Chapter 5: Travel Demand Model Scenarios

Introduction
This chapter highlights the fundamental aspects to the 2045 Metropolitan Transportation Plan (MTP) used as a policy level decision-making guide for future transportation investment by the BMCMPO. The Guiding Principles, the financial forecast, and the future needs discussed in the previous chapters reflect the course of future decisions by the BMCMPO.

The travel demand modeling process establishes a quantifiable framework through which the BMCMPO Committees and the general public can

- Examine the existing transportation system under current performance assumptions
- Examine alternative future investment policy scenarios, and
- Achieve a broad policy-level investment consensus of solutions that meet the established Guiding Principles vision, goals, and objectives and satisfy fiscally constrained transportation needs and wants of the urban area.

The MTP provides direction for these considerations from the beginning project concept through implementation. The MTP provides general policy direction during the project concept phase by using the Guiding Principles; during the financial feasibility by considering the financial forecast or available resources; and during the technical design by addressing future needs.

The Bloomington-Monroe County Travel Demand Model (TDM) is another powerful tool of the MTP to assist in the 3C process. Again, this should inform and establish a framework for all BMCMPO members to work towards the best solution. Appendix C and D provide TDM technical information not detailed in this chapter. The TDM was developed to project future growth and travel demands (as discussed in Chapter 2) and to apply these to the 2013 base year conditions (existing and committed projects) and then to the year 2040. The TDM also uses multiple growth and development scenarios. This is a unique aspect of this TDM and a new analysis for the BMCMPO. What is important to this analysis is it allows the TDM to consider different rates of growth and allocate the growth into several different development styles as land uses and people are the most significant influences on transportation needs. Finally, another unique aspect and new tool for the BMCMPO is a TDM performance measure analysis. Together these components of the TDM provide results to further guide decision.

Travel Demand Model
The BMCMPO Travel Demand Model (TDM) established 2013 baseline conditions for Monroe County. This “Base Year” snapshot used travel demand forecast model methodology for measuring transportation network changes over time given alternative policy scenarios. The BMCMPO TDM quantified travel demand growth through land use, county-specific socioeconomic characteristics, and modal choices. This standard approach identified basic future transportation network needs in the absence of network considerations such as political,
topographical, and technical feasibility for system improvements. Needs derived from public comments, feedback from various agencies, and even land development activities can further assist planners formulate a TDM to reasonably reflect transportation needs. This list could include bigger buses to aid in serving busy bus routes, a roundabout for a dangerous intersection, and new road to serve business park growth.

Factors related to financial aspects, political support, technology, environmental constraints, societal trends, and public policy can introduce complexity into a TDM. Projections twenty-five years into the future make this exercise much more complicated. While the TDM does aid in this process by assessing socioeconomic trends, anticipated land use changes, and some transportation improvements highly anticipated, the future is nevertheless uncertain. What the TDM can achieve is aid with understanding the magnitude of future needs by considering a range of scenarios. The TDM can further assist planners and public officials to understand possible consequences of scenarios and near-term decisions by using performance measures. Together the TDM can guide decisions based on preferred courses of action or trajectories to meet our future expectations.

**Network Scenarios**
The BMCMPO travel demand model examined transportation system network scenarios to determine the macro-level performance impacts under an assortment of policy considerations. Scenario identifications evolved through general public input and BMCMPO committees. Staff evaluations through the MTP steering committee resulted in the identification of thirteen (13) network scenarios. These scenarios provided an understanding of the implications that may result from public policy investments strategies within the transportation network and associated socioeconomic changes, land use changes and other defined parameter conditions.

All scenarios examined with the BMCMPO TDM relied upon guidance from the public Metropolitan Transportation Plan Task Force, general public input, and the MPO staff. The overall assumption for most scenarios is that general operations and maintenance shall continue at existing necessary baseline levels. Scenarios 2, 3, 4, 6, and 11 did examine aspects of changing operations, maintenance, or some external factor impacting travel demand. The financial forecast (see Chapter 4) accounted for general operations and maintenance as an element of all scenarios.

