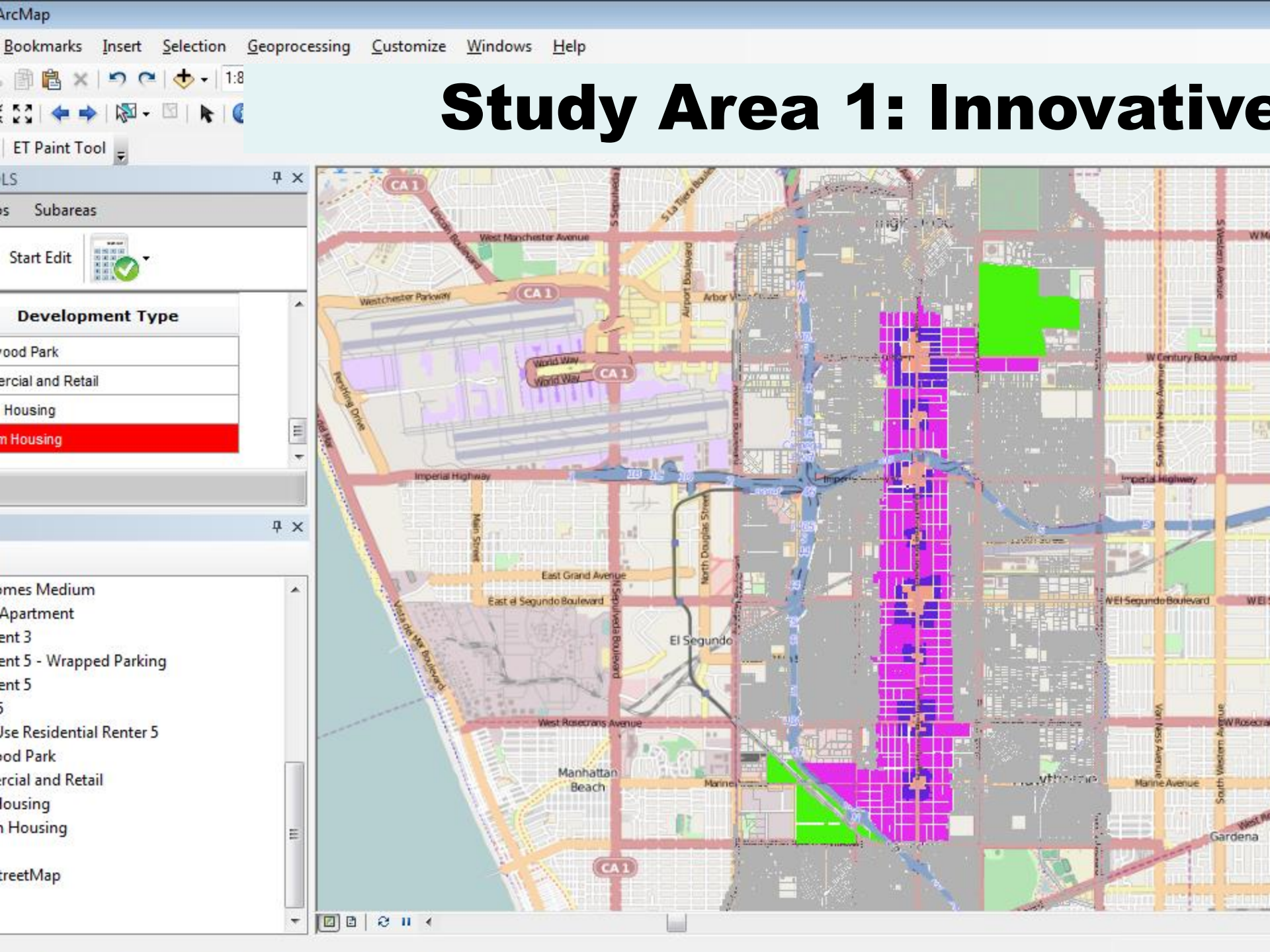
Study Area 1: Existing



Study Area 1: Traditiona



Study Area 1: Innovative



Recommended Performance Measures

Performance Metric	Project/Purpose	Tool/Data	Comments
Average Proximity to Employment (30/45 min Transit)	Location of priority areas (nodes) for local Ped/Bike/NEV/Transit projects & regional connections	Travel Demand Model/ ET+ (GIS)	SBCCOG – Should incorporate distance in addition to travel time
Average Proximity to Employment (20/45 min Drive)	Location of priority areas (nodes) for local Ped/Bike/NEV/Transit projects & regional connections	Travel Demand Model/ ET+ (GIS)	SBCCOG – Should incorporate distance in addition to travel time
Average Vehicle Occupancy (AVO)	Park-and-ride lots;	Travel/Survey Demand Model	
Modal Travel Time and Cost	Transit, Bike, NEV Projects	Travel Demand Model	
NEV, Bicycle, Walking Facilities	NEV lanes, NEV subsidies; bike lanes; PEV Readiness Plan; bike/ped improvements	ET+ (GIS)/ CSLOS tool	
Percentage of Trips by Transit	Mobility Hub, Neighborhood vanpool, transit improvements	Travel Demand Model ET+ (7D,TXD, Sketch 7)	
Percentage of Trips by NEV	NEV lanes, NEV Subsidy; PEV Readiness	Research	SBCCOG – Need to include NEV mode
Percentage of Trips by Bicycling	Bike lanes, safe routes to school	Census/ACS/Research/LA Bike Model	
Percentage of Trips by Walking	Livable Boulevard, safe routes to school	Census/ACS ET+ (7D,TXD, Sketch 7)	
Quantities of Criteria Pollutants and GhGs	NEV Infrastructure & Incentives	Travel Demand Model, EMFAC	Caltrans – more correlated to VHT than VMT
Vehicle Hours of Delay (VHD) or Person Hours of Delay	Intersection Improvements, Railroad Grade Separations, Corridor System Operations/ITS, Hwy on/off-ramps,	CMF Tool, Travel Demand Model, CSLOS tool	
Vehicle Miles Traveled (VMT) or Person Miles Traveled	Transportation/Land Use Alternatives Analysis	Travel Demand Model ET+ (7D,TXD, Sketch 7)	
Vehicle Hours Traveled (VHT)	Transportation/Land Use Alternatives Analysis	Travel Demand Model ET+	Caltrans – More useful indicator than VMT
VMT per Capita by Speed Range	Transportation/Land Use Alternatives Analysis	Travel Demand Model	
Number of Crashes	Transportation/Land Use Alternatives Analysis	SWITRS, Travel Demand Model, ET +	Metro – Safety is an important goal to measure
Number of Vulnerable User Crashes	Transportation/Land Use Alternatives Analysis	SWITRS, Travel Demand Model, ET +	Metro – Safety is an important goal to measure

Other Candidate Measures				
Performance Metric	Project/Purpose	Tool/Data	Comments	Future Effort/Action (High, Medium, Low)
Travel Time by Mode	Transit, Bike, NEV Projects	Travel Demand Model, ET+	SBCCOG – Better indicator of system impacts than percentage of trips	
Travel Distance by Mode	Transit, Bike, NEV Projects	Travel Demand Model, ET+	SBCCOG – Better indicator of system impacts than percentage of trips	
DDI: "Destination Distance Index."	NEV lanes, NEV Subsidy; PEV Readiness	Travel Demand Model, ET+	SBCCOG – This is similar to the CPI which is based on the price of a standard bundle of goods. A decreasing DDI indicates that a neighborhood is becoming more compact.	
Average Trip Distance	- Priority Development Area ID - Priority areas for bike/NEV/ped projects	Travel Demand Model, ET+	SBCCOG / Metro – More sensitive to land use redistribution	
Resource Impacts (largely result from the variation in land-use scenarios.)	- Priority Development Area ID - Priority areas for bike/NEV/ped projects	ET+ GIS	Metro – Indicators of fuel, land, water, etc. usage	
Travel costs	- Priority Development Area ID - Priority areas for bike/NEV/ped projects	Travel Demand Model, ET+/GIS	Metro – Metro's prosperity priority	
Multi-Modal Travel Reliability	- Priority Development Area ID - Priority areas for bike/NEV/ped projects	Travel Demand Model, ET+	SBBCOG – Time variability disappears when distances become short.	
Equitable Distribution of Impacts: Proportion of Disadvantaged Persons Impacted	All Projects Important for Cap & Trade	Travel Demand Model, ET+/GIS	Metro – Important for Cap & Trade Need to overlay census socio-demographic data	
Equitable Access and Mobility: Travel Time and Cost for Disadvantaged Persons to Total Population	All Projects Important for Cap & Trade	Travel Demand Model, ET+/GIS	SBCCOG – Important for Cap & Trade Need to overlay census socio-demographic data	
PEV registrations by vehicle type	Monitor fleet conversion from ICE to PEV	Polk data to track PEV registrations	SBCCOG – Use Polk data to track PEV registrations	
"Transit Service Index" (TSI)	Compare transit inputs to service capacity and frequency	Travel Demand Model, ET+/GIS, Metro Operations	SBCCOG – allow cities and sub-regions to compare the transit inputs in the form of service capacity and frequency	
Energy Consumption by Mode	- Priority Development Area ID - Priority areas for bike/NEV/ped projects	Travel Demand Model, ET+/GIS, Mode-Energy table	SBCCOG – VT and VMT in a ZEV is not a problem for air quality, GHG emissions or gasoline consumption	

The What? Why? and Who? of Performance Measures

"What?" refers to the *Meaning/Associations* and *Context* of the performance measures.

Meaning/Associations

- What do the measures tell us?
- What are the *associations* measures have to policy, as well as to each other,
  - can be established from empirical research, theory, and/or practice
- For example, research tells us that accessibility/centrality is often associated with lower VMT, vehicle use
  - *Asociations* can also refer how measures interact and are related to each with each other. For example, lower VMT leads to lower emissions and lower and Housing + Transportation costs.

- ***Context:***
  - What is the environment in which these measures are being applied? What are the characteristics of the built form, transport facilities, scale (e.g., Street design, light rail facility, freeway, socio-demographics, etc.)

- Combining Associations and Context
- For example, in an area with High Job Centrality, we should expect lower VMT. If not, than something is missing. In the case of the SBCC subregion, perhaps facilities for non-auto and/or NEV travel.

The What? Why? and Who? of Performance Measures

Why?

- Essentially refers to the purpose of the measure. Once the *meaning* of the measures and the *context* within which they are being applied is established, attention should turn to the purpose for which the measures are used.

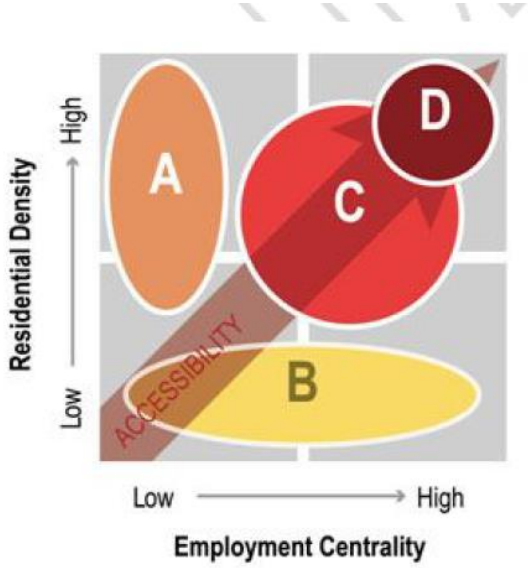
- PURPOSE: *What is the measure going to be used for?*
  - There are at least four purposes:
    - Benchmarking/Assessment (Diagnosis):
    - Policy Decision-making(Prognosis);
    - Forecasting.
    - Monitoring;

  A measure can be used for all these different purposes, at different times, and for various processes.

The What? Why? and Who? of Performance Measures

- **Who?**
- Refers to the agencies and stakeholders who will use these data and the decision processes in which the measures are applied.

- **Transportation Agencies** are concerned with access along concerns relating to transit ridership levels, capital investment decisions a various modes and at the local and regional scale.
- **Municipal Governments** set land use and standards for priv authority over local streets and infrastructure. Municipal policies also relat and other dimensions of livability.
- **State Agencies** have responsibility for complementary policies pe environment, economic development, and social services
- **Private Developers** and business interests deliver most non-gc forms of development within regulatory limits and procedures.
- **Advocacy Groups** represent an array of concerns that may foc groups) or a specific interest (such as affordable housing or bicycling).
- **Community Members** who live or work in the areas are central stakeholders, regardless of whether they are represented by an organization.



