2035 Long Range Transportation Plan Task Force

December 10, 2012; 12:00 – 1:30 p.m.
City Hall, Hooker Room (245)

I. Welcome

II. Consultant Scope of Work

III. Public Input Process

IV. Next Steps

V. Next Meeting: January 2013

Adjournment

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Exhibit A: Scope of Work

Work tasks 1 through 16 are described below:

Task 1: Land Use Scenario Forecasting

Corradino will work cooperatively with BMCMPO staff to formulate a set of land use scenarios and methodologies that can be used in the development of the Long Range Plan. The land use forecasts will be based on Census 2010, available employment datasets, and available control total forecasts (State of Indiana, REMI, Woods and Poole, etc.) all of which are available from INDOT or at low cost. Methodologies will be developed to allow the allocation to the TAZ geography for several control total/policy options. It is anticipated that the local existing land use, zoning, and comprehensive land use plan status will be available at the parcel level. We list this as the first task, because of it's importance to the planning process, and because the data collection and review are the most extensive of all tasks involved in the Long Range Plan development cycle.

	Growth Styles		
Macro-economic Growth Scenario	Auto Oriented	Blend	Smart Growth
Slow			
Medium (Standard Forecast)			
Fast			

Macroeconomic growth scenario – We anticipate 3 growth scenarios at the county control total leve. These will use control totals from reliable sources such as INDOT's REMI model. The standard scenario would be represented in the "medium" range. The "slow" and "fast" scenarios will be set up as one standard deviation above, and one below, the mid-range economic estimate.

Growth styles are to be represented in the allocation to the TAZ level. We've identified 3 possible growth styles to consider; auto oriented, blend, and smart growth. Where the "blend" style is probably the most representative of business as usual in the region.

Combining macro-economic scenarios with growth allocation scenarios will provide 9 different modeling options.

Task 2: Data Collection

2.1 Online Survey. Corradino will conduct an online survey sampling of household travel behavior in Monroe County, to supplement the travel data already collected in that area and across Indiana in the 2008-2009 National Household Travel Survey NHTS). We propose to augment and enrich the existing data with new households to be collected over a three month period (Oct.-Dec., 2012). Details of the survey instrument, sampling design, etc. will be formulated during Task 2 after reviewing the existing Indiana University survey. The goal will be to obtain a representative sample across various market segments (household size, age of household head, income, auto ownership, work status). Typical model trip generation requirements will be for market segments of; autos greater or equal to workers, autos less than workers, and zero auto households. Within these segments, households will be classified by 12 household size and income categories.

2.2 Transit On-Board Survey. An on-board transit survey will be conducted by Consultant's staff on both BT and IU bus systems. The survey will be designed to collect the following rider information such as; demographics, household income, automobile availability, origins and destinations. Recent transit passenger surveying experience has determined that an intercept interview is the best means of getting complete and reliable data. This method involves a surveyor riding the bus and interviewing passengers.

The number of completed interviews will be determined by the number of daily passengers. Upon completion of the data collection, the survey data will be summarized in a set of tables and the origin and destination data will be geocoded and presented graphically as points or sets of linked points. The currently planned BT on-board survey can be augmented to include these elements.

2.3 Other Relevant Data. All relevant existing travel surveys and other data will be reviewed, and if found to be applicable to this study, they will be used for model calibration or validation purposes. Examples include existing travel surveys from the NHTS, or the Central Indiana Household Travel Survey, existing Indiana University travel survey, or other transit on-board survey datasets.

Task 3: 2010 Model Network Development

3.1 TransCAD Network. Consultant's Team will work with BMCMPO staff to create a TransCAD representation of the 2010 model network based on the existing model files and/or a new street centerline GIS data source. Consultant's Team will run a variety of path, logic, and consistency checks on the 2010 mode. Typical errors will pertain to the direction of one-way streets and ramps, inconsistent laneage or functional class designations, node connectivity, correct grade separation, etc. The process will also suggest possible locations for turn penalties and prohibitors. We also will review the model network to evaluate the location of centroids and centroid connectors (tied to completion of Task 5).

3.2 Link Attributes. Consultant's Team would look to BMCMPO to attach all available counts to the model network. AM, PM and off-peak counts may be required in addition to AADTs on a representative sample of links (it is desirable to have about 30 counts per FHWA functional class). It is anticipated that BMCMPO will include all of the link attributes needed with the exception of alpha and beta coefficients, which will be inserted later by Consultant during the assignment calibration/validation phase.

3.3 Link Capacity and Speed Calculations. Consultant has developed tables and equations for calculating free flow speeds, typical intersection delays at signalized intersections, and link capacities using 2000 Highway Capacity Manual methods. The speed, delay, and capacity estimation process will be implemented by means of a GISDK program that will be inserted into the model's program execution stream, so that updates are provided whenever the network is modified.

