

ID	Old ID	Issue	Description	Significance	Possible Solutions	Status	Recommendation	Over-arching Priority	Con-formity	MIS-C'dor Studies	Opera-tional Analys.	Vision-ing	Policy Anal-ysis
1. ZONING SYSTEM													
1.1	B3	Large Zones Outside the Urban Core	For some applications, the zone system is too geographically coarse, particularly in the outer suburbs.	Suburban areas have large TAZs because BPM's zone system was designed to be equitable regionwide, in terms of the number of census tracts per TAZ. Maintaining a fixed ratio between tracts and zones also helped ensure that the zones have approximately equal populations. However, it can cause zones to become very large in low-density areas. Areas with low density can still contain major transportation corridors. Analysis of those corridors is complicated when the zone system surrounding them is overly coarse.	Increase the number of zones in selected areas. The original reason for minimizing the number of zones -- the high computational cost of a model with a higher number of zones -- is rapidly being overtaken by improvements in software efficiency and computational power. By the end of the 10-year study period, BPM will be able to accommodate a significant increase in the number of zones, while also achieving better performance than it achieves today.	NO ANNOUNCED PLANS.	NYMTC member agencies should identify corridors and areas where it would be useful to subdivide existing zones. This list might include all major suburban arterials/highways that are likely to be the objects of planning studies over the next 5-10 years, as well as each county's targeted growth area, as designated by the NYMTC principals.	3		1		1	
2. HIGHWAY AND TRANSIT NETWORKS													
2.1	B4	Highway Network Level of Detail	The model includes only about 60% of the region's road network.	NYBPM does not use a spatially realistic road network - if it did, the computational cost of its traffic assignment procedures would be astronomical. Instead, it uses a schematic simplification of the road network. Many minor routes are omitted, and the lost capacity is replaced by increasing the capacity of links on the remaining network. This makes it difficult to use BPM to get reliable estimates of travel speed, or to simulate traffic conditions at the degree of precision needed to produce the data used for emissions modeling.	Increasing the percentage of roads included in the network would increase the number of links in the model which would, in turn, increase the model's running time. As discussed in item 1.1 above, anticipated increases in computational power (combined with the adoption of more efficient network assignment algorithms), make it feasible to consider increasing the scope of the network.	NO ANNOUNCED PLANS.	In tandem with item 1.1 above, NYMTC member agencies should identify areas of interest where additional links should be added to the network.	2		1	1		
2.2	A16, B5, B6, O3	Network Quality and Reliability	The data for NYBPM's network were assembled from multiple sources, and much of it was estimated because no primary data were available. As a result, data quality is uneven.	Before a project is started, the links in the area to be analyzed need to be carefully checked and cleaned. Companies are required to keep track of the changes they make. NYMTC tried to standardize and mechanize this process, but still it is time consuming and some participants find it confusing.	NYMTC needs an updated strategy for routine updates of network data from agencies and model users. (1) Develop a better tool for consultants to report network changes to NYMTC; (2) Develop procedures so that agencies can more easily update databases associated with each link in the network; (3) allow counties to take responsibility for updating their networks and adding relevant data; (4) Consider integrating BPM's network with ALIS or NYCmap. One approach may be to write an algorithm that automatically generates a BPM network from the ALIS network.	IN PROGRESS. A number of corrections and updates were made to the Base Highway Network as part of the BPM 2002 Base Year Update, and further corrections will be incorporated in the BPM 2005 Base Year Update.	NYMTC should explore options for an online tool for reporting network updates.	1					
2.3		Highway Network - New Jersey	The New Jersey highway network is from 1996 and thus out of date		Cooperate with NJ Transit and NJTPA to get the latest network data.	NO ANNOUNCED PLANS.	Reach out to New Jersey to determine data availability.						
2.4	B14	Network Hierarchy	The BPM reports results by physical link type rather than functional class	BPM's physical link types are not compatible with the federal and state functional class classification system .	BPM's highway links already include functional class as an attribute. A new tool is needed to aggregate and report results by functional class.	NO ANNOUNCED PLANS.	Several member agencies identified this as something that would be useful to them. NYMTC should proceed with this.	2					
2.5	A15	Bus routes and schedules	Update bus schedules and routes with each BPM update. Suburban schedules and routes need particular attention.	It is difficult to compile schedule information from smaller bus services in the suburbs, particularly privately run express bus operators.	NYMTC should consider strategies for fostering cooperation among bus operators. One possibility is some kind of bus schedule management tool that would enable agencies to more easily update and manage their schedules, and output the results in various forms suitable for publication or sharing with NYMTC. Private bus companies may be interested in obtaining information about competitors' schedules.	IN PROGRESS. NYMTC has been working with its member agencies to coordinate data sharing for bus schedules.	Reach out to suburban bus operators to determine willingness to provide data. Link with NYSDOT Schedule Data Profile (SDP) project which has an XML schema that describes operator generated schedule and related data.	1					

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2.6	B7	Commuter rail and park-and-ride stations	The existing network lacks connectors to commuter rail stations and park-and-ride lots		Add nodes and connectors for all commuter rail stations and park-and-ride lots.	NO ANNOUNCED PLANS.		3		2			
2.7	B11, M19	Transit Network - New Jersey	The New Jersey transit network is not sufficiently detailed.	A substantial number of trans-Hudson trips are assigned to the highway network, when, in reality, they are made by transit. Trans-Hudson travel is becoming increasingly important for transportation planning in New York, so the ability of the model to examine bistate travel is important.	Cooperate with NJ Transit, the Port Authority, and NJTPA to get the latest network data. Express buses are particularly important and should not be overlooked. NJ Transit has surveys of travel on all modes across the Hudson River.	NO ANNOUNCED PLANS.	Reach out to New Jersey and bi-state agencies to determine data availability.	2					
2.8	B8	Transit Network Coding	Creating new rail lines or attaching new bus routes to highway links requires very tedious manual coding. Also, bus networks and routes need to be manually attached to highway links.	Making changes in the transit network is a very time consuming process.	Improve the graphic interface by which transit network coding is done	NO ANNOUNCED PLANS. The 2005 Base Year update will fully link bus routes with the underlying road network, but this will remain a manual process.	Improve the graphic interface by which transit network coding is done	2					

3. HOUSEHOLD SURVEY

3.1	A1	Regional Travel Survey Outdated	The 1997/98 Regional Household Travel Interview Survey is reaching the end of its utility as a basis for modeling in the region.	The survey never captured the full range of behavior changes that resulted from the creation of free bus-subway Metrocard transfers in 1997, the introduction of unlimited ride Metrocards in 1998, or the high levels of E-ZPass market penetration seen today. The survey also does not capture other economic and behavioral changes that have taken place since the late 1990s.	It is a standard practice among large MPOs to conduct a new regional travel survey every 10-12 years.[citation?]	IN PROGRESS. NYMTC has issued an RFP and selection of a contractor is pending.	The survey should incorporate a robust sampling plan that ensures adequate sampling of all key demographic groups.	1					
3.2	A2	Inadequate Data for Populations of Special Interest	A traditional sampling plan for a regional travel survey may not have sufficient data to provide an accurate statistical picture of the travel patterns of special populations in the region -- such as students or senior citizens.	Sparse data for these populations limits the ability of BPM to model their behaviors accurately, as well as the survey's utility as a basis for special planning studies.	Populations of special interest can be oversampled when a new regional travel survey is conducted.	UNDER CONSIDERATION as part of household travel survey RFP.	NYMTC should determine whether there are special populations (e.g. seniors, carpoolers, residents of the outer suburbs, self-employed workers, etc.) for which a richer sample would be especially valuable over the next ten years. If such a population is identified, then a special sampling plan should be developed for them.	2					2
3.3		Panel Survey	A decennial, large-sample travel survey provides an excellent snapshot of regional transportation, but does a poor job at capturing how individuals' travel behavior changes over time. A periodic, small-sample panel survey would provide the tools needed to examine change over time.	The absense of appropriate data makes difficult to adapt BPM or off-model analyses to address new policy questions as they arise. As a result, no mechanism exists for determining on a useful timeframe the impacts of new policy interventions, such as changes in toll stuctures, parking regulations, etc.	Use the 2008 Regional Household Travel Interview Survey to launch the first wave of a panel survey. A panel survey would provide (1) an opportunity to examine behavioral changes in response to policy changes as they occur; (2) ongoing opportunities to add stated-preference questions that would provide data needed to examine critical policy questions as they arise; and (3) the ability to track changes in key travel behavior characteristics, extending the useful life of the large-sample survey.	UNDER CONSIDERATION as part of household travel survey RFP.	In conducting the regional travel survey, NYMTC should ensure that respondants are asked if they would be willing to participate in a panel survey. This will keep the door open to the possibility of a panel survey if NYMTC decides later that this would be useful.	2					1