SMF/CSPP Measure Framework to Guide Land Use & Transportation Decisions

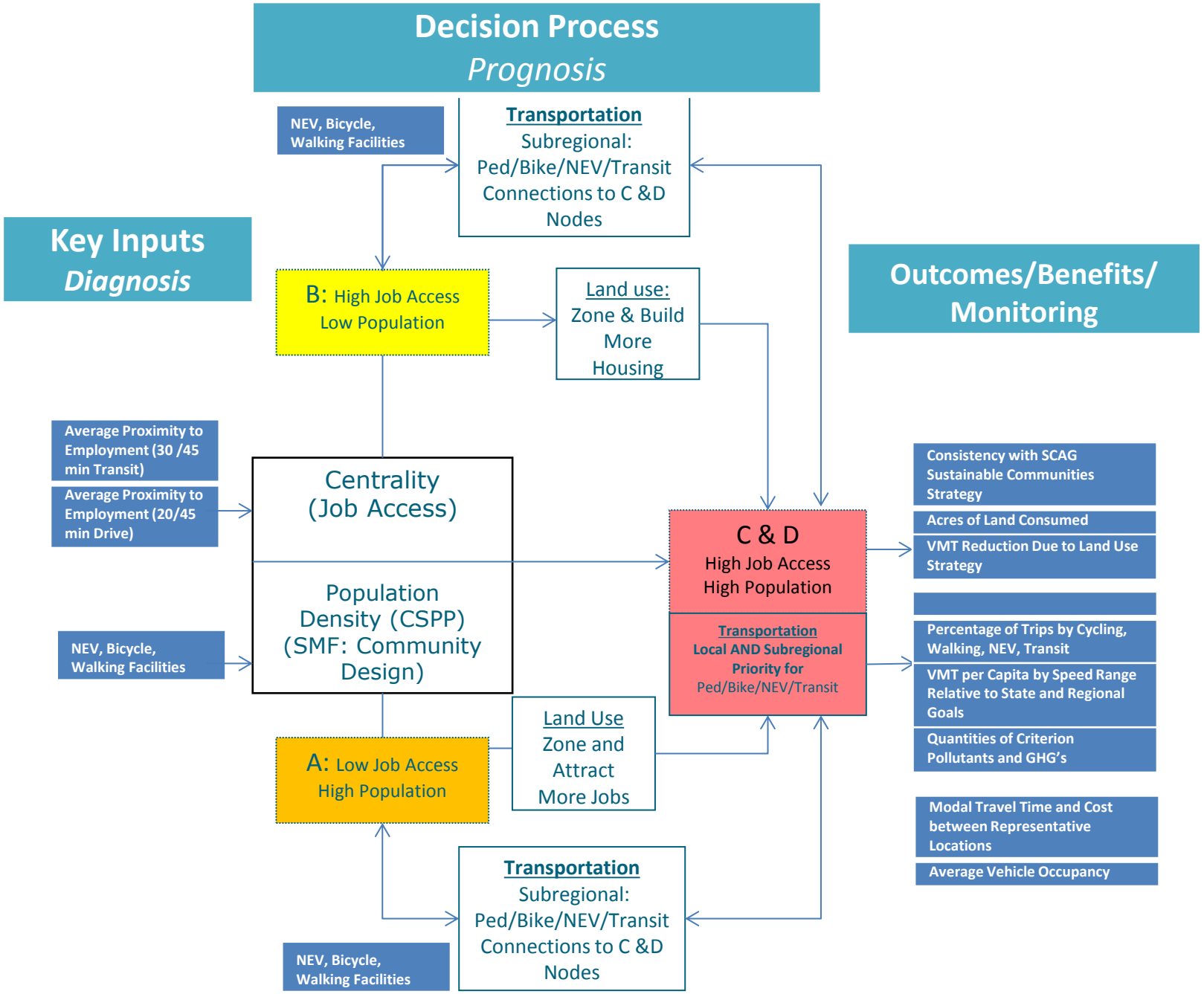
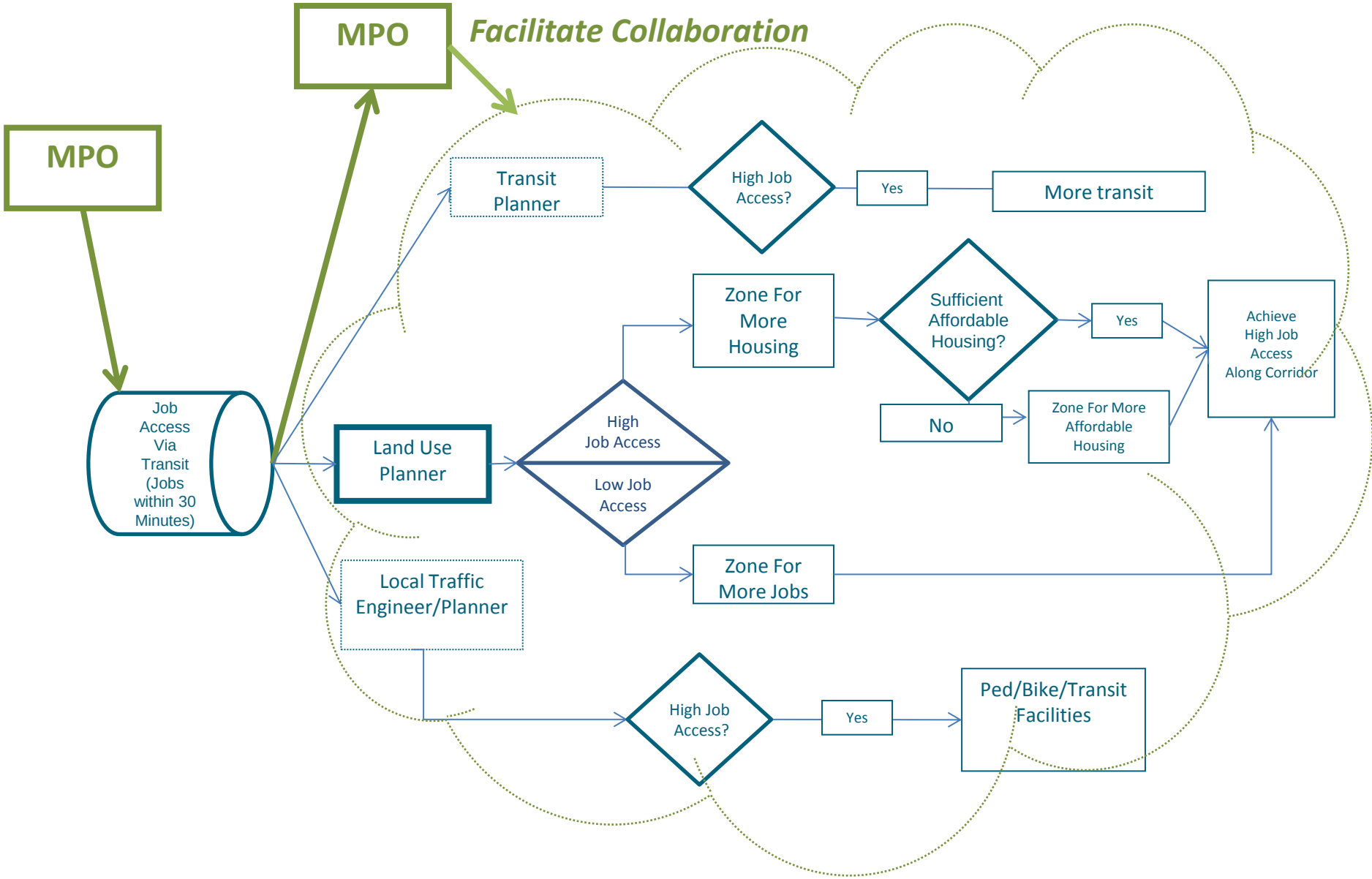


Illustration of how Livability Metrics can be used to Guide Corridor Livability Strategies

Production of Metric	Use of Metric	Action upon Metric	Outcome



Essential Measures for Land Use/Transportation Strategy Decisions

Policy Solutions In Red

Regional Perspective

Responsibility to Act upon Measures

Local Perspective

Flexible, Inclusive Zoning

Local Government

Fed/State/Regional Incentives For Development

Walkability

Demand
Local Accessibility
Network walkscore
transit score
Supply
Intersection Density
Transit LOS

Transportation Infrastructure & Incentives

Transit Oriented Development

Regional Accessibility Jobs Within 30' of Transit & 20' Auto

Regional Location of Jobs/housing

Density

Diversity

Design

Transit Access

- Transit trips per capita
- Workers commuting by transit, bicycle, or foot
- Vehicle miles traveled per capita

Developer Incentives

Occ. Matched Jobs Within 30' of Transit & 20' Auto of Low-income Housing

Accessible Affordable Housing (near transit)

Number of Affordable homes and rental units Near employment centers and/or well-served by transit

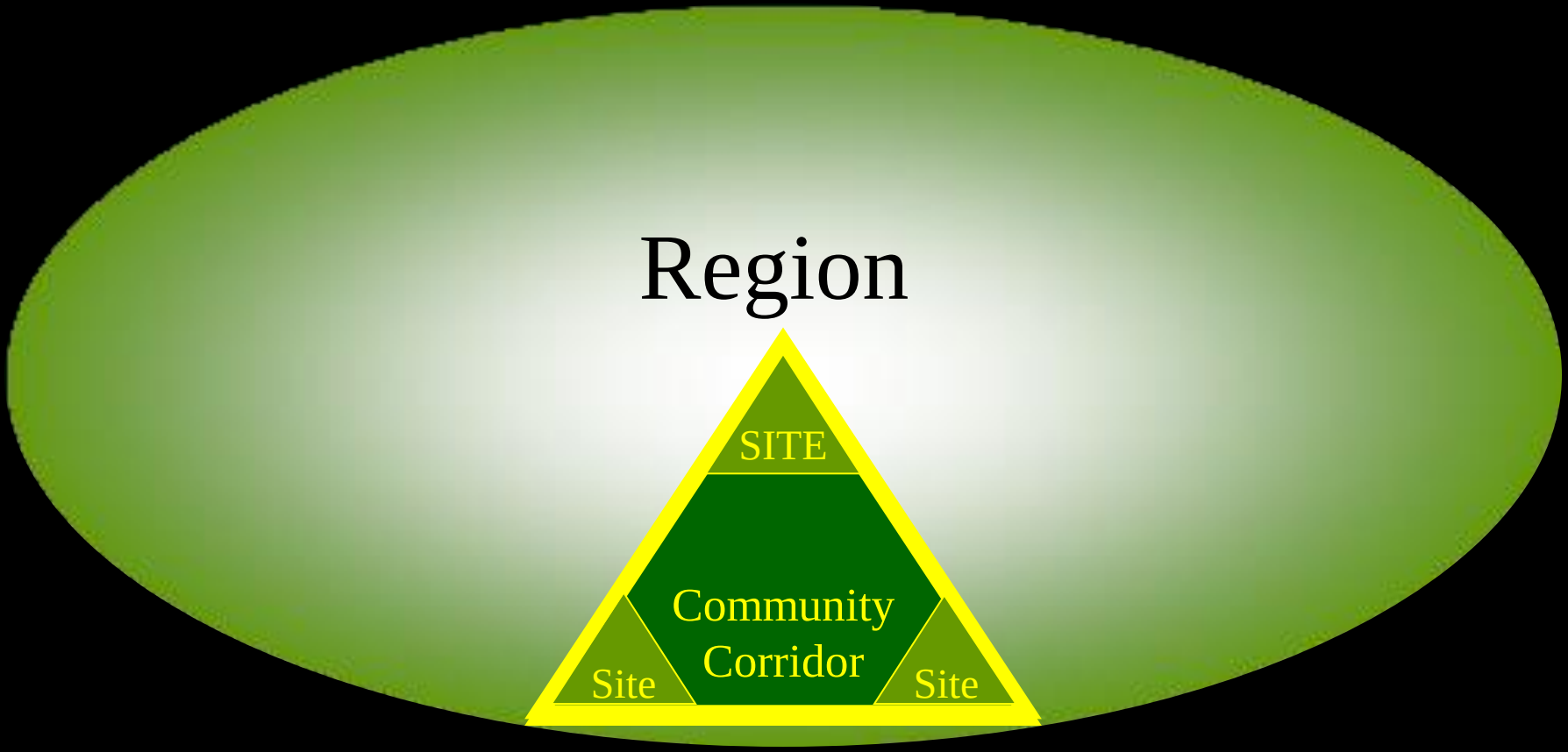
Housing & Transportation Index

LEMs

Housing Affordability

Affordable Housing Incentives

Big Solution: Transport/Land Use Coordination
For Realizing Sustainability Livability and Equity
"Beyond Tribes"



Bruce Appleyard, MCP, AICP
brucea@serapdx.com

Metro Countywide Sustainability Planning Policy

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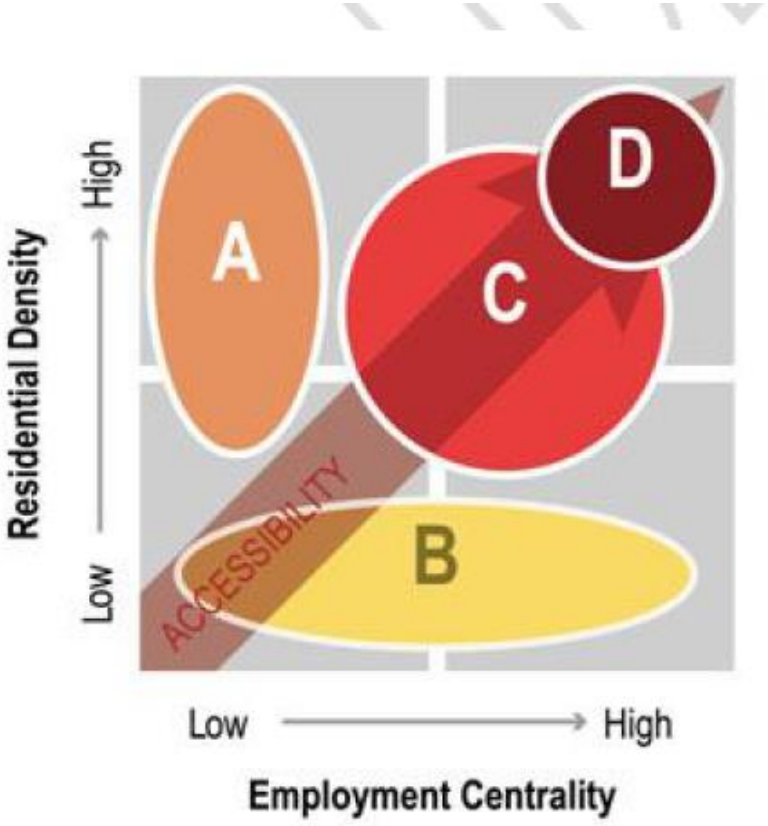


Figure 2.1 Principles and Priorities

Connect

Connect People and Places

Access. Better integrate land-use and transportation planning to reduce trip lengths and increase travel choices.

