Presentation to:
Advisory and Stakeholders
Workshop #4

October 27, 2004
San Joaquin Valley Growth Response Study, Phase III

Study Purpose

- To explore smart growth best practices and “new regionalism” opportunities
- Develop a comprehensive approach to guide growth and development within the San Joaquin Valley
- To develop the “toolbox” of land use and other models to enhance our regional planning efforts – transportation models cannot provide all the answers
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Presentation Overview

- Previous Activity
- Why Change Modeling Practices?
- Alternative Scenarios – What are they?
- Overview of Three Model Types
- Smart Growth Indicators
- Model Benefits
- Next Steps to Model Refinement
- Potential Application of Tools
- Your Modeling Ideas
- Closing
- Special Thank You
- Questions and Answers
Station 1 – Results of Phases I and II
- Mineta Institute Findings
- Educational Component
- Smart Growth Best Practices
- Criteria for Selecting Transportation Models
- Technical Framework for Modeling Smart Growth

Station 2 – Phase III Modeling Inputs and Background
- Evaluation Process
- Development of GIS Data
- Smart Growth Indicators
- Market Feasibility Analysis
- Alternative Scenarios
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Why Change Modeling Practices?

- **Standard Modeling Practices** -
  - TAZ geography
  - Demographic projection for household and job growth
  - Inconsistent relationship to land use patterns
    - Existing
    - Policy
  - Difficult to review with the public and decision-makers

Fresno-Clovis Core Area - TAZ Pattern
Why Change Modeling Practices? (Cont.)

- **Potential with New Modeling Tools** -
  - Parcel or block geography
  - Demographic projection for household and job growth can be use-specific
  - Land use patterns as specific as available in GIS data
    - Existing
    - Policy
  - Easier to review with the public and decision-makers
    - Maps look more real
    - Potential to “paint” alternatives interactively

Fresno-Clovis Core Area - What If? Land Use Pattern
Alternative Scenarios – What Are They?

Initial Run Scenario

- Based on communities’ General Plan land use policy - “Business-as-Usual”
- “Build-out” City of Fresno to 2034 - provide additional housing in surrounding area to balance Fresno jobs

2 Alternative Scenarios

- Based on Workshop #3 polling results
- Intensification Areas
  - Higher intensity land uses
  - Based on “marketable” mix of land uses
- Introduction of high-capacity transit system
- Lands outside of Intensification Areas keep Initial Run land use designations
Economics of Land Use

- **Modeling Process based on Economic Realities**
  - Not just a Visioning Exercise
  - Growth Forecast and Distributions reflect Real Estate Market Conditions

- **Strong Challenge given History, Lifestyles, Economy**
  - Central Valley dominated by Low Density, Affordable Living
  - Large number of households prefer Non-Urban Lifestyle
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**Housing Demand**

- **Demand for Higher Density Development**
  - Geodemographics – age/ household size/ current residence/ jobs
  - Household Incomes – market-rate/ affordable
  - Location - new growth areas vs existing urbanized areas

- **Findings for Fresno/ Madera Region**
  - Significant Potential Interest: 12.5 percent of households (less than other regions)
  - Policy implications: require investments in urban areas and support for higher density development in a number of locations
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Housing Development Feasibility

- **Financial Feasibility of Higher Density Development**
  - Potential Sales Prices given Competitive Supply
  - Development and Land Costs
  - Key Considerations: parking costs; entitlement risk; existing uses

- **Findings for Fresno/ Madera Region**
  - Competitive housing market makes feasibility a challenge
  - Possibilities in new growth areas; urban areas require public investment
  - Policy Implications: need active Redevelopment Agency involvement and supportive land use policies and policymakers
Initial Run City of Fresno “Build-out”

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Households</th>
<th>Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>179,500</td>
<td>237,400</td>
</tr>
<tr>
<td>2025 Total Increment</td>
<td>282,400</td>
<td>399,800</td>
</tr>
<tr>
<td></td>
<td>+102,900 (37%)</td>
<td>+162,500 (69%)</td>
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<tr>
<td>“Build-out” Total Increment (2034)</td>
<td>311,900</td>
<td>496,900</td>
</tr>
<tr>
<td></td>
<td>+29,500 (10%)</td>
<td>+97,100 (20%)</td>
</tr>
</tbody>
</table>

25,600 additional homes needed to provide workers for all new jobs in Fresno; these are added to surrounding areas.
Issues explored in Alternative Scenarios —

- Infill and revitalization policies for cities and unincorporated communities;
- Transit options with focused Transit-Oriented Development around stations and corridors -
  - Bus Rapid Transit
  - Light Rail
  - Monorail
  - Commute Rail
- Policies to encourage distribution of jobs in proximity to concentrations of housing
- Policies to encourage 20 to 30% increase in density for new growth, e.g. -
  - Low Density Residential @ 6 du/ac rather than 4.5 du/ac
  - Medium Density Residential @ 10 du/ac rather than 8 du/ac
  - High Density Residential @ 25 du/ac rather than 20 du/ac
Used polling in Workshop #3 to explore preferences regarding:

- Potential intensification areas;
- Potential high-capacity transit corridors; and,
- Methods for increasing intensities and land use mixes.
Alternatives to the Initial Run

Based on Workshop #3 Polling Results

Preferred Network and Intensification Areas:
- Blackstone Corridor
- Downtown Fresno
- Kings Canyon corridor to SE Fresno
- SE Madera New Towns
- Clovis Jensen to Herndon

Land uses with greater densities & mix than current General Plan designations

Connected by high capacity/high speed transit network

Preferred Transit Network & Intensification Areas
Based on Workshop #3 Input
Alternative Scenario #1

- **Blackstone/41-Downtown Fresno Scenario (Alt. 1)**
  - “Fixed guideway” transit routes:
    - Blackstone/41
    - Ventura/Kings Canyon
  - Intensification Areas focused on transit corridors:
    - Blackstone Corridor
    - Downtown Fresno
    - Kings Canyon corridor to Southeast Fresno
    - SE Madera New Towns
Alternative Scenario #2