4. PARKING SUPPLY AND AUTO OWNERSHIP

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4.1	A12	Parking Inventory	The model lacks basic data on parking supply and price.	Parking availability, regulations, and pricing are key determinants of automobile ownership and mode choice. These factors have long been used as traffic management tools in many communities throughout the region, and recently have emerged as key policy levers under consideration by the City of New York. Because of a lack of data on these direct factors influencing auto ownership, NYBPM relies on indirect indicators, including density and relative employment accessibility by alternative modes. In the mode choice model, parking is treated as a fixed cost, but is not a limited resource.	NYMTC could develop a methodology, based on analysis of zoning maps and land use inventories, for estimating parking supply in traffic analysis zones regionwide. These estimates can be validated and supplemented with price data through areawide surveys and detailed inventories in selected locations.	PILOT STUDIES. The UPWP contains funding for an "On-Street Parking Use Assessment" in New York City.	NYMTC and its member agencies should proceed with developing estimates of parking supply and price by zone. If feasible, this should be separated into monthly vs. hourly markets. NYMTC staff should reach out to NYCDOP to find ways to ensure that the data collected as part of its On-Street Parking Use Assessment can help improve the BPM.	2				2	2
4.2		Auto Ownership Model - Parking Link	The auto ownership model is not currently designed to facilitate analysis of changes in parking policy and pricing.	Currently, the model uses density and accessibility as key determinants of auto ownership. The lack of "policy variables" in this model limits its usefulness as a policy analysis tool.	Ultimately, the model could be modified to allow users to vary parking supply and price variables as key policy inputs to the auto ownership model and the mode destination stop choice model. Similarly, the parking supply could be constrained to limit the number of automobile commuters into Lower Manhattan, or individual commuter rail stations and park-and-ride lots.	NO ANNOUNCED PLANS.	NYMTC should proceed with collecting data on the characteristics of parking supply.	2				2	2
4.3	C2	Auto Ownership Model - Alternative Specification	As currently specified, the auto ownership model treats the choice between zero and one car the same as the choice between two or more cars.	In reality, each additional car adds a smaller marginal benefit to a household, while having a constant marginal cost.	PB tried nested logit and other structures but they were not successful. Other possible modeling approaches include ordered generalized extreme value, ordered logit, and multinomial logit with shift variables centered on car sufficiency [1]	NO ANNOUNCED PLANS.	Maintain existing model structure.	4					

5. PRICING REFINEMENTS AND TIME OF DAY MODELING

5.1	E1	Outdated Prices	The model uses 1996 dollars and prices for tolls and does not have a mechanism for keeping up with changes in the real cost of tolls and fares.	Outdated prices limit the ability of the model to produce sound estimates of user responses to pricing changes.	Tolls, fares, and automobile ownership and operating costs can be updated in each recalibration of the model. Price updates could also be included in annual model updates, but the implications of this for model validity need to be considered.	IN PROGRESS. Toll and transit cost update included in 2005 Base Year Update	Unless this would create calibration problems, the model should a mechanisms for including tolls, fares, gasoline prices, and the consumer price index in its annual updates.	1					
5.2	E3, E4, G2	Complex Pricing Structures	The model is not currently able to represent complex or variable pricing structures.	In recent years, the payment of fares and tolls has become far more complex than NYBPM supports. The fixed-price-per-trip paradigm is already challenged by (1) "Unlimited Ride" Metrocards, (2) time-variable tolls, (3) E-ZPass discounts, (4) peak hour surcharges on taxis, (5) toll discounts based on residential locations, and (6) employer-provided transit passes and parking, all of which already have a significant impact on travel behavior. Other pricing tools under consideration, such a cordon-style congestion charge, and variable pricing of on-street parking, reach even further beyond the model's current capabilities. At present, if BPM is used to investigate issues for which pricing structures are relevant, <i>ad hoc</i> solutions must be developed.	PB indicated that individual discounts can be incorporated into the model but it would require an additional choice model for person mobility attributes [1]. Models of which households opt for which fare payment options can be based on stated preference surveys, which can be conducted in conjunction with a new regional household travel survey if these data are not already available. The mode choice model would need to be adapted so that appropriate pricing characteristics are incorporated into the mode choice determination.	PILOT STUDIES. Some modifications were made to BPM to examine the impacts of cordon pricing. It is unclear whether these modifications will be incorporated into the official model.	NYMTC should commission an assessment of the various current and proposed pricing schemes that diverge from pricing structures assumed in the model, and the effort required to adapt the model to accommodate each.	1	1				1

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5.3	E2	Complex Pricing Structures - Managed Lanes	The model is not currently able to represent optional toll-based access to HOV lanes or occupancy-based variations in toll rates.	Some models differentiate between SOV with tolls and SOV without tolls as separate modes. This is important for "managed lane" studies, and could improve handling of tolls more generally.	In addition to the above, the highway network attribute data structures would also have modified to include more detailed vehicle classes and/or payment types, as well as more detailed coding of toll plazas in order to represent advantages of EZ-Pass properly in terms of delay [3].	PILOT STUDIES. There have been project-specific efforts to examine HOT lanes, but the results of these have not been incorporated into the model.	See above.	1	1				1
5.4	G1	Dynamic Time-of-Day Modeling	NYBPM does not currently model households' departure time decisions as a function of price and congestion levels on the network.	Like other activity-based models, BPM possesses the potential to incorporate dynamic scheduling of activities in response to pricing and congestion. But currently, it does not model departure times dynamically. Instead, peak spreading is examined off-model. A possible way to bring this sensitivity into BPM has already been implemented on an ad hoc basis in the Goethals Travel Model developed for the Port Authority.	Implement "continuous time of day" departure time selection.	NO ANNOUNCED PLANS.	Implement "continuous time of day" departure time selection.	1	1				1

