How does the Smart Growth scenario affect the development of road infrastructure in the State of Maryland?
Existing Housing Unit Density vs. Road Density

Inside Priority Funding Area

\[ y = 4 \times 10^{-5}x + 0.0359 \]

Outside Priority Funding Area

\[ y = 6 \times 10^{-5}x + 0.0088 \]

Inside Priority Funding Area: 0.24 Acre Roadway Developed per Unit

Outside Priority Funding Area: 0.36 Acre Roadway Developed per Unit
## Community vs. General Roadway

<table>
<thead>
<tr>
<th>Community Road</th>
<th>General Roadway</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Roads with residential housing on either side</td>
<td>• Roadways including Interstate, State, County, Municipal and Local roads</td>
</tr>
<tr>
<td>• Proportional to unit number and inverse proportional to density</td>
<td>• Projection compiled from Annual Mileage Report by MD State Highway Administration 1996-2008</td>
</tr>
</tbody>
</table>

![Diagram illustrating community vs. general roadways]
Research Methodology

• Community roads: Digitized for each Maryland County based on housing locations and densities projected by the 2030 Smart Growth and Current Growth Scenarios from the MDP Growth Simulation Model.

• General Roadway Systems: Projected based on a regression model of population against total road lane mileage.
Research Methodology

• Mileage of new road development is dependent upon the housing location, density and quantity of development units

• As density increases, the amount of roadway required to connect units will decrease

• Unit projections compiled from the Maryland Smart Growth Simulation Model
Digitizing Procedure

1. All digitizing was performed at either 1:5,000 or 1:10,000 scale to ensure standardization.
2. There should be uninterrupted access from the road to the vicinity of the parcel point without the obstruction of other properties. The presence of other properties was determined by loading the Maryland Property View shape file.
3. If the number of projected units was 4 or below, the projected road was digitized from the centroid of the projected point to the road. If the centroid was directly on an existing roadway, no new roadway was digitized.
4. If the number of projected units was above 4, the following equations were used: at a scale of 1:5,000 – “Inches Digitized = NHA / (3.5714 * RESULTDENS)” , at a scale of 1:10,000 – “Inches Digitized = NHA / (7.1428 * RESULTDENS)”.
5. Roadway for projected points was interconnected with already established developments if roadway connections permitted.
6. A grid pattern was utilized when a grid pattern was already present in the surrounding developments or when density of roadway and the density of units required compact development.
7. When two or more projected points overlapped and their densities and number of units allowed, the digitized roadway was combined. This formed neighborhoods or developments out of closely located projected points. This was particularly relevant in suburban areas where adjacent projected points are to be developed with over 100 units at densities around 3 Units per Acre.
8. If a projected point was located closer to another point than to the roadway, the furthest projected point was connected to the closer point and then connected to the roadway.
9. In some instances the projected point intersected with existing properties. In these instances the roadway was digitized as close as possible to the projected point.
10. The newly digitized roadway, wherever possible, was connected to existing roads at three or four way intersections at 90° angles.
Analysis Regions in the State of Maryland

- Rural
- Exurban
- Inner Suburban
- Urban
<table>
<thead>
<tr>
<th></th>
<th>Inner Suburban</th>
<th>Exurban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[Current Growth Scenario]</td>
<td>[Smart Growth Scenario]</td>
<td>[Current Growth Scenario]</td>
</tr>
<tr>
<td>Road Mileage within PFA</td>
<td>1,008</td>
<td>985</td>
<td>105</td>
</tr>
<tr>
<td>Road Mileage out of PFA</td>
<td>1,045</td>
<td>60</td>
<td>414</td>
</tr>
<tr>
<td><strong>Total Road Mileage</strong></td>
<td><strong>2,053</strong></td>
<td><strong>1,045</strong></td>
<td><strong>519</strong></td>
</tr>
<tr>
<td>Costs within PFA</td>
<td>$4,233,657,000</td>
<td>$4,138,027,000</td>
<td>$442,842,000</td>
</tr>
<tr>
<td>Costs out of PFA</td>
<td>$4,389,021,000</td>
<td>$253,704,000</td>
<td>$1,738,190,000</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td>$8,622,678,000</td>
<td>$4,391,731,000</td>
<td>$2,181,032,000</td>
</tr>
</tbody>
</table>
## Compare Statewide Community Road Results: Current vs. Smart Growth