Prosperity. Reduce transportation costs for residents and provide the mobility necessary to increase economic competitiveness.

Green Modes. Promote clean mobility options to reduce criteria pollutants, greenhouse gas emissions, and dependence on foreign oil.

Create

Create Community Value

Healthy Neighborhoods. Improve public health through traffic safety, reduced exposure to pollutants, and design for walking and biking.

Community Development. Design and build transportation facilities that promote infill development, build community identity, and support social and economic activity.

Urban Greening. Enhance and restore natural systems to mitigate the impacts of transportation projects on communities and wildlife.

Conserve

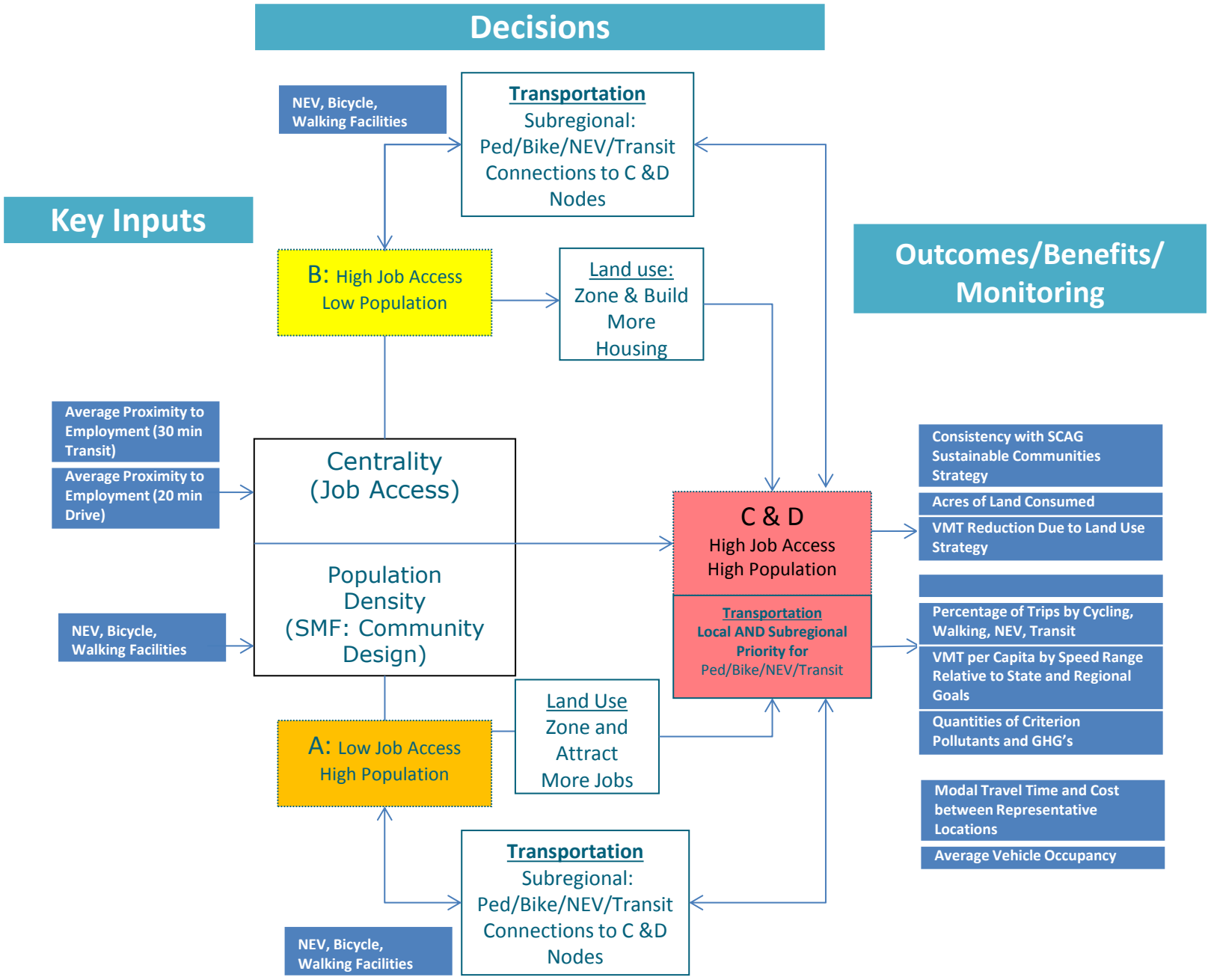
Conserve Resources

Context Sensitivity. Build upon the unique strengths of Los Angeles County's communities through strategies that match local and regional context and support investment in existing communities.

System Productivity. Increase the efficiency and ensure the long-term viability of the multimodal transportation system.

Environmental Stewardship. Plan and support transportation improvements that minimize material and resource use through conservation, re-use, re-cycling, and re-purposing.

SMF/CSPP Measures to Guide Land Use & Transportation Decisions



Toward a Livability Ethic to Guide Planning and Design Decisions

- ***"pursuit of happiness"***

- ***Livability could be:***
- ***A collection of People and Place <u>Opportunities</u> for individual s to pursue a satisfying quality of life…***
- ***But there should be an ethic.***

- ***…. without unduly limiting the livability opportunities of others.***

Bruce Appleyard, PhD, AICP
appleyard1@gmail.com

Reaching out to Overcome the De-Humanizing Forces of Auto-Domination

Reaching out to Overcome the De-Humanizing Forces of Auto-Domination

Reaching out to Overcome the De-Humanizing Forces of Auto-Domination

Bruce Appleyard, AICP
appleyard@berkeley.edu

Knowledge is Power: Measuring, Understanding and Realizing Social Equity in Scenario Planning

- **Measure and Understand:**
  - How do we measure and understand equity?
- **Realize:**
  - How are equity issues used in Scenario planning?
  - **Realize:** How is Equity being manifest to inclusive engagement?

Bruce Appleyard, PhD, AICP
appleyard1@gmail.com

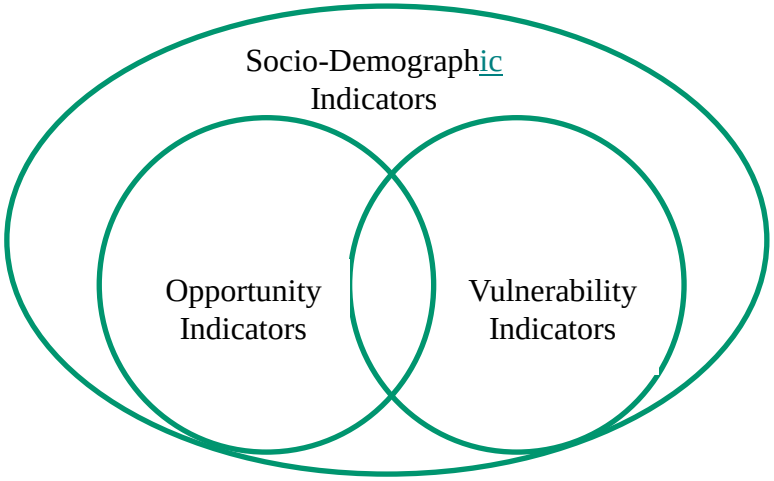
A Livability Ethic for Equity:

Consider:

- Livability as the inclusive collective quality of the “human experience” in and around public spaces,
- Giving priority to most vulnerable.
- One’s pursuit of Livability Should Not Unduly Detract from a Region/Community’s Collective Quality of Life

Bruce Appleyard, AICP
appleyard@berkeley.edu

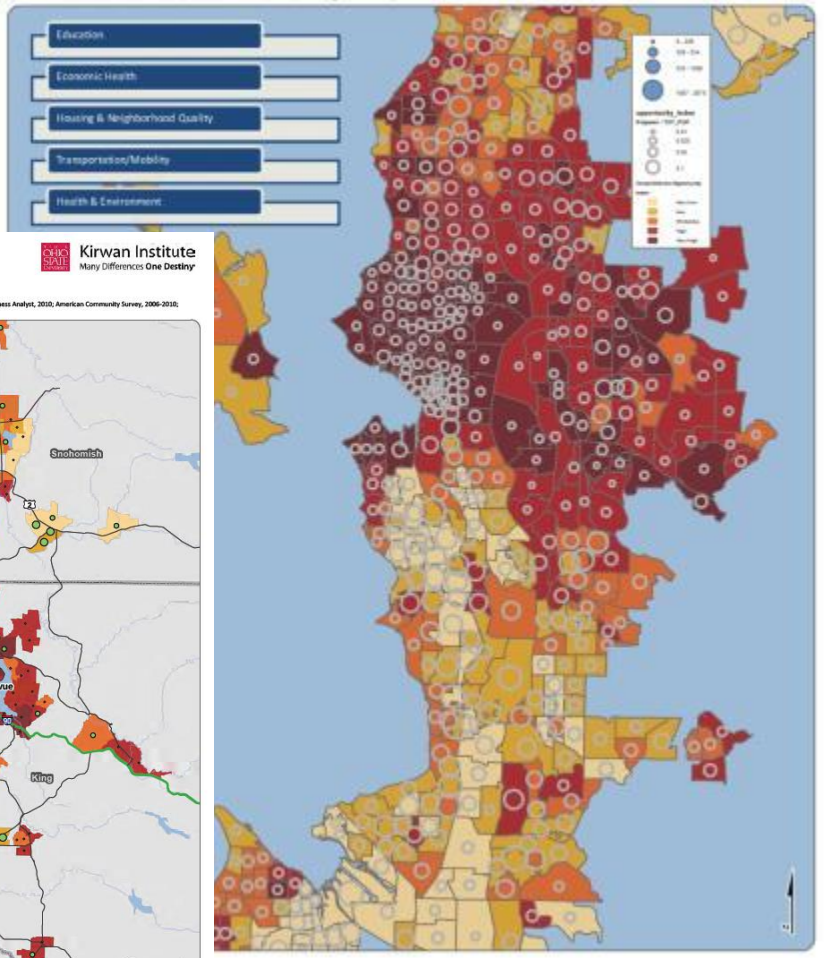
- **Opportunity Indicators**
- **Vulnerability Indicators**
- **Socio-Demographic Indicators**



Map 1.1 Comprehensive Opportunity Map

Puget Sound Urbanized Area

Sources: Puget Sound Regional Council, 2011; Environmental Protection Agency, 2010; Washington Dept. of Ecology, 2011; ESRI Business Analyst, 2010; American Community Survey, 2006-2010; U.S. Census, 2010; Tetrad, Inc. PCensus Obx, 2010; Washington State Report Card, 2010-2011

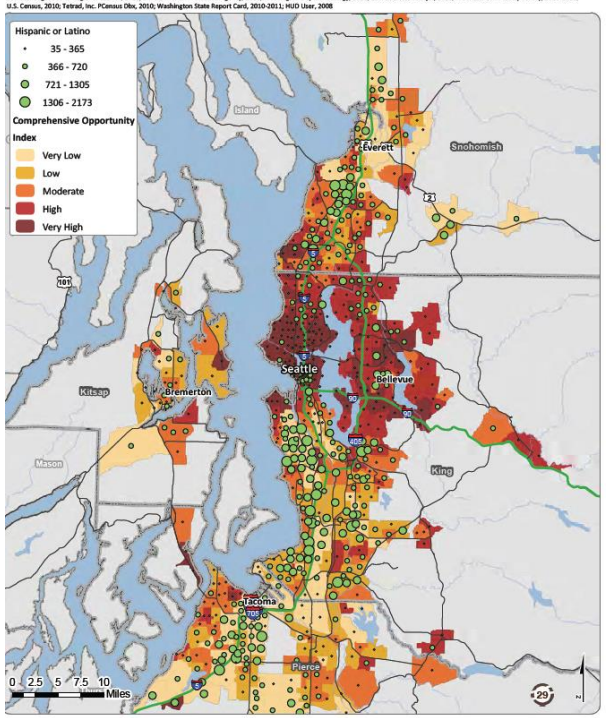


Map 2.4 Demographic Overlays (Hispanics)

