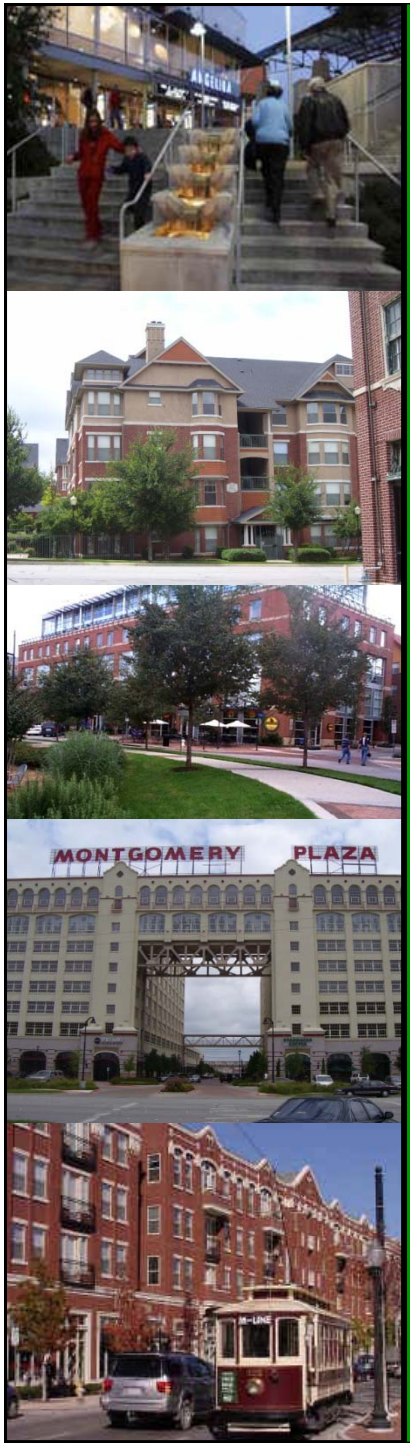

EMISSIONS BENEFITS FROM ALTERNATIVE LAND USE DEVELOPMENT (PHASE I)

2009 Transportation Planning, Land Use, and Air Quality Conference
Denver, Colorado
July 28, 2009

Jenny Danieau
Air Quality Planning and Operations
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Project Background

- **Single-use, low-density developments equals an increased demand for automobiles and roads**
- **Transportation facility needs directly related to location and magnitude of population and employment**
- **Changes in land use impact demographic distribution and needed transportation improvements**
- **Improvements lead to nitrogen oxides (NOx), volatile organic compound (VOC) and carbon monoxide (CO) reductions**

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Project Objectives

- Identify types of development strategies that result in positive impacts to the transportation system
- Analyze the parts of alternative land use projects and how they improve the transportation system
- Investigate transportation needs related to alternative land use projects for existing developments in the Dallas-Fort Worth (DFW) region
- Investigate transportation components of alternative land use projects nationwide
- Gather air quality quantifications for projects

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Development Strategies

Integrating land use planning with transportation planning can reduce emissions by decreasing vehicle travel and trip distances

- **Infill**
- **Mixed Use**
- **Neo-Traditional Design**
- **Transit-Oriented**

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Development Strategies - Infill

- Built in existing urban areas
- Made to serve pedestrians, cyclists, and automobiles
- Successful development often includes:
  - New development on vacant lots within urbanized areas
  - Redevelopment of underused buildings and sites, or
  - Rehabilitation of historic buildings for new uses

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Development Strategies – Mixed-Use

- Combination of residential, commercial, industrial, and/or other types of land use at 1 location
- Encourage rideshare or transit use
- Eliminate reliance in single occupancy vehicle
- Successful mixed-use developments:
  - 3 or more significant revenue-producing uses
  - Significant physical and functional integration of project components
  - Development in conformance with a coherent plan

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Development Strategies – Neo-Traditional Design

- Replicates pedestrian-oriented neighborhoods built before automobiles dominated travel
- Promotes pedestrian-friendly areas
- May include mixed-uses
- Parking usually hidden behind buildings
- Does not necessarily eliminate vehicle trips

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Development Strategies – Transit-Oriented (TOD)