6. NON-MOTORIZED MODES

6.1	D1, D2, D3	Non-Motorized Travel	Non-motorized trips are not captured and reported by the model. There are no trip tables reporting on non-motorized travel.	BPM's pre-mode choice model identifies non-motorized journeys and then seeks destinations within 3 miles. In practice, the model is unable to find destinations for these journeys, so none are assigned to the network. The only non-motorized modes included in the trip tables are walk to transit and walk to commuter rail. The substitution of non-motorized trips for vehicular trips is a key goal of transit oriented development and other land use-based strategies for transportation management. Walking and bicycling are locally important modes of travel in dense urban communities and town centers regionwide, especially for non-work travel. Enabling the model to capture the influence of urban environment on propensity to travel by non-motorized modes is important for projects like NYMTC's regional centers initiative to be reflected in conformity analysis.	NYMTC can work to ensure that its regional household travel survey adopts state-of-practice methods for capturing travel by non-motorized modes. Particular attention to non-motorized modes in the survey design is required if the survey is to capture these modes correctly. BPM can be modified so that it generates O/D tables for non-motorized trips. While these output are not needed for conformity analysis, there are other situations in which they would be useful.	UNDER CONSIDERATION as part of household travel survey RFP.	NYMTC should work to ensure that its regional household travel survey adopts state-of-practice methods for capturing travel by non-motorized modes.	2					
6.2	B12, B13	Non-Motorized Network	NYBPM includes very limited data on the quality or extent of the non-motorized transportation networks. The model's sidewalk network is part of the transit network and is used for walking access to transit, rather than non-motorized trips, and it is limited to parts of Manhattan and downtown Brooklyn. The model has no bicycle network.	If non-motorized trips were represented in the model, it would be possible to estimate exposure rates for safety analysis by generating pedestrian trips, assigning these to TIGER street networks, and assigning accessibility variables (sidewalks, network density). This could also be linked to "Legion" pedestrian simulation software. However, a special non-motorized network is not necessary to do this; it merely helps designate certain O/D pairs as more attractive for non-motorized travel than others.	Instead of developing a non-motorized transportation network, the model can use point- or path-specific indicators of pedestrian freindliness (see 6.3 below). For bicycles, a network could be developed by adding attributes indicating the presence of a bicycle lane to appropriate links on the highway network.	PILOT STUDIES. Nassau County's "Downtown Transportation Inventory" in the 2008-09 UPWP assesses "walkability" and non-motorized transportation facilities. NYMTC's Non-Motorized Transportation Data Collection project can also serve as a basis for a regional data collection effort.	The two projects in the UPWP should help set standards for data collection that can then be applied in all other relevant NYMTC projects. NYMTC staff should work with Nassau County to help design its data collection effort so it can serve as a template for other efforts in the region and generate data that can ultimately be used to improve the model.	2					

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6.3	A14, F1	Non-Motorized Travel - Urban Design Influence	More data needed on the urban design characteristics of each zone, including pedestrian and bike friendliness, as well as the impact these have on mode choice.	Urban design plays a significant role in determining primary mode choice, as well as access modes for transit. A highly dense urban environment that is inhospitable to pedestrians will produce relatively few pedestrian trips.	Portland, Sacramento, Chicago have built zonal variables into their models that allow this type of analysis. This can be done through image processing of map data (e.g. avg. block size, mesh density, difficulty of crossing streets as indicators of pedestrian friendliness).	NO ANNOUNCED PLANS.	Through the projects mentioned above, NYMTC should begin developing GIS-based data on the quality of the pedestrian and bicycle environments.	2					

7. MODE AND DESTINATION CHOICE MODELS

7.1	E5, E6	Mode Choice Set Specification	Modes with very different characteristics (e.g., ferry and subway) are combined into the same category within the model. Different applications require different sets of mode choices.	Some modes, such as kiss and ride and commuter buses, are not well represented in the specified mode choice set. Some studies need to focus on the choice between SOV and HOV, while others need to focus on the walk/transit/taxi choice. More flexibility would be desirable. However, using a choice set that includes all possible modes would stretch the O/D matrix too thin.	Rather than using a fixed mode choice set, the model could allow variable mode choice sets either by letting the user specify the mode choice set or by developing pre-calibrated mode choice sets for different types of analysis	PARTIAL SOLUTION IN PROGRESS. The 2005 Base Year Update will add an explicit trip table for taxis.	If feasible, the next re-calibration of the model should include three alternative calibrated mode choice sets: (1) a default set used for conformity purposes; (2) a set providing less differentiation of automobile modes, but more differentiation among regular buses, express buses, subways, and ferries; and (3) a set combining all transit modes but creating an option for paid vehicular access to an express lane.	2		1			
7.2	E7, E10	Additional Mode Characteristics	Some mode characteristics such as access mode and reliability are not taken into account by the model.	Mode choices are shaped by the characteristics of the access mode, such as parking availability for driving and urban design characteristics for walking, as well as mode reliability.	The reliability of the transit modes has been taken into account in the wait time coefficients because the coefficients for bus, subway, and ferry are significantly higher than that for commuter rail. [2]	NO ANNOUNCED PLANS.	NYMTC should develop a guideline for including reliability improvements in BPM's travel time estimates via adjustments to wait times. For discussion of access modes, see 6.3	3		2			
7.3	A9	Vehicle Occupancy	Vehicle counts don't include information on the number of passengers in a vehicle.	Several key transportation facilities are reserved for the vehicles with two or more occupant (HOV-2) or three or more occupants (HOV-3). Similarly, BPM distinguishes vehicles by their occupancy. But except for the Hub Bound study, vehicle count programs don't collect data that can be used to assist these efforts.	Agencies conducting counts can supplement their conventional data with estimates of vehicle occupancy in selected locations.	NO ANNOUNCED PLANS.	Once it is formed, the interagency Traffic Monitoring Group should examine the feasibility and utility of collecting vehicle occupancy data at a few locations.	2					
7.4	E9	Captive Demand	The model does not take captive demand into account.	Some travelers are captive to a particular mode -- they do not have a choice of different travel modes. One firm using BPM suggested it would be more appropriate to use a model form that reflects the reality or perception of reduced mode choices.	Captive demand can be handled by logit models, parameterized logit captivity models, and implicit availability perception models. But these are computationally expensive, and not feasible to implement in a model with this scale and time constraints.	NO ANNOUNCED PLANS.	Maintain existing model structure.	4					
7.5	E13	Mode and Destination Choice - Sensitivity to Urban Design	Mode and destination choice are based on the average characteristics of zones, rather than on the characteristics of specific locations. This masks the influence of urban design on transportation choices.	BPM includes a coarse solution to the urban design problem: it computes the mode choice log-sum as an indicator of accessibility and treats it as an explanatory variable in the destination choice model [2]. But this is done at a zonal level. Capturing more fine-grained urban design characteristics in BPM would better enable the model to reflect the benefits of transit oriented development, and mixed use, neotraditional urban development patterns. However, it requires adding some complexity to the model: households must remain spatially disaggregated until their destinations and mode choices are selected.	To model these effects at a sub-zonal level, households need to be microsimulated at a specific location in real space, and the characteristics of the urban environment around them estimated from detailed GIS layers. Only then can they be aggregated up to zones for network assignment.	NO ANNOUNCED PLANS.	NYMTC should evaluate the feasibility of shifting to a greater emphasis on location-specific explanatory variables for the Housing-Auto-Journey and Mode-Destination Choice models.	2				2	

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7.6	O2	FTA Requires "Fixed" Trip Table for Project Evaluation	BPM uses an integrated mode & destination choice model. 'New Starts' runs must use fixed trip table.	FTA and FHWA each have different regulatory goals in issuing modeling guidance. NYMTC's model initially addressed FHWA's objectives (ability to demonstrate air quality conformity), but was at odds with the FTA's requirement that the model not allow the trip table to shift with demand.	The latest BPM version includes a "New Starts" option in which the full micro-simulation model is run for the "base" scenario and then all tours are fixed with their primary destinations. The "build" scenario is then run with only the mode, stop frequency, stop location, and time of day modules as well as the pre-assignment processor and assignment steps [3].	IN PROGRESS. Included in 2005 Base Year Update.	No further action needed.	-					