Puget Sound Urbanized Area

Kirwan Institute
Many Differences One Destiny

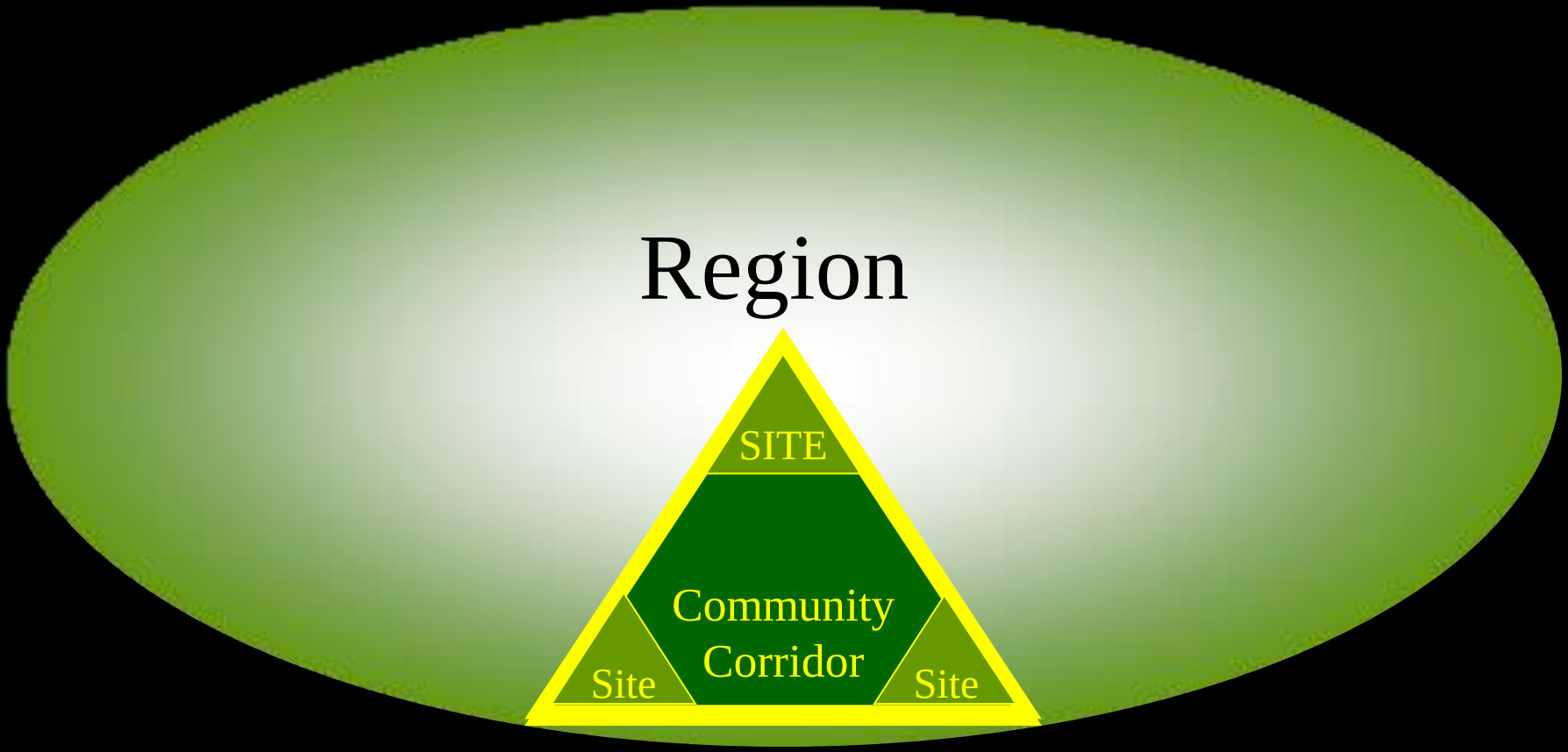
Sources: Puget Sound Regional Council, 2011; Environmental Protection Agency, 2010; Washington Dept. of Ecology, 2011; ESRI Business Analyst, 2010; American Community Survey, 2006-2010; U.S. Census, 2010; Tetrad, Inc. PCensus Obx, 2010; Washington State Report Card, 2010-2011; HUD User, 2008



Big Solution:

Multiple Perspectives For Realizing Livability and Equity

"Beyond Tribes"



Basic information:

- Transit trips per capita
- Workers commuting by transit, bicycle, or foot (Need better info on ped and bike counts
- Vehicle miles traveled per capita
- Number and location of Jobs and population
- Transpo facility characteristics (sidewalks? Bike lanes?)

Major Themes	Easy to Gather, Useful measures
•**Walkability (bikability)** •**Transit Access**	**Demand** ***Local Accessibility*** •Network walkscore •Network transit score **Supply** •*Intersection Density* •*Transit LOS*
Regional Location of Jobs/housing (Lower VMT, etc.)	*Regional Accessibility Jobs Within 30' of Transit & 20' Auto*
Accessible, Affordable Housing (near transit)	*Number of Affordable homes and rental units Near employment centers and/or well-served by transit*
Housing Affordability	*Housing & Transportation Cost Index (CNT/CTOD/RA)*
Economic Competiveness (Operation and reliablity	"Person Mobility Index", VHT/per cap, TTI

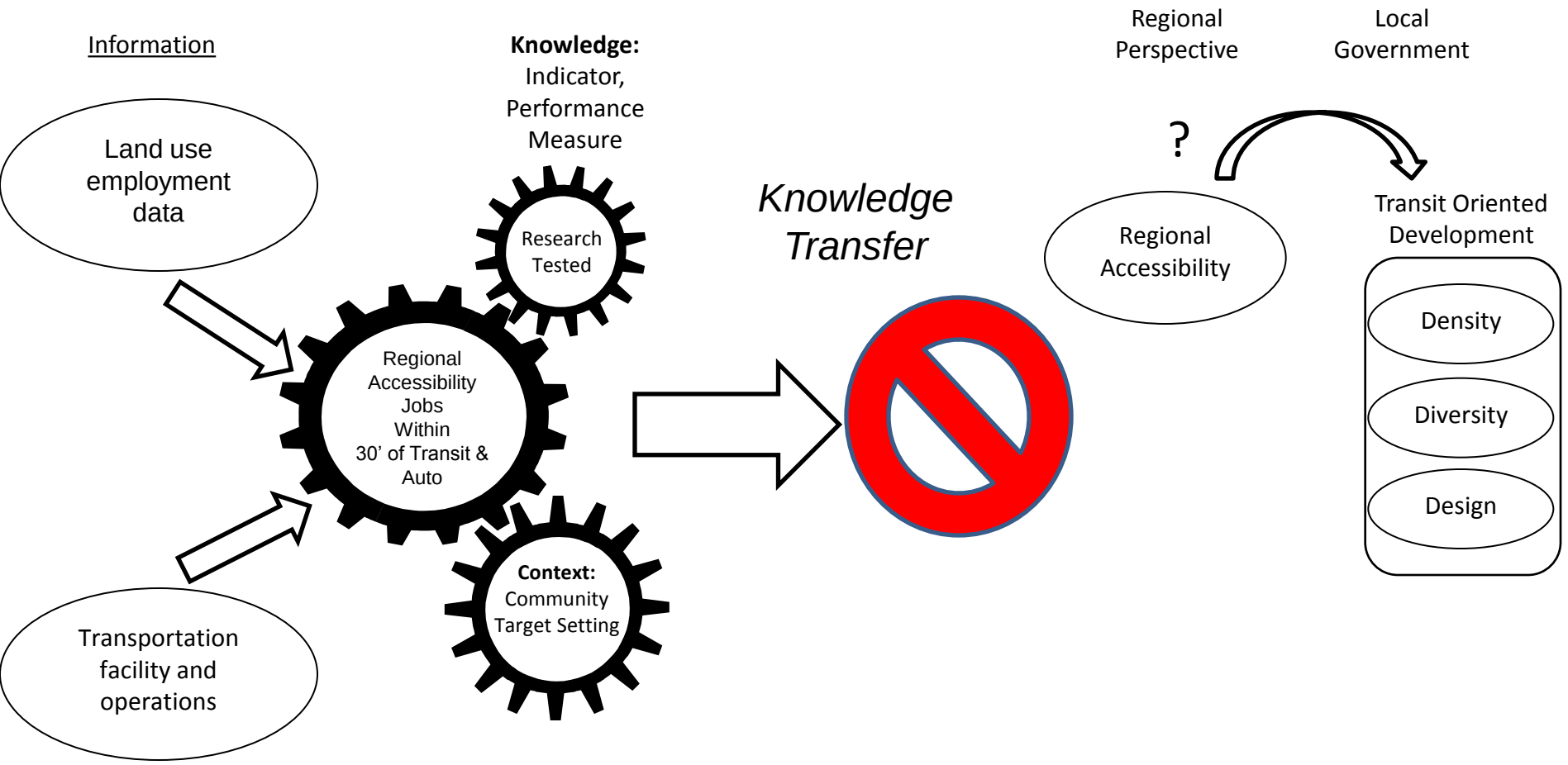
Regional Accessibility Performance Measure

Transportation

Who Acquires/Calculates Regional Accessibility Measure

Land Use

Responsibility to Act upon the PM



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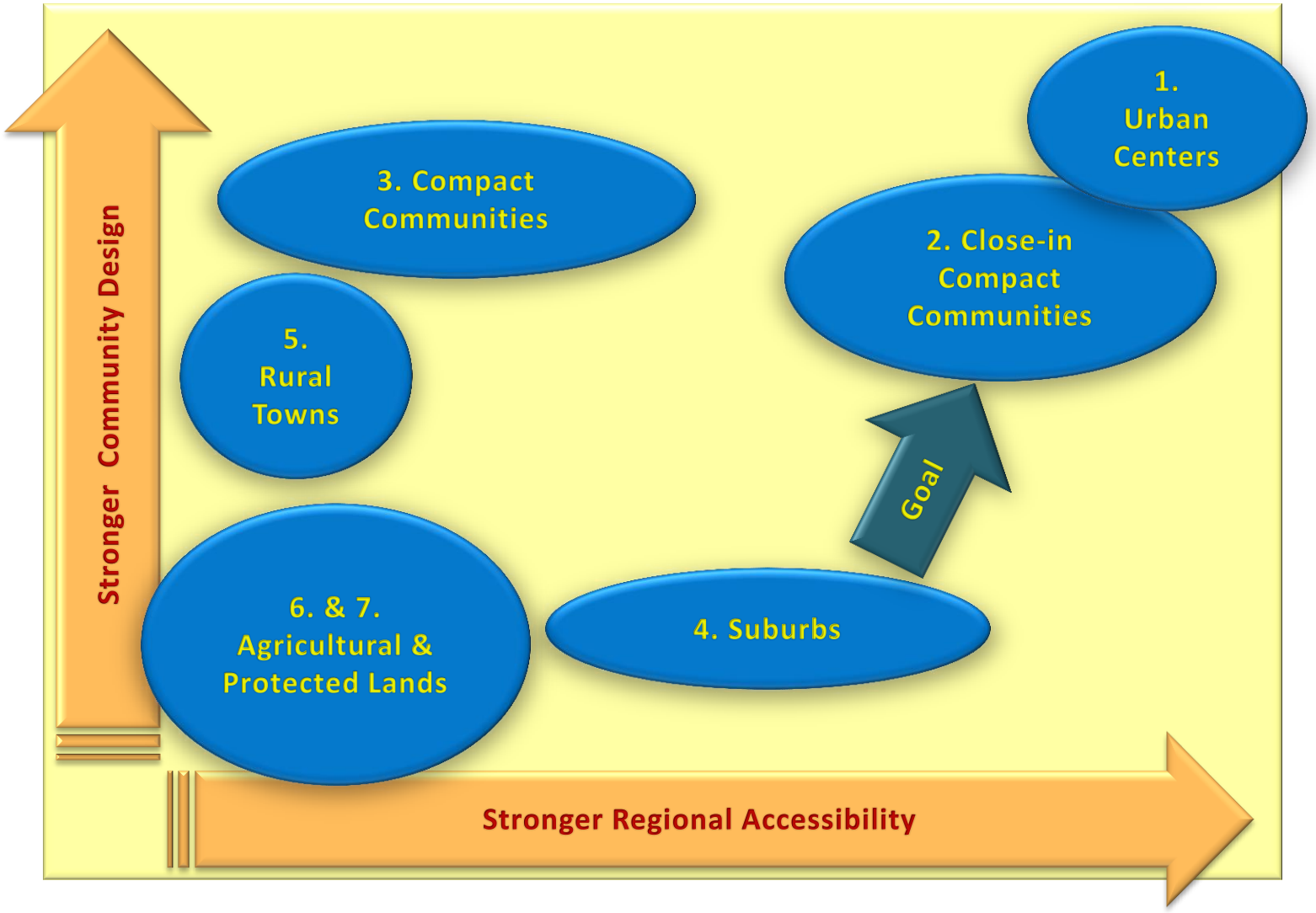