The BMCMPO TDM examined a no build or “Do Nothing” scenario and twelve (12) additional scenarios using the modeled Base Year 2013. The E+C network (Existing plus Committed) is included as part of all other scenarios with the single exception of Scenario 3 which did not include I-69 corridor development through the BMCMPO, and is intended only to compare it with the E+C network to better understand local impacts associated with I-69. Each scenario is detailed on the following pages below:
### Scenario Statistics

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### Table 5-1: TDM Scenario Results
Scenario 0 - “Do Nothing”

This scenario, also known as the Existing plus Committed Network (E+C), operates under the Base Year 2013 transportation network conditions (roadway configurations, operations of traffic control devices, transit services, and bicycle and pedestrian facilities, population, employment, households, and land use) and only with the committed transportation projects scheduled for then near-term construction (i.e., bid awards by FY 2014). All the other scenarios represent Year 2040 projections.

The “Do Nothing” Scenario in not comparable to other scenarios. The committed projects included within this scenario included the following Existing + Committed (E+C) projects:

- **I-69 Section 4** – New Major roadway/interchange construction from U.S. 231 near Crane NSWC/NSA to State Road 37 south of Bloomington.

- **I-69 Section 5** – Major roadway/interchange construction and the roadway conversion of SR 37 to a fully access controlled interstate from Kinser Pike to Victor Pike.

- **Fullerton Pike/Gordon Pike/Rhorer Road** - Road reconstruction and safety improvements including bituminous pavement, curb, gutter, sidewalk, multi-use side path, bridges and drainage appurtenances. This project included turn lanes and the installation of a new traffic signal at the Walnut Street Pike intersection from 475 feet west of the intersection of Old SR 37 and proceeding east to the end point, 200 feet east of Walnut Street Pike.

- **Karst Farm Greenway (Phase I)** – Preliminary engineering, Right-of-Way and construction of a multi-use pathway for non-motorized use, including site amenities (~4.00 miles long) from South of Vernal Pike to Karst Farm Park.

- **Karst Farm Greenway (Phase Ila)** – Preliminary engineering, Right-of-Way and construction of a multi-use pathway for non-motorized use, including site amenities (approximately 1.1 mile length) from Vernal Pike to Woodyard Road.

- **Karst Farm Greenway (Phase 3)** – Multi-use pathway construction with amenities from railbanked area to Hartstrait Road.

- **17th St. & Arlington Rd. Roundabout** – Construction to replacement of “K” intersection with a modern roundabout to serve this intersection of three streets to improve safety and facilitate better traffic flow from the Intersection of Arlington Road, West 17th Street and North Monroe Street.

- **17th St. & Jordan Avenue** – Construction to improve vertical geometry and sight distance at the intersection and on approaches from the Intersection of East 17th Street and North Jordan Avenue.
• **17th St. & Jordan Avenue Pathway** – Construction of a new non-motorized side path on 17th Street at Jordan Avenue.

• **Old SR 37 & Dunn St. Intersection Improvements** – Construction to improve horizontal and vertical geometry and sight distance at the intersection and on approaches.

• **Tapp Rd & Rockport Rd Intersection Improvements** - Intersection improvements to correct a skew, improve sight distance & geometry and add bicycle and pedestrian facilities at the intersection of Tapp Rd/Country Club Drive and Rockport Road.

• **Black Lumber Trail Spur** - Construction of a multi-use trail for non-motorized use from Henderson Street to B-Line Switchyard property (approximately 0.3 mile length).

• **Ellettsville Heritage Trail (Phase I)** – Construction of a multi-use pathway for non-motorized use, including site amenities along the former rail line from Main Street to Depot Road.

• **Ellettsville Heritage Trail (Phase II)** – Construction of a multi-use trail bridge for non-motorized use over Jack’s Defeat creek

**Scenario #1 - I-69 Section 5**

This scenario assumes the full construction of I-69 Section 5 as committed and the following associated, committed projects benefiting the Bloomington-Monroe County local area including:

• **Fullerton Pike Phase I** - Construction for the installation of a new traffic signal and turn lanes at the Walnut Street Pike intersection from approximately 500 feet west of South Walnut Street to just east of Walnut Street Pike.

