Economic Impacts, Benefits and Costs of Completing the ADHS

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ADHS Economic Study – Today's Presentation

- Appalachian Development Highway System (ADHS) Context
- Back-casting to estimate transport and economic impacts of ADHS system through 2015
- Forecasting of economic impacts, benefits, and costs of ADHS system completion
- Analysis of major ADHS corridors and impacts of accelerated completion

Appalachian Development Highway System (ADHS)

- Established by Congress in 1965
- System of corridors totaling 3,090 miles within the 13 Appalachian states
- Designed to generate economic development in previously isolated areas, connect Appalachia to the interstate system, and provide access to regional, national and global markets

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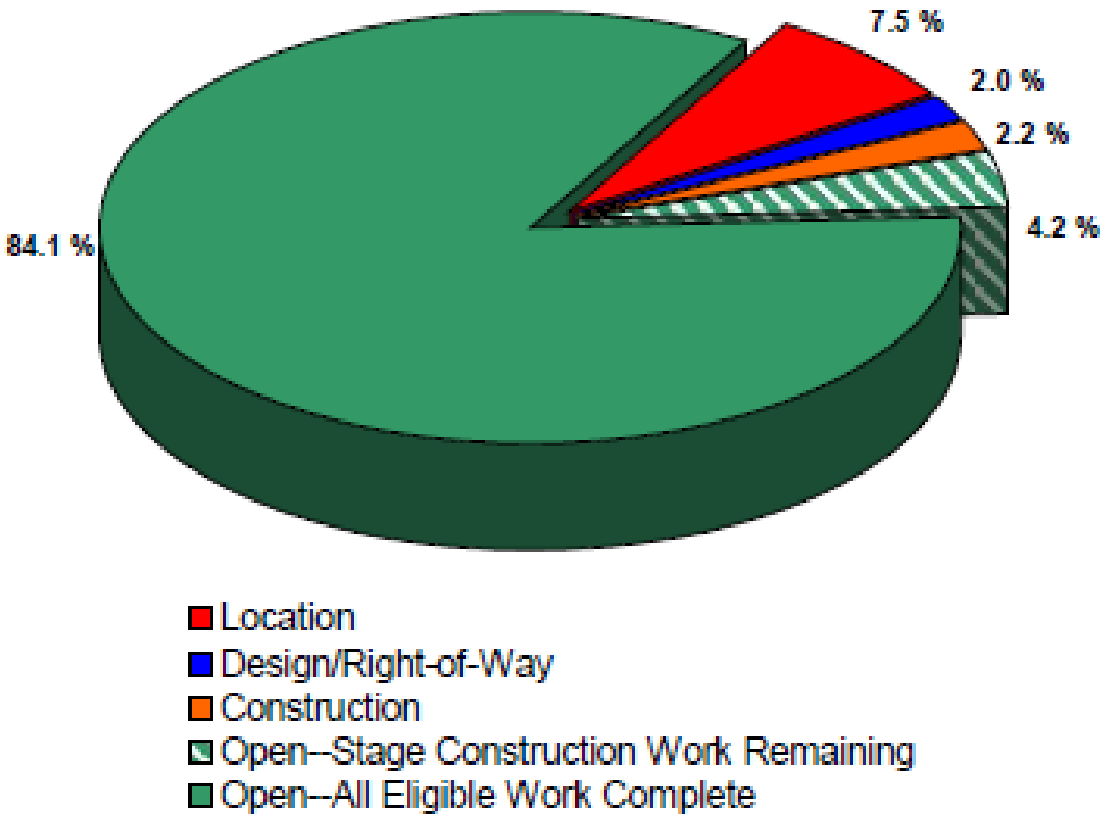
Appalachian Development Highway System