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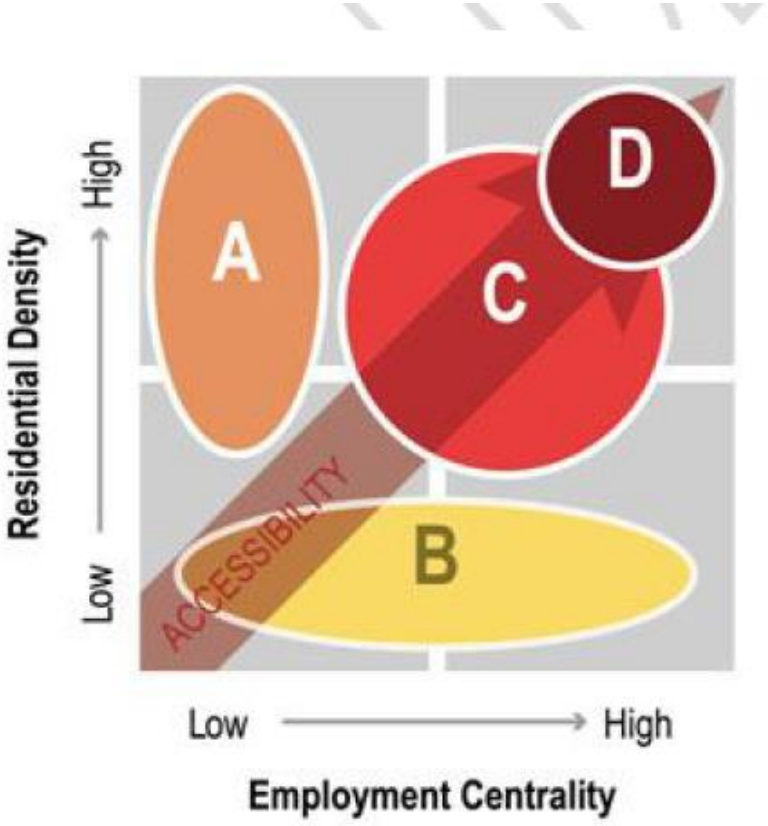

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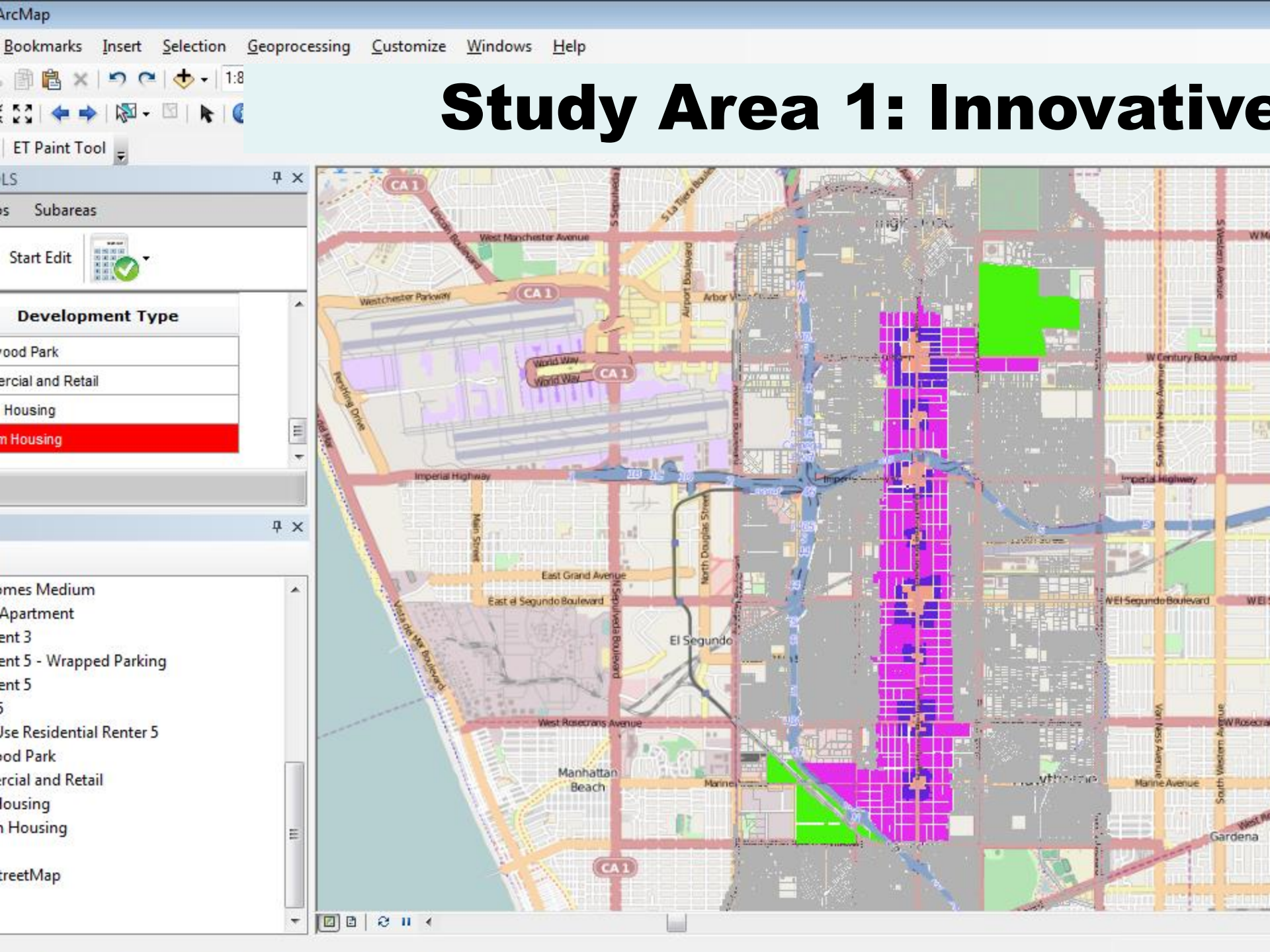
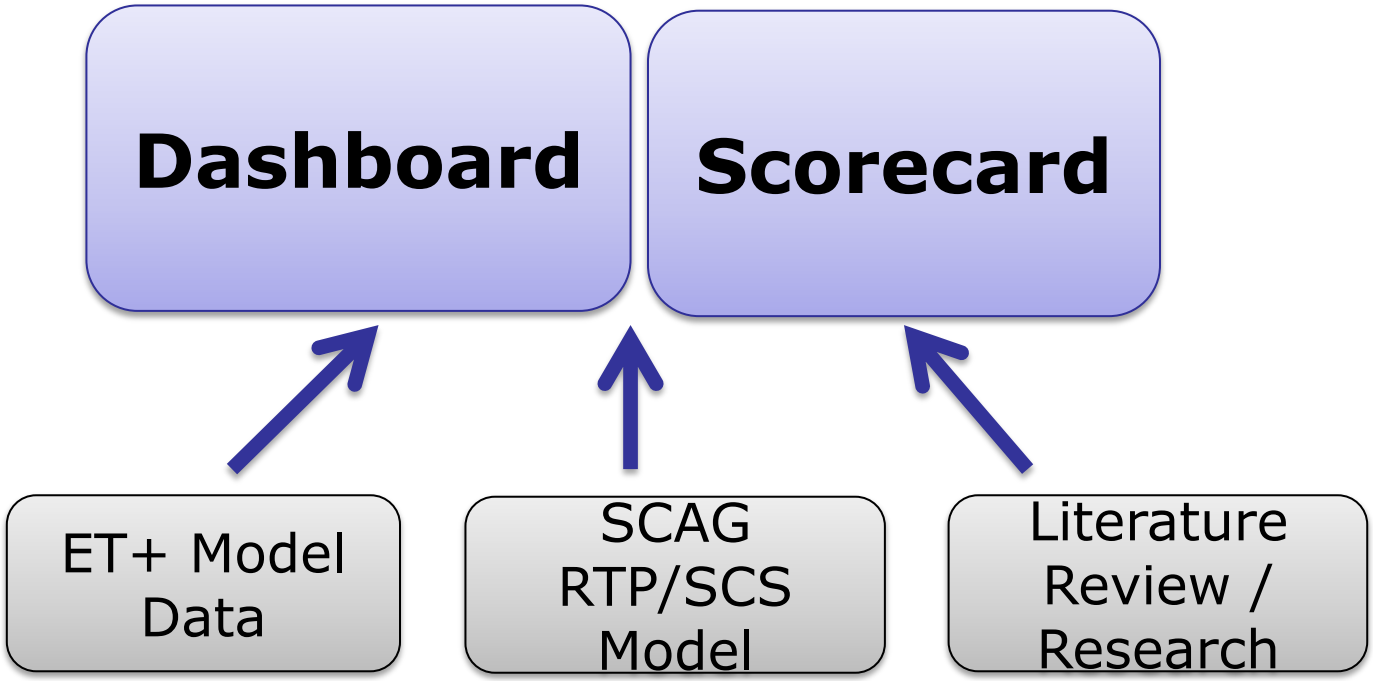
Study Area 1: Innovative



Outputs


Dashboard
Scorecard
ET+ Model Data
SCAG RTP/SCS Model
Literature Review / Research

7D Dashboard.xlsx - Microsoft Excel

File | Home | Insert | Page Layout | Formulas | Data | Review | View

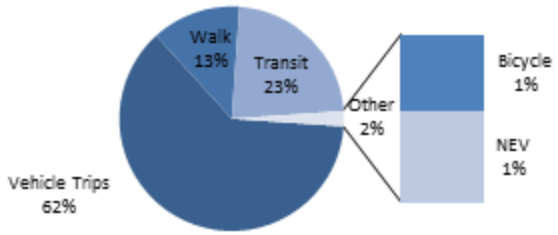
Dashboard

Workbook Views | Show | Zoom | Window

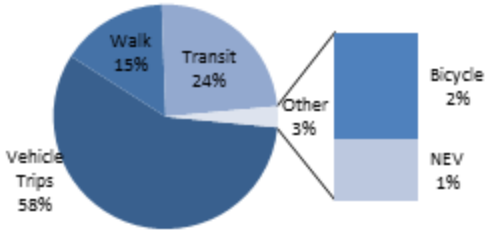
X24

Smart Mobility Framework: Dashboard Results

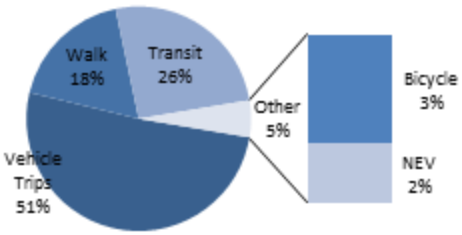
Existing



Traditional



Innovative

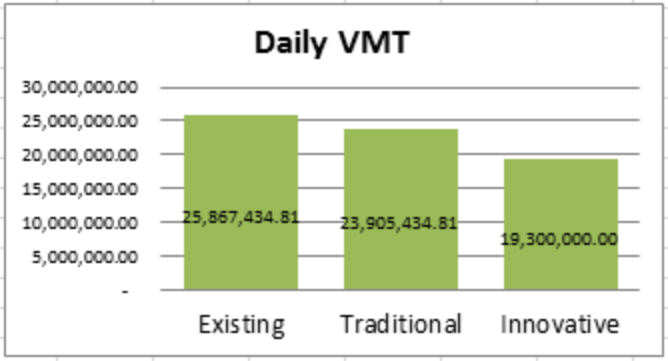


NEV Ownership
(percent of population)
10%

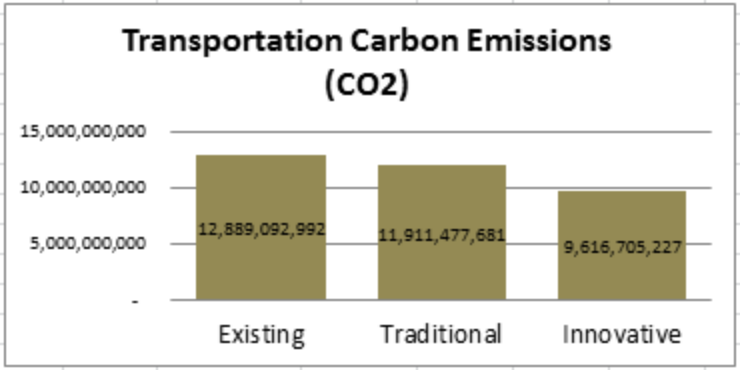
NEV Use
due to innovative land use and transportation policy
(as percent of VMT)
35%

Bicycle Ridership
due to innovative land use and transportation policy
(percent reduction of per capita VMT)
35%

Daily VMT



Transportation Carbon Emissions (CO2)



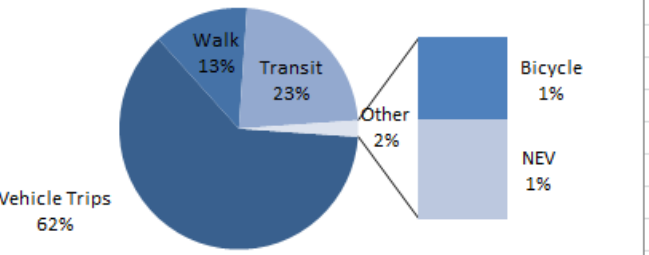
Dashboard | Sheet1 | HH Travel Model | Summary | Travel App Inputs | Traffic Safety Elasticities | County Crash Rates | Running Emissions

