

New Partners for Smart Growth ▪ February 12, 2016  
“The Dollars and Sense of Smart Growth”

## Land use and municipal budgets

Modeling the fiscal implications of  
development patterns

Christopher Zimmerman

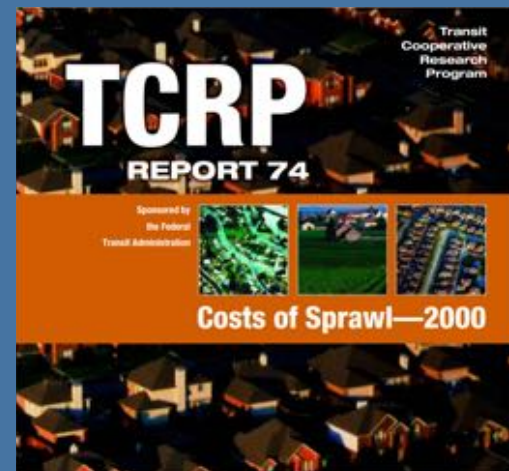
Vice President for Economic Development



**Smart Growth America**

Making Neighborhoods Great Together

# DOZENS OF STUDIES CONFIRM: LOW-DENSITY SPRAWL COSTS MORE THAN SMART GROWTH



“Compact development patterns and investment in projects to improve urban cores could save taxpayers money and improve overall regional economic performance”

Mark Muro and Robert Puentes,  
*Investing in a Better Future: A Review of the Fiscal and Competitive Advantages of Smarter Growth Development Patterns.*  
Washington, DC: The Brookings Institution, 2004.

# Infrastructure and services



# Sprawl is expensive

Delivering **services** is less efficient:

- Police and fire departments have more area to cover.
- More miles of road to cover for trash pickup, school buses.
- More miles of water and sewer pipes to maintain.







## The Fiscal Implications of Development Patterns

A MODEL FOR MUNICIPAL ANALYSIS

April 2015

A scenario analysis tool

A fiscal impact model focused  
on the relative effects of  
sprawl versus compact  
development

# A scenario analysis tool



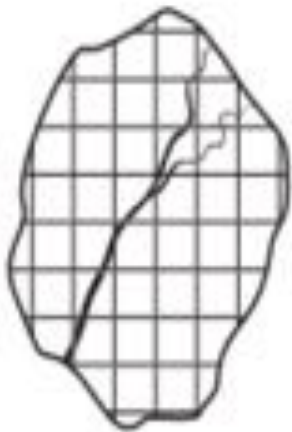
A scenario analysis tool

A fiscal impact model focused on the relative effects of sprawl versus compact development



# Comparative development patterns for the same population

**Scenario A**



**Scenario B**



**Scenario C**



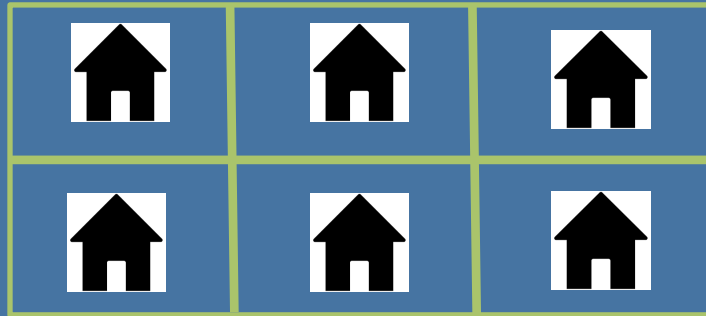


# WHERE WE HAVE USED THIS MODEL

- Madison, Wisconsin
- West Des Moines, Iowa
- Doña Ana County, New Mexico
- Macon, Georgia
- Indianapolis, Indiana

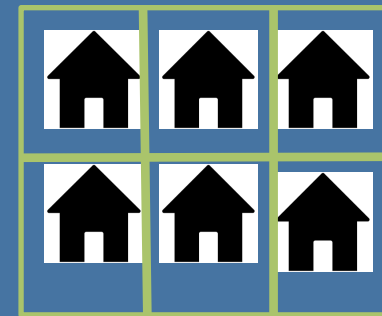
# TYPICAL AVERAGE COST FISCAL IMPACT MODEL

Option A



=

Option B



- Costs are assumed to be proportional to residents and employees
- Same number of residents = same additional costs regardless of density

# OUR MODEL: COSTS VARY BY DENSITY



Expenditures for infrastructure and services are more efficient in denser, better connected areas.

# WHAT COST CATEGORIES MIGHT VARY BY DENSITY?

## **Services & Infrastructure**

Fire

Roads

Stormwater

Sewer and Water

Solid Waste

Schools

Libraries

Hospitals

Parks

Police

---



# WHAT COST CATEGORIES MIGHT VARY BY DENSITY?

## Services & Infrastructure Dependent on Density

Fire	Yes
Roads	Yes
Stormwater	Yes
Sewer and Water	Yes
Solid Waste	Yes (collection)
Schools	Yes (bus transportation)
Libraries	No
Hospitals	No
Parks	No
Police	Maybe