Status of Completion as of 9/30/2017

3090.1 Eligible Miles

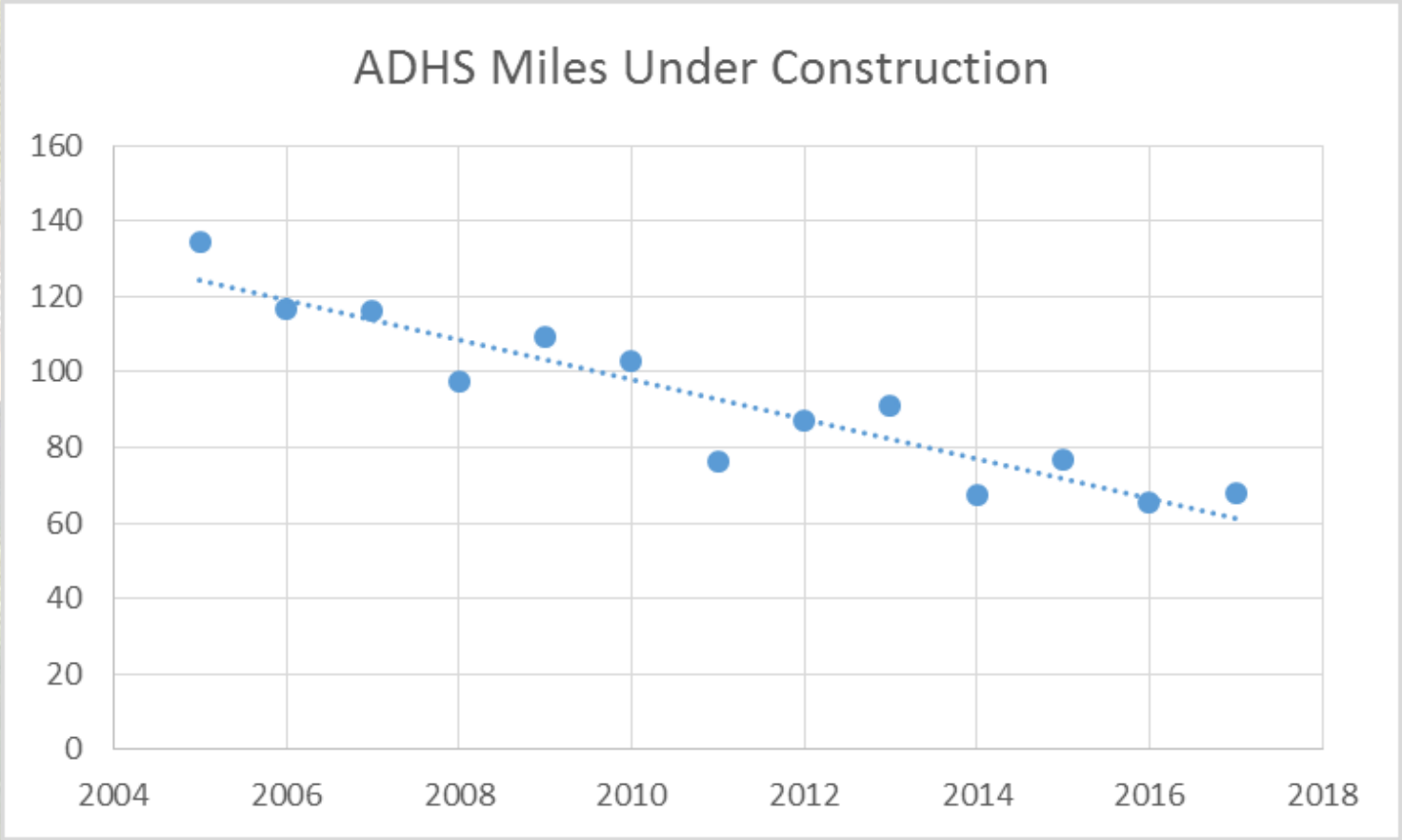


ADHS - Funding

- Between 1965 and 1999, funds were provided through annual appropriations
- TEA-21 and SAFETEA-LU provided annual authorizations of between $450 Million and $520 Million through FY 2012
- MAP-21 and the FAST Act did not provide specific authorization of funds for ADHS but did increase eligible share to 100% for remaining ADHS funds

Slowed Progress

- Since 2012, the number of ADHS miles in the location study stage (pre-NEPA) has remained the same at 231.



ADHS Economic Impact Study Objectives and Key Concepts

- **Back-cast:** What have been the transportation and economic impacts of ADHS investment so far (1965-2015)?
- **Forecast:** What are the economic impacts, benefits, costs and ROI of completing the ADHS (2016-2045)?
- **Travel Impact:** Modeling highway network with vs. without ADHS segments in place, to assess:
  - *Travel Efficiency Performance* (travel times, distances, costs) and
  - *Travel Accessibility* (labor market, same-day delivery market, intermodal terminal connectivity)
- **$ Value** of Travel Time & Cost Savings
- **Economic development:** forecasting model calculates effects on job growth, GDP and wages