Ready

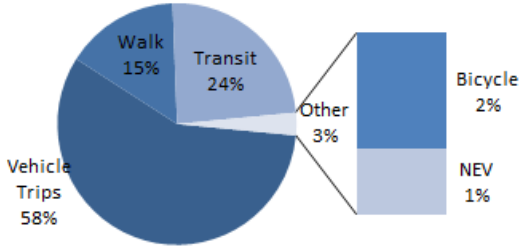
Dashboard

Smart Mobility Framework: Dashboard Results

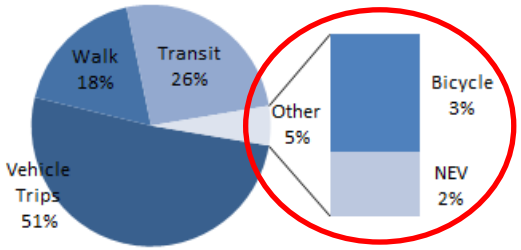
Existing



Traditional



Innovative



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35%

Bicycle Ridership
due to innovative land use and transportation policy
(percent reduiction of per capita VMT)
35%

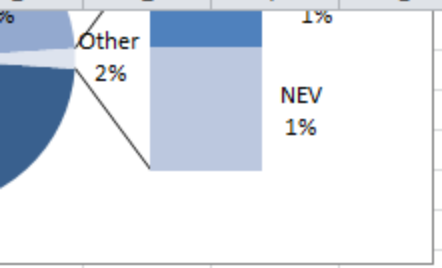
Daily VMT

30,000,000.00

Transportation Carbon Emissions (CO2)

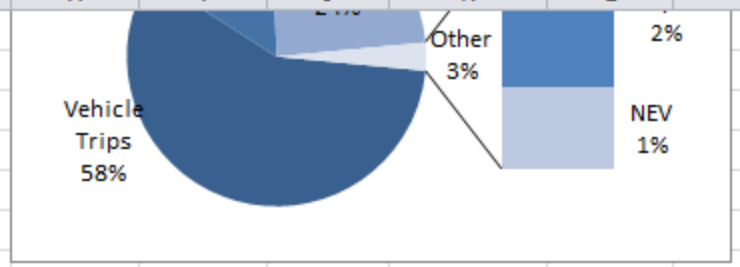
Dashboard | Sheet1 | HH Travel Model | Summary | Travel App Inputs | Traffic Safety Elasticities | County Crash Rates | Running Emissions | StartStop Emissions | By Speed | By Populatio

Dashboard



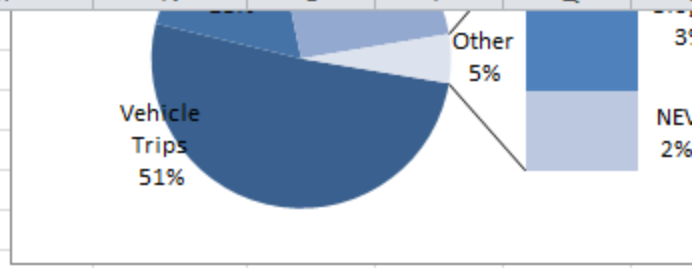
NEV Ownership
(percent of population)

10%



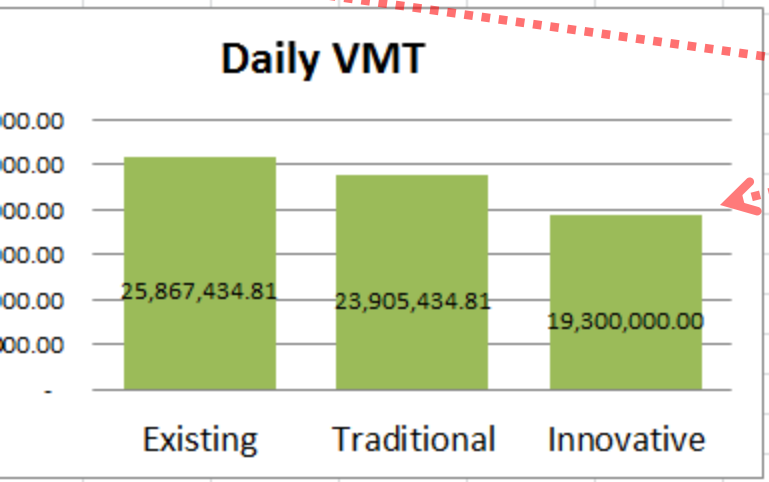
NEV Use
due to innovative land use and transportation policy
(as percent of VMT)

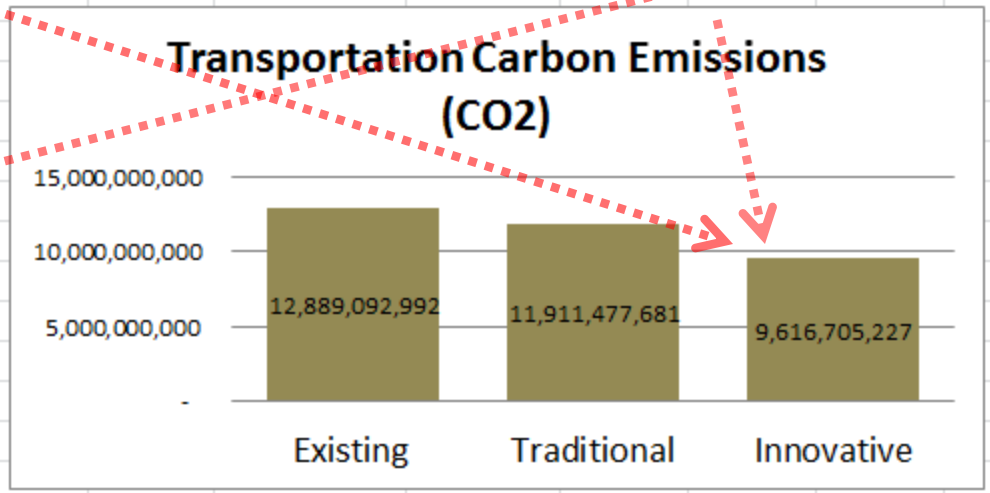
35%



Bicycle Ridership
due to innovative land use and transportation p
(percent reduiction of per capita VMT)

35%





Travel Model | Summary | Travel App Inputs | Traffic Safety Elasticities | County Crash Rates | Running Emissions | StartStop Emissions | By Speed

Study Area 1: Score Card

SMF Pilot Area 2 Performance Measures

Study Area 1 - Hawthone

Measure	Existing	Traditional LU		Innovative LU	
	Landuse: B- Transportation: C	Traditional Transportation	Innovative Transportation	Traditional Transportation	Innovative Transportation
Average Proximity to Employment (within 30 min drive)	24.1%	C-	C+	B-	A-
Average Proximity to Employment (within 45 min transit)		C- (xx.yy)	B-	B	A-
Average Vehicle Occupancy	?	D+	B-	C+	B+
Modal Travel Time and Cost*	model	D+	C+	C+	B+
NEV, Bicycle, Walking Facilities	Low	D-	B-	D-	B-
Percentage of Trips by Transit	model	C+	B	B-	A-
Percentage of Trips by NEV	0	F	D	C-	B-
Percentage of Trips by Bicycling	model	D+	C+	B	A
Percentage of Trips by Walking	model	C-	B-	A-	A+
Quantity of Criteria Pollutants	model	C	B-	C+	B
Vehicle Hours of Delay	?	C	B-	C+	B-
Vehicle Miles Traveled (VMT)	model	C	B	B+	A-
Vehicle Hours Traveled	model	C	B-	A-	A
VMT per Capita by Speed Range	model	C	B	B+	A-
Number of Crashes	1,052	C	B	B	A-
Number of Vulnerable User Crashes					
	Average:	C	B-	B-	B+

Grades are based on improvement over existing conditions

Grades based on improvement over exisiting conditions

Land Use / SCAG RTP/SCS | nd Use / SCAG RTP/SCS | Land Use / SBCCOG

*Based on balanced model assumption (should we calculate

Sheet1 | Sheet2 | Sheet3 | Sheet1 (2)

Study Area 2: Score Card

Study Area 2 - Torrance

Measure	Existing	Traditional LU		Innovative LU	
	Landuse: B- Transportation: C	Traditional Transportation	Innovative Transportation	Traditional Transportation	Innovative Transportation
Average Proximity to Employment (within 30 min drive)	19.6%	C-	C+	B-	A-
Average Proximity to Employment (within 45 min transit)	1.4%	C- (xx.yy)	B-	B	A-
Average Vehicle Occupancy	?	D+	B-	C+	B+
Modal Travel Time and Cost	Model	D+	C+	C+	B+
NEV, Bicycle, Walking Facilities	Low/Med	C	B	C	B+
Percentage of Trips by Transit	model	C+	B	B-	A-
Percentage of Trips by NEV	0	F	D	C-	B-
Percentage of Trips by Bicycling	model	C	B-	B+	A
Percentage of Trips by Walking	model	C-	B-	A-	A+
Quantity of Criteria Pollutants	?	C	B-	C+	B
Vehicle Hours of Delay	model	C	B-	C+	B-
Vehicle Miles Traveled (VMT)	model	C	B	B+	A-
Vehicle Hours Traveled	model?	C	B-	A-	A
VMT per Capita by Speed Range	model	C	B	B+	A-
Number of Crashes	429	C	B	B	A-
Number of Vulnerable User Crashes	50	C	B+	B+	A
	Average:	C	B-	B-	A-

Land Use / SCAG RTP/SC Land Use / SCAG RTP/S Land Use / SBCCOG Land Use / SBCCOG

Toward a Livability Ethic to Guide Planning Decisions:
Lessons Learned:

1. ***People Adapt to Poor Conditions***
   - The poor, the disenfranchised, the disconnected.

- ***The Need for Advocacy and Inclusion: Understanding the Adaption and Retreat from Poor Conditions***

Bruce Appleyard, AICP
appleyard@berkeley.edu

A Livability Ethic for Equity:

Consider:

- Livability as the inclusive collective quality of the “human experience” in and around public spaces,
- Giving priority to most vulnerable.
- One’s pursuit of Livability Should Not Unduly Detract from a Region/Community’s Collective Quality of Life

Bruce Appleyard, AICP
appleyard@berkeley.edu

Reaching out to Overcome the De-Humanizing Forces of Auto-Domination

Reaching out to Overcome the De-Humanizing Forces of Auto-Domination

Reaching out to Overcome the De-Humanizing Forces of Auto-Domination

Bruce Appleyard, AICP
appleyard@berkeley.edu

Knowledge is Power: Measuring, Understanding and Realizing Social Equity in Scenario Planning

- **Measure and Understand:**
  - How do we measure and understand equity?
- **Realize:**
  - How are equity issues used in Scenario planning?
  - **Realize:** How is Equity being manifest to inclusive engagement?

Bruce Appleyard, PhD, AICP
appleyard1@gmail.com

Toward a Livability Ethic to Guide Planning and Design Decisions

- ***"pursuit of happiness"***

- ***Livability could be:***
- ***A collection of People and Place <u>Opportunities</u> for individual to pursue a satisfying quality of life…***
- ***But there should be an ethic.***

- ***…. without unduly limiting the livability opportunities of others.***

Bruce Appleyard, PhD, AICP
appleyard1@gmail.com

A Livability Ethic for Equity:

Consider:

- Livability as the inclusive collective quality of the “human experience” in and around public spaces,
- Giving priority to most vulnerable.
- One’s pursuit of Livability Should Not Unduly Detract from a Region/Community’s Collective Quality of Life

Bruce Appleyard, AICP
appleyard@berkeley.edu

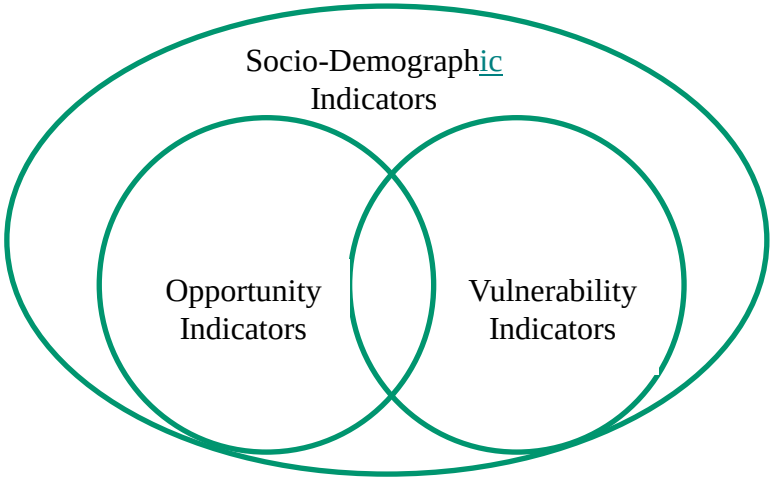
Toward a Livability Ethic to Guide Planning Decisions:
Lessons Learned from Livable Streets:

1. ***People Adapt to Poor Conditions***
   - The poor, the disenfranchised, the disconnected.