# Fiscal Impact Model: Data Inputs



**Roads +  
Maintenance**



**Water/  
Sewer**



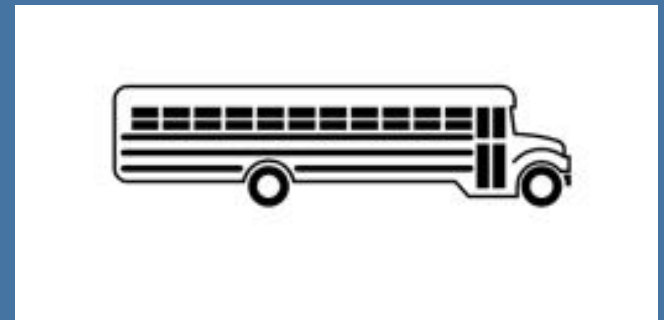
**Stormwater**



**Fire/EMS**

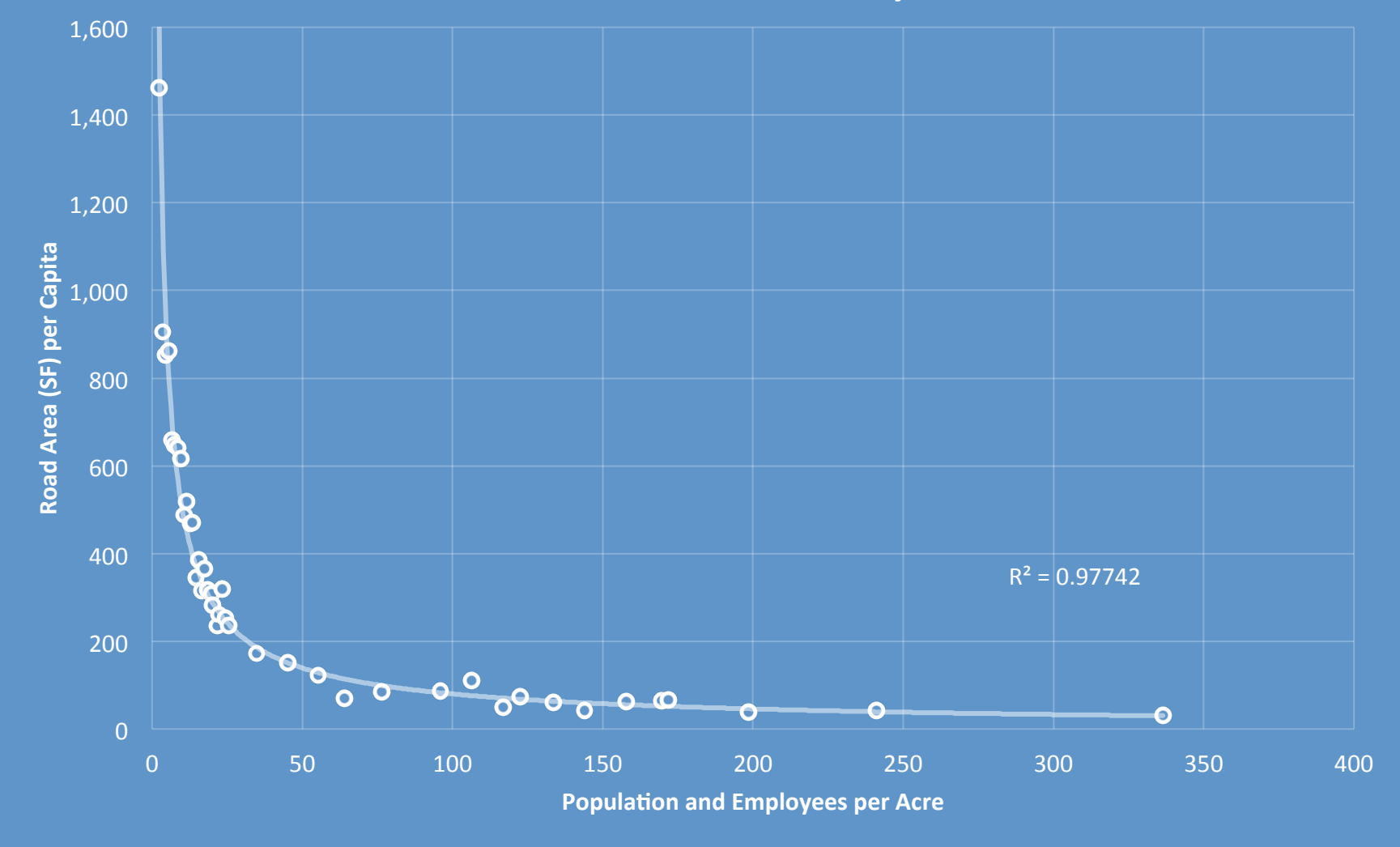


**Solid Waste**

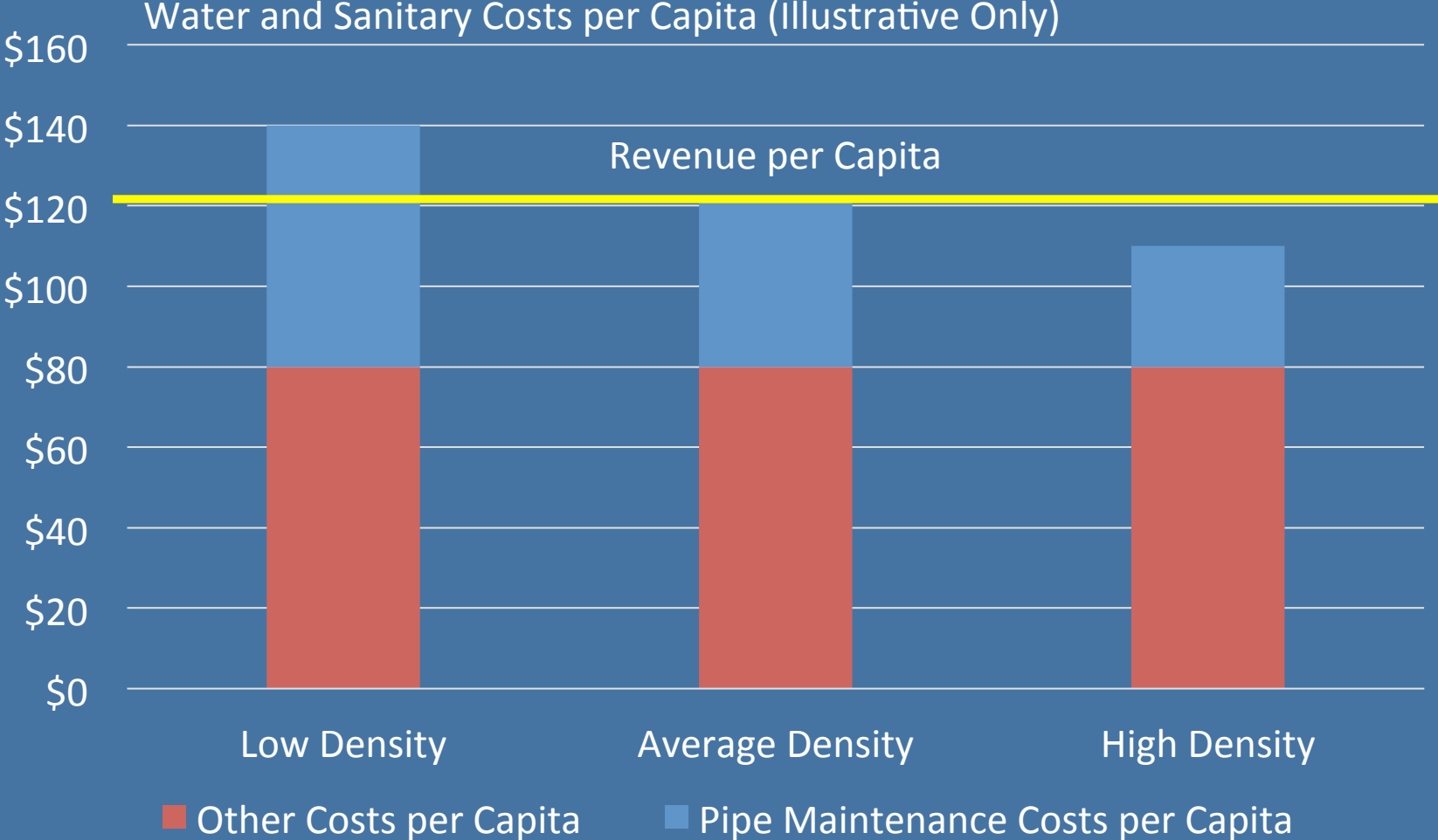


**Schools**

# ROAD LENGTH AND AREA PER CAPITA DECREASES AS DENSITY INCREASES – ARLINGTON, VA

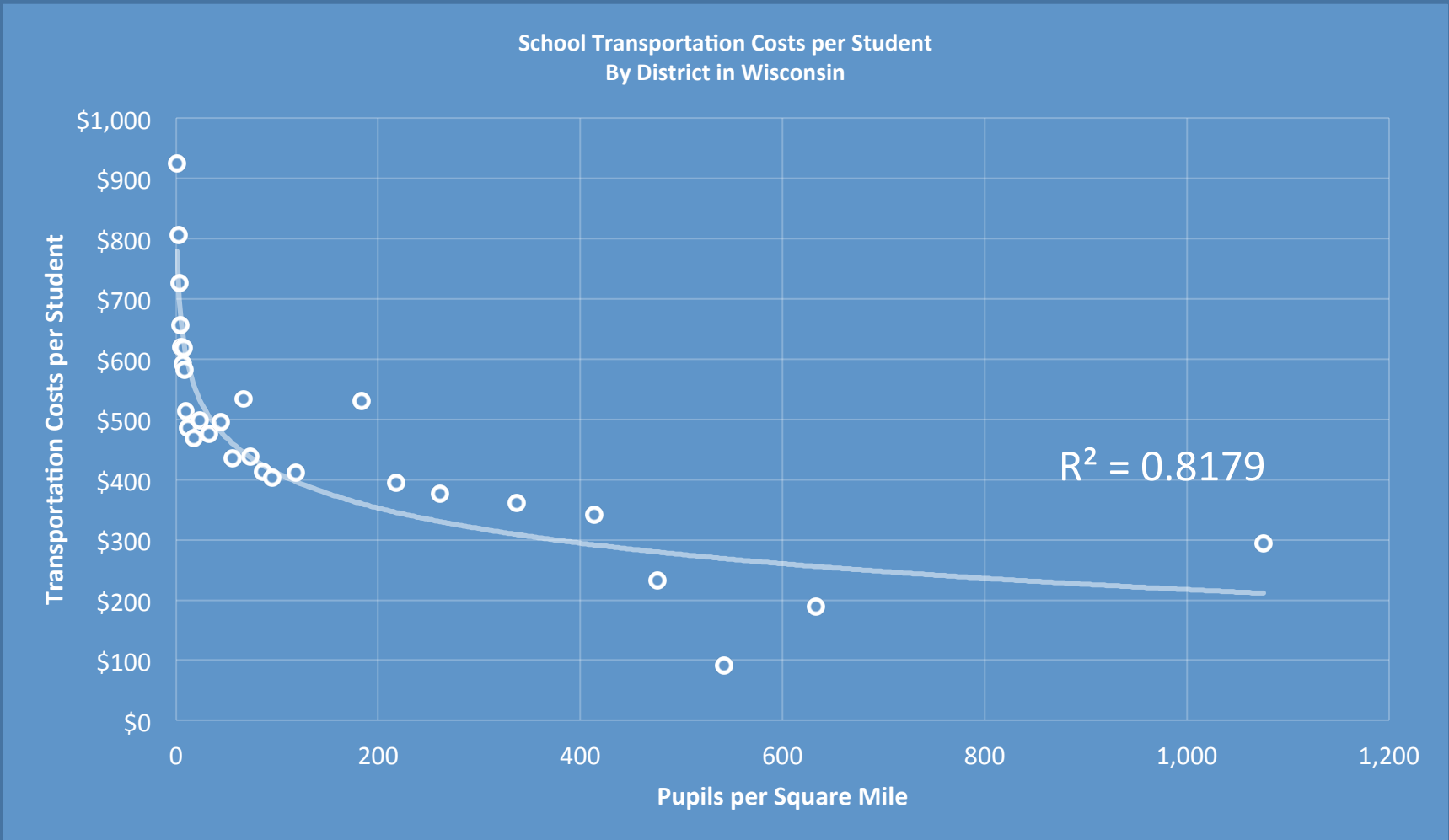


# LOW DENSITY DEVELOPMENT REQUIRES MORE PIPE – MEANING HIGHER MAINTENANCE COSTS



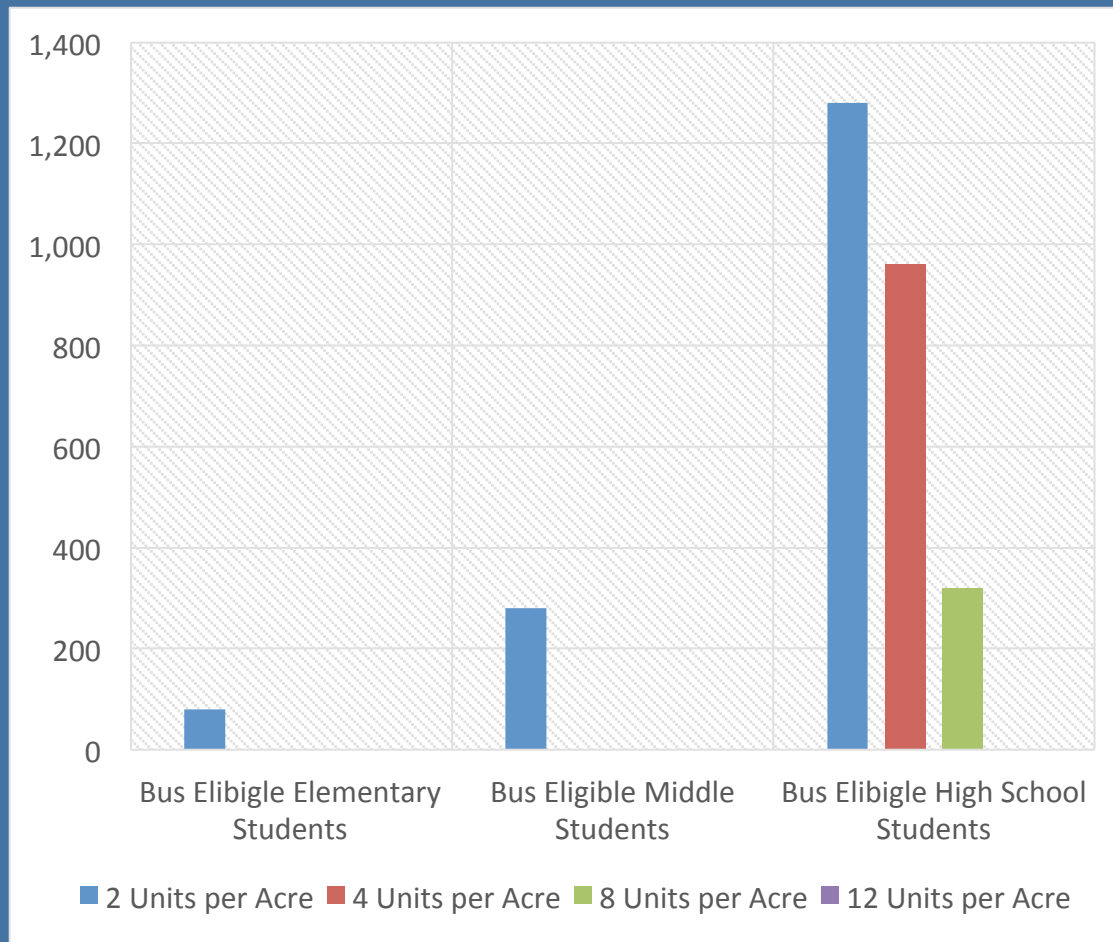


# SCHOOL TRANSPORTATION COSTS DECLINE AS DENSITY INCREASES



SOURCE: Wisconsin Dept. of Public Instruction

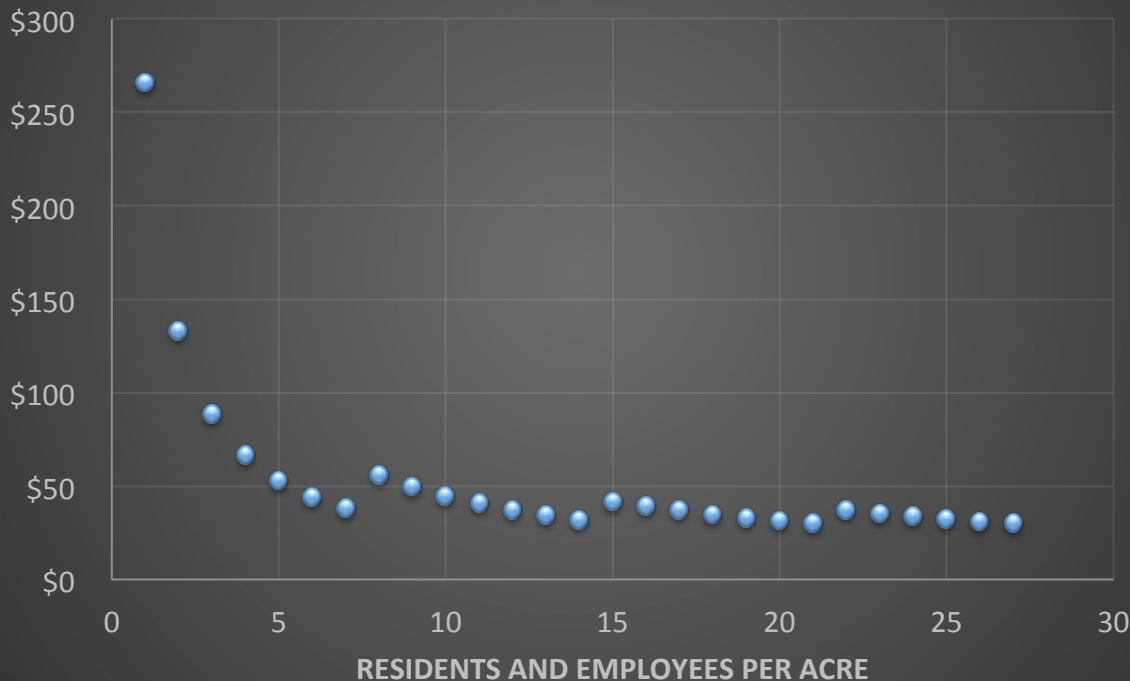
# SGA MODEL IS BASED ON ANTICIPATED NUMBER OF STUDENTS IN THE “WALK ZONE”



- Not specific to existing school situation
- Key determinants are size of the schools, radius of the walk zone, and students per unit
- Chart assumes 1-mile walk zone and school sizes of 400, 600, and 1,600 and single-family detached units
- Does not account for route distance/time

# FIRE PROTECTION COSTS INCREASE DRAMATICALLY AT VERY LOW DENSITIES

## Projected Fire Costs per Capita in Macon-Bibb



## Determinants of Operating Efficiency

- Response Shed Size
- Population Density
- Rate of Calls per Population
- Capacity per Fire Engine