• **Karst Farm Trail Phase 2a** – Construction from of a multi-use path on publicly owned land connecting Ellettsville, Bloomington, three educational institutions, several large residential areas, several major, employment centers, the Monroe County Airport, and Karst Farm Park.

• **Mt. Tabor Road** – Roadway reconstruction as an element of I-69 Section 5.

• **17th Street/Arlington Road/Monroe Street roundabout** – Construction to resolve significant grade and sight distance problems.

• **17th Street and Jordan Avenue** – Pathway construction and reconstruction.
• **Old SR 37 and Dunn Street** – Improve horizontal and vertical geometry and sight distance at the intersection and approaches. Construction and reconstruction of a multiuse trail.

• **The Black Lumber Trail** - Construction of a multi-use trail for non-motorized use from Henderson Street to B-Line Switchyard property (approximately 0.3 mile length).

**Scenario #2 - Bus Rapid Transit Route #3**
This scenario converts and slightly modifies Bloomington Transit’s existing Route #3 by converting it into a bus rapid transit route. This route would have 10-minute headways and signal preemption for added time-efficiency. This scenario demonstrates the system impacts associated with a major east-west bus rapid transit route.

**Scenario #3 - State Road 37**
In this scenario, the only modification to the E+C network is to exclude the I-69 Section 5 project and all associated local projects previously noted. This scenario analysis provided further understanding of the transportation system impacts associated with the construction of I-69 Section 5 beyond the proposed construction/operational corridor as well as a means to identify other local needs outside the I-69 Section 5 corridor. Table 5-1 does not show final results.

**Scenario #4 - Peak Oil**
This scenario considered the impacts of rising gasoline and diesel fuels an element affecting mode choice decisions. This scenario did not modify the E+C network, but did illustrate the reduction of trips as fuel prices increased. Leading to economic and behavioral influences with fuel prices at $5.00 per gallon. Fuel efficiencies as well as alternative fuels and new technologies will play a mitigating factor, but this helps factor a reasonable constraint, i.e., cost, into the mode-choice process for the BMCMPO planning area.

**Scenario #5 - Transportation Improvement Program (TIP)**
This scenario modified the E+C network with programmed projects of the adopted BMCMPO FY 2016-2019 TIP scheduled for completion well before 2040. The new transportation projects for this scenario included the following:

• Rogers Road Multi-Use Pathway construction.

• Winslow Road Multi-Use Pathway construction.

• 10th Street and Law Lane new road connection construction.

• 17th Street reconstruction.

• Fullerton Pike Phases 1 & 2 construction and modernization.
• South Henderson Multi-Use Pathway construction, and
• Jackson Creek Trail Extensions construction.

**Scenario #6 - TIP + Public Workshop Allocation**
This scenario uses the TIP network with the addition of priorities identified by two (2) public workshops. The additional new transportation projects included:

• The construction of a B-Line Trail extension westward to the Karst Farm Trail
• The construction of a Fullerton Pike connection from I-69 to Rogers Road (3-lane with sidewalks and pathway that connects to Clear Creek Trail)
• The construction of a completed Jackson Creek Trail, and
• The implementation of a new Bloomington Transit service route along Tapp/Winslow/Rogers/Country Club from Curry Pike and SR 45 to Sare Road and Rogers Road with 30 minute headways

Results demonstrated by this scenario provided system performance information on the community-based transportation projects previously noted.

**Scenario #7 - TIP + MTP 2035 Carryover Projects**
This scenario evaluated older local project priorities that had yet to achieve fruition. Several of these projects did not move forward for a variety of reasons because of changes in local investment and private sector funding priorities. Generally speaking, these improvements included completing South Adams Street, connecting East 14th Street to Law Lane, completing Sudbury Drive, connecting Fullerton Pike from I-69 to Walnut Street, the modernization of Curry Pike from Constitution Avenue to Tapp Road, the realignment of Weimer Road, and the total completion of the Jackson Creek Trail. System performance information derived from this scenario aided in a reassessment of challenging local project needs previously identified in the 2030 Long Range Transportation Plan.

