

Phase 2 Screening Results

December 14, 2021



1954 Tolling Meeting in Kalamazoo

States Talk Toll Roads

KALAMAZOO, Jan. 13 (AP)—Officials of four states gathered here today to try to co-ordinate plans for a network of interconnecting toll roads.

William E. Slaughter, Jr., of Detroit, chairman of the Michigan toll road authority, called the session. He invited toll road authorities in Indiana, Illinois and Wisconsin to join in the conference.

Of the four states, only Indiana now has a toll road program actually under way. A bond issue recently was floated there to build a toll highway across the northern border of the state. It would connect with the proposed Ohio toll road, which in turn would be linked with the Pennsylvania turnpike.

Illinois is considering a plan to continue the Indiana segment westward into Chicago and on to Davenport, Ia.

There also is a possibility that another link would carry from the Wisconsin-Illinois border into St. Paul, Minn.

Michigan is considering a toll road from Ypsilanti to connect with the Indiana segment south of New Buffalo. Another proposed toll road would connect with the planned Ohio highway at Toledo and run northward to Detroit and on to Bay City.

Lansing State Journal 1/13/1954

Network of Toll Roads Under Study

KALAMAZOO, MICH., (AP)—A coast to coast network of fast, safe toll roads is envisioned by Midwestern turnpike authorities.

And they intend to make a fight of it, if necessary, to keep such a vast highway program from federal regulation and control.

Meeting here Wednesday, a score of officials from four Midwestern states and Florida laid the groundwork for a tightly-knit organization designed to keep the inter-connecting state toll road system in state hands.

Uniform Rates

The group agreed that such an organization would be the only alternative to federal regulation if uniform toll rates, traffic regulations and the like are to be set up.

Evan Howell, chairman of the

The Spencer Daily Reporter, Thursday, January 14, 1954

Illinois Toll Highway Commission, was supported in saying that all states should join in a campaign for uniformity and strict state control.

"There is no question," he said, "but what we're headed toward a nation-wide system of toll roads from New York to California.

"Eventually we'll have a federal toll road commission unless we have a strong organization of toll road authorities in the various states."

He added: "The day the first federal dollar comes into the toll roads you'll get federal regulation."

Officials of turnpike commissions in Michigan, Indiana and Ohio voiced similar sentiments.

At Howell's invitation, the of-

icials agreed to meet in Chicago within the next few months to make more definite plans for organizing Representatives from all states with turnpikes under construction or on the drawing boards will be invited.