<table>
<thead>
<tr>
<th></th>
<th>Difference Projected New Housing Unit Development</th>
<th>Difference Projected Acres of New Housing Development</th>
<th>Difference in Miles Projected Community Road Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner Suburbs</td>
<td>2%</td>
<td>143%</td>
<td>96.3%</td>
</tr>
<tr>
<td>Exurbs</td>
<td>1%</td>
<td>437%</td>
<td>273.7%</td>
</tr>
<tr>
<td>Rural</td>
<td>-3%</td>
<td>177%</td>
<td>133.7%</td>
</tr>
<tr>
<td>Statewide</td>
<td>1.26%</td>
<td>229%</td>
<td>157.7% (2.5 time)</td>
</tr>
</tbody>
</table>

Current Growth scenario requires **2.5 times** more road construction than Smart Growth Scenario under Community Road.
Compare Statewide Community Road Results

Acres of New Housing Development

- Current Growth Scenario: 478,414
- Smart Growth Scenario: 145,514

Projected Miles of New Community Road Development

- Current Growth Scenario: 4,813
- Smart Growth Scenario: 1,867
General Roadway Lane Mileages as the function of Population Growth

\[ Y = 0.0078X + 23,725 \]

\[ R^2 = 0.99 \]

Road Lane Mileage (Y) in Thousands (State, State Toll, County, and Municipal roadway systems) vs. Population (X) in Millions

- 1981: 57.0
- 1990: 62.0
- 2000: 67.0
- 2010: 72.0
- 2020: 77.0
- 2030 (estimated): 82.0

Smart Growth
General Roadway

- Based on Regression Model
- 76,200 total road lane mileages w/ 6.7 million population in 2030
- Additional 7,536 lane mileages from now to 2030

- Smart Growth Scenario:
  About 20% of total road of additional lane mileage for general roadway system in 2030 would be reduced
- Additional 6,029 lane mileages.
## Fiscal Implication of Transportation 2030

<table>
<thead>
<tr>
<th>Additional Need (between 2010 and 2030):</th>
<th>Current Trend</th>
<th>Smart Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Development (Acres)</td>
<td>478,414</td>
<td>145,514</td>
</tr>
<tr>
<td>Community Road (miles)</td>
<td>4,813</td>
<td>1,867</td>
</tr>
<tr>
<td>General Roadway System (miles)</td>
<td>7,536</td>
<td>6,029</td>
</tr>
<tr>
<td>Construction: Community Road (Billions)</td>
<td>$20</td>
<td>$8</td>
</tr>
<tr>
<td>Construction: General Roadway System (Billions)</td>
<td>$83</td>
<td>$66</td>
</tr>
<tr>
<td>Maintenance: Community Road (Millions)</td>
<td>$414</td>
<td>$161</td>
</tr>
<tr>
<td>Maintenance: General Roadway System (Millions)</td>
<td>$649</td>
<td>$519</td>
</tr>
<tr>
<td><strong>Total Estimated Transportation Cost (Billions)</strong></td>
<td><strong>$104.3</strong></td>
<td><strong>$74.9</strong></td>
</tr>
</tbody>
</table>
Conclusions

1. Up to Year 2007, .24 and .36 Acre Roadway need per Unit in PFAs and Outside PFAs, respectively.
2. The Current Growth scenario results in low density development, thus high roadway demand, especially in exurban counties.
3. The Smart Growth scenario’s focus on higher density development requires less new road development – 2.5 times less community road.
4. Higher density development results in much lower road infrastructure development costs ($29 Billion).
Questions?

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