- **High-Capacity Transit Network Scenario** (Alternative 2)
  - High-capacity transit mainly in dedicated lanes:
    - Blackstone/41
    - Ventura/Kings Canyon
    - Shaw - east of Blackstone
    - Clovis - Kings Canyon to Shaw
  - Intensification Areas:
    - Blackstone Corridor
    - Downtown Fresno
    - Fancher Creek & Southeast Fresno
    - Clovis Shaw Corridor & Southeast Urban Center
    - Whitesbrigde Corridor
    - Southeast Madera New Towns
### San Joaquin Valley Growth Response Study, Phase III

#### Alternative Scenarios - Intensification Prototypes

<table>
<thead>
<tr>
<th></th>
<th>Initial Run</th>
<th>Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RESIDENTIAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>4.5 du/ac</td>
<td>6 to 8 du/ac</td>
</tr>
<tr>
<td>Medium</td>
<td>8 du/ac</td>
<td>10 to 20 du/ac</td>
</tr>
<tr>
<td>High</td>
<td>20 to 26 du/ac</td>
<td>24 to 36 du/ac</td>
</tr>
<tr>
<td>Very High</td>
<td>Not available</td>
<td>45 to 80 du/ac</td>
</tr>
<tr>
<td><strong>EMPLOYMENT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial</td>
<td>10.65 emp/ac</td>
<td>40 emp/ac</td>
</tr>
<tr>
<td>Bus. Park</td>
<td>10.65 emp/ac</td>
<td>38 to 60 emp/ac</td>
</tr>
<tr>
<td>Office</td>
<td>48.53 emp/ac</td>
<td>50 to 120 emp/ac</td>
</tr>
</tbody>
</table>
Alternative Scenarios - Transit Prototypes

<table>
<thead>
<tr>
<th>Light Rail/Monorail (proposed for Alternative 1-Blackstone/41)</th>
<th>Bus Rapid Transit (BRT) (proposed for Alternative 2-BRT Network)</th>
</tr>
</thead>
</table>
| Headways | 5 minutes (peak)  
10 minutes (off-peak) | Headways | 2.5 minutes (peak)  
5 minutes off-peak |
| Line Speed | = Auto free flow speed | Line Speed | 80% of auto |
| Basic Bus | As in Initial Run | Basic Bus | As in Initial Run |
Example Intensification of a Corridor

East 14th Street, San Leandro, CA
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Example Infill Site

East 14th Street, San Leandro, CA
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Example Infill Site

East 14th Street, San Leandro, CA

Simulation by Urban Advantage
Overview of Three Model Types

- **Land Use Allocation Models**
  - Map existing and future land use & transportation patterns
  - Define additional assumptions and directions for growth

- **Indicator/Visualization Models**
  - What will the effects of growth be under alternative development plans?
  - Allows scenario testing — comparisons to baseline/business-as-usual conditions

- **Transportation Model Enhancements**
  - Enhance Fresno/Madera Region’s existing transportation and air quality models

*Models in blue boxes*
The “What if?” Land Use Allocation Process

**GROWTH PROJECTIONS**
Population and Jobs

**DEMAND** for Housing and other Real Estate Development

**“What if?” Setup**
Configure Program and Establish Allocation Rules

**Run Model**
Population and Jobs allocated based upon established rules

**Output**
Population and Jobs allocated based upon established rules

Prepare Output for Analysis
Review and refine allocations for Visualization and Indicator Tool

**LAND USES / POLICY**
Existing and Approved Uses also Alternate Scenarios
Major urban areas of Fresno and Madera County
- Fresno - Clovis urban center
- Hwy. 99 Corridor Cities
- Southeastern Fresno County Communities
- San Joaquin River Communities

2003 Demographics
- 85% of regional population
- 97% of regional jobs
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“What if?” Land Allocation Model

“Suitability” Parameters

- Agricultural preserved lands
- Vacant lands
- Slopes
- Soils
- Growth Patterns
“What if?” Land Allocation Model (Cont.)

“Suitability” Parameters

- Agricultural preserved lands
- Vacant lands
- Slopes
- Soils
- Growth Patterns within communities
INDEX Evaluation Model

- Measuring the success of each Alternative Scenario
  - Evaluating indicators of success

- Results from land use allocation model input into INDEX

- Allows visual and numerical comparisons of Alternative Scenario performance
Roles for INDEX in Planning & Monitoring

- Assess performance at different stages of planning and implementation:
  - Existing conditions
  - Existing policies
  - Alternative scenarios
  - Monitor performance of implementation
    - Overtime
    - Against benchmarked goals
Using the Model – How does “INDEX” Work?

- Study Areas
  - Region
  - Communities
  - Neighborhoods

- Studies
  - Static/dynamic
  - Parcel/area-based

- Cases
  - Actual conditions
  - Proposed changes

- Elements
  - Land-Use
  - Transportation
  - Infrastructure
  - Environment

- GIS Input from
  - What if?

Create
- Technical user
- Interactive public

Score
- Indicators numerically
- Indicators spatially

Compare
- To baseline
- To alternatives
- To goals
- RAW ranking

Visualize
- Drawings
- Photography
- Video
- 3D

Link
- Internet/web resources
- Other models
- Build on Fresno COG and MCTC TP+ models assumptions and data as fully as possible
  - Each updated to 2003 conditions in terms of basic land use and transportation networks
  - 2025 models used for network and other key assumptions regarding 2034
- Translate What If? Acreage forecast in TP+ HH and Employment Forecast
- Enhance sensitivity to local land use (the 4 Ds ← more later)
Both Fresno COG & Madera CTC have “conventional” TP+ four-step models

- Generate trip “Productions” based on Household travel surveys
- Distribute trips based on location of trip “Attractions”
- Determine Choice of Travel Mode
  - Fresno COG Model only; MCTC model is vehicle trips only
- Assign Trips to the Network

TP+ is most used software package in the San Joaquin Valley

Like all models, structurally insensitive to local land use features, hence the need for the 4D process
Assume – or modify – trends?

Population:
Up 22%

Driving:
Up 70%

Highway Delay:
Up 235%

Fresno region has bucked these trends somewhat
### Model Inputs

#### Land Use/Socioeconomic Data
- Based on Travel Analysis Zones (TAZs)

#### Roadway Network Data

#### Travel Characteristics Data

<table>
<thead>
<tr>
<th>LAND USE . DBF</th>
<th>TAZ</th>
<th>SF</th>
<th>MF</th>
<th>EMP</th>
</tr>
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<tr>
<td></td>
<td>848</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1025</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1024</td>
<td></td>
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</tbody>
</table>
Model Inputs (Cont.)