Back-casting – ADHS Projects 1965-2015

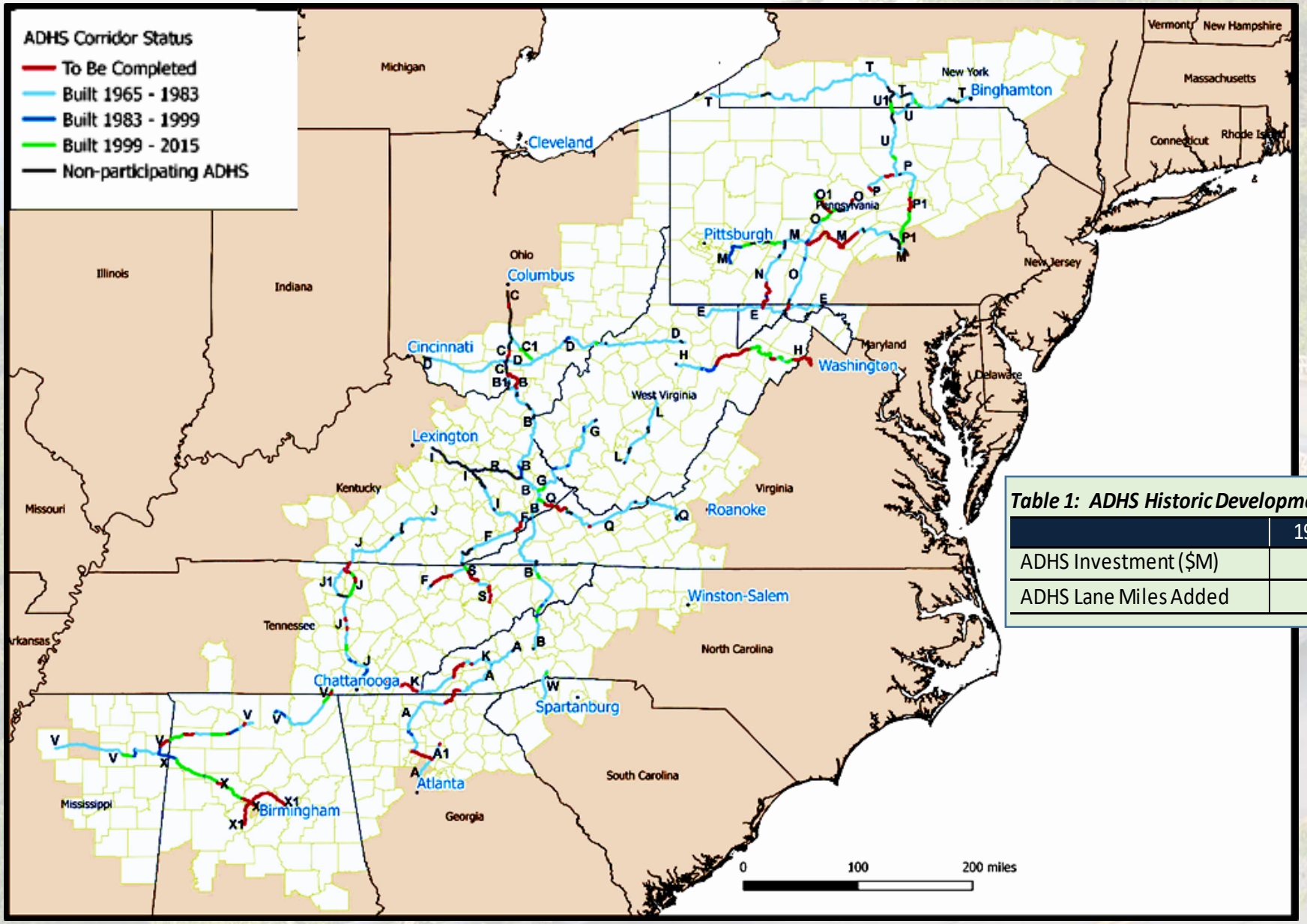


Table 1: ADHS Historic Development Periods

	1965–1983	1983–1999	1999–2015	All Periods
ADHS Investment ($M)	$3,255	$1,661	$6,287	$11,203
ADHS Lane Miles Added	4,356	267	496	5,119

