TOD as a Transportation Demand Tool: Responding to Climate Change and Demographic Change

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Who is This TOD and What Can He Do for You?
TOD=Transit Oriented Development
No one definition, but.....
No one definition, but.....

A mix of uses
No one definition, but.....

A mix of uses

Pedestrian-oriented
No one definition, but.....

A mix of uses

Pedestrian-oriented

Compact development
No one definition, but.....

A mix of uses
Pedestrian-oriented
Compact development
Focus on transit
The good....
The good....
the bad...
The good....
the bad...
and the ugly
TOD Basic Principles
TOD Basic Principles.......
TOD Basic Principles

Moderate to high density

Pedestrian orientation
TOD Basic Principles

Moderate to high density

Pedestrian orientation

Easy walk to transit station (1/4-1/2 mile)
TOD Basic Principles......

Moderate to high density

Pedestrian orientation

Easy walk to transit station (1/4-1/2 mile)

Should be a viable development even without transit
TOD Basic Principles

Moderate to high density

Pedestrian orientation

Easy walk to transit station (1/4-1/2 mile)

Should be a viable development even without transit

Residential emphasis with mixed use (3 Rs)
The 3 Rs of TOD…
The 3 Rs of TOD...

Residential
The 3 Rs of TOD...

Residential

Restaurants
The 3 Rs of TOD...

Residential

Restaurants

Retail
TOD  Transportation Objectives.........
TOD Transportation Objectives........

*Increase transit use (including new riders)*
TOD Transportation Objectives

Increase transit use (including new riders)

Reduce auto ownership, vehicular traffic, and associated congestion
TOD Transportation Objectives

- Increase transit use (including new riders)
- Reduce auto ownership, vehicular traffic, and associated congestion
- Enhance the environment through reduced emissions and energy consumption
Increase housing choices
TOD Development Objectives

*Increase housing choices*

*Enhance sense of community*
TOD Development Objectives

- Increase housing choices
- Enhance sense of community
- Support economic development and revitalization
TOD Development Objectives

- Increase housing choices
- Enhance sense of community
- Support economic development and revitalization
- Shift development away from sensitive areas to transit station areas
TOD Development Objectives

- Increase housing choices
- Enhance sense of community
- Support economic development and revitalization
- Shift development away from sensitive areas to transit station areas
- Reduce infrastructure costs
Increased housing choices

Enhance sense of community

Support economic development and revitalization

Shift development away from sensitive areas to transit station areas

Reduce infrastructure costs

Reduce sprawl
Public Sector
Benefits of TOD...
Public Sector
Benefits of TOD...

Increased ridership/revenue
Increased ridership/revenue

Neighborhood revitalization

Public Sector
Benefits of TOD...
Public Sector
Benefits of TOD...

Increased ridership/revenue

Neighborhood revitalization

Economic development
Public Sector Benefits of TOD...

Increased ridership/revenue

Neighborhood revitalization

Economic development

Increased tax base
Public Sector Benefits of TOD...

- Increased ridership/revenue
- Neighborhood revitalization
- Economic development
- Increased tax base
- Reduced traffic congestion and pollution
Increased ridership/revenue

Neighborhood revitalization

Economic development

Increased tax base

Reduced traffic congestion and pollution

Lower infrastructure costs
Public Sector
Benefits of TOD...

- Increased ridership/revenue
- Neighborhood revitalization
- Economic development
- Increased tax base
- Reduced traffic congestion and pollution
- Lower infrastructure costs
- Lower crime (eyes on the street)
Private Sector Benefits of TOD...
Private Sector
Benefits of TOD...

*Increased land values, rents, and real estate performance*
Private Sector
Benefits of TOD...

- Increased land values, rents, and real estate performance
- Increased affordable housing opportunities
Private Sector
Benefits of TOD...

*Increased land values, rents, and real estate performance*

*Increased affordable housing opportunities*

*Increased retail sales*
Private Sector
Benefits of TOD...

- Increased land values, rents, and real estate performance
- Increased affordable housing opportunities
- Increased retail sales
- Increased access to labor
Private Sector Benefits of TOD...

- Increased land values, rents, and real estate performance
- Increased affordable housing opportunities
- Increased retail sales
- Increased access to labor
- Reduced parking costs for employees
Private Sector
Benefits of TOD...