- Land Use/Socioeconomic Data
- Roadway Network Data
- Travel Characteristics Data

<table>
<thead>
<tr>
<th>LINKS.DBF</th>
<th>LINK</th>
<th>SPEED</th>
<th>DIST</th>
<th>LANES</th>
<th>COUNT</th>
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<tr>
<td>848-1025</td>
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<tr>
<td>1025-1024</td>
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<tr>
<td>1024-848</td>
<td></td>
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</tr>
</tbody>
</table>
Land Use/Socioeconomic Data

Roadway Network Data

Travel Characteristics Data

- In the end, based on surveys of travelers
- Must include assumptions about trips that are both internal and external to the study area
Many factors affect travel demand that are not easily reflected in traditional four-step models, e.g., due to scale of the TAZs.

Focusing on land use, we may speak of several “D-factors” that at the neighborhood scale, shift travel demand away from driving:

- **Density**
- **Diversity** (complementary mixing of land uses)
  - Sacramento studies suggest that nearby retail and personal services are especially effective in reducing midday trips and trips to and from work
- **Design** (to encourage walking and biking)
- **Destinations** (how many attractions are you near?)

The TP+ modeling process was adjusted to account for the 4Ds.
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Density, Diversity, Design...

- Compact uses
- Synergy through mix of use
- Trip linking opportunities
- Pedestrian, bicycle oriented
- Interconnected multimodal streets
- Walkable destinations
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Density, Diversity, Design... (Cont.)

...Destinations & a fifth D, Distance to Transit
**4-D Elasticities**

Percent change in trip generation by trip purpose given a 100% change in each of four key land use variables for a given TAZ

<table>
<thead>
<tr>
<th>Trip Purpose</th>
<th>Net Res. Density</th>
<th>Net Emp. Density</th>
<th>Job-mix Index</th>
<th>Design Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Based Non-Work</td>
<td>-7.0 %</td>
<td>-</td>
<td>-</td>
<td>- 3.2 %</td>
</tr>
<tr>
<td>Home Based Work</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Non-Home-Based</td>
<td>-33.9 %</td>
<td>-46.2 %</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Purpose: To display the impacts of land use patterns

Examples of Indicators:
- Population Density
- Percent of dwellings within 1/4 mile of transit

Enables comparison of Alternative Scenarios in terms of their success in meeting stakeholder goals

Narrowed list of potential indicators down to 13 to address key community concerns

Worked with stakeholders, elected officials, interest groups, government agencies and general public to define indicators important to the region
13 Selected Indicators:

1. Developable land remaining after new growth
2. Acres of agriculture remaining
3. Development Footprint (combined measurement of infill and density of population and employment)
4. Population density
5. Employment density
6. Use Mix
7. Transit Adjacency to Housing
8. Transit Adjacency to Employment
9. Mode split to transit
10. Vehicle miles traveled
11. Vehicle hours traveled
12. Economics of Development
13. Air pollution (NOx, HC, CO, & CO2) emitted from light vehicles
<table>
<thead>
<tr>
<th>Indicator #</th>
<th>Indicator Categories/Indicators</th>
<th>Indicators Directly Available From Models</th>
<th>Candidates for Economic &amp; Environment Justice</th>
<th>Status</th>
<th>City of Clovis</th>
<th>City of Fresno</th>
<th>Fresno County</th>
<th>Madera County</th>
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<tr>
<td>1</td>
<td><strong>Economics</strong></td>
<td></td>
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<tr>
<td>a</td>
<td>Travel cost ($/year/capita) to travel by mode</td>
<td>Partially</td>
<td>X</td>
<td>Requires TP+ run</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>b</td>
<td>Infrastructure/capital Facilities Costs - relative road, water, sewer, storm drain, education facility, and emergency service facilities costs</td>
<td>INDEX/COG Models</td>
<td>Partially</td>
<td>INDEX/COG TP+ post-process</td>
<td>Requires TP+ run to define roadway improvements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>Average cost of real estate development</td>
<td>Partially</td>
<td>Costs not developed at this point</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td><strong>Congestion Relief</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
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<tr>
<td>a</td>
<td>Vehicle hours of delay (hours/year/capita)</td>
<td>COG Models</td>
<td>Partially</td>
<td>INDEX/COG TP+ post-process</td>
<td>Requires TP+ run</td>
<td>20a, 20i, 20j</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>Congestion (Lane Miles at LOS E/F) by Facility Type and Sub-Region in tabular format.</td>
<td>COG Models</td>
<td>Partially</td>
<td>INDEX/COG TP+ post-process</td>
<td>Requires TP+ run</td>
<td>20a, 20i, 20j</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td><strong>Improved Air Quality</strong></td>
<td></td>
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<td></td>
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<tr>
<td>a</td>
<td>Air pollution (NOx, HC, CO, &amp; CO2) (lbs/year/capita of non-attainment pollutants) emitted from light vehicles</td>
<td>Partially</td>
<td>INDEX/COG TP+ post-process</td>
<td>Requires TP+ run</td>
<td>103, 201, 211</td>
<td></td>
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<tr>
<td>b</td>
<td>Air pollution (lbs/year/capita of non-attainment pollutants) emitted from heavy vehicles</td>
<td>Partially</td>
<td>INDEX/COG TP+ post-process</td>
<td>Requires TP+ run</td>
<td>103, 201, 211</td>
<td></td>
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</tr>
<tr>
<td>c</td>
<td>NOx and ROG emissions per vehicle mile traveled</td>
<td>Partially</td>
<td>INDEX/COG TP+ post-process</td>
<td>Requires TP+ run</td>
<td>101, 103, 104, 105, 106, 107</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>NOx and ROG emissions per trip</td>
<td>Partially</td>
<td>INDEX/COG TP+ post-process</td>
<td>Requires TP+ run</td>
<td>104, 105, 106, 107</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>Non-attainment emissions from transit vehicles/systems</td>
<td>Partially</td>
<td>INDEX/COG TP+ post-process</td>
<td>Requires TP+ run</td>
<td>101, 103, 104, 105, 106, 107</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td><strong>Travel Time &amp; Length (Jobs/Housing Balance)</strong></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>a</td>
<td>Vehicle miles traveled (miles/year/capita)</td>
<td>Indicators</td>
<td>Partially</td>
<td>Preliminary Home and Non-Home based from INDEX/COG TP+</td>
<td>Requires TP+ run</td>
<td>104, 105, 106, 107</td>
<td></td>
<td></td>
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<tr>
<td>b</td>
<td>Vehicle hours traveled (hours/year/capita)</td>
<td>Indicators</td>
<td>Partially</td>
<td>Preliminary Home and Non-Home based from INDEX/COG TP+</td>
<td>Requires TP+ run</td>
<td>20a, 20i, 20j</td>
<td></td>
<td></td>
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<tr>
<td>c</td>
<td>Daily and Peak Hour Vehicle Trip Time (Minutes) by Trip Purpose</td>
<td>COG Models, INDEX 4D</td>
<td>Partially</td>
<td>Requires TP+ run</td>
<td>3.3</td>
<td>Goal 9</td>
<td>104, 105, 106, 107</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>Job proximity to services (1/4 mile walking distance, average for study region displayed graphically and in tabular format - how many jobs are within 1/4 mile of services)</td>
<td>INDEX</td>
<td>Partially</td>
<td>Requires TP+ run</td>
<td>3.3</td>
<td>Goal 9</td>
<td>LU R8 PF 1.2</td>
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</tbody>
</table>
### 6 Land and Water Consumption