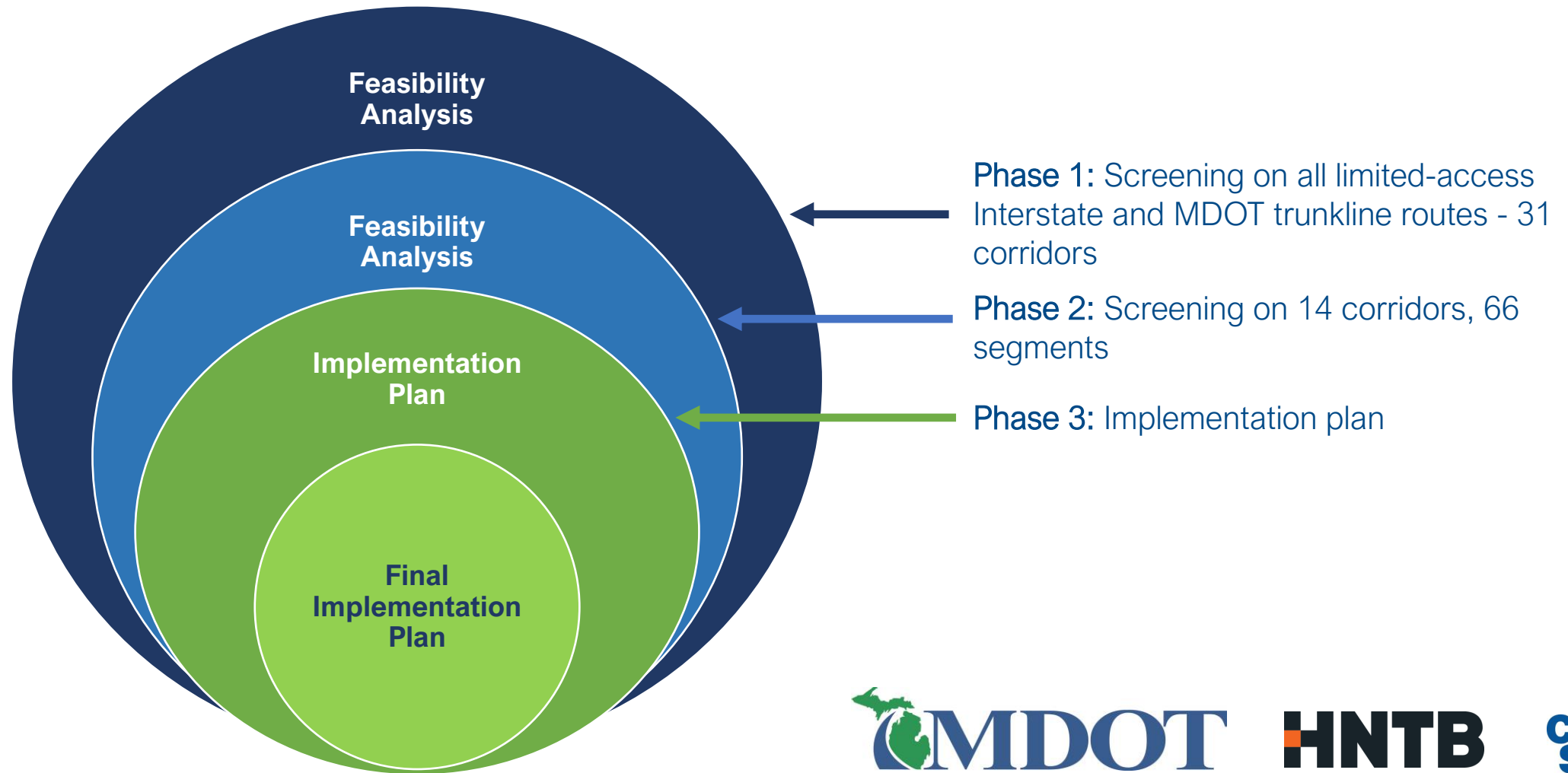
Network Seen

Progress reports detailed ultimate network of connect turnpikes extending northward to Bay City, Mich., and Minneapolis, eastward to the Pennsylvania state line, southward Cincinnati and westward Davenport, Iowa.

Charles P. Smith, executive assistant to the Ohio Turnpike Commission, pointed out that these Midwestern routes would connect with other actual planned toll roads extending far beyond.