- Promotes mixed-use development around transit stops
- Possibly eliminates vehicular use entirely
- Increases ridership on rail lines by 20-40%
- Principles usually include:
  - Variety of land uses (horizontally or vertically)
  - Compact pedestrian-oriented design and streetscapes
  - Building design and orientation to street which allows easy pedestrian access

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Development Strategies – Transit-Oriented (TOD)

- Within quarter-mile from transit stop
- Balance of mixed-uses that can generate 24 hours of ridership
- Average block perimeter limited to 1,350 feet
- Maximum vs. minimum parking requirements
- Transit service is fast, frequent, reliable, and comfortable
- Roadway space allocated and traffic signals timed for walkers and cyclists
- Automobile level-of-service met through congestion pricing measures
- Traffic is calmed by reduced speed limits

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Project Focus

- TOD projects can eliminate vehicle start ups
- Increasing interest in TOD projects in DFW region
- Demographic Sensitivity Analysis Scenarios
  - When growth (employment and household) redistributed around rail vs. other land use developments, greater decrease in vehicle miles of travel (VMT)

Project focus narrowed to investigate projects located near transit

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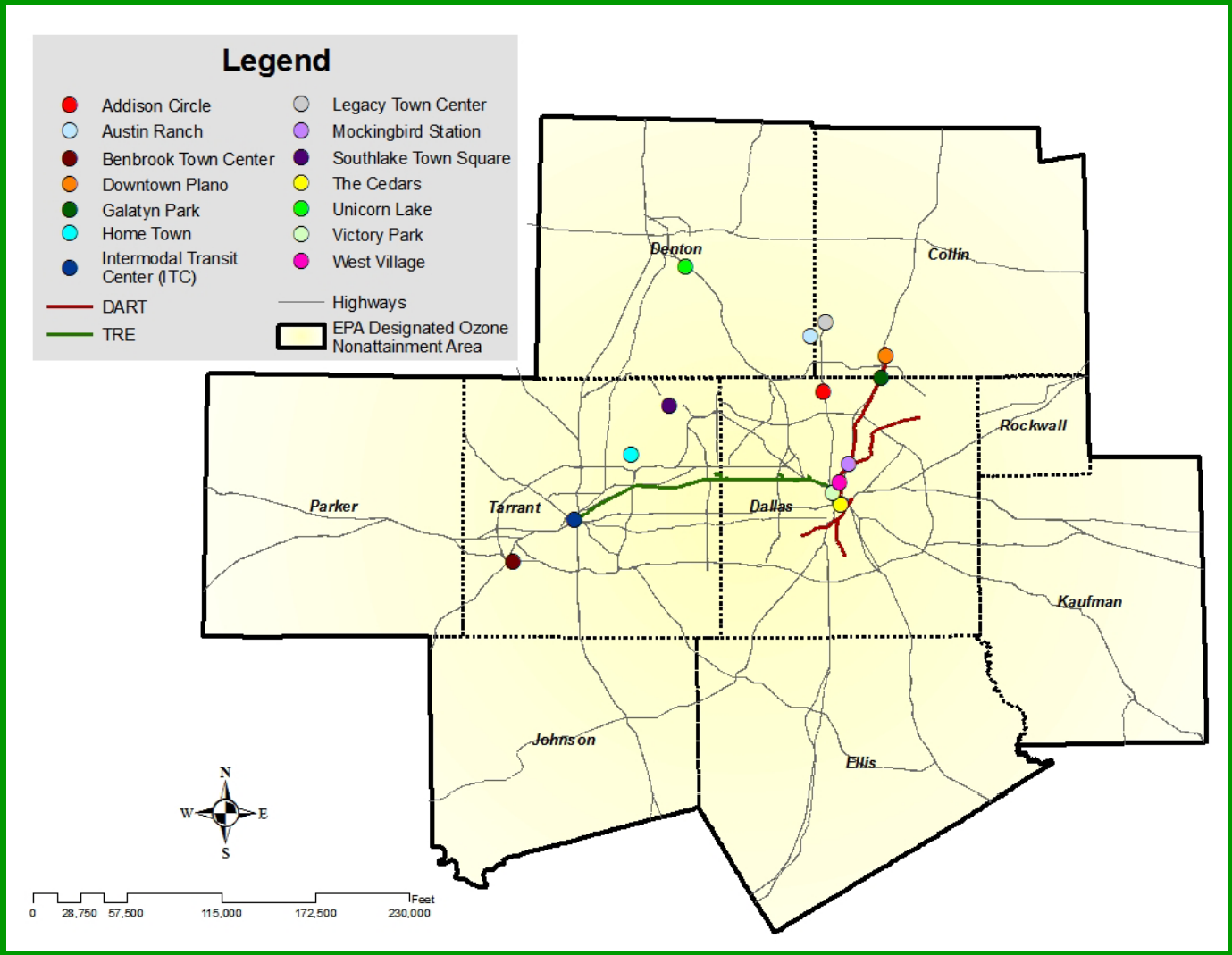
Alternative Land Use Projects (DFW Region)