8. SUPPLEMENTARY MODELS: COMMERCIAL, EXTERNAL, SPECIAL

8.1	A19, I1, I2	Commerical Trips Better Data Needed	More data is needed to improve the understanding of truck origins and destinations by vehicle classification, time of day, and economic sector.	Currently, commercial vehicle trips are modeled for only two classes of vehicles, trucks and vans, because of limited data	Possible sources of data include NJTPA/PANYNJ data and PlaNYC cordon data, or new data collection efforts.	IN PROGRESS. NYMTC has issued an RFP for an assessment of freight data collection options.	The recommendations of the final report from this project should be implemented.	1					
8.2	I3	Commerical Vehicle Models	A more rigorous modeling approach would be helpful for meaningful analysis in major investment studies and policy scenario analysis.	The current approach uses linear programming to generate an OD matrix and a gravity model for trip distribution. A model which is more theoretically consistent with the passenger model should be developed.	A disaggregate approach to business trip generation (parallel to the microsimulation of households) could help overcome data availability problems.	UNDER CONSIDERATION. NYMTC is considering developing a new regional freight model that would incorporate these concepts.	NYMTC should evaluate carefully whether a fully developed disaggregate freight model is needed within the BPM cluster of models, or whether a simpler microeconomic model might achieve NYMTC's goals more readily.	2	2	2			2
8.3	A4, A5, I4	Establishment-Based Trip Generation Rates	More data are needed on trip generation rates and patterns for different types of establishments.	The current generation of BPM relies on very sparse data for its commercial travel model. Many service and delivery trips are made to workplaces each day, some of which may be captured by BPM's commercial model, and some of which may be captured by the residential model. As a result, proper calibration of these trips is difficult. It is unclear whether certain trips, such as those in corporate cars, are captured at all.	An establishment-based survey, focusing on quantifying all varieties of trips to and from establishments in different economic sectors, would help improve the accuracy of modeling results. But it is an expensive and risky initiative. Before proceeding, NYMTC should narrow down the number of sectors that need to be surveyed by extrapolating from commerical databases and surveys, where these are available. Theaters, major retailers, etc. likely know where their customers live and how they get there. NYSDOT is exploring the applicability of commercial databases to estimating truck O/D patterns and generation rates.	PLANNED. Plans for a Regional Establishment/ Workplace Survey were included in the 2008-09 UPWP, but funding was not approved. The UPWP also includes a NYCDOT "Big Box Trip Generation Analysis" that should provide useful data for the retail sector.	NYMTC should identify cost-effective strategies for estimating trip generation characteristics of establishments. This should be done using a sector-by-sector strategy. NYMTC should explore opportunities for obtaining commercially available databases before undertaking direct surveys of establishments.	1					
8.4	A3, E8	Tourists and Visitors; Airport Access Modes	Trips by non-residents of the region are not captured by the survey or well-represented in the model. Access modes for airports are also not well represented.	This leads to undercounting of certain key travel markets, such as taxi trips and airport access trips. It also limits the ability to look at projects that address access to JFK, Stewart, and other airports.	Conduct hotel and taxi surveys, and use existing surveys on airport access from the Port Authority. Develop a hotel-based Visitor Model and and Airport Access Model. But gaining the trust and cooperation of taxi drivers for a ridership survey will be challenging.	PLANNED. Plans for a Regional Taxi Survey and a Regional Airport Survey were included in the 2008-09 UPWP, but funding was not approved.	NYMTC should work closely with the NYC Taxi and Limousine Commission to identify a viable means for meeting NYMTC's goals. Similarly, NYMTC should partner with the Port Authority on the development of an airport survey, since the Authority already conducts such surveys periodically.	3	2	2			

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8.5	A11	Special Generators and Events	Certain types of major events or significant activity centers may have atypical timings, may draw traffic from atypical origins, and may not be adequately captured in the survey. Examples include airports, hotels, universities, hospitals, sporting venues, concert halls, theaters, convention centers, museums, exhibit halls, and tourist attractions. [3]	The lack of data for these locations and circumstances reduces the ability of the model to simulate conditions and scenarios seen in the real world, and complicates the task of predicting the impacts of future developments or events.	NYMTC could conduct an inventory of special generators, and collect surveys to assess travel patterns associated with various types of special events. In some cases, the generators themselves may have data that could be used for this purpose. For example, major retailers, malls, entertainment venues, and sports teams likely have credit card data or customer surveys that help them understand the geographic distribution of their customers.	NO ANNOUNCED PLANS.	NYMTC member agencies should identify special generators of particular concern for their planning efforts. For any high-priority generators that are identified, they should seek avenues of cooperation by contacting the site operators directly, or through a local business association.	3	2	2	2		
8.6	J1, J2, J3, A18	External Model Improvements	Trips starting or ending outside the region must be generated separately from the core travel demand forecasting model.	The first iterations of the model did not handle external-internal (E-I), internal-external (I-E) and external-external (E-E) trips very well. Estimates of E-E trips were five times too high, which threw off the estimates of the rest of the model. This has been improved, but additional data collection is still needed. A robust external trip model is needed for a model to be useful for examining weekend trips.	More data collection and model re-estimation. Previous iterations of the model classified all external passenger car traffic as HOV-3, and assigned the traffic to HOV lanes where available. This can be replaced with a more realistic mode split assumptions.	IN PROGRESS. Improvements to the External model are included in 2005 Base Year Update.	After the survey is complete, NYMTC should re-evaluate the adequacy of the model.	3	2				

9. NETWORK ASSIGNMENT

9.1	O18	Non-Recurring Delay	BPM's non-recurring delay model includes only incident delay, which is only about 8-10% of total non-recurring delay.	By limiting its focus to incidents, BPM fails to include non-recurring delay from other sources, including route diversions due to construction, special events, or weather. NYBPM is not designed to handle simulations of how traffic is impacted by these various kinds of incidents and unusual events (this would best be handled via integration with a mesoscopic regional traffic simulation model). However, it would be appropriate to include non-recurring delay in travel time estimates.	Non-recurring delay can be included in travel time estimates by distributing the aggregate delays due to route diversions and weather evenly across the network, and concentrating delays due to special events near the facilities that generate them.	NO ANNOUNCED PLANS.	Allocate total non-recurring delay across the network	3	2	2	2		
9.2	K2	Traffic Assignment - Bridge Tolls	Current version of BPM doesn't account for tolls in traffic assignment.	Although the Destination Mode Choice model incorporates the effects of tolls, the highway network assignment has neglected them. This was a flaw in the network assignment algorithm used by TransCAD 4.5.	Will be fixed with the upgrade to TransCAD 4.8.	IN PROGRESS. Included in 2005 Base Year Update.	No further action needed.	-					
9.3	E17, K3, O6	Traffic Assignment - Speeds and Capacity Constraints	The model uses volume delay functions that vary by link type, and which allow volume / capacity ratios greater than one.	Allowing $v/c > 1$ is a consequence of using a simplified network. But it doesn't allow the model to examine the impacts of network changes on travel times and therefore on travel behavior. It also doesn't allow an easy correspondence between traffic volume and travel speed variability.	A more detailed highway network, as discussed in 2.1, would go partway toward resolving this problem. But ultimately the best way to simulate traffic speeds and flows accurately will be to load the volumes on a more detailed and accurate network outside the BPM framework.	NO ANNOUNCED PLANS.	Seek independent review of BPM's volume delay functions, and strategies for aligning the model's speed estimates with the needs of the BPM user community.	2		2			
9.4	K4	Traffic Assignment- Convergence Problems	Highway assignments have not been converging well, even after the default of 35 iterations. In some cases, assignment output has been observed to be highly sensitive to initial skims/trip table.	Research by Caliper indicates that even at a standard convergence criterion of $<.01$, BPM shows significant instability in its output. And yet, many users of BPM are reluctant to rely on a stricter convergence criterion, because of the additional time that would require. Similarly, the recommended practice of running the model through several large-cycle iterations (i.e. running the skims back through the destination/mode choice module) is also usually neglected.	TransCAD 4.8 provides a more powerful assignment procedure that sharply reduces the number of iterations required to achieve convergence. At the same time that the upgrade to TransCAD 4.8 is implemented, NYMTC could issue strict new guidance on what convergence criteria should be used (e.g. $<.001$) and a minimum number of full-model iterations. It could couple these new requirements with new hardware standards that sharply increase available computational power.	NO ANNOUNCED PLANS, beyond the scheduled upgrade to TransCAD 4.8.	NYMTC should issue new operating guidelines for the model that specify strict convergence criteria and require full-model iterations. It should also update its hardware guidance to promote the purchase of computers capable of achieving convergence in a reasonable period of time.	1					

