Modeling the Transportation Impacts of Smart Growth Development in Maine

Town of Lisbon and Town of Sanford

Funded by the Maine Department of Transportation
Project Background

Purpose

– Investigate the relationship between land use development, which implements smart growth principles, and its impact on transportation by looking at different build out scenarios for dense infill development in existing towns.

– To answer the question: does implementing higher density mixed use development in towns in a rural area result in short trip lengths and a reduction in vehicle-miles traveled?
Project Background

- Funded by the Maine Department of Transportation
- Analysis work by the University of Vermont Transportation Research Center in conjunction with the Androscoggin Valley Council of Governments/Androscoggin Transportation Resource Center (MPO)
What are **smart growth** and **transit-oriented development**?

“smart growth” uses planning principles to foster dense, mixed use development that can be effectively serviced by transit with strategies that can encourage use of transit by travelers, thus “transit-oriented”

the goal is to reduce dependence on automobiles for travel and create livable communities while preserving undeveloped land and conserving natural resources
Density and Transit

Smart growth with dense, mixed-use development density alone does not necessarily equal transit-oriented development.

Transit-oriented development requires more:

– transit system/infrastructure
– possible incentives for transit ridership

This study explores mixed-use density only, and so the smart growth scenarios do not represent complete transit-oriented development strategies.
Study Structure

Background Information: Transportation Models, Aerial photos, Land Use maps, Local interest

Case Study Selection (with Maine DOT)

Lisbon

- Town 1 Scenario
  - Status Quo Growth
  - Targeted Smart Growth
  - Multiple Smart Growth

- ATRC MPO model
  - TransCAD Model
    - VMT
    - Emissions

Sanford

- Town 2 Scenario
  - Status Quo Growth
  - Targeted Smart Growth
  - Multiple Smart Growth

- TRC-developed model
  - TransCAD Model
    - VMT
    - Emissions

3 scenarios for Year 2030

Analysis results compared across the 3 scenarios
Key Assumptions

- Linear growth rates used for modeling forecasts
- Density and land use mixing considerations only
- Alternative modes to automobile are not considered
- Development scenarios are thought of as “transit-ready,” not “transit-oriented”
- Average household sizes and auto availability held constant, and corresponding trip rates held constant
- The number of daily person trips is constant across the three scenarios

→ Changes in VMT can be attributed to development pattern only
Growth Scenarios for Lisbon

“Status Quo”
- assumes the expected growth from 2005 to 2030 as projected in the ATRC MPO travel demand model to be spatially organized based on existing land use patterns; the default forecast by the MPO model

“Targeted Smart Growth”
- reorganizes the expected growth from 2005 to 2030 in Lisbon Falls only, centralizing a large portion of new households and employment as mixed-use development, likely at the site of the Worumbo Mill

“Multiple Smart Growth”
- in addition to the smart growth plan for Lisbon Falls, the expected growth in the rest Lisbon is reorganized into a second mixed-use development center in the vicinity of Lisbon Street & Village Street/Grandview Street
Center of Lisbon Falls & Worumbo Mill
Lisbon Growth Scenarios
Households, 2005–2030

- Status Quo Growth
- Targeted Smart Growth (25% of Household Growth is Redirected)
- Multiple Smart Growth (60% of Household Growth is Redirected)
Lisbon Growth Scenarios
Employment, 2005–2030

Status Quo Growth
Targeted Smart Growth
(30% of Employment Growth is Redirected)
Multiple Smart Growth
(41% of Employment Growth is Redirected)
Growth Scenarios for Sanford

“Status Quo”
- uses growth rates from the ATRC MPO travel demand model for 2000 to 2030, and applied to Sanford with the growth spatially organized based on existing land use patterns

“Targeted Smart Growth”
- reorganizes the expected growth from 2000 to 2030 in Sanford only, centralizing a large portion of new of households and employment as mixed-use development in the downtown, likely at the site of the Sanford Mill Complex/Number 1 Pond