# SOLID WASTE PICKUP – HIGHER DENSITY SHOULD SAVE TIME FUEL AND VEHICLE COSTS

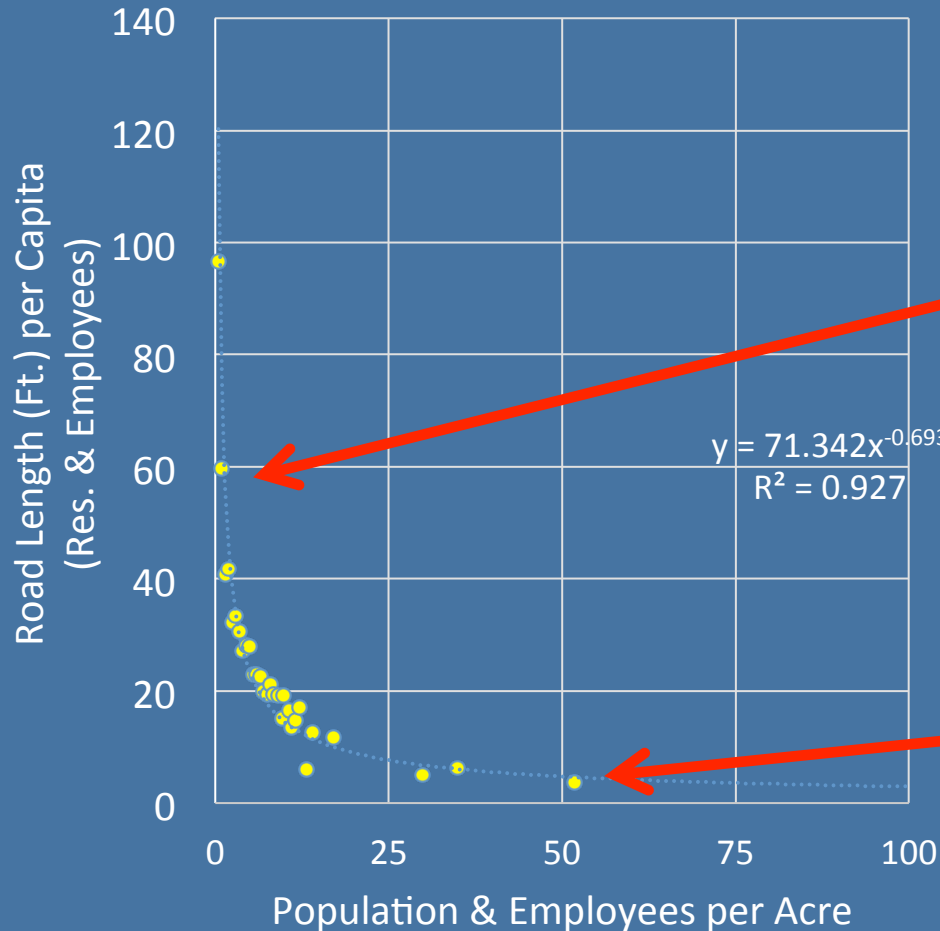


- Lower densities imply larger distances between homes
- Higher distances between pickups means more time and fuel expense per home
- Over large areas, small time and fuel savings can add up to significant sums
- So far, data limitations have prevented application of this part of the model





# ROAD LENGTH AND AREA PER CAPITA DECREASES AS DENSITY INCREASES



## Samples from Macon-Bibb Suburban Residential



Residents: 120  
Employees: 12  
Total: 132  
Total Res. & Emp Per Acre: 2.2  
Total Road Length: 7,401  
Road Length per Capita: 56 ft.

## Downtown Urban



Residents: 348  
Employees: 2,839  
Total: = 3,187  
Total Res. & Emp Per Acre: 53  
Total Road Length: 17,616  
Road Length per Capita: 5.5 ft.

NOTE: Chart shows road length only. Road area per capita has a similar relationship to density.

# MACON MODEL PROJECTS THAT MOVING FROM 1 UNIT PER ACRE (NET) TO 16 REDUCES PER CAPITA COUNTY COSTS BY

25%  
0.9 units  
per acre



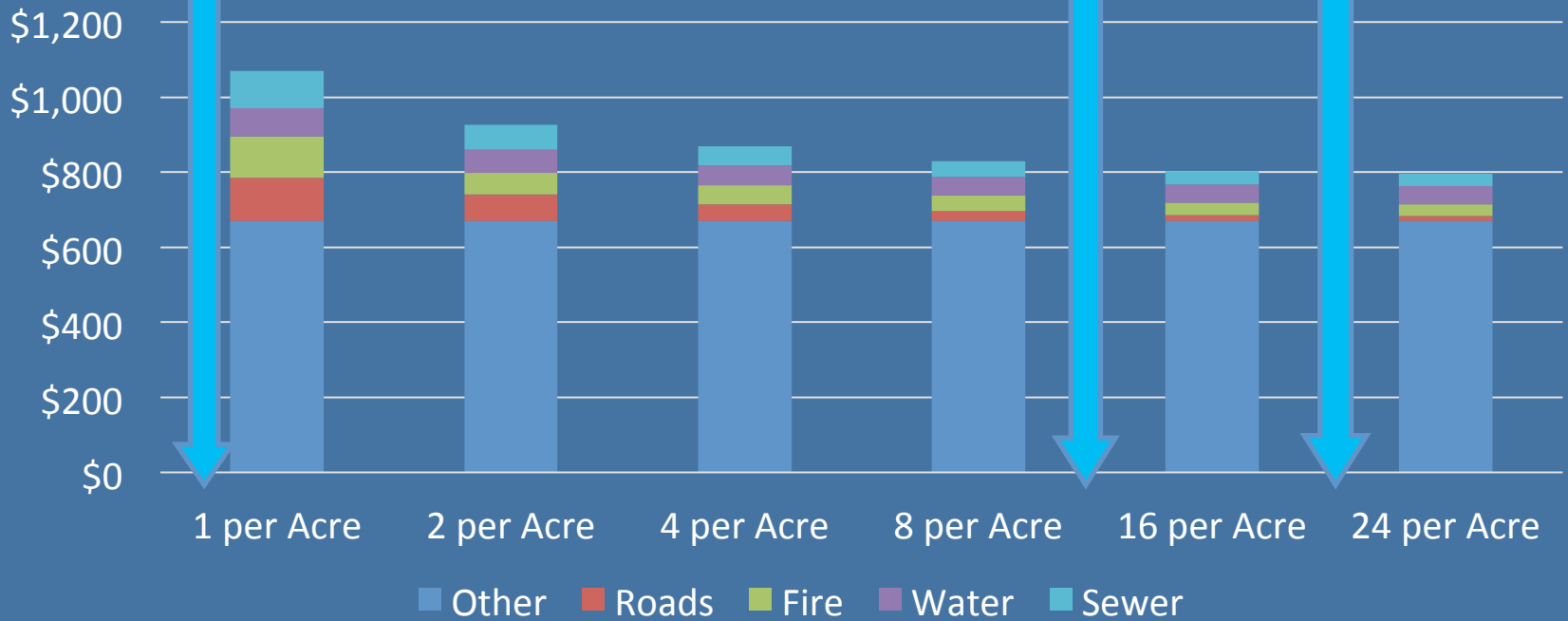
11.7 units  
per acre



21.8  
units  
per  
acre



Hypothetical Residential Programs in Macon-Bibb



NOTE: Does not include potential density-related savings associated with solid waste or use of existing infrastructure

# MACON MODEL PROJECTS THAT MOVING FROM 1 UNIT PER ACRE (NET) TO 16 REDUCES PER CAPITA COUNTY COSTS BY

25%  
0.9 units  
per acre



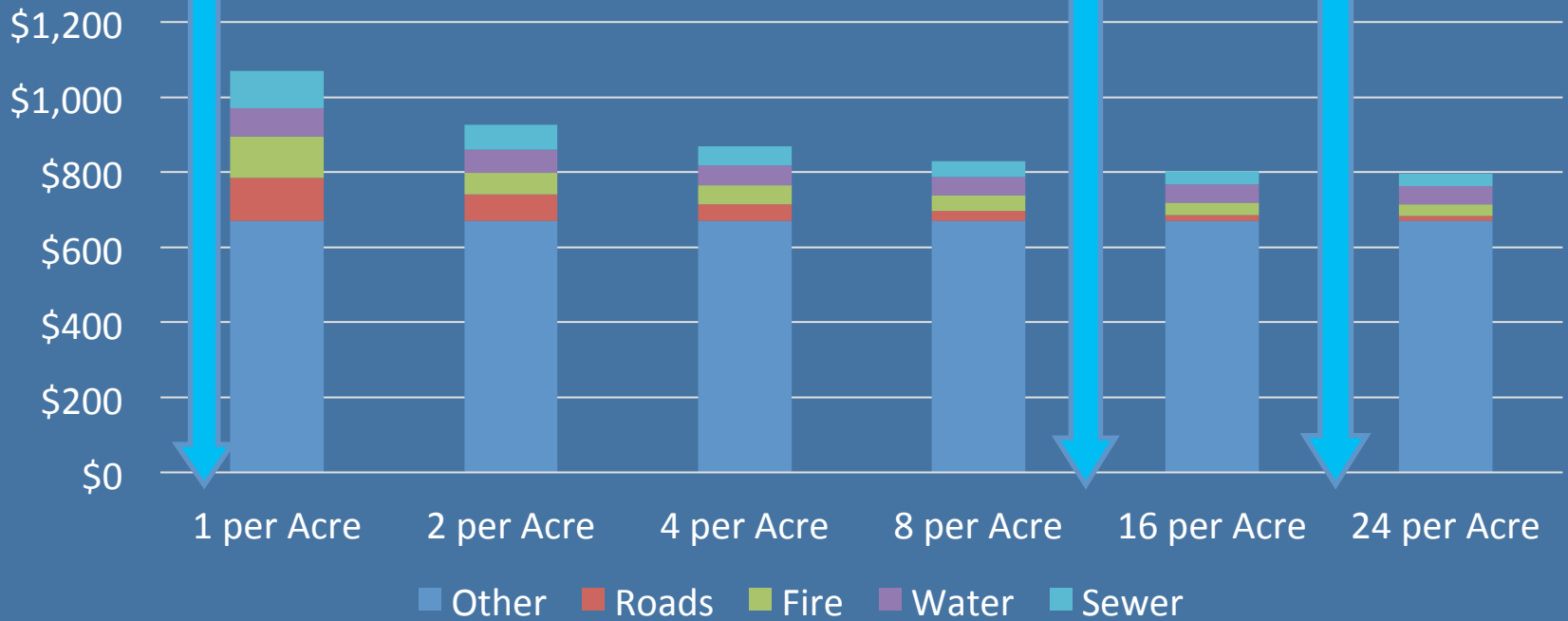
11.7 units  
per acre



21.8  
units  
per  
acre



Hypothetical Residential Programs in Macon-Bibb



NOTE: Does not include potential density-related savings associated with solid waste or use of existing infrastructure



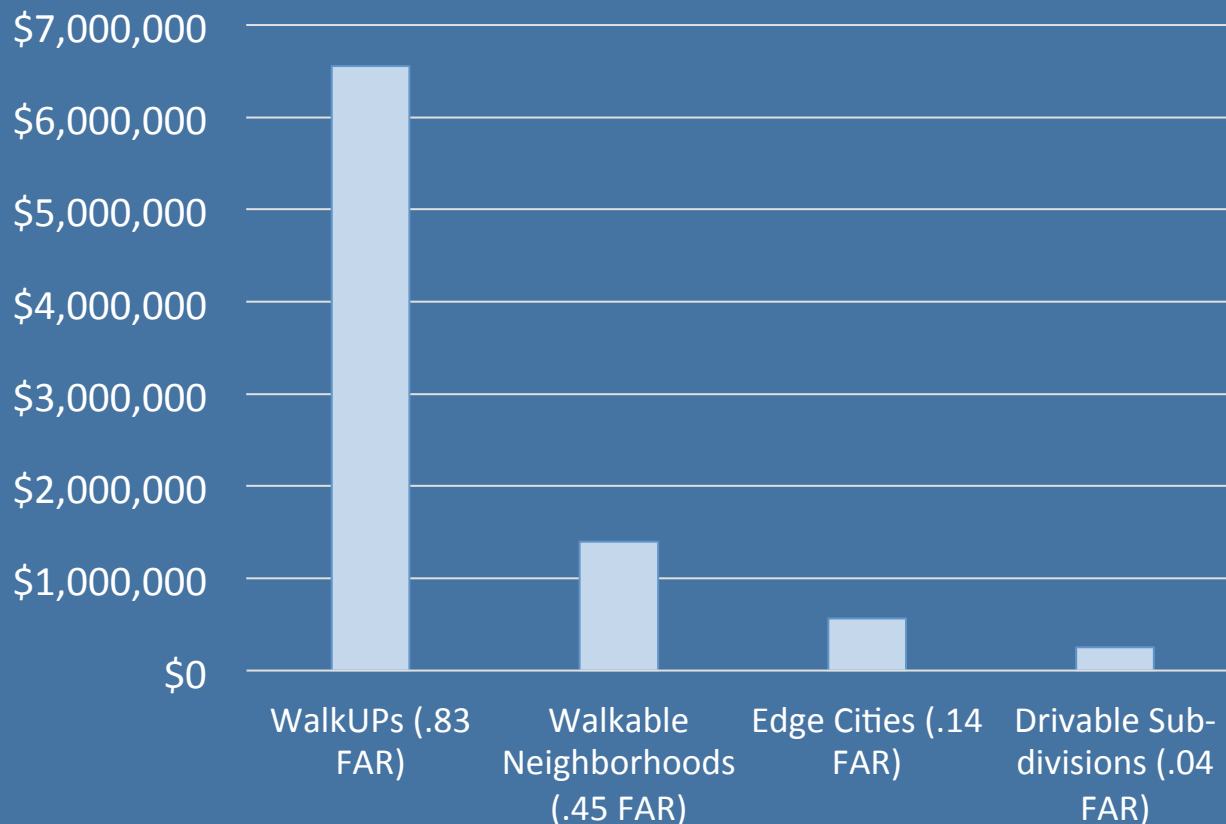
# REVENUE ANALYSIS

# Development affects revenue

- Low-density suburban development generates much less per acre revenue.
- “Main streets” and dense mixed-use areas create synergies that produce substantially higher revenues than commercial sprawl.