Overall Screening Approach



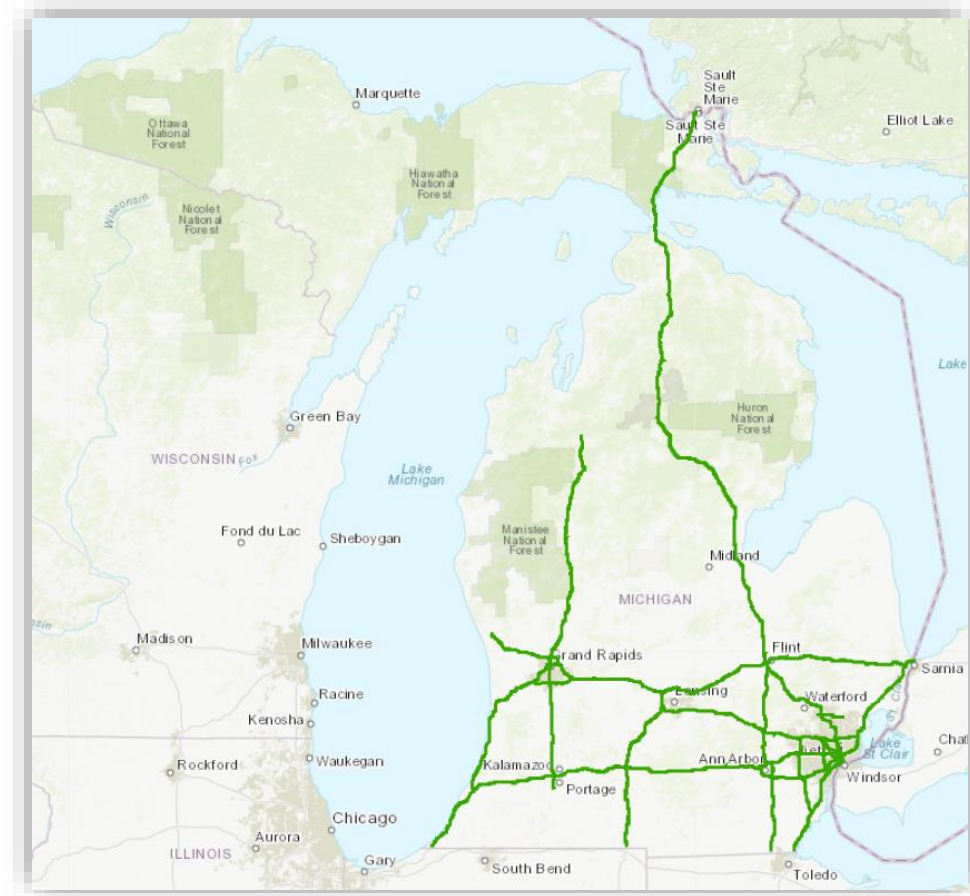
Phase 1 Screening

Corridors that advanced through Phase 1 screening:

- | | |
|-----------|-----------|
| 1. I-69 | 8. M-6 |
| 2. I-75 | 9. M-10 |
| 3. I-94 | 10. M-14 |
| 4. I-96 | 11. I-696 |
| 5. I-196 | 12. I-275 |
| 6. US-23 | 13. M-59 |
| 7. US-131 | 14. M-39 |

ADVANCE

Note: Corridors listed in no hierarchical order



Tiering Concept

- Segments were broken down into different “Tiers” based on their readiness for deployment
- Potential deployment timeframes for Tiers:
 - Tier 1: Around 5 to 7 years
 - Tier 2: Around 7 to 14 years
 - Tier 3: Around 15+ years
- Tier 1 will be further refined in the Step 2 Implementation Plan

Phase 2B Screening

- Phase 2B screening based on feedback from July 23 Phase 2A screening meeting
- July 23 meeting overview:
 - Screening considerations
 - Cost estimating assumptions
 - Financial performance metric
 - 4, 6, and 8 cent per mile screening scenario results



Phase 2B Updates versus Phase 2A

- Defined Tier 1, Tier 2, and Tier 3 corridors. Used the \$0.06 per mile toll rate scenario (recommended from Phase 2A) as starting point
- Added segments to system:
 - I-75 between I-675 north of Saginaw and US-23 split near Standish (geographic equity, roadway and bridge needs)
 - I-94 between US-23 and US-24 (roadway and bridge needs)
 - M-14 between I-94 and M-14/US-23 spit north of Ann Arbor (Huron River Bridge needs)
- Removed segment from system:
 - I-75 between US 127 north of Higgins Lake and Mackinac Bridge (low traffic volumes, overall system financial considerations)
- Updated toll gantry costs to reflect truss-style instead of monotube-style gantries
- Added additional bridge costs for the M-14 Huron River Bridge