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Source</th>
<th>Goal(s)</th>
<th>LU F8</th>
<th>LU F10</th>
<th>LU F20</th>
<th>103, 2G1</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Land area taken up by new growth (total acres and acres per 1000 population)</td>
<td>INDEX</td>
<td>3.2, 4.2</td>
<td>Goal 9</td>
<td>C2a, 2Gj</td>
<td>Els, Elm</td>
<td>103, 2G1</td>
</tr>
<tr>
<td>b</td>
<td>Percentage of growth that is infill</td>
<td>INDEX</td>
<td>3.2, 4.2</td>
<td>Goal 9</td>
<td>C2a, 2Gj</td>
<td>Els, Elm</td>
<td>103, 2G1</td>
</tr>
<tr>
<td>c</td>
<td>Population density</td>
<td>INDEX</td>
<td>2.3</td>
<td>Goal 9</td>
<td>C2a, 2Gj</td>
<td>Els, Elm</td>
<td>103, 2G1</td>
</tr>
<tr>
<td>d</td>
<td>Residential Footprint (total residential acres per 1000 residents)</td>
<td>INDEX</td>
<td>2.3</td>
<td>Goal 9</td>
<td>C2a, 2Gj</td>
<td>Els, Elm</td>
<td>103, 2G1</td>
</tr>
<tr>
<td>e</td>
<td>Acres of agriculture remaining (orchards, crops, and grazing land)</td>
<td>INDEX</td>
<td>3.2, 4.2</td>
<td>Goal 9</td>
<td>C2a, 2Gj</td>
<td>Els, Elm</td>
<td>103, 2G1</td>
</tr>
<tr>
<td>f</td>
<td>Acres of public parks per capita</td>
<td>INDEX</td>
<td>3.2, 4.2</td>
<td>Goal 9</td>
<td>C2a, 2Gj</td>
<td>Els, Elm</td>
<td>103, 2G1</td>
</tr>
<tr>
<td>g</td>
<td>Use mix (mix of developed land uses among user defined grid)</td>
<td>INDEX</td>
<td>2.3</td>
<td>Goal 9</td>
<td>C2a, 2Gj</td>
<td>Els, Elm</td>
<td>103, 2G1</td>
</tr>
</tbody>
</table>

### 6 Travel Mode Shift/Visibility of Increased Transit Usage

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Source</th>
<th>Goal(s)</th>
<th>LU F8</th>
<th>LU F10</th>
<th>LU F20</th>
<th>103, 1C1, 1C2, 1G1, 1E1, 1F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Transit Adjacency to housing substituted for earlier requested measure (% of residences within 0.4 mile of transit corridor)</td>
<td>INDEX</td>
<td>5.4, 5.6</td>
<td>Ath</td>
<td></td>
<td></td>
<td>103, 1C1, 1C2, 1G1, 1E1, 1F1</td>
</tr>
<tr>
<td>b</td>
<td>Transit Adjacency to Employment substituted for earlier requested measure (% of employees within 0.4 mile of transit corridor)</td>
<td>INDEX</td>
<td>5.4, 5.6</td>
<td>Ath</td>
<td></td>
<td></td>
<td>103, 1C1, 1C2, 1G1, 1E1, 1F1</td>
</tr>
<tr>
<td>c</td>
<td>Mode split proxy (change in daily and peak hour vehicle trips by purpose)</td>
<td>INDEX, final from COFG TP, possibly including MODES Split model</td>
<td>3.1</td>
<td>Goal 6</td>
<td>Ath</td>
<td></td>
<td>103, 1C1, 1C2, 1G1, 1E1, 1F1</td>
</tr>
</tbody>
</table>
Modeling Alternative Scenarios

- Growth Allocation
- Transportation Impacts
- Air Quality Impacts
- Indicator Results
**San Joaquin Valley Growth Response Study, Phase III**

**“What if?” Land Allocation Results**

**Initial Run Scenario vs. Existing 2003**

<table>
<thead>
<tr>
<th>Fresno Co.</th>
<th>Households</th>
<th>% Change</th>
<th>Jobs</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing 2003</td>
<td>247,800</td>
<td></td>
<td>317,400</td>
<td></td>
</tr>
<tr>
<td>Initial Run</td>
<td>450,300</td>
<td>82%</td>
<td>678,400</td>
<td>114%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Madera Co.</th>
<th>Households</th>
<th>% Change</th>
<th>Jobs</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing 2003</td>
<td>27,100</td>
<td></td>
<td>30,700</td>
<td></td>
</tr>
<tr>
<td>Initial Run</td>
<td>83,800</td>
<td>209%</td>
<td>50,600</td>
<td>65%</td>
</tr>
</tbody>
</table>