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9.5	K5	Traffic Assignment -Time of Day	Although the model generates trips in half-hour time slices, the traffic assignment procedure considers only four major time periods.	Each assignment takes 4 hours, so it would add significantly to computing time to consider smaller time slices. But for many purposes, especially if dynamic time-of-day modeling is implemented, it would be valuable to be able to examine smaller time periods.	Improvements in software efficiency and computational power will help to make it feasible to do assignments for shorter time periods. In the meantime, the assignment procedures can be designed to be more flexible, so that the user can configure which time periods will be examined.	NO ANNOUNCED PLANS.	The model should be modified to allow user-configurable time periods for traffic assignment.	2	2	2	2		2
9.6	B9, B10, K6, K7	Transit Assignment	Transit assignment procedures need significant improvement.	The transit assignment model produces results that are not deemed reasonable by the relevant operating agencies. Also, bus vehicles not loaded on the road networks in BPM's output files. Similarly, bus passengers not represented as being on links.	One strategy for improving the model's transit assignment procedures may be to supplement the Household Travel Survey data with data from the Metrocard Data Analysis Tool developed by the MTA. As noted in the UPWP, this tool can be used to help generate screenlines and other targets to improve the calibration of BPM's transit model.	SOME COMPONENTS IN PROGRESS. 2005 Base Year Update will include buses on the highway network.	Transit operating agencies should assist NYMTC in identifying data sources and methods to improve BPM's transit assignment procedures.	2		2			2

10. SUBREGIONAL AND CORRIDOR ANALYSIS

10.1	B1, B2, L1, L2, L4, M7	Sub-Area Module Need Improved Tools	There is a significant demand for more detailed, sub-area models. Three key technical options exist, and have been used in various studies across the region: "Sub Regional Model Methods," essentially freeze all activity outside a particular travel zone, thereby significantly speeding up modeling runs. "Sub-Area Extraction" fabricates a local network and zone structure and allocates travel to it. "Calibration to Sub-Area Counts" allows users to recalibrate the model to match local counts	None of these wins particularly high praise from the BPM user community. Users have reported that they are difficult to use, and produce results of uncertain quality. Another problem is that the subarea module doesn't include transit or mode choice. Finally, a substantial effort is required to reconfigure the zoning system for corridor and sub-area analysis. In the case of "Calibration to Sub-Area Counts," the procedures apparently are not working. A user ultimately had to adjust mode-specific constants instead of coefficients in mode choice model... not an ideal approach.	One ambitious alternative could be to develop and maintain four flavors of the model: one for regional conformity analysis; one with a more detailed zone and network structure focusing on Nassau and Suffolk Counties; one focusing on New York City; and a final one focusing on the Mid-Hudson South region. A more flexible or reconfigurable zoning system would be helpful for conducting local level analysis such as corridor analysis and using BPM results as input into microsimulation models. A solution to the problem of an inflexible zoning system could be to develop a G+F65IS-based tool which facilitates the reconfiguration of TAZs, and to revise the BPM software so that the number of zones is not hard-coded.	NO ANNOUNCED PLANS.	Identify options for improved sub-area estimation methods, and develop tools for implementing them. Also, work toward integration of BPM output with a regional traffic simulation model.	3		1		1	
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11. ESTIMATION, CALIBRATION, VALIDATION

ID	Old ID	Issue	Description	Significance	Possible Solutions	Status	Recommendation	Over-arching Priority	Con-formity	MIS-C'dor Studies	Opera-tional Analys.	Vision-ing	Policy Anal-ysis
11.1	A6, A7, A8, M8	Vehicle Count Programs Need Improvement	Several agencies raised concerns about the traffic program in the NYMTC region. They would like to see a more comprehensive and coordinated regional count program. Traffic count data are used by the FHWA to evaluate system performance and overall levels of travel, and by state and local entities for highway planning and programming. They are also used to calibrate BPM by vehicle class and highway class.	The region's network of continuous classification count data is indeed very sparse: among all of the DOT regions statewide, New York City and Long Island have among the fewest continuous count locations capable of discerning vehicle volume, speed, and vehicle class [6]. Mobile count collection procedures are also poorly coordinated, with each county using its own methodology. Currently, the entire system exists on a fragile arrangement of cooperation among state, regional, and local offices. Local resource constraints and lack of a single agency playing a leadership role hamper efforts to improve these data collection efforts, thereby making reliable estimation of traffic flows difficult. However, while improved classification data could help improve calibration of BPM, it is not a critical need for BPM improvement. The purpose of BPM is not to be able to recreate detailed counts at a segment level -- it is to model how travel behavior changes overall in response to changes to the system. If BPM's output were to be calibrated to match classification count data too tightly, it would distort the model and render it insensitive to the very behavioral changes it was designed to capture.	The region can increase the number of continuous count locations to include all major river crossings and highways. One means to advance these efforts It can also establish an interagency Traffic Monitoring Group to maintain an inventory of counts, to promote a comprehensive regional program of mobile count sites, and to standardize equipment and data handling practices. Alternatively, a state or regional agency could underwrite the full costs these enhanced data collection efforts, or offer to take over the task completely from the local level. Ideally, count data should be reported in a form in which it can be linked to capacity data, and gathered so that "typical weekly" values are available.	PILOT STUDIES. The UPWP contains a small amount of funding for an Enhanced Traffic Counting Program in Nassau County. But this project does not appear to include the installation of facilities for continuous collection of volume, speed, and class data.	NYMTC should help convene an interagency Traffic Monitoring Group, and provide technical assistance, funding, or other strategies to encourage the agencies to harmonize their approaches and add NYMTC identifiers to their data. However, it is not clear that NYMTC should necessarily take the lead in this effort. NYSDOT and its regional offices have greater expertise working with these data, and just as great a stake in ensuring their quality. NYSDOT may be better positioned than NYMTC to serve as a coordinating agency for these counts, and by setting technical and data standards statewide. Currently NYSDOT has GIS network identifying unique station numbers to tag locations for data collection, but it is limited to state touring routes. The network must expand to incorporate local streets and assign similar unique station numbers so that other agencies can collect data using this common GIS network for better data sharing.	3		2	2		
11.2	M6, M9	Calibration - Heavy Reliance on Adjustment Factors	Transit has only been calibrated to the major corridors, and the model relies heavily on adjustment factors	Calibration using corridor factors is not accepted practice [4]. Using adjustment factors masks the model's sensitivity to important policy/input variables. Many of BPM's adjustment factors have not been re-evaluated	The constants which have a minor impact should be dropped and possible root causes for disparities between model and target values should be identified. Either there are household socio-economic issues or the transit service differs qualitatively. [3] The number and magnitude of calibration constants was significantly reduced in the 2002 Recalibration.[2]	IN PROGRESS. The 2005 Base Year Update will include a complete recalibration of the transit assignment model.	Renewed efforts are required with each calibration. Methods used should be fully documented so that they can be successfully repeated.	2					
11.3	E11, E14, M14, M17	Transit Assignment - Trip Length	Long trips are significantly underrepresented in the model.	The model's output is significantly skewed toward shorter-distance trips: there is not enough travel between the outer counties and Manhattan, while trips from areas closer in are over-estimated. One theory is that this is the result of a simple calibration problem. A second theory is that the model makes long trips appear to be more unreliable than they really are and therefore appear less desirable than they should be.	The simplest solution may be a more careful and thorough calibration of the transit network assignment. Previously, the transit assignment was only calibrated using Hub-Bound data. An alternate solution may be more elaborate formulations of reliability and other variables, and using Census Journey to Work data in the work tour model estimation [1].	IN PROGRESS. The 2005 Base Year Update will include a more complete calibration of the transit assignment model, using screenlines located in the suburbs as well as the core.	Following the 2005 Base Year Update, NYMTC should assess the extent to which these problems remain.	2					