Phase 2B Assumptions

General Assumptions	
Number of Routes - Input to Phase 2	The 14 corridors (full routes) remaining at the end of the Phase 1 screening were included as inputs to Phase 2 screening. These are I-69, I-75, I-94, I-96, I-196, I-275, I-696, US-23, US-131, M-6, M-10, M-14, M-39, and M-59.
Tolling Scenarios	Only the \$0.06 per mile rate (2020\$) for passenger cars was assumed for Phase 2B. Single-unit trucks were assumed to have a toll rate of 1.5x passenger car and multi-unit trucks 4.0x passenger car. Toll rates were assumed to increase annually at the rate of inflation.
Year of Dollars	All analysis was completed in 2020\$. All values are in 2020\$ unless indicated otherwise.
Centerline Mileage	Taken from the MDOT Statewide Model and checked with Google Earth or GIS.
Number of Lanes	Based on aerial imagery. Included only auxillary lanes greater than 0.5 miles in length. Auxillary lane length was measured from gore point to gore point.
Right-of-Way	Assumed that no new right-of-way would be needed.
Capital Cost Assumptions	
Highway Improvement Types	If remaining service life is 0 to 7 years assumed reconstruction, 8 to 12 years assumed rehabilitation, or 13+ years assumed 2 cycles of CPM. Also, if the highway was recently reconstructed (2015 to 2020) or is to be reconstructed per MDOT 2021 to 2025 Five-Year Transportation Program (5YTP) assumed 2 cycles of CPM. Widening is not included in the Phase 2B results but will be considered in the Step 2 (Implementation Plan).
Highway Unit Costs	Per MDOT Average Cost Per Lane Mile by Major Work Type for Various Networks, 2018-2025 table, for "Freeway" network reconstruction is \$3.308M per lane mile, rehabilitation is \$0.929M per lane mile, and CPM is \$0.131M per cycle per lane mile. Capacity improvements were assumed to include the \$3.308M for reconstruction and an additional \$2,692M for other items including drainage, culvert extensions, bridge widenings, etc. necessitated by the widening (total of \$6.000M per lane mile). These unit costs are assumed to be inclusive of all roadway, engineering, and inspection costs. The capacity improvement unit costs were not used in favor of existing cost estimates for corridors currently under study, especially those, when applicable, are part of an MDOT environmentally cleared project.
Highway Cost Contingencies	A 10% general contingency was added on to all highway unit costs. An additional 20% contingency was added for urban depressed highways.