Land Use - 2034
“What if?” Land Allocation Results

- Blackstone/41-Downtown Fresno
  Scenario (Alt. 1) vs. Initial Run Scenario

### Fresno Co.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Households</th>
<th>% Change</th>
<th>Jobs</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing 2003</td>
<td>247,800</td>
<td></td>
<td>317,400</td>
<td></td>
</tr>
<tr>
<td>Initial Run</td>
<td>450,300</td>
<td></td>
<td>678,400</td>
<td></td>
</tr>
<tr>
<td>Blackstone/41</td>
<td>462,350</td>
<td>3%</td>
<td>639,100</td>
<td>-6%</td>
</tr>
</tbody>
</table>

### Madera Co.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Households</th>
<th>% Change</th>
<th>Jobs</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing 2003</td>
<td>27,100</td>
<td></td>
<td>30,700</td>
<td></td>
</tr>
<tr>
<td>Initial Run</td>
<td>83,800</td>
<td></td>
<td>50,600</td>
<td></td>
</tr>
<tr>
<td>Blackstone/41</td>
<td>79,400</td>
<td>-5%</td>
<td>105,550</td>
<td>109%</td>
</tr>
</tbody>
</table>

Land Use - 2034
### San Joaquin Valley Growth Response Study, Phase III

**“What if?” Land Allocation Results**

#### High Capacity Transit Network Scenario (Alt. 2) vs. Initial Run Scenario

<table>
<thead>
<tr>
<th>Fresno Co.</th>
<th>Households</th>
<th>% Change</th>
<th>Jobs</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing 2003</td>
<td>247,800</td>
<td></td>
<td>317,400</td>
<td></td>
</tr>
<tr>
<td>Initial Run</td>
<td>450,300</td>
<td></td>
<td>678,400</td>
<td></td>
</tr>
<tr>
<td>Blackstone/41</td>
<td>462,350</td>
<td>3%</td>
<td>639,100</td>
<td>-6%</td>
</tr>
<tr>
<td>HCT Network</td>
<td>440,750</td>
<td>-2%</td>
<td>622,600</td>
<td>-8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Madera Co.</th>
<th>Households</th>
<th>% Change</th>
<th>Jobs</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing 2003</td>
<td>27,100</td>
<td></td>
<td>30,700</td>
<td></td>
</tr>
<tr>
<td>Initial Run</td>
<td>83,800</td>
<td></td>
<td>50,600</td>
<td></td>
</tr>
<tr>
<td>Blackstone/41</td>
<td>79,400</td>
<td>-5%</td>
<td>105,550</td>
<td>109%</td>
</tr>
<tr>
<td>HCT Network</td>
<td>91,650</td>
<td>9%</td>
<td>117,120</td>
<td>131%</td>
</tr>
</tbody>
</table>

**Land Use - 2034**
San Joaquin Valley Growth Response Study, Phase III

Developable Land Remaining After New Growth

■ Initial Run Scenario vs. Existing 2003

<table>
<thead>
<tr>
<th>Fresno Co.</th>
<th>“Developable” Land Area</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td>70,200</td>
<td></td>
</tr>
<tr>
<td>Initial Run</td>
<td>7,060</td>
<td>-90%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Madera Co.</th>
<th>“Developable” Land Area</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td>32,200</td>
<td></td>
</tr>
<tr>
<td>Initial Run</td>
<td>4,100</td>
<td>-87%</td>
</tr>
</tbody>
</table>

Note: “Developable” Land is vacant, rural residential, agriculture, and open space with urban General Plan Designations.
### Blackstone/41-Downtown Fresno Scenario (Alt. 1) vs. Initial Run Scenario

<table>
<thead>
<tr>
<th>Fresno Co.</th>
<th>“Developable” Land Area</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td>70,200</td>
<td></td>
</tr>
<tr>
<td>Initial Run</td>
<td>7,060</td>
<td></td>
</tr>
<tr>
<td>Blackstone/41</td>
<td>14,000</td>
<td>98%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Madera Co.</th>
<th>“Developable” Land Area</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td>32,200</td>
<td></td>
</tr>
<tr>
<td>Initial Run</td>
<td>4,100</td>
<td></td>
</tr>
<tr>
<td>Blackstone/41</td>
<td>11,300</td>
<td>176%</td>
</tr>
</tbody>
</table>

Note: “Developable” Land is vacant, rural residential, agriculture, and open space with urban General Plan Designations.
San Joaquin Valley Growth Response Study, Phase III

Developable Land Remaining After New Growth

High Capacity Transit Network Scenario (Alt. 2) vs. Initial Run

<table>
<thead>
<tr>
<th>County</th>
<th>“Developable” Land Area</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresno Co.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing</td>
<td>70,200</td>
<td></td>
</tr>
<tr>
<td>Initial Run</td>
<td>7,060</td>
<td></td>
</tr>
<tr>
<td>Blackstone/41</td>
<td>14,000</td>
<td>98%</td>
</tr>
<tr>
<td>HCT Network</td>
<td>10,200</td>
<td>44%</td>
</tr>
<tr>
<td>Madera Co.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing</td>
<td>32,200</td>
<td></td>
</tr>
<tr>
<td>Initial Run</td>
<td>4,100</td>
<td></td>
</tr>
<tr>
<td>Blackstone/41</td>
<td>11,300</td>
<td>176%</td>
</tr>
<tr>
<td>HCT Network</td>
<td>5,660</td>
<td>38%</td>
</tr>
</tbody>
</table>

Note: “Developable” Land is vacant, rural residential, agriculture, and open space with urban General Plan Designations.
### All Scenarios vs. Existing 2003

<table>
<thead>
<tr>
<th></th>
<th>2003 Acres</th>
<th>2034 Acres</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresno County</td>
<td>288,600</td>
<td>255,500</td>
<td></td>
</tr>
<tr>
<td>Madera County</td>
<td>393,400</td>
<td>378,500</td>
<td></td>
</tr>
<tr>
<td>Total Study Area</td>
<td>682,000</td>
<td>634,000</td>
<td>-7.0%</td>
</tr>
</tbody>
</table>
Development Footprint