- ***The Need for Advocacy and Inclusion: Understanding the Adaption and Retreat from Poor Conditions***

Bruce Appleyard, AICP
appleyard@berkeley.edu

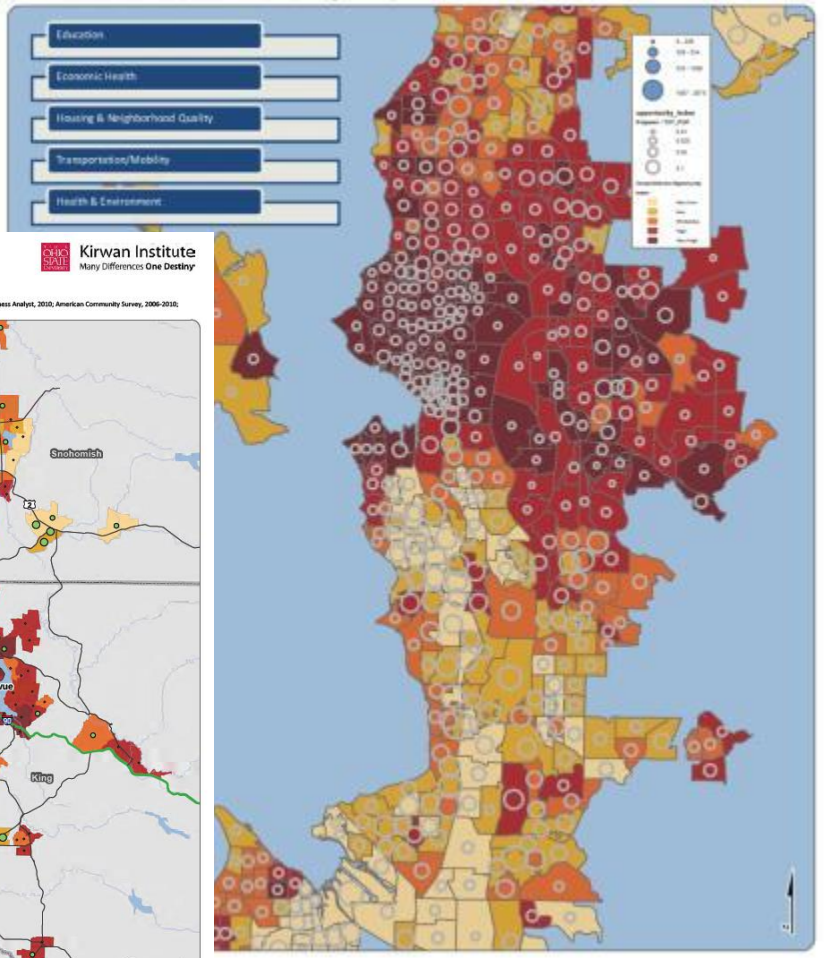
- **Opportunity Indicators**
- **Vulnerability Indicators**
- **Socio-Demographic Indicators**



Map 1.1 Comprehensive Opportunity Map

Puget Sound Urbanized Area

Sources: Puget Sound Regional Council, 2011; Environmental Protection Agency, 2010; Washington Dept. of Ecology, 2011; ESRI Business Analyst, 2010; American Community Survey, 2006-2010; U.S. Census, 2010; Tetrad, Inc. PCensus Obx, 2010; Washington State Report Card, 2010-2011

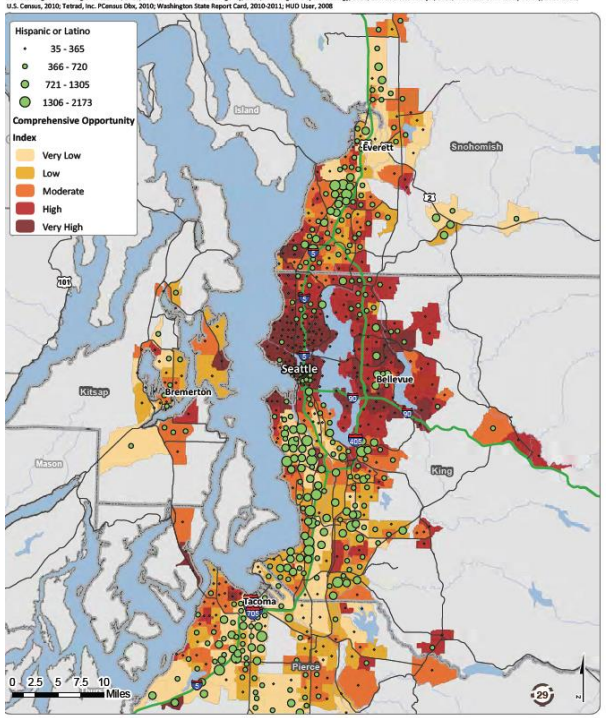


Map 2.4 Demographic Overlays (Hispanics)

Puget Sound Urbanized Area

Kirwan Institute
Many Differences One Destiny

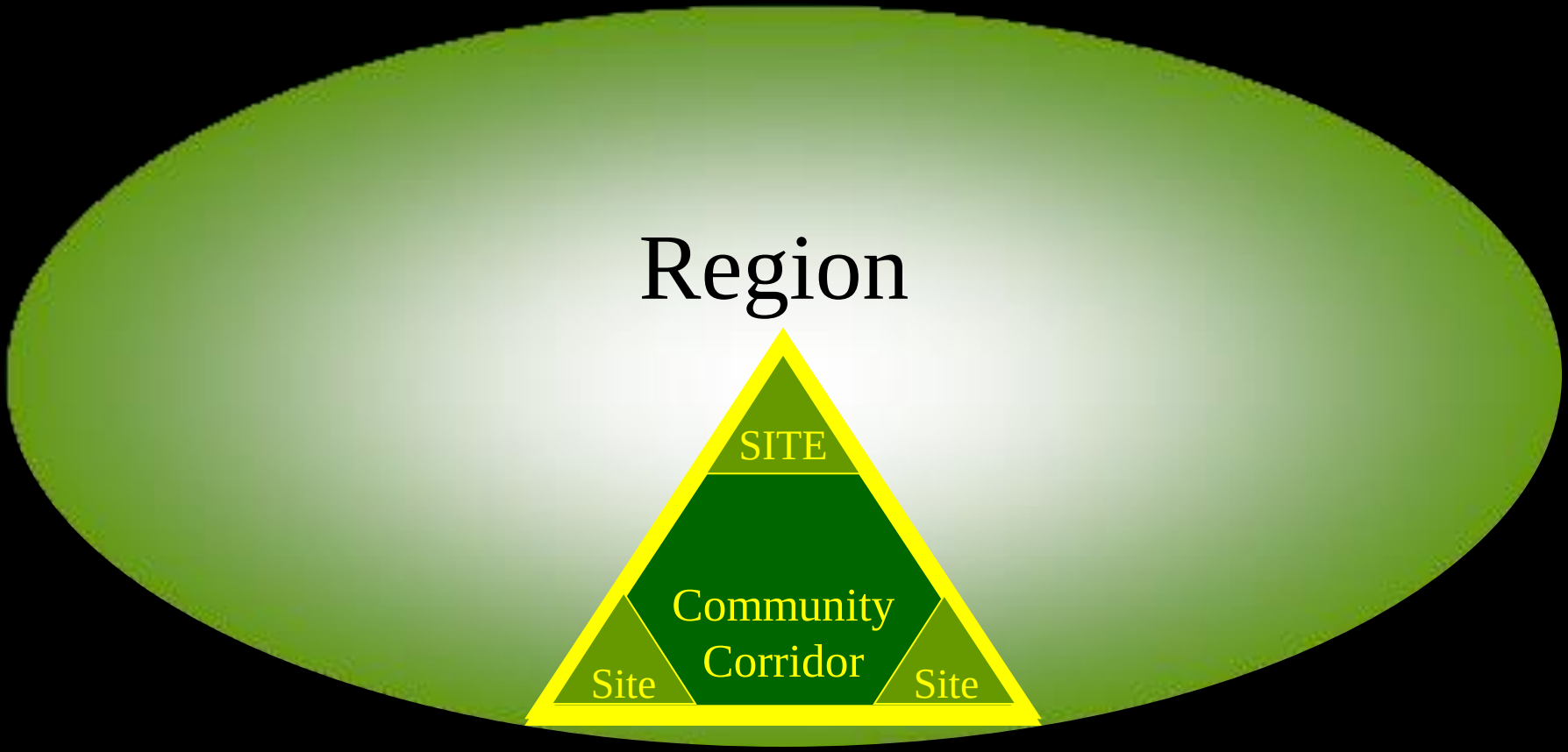
Sources: Puget Sound Regional Council, 2011; Environmental Protection Agency, 2010; Washington Dept. of Ecology, 2011; ESRI Business Analyst, 2010; American Community Survey, 2006-2010; U.S. Census, 2010; Tetrad, Inc. PCensus Obx, 2010; Washington State Report Card, 2010-2011; HUD User, 2008



Big Solution:

Multiple Perspectives For Realizing Livability and Equity

"Beyond Tribes"



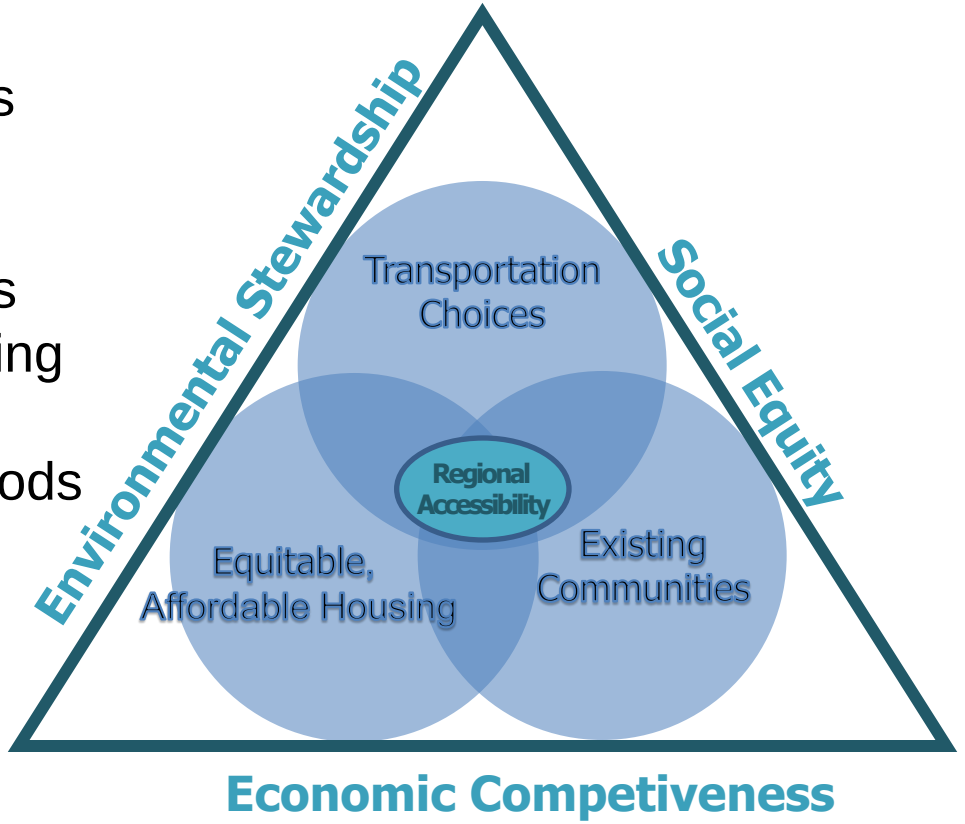
Identify the appropriate performance measures, data needs, and analytic approaches for each **Livability Principle**

From this?

- Enhance economic competitiveness
- Coordinate and leverage federal policies and investment
- Provide more transportation choices
- Promote equitable, affordable housing
- Support existing communities
- Value communities and neighborhoods
-

To this?

Good Governance "Ethic"
Coordinate and leverage federal policies and investment



Basic information:

- Transit trips per capita
- Workers commuting by transit, bicycle, or foot (Need better info on ped and bike counts
- Vehicle miles traveled per capita
- Number and location of Jobs and population
- Transpo facility characteristics (sidewalks? Bike lanes?)