Phase 2B Assumptions

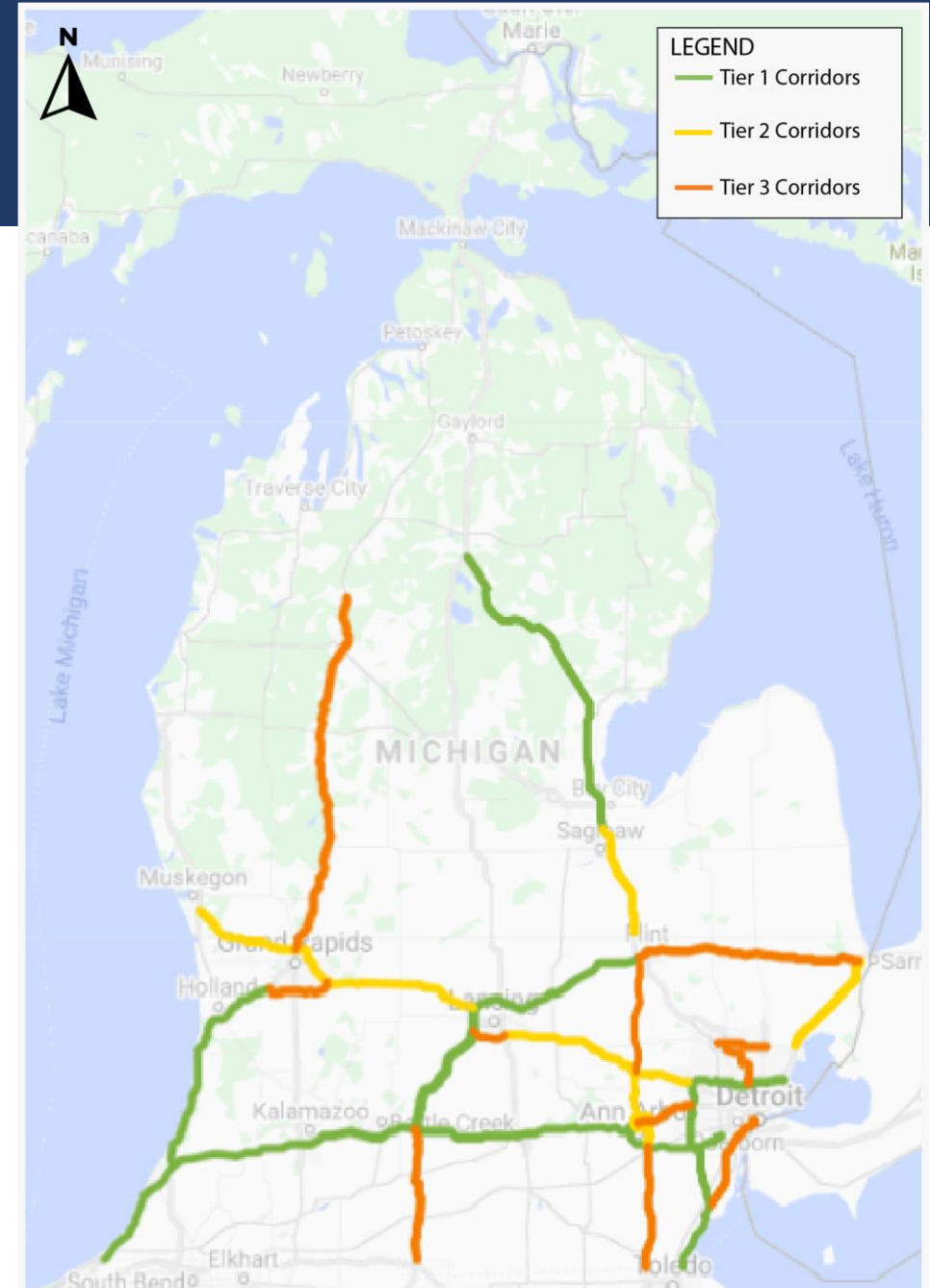
Capital Cost Assumptions (cont.)	
Bridge Improvements	Bridges in 2018 National Bridge Inventory with rating of 5 or below assumed reconstruction unless they are scheduled for reconstruction in MDOT 2021 to 2025 Five-Year Transportation Program (5YTP).
Bridge Cost	\$9M for reconstruction per bridge based on average bridge cost for Interstate and non-Interstate bridge replacements in the 2026 Call For Projects.
Bridge Cost Contingencies	A 10% general contingency was added on to the base bridge unit costs. Additional reconstruction costs were also added for MDOT "Big Bridges" and the M-14 Huron River Bridge which were assumed to have an additional cost of \$385 per square foot (made up of \$220 per square foot plus an additional 25% for PE/CE plus an additional 40% contingency).
Toll Gantry Style	Dual truss-style consistent with FLEX-lane applications.
Toll Gantry Placement	Over the mainline lanes with one pair of gantries in both travel directions between every other interchange. (For example, a corridor with four interchanges would have two sets of toll gantries in each direction, or four total tolling locations.) A unique case was the existing I-96 local/express lanes which were assumed to have one set of gantries over the local lanes and one set over the express lanes.
Toll Gantry Cost	\$1.58M per tolling location. Includes installation of civil, gantries (pair), and tolling equipment as well as one life cycle replacement of tolling equipment after 10 years.
Toll Gantry Contingency	10% additional.
Tolling Back-Office	Tolling back-office infrastructure costs are not included. This will be considered in more detail in Step 2 (Strategic Implementation Plan).
Fiber Coverage	Assumed additional centerline mileage needed to get to full coverage on toll corridors for toll communications.
Fiber Cost	\$270,000 per centerline mile. Assumed one 6-strand and two 24-strands consistent with MDOT standards.
Fiber Contingency	10% additional.
Total Capital Costs Equation	Total Capital Costs = Highway Costs + Bridge Costs + Toll Gantry Costs + Fiber Costs