- Initial Run Scenario vs. Existing 2003

<table>
<thead>
<tr>
<th></th>
<th>Existing (2003)</th>
<th>Initial Run (2034)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acres/1000 Residents</td>
<td>183.0</td>
<td>146.9 (total)</td>
</tr>
</tbody>
</table>

SAN JOAQUIN VALLEY GROWTH RESPONSE STUDY, PHASE III

2034 Initial Run Development Footprint
San Joaquin Valley Growth Response Study
Sponsored by Caltrans
September 15, 2004
San Joaquin Valley Growth Response Study, Phase III

Development Footprint

Alternatives 1 and 2 vs. Initial Run

- Existing @ 183.0
- Initial Run (2034): 146.9 acres
- Alternative 1 (2034): 111.7 acres
- Alternative 2 (2034): 110.1 acres

-13.3% (Alternative 1)
-35.18% (Total Initial Run)
-12.9% (Alternative 2)
### Population and Employment Density

- **Population Density** - population per gross developed acre of residential development
- **Employment Density** - employees per gross acre of employment use
Population Density

- **Initial Run vs. Existing 2003**

  - **Existing (2003):** 10.8
  - **Initial Run (2034):** 11.6 (total)
  - **Increase:** 7.5%

  *Legend:*
  - Population Density:
    - 1.0 - 5.0 res/ac
    - 5.1 - 10.0 res/ac
    - 10.1 - 30.0 res/ac
    - 30.1+ res/ac
  - Employment Density:
    - 1.0 - 5.0 emp/ac
    - 5.1 - 10.0 emp/ac
    - 10.1 - 40.0 emp/ac
    - 40.1+ emp/ac
Population Density

Alternatives 1 and 2 vs. Initial Run

- Existing: 10.8 res/ac
- Initial Run: 11.6
- Alternative 1: 14.2 (total)
- Alternative 2: 14.4 (total)
San Joaquin Valley Growth Response Study, Phase III

Employment Density

- Initial Run vs. Existing 2003
Employment Density

Alternatives 1 and 2 vs. Initial Run

<table>
<thead>
<tr>
<th></th>
<th>Employees/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing (2003)</td>
<td>11.10</td>
</tr>
<tr>
<td>Initial Run (2034)</td>
<td>14.97 (total)</td>
</tr>
<tr>
<td>Alternative 1 (2034)</td>
<td>16.2 (total)</td>
</tr>
<tr>
<td>Alternative 2 (2034)</td>
<td>16.13 (total)</td>
</tr>
</tbody>
</table>

Legend:
- Population Density:
  - 0.0 - 5.0 emp/acre
  - 5.1 - 10.0 emp/acre
  - 10.1 - 15.0 emp/acre
  - 15.1 - 20.0 emp/acre
  - 20.1+ emp/acre
Use Mix

- Use Mix
- Mix of land uses within a 1/4-mile grid
San Joaquin Valley Growth Response Study, Phase III

Use Mix

Initial Run vs. Existing 2003

<table>
<thead>
<tr>
<th></th>
<th>Existing (2003)</th>
<th>Initial Run (2034)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing (%)</td>
<td>0.123</td>
<td>0.137 (total)</td>
</tr>
<tr>
<td>Change (%)</td>
<td>11.3</td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- 0.00-10.00%
- 10.01-20.00%
- 20.01-30.00%
- 30.01-40.00%
- 40.01-50.00%
- 50.01-100.00%
San Joaquin Valley Growth Response Study, Phase III

Use Mix

Alternatives 1 & 2 vs. Initial Run

- Existing @ 0.123
- Initial Run (2034) 0.137 (total)
- Alternative 1 (2034) 0.157 (total)
- Alternative 2 (2034) 0.156 (total)

Blackstone/41 & SE Fresno Transit Corridor
Use Mix
San Joaquin Valley Growth Response Study
Sponsored by Caltrans
September 15, 2004
Alternatives 1 & 2 vs. Initial Run

- Existing @ 0.123
- Initial Run (2034) @ 0.137 (total)
- Alternative 1 (2034) @ 0.157 (total)
- Alternative 2 (2034) @ 0.156 (total)
San Joaquin Valley Growth Response Study, Phase III

Housing & Employment Adjacency to Transit

- Housing & Employment Adjacency to Transit
  - Percent of households and jobs within 1/4 mile of a transit line

Legend:
- 2003 Bus Network
- Housing Adjacency: Within 1/4 ml
- Employment Adjacency: Within 1/4 ml
- Outside 1/4 ml

2003 Existing
Residential and Employment Adjacency to Transit
San Joaquin Valley Growth Response Study
Prepared by Caltrans
September 15, 2004
San Joaquin Valley Growth Response Study, Phase III

Transit Adjacency to Housing

- Initial Run vs. Existing 2003

[Graph showing dwelling units per acre for Existing (2003) and Initial Run (2034)]

[Map showing residential and employment adjacency to transit]
Transit Adjacency to Housing

- Alternatives 1 and 2 vs. Initial Run

<table>
<thead>
<tr>
<th>Dwelling Units/Acre</th>
<th>Existing (2003)</th>
<th>Initial Run (2034)</th>
<th>Alternative 1 (2034)</th>
<th>Alternative 2 (2034)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing @ 63.15</td>
<td>57.72 (total)</td>
<td>68.44 (total)</td>
<td>64.79 (total)</td>
</tr>
<tr>
<td></td>
<td>63.15</td>
<td>10.72</td>
<td>7.07</td>
<td></td>
</tr>
</tbody>
</table>

Blackstone/41 & SE Fresno Transit Corridor
Residential and Employment Adjacency to Transit
San Joaquin Valley Growth Response Study
Sponsored by Caltrans
September 15, 2004
San Joaquin Valley Growth Response Study, Phase III

Transit Adjacency to Employment

- Initial Run vs. Existing 2003

![Graph showing employees per acre comparison between Existing (2003) and Initial Run (2034).](chart)

![Map showing residential and employment adjacency to transit.](map)