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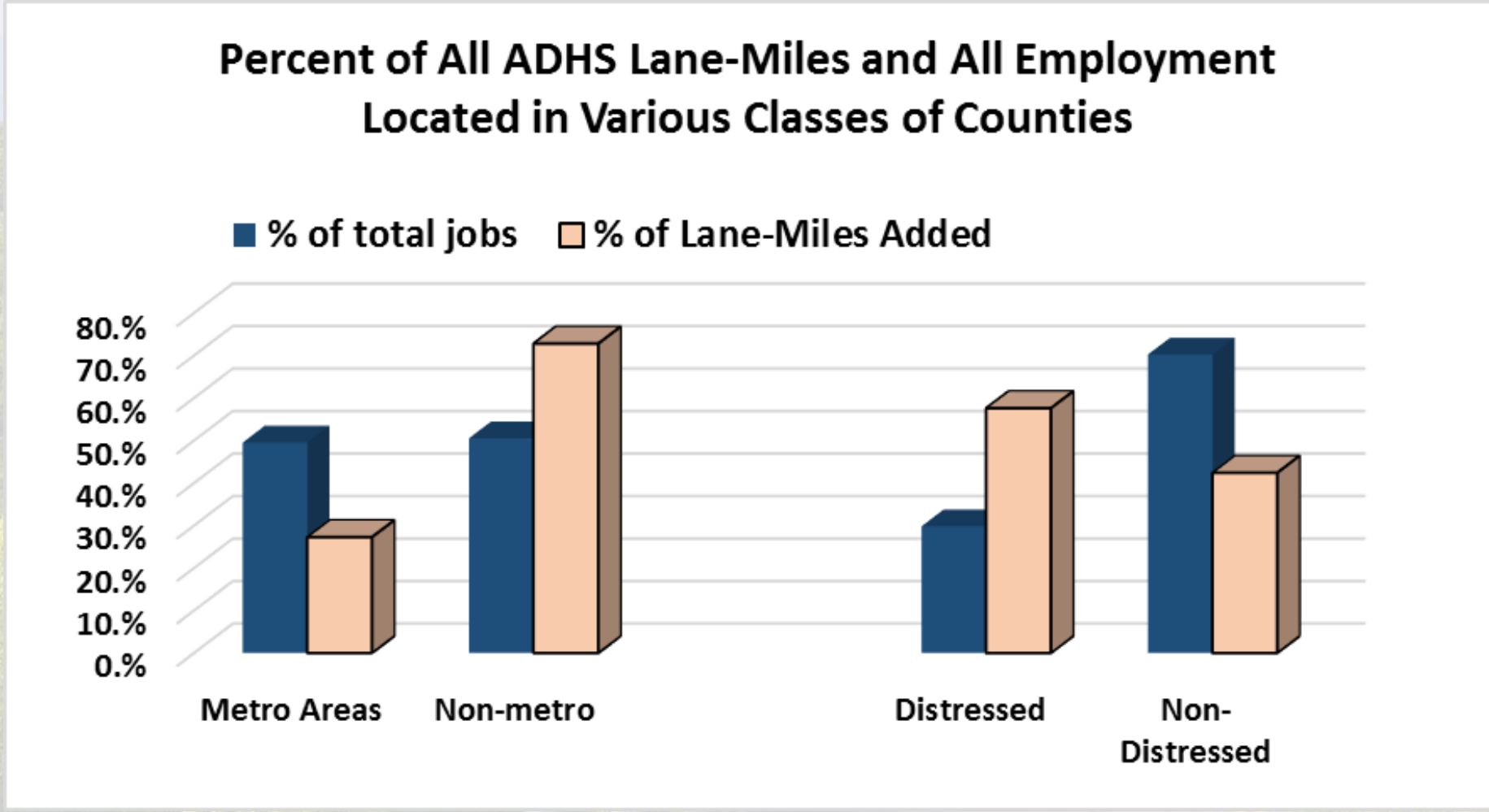
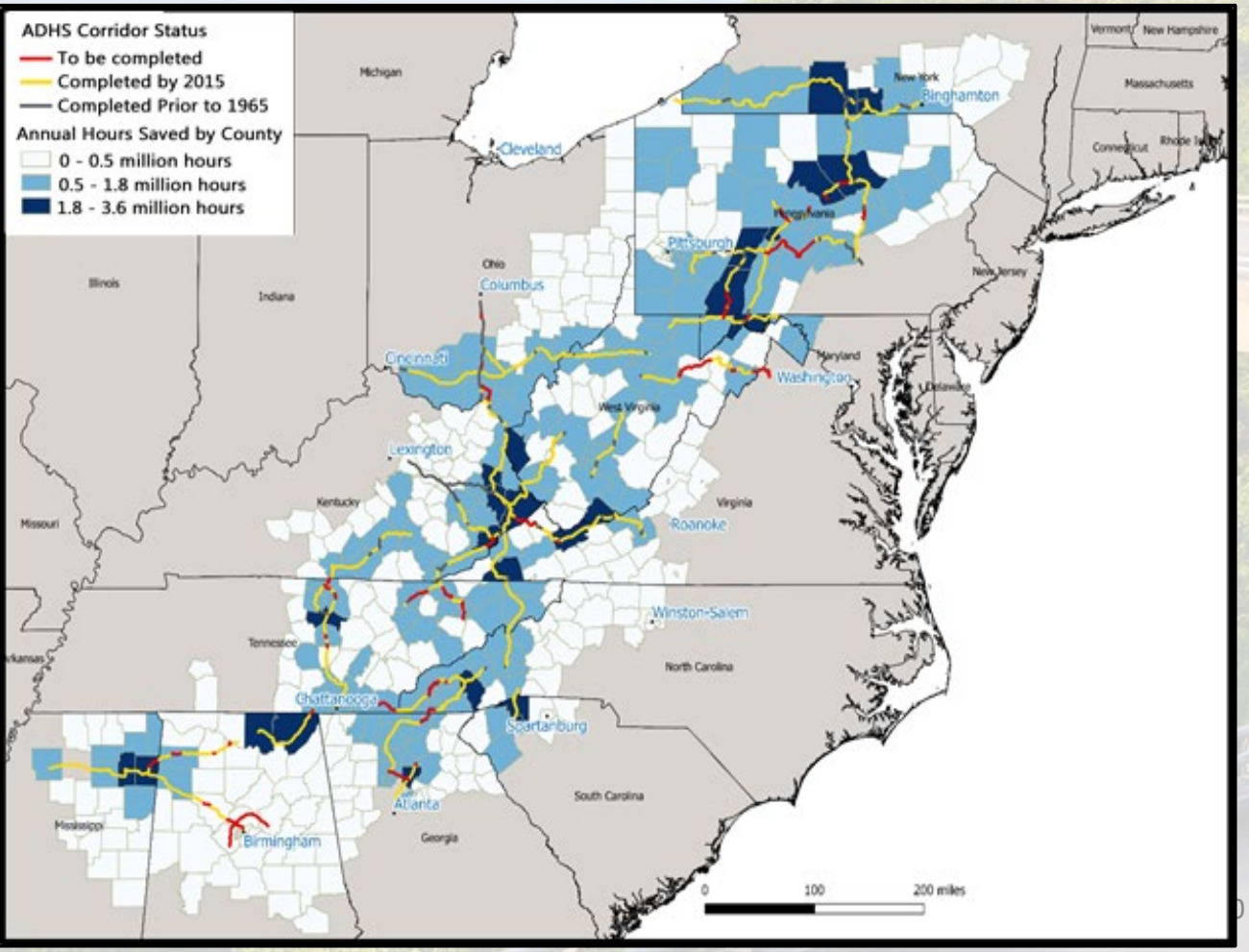
ADHS Investments Concentrated in Non-Metro and Distressed Areas