# DENSITY CAN AFFECT PROPERTY VALUE AND PROPERTY TAX REVENUE PER ACRE IN 2 WAYS:

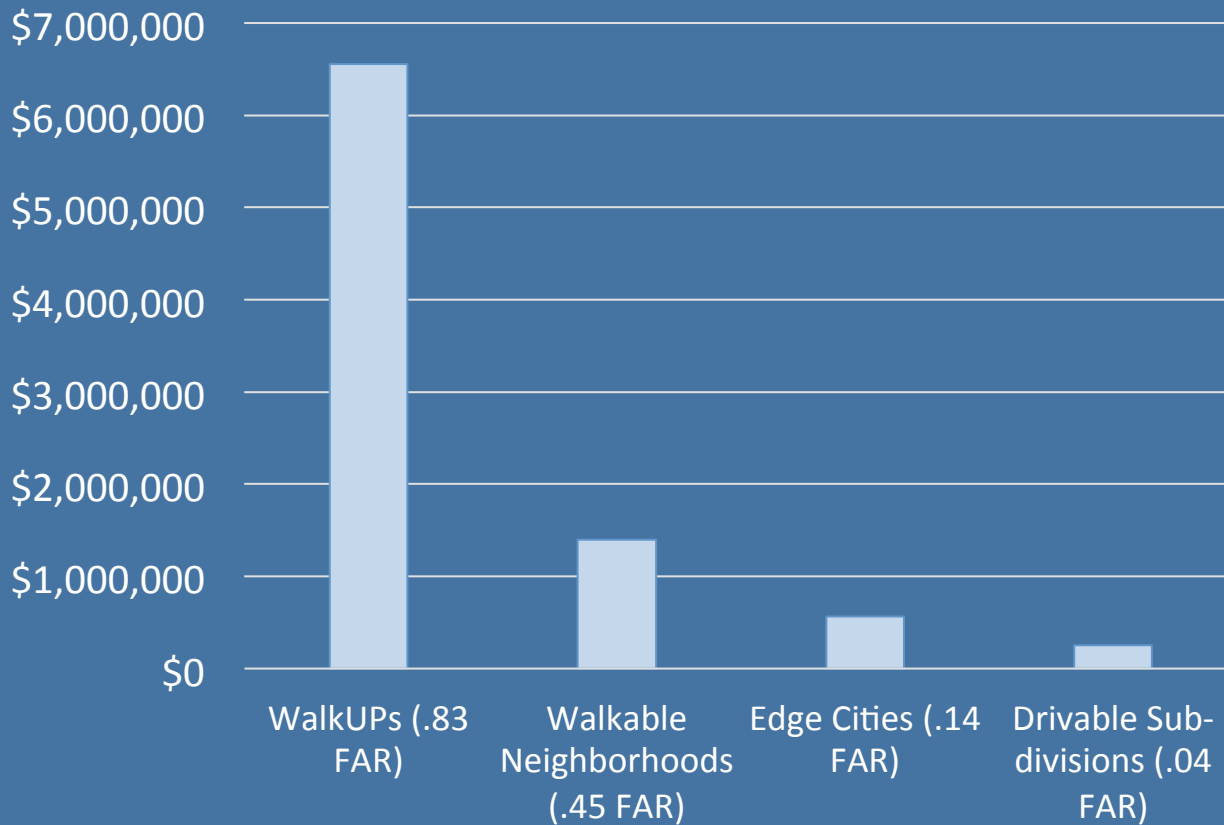
Assessed Values per Acre in Metro Boston by Neighborhood Category



- By simply allowing for more space: 2 houses are worth more than 1, all else equal
- By creating conditions for the “walkable” urban premium to emerge making each square foot more valuable

# Walkable Urban Places

Assessed Values per Acre in Metro Boston by Neighborhood Category



## Key Metrics by Land Use

### REGIONAL LAND

Share of Regional Land by Land Use Type:



### POPULATION

Share Residing in Each Land Use Type:



### EMPLOYMENT

Share of Employment in Each Land Use Type:



### ASSESSED VALUE

Share of Region's Total Assessed Value & Property Tax Revenue by Each Land Use Type



### OFFICE INVENTORY

Share of Region's Office Inventory Housed in Each Land Use Type:



- WALKUP
- WALKABLE NEIGHBORHOOD
- DRIVABLE EDGE CITY
- DRIVABLE SUB-DIVISION

**Line 1**

RCA & Walk Score CPPI



Suburban - Highly Walkable



**Line 2**

RCA & Walk Score CPPI



CBD - Highly Walkable

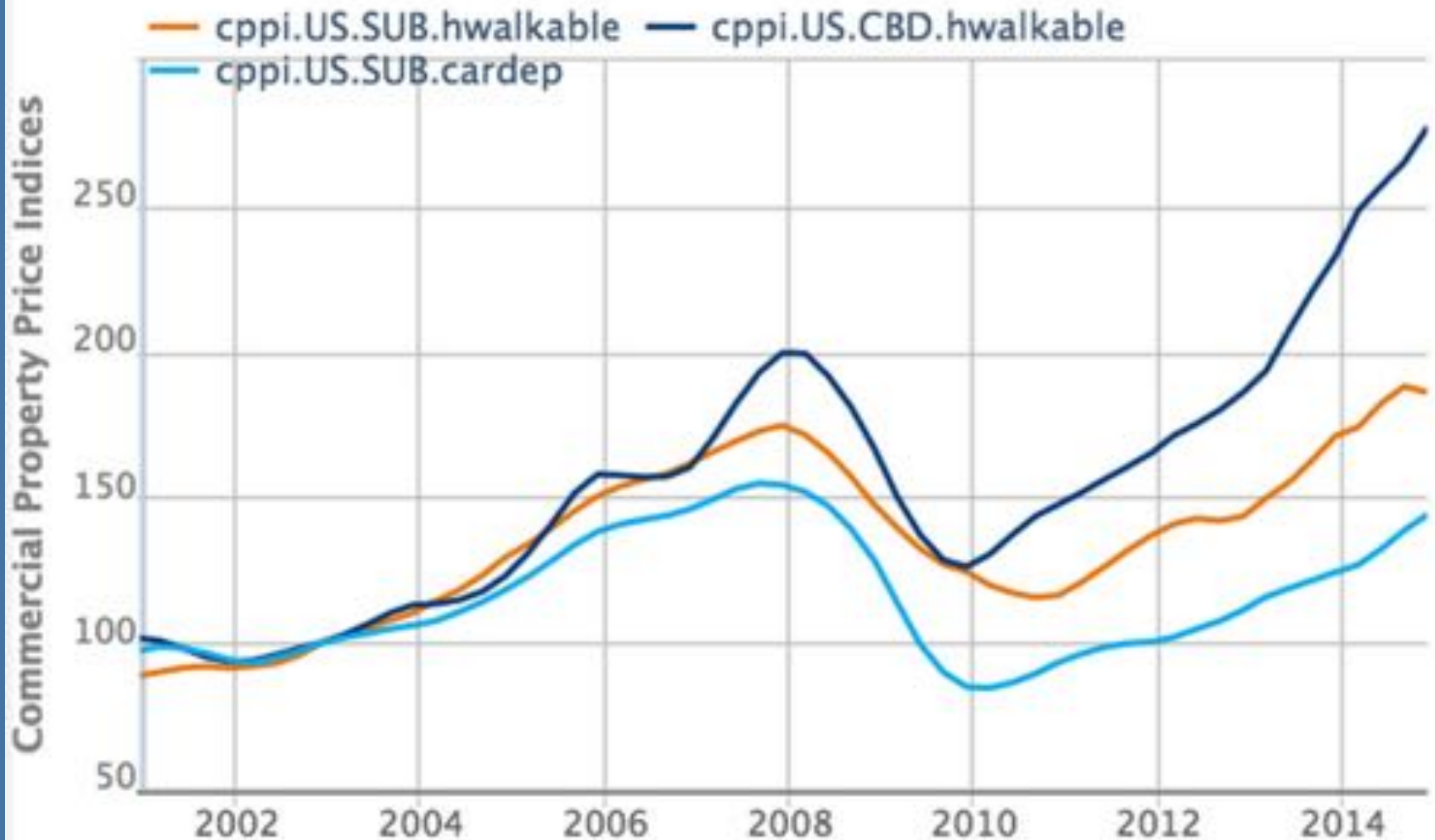


**Line 3**

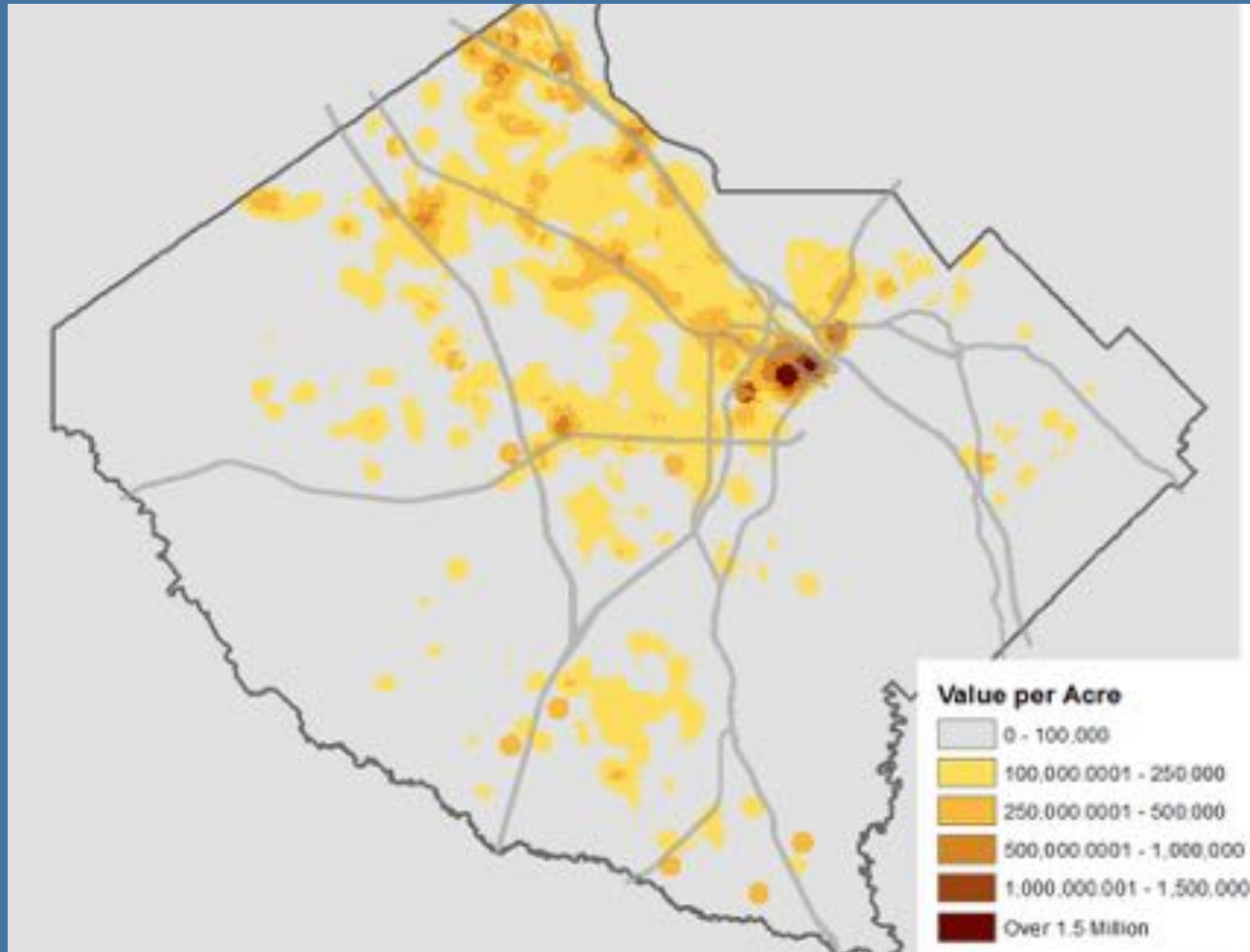
RCA & Walk Score CPPI



Suburban - Car Dependent



# DOWNTOWN MACON HAS HIGHEST AVERAGE PROPERTY VALUES PER ACRE IN BIBB COUNTY



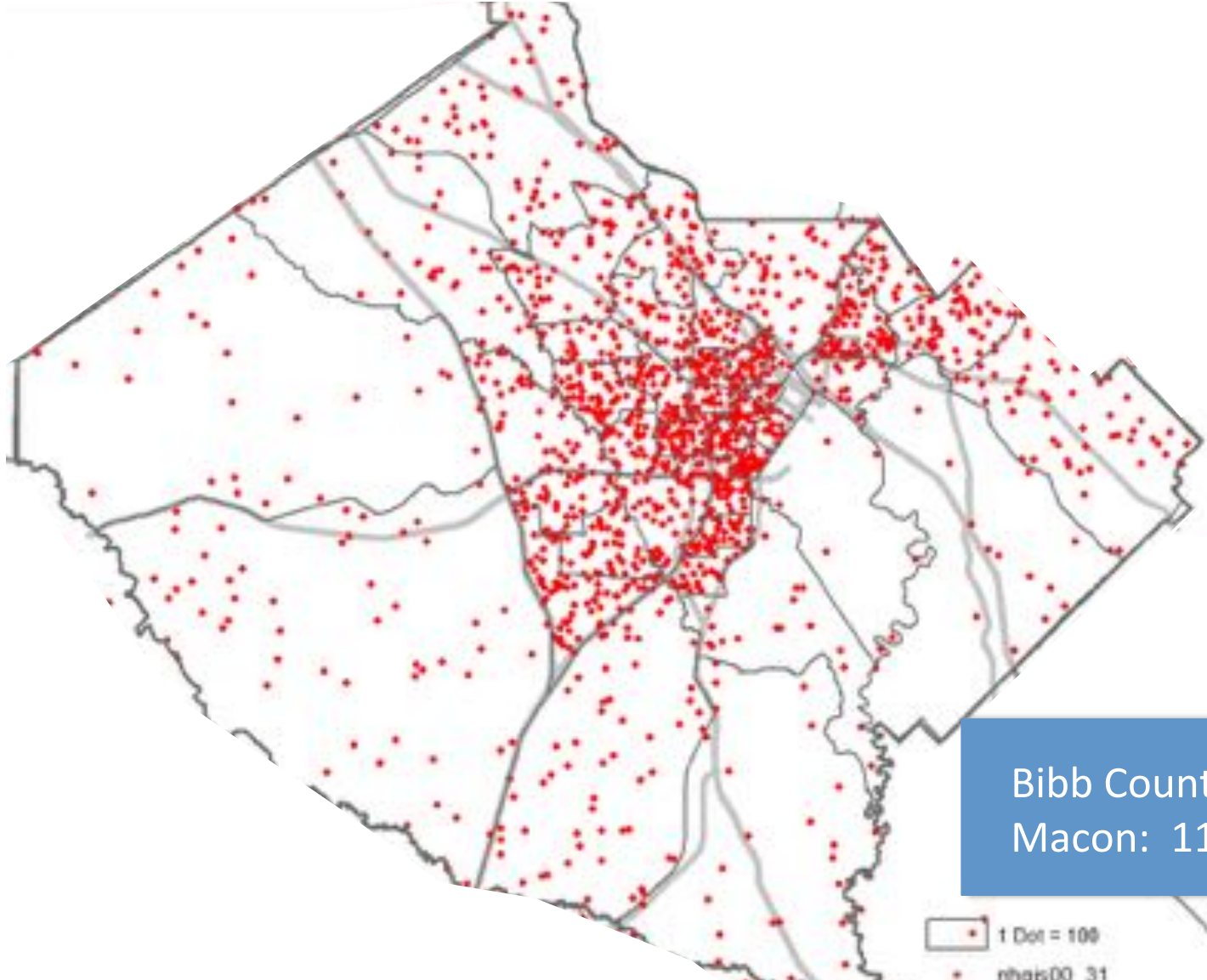
- Downtown Avg. Assessed Value per Acre: \$1.3 million
- Shoppes at River Crossing: \$967,000 per Acre
- County Avg: \$77,000

# SUMMARY OF RESULTS

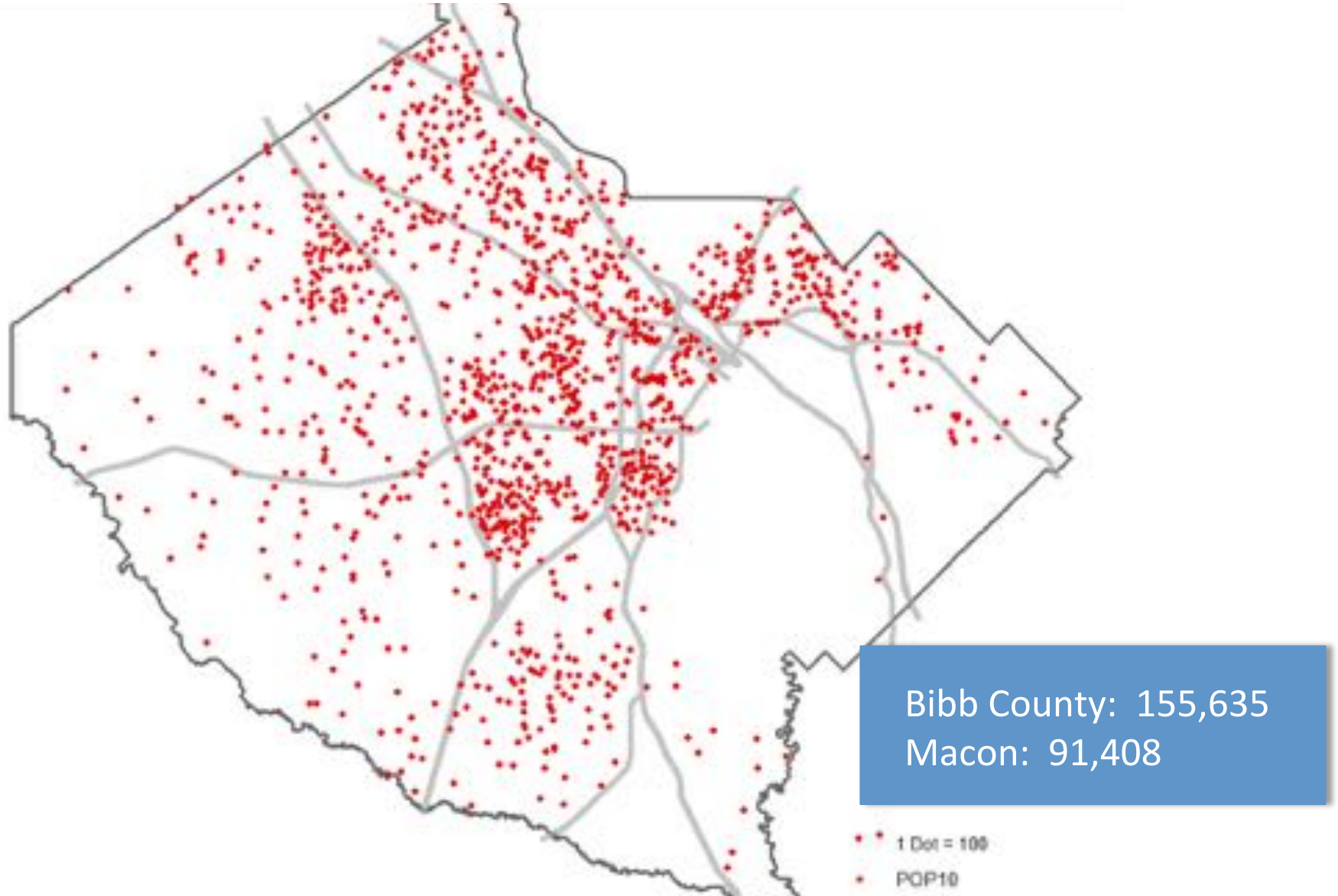


# **SUMMARY OF RESULTS IN MACON-BIBB**

# BIBB COUNTY POPULATION DISTRIBUTION 1980



# BIBB COUNTY POPULATION DISTRIBUTION 2010



# MAP

MACON ACTION PLAN  
for the heart of macon



- study area
- downtown core
- open space
- rail



# SCENARIOS EVALUATED:

## LOW DENSITY GREENFIELD

- 300,000 SF of Office
- 200,000 SF of Retail
- 1,000 Single-Family Detached Units
- \$200,000 Avg. Value per Unit
- Density of 2 per Acre (Net)
- Greenfield development requiring all new infrastructure

## HIGH DENSITY GREENFIELD

- 300,000 SF of Office
- 200,000 SF of Retail
- 200 Townhouses
- \$110,000 Avg. Value per Unit
- 800 Multifamily Units
- Avg. Value of \$68,000 per Unit
- Overall Density of 16 per acre (net)

## DOWNTOWN IN-FILL

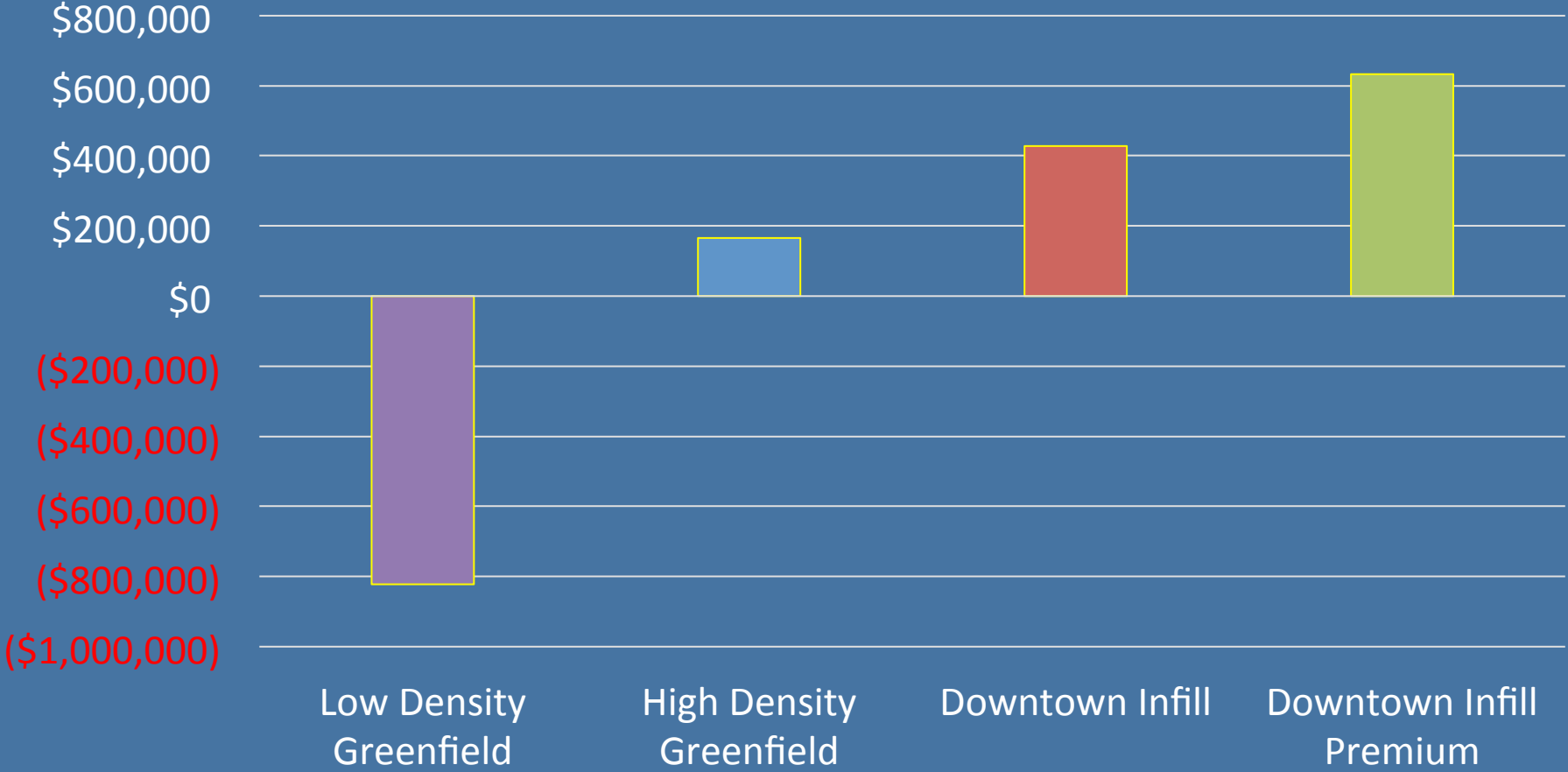
- 300,000 SF of Office
- 200,000 SF of Retail
- 200 Townhouses
- \$110,000 Avg. Value per Unit
- 800 Multifamily Units
- Avg. Value of \$68,000 per Unit
- Only marginal additions to existing infrastructure