**Legend**
- Green: 2003 Bus Network
- Red: 2034 Bus Network
- Orange: Existing Adjacency
- Yellow: Within 1/4 mi
- Purple: Outside 1/4 mi

**2034 Initial Run**
Residential and Employment Adjacency to Transit
San Joaquin Valley Growth Response Study
Sponsored by Caltrans
September 15, 2004
Transit Adjacency to Employment

Alternatives 1 and 2 vs. Initial Run

- Existing @ 72.92
- Initial Run (2034) 55.09 (total)
- Alternative 1 (2034) 61.30 (total)
- Alternative 2 (2034) 60.60 (total)

Legend:
- Intensification Areas
- Transit Corridors
- 2003 Bus Network
- 2004 Bus Network
- Proximity Accessibility
  - Within 1/4 mi
  - Outside 1/4 mi
- Employment Adjacency
  - Within 1/4 mi
  - Outside 1/4 mi
Each Scenario was compared in terms of:

- Vehicle Trips (VT)
- Vehicle Miles Traveled (VMT)
- Roadway Speeds
- Mode Split
### Study Area Area Results by Scenario

<table>
<thead>
<tr>
<th>INDICATOR:</th>
<th>Initial Run</th>
<th>Blackstone/41 (Alt 1) (vs. Initial Run)</th>
<th>BRT Network (Alt 2) (vs. Initial Run)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Trips:</td>
<td>5,483,000</td>
<td>-2.0 %</td>
<td>-4.1 %</td>
</tr>
<tr>
<td>Vehicle miles:</td>
<td>45,139,000</td>
<td>-3.0 %</td>
<td>-3.6 %</td>
</tr>
<tr>
<td>Peak Auto Speeds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--Fresno Roads:</td>
<td>18 mph</td>
<td>17 mph (-5.5%)</td>
<td>19 mph (+5.5%)</td>
</tr>
<tr>
<td>--Madera Roads:</td>
<td>28 mph</td>
<td>24 mph (-14.3%)</td>
<td>24 mph (-14.3%)</td>
</tr>
<tr>
<td>Transit Mode Split:</td>
<td>1.1 %</td>
<td>1.6% (+45 %)</td>
<td>1.6% (+45 %)</td>
</tr>
</tbody>
</table>
Interpreting the Bridge Constraint

Bay Bridge Congestion Levels In Fresno-Madera!?!?

- Land Use is better balanced, but trip generation is higher in SR 41 Corridor (+65%, nearly half a million new vehicle trips under Alt. 1)
- Model shows auto still the most convenient mode despite speeds of under 10 mph in the morning and afternoon peak periods.
- Model projected Trans-Bridge Transit Mode Split of 5-7% may be low
  - Similar to 2020 transit mode split projection for Altamont Pass
  - Maximum likely split ~ 15% (midpoint of projected Altamont Pass and current Caldecott Tunnel transit shares)
Summary Results:

- Most indicators are going in the expected direction: overall vehicle trips and vmt are down; transit ridership increases
- Slower speeds in Madera County due to more development
- Non-residential uses add more attraction trip ends (demand) in intensification zones than the residential uses added on the production end
- Keeping employment and population levels at approximately the same for all alternatives has unintended effects
**Summary Results:**

- **Blackstone/41 (Alternative 1) Scenario** - The concentration of intensification zones in the SR 41 corridor increases opportunities to walk and use transit, but also increases vehicular traffic and congestion in this corridor.

- **BRT Network (Alternative 2) Scenario** - Wider dispersal of intensification zones in SR 41 corridor reduces vehicular traffic and congestion in the intensification areas.
San Joaquin Valley Growth Response Study, Phase III

Vehicle Trips

Daily Vehicle Trips

- Fresno County
- Fresno Study Area (WhatIf Modeling)
- Madera County
- Madera Study Area (WhatIf)

- 2003
- Initial Run 2034
Vehicle Miles Traveled (Cont.)

Daily Vehicle Miles Traveled (VMT)

- Fresno County
- Fresno Study Area (WhatIf Modeling)
- Fresno Intensification Area
- Madera County
- Madera Study Area (WhatIf Modeling)

Initial Run
Alternative 1
Alternative 2
Vehicle Hours Traveled

Daily Vehicles Hours Traveled

- Fresno County
- Fresno Study Area (WhatIf Modeling)
- Madera County
- Madera Study Area (WhatIf Modeling)

Legend:
- 2003
- Initial Run 2034
Vehicle Hours Traveled (Cont.)

Daily Vehicles Hours Traveled

- Fresno County
- Fresno Study Area (WhatIf Modeling)
- Fresno Intensification Area
- Madera County
- Madera Study Area (WhatIf Modeling)

- Base Case
- Alternative 1
- Alternative 2
Economic Indicators

- Daily Transportation Costs
- Relative Infrastructure Costs
- Real Estate Development Costs
Daily Transportation Costs ($Millions)

<table>
<thead>
<tr>
<th>Cost Type</th>
<th>Initial Run - 2034</th>
<th>Alternative 1 - 2034</th>
<th>Alternative 2 - 2034</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Cost</td>
<td>11.2</td>
<td>10.7</td>
<td>10.4</td>
</tr>
<tr>
<td>Time Value</td>
<td>14.4</td>
<td>14.7</td>
<td>13.6</td>
</tr>
<tr>
<td>Total</td>
<td>25.6</td>
<td>25.4</td>
<td>24.0</td>
</tr>
</tbody>
</table>

Legend:
- Green: Initial Run - 2034
- Red: Alternative 1 - 2034
- Purple: Alternative 2 - 2034
Relative Infrastructure Costs (Study Area)

- Water/Sewer: Initial Run - 93%, Alternative 1 - 96%, Alternative 2 - 92%
- Storm Drain: Initial Run - 97%, Alternative 1 - 96%, Alternative 2 - 97%
- Roads: Initial Run - 100%, Alternative 1 - 100%, Alternative 2 - 100%

Legend:
- Green: Initial Run - 2034
- Red: Alternative 1 - 2034
- Purple: Alternative 2 - 2034
### Real Estate Development Costs