Travel Efficiency Benefits to 2015

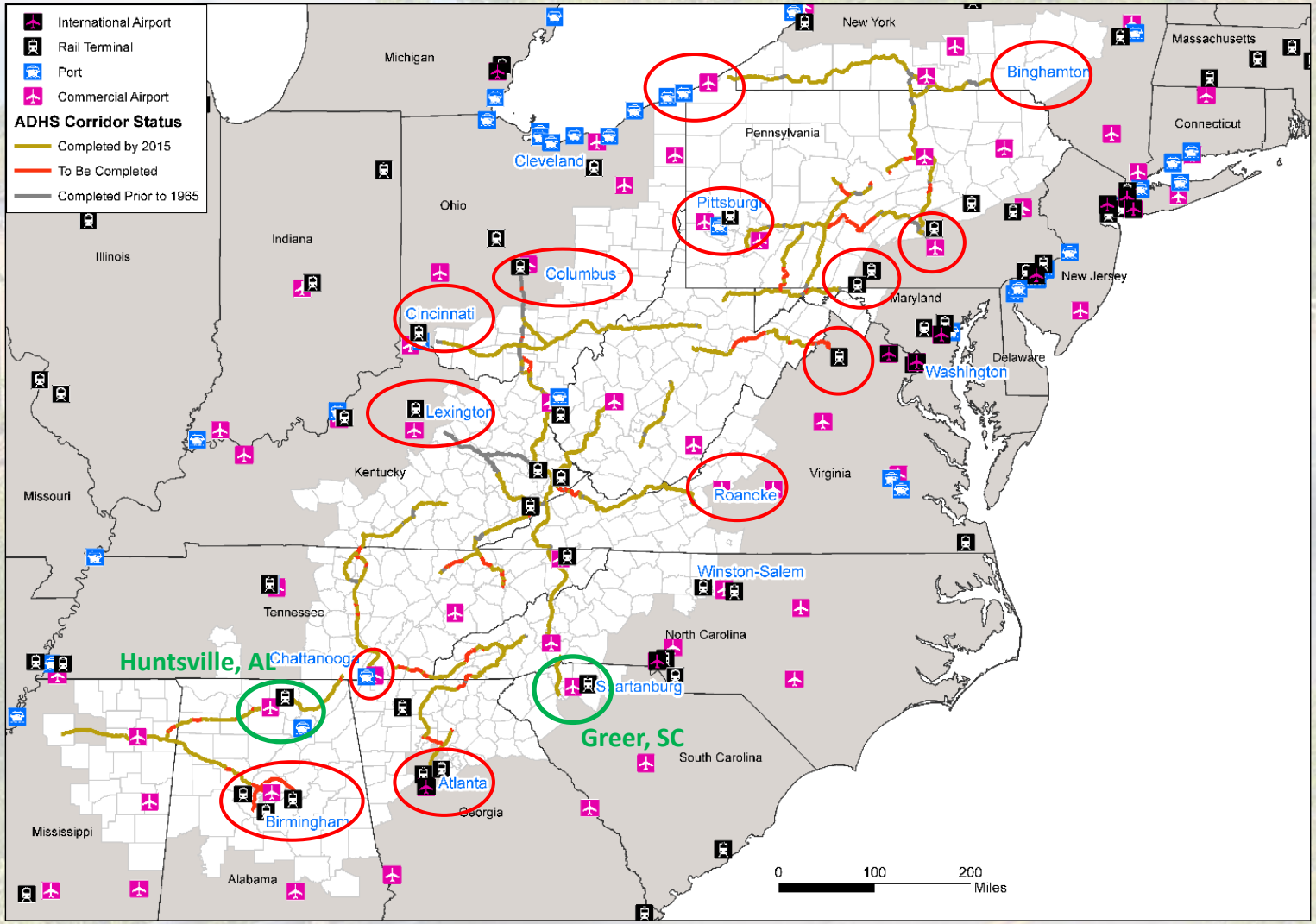


For all projects completed →	As of 2015
Total VHT Time Savings in 2015 (millions)	231.0
Car and Light Trucks	199.5
Freight Trucks	31.5
Total Reliability Time Savings in 2015 (millions)	129.1
Car and Light Trucks	111.5
Freight Trucks	17.6
Total Hours Saved (Reliability and VHT)	**360.1**