Task 4: Transit Network Development

Consultant will code transit network route systems, walk and drive access links and the computation of all standard impedances (walk times, wait times, on-board travel times, etc.). Consultant will propose a transit stop arrangement for the updated BMCMPO model, preferably derived from local transit GIS layers.

Task 5: TAZ Development

BMCMPO will develop the base and forecast TAZ geographic layer with all the socioeconomic variables needed for the updated model. Consultant's Team will provide guidance on such technical issues as constant dollar income inflation, auto ownership forecasts, re-designation of forecast-year area types, etc. It is anticipated that most attributes can be obtained directly from Census 2010 block, or tract data. Specific TAZ attributes will include:

1. Household population
2. Number of households
3. Non-Household population
4. Non-Household housing units
5. Average workers per household
6. Average household size
7. Average auto ownership

8. K-12 school enrollment
9. University enrollment
10. Total employment
11. Employment by sector (to be determined)

Task 6: External Trips

Consultant will use the Indiana Statewide Travel Demand Model (ISTDM) version 6 to develop external to external trip demand. This can be done as a sub-area extraction from the statewide model. We will adopt station-specific growth rates from the INDOT model for model forecasts and apply the standard Fratar process to create forecast E-E trip tables (auto and truck). Intermediate year trip tables can be easily generated by growth factoring from the base year trip tables.

Task 7: Trip Generation

7.1 Trip Productions. At the start of this task, we will work with BMCMPO to decide on possible addition of trip purposes and the trip production generation method to use. We will develop Increased sensitivities to income, household size and makeup (seniors, kids, workers, etc.), auto ownership, and transportation costs. Consultant recommends that BMCMPO consider splitting its work trip purposes by income quartiles, and non-home based trip purpose into non-home based work (NHBW) and non-home-base other (NHBO) due to the different locations of trip ends between work-oriented and non-work oriented trips. We would also encourage the creation of a home-based school trip purpose and a university school trip purpose. Calibration of the trip generation model will use INDOT's statewide "NHTS Add-On" household survey.

7.2 Household Stratification Curves. In a traditional modeling framework, some of the inherent aggregation bias in the trip generation process can be mitigated via use of household stratification curves. Stratification curves are used to take TAZ-level household characteristics expressed in terms of zonal averages and disaggregates them for use in the trip generation process. New stratification curves will be developed using a probabilistic method in place of the traditional linear regression equations that are commonly used.

7.3 Trip Attractions. The geocoded household survey data, the non-home-based end of each person-trip will be statistically expanded using appropriate sample expansion factors. Multiple regression equations will be computed for the expanded person-trip totals. Regressions will be developed by trip purpose as a function of zonal employment totals (by major grouping), as well as zonal totals for school enrollment, households and population.

7.4 Special Generators. Our recommended approach to special generators will be to identify the need for special generators during the model validation process when it becomes apparent that a sub-area is attracting significantly more or less trips than the trip generation model is predicting. Guidance for these trip rates will come from other models and the ITE Trip Generation manual.

7.5 External-Internal and Internal-External Trips. Best results for modeling EI/IE trips occur when these trips are broken into work and non-work trip purposes. We also recommend conversion of the EI/IE demand at the external stations into production and attraction rates by trip purpose and then allowing those trips to operate within the mainstream portions of the model.

7.6 Trip Generation Validation. Validation is required to ensure that errors are not propagated as we progress through the four steps of the modeling process. We will use the validation tests recommended in TMIP's Model Validation and Reasonableness Checking Manual (MVRCM), whereby we will run the following validation tests:

- Comparison of total person-trips produced per household with NCHRP 365 rates

- Comparison of person-trips by trip purpose per household with Tables 3-5 and 3-6 in MVRCM
- Comparison of expanded survey trips (observed) with the modeled (estimated) trips at the regional level
- Comparison of observed and estimated trips at the district level by way of a plot and the coefficient of determination (R^2).

Task 8: Trip Distribution

Consultant will review the trip length frequency tabulations, and average travel times for all trip purposes comparing them with expanded, observed survey data from BMCMPO. In order to replicate the survey sample data, we will make successive adjustments to the distribution models until validation standards are satisfied. The exact methods of model validation will vary to some degree depending on the decision to go with a traditional gravity formulation or a discrete choice model. In either case, comparisons of observed versus modeled trip length distributions will be made and the coincidence ratios computed. Percentage district-level trip interchanges by purpose will be calculated and compared to the observed percentage distributions from the BMCMPO survey. Trip interchanges between area types and by income range will also be made.