- Increased land values, rents, and real estate performance
- Increased affordable housing opportunities
- Increased retail sales
- Increased access to labor
- Reduced parking costs for employees
- Increased physical activity, lower health care costs
TOD and Global Warming
TOD and Global Warming
TOD and Global Warming
Global warming =
Global warming = Climate change =
Global warming = Climate change = Global ‘weirding’
World Population: 6,860,503,729

- Male: 3,440,317,794
- Female: 3,418,185,934
- Births: 21,717,860
- Deaths: 12,026,318

China Population: 1,338,052,284

- India: 1,292,542,031
- European Union: 432,968,293
- United States: 318,855,839
- Under 15 yrs: 1,852,336,007
- 15-64: 4,478,908,935
- 65+ years old: 521,398,283

Total ever born: 106,785,504,279
World Population: 6,759,806,325
- Male: 3,396,718,601
- Female: 3,363,087,723
- Births: 77,628,002
- Deaths: 34,301,907
- China Population: 1,338,915,581
- India: 1,267,295,251
- European Union: 505,241,129
- United States: 306,654,715
- Under 15 yrs: 1,825,147,708
- 15-64: 4,393,874,111
- 65+ years old: 540,784,506

New York
- World Time
- Population
- Death
- Illness
- Environment
- Energy
- US Crimes
- Food
- More
- Help
Current World Population:
6.87 billion
Current World Population: 6.87 billion

Current U.S. Population: 314 million
Oil reserves left:
13,850 days (37.9 years)
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13,850 days (37.9 years)

Carbon concentration in atmosphere: 
390.9 parts per million
Transportation’s share of greenhouse gases

![Pie chart showing the sources of greenhouse gases.](image)

- **Electric Power Sector**: 39% (2,344 million metric tons CO₂e)
- **Direct use of fossil fuels in homes, commercial buildings, and industry**: 27% (1,562 million metric tons CO₂e)
- **Transportation**: 34% (1,985 million metric tons CO₂e)

*Source: Energy Information Administration*
The key question: can TOD contribute to managing transportation demand by reducing (or slowing the growth of) Vehicle Miles Traveled (VMT) and its related greenhouse gases?
TOD and transit ridership
2004 study: Residential density within 1 mile of station increases rail ridership:
- 10 units/acre: 24.3% use transit
- 20 units/acre: 43.4% use transit
- 40 units/acre: 66.6% use transit

TCRP 102: TOD in the United States
2004 study: Employment density within 1 mile of station increases rail ridership:

- 5 jobs/acre: 11% use transit
- 20 jobs/acre: 26.5% use transit
- 60 jobs/acre: 52.1% use transit

TCRP 102: TOD in the United States
2004 study: Residents living near transit stations are 5 times more likely to commute by transit as the average resident in the same city not living near transit
• employees working in TOD are 3.5 times more likely to commute by transit than others

*BART/CalTrans: Travel Characteristics of TOD in California*
TOD and vehicle ownership
2000 study: number of vehicles per person decreases by 24% for those living within ¼ mile of a transit station vs. those living a mile or more away

Gossen: Travel Characteristics of TOD and Non-TOD Residents in the San Francisco Bay Area
2004 study: Households in transit zones in cities with major transit systems own an average of 0.9 cars per household, compared with 1.6 in metro area as a whole

*Reconnecting America: “Hidden in Plain Sight”*
2004 study: 54% of residents living in transit zones commute by car, compared with 83% in metro areas

Reconnecting America: “Hidden in Plain Sight”
TOD and trip/VMT reduction
2000 study: average VMT per household within $\frac{1}{2}$ mile of transit $\frac{1}{2}$ that of those living one mile away

*MTC Bay Area STARS Survey*
2002 study: Doubling density corresponds to lowering VMT by 25%
Holtzclaw/Clear/Dittmar/Goldstein/Hass: “Location Efficiency”, Transportation Planning and Technology
2007 study: Compact development generates up to 1/3 fewer miles than traditional developments - the more mix and density, the greater reduction in miles driven.

Bartholomew: “Land Use-Transportation Scenario Planning: Promise & Reality,” Transportation Journal
2007 study: Households within ¾ mile of transit average 11.3 fewer daily VMT and spend roughly half the typical household on auto fuel expenditures

Bailey - ICF/APTA: “Public Transportation and Petroleum Savings in the U.S.”
2007 study: Residents in the most walkable neighborhoods drive 26% fewer miles per day than those living in the most sprawling neighborhoods.

Frank/Kavage/Appleyard: “The Urban Form and Climate Change Gamble” Planning Magazine
2008 study: TOD results in up to 50% reduction in daily trips per household compared with typical development.