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11.4	K1	Traffic Assignment - Problematic Distribution	There is a large discrepancy between the estimated flows on bridges and tunnels into Manhattan and target traffic counts.	Many users have reported that BPM does not distribute traffic accurately across the network hierarchy, or across free vs. tolled bridges. Problems with modeled traffic flows on adjacent river crossings are likely the result of a "willingness to pay tolls" problem and inaccurate or missing models for non-household based travel.[4, p. 2] While modeled flows on individual crossings can be very different from their target flow, when they are grouped into screenlines, they match the target values reasonably well. This suggests that the demand model performs well, but the assignment procedure has some problems. [4, p. 10] These problems may also relate to TransCAD 4.5's assignment procedures, which disregarded tolls.	1. Refine the characteristics of different physical link types; 2. Use a more complete road network; 3. Use values of time rather than network capacity as a calibration tool for free vs. tolled bridges; 4. Upgrade to TransCAD 4.8, which has more robust network assignment procedures; 5. Adopt more rigorous iteration and convergence standards, as discussed in 9.4 above.	SOME COMPONENTS IN PROGRESS. The 2005 Base Year Update will include a recalibration of the highway network and implementation of TransCAD 4.8 assignment procedures.	Following the 2005 Base Year Update, NYMTC should assess the extent to which these problems remain.	2					
11.5	M10-M13, M15, M16, M18, M20	Issues to Consider in Model Recalibration	BPM users have raised a wide array of other concerns about the validity of model output.	These are other issues that have been identified with the model output. To the extent practical, they should be addressed in the next recalibration of the model. - BPM fails to replicate observed intra-regional travel flows. Intra-county flows can be off by +/- 30%. - LIRR survey data gives 40,000-45,000 trips/day. BPM has 18,000-19,000 trips in total. - Percent of home based trips during peak periods is fixed for all regions (33%) - Non work trips are understated (a problem shared by many models) - Destinations above 60th Street in Manhattan over-represented relative to below 60th Street - Vehicle type distribution seems inaccurate - Truck volume estimates don't conform to counts.	These issues can be addressed in future calibrations of the model.	NO ANNOUNCED PLANS.		2					
11.6	M21	Low VMT Growth Rates in Suburbs	On many projects, the model forecasts VMT growth rates that are much lower than the population growth rates.	In most suburban areas, VMT growth is not restricted by constraint congestion or limited parking availability. VMT growth rates lower than population growth rates would be historically unusual. On one project in the suburbs, BPM showed a growth rate in traffic (2% over several years) that was much lower than the population growth rate (8-15%) over the same period.		PLANNED. Should be implemented in the next BPM update	The reasons for this discrepancy should be examined carefully.	2	1				

12. EMISSIONS AND PERFORMANCE ANALYSIS

12.1	A10	Vehicle Classifications for Environmental Analysis	BPM's vehicle classification system ignores key vehicle characteristics important for policy purposes and emissions analysis.	BPM uses FHWA's 13 vehicle classes, which are based on vehicle body types and number of axles. They do not include fuel and engine types, which are critical information for emissions modeling.	EPA's forthcoming MOVES model, which will replace the Mobile model as the standard for emissions analysis within this study's 10-year timeframe, employs 13 "source use types" that are different in important ways from FHWA's 13 vehicle classes.[5]	PLANNED. Should be implemented in the next BPM update	BPM should be transitioned to the MOVES "Source Use Type" classification system, while retaining the ability to output data according to the FHWA HPMS vehicle classification framework.	3	1				
12.2	N3	Emissions model - additional pollutants	The emissions post-processor software produces estimates of PM2.5, greenhouse gas emissions, and air toxics emissions which are not very robust.	Analysis of PM2.5, greenhouse gas emissions, and air toxics emissions will all eventually be required as part of the conformity determination.		IN PROGRESS. The existing post-processor software, PPSUITE, is being modified to address these pollutants.	No further action needed.	-					

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12.3	N2	Emissions model - temporal refinement	The emissions post-processor software currently looks only at peak period and 24-hour travel activity, and disregards BPM's more detailed estimates of half-hourly traffic volumes.	The current emissions post-processor software re-estimates volumes for the complete network in each hour (based on BPM's loaded network volumes on links and transit, and estimation techniques for peak spreading). This software tries to reconcile VMT and v/c ratios to estimate speeds. This is sufficient for some purposes, but will lost important information if BPM is adapted to include more dynamic modeling of departure times. With a dynamic time-of-day model able to estimate the peak-spreading effects of value pricing, it would become important to have post-processor software that directly captures the temporal travel patterns predicted by BPM.	With very minor modifications, BPM can produce readable O/D tables for half-hour time slices. These tables can then be loaded on a network either on- or off-model to estimate the speed and flow characteristics needed to estimate emissions.	UNDER CONSIDERATION. NYMTC has issued an RFP for new post-processor software, and this is one possible approach a software development team might take.	Outside the scope of the Post-Processor Software RFP, NYMTC should proceed with a small task order project to modify BPM to produce the half-hourly O/D tables needed to implement this approach.	3	1				
12.4	N1, N4	Emissions model - spatial refinement	The emissions post-processor software does not currently estimate emissions at a fine enough geographic scale for certain types of environmental analysis.	Reasearchers in the fields of public health and environmental engineering would like to use BPM to analyze pollution "hot spots" for ground-level ozone and particulate matter in order to better understand the epidemiology of asthma and other diseases. To do this, they need more spatially accurate models of mobile source emissions.	The emissions post-processor software could be designed to produce link-level emissions estimates by time of day. EPA will likely soon require quantitative appraisal of the impacts of PM hot spots.	UNDER CONSIDERATION. NYMTC has issued an RFP for new post-processor software, and this is one possible approach a software development team might take.	The Post-Processor Software development team should be encouraged to include a capabiltiy to produce data that could drive pollution hot spot analysis.	3	1				
12.5	N5, O8	Environmental Analysis & Performance Measures	BPM could produce a set of environmental, economic, and system efficiency performance measures that can more easily be tracked and understood by policymakers and the public..	A performance measures post-processor could help policymakers assess strategies to prevent traffic congestion. It could esimate metrics like aggregate passenger-hours of delay, aggregate hours of stop & go conditions (a major determinant of air quality impacts on surrounding neighborhoods), and any number of other performance measures. PPSUITE already has the capability to report on some performance measures, but currently this component of the program is not distributed with the model.	New performance measures post-processor software could be designed to churn out policy metrics that would help NYMTC board members and the public understand the impacts of each new TIP.	NO ANNOUNCED PLANS.	NYMTC should consult with member agencies concerning needs and requested features for performance measures post-processor software.	3		2		2	2
12.6	O12	Economic Impacts	BPM could be a tool for examining the economic impacts of changes in transportation infrastructure and services	Currently, BPM places insufficient focus on economic and socio-economic impacts. It would be useful to have more data on market segmentation based on income.	Market segmentation with respect to income could be attached to trips and tracked through the model. Identifiers linking trips to households to the O/D table would enable more detailed link-level analysis of the demographics of travel.	NO ANNOUNCED PLANS.	NYMTC should examine the feasibility of having BPM produce a table listing household identifiers associated with each O/D pair and mode choice.	3		2		2	2