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DFW Land Use Development Projects Near Rail

Station or Development Name	Train Line	Mixed-Use	Residential	Retail	Restaurants	Office
Kiest (low end)	DART-Blue		Y	Y	Y	
Akard	DART-Red	Y		Y	Y	Y
Cityplace/West Village	DART-Red	Y	Y	Y	Y	Y
Downtown Plano	DART-Red	Y	Y	Y	Y	
Forest Lane	DART-Red			Y		Y
Galatyn Park	DART-Red		Y			Y
Lovers Lane	DART-Red			Y	Y	
Mockingbird Station	DART-Red	Y	Y	Y	Y	Y
Park Lane	DART-Red		Y	Y	Y	
Pearl	DART-Red			Y		Y
Spring Valley	DART-Red			Y		
St. Paul	DART-Red	Y	Y	Y	Y	Y
The Cedars	DART-Red			Y	Y	
Union Station	DART-Red			Y		Y
Walnut Hills	DART-Red		Y			
West End	DART-Red	Y	Y	Y	Y	
Centerport/DFW Airport	TRE		Y			
Fort Worth ITC	TRE			Y		Y
South Irving	TRE			Y	Y	Y
T& P Station	TRE		Y			Y

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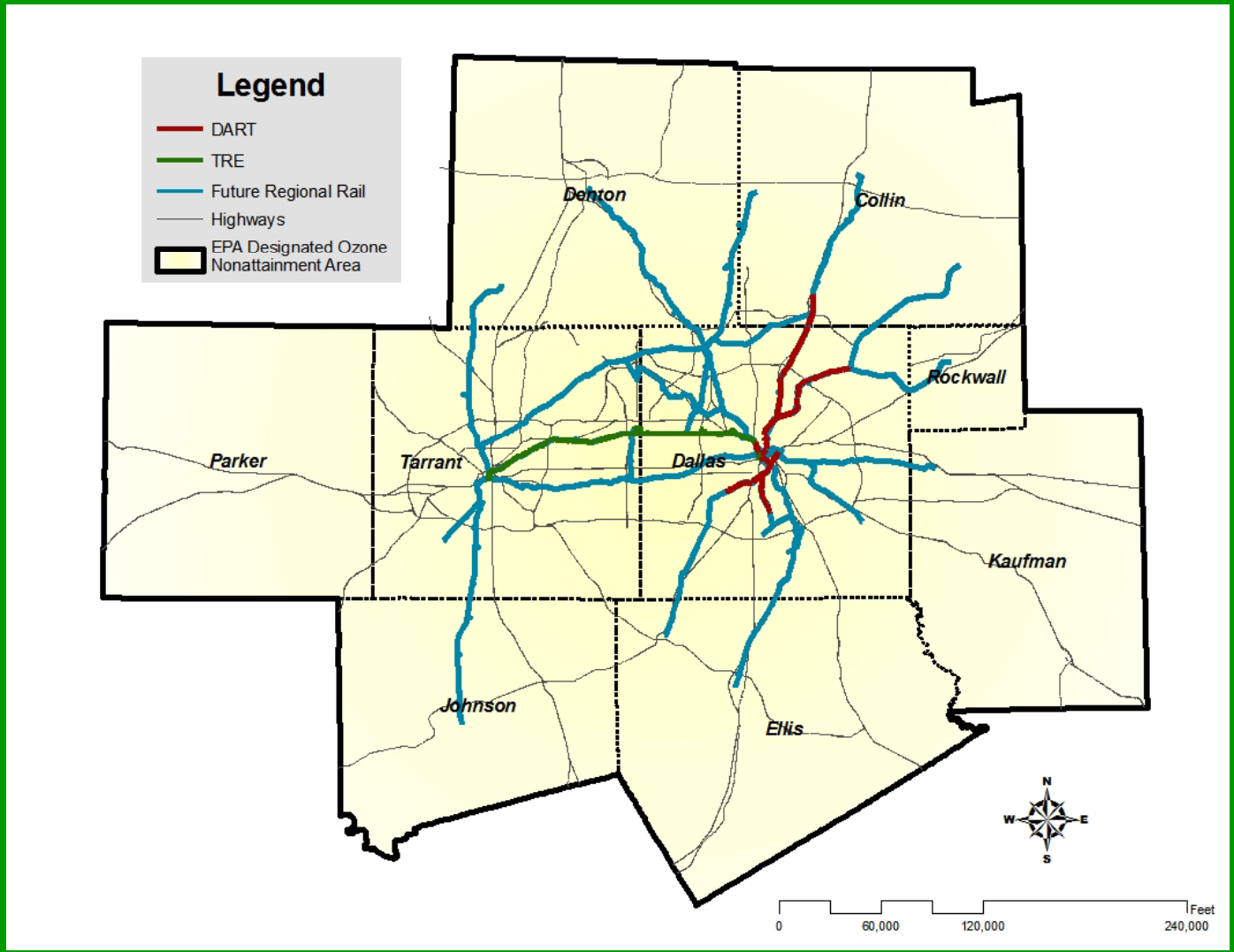
DFW Region Rail System