Arrington/Cervero: “Effects of TOD on Housing, Parking, and Travel,” TCRP 128
2008 study: Compact urban development as an alternative to sprawl could reduce VMT by 20-40%

ULI/Smart Growth America/CCAP: Growing Cooler
• Compact development reduces VMT by 20-40%
• Neighborhoods with good land use mix typically result in 5-15% lower VMT per capita
Overall Conclusions

- Improved regional accessibility reduces per capita VMT by 10-30%
- Residents of TODs tend to own 10-30% fewer vehicles and use alternative modes 2-10 times more than residents of auto-oriented communities
Overall Conclusions

- Residents living near and employees working near transit stations are 3-5 times more likely to commute by transit
- Residents of TODs make up to 50% fewer daily trips than those in typical neighborhoods
Relationship of Vehicle Miles Traveled (VMT) growth to population growth

FHWA
Relationship of Vehicle Miles Traveled (VMT) growth to population growth

Source: Nate Silver, “The End of Car Culture,” Esquire Magazine, 2009
Has the passion gone out of America’s fabled love affair with the automobile?

The 389-cubic-inch overhead-cam V-8 holds a sweet spot in many aging hearts, but their grandchildren are more likely to lust after a 1-terabyte hard drive streaming video to a high-resolution screen.

"Today, it's not the most critical thing in the world to have the most exciting car," said Jim Wangers, 85, known as "the godfather" of the Pontiac GTO, which helped define the muscle car era. "In the 1960s it was absolutely mandatory that you had a swinging set of wheels. Now, personal mobility has been replaced by personal mobility on the Web."
VMT per capita is stabilizing

- 2011 per capita VMT at 9,500 miles
VMT per capita is stabilizing

- 2011 per capita VMT at 9,500 miles
- Roughly equal to that of 1995

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WHY?

“Continued declines in driving will have dramatic impacts in the realms of transportation finance, environmental emissions, and development patterns.”

The Road…Less Traveled: An Analysis of Vehicle Miles Traveled Trends in the U.S.

Robert Puente and Adie Tomer

Findings

- Driving, as measured by national VMT, in 2007 for the first time since 1980, fell after 2000 and remains in general a steady decline in gasoline prices.
- VMT per capita fell from 11.2 billion miles in 2000 to 9.9 billion miles in 2007.
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Our cooling love affair with driving

By Charles Lane

Good news for Memorial Day weekend: Since peaking at a national average of $3.93 on April 5, the price of regular gasoline has fallen almost 25 cents per gallon. That’s like a $25 billion tax cut for consumers. In fact, gasoline is cheaper now than it was a year ago at this time. Futures markets are signaling further possible declines.
It’s all about demographics.... the ‘great convergence’
It’s all about demographics.... the ‘great convergence’
It’s all about demographics… the ‘great convergence’
It’s all about demographics... the ‘great convergence’

“a profound structural shift... the convergence of the two largest generationals in American history: the baby boomers... and the millennials, which today represent half the total population....”

-Chris Leinberger, Brookings Institute
Public preferences point to more walkable communities...
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The 2011 Community Preference Survey
What Americans are looking for when deciding where to live

Analysis of a survey of 2,071 American adults nationally
Conducted for the National Association of Realtors®

March 2011
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March 2011

Half would prefer to live in mixed-use community
Public preferences point to more walkable communities...

- Half would prefer to live in mixed-use community
- Only 12% prefer a suburban neighborhood with houses only

The 2011 Community Preference Survey
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March 2011
Inner cities are re-gaining population....
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- Counties at metro cores are growing faster than the country
Inner cities are re-gaining population....

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- Larger, older cities are seeing population growth for the first time in decades...
The millennials are leading the charge....
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- Annual VMT for young people fell by 23% in the last decade
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- % of young people without drivers licenses rose from 21% in 2000 to 26% in 2010
- Bicycle use up 24%, walking up 16%, transit use up 40%
The millennials are leading the charge....

- Annual VMT for young people fell by 23% in the last decade
- % of young people without drivers licenses rose from 21% in 2000 to 26% in 2010
- Bicycle use up 24%, walking up 16%, transit use up 40%
- 2/3 prefer to live in mixed-use communities
... and the Baby Boomers are equally as important....
What does all this mean for the housing market?

- Infill: rebuilding our inner cities
What does all this mean for the housing market?

- Smaller homes in walkable communities with access to transit
What does all this mean for the housing market?

- A higher share of multi-family and rental properties
What does all this mean for the housing market?

In short, Transit-Oriented Development
In the past 15 minutes.....

- World population has increased by 3,070 people
- In one day, we will add 295,000 people (equivalent to Riverside, CA or New Orleans)
In the past 15 minutes.....

- CO2 concentration in the atmosphere has increased by .0005043 parts per million
- In one day, it will increase by .0030258 parts per million
Between now and 2050:

- Our population will grow from its present number of 307 million to 450 million (by 2100 - 600 million? 1.2 billion?)
- We will construct 89 million new or replaced homes and 190 billion square feet of nonresidential buildings
- **One-half to two-thirds** of the development on the ground will be built between now and 2050
What are you going to do about it?
What are you going to do about it?
And don’t forget......