Task 9: Mode Choice

9.1 Mode Choice Model. The consultant recommendation for the mode choice model structure is to use the standard nested logit model format which is consistent with FTA New Starts/Small Starts applications. We will recommend all the components of impedance appropriate for each of the modes. Examples include: walk and wait times, in-vehicle time, highway time, and fare for walk access standard service; drive time and **parking cost**; "suitability index" for bike/ped modes; etc. Following approval by BMCMPO, Consultant will implement the approved mode choice procedure. For model calibration mode share targets derived from the household and on-board transit surveys will be used, and then we will make heuristic adjustments to bias constants and coefficients as needed to produce accurate mode-specific trip tables.

9.2 Model Validation. Using "disaggregate validation" methods described in Section 5.2 of MVRCM, we will compare inter-district trips and market shares (e.g., zero-car households) produced by the model with available data. The model will also be "stressed" by adding a 10% increase in a key impedance to ascertain the associated elasticity in the mode share for each mode.

Task 10: Basic Truck Model

The basic truck model for 2010 will be divided into two trip tables: an E-E trip table and a combined EI/IE and Internal trip table. The E-E trip table will be developed by subtracting BMCMPO's zones from INDOT's base year truck trip table. We will then conduct (or request from INDOT) a simple, all-or-nothing traffic assignment of trucks on the INDOT network. Within the BMCMPO portion of the state, this will result in assigned truck trips that are passing through the County. These loaded truck volumes will then be subtracted from the link truck counts in the BMCMPO network. In the next step, the combined EI/IE/Internal trip demand will be created. Internal truck trips will be generated and distributed using the latest Quick Response Freight Manual recommendations.

Task 11: Daily and Peak Assignments

11.1 Determination of Time-of-Day Periods. Both traffic count data and travel survey data will be analyzed to determine the time and duration of the weekday peaks in BMCMPO. Presumably, this information will be used in both the distribution and assignments steps of the modeling process. The daily truck trip tables will be factored based on count data to create the peak and off-peak trip tables.

11.2 Determination of Assignment Algorithm. Consultant will consult with BMCMPO regarding the advantages and disadvantages of alternative assignment algorithms. There have been numerous alternative α and β coefficients in the standard BPR volume-delay function suggested in the literature. Usually, these are organized by facility type. These will be reviewed and a system of alpha's and beta's proposed for use in the new BMCMPO model.

Task 12: Model Validation

12.1 Highway Model. To the extent that counts are available for all modeled periods of the day (i.e., AM, PM, and Off-Peak), the model validation will focus on validating to these sets of counts. If data are only available for 24 hours and one of the peak periods, we will validate those two periods. Since, much work will have already taken place to ensure the validation of the trip generation, distribution, and mode choice models, we expect that adjustments to those components will be minimal and the focus of this task will be on trip assignments.

Consultant will use a post-processor to compare model assignment link loadings with base year traffic counts and then compute several useful error statistics. The validation tool will be set up to produce link error statistics stratified by volume group, functional classification, screenlines, cutlines, and area types. Error metrics will include; link loading error, percent root mean square error, and VMT percentage error. Validation runs and adjustments will continue, as needed, until the accepted accuracy targets are achieved. Model validation reporting feature will be provided to BMCMPO and an option for running it will be included in the model interface.

12.2 Transit Model. A comparable process for calibrating/validating the transit system at the route level will be undertaken. Similar error reporting will also be provided. Validation runs and adjustments will continue as needed until the system-wide and route-specific accuracy targets are achieved.

12.3 Sensitivity Test. Consultant will conduct a dynamic validation test of both vehicle and transit models to compute VMT and VHT elasticities with respect to forecasted household and employment growth.

Task 13: Model Interface Development

13.1 Model Interface. The new BMCMPO model interface will allow for both individual model component runs as well as complete model runs for highway, transit, or both. Specific aids will be provided to facilitate the exchange and logging of input and output files for alternatives analysis. If desired, a Master Network feature can be added.

Task 14: Documentation and Training

14.1 Model Calibration Report. The final calibration report will consolidate all technical memos reorganized into a report format that documents all aspects of the updated model.

14.2 On-Site and Off-Site Participatory Training. We will install the updated model and train BMCMPO staff. The training will include a real-world example of network changes as well as a land use changes. These scenarios will be demonstrated and the performance-reporting tool will be run to measure the effect of these changes on the system.

14.3 Users Manual. Consultant will provide BMCMPO with a detailed users manual complete with step-by-step instructions and example pull-down tabs and dialogue boxes. Process diagrams will be included along with narrative describing how the model works at each step.

Task 15: Performance Measures and Tools

Consultant has developed TransCAD post-processors in GISDK that are designed to produce emission rates and compute link-level emissions for urban travel demand models. A similar air quality tool, consistent with the new MOVES model will be developed for the BMCMPO model.