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Alternative Land Use Development Nationwide

- Austin, Texas
  - Midtown Commons at Crestview Station
- Atlanta, Georgia
  - Community programs to provide funding
  - MARTA
- Baltimore, Maryland
  - Baltimore Metro (heavy rail) and Central Light Rail Line
  - Four TODs
- Denver, Colorado
  - Wide range transit system
- California
  - Proposition 1C Transit-Oriented Development Housing Support
- Chicago, Illinois
  - Metra system 505 route miles with 228 stations on 11 lines
  - TOD planning area of debate
- Portland, Oregon
  - Metropolitan Area Express (MAX)
  - 3 TODs

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Air Quality Quantifications

- **Models:**
  - **Travel Demand Model**
  - **Environmental Protection Agency's Smart Growth Index**

- **Methodology:**
  - **California Department of Transportation**
  - **Texas Transportation Institute**
  - **Center for Clean Air Policy**
  - **Inner City Fund (ICF) International**

EMISSIONS BENEFITS FROM ALTERNATIVE LAND USE DEVELOPMENT (PHASE I)

Air Quality Quantifications

- Travel Demand Model
  - Calculate regional VMT
  - Drawback: Unable to capture small trips made within analysis zones due to model's regional focus

- EPA Smart Growth Index:
  - Measure benefits of infill development
  - Combines Geographic Information Systems (GIS) mapping with spreadsheet analysis
  - Drawback: Sketch model that evaluates transportation and alternative land use variations; is not suitable for evaluating major transportation improvement alternatives

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Air Quality Quantifications

- California Department of Transportation
  - Quantifies benefits using 3 types of methodologies:
    1. Reduced energy consumption for vehicles (gasoline)
    2. Reduced energy consumption in the home (power equivalence)
    3. Reduced carbon dioxide (CO_2) emissions

- Texas Transportation Institute
  - Quantification procedures separated into 3 types depending on how applied:
    1. Applied to cities with transit service
    2. Applied to cities with developing activity centers
    3. Applied for new developments or redevelopment in urban areas

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Air Quality Quantifications

- California for Clean Air Policy
  - Guidebook includes on-road emission savings for alternative land use projects with the idea that TOD policy affects reductions through the impact on mode splitting
  - Vehicle miles traveled calculated and used to quantify emission savings

- ICF International
  - Federal Highway Administration report to assist transportation practitioners in considering appropriate methods to calculate emission impacts for transportation-related strategies
  - Sample projects used

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Recommendations

- State Implementation Plan (SIP) credits for emission benefits
- Development of methodology that best addresses alternative TOD land use projects to quantify reductions of:
  - NOx
  - VOC
  - CO
  - CO_2
- Parameters:
  - Ridership
  - Population
  - Time of Day
  - Number of trips
  - Trip length
  - VMT
- Dallas-Fort Worth Regional Travel Demand Model

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