**Scenario #8 - TIP + MTP 2030 Limited Carryover**
This scenario is identical to Scenario #7 except it omits the construction of improvements to Weimer Road, 14th Street, Curry Pike, Sudbury Drive, and sections of the Jackson Creek Trail that are not part of the TIP. This analysis primarily illustrates information for a new 3-lane connection of Fullerton Pike from I-69 to Rogers Road, and projects included within the FY 2014-2017 TIP. Table 5-1 does not show these final results.
**Scenario #9 - TIP + IU Research Park**
This scenario examined the transportation system impact of Bloomington Hospital’s relocation to the Indiana University Research Park neighborhood at East 10th Street and SR 45/46 Bypass. Land at the vacated current Bloomington Hospital site located at 2nd Street and Roger Street would then convert to a traditional single family housing neighborhood. This scenario provided a system understanding of the associated changes that would potentially occur with a Bloomington Hospital relocation to the east side of the city.

**Scenario #10 - TIP + Sample Road Bedroom Community**
This scenario examined the construction of a new I-69 Section 5 interchange at Sample Road and demonstrated transportation system impacts associated with a conceptual new bedroom community having new access to either Bloomington or to Indianapolis. In this scenario, the BMCMPO TDM model allocated a majority of new population growth around this interchange to demonstrate the maximum impacts for an urban sprawl type of land use development.

**Scenario #11 - TIP + 2-Way Streets**
This scenario converts many of the existing local one-way streets back into two-way street corridors for College Avenue, Walnut Street, 3rd Street, and Atwater Avenue. This scenario demonstrated the impacts of one-way streets in Scenario #5 when compared with the results of this scenario (i.e., Rogers Road Pathway, Winslow Road Pathway, 10th Street and Law Lane new road connection, 17th Street reconstruction, Fullerton Pike Phases 1 & 2 modernization, the South Henderson Multi-use Pathway, and the Jackson Creek Trail Extensions).

**Scenario #12 - TIP + Urban Infill**
This scenario allocated to growth to existing housing by minor increases in neighborhood densities through the inclusion of accessory dwelling units, or so-called “granny flats”. This scenario eliminated the potential for allocating new population growth with new bedroom communities. This scenario offered an additional examination of impacts on land use policy similar to a relocation of the Bloomington Hospital and a subsequent adaptive reuse/conversion of that land into a traditional single family housing neighborhood.

**Performance Measures**
The Bloomington-Monroe County Travel Demand Model (TDM) examined a range of performance measures to further shed insight on outcomes of the thirteen scenarios considered to the year 2040. These performance measures used MAP-21 and current FAST Act federal performance guidance with the expectation that performance measures shall remain a requirement for all future transportation projects using federal resources.

The TDM additionally considered local performance measures to further assess the conditions of the built environment and influences on travel. The first tier of performance measures use attributes based on safety, travel demand, travel efficiency, environmental considerations, and economic factors. Respectively they include multiple measureable values such as the crash
frequency and severity, person trips, delay and accessibility, greenhouse gas emissions, and multiple economic factors.

A second tier of local performance measures used various urban design variables (a land use density score called “5D”) that included density, diversity, design, destinations, and distance to transit elements. This scoring process further assessed the relationship between land uses and transportation.

**Conclusion - 2040 MTP Scenarios Summary**

The BMCMPO examined a “Do Nothing” Scenario and twelve additional travel demand model (TDM) scenarios using Base Year 2013 conditions and forecasting to the Year 2040. The TDM additionally used a range of local performance measures (travel demand, efficiency, environmental, safety, economic, and a “5D” land use score) to further examine the overall performance of the thirteen (13) scenarios. The information in Table 5-XX illustrates the summary results of each scenario by their respective performance. The scenarios summary analysis shows that Scenario #4 (Peak Oil), and Scenario #12 (Urban Infill), respectively out-performed other scenarios using the local performance measures.

Coupled with the 5D land use scores, Scenario #12 stands out from all other scenarios. Using an adopted transportation policy orientation of projects programmed in the BMCMPO FY 2016-2019 TIP plus a strong focus on urban infill (TIP + Urban Infill), clearly demonstrated the best multi-modal system performance in the Year 2040. Furthermore, Scenario #12 meets or shall meet all FHWA national performance goals for safety, infrastructure condition, congestion reduction, system reliability, freight movement and economic vitality, environmental sustainability, and potentially reduced project delivery delays.