Travel time and reliability improvement by location of occurrence

Connecting to Intermodal Terminals in (and just beyond) Appalachia

ADHS Ties Appalachia to Air & Rail intermodal terminals



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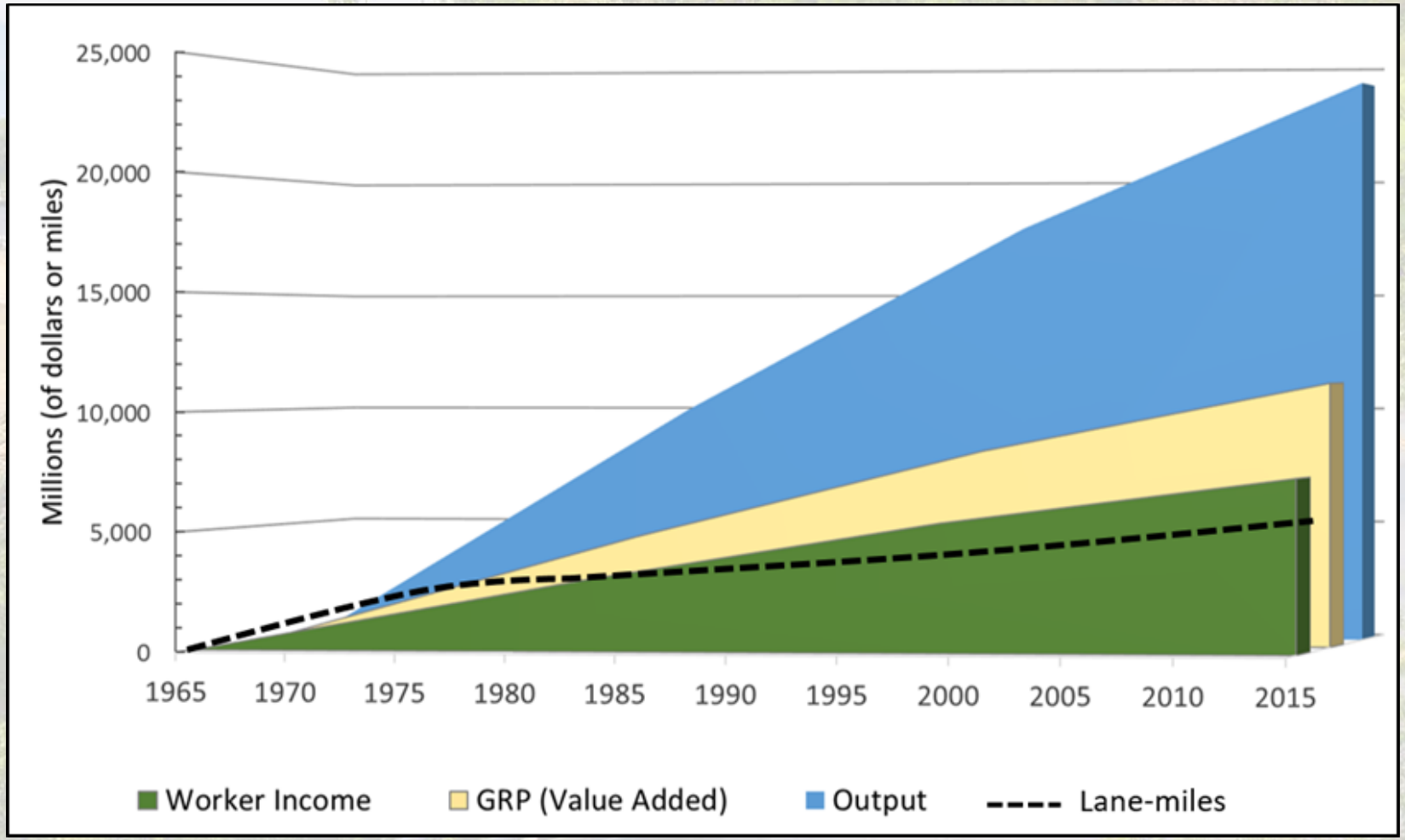
Economic Impact: Appalachia and States