Phase 2B Assumptions

Other Cost Assumptions	
Highway O&M	\$25,000 annually per lane mile. Assumed to include minor roadway repairs, mowing, litter pickup, snow and ice removal, freeway courtesy patrol, and incident detection and management at the Traffic Management Center.
Tolling O&M	\$0.07 per transaction. Assumed to include customer service center operations including call center and walk up centers as well as transaction processing including image review, credit card fees, payment processing, and transponder fulfillment.
Toll Discount Program	5% of total gross revenue was assumed to be set aside to fund to-be-determined tolling discount programs. This could include environmental justice, commuter, or resident-based programs.
Gross Revenue Assumptions	
Analytical Approach	Used a travel demand model approach based on the Michigan Statewide Model to estimate gross revenue. The model was calibrated to a 2019 base year using average weekday daily traffic estimates between major interchanges on study corridors.
Analysis Year	Gross Revenue estimates were based on 2030 traffic levels. Changes in traffic out to 2030 were based on those inherent in the Michigan Statewide Model.
Net Revenue Assumptions	
Net Revenue Equation	Net Revenue = Gross Revenue - (Highway O&M + Tolling O&M + Toll Discount Program)
Screening Assumptions	
Financial Performance Metric (FPM)	Rule-of-thumb metric to simulate relative financial feasibility and is not a financial or debt capacity analysis.
FPM Equation	$\text{FPM} = (\text{Net Revenue} * 20 \text{ years}) / (\text{Total Capital Costs} * 2)$ <p>The 2 factor is assumed to cover debt service requirements and contingency. Potential traffic changes over time are not considered. This is a conservative assumption.</p>
FPM Results	A FPM of less than 0 indicates no feasibility, between 0 and 1 indicates low feasibility, between 1 and 2 indicates medium feasibility, and over 2 indicates high feasibility
Comparative Surplus/Shortfall	<p>This is a variation of the FPM based on the equation below:</p> $\text{Comparative Surplus/Shortfall} = (\text{Net Revenue} * 20 \text{ years}) - (\text{Total Capital Costs} * 2)$

Summary

- Based on feedback, the 6 cent per mile scenario is recommended.
- Including system shown on map
 - Tier 1: 546 miles, \$4.4B Capital Cost
 - Tier 2: 232 miles, \$2.1B Capital Cost
 - Tier 3: 379 miles, \$3.6B Capital Cost
- Not included in system:
 - Much of urban Grand Rapids and Detroit (EJ considerations)
 - Existing toll bridges (Mackinac and Blue Water)
 - Upper peninsula and northern lower peninsula (very low traffic volumes)
 - Other segments not included so system is self supporting



Summary

- No additional operational improvement projects are currently included
- Based on the more refined Step 2 financial analysis, the funding of additional Tier 1 operational improvement projects may be considered in the Implementation Plan including:
 - Flex Lanes or Priced Manages Lanes on mainline corridors with operational issues
 - Interchange reconfiguration on interchanges with operational issues
 - Addressing safety issues for trucks, for example by adding a third general purpose lane on two-lane sections of I-94

Summary

- Roadway O&M is included in program – can free up money beyond capital cost
 - Assumed \$25,000 per lane mile annually for roadway O&M
 - Tier 1 corridors: 2,587 lane-miles
 - Total Tier 1 annual roadway O&M included: \$64.7M (2020\$)

Tier 1 Corridors (Step 2)

#	Corridor	Corridor Limits*		Centerline Mileage	Comparative Surplus/Shortfall (millions)	Potential Program	Key Screening Factors**
1	I-69	I-94 near Marshall	I-75 near Flint	94.4	\$ (959.7)	Bridge Program	Roadway and bridge needs
2	I-75 (River Raisin Bridge)	Ohio border	I-275 south of Detroit	19.8	\$ 164.8	Bridge Program	Bridge needs
3	I-75	I-675 north of Saginaw	US 127 north of Higgins Lake	93.8	\$ (480.8)	Bridge Program	Geographic equity, bridge needs
4	I-94	Indiana Border	US 24 in Detroit	200.8	\$ 2,046.5	ISRRPP	Roadway and bridge needs, stakeholder feedback
5	I-196	I-94 north of St. Joseph	M 6 southwest of Grand Rapids	64.1	\$ 256.9	Bridge Program	Roadway and bridge needs
6	I-275	I-75 south of Detroit	I-96/I-275/I-696/M 5 Interchange	38.9	\$ 37.7	VPPP	Operational issues, roadway and bridge needs
7	I-696	I-96/I-275/I-696/M 5 Interchange	I-94 in St. Clair Shores	29.1	\$ 620.9	VPPP	Operational issues
8	M 14 (Huron River Bridge)	I-94 southwest of Ann Arbor	M 14/US 23 split north of Ann Arbor	4.8	\$ (155.0)	Bridge Program	Bridge needs
		Total Tier 1 Corridors***		545.6	\$ 1,531.3		