13. LAND USE AND SOCIO-ECONOMIC FORECAST

13.1	H1	Land Use Visioning Tool	NYMTC member agencies expressed interest in some kind of land use impact appraisal tool	Particularly at a county level, it would be helpful to be able to define alternative land use development and growth scenarios and examine their impact on the regional transportation system. This type visioning tool for land use and transportation futures is becoming increasingly common among regional planning efforts across the country.	Many options are available, ranging from off-the-shelf commercial packages, to guidelines on applying the built-in capabilities of TransCAD. NYMTC could recommend a single technical approach and either purchase and maintain it regionwide, or support development at a county level through the UPWP.	UNDER CONSIDERATION.	As a follow-up to the Land Use Modeling Workshop in May, NYMTC should assess and recommend technical options for using land use visioning tools in conjection with the BPM. The interactive mapping web application created by Urbitrn for 2035 SED TAZ forecast review may be of use for this.	3		2		1	
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13.2	H2, H3	Regional Land Use Forecasting Model	A regional land use forecasting model would predict the future spatial allocation of growth based on accessibility factors in the regional transportation network, land zoning and availability, and the characteristics of the region's forecasted economic change.	NYMTC has already developed a land use forecasting model, but it has never been deployed, and it is unclear whether it is the best fit for the region's needs. A number of MPOs around the country are using land use models to work in conjunction with their socioeconomic and demographic forecasting models, refine their ability to examine how the impacts of transportation investments evolve over time. According to Eric Miller, "Land use models do not make decisions and do not replace planning design. They are another "voice at the table" that allows planners to explore the likely consequences of their policies." They are not a substitute for consensus-based regional forecasts.	There are three state-of-practice models being used by leading MPOs around the country: Metroscope, PECAS, UrbanSim. NYMTC could also opt to update and implement its existing land use model.	UNDER CONSIDERATION.	PFAC is due to decide whether to proceed with development of a regional land use forecasting model. In the meantime, NYMTC staff should focus on designing and implementing a land use data strategy, since this will shape the ultimate feasibility of any type of land use model.	1					
13.3	A13	Land Use Survey	More spatially-linked data needed on land uses, non-home-end attractions and "supply side activities"	A comprehensive land use survey would provide much of the necessary data for a land use model, and have countless other applications in the region.	Take better advantage of destination activity data in regional travel survey; or develop more fine grained land use data, which provides a richer classification of activities (e.g. San Francisco Bay Area, Atlanta, Sacramento)	UNDER CONSIDERATION.	NYMTC should proceed with an effort to assemble and develop better regional land use and non-residential activity data before proceeding with an RFP for a land use model. Urbanomics has collected land use data for the NY-NJ-CT region for 2005 and these data could be of use.	1		2		1	
13.4	C1	Spatial distribution of growth (DELETE?)	Existing SED model distributes growth to a zonal level without considering transport capacity	A new Socio-Economic and Demographic model could be designed to work in conjunction with a regional land use forecasting model to distribute growth to a zonal level.		UNDER CONSIDERATION.	Determination of how to improve SED model should be made in parallel with decision about a new regional Land Use Model	2		2		1	

14. MODEL PERFORMANCE, INTERFACE, AND OUTPUTS

14.1	E16, K6, O9	Improve Model Performance	While significant gains have been made, the model still operates very slowly -- about 72 hours for a complete run, assuming no errors along the way.	The model's long run time limits its utility and appeal. Several agencies have cited the long run times as a reason they have not sought to use the model. The long run times also discourage development of model improvements that would require additional computer resources, including development of a more detailed network and zone structures, simulation of traffic at more refined time intervals, more complete iteration of the model to achieve more robust results, etc.	There are many solutions to these problems: (1) Re-engineering. Many components of the model are computationally inefficient, and could be accelerated if re-written. (2) More computing power. Computing speed doubles approximately every two years. If this trend continues over a decade, it will be possible to purchase computers approximately 32x faster than what we have today. (3) Parallel and remote computing. Procedures that are particularly time consuming can be farmed out to multiple computers over the internet, or to a single supercomputer.	IN PROGRESS. NYMTC has a contract with Caliper to optimize key model components, and take advantage of parallel computing capabilities in multi-core computers.	(1) NYMTC should continue to explore opportunities for efficiency improvements within the model. Particular attention should be paid to the model components' data handling and management methodologies, as well as transit skims and transit assignment; (2) Once BPM is updated to take full advantage of multiple-core computers, NYMTC's computer procurement guidance should be updated; (3) NYMTC should explore the feasibility of using remote computing power, such as the CUNY High-Performance Computing Laboratory, to run CPU-intensive components of the model.	1					
14.2	O10, O11, O20	Improve Process Control	A new, better engineered process control system could significantly reduce the amount of time required for a person to conduct a model run.	The current process control system provides minimal feedback to the user, does a poor job of detecting errors early, and has minimal mechanisms for error recovery and diagnosis. This requires frequent monitoring by the user, with the result that employees must either stay late at work to operate the model, or modeling runs must take place during business hours.	NYMTC could develop a new process control system with greater feedback to user on the status of a model run; improved error handling, diagnosis, and prevention procedures; and capabilities for remote monitoring and support (so that users can monitor and control the process from home),	IN PROGRESS. Caliper is developing a new Graphical User Interface (GUI) with all of these capabilities.	No further action needed.	-					