## DOWNTOWN IN-FILL WITH PREMIUMS

- Same as above but assumes 20% higher assessed value for all property types

# SUMMARY OF RESULTS BY SCENARIO

Total Annual Budgetary Impact  
Macon-Bibb County and Schools Combined

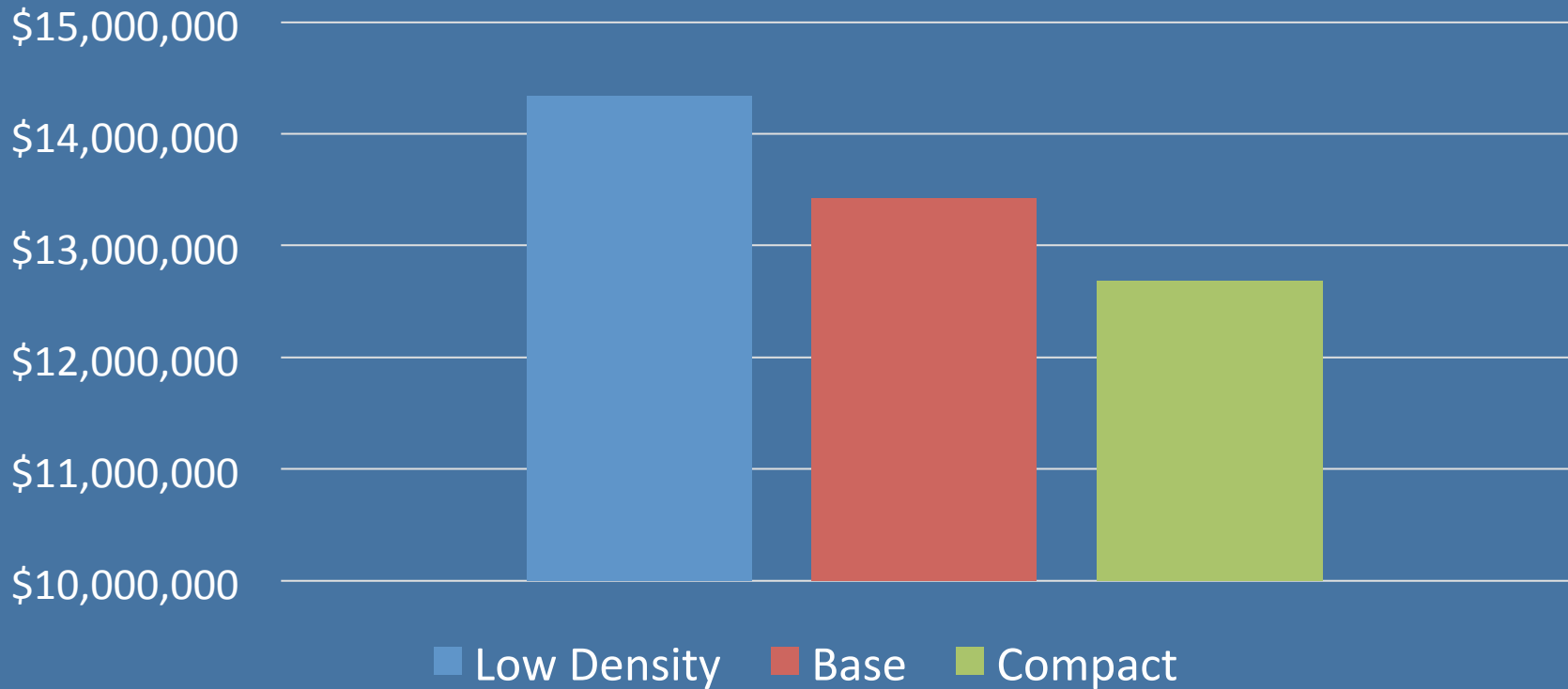


# SUMMARY OF RESULTS IN MADISON



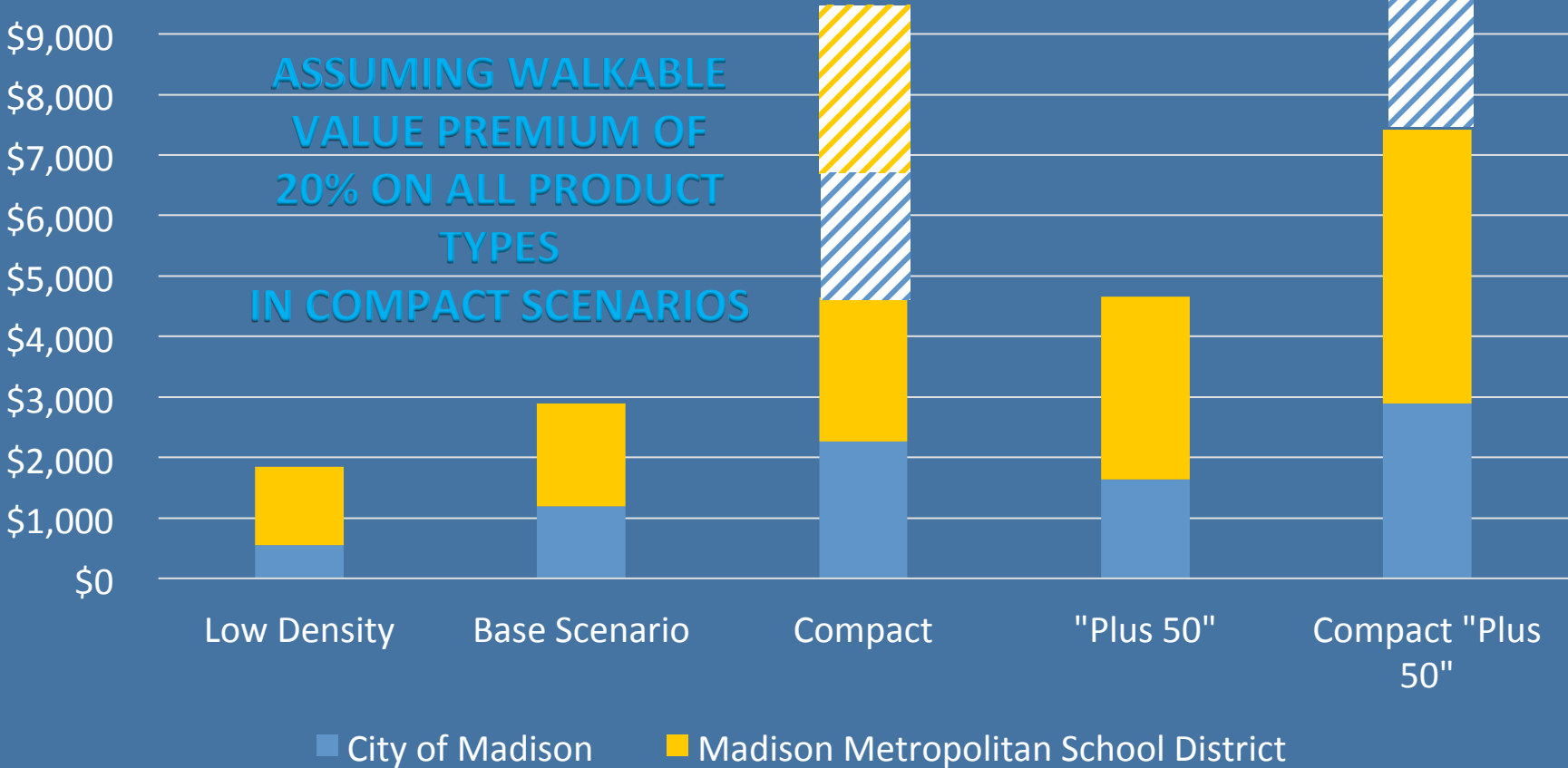
# THE COMPACT DEVELOPMENT SCENARIO REDUCES CITY EXPENDITURES

Total Projected Annual City Costs of Pioneer District  
Development at Build-Out in Today's Dollars



# MORE COMPACT DEVELOPMENT RESULTS IN HIGHER NET FISCAL IMPACTS PER ACRE

Madison Scenarios  
Estimated Annual Net Fiscal Impact per Acre



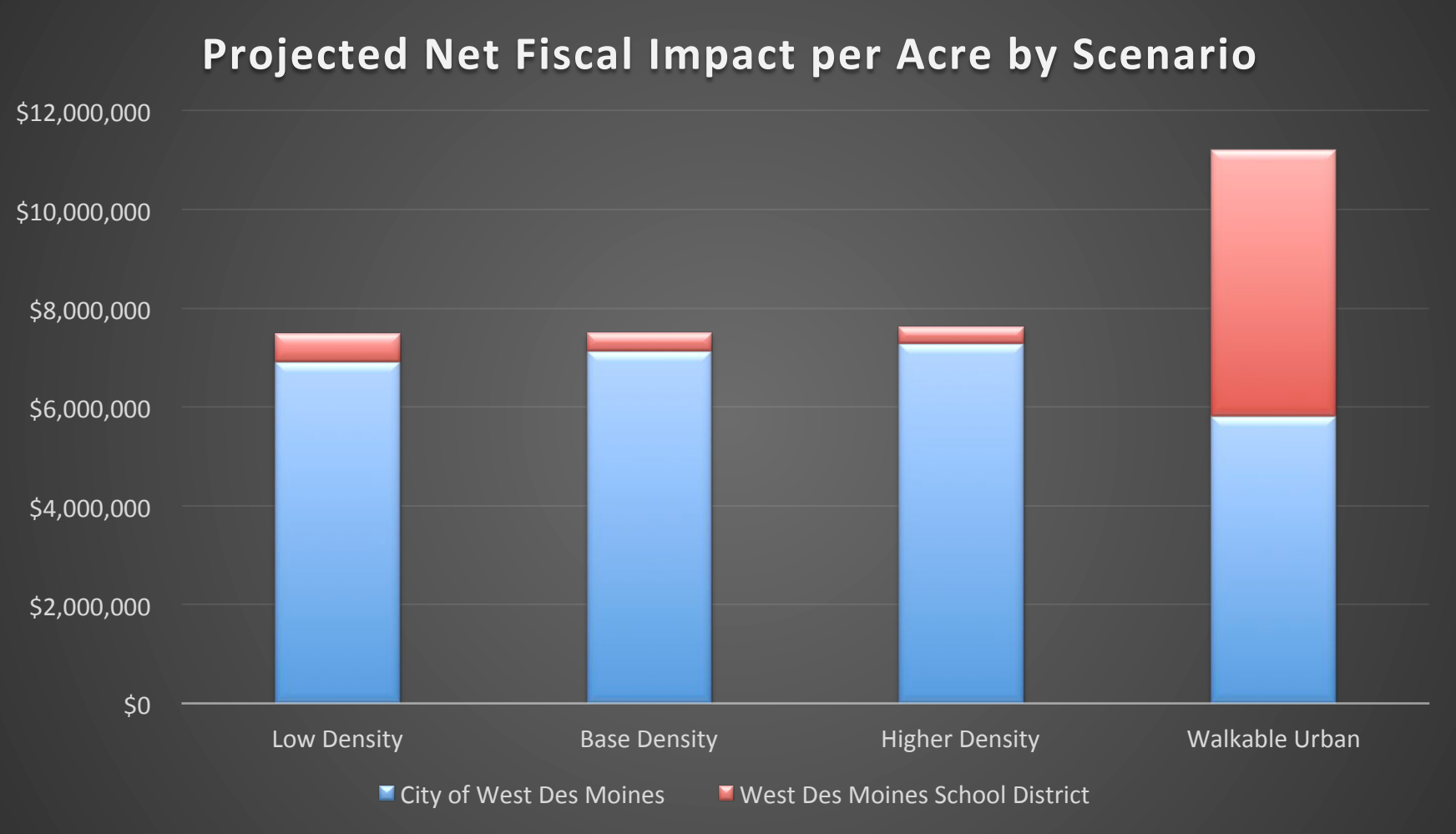
(Numbers represent annual operating costs and certain annualized capital costs associated with the development at full build-out)