15.1 Performance Statistics Reporting. A post-processing tool will be designed in GISDK to report system-wide, and link-specific performance statistics for the BMCMPO model that is tailored to local planning needs. Performance statistics will be created in consultation with BMCMPO staff. It is anticipated that many of the statistics will be focused on the transportation system user benefits and will cover alternative modes beyond simple automobile-based measures.

15.2 Economic Analysis. A post-processing tool will be designed in GISDK to extract model data for input into a user benefit analysis system. Under this system, user benefits will be monetized for time savings, operating cost savings, safety cost savings, and air quality impact cost savings. The user benefit calculations will be independent of transport mode, and will be in the correct format for use in later FHWA TIGER grant applications. Additionally, the spreadsheet tool will estimate the impact on the local economy in terms of jobs, GDP, and personal income.

15.3 Sketch Planning Tool for Smart Growth. A 4D (Density, Design, Diversity, and Distance to Transit) methodology will be developed using a synthesis of research related to land development types and their impacts on travel behavior (less VMT and vehicle trip making for smart growth).

Task 16: Technical Assistance

16.1 The consultant team will play an active role in running multiple LRP scenarios. It is anticipated that a total of 12 unique scenarios can be accommodated (combinations of growth and transportation projects) along with a set of performance measures for each.

16.2 Consultant team staff will be available to BMCMPO for technical assistance for the duration of the contract.

2035 LRTP: Visioning/Public Input Process
[12/10/12]

Public Meetings (Visioning)
Initial public meetings will be held to determine the overall vision for the MPO transportation system. Meetings will occur at multiple locations/times in order to provide an accessible process. The discussion will be very broad, encompassing all modes of transportation, and giving participants an opportunity to express their ideas. In addition to these special public meetings, the regular meetings of the Citizens Advisory Committee could also be used as a venue for collecting public input during this stage of the project.

- Locations: Bloomington, Ellettsville
- Times: Afternoon/evening sessions at each location

Key Stakeholder Interviews
Several key stakeholders will be identified and interviewed in group sessions with MPO Staff. This will be done to ensure that key transportation stakeholders have an opportunity to express their needs and desires for the future transportation system. Below is a list of key groups that should be included. Potential invitees under each group heading are listed at the end of this memo.

- Local Business/Employers
- Freight Users
- Accessibility
- Bicycle/Pedestrian
- Emergency Responders
- Transit
- Environmental Justice
- Schools

Legislative Body Presentations
MPO staff will present the LRTP process to the legislative bodies of the MPO Partners. This will require getting on the agenda for the Bloomington Common Council, the Monroe County Commissioners, and the Ellettsville Town Council. This would be an opportunity to familiarize elected officials with the MPO as well as gather any initial input that these officials may have. This is also a good way to get the message about the LRTP process out to the general public.

Public Meetings (Draft Plan Review)
A second round of public meetings will be held to present the draft plan as conceived by MPO Staff. It will include a review of the plan's vision statement as well as proposed projects for all modes of transportation. Input from this round of meetings will be used to finalize the content of the plan and prepare a final draft for review and adoption by the Policy Committee. Meetings would be held in the same locations as during the Visioning stage of the project.

- Locations: Bloomington, Ellettsville
- Times: Afternoon/evening sessions at each location

Proposed Stakeholder Group Participants

Local Business/Employers

- Greater Bloomington Chamber of Commerce
- Ellettsville Chamber of Commerce
- Downtown Bloomington, Inc.
- Ellettsville Main Street, Inc.
- Baxter BioPharma
- Cook Group
- IU
- IU Health Bloomington Hospital

Freight Users

- Stonebelt Trucking
- Bender Transportation LLC
- Bloomington Shuttle
- RW Transport
- William K. Hanna Trucking

Accessibility

- Bloomington Council on Community Accessibility
- Options
- Stone Belt
- Abilities Unlimited

Bicycle/Pedestrian

- Bloomington Bicycle & Pedestrian Safety Commission
- Bloomington Bicycle Club
- Bloomington Bike Project

Emergency Responders

- IU Health Bloomington Hospital
- Bloomington Police Department
- Bloomington Fire Department
- Monroe County Sheriff's Department
- Ellettsville Police Department
- Ellettsville Police Department
- Monroe Hospital
- IU Police Department
- Township Fire Departments
- Indiana State Police

Transit

- Bloomington Transit
- Rural Transit
- IU Bus
- Yellow Taxi

Environmental Justice

- Area 10 Agency on Aging
- Shalom Center
- Bloomington Commission on Hispanic and Latino Affairs
- NAACP – Monroe County
- El Centro Communal Latino
- South Central Community Action Program

Schools

- IU
- Ivy Tech
- MCCSC
- RBBSC