*Corridor limits will be further refined during the Implementation Plan.

**In addition to the factors listed that varied by corridor, other factors were considered across all corridors including having sufficient net revenue, avoiding disadvantaged communities as much as possible, and system continuity.

***Values may not add due to rounding.



Tier 2 Corridors

#	Corridor	Corridor Limits		Centerline Mileage	Comparative Surplus/Shortfall (millions)	Key Screening Factors*
1	I-75	I-475 north of Flint	I-675 north of Saginaw	30.4	\$ 160.1	Road and bridge needs, Zilwaukee Bridge (long term)
2	I-94	M 59 north of Detroit	I-69/I-94 split near Port Huron	31.2	\$ (124.0)	Road and bridge needs
3	I-96	US 31 near Muskegon	Northern I-69/I-96 split near Lansing	89.0	\$ 136.8	Road and bridge needs
4	I-96	US 127 southeast of Lansing	I-96/I-275/I-696/M 5 Interchange	57.2	\$ (88.2)	Road and bridge needs
5	US 23	I-94 southeast of Ann Arbor	I-96 near Brighton	24.3	\$ (90.5)	Road and bridge needs
		Total Tier 2 Corridors**		232.1	\$ (5.9)	

*In addition to the factors listed that varied by corridor, other factors were considered across all corridors including having sufficient net revenue, avoiding disadvantaged communities as much as possible, and system continuity.

**Values may not add due to rounding.

Tier 3 Corridors

#	Corridor	Corridor Limits		Centerline Mileage	Comparative Surplus/Shortfall (millions)	Key Screening Factors*
1	I-69	Indiana border	I-94 near Marshall	37.8	\$ (248.3)	Road and bridge needs
2	I-69	I-75 near Flint	I-69/I-94 split near Port Huron	66.8	\$ 130.1	Bridge needs
3	I-75	I-275 south of Detroit	I-96 in Detroit	28.8	\$ (419.8)	Road and bridge needs
4	I-75	I-696 near Detroit	M 59 near Detroit	16.1	\$ 60.8	Road and bridge needs
6	I-96	Southern I-69/I-96 Split near Lansing	I-496/US 127 southeast of Lansing	9.3	\$ (396.7)	Road and bridge needs
7	US 23	Ohio border	I-94 southeast of Ann Arbor	35.0	\$ (270.4)	Road and bridge needs
8	US 23	I-96 near Brighton	I-75/US 23 split southwest of Flint	31.2	\$ (512.0)	Road and bridge needs
9	US 131	I-96 in Grand Rapids	north of Cadillac	106.8	\$ 179.8	Geographic equity
10	M 6	I-196 southwest of Grand Rapids	I-96 southeast of Grand Rapids	18.2	\$ (20.7)	Road needs
11	M 14	M 14/US 23 split northeast of Ann Arbor	I-96/I-275/M 14 Interchange	15.4	\$ 34.7	Road and bridge needs
12	M 59	Huron St. near downtown Pontiac	Van Dyke Ave in Utica	13.2	\$ (59.2)	Road and bridge needs
		Total Tier 3 Corridors**		378.6	\$ (1,521.5)	

*In addition to the factors listed that varied by corridor, other factors were considered across all corridors including having sufficient net revenue, avoiding disadvantaged communities as much as possible, and system continuity.

**Values may not add due to rounding.

Discussion and Questions