“Multiple Smart Growth”
- in addition to the smart growth plan for downtown Sanford, the expected growth in the rest of Sanford is reorganized into two more mixed-use developments – in Springvale and South Sanford
Center of Sanford & Sanford Mill Complex
Sanford Growth Scenarios
Households, 2000–2030

Status Quo Growth

Targeted Smart Growth
(20% of Household Growth is Redirected)

Multiple Smart Growth
(49% of Household Growth is Redirected)
Sanford Growth Scenarios
Employment, 2000–2030

Status Quo Growth

Targeted Smart Growth
(22% of Employment Growth is Redirected)

Multiple Smart Growth
(33% of Employment Growth is Redirected)
## Results

### Lisbon  
(All Daily Trips, 2030)

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<tbody>
<tr>
<td>Status Quo (S.Q.)</td>
<td>8.94</td>
<td>152,955</td>
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<td>---</td>
<td>70.4</td>
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<td>8.92</td>
<td>152,300</td>
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<td>70.1</td>
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<td>Multiple Smart Growth</td>
<td>8.91</td>
<td>151,917</td>
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<td>-0.68%</td>
<td>70.0</td>
<td>-0.57%</td>
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[1] Trip length (distance in miles) includes distance traveled for trips from/to Lisbon zones only.  
[2] Average trip length of HBW, HBNW, and NHB trip purposes as daily person trips.  
[3] VMT for roadway network within Lisbon only; TAZ centroid connectors are omitted from VMT estimates.

### Sanford  
(All Daily Trips, 2030)

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<tbody>
<tr>
<td>Status Quo (S.Q.)</td>
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<td>Multiple Smart Growth</td>
<td>4.40</td>
<td>405,134</td>
<td>-1,698</td>
<td>-0.42%</td>
<td>186.6</td>
<td>-0.43%</td>
</tr>
</tbody>
</table>

[1] Trip length (distance in miles) includes distance traveled within the Sanford model study area only; does not include distances traveled outside the Sanford study area for trips from/to external origins/destinations.  
[2] Average trip length of HBW, HBNW, and NHB trip purposes as daily person trips.  
[3] VMT for roadway network within Sanford only; TAZ centroid connectors are omitted from VMT estimates.
Summary of Results

• The densification and mixing of residential and employment growth as infill developments, which this study only considered, has a slight but observable impact on VMT and average trip lengths.

• The scenario with multiple smart growth developments had greater benefit, in the form of VMT and GHG reductions, than the scenario with one smart growth development.

• Intra-zonal trips tend to increase for smart growth zones, while the number of intra-zonal trips for non-smart growth zones decreases, albeit at varying degrees depending on the land use mix of those zones.

• Some roadways in the towns experienced VMT increases, which were offset by greater VMT reductions on other roadways, resulting in net, network-wide VMT reductions.

• The effect of increases in VMT on some roadways to/from the smart growth developments should be considered when performing detailed planning of such developments.

• The smart growth scenarios are limited to the amount of growth expected in Lisbon and Sanford by the year 2030; greater benefits in VMT and GHG reductions may be more apparent at a later forecast year when more growth could be redirected.
Area for Further Research

Example of Multiple Smart Growth in Sanford, assuming a 20% transit share for daily person trips to/from smart growth zones and other zones along Route 109:

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<tr>
<td>Status Quo (S.Q.)</td>
<td>406,832</td>
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<td>---</td>
<td>187.4</td>
<td>---</td>
</tr>
<tr>
<td>Multiple Smart Growth without transit trips</td>
<td>405,134</td>
<td>-1,698</td>
<td>-0.42%</td>
<td>186.6</td>
<td>-0.43%</td>
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<tr>
<td>Multiple Smart Growth with assumed transit trips</td>
<td>398,990</td>
<td>-7,842</td>
<td>-1.93%</td>
<td>183.8</td>
<td>-1.92%</td>
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[1] VMT does not include distances traveled outside the Sanford study area for trips from/to external origins/destinations; TAZ centroid connectors are omitted from VMT estimates.
Questions / Discussion

Lisbon Falls, c. 1905

Sanford, c. 1908