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14.3	O1	Improved Transit Reporting	The model produces text files indicating the number of people boarding or alighting at each rail station. The total number of people per station is reported, but no data is directly available at a line or corridor level.	To get data on ridership by line or corridor, the user needs to go back into the files and compile the data manually, which is tedious	A more thorough system for transit selective link analysis, comparable to what is available on the highway side, would be helpful.	IN PROGRESS. Selective link analysis will be implemented with Transcad 4.8.	No further action needed.	-					
14.4	O4, O13	Clarity and Accessibility of Output Data Files	Many of the data files produced by BPM are undocumented. The capabilities and utility of BPM could be improved simply by mining these data and making them more readily available.	Model creates large numbers of directories with no apparent use, leading to data clutter. The creation of superfluous output files should be cleaned up.	An automatic customized reporting system could be helpful for generating printable report.	NO ANNOUNCED PLANS.	BPM's output files should be fully documented and accessible via a customizable reporting system. If improvements already underway result in these files being stored in a compressed format, viewers and other tools to access the uncompressed data will especially be needed.	2					
14.5	O14	File names	Scenario names are limited to five characters, which makes it more difficult to keep track of them.		Improve naming of input and output files so they are easier to understand.	NO ANNOUNCED PLANS.	BPM should allow more descriptive scenario names	2					
14.6	O5	Integration with Microsimulation Models	Many users of BPM, particularly for MIS or corridor studies, need to use the model in conjunction with more detailed simulations of traffic flows.	To the extent practical, the design of output data files should be optimized for improved ability to interface with microsimulation models (Paramics, VISM, TransModeler) without limiting users' choice of which tool to use.		NO ANNOUNCED PLANS.	Pursue strategies to streamline the interface between BPM and other models.	3		1	1		
14.7	O7	Integration with Mesoscopic Models	Develop a capability to link with mesoscopic models to allow more realistic simulation of the regional transportation network.	An interface between BPM and mesoscopic models would, for example, allow the I-95 Corridor Coalition could look at how real time strategies can improve productivity of their facilities. To the degree that we can introduce high performance corridor management strategies, a lot more capacity and revenue can be generated. By marrying BPM to a mesoscale model, it should also be possible to look at smaller time slices and feed speeds back into BPM.	CUNY's Universal Travel Model Simulation Center is now running the Vista model on a supercomputer. This provides an opportunity for the development of new applications for BPM.	NO ANNOUNCED PLANS.	Pursue strategies to streamline the interface between BPM and other models.	3		1	1		
14.8	O16	Flexible and Modular Structure	BPM should provide flexibility to swap in and out various components of the model.	Many NYMTC member agencies and users of BPM expressed a shared vision of BPM serving as a core of a "family of models." While there appears to be a broad consensus in favor of this vision, it remains vague and undefined. For some, this vision also includes an idea that BPM should move to a more flexible and modular internal structure. This could, for example, include enabling the housing-auto-journey production model to become somewhat more independent from the destination-mode choice components of BPM, so that alternate versions of these models may be swapped in for alternative purposes. One application of this could be that other agencies may choose to utilize not just BPM's raw input data, but also one or more of its actual components in their internal modeling.	All future model improvements should clearly specify all input and output variables and data structures. New control programs should allow open access so that alternative model components can be called as appropriate.	NO ANNOUNCED PLANS.	All future model improvements should clearly specify all input and output variables and data structures. New control programs should allow open access so that alternative model components can be called as appropriate.	2					

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14.9	O17	Near-term forecasts	BPM could be used to produce a rolling, nearer-term forecast of regional congestion levels, based on market conditions.	BPM is primarily used for long-range forecasting of traffic and congestion levels. A different function for NYMTC could be to produce a quarterly report and forecast on traffic congestion hot spots and overall congestion levels. These type of analysis and forecast would be of great value to policymakers, businesses, and the public in the region. Similar analyses of regional congestion hotspots (without the forecasts) are conducted by the San Francisco Metropolitan Transportation Commission and are a popular feature in their newsletter.	Reports on traffic congestion hot spots can be based on an ongoing analysis of ITS data. The methodologies already exist. Forecasts of traffic levels and hot spots can be based on: analysis of historical traffic levels as a function of calendar date, unemployment rates, oil prices, and other factors.	NO ANNOUNCED PLANS.	NYMTC should explore options for producing these types of reports. They could be a popular addition to NYMTC's existing data products.	3		2			2

15. INSTITUTIONAL AND PROCESS ISSUES

15.1	P2	Independent Peer Review Panel	An independent peer review panel could be a useful sounding board before major new investments in data and model development.	Indepdent peer review panels are commonly used in professional transportation planning and engineering practice in Europe. They are also a standard feature of studies conducted by the TRB Cooperative Research Programs. They provide a mechanism for peer exchange about best practices, and for an independed reality check on the feasibility and value of a potential course of action.	Convene a panel of independent advisors from peer agencies and universities outside the region.	UNDER CONSIDERATION. NYMTC's early 2008 workshops on household survey design and land use models were first steps in this direction.	Much as NYMTC did when fist developing BPM, it should convene a panel of independent expert advisors -- from outside the region and bound by confidentiality agreements if necessary -- to review draft RFPs and consultant deliverables, and provide guidance on the details of proposed surveys and model improvements.	2					
15.2	P1, P3	Interagency Outreach and Coordination on Data	There is a need for more cooperation among the region's agencies on a wide range of data issues. Standardized procedures are needed for collection methods, management, metadata standards, storage formats, timetables for updates, reporting and dissemination, etc.	A tremendous amount of data is collected in the region, and then stored in formats that render them difficult to integrate with data from other agencies. Modeling efforts across NYMTC and its member agencies would benefit from improved standards, technologies, and cooperation on data issues. NYMTC member agencies should be contacted about their needs and upcoming actions that may relate to NYMTC's proposed surveys.	NYMTC has already convened a number of interagency working groups on data issues of various kinds. It should use these groups to solicit feedback and partnerships on its major new data collection initiatives. But NYMTC lacks a strong incentive for member agencies to agree to the risky and difficult challenge of changing lonstanding methods for the sake of regional cooperation.	IN PROGRESS. Several such working groups exist, while others are dormant; other strategies are needed to secure the full participation of agencies without becoming burdensome.	NYMTC should think strategically about how to provide something of benefit -- in terms of usable data, etc. -- to encourage agencies to cooperate. Implementing the NYMTC Data Repository and launching the proposed Transportation Information Gateway project could be an important first step toward encouraging agency participation.	1					
15.3		Data Collection and Reporting Standards	The availability and quality of data NYMTC relies on is uneven.	Data coordination is seen as a critical function of NYMTC by its member agencies, and some would like to see it play a stronger role in promoting data cooperation and coordination.	NYMTC could establish data collection and reporting standards for all data types of importance to BPM. This could include traffic counts, land use surveys, parking surveys, ridership surveys, etc.	IN PROGRESS. For a limited number of data types, NYMTC has worked with member agencies to adopt regional standards. For other critical data types, these efforts are not underway.	In consultation with its member agencies, NYMTC should set minimum, uniform standards for these efforts, which would then become a contractual requirement for any project receiving UPWP funding to engage in these activities. Leadership from PFAC is needed to provide NYMTC staff with the mandate they need to play a stronger role in regional data coordination.	1					

[1] Peter Vovsha, Presentation to BPM Users Group Meeting, June 4, 2007

[2] Parsons Brinckerhoff, General Final Report New York Best Practice Model, 2005, p. 5-80

[3] PB, Technical Memorandum: BPM Enhancements, April 24, 2007

[4] T. Keith Lawton, Review of the NYMTC Best Practice Model in the context of application and use, particularly for Air Quality Conformity Analysis, May, 2005.

[5] USEPA, *Motor Vehicle Emission Simulator - Highway Vehicle Implementation (MOVES-HVI) Demonstration Version, Software Design and Reference Manual, Draft* (420-P-07-001, February 2007).

[6] Authors' analysis New York State Department of Transportation, *2006 Traffic Data Report for New York State*, pp. 8-29.

Continuous Monitoring Stations
with Vehicle Classification capability

Region 1

5

Region 2

4

							Over-arching Priority	Con-formity	MIS-C'dor Studies	Opera-tional Analys.	Vision-ing	Policy Anal-ysis
ID	Old ID	Issue	Description	Significance	Possible Solutions	Status	Recommendation					
			Region 3	10								
			Region 4	9								
			Region 5	10								
			Region 6	7								
			Region 7	13								
			Region 8	8								
			Region 9	12								
			Region 10	2								
			Region 11	6								