# **SUMMARY OF RESULTS IN WEST DES MOINES**

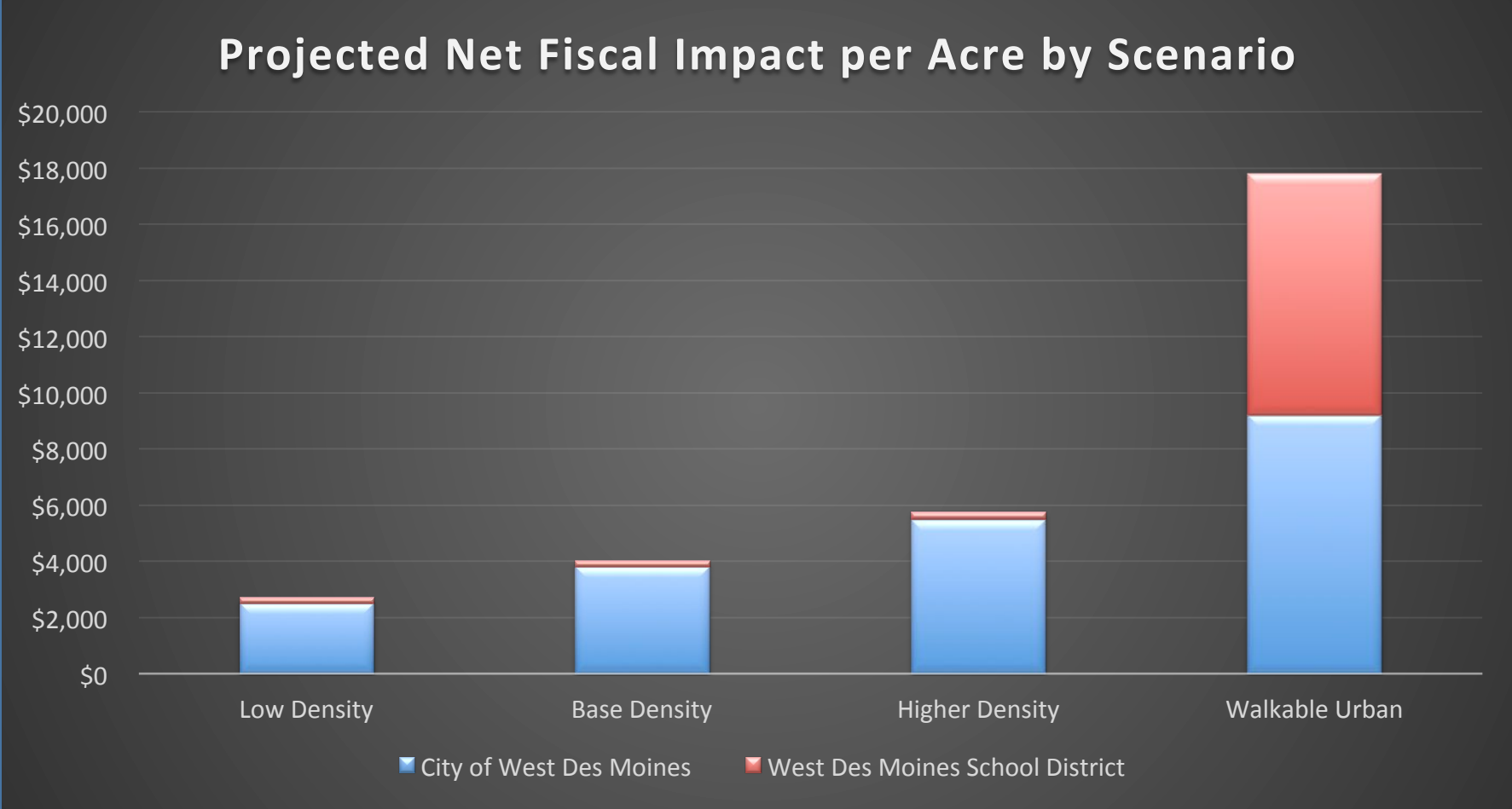
# SCENARIOS EVALUATED:

Unit Type	Low Density	Base Density	Higher Density	Walkable Urban
Large Lot SFD	150	150	150	0
Standard/Small SFD	5,000	5,000	5,000	1,500
Townhouses	1,125	1,125	1,125	3,275
Multifamily Units	3,000	3,000	3,000	4,500
Total Units	9,275	9,275	9,275	9,275
Total Gross Acres	2,654	2,188	1,728	783
Net Residential Density	5.5	6.9	10.8	22.4
Commercial SF	2,690,000	2,690,000	2,690,000	2,690,000