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Standard Single Family</th>
<th>Intensification Area Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost per Unit</td>
<td>$175,000</td>
<td>$115,000</td>
</tr>
<tr>
<td>Cost per SqFt</td>
<td>$92.00</td>
<td>$115.00</td>
</tr>
<tr>
<td>Infra/ Capital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost per Unit</td>
<td>$10,000</td>
<td>$3,300</td>
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<tr>
<td>Cost per SqFt</td>
<td>$5.25</td>
<td>$3.30</td>
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<tr>
<td>Total Costs</td>
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<tr>
<td>Cost per Unit</td>
<td>$185,000</td>
<td>$118,300</td>
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<tr>
<td>Cost per SqFt</td>
<td>$97.25</td>
<td>$118.30</td>
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### San Joaquin Valley Growth Response Study, Phase III

#### Air Quality Indicator Results

<table>
<thead>
<tr>
<th>Scenario</th>
<th>POP</th>
<th>VMT</th>
<th>Tons/Day</th>
<th>Lbs/Yr/Capita</th>
<th>Lbs/VMT</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>CO</td>
<td>ROG</td>
<td>NOX</td>
</tr>
<tr>
<td>2003 Base Year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Fresno</td>
<td>855,743</td>
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<td>489.8</td>
<td>79.6</td>
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<tr>
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<td>117,606</td>
<td>3,446,450</td>
<td>49.7</td>
<td>4.8</td>
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<tr>
<td>TOTAL</td>
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<td>23,522,450</td>
<td>539.6</td>
<td>84.4</td>
<td>76.6</td>
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<tr>
<td>Initial Run - 2034</td>
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<td></td>
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<tr>
<td>Fresno</td>
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<td>39.9</td>
<td>5.3</td>
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<td>8,677,118</td>
<td>11.2</td>
<td>1.4</td>
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<td>TOTAL</td>
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<td>45,139,353</td>
<td>51.1</td>
<td>6.8</td>
<td>12.6</td>
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<tr>
<td>Alt 1 - 2034</td>
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<td>Fresno</td>
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<td>TOTAL</td>
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<td>12.5</td>
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<tr>
<td>Alt 2 - 2034</td>
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<tr>
<td>Fresno</td>
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<td>4.0</td>
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<td>12.5</td>
</tr>
</tbody>
</table>
San Joaquin Valley Growth Response Study, Phase III

Air Quality Indicator Results (Cont.)

Tons Per Day

- **CO**
- **ROG**
- **NOX**

2003 Base Year

Initial Run - 2034
Carbon Monoxide (CO)
Pounds / Year / Capita

<table>
<thead>
<tr>
<th></th>
<th>Initial Run - 2034</th>
<th>Alt 1 - 2034</th>
<th>Alt 2 - 2034</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>47.3</td>
<td>47.9</td>
<td>46.1</td>
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</tbody>
</table>
San Joaquin Valley Growth Response Study, Phase III

Air Quality Indicator Results (Cont.)

Reactive Organic Gas (ROG) Pounds
Pounds / Year / Capita

<table>
<thead>
<tr>
<th>Scenario</th>
<th>2034</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Run</td>
<td>6.2</td>
</tr>
<tr>
<td>Alt 1</td>
<td>6.2</td>
</tr>
<tr>
<td>Alt 2</td>
<td>5.9</td>
</tr>
</tbody>
</table>
San Joaquin Valley Growth Response Study, Phase III

Air Quality Indicator Results (Cont.)

Oxides of Nitrogen (NOX)
Pounds / Year / Capita

Initial Run - 2034: 13.4
Alt 1 - 2034: 13.7
Alt 2 - 2034: 13.1
Modeling tools provide a new level of analysis that can better inform land use and transportation decisions

- Allow stakeholders to evaluate growth scenarios at a large scale both visually and statistically with results that are not overly technical
- New indicators can be evaluated more easily
- INDEX provides input to 4-D process improving standard transportation models

Modeling tools encourage comprehensive and integrated planning approach

- Translation of land use policy to model inputs is more direct
- Input requirements encourage more clarity in land use policies
- Require higher-level of interaction between land use and transportation planners
San Joaquin Valley Growth Response Study, Phase III

Next Steps to Model Refinement

- **Modeling tools and data inputs need further refinement**
  - What If? and INDEX are new tools that are continuing to be developed and refined, similarly to early transportation modeling tools

- **Region and jurisdictions need to continue commitment to refining GIS data**
  - Will help future use of What If? and INDEX
  - Will be helpful as transportation modeling practices shift to GIS-based modeling packages

- **Bring land use designations into “alignment”**
  - Similar employment and residential densities from jurisdiction to jurisdiction
  - Provide more clarity in capacity for mixed-use designations
  - Verify employment densities
San Joaquin Valley Growth Response Study, Phase III

Potential Application of Tools

- **Test Additional Alternatives**
  - Increase employment and services in Madera County?
  - Refine transit corridors to better link growing employment areas to denser residential neighborhoods?
  - Increase employment densities to reflect market and transition some employment designations to housing and services?

- **Possible Next Applications:**
  - Caltrans SR 41 Corridor Study – City of Fresno and Caltrans to undertake a micro scale analysis using the Tool Box
  - City of Fresno General Plan Implementation Program – Activity Center Analysis
  - Downtown Fresno Transportation Study
  - Public Transportation Infrastructure Study (PTIS)
What would you like to see these tools used for –

- Additional micro-scale analysis of new developments?
- Test additional alternative scenarios at the “regional” level?
- To test the RTP and other Circulation Plans and Studies?
- Assess residential access to services?
Thank you for attending and participating!

For additional information contact:
Georgiena Vivian at (559) 259-9257 or gvivian@vrpatechnologies.com
Web Site: www.vrpatechnologies.com

The Phase III Report will be available in November
Web Site: www.dot.ca.gov/dist6/projects.htm

The “Tool Box” will be housed at Fresno COG and at the Madera County Transportation Commission (MCTC)
Special thank you to:

- Darrell Unruh, Fresno Development Dept.
- Jon Elam – Fresno Public Works
- John Downs – Fresno Area Express
- John Wright – Clovis Planning & Development Services
- Lynn Gorman – Fresno County Public Works Dept.
- Tony Boren and Mike Bitner – Fresno COG
- Derek Winning – MCTC
- Stakeholders!
Questions and Answers