Table 5: Impact of ADHS Projects on the Economy of Appalachia and Appalachian States

Increase compared to "no build" case	As of 1983	As of 1999	As of 2015
13-State Appalachian Region			
Business Output (Revenue) in $M/year	$9,959	$15,207	$24,183
GRP (Value Added) in $M/year	$4,611	$7,037	$11,173
Worker Income in $M/year	$3,006	$4,587	$7,282
Employment level (single year)	69,385	105,897	168,336
Lane-Miles Built to date	4,356	4,623	5,119
Appalachian Region			
Business Output (Revenue) in $M/year	$8,063	$12,312	$19,578
GRP (Value Added) in $M/year	$3,733	$5,697	$9,046
Worker Income in $M/year	$2,434	$3,714	$5,895
Employment level (single year)	56,174	85,734	136,284
Lane-Miles Built to date	3,527	3,743	4,144

Economic Impact over Time (1965-2015)



Forecasting Analysis – ADHS Completion: 2016 to 2045

Table 6: Future Completion of the ADHS by Investment and Miles Over Time

	2016–2025	2026–2035	2036–2045	Total
ADHS Cost to Complete ($M)	$3,374.0	$2,192.4	$5,348.4	$10,914.8
Highway Miles to be Completed	120.6	57.3	117.4	295.3

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ADHS Completion: Benefit-Cost Analysis – Strong ROI for Region and the US

Discounted net present value of 2016-2045 benefits and costs

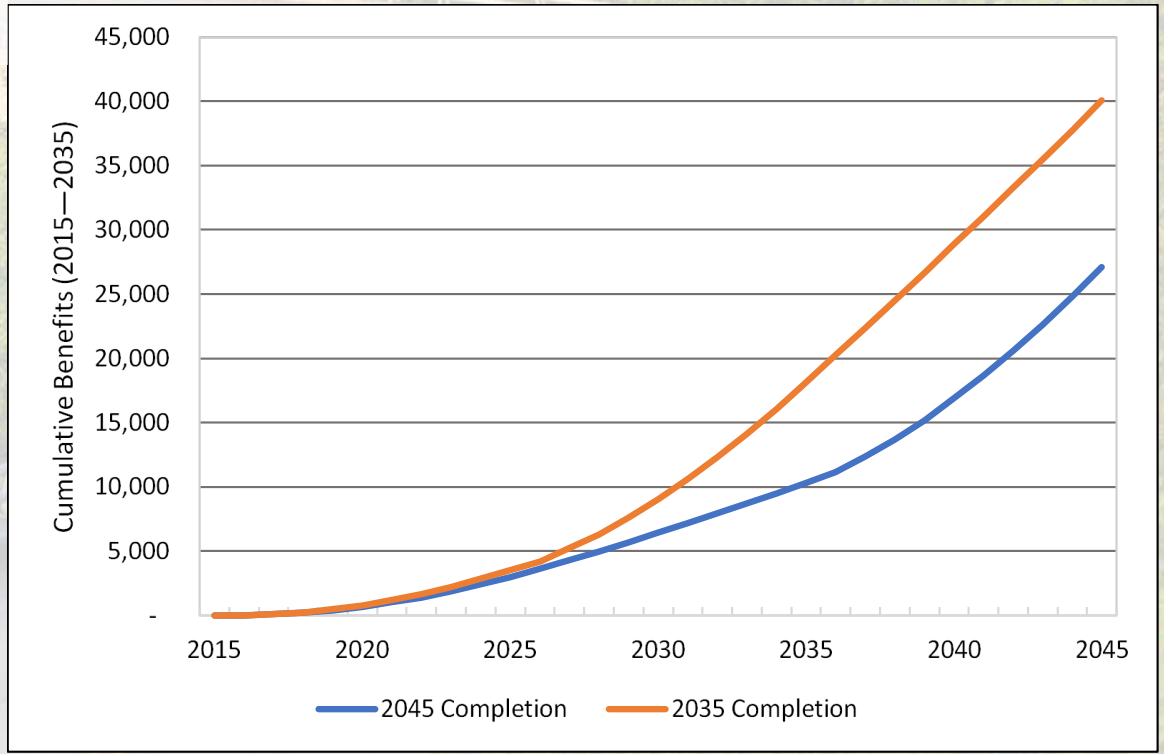
Benefit and Cost Elements	Regional Perspective with 7% discount rate	National Perspective with 7% discount rate
Vehicle Operating Cost Savings	$1,053	$1,659
Travel Time Saved	$5,602	$8,622
Reliability Time Saved	$1,589	$2,526
Safety Benefit	$637	$950
Environmental & Emissions Benefit	$223	$358
Logistics and Supply Chain Savings	$986	$1,786
Market Access (Productivity Gain)	$1,994	$419
Total Cumulative Benefits	**$12,083**	**$16,320**
Total Cumulative Costs	**$4,471**	**$4,471**
Benefit-Cost Ratio	**2.7**	**3.7**