# TOTAL NET FISCAL IMPACT INCREASES WITH HIGHER DENSITY

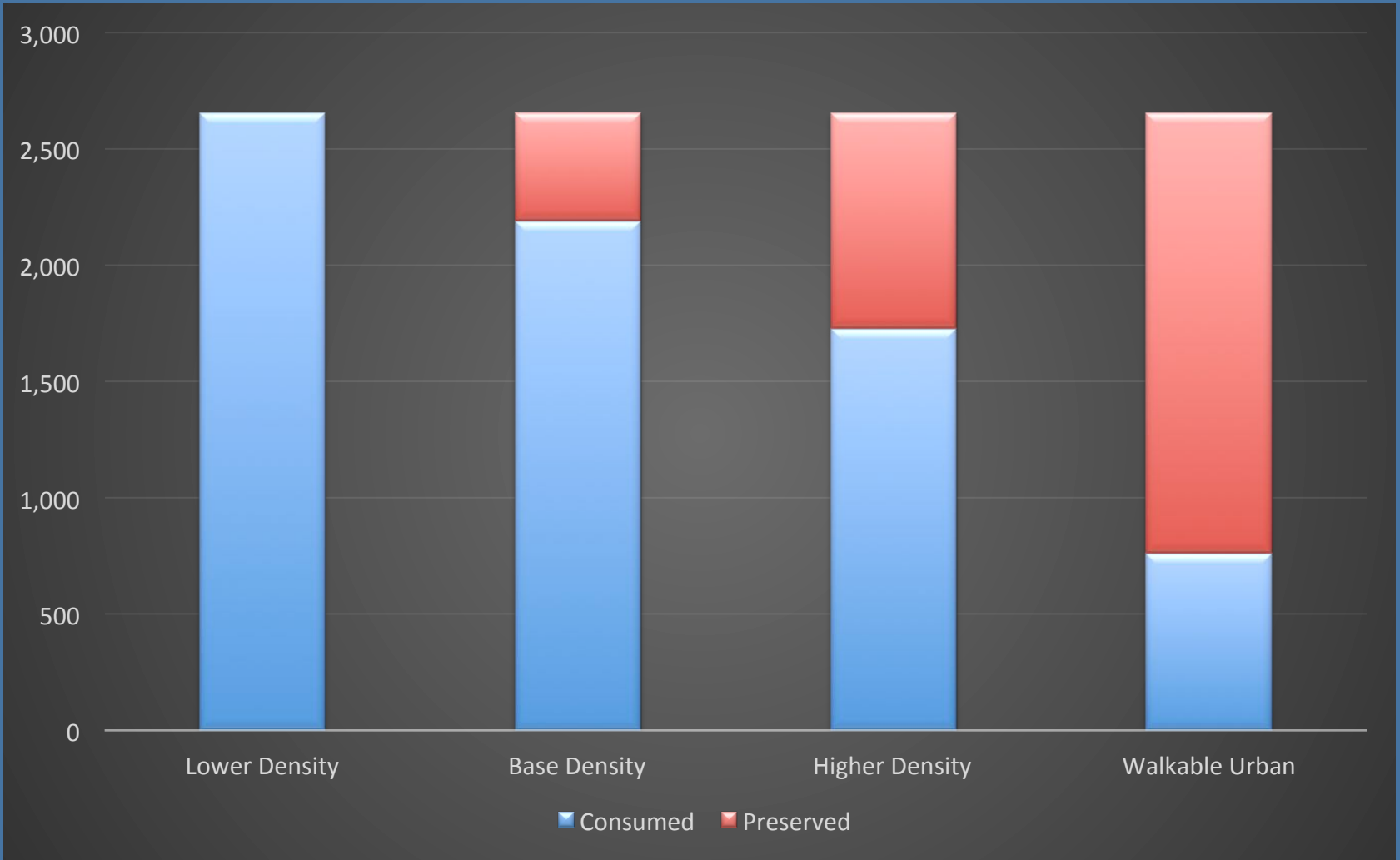


# IMPROVEMENTS IN NET FISCAL IMPACT PER ACRE





# DEVELOPMENT SCENARIOS – ACRES CONSUMED AND “PRESERVED”

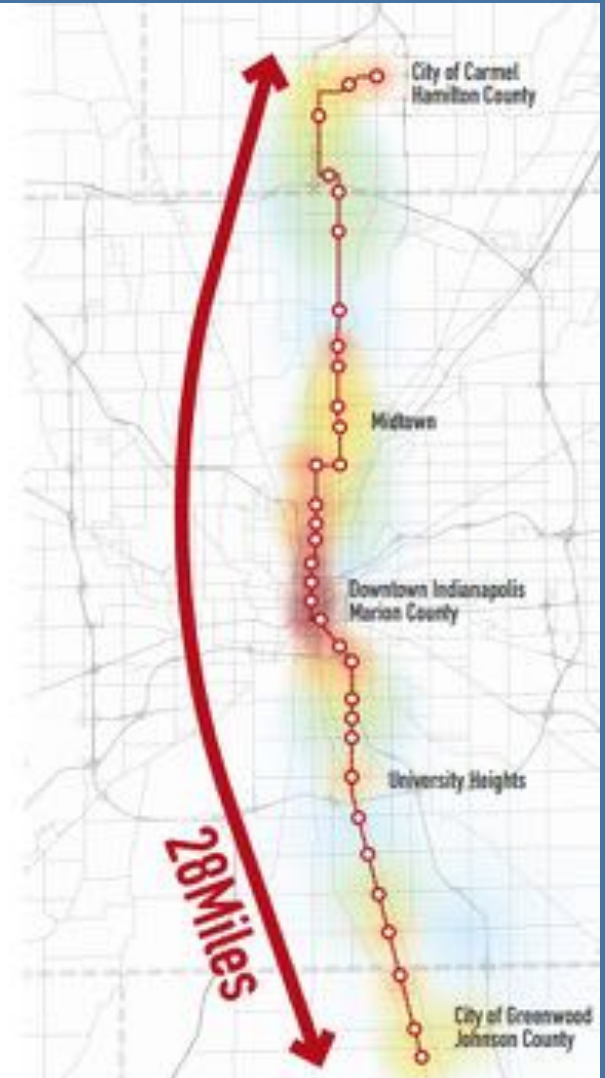


# **SUMMARY OF RESULTS IN INDIANAPOLIS**

# Indianapolis

**The Red Line** *e*-BRT  
Indianapolis, Indiana

**America's First  
Full *e*-BRT Line**



# Indianapolis

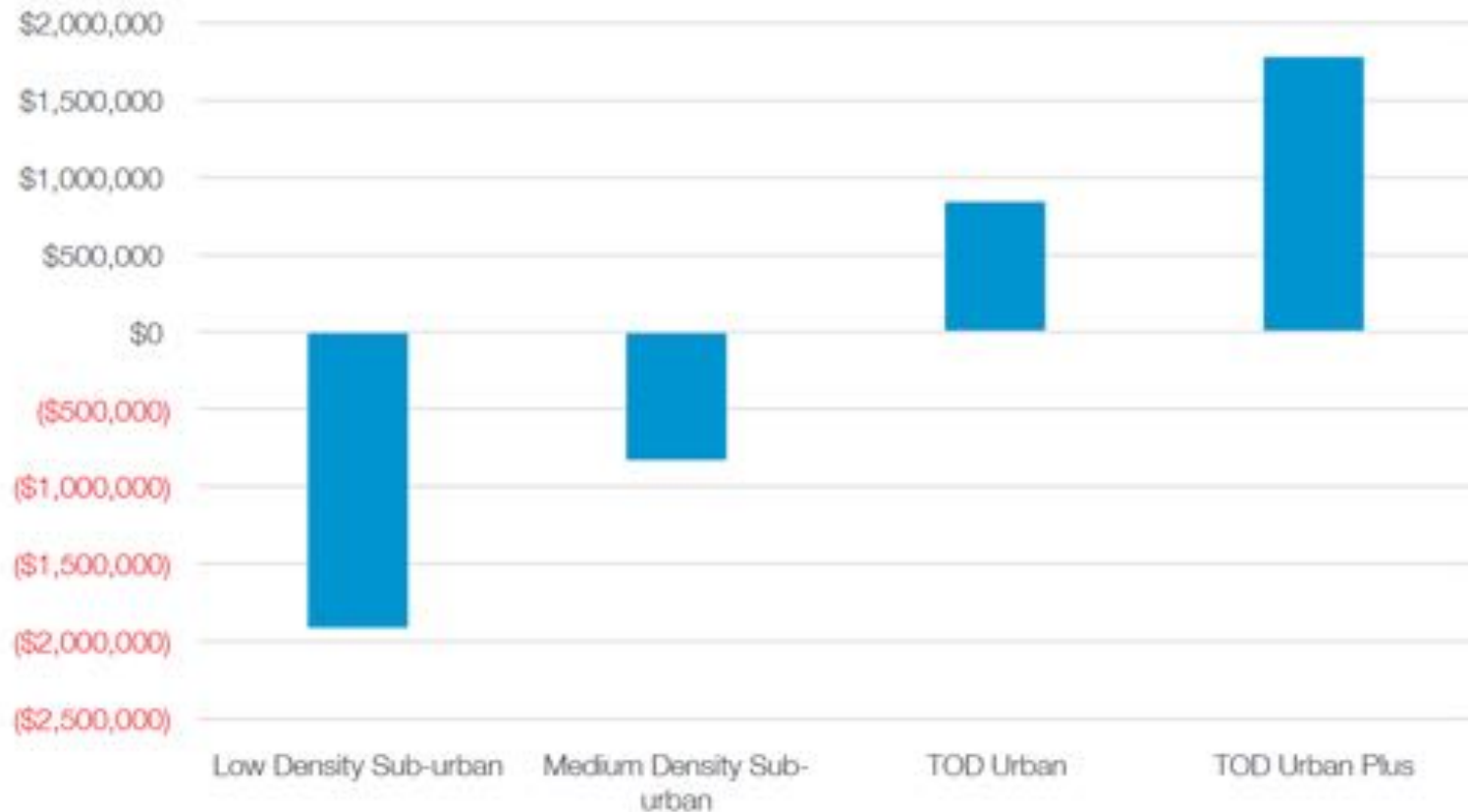
## Development in four scenarios

<b>Unit Type</b>	<b>Low Density Sub-urban</b>	<b>Medium Density Sub-urban</b>	<b>TOD Urban</b>	<b>TOD Urban Plus</b>
Single-family detached	1,950	1,950	450	450
Single-family attached	150	150	750	750
Multifamily units	900	900	1,800	1,800
Total units	3,000	3,000	3,000	3,000
Total gross acres	952	409	210	210
Net residential density	4.2	10.3	20.3	20.3
Commercial square feet	488,000	488,000	488,000	488,000

# Indianapolis

## Projected annual net fiscal impact at build-out

*City of Indianapolis and Indianapolis school transportation budget combined*



# TO SUM UP

		Development Location	
		Greenfield	Infill
Development Density	Low-density	Low or negative	Moderate
	High-density	Moderate	High positive

# TO SUM UP

Certain public costs vary by density.

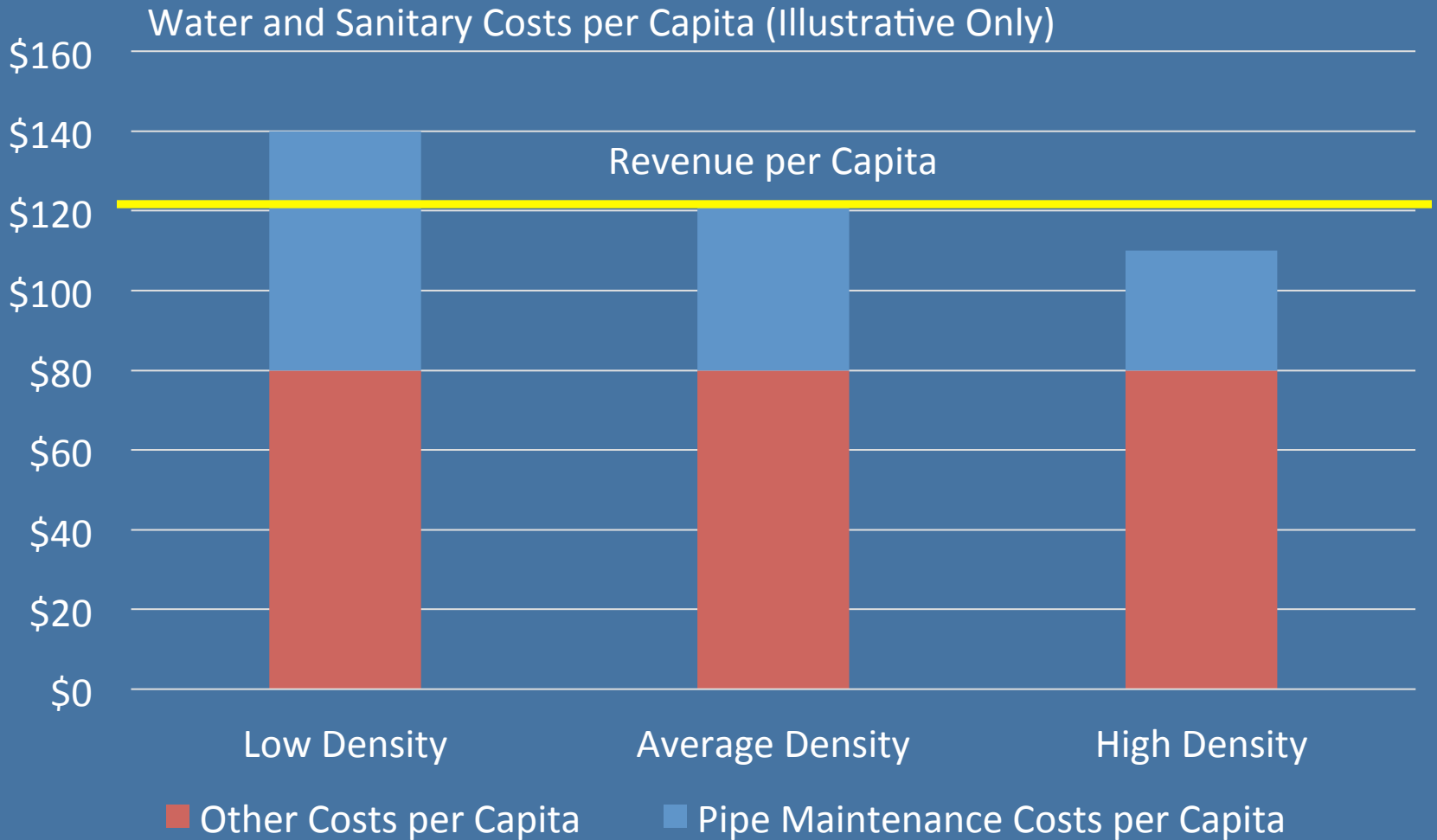
- All else being equal, more compact development imposes a **smaller cost burden** on municipalities, and the savings can be significant.
- Compact development uses land more efficiently and **maximizes the revenue** yield per acre.
- With the right design and “critical mass”, compact development can foster **walkable urban environments**, which often **command a “value premium.”**
- The combination of lower costs and higher values results in an **improved net fiscal impact** for the locality.



# REMAINING CHALLENGES/QUESTIONS:

- Availability of data limits potential to fully account for all density-related costs – Solid Waste, School Transportation
- Potential savings in other categories
- Model does not account for all capital costs associated with new development
- Impacts of density can be offset by changes in residential unit mix and residential to commercial space ratios
- Refinements to the methodology still in process
  - *Especially on the revenue side*

# SOME POLICY IMPLICATIONS



# The Pattern: Canadian cities sprawl less

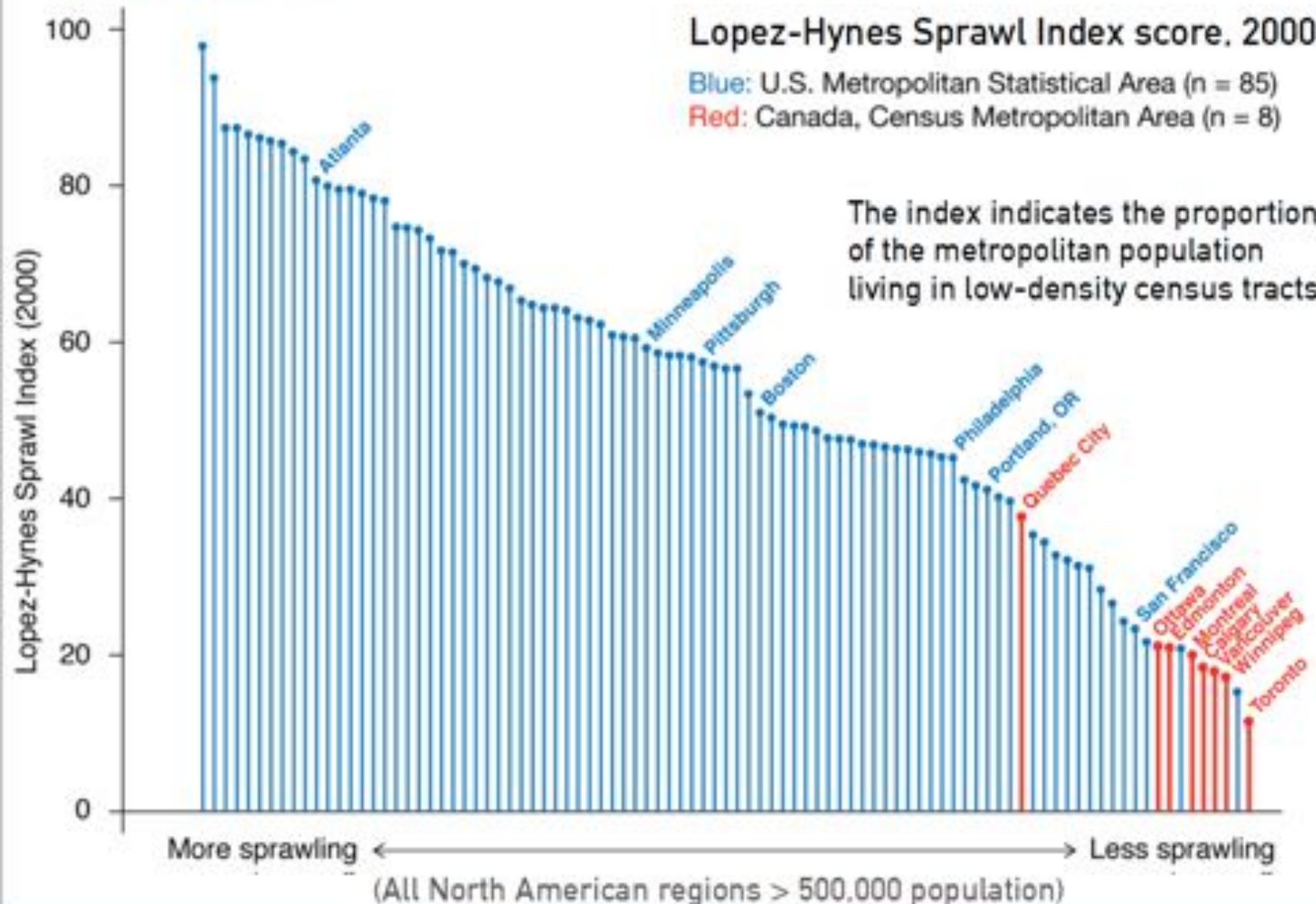
Dr. Zack Taylor, MCIP, Western University, Canada, "Growth Management: A Canadian Perspective"

## Lopez-Hynes Sprawl Index score, 2000

Blue: U.S. Metropolitan Statistical Area (n = 85)

Red: Canada, Census Metropolitan Area (n = 8)

The index indicates the proportion of the metropolitan population living in low-density census tracts





# Smart Growth America

Making Neighborhoods Great Together

For more information about our fiscal model,  
or other services, please contact me:

Christopher Zimmerman  
Vice-president for Economic Development  
[czimmerman@smartgrowthamerica.org](mailto:czimmerman@smartgrowthamerica.org)  
(202) 971-3939

**Thank you**