Major Themes	Easy to Gather, Useful measures
•**Walkability (bikability)** •**Transit Access**	**Demand** ***Local Accessibility*** •Network walkscore •Network transit score **Supply** •*Intersection Density* •*Transit LOS*
Regional Location of Jobs/housing (Lower VMT, etc.)	*Regional Accessibility Jobs Within 30' of Transit & 20' Auto*
Accessible, Affordable Housing (near transit)	*Number of Affordable homes and rental units Near employment centers and/or well-served by transit*
Housing Affordability	*Housing & Transportation Cost Index (CNT/CTOD/RA)*
Economic Competiveness (Operation and reliablity	"Person Mobility Index", VHT/per cap, TTI

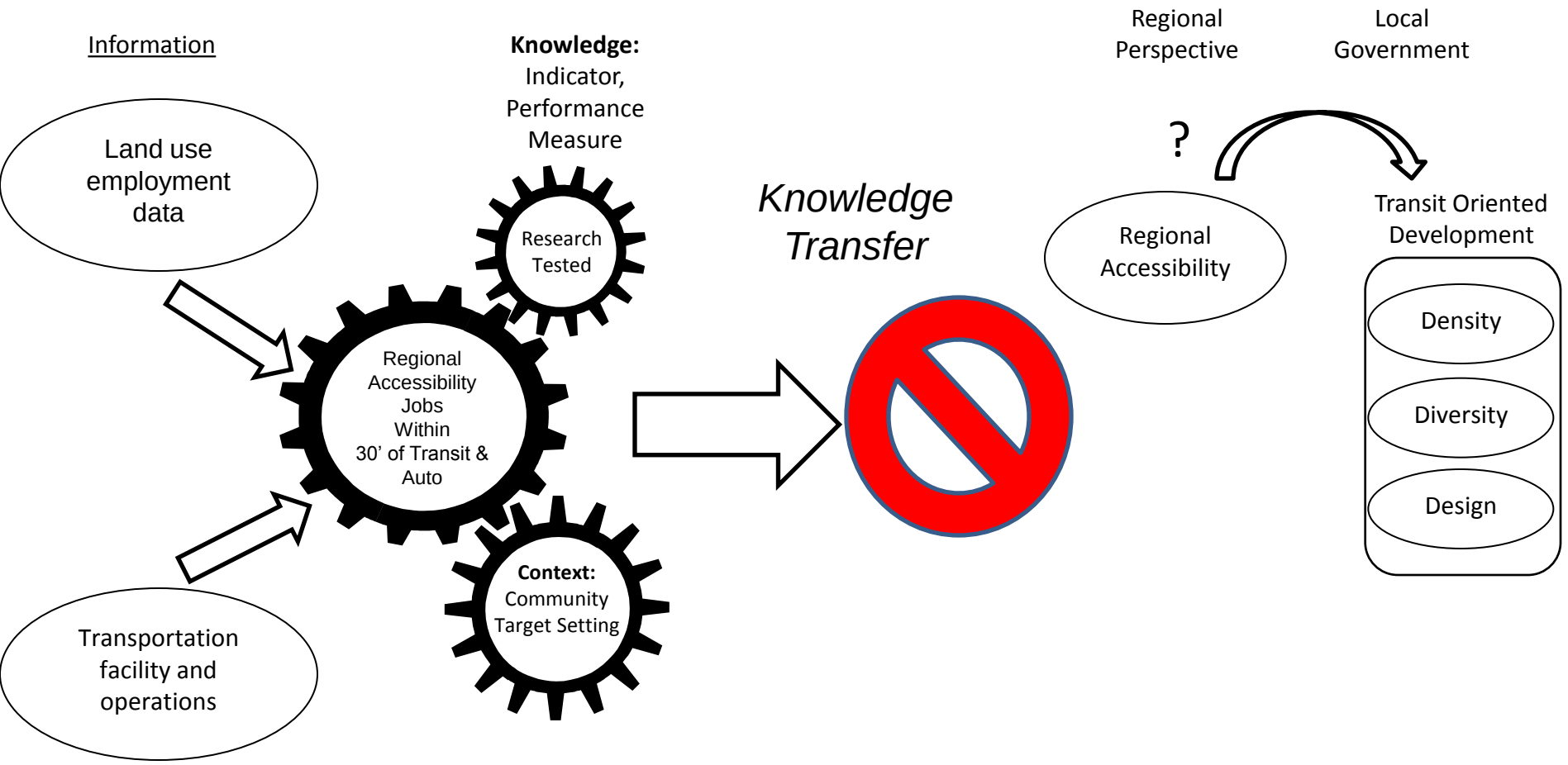
Regional Accessibility Performance Measure

Transportation

Who Acquires/Calculates Regional Accessibility Measure

Land Use

Responsibility to Act upon the PM



Essential Measures for Land Use/Transportation Strategy Decisions

Policy Solutions In Red

Regional Perspective

Responsibility to Act upon Measures

Local Perspective

Flexible, Inclusive Zoning

Local Government

Fed/State/Regional Incentives For Development

Walkability

Demand
Local Accessibility
Network walkscore
transit score
Supply
Intersection Density
Transit LOS

Transportation Infrastructure & Incentives

Transit Oriented Development

Regional Accessibility Jobs Within 30' of Transit & 20' Auto

Regional Location of Jobs/housing

Density

Diversity

Design

Transit Access

- Transit trips per capita
- Workers commuting by transit, bicycle, or foot
- Vehicle miles traveled per capita

Developer Incentives

Occ. Matched Jobs Within 30' of Transit & 20' Auto of Low-income Housing

Accessible Affordable Housing (near transit)

Number of Affordable homes and rental units Near employment centers and/or well-served by transit

Housing & Transportation Index

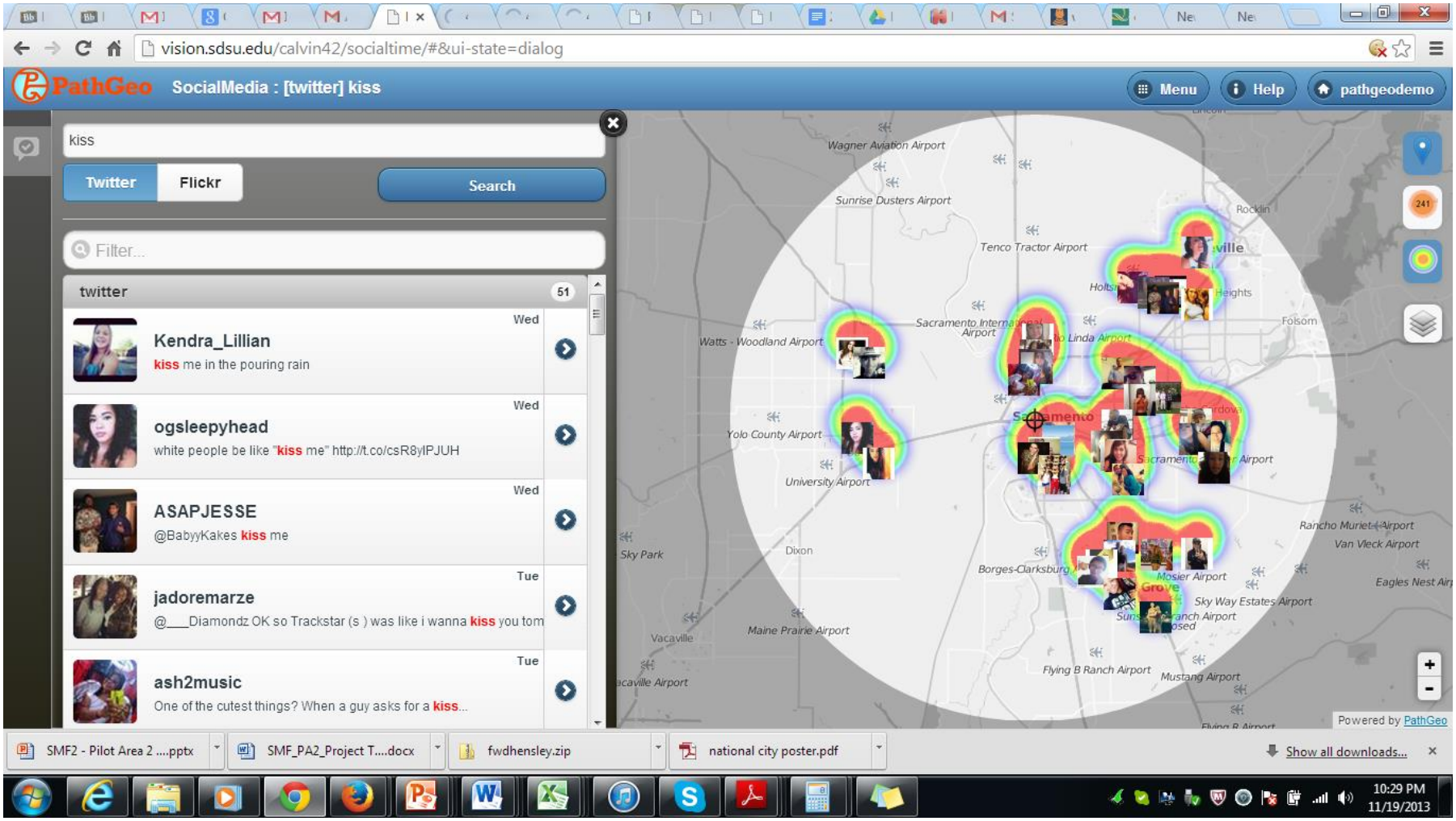
LEMs

Housing Affordability

Affordable Housing Incentives

- Much great work has been done thus far.

- Achieving livability =
  1. Individual, scale (or as close as possible)
  2. Perceptions (honor qualitative/subjective)
  3. Prioritize actions in face of conflicting objectives
  4. Need to mitigato
  5. Need detailed measures (Individual, scale or as close as possible)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kiss me in the pouring rain
Wed
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white people be like "kiss me" http://t.co/csR8ylPJUH
Wed
ASAPJESSE
@BabyyKakes kiss me
Tue
jadoremarze
@___Diamondz OK so Trackstar (s) was like i wanna kiss you tom
Tue
ash2music
One of the cutest things? When a guy asks for a kiss...
Wagner Aviation Airport
Sunrise Dusters Airport
Tenco Tractor Airport
Watts - Woodland Airport
Sacramento International Airport
Folsom
Yolo County Airport
University Airport
Sacramento
Rancho Murieta Airport
Van Vleck Airport
Sky Park
Dixon
Borges-Clarksburg
Mosier Airport
Sky Way Estates Airport
Maine Prairie Airport
Vacaville
Flying B Ranch Airport
Mustang Airport
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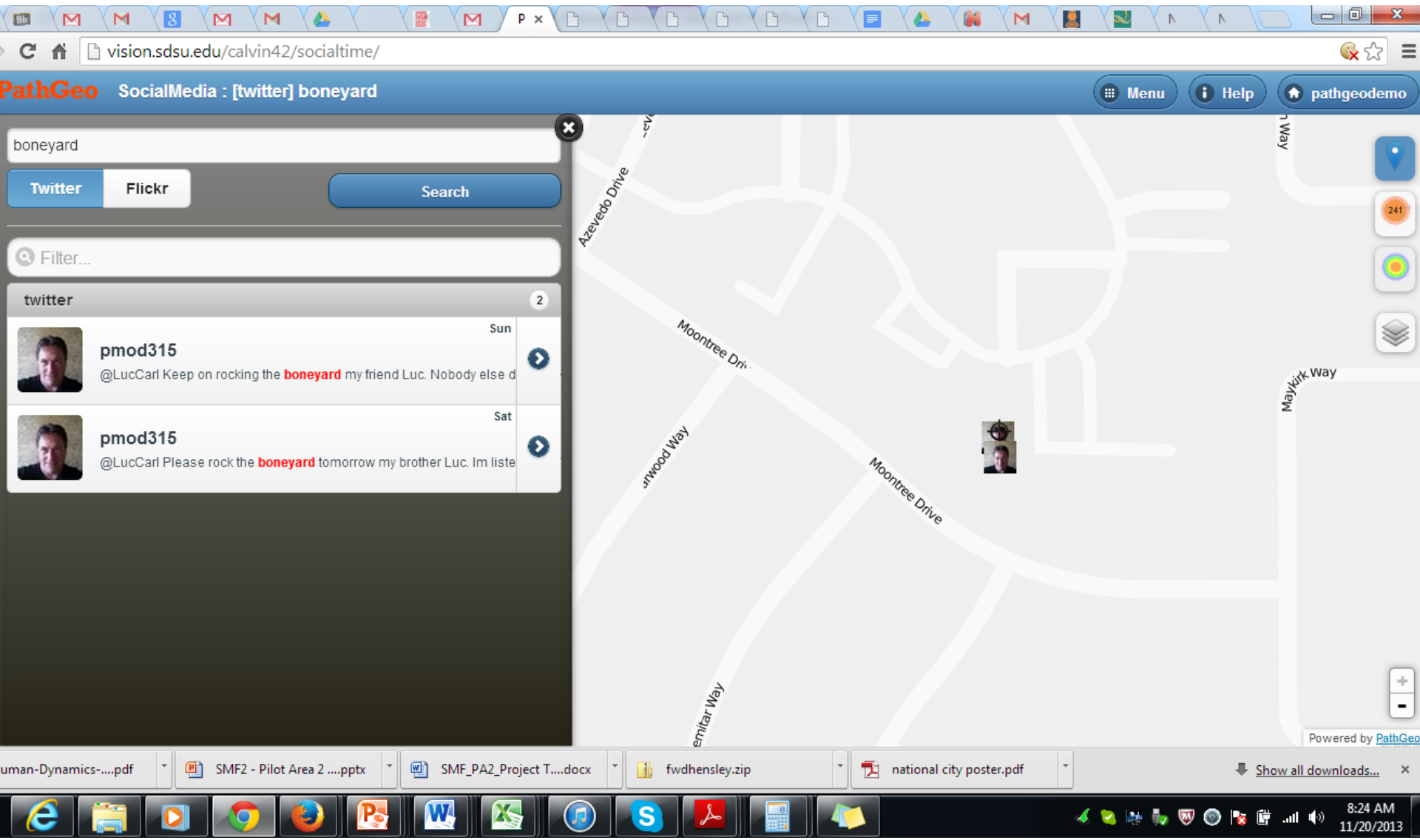
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