Impact of Accelerating ADHS Completion – 2035 versus 2045 – Large Projects Accelerated

Corridor Name	State	Estimated Completion Year (2045 or sooner)	Assumed Completion Accelerated Schedule (2035 or sooner)	Estimated Cost (Undiscounted) $M
Corridor H	West Virginia	2042	2035	$810.0
	Virginia	2026	2026	$138.3
Corridor K	Tennessee	2025	2025	$535.5
	North Carolina	2028	2028	$760.5
Corridor M	Pennsylvania	2045*	2035	$1,477.1
Corridor N	Pennsylvania	2045*	2035	$510.1
	Maryland	2022	2022	$183.9
Corridor Q	Virginia	2021	2021	$474.1
	Kentucky	2019	2019	$371.2
Corridor X1	Alabama	2045	2035	$2,966.4
Other Corridors	Multiple States	varies	varies	$2,687.7
All Corridors	**Multiple States**	**varies**	**Varies**	**$10,914.8**

Impact of Accelerating ADHS Completion – 2035 versus 2045

Benefit and Cost Elements	Cumulative Value (2015-2035)	Cumulative Value (2015-2035)
	2045 Completion	2035 Completion
Vehicle Operating Cost Savings	$820	$1,537
Travel Time Saved	$4,396	$8,231
Reliability Time Saved	$1,231	$2,315
Safety Benefit	$505	$944
Environmental and Emissions Benefit	$125	$243
Logistics and Supply Chain Savings	$732	$1,382
Market Access (Productivity Gain)	$2,511	$3,497
Total Cumulative Benefits	**$10,320**	**$18,149**



Major Corridor-Specific Analysis: Impacts & Benefit-Cost Analysis

	H	K	N	Q	X1
Investment Cost ($ mil)	948	1,296	694	845	2,966
Benefit-Cost Analysis					
Societal Benefits ($ mil, discounted 7%)	761	1,623	373	1,458	3,078
Cost ($ mil, discounted 7%)	278	887	239	739	727
Benefit-Cost Ratio	2.7	1.8	1.6	2.0	4.2
Economic Impact Analysis					
Gross Regional Product (after 10 yrs) ($ mil)	166	205	61	97	1,395
Employment Change (after 10 Yrs)	1,852	2,368	700	987	13,937

The estimated benefit-cost ratio is over 1.0 for all major corridors, meaning benefits are expected to exceed costs, resulting in a positive ROI

Summary of Findings

ADHS Investment to Date

- Significant travel time, reliability, labor access, business delivery gains
- Cost savings + productivity gains of $10.7 billion/year as of 2015
- 20% of car benefits, 31% of truck benefits are outside of the 13 states
- Accountable for 168,000 jobs and $11 billion of GRP/yr. as of 2015

Summary of Findings

Forecast ADHS Completion

- Expect 121 million hours of more time savings/year by 2045
- Cost savings + productivity gains of $1.8 billion/year as of 2015
- Present value of benefits/costs = 3.7 return on investment (ROI)
- Expected to enable +47,000 jobs and +$4.2 billion of GRP/yr. by 2045(77% of gains in Appalachian counties, rest elsewhere in 13 states)(jobs concentrated in knowledge industries, also tourism)

Questions?

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