IV. ALTERNATIVES FOR LAND USE AND TRANSPORTATION

The Plan was developed, in part, utilizing the results of testing alternative land use and transportation improvement scenarios through a land use and transportation model. This chapter presents the alternative scenarios developed through public meetings, workshops and steering committee discussions, the methodology used to develop and apply the testing model and the results of the process. The first round of testing led to a refinement of "preferred alternatives" and to further testing. The chapter concludes with a report on this process.

A. ALTERNATIVE SCENARIOS

Five future land use patterns and five future transportation system configurations for the study area were developed from suggestions and discussions by the Stakeholders Committee, the Steering Committee and at public workshops.

The purpose of defining these "alternative futures" was to permit an analysis that would show how different development patterns and different specific transportation system improvements would affect the study area. Based on the results, the study participants could begin to assess which land use patterns combined with specific transportation projects would come closest to meeting the consensus objectives for the future of the study area. (See **Chapter I** for a listing of the consensus objectives.)

1. Land Use Scenarios

The five alternative land use scenarios are described below and illustrated in **Figure 26**. Each scenario assumes that existing zoning regulations would not be changed so as to permit more residences or more square feet of commercial building space than is currently permitted.

Scenario 1: Full Build-Out. All buildable, vacant parcels are developed according to existing zoning regulations.

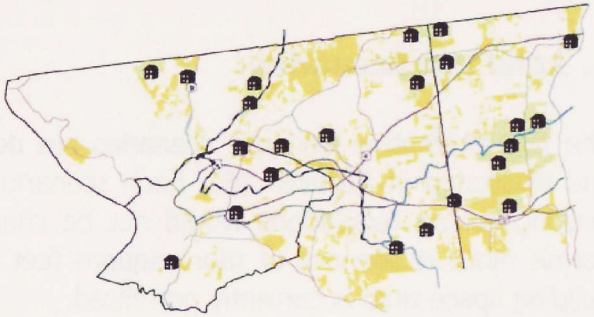
Scenario 2: Enhanced Centers. Potential development on vacant parcels larger than five acres is shifted to three central locations: Crossroads Plaza in Peekskill, Cortlandt Town Center in Cortlandt and the Bear Mountain Parkway Triangle area in Yorktown.

Scenario 3: Reduced Development. Potential development on vacant parcels larger than five acres, located outside of three target areas, is reduced by 50%. Development within the target areas is as permitted by existing zoning regulations. The three target areas are: along Main Street in Peekskill, along the Route 6 corridor in Cortlandt and along the Route 202/35 corridor in Yorktown.

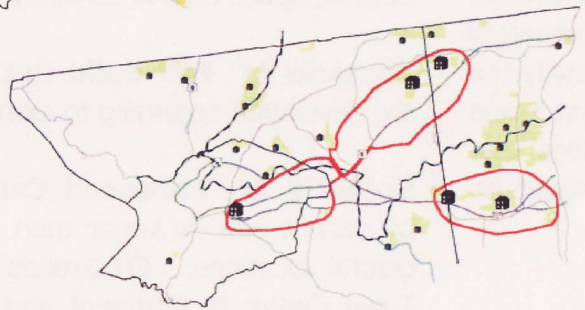
Scenario 4: Reduced Development and Transfer.

Figure 26. Land Use Scenarios

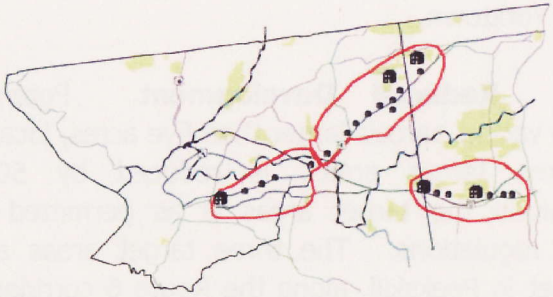
Scenario 1: Full Build-Out
All current vacant lands would be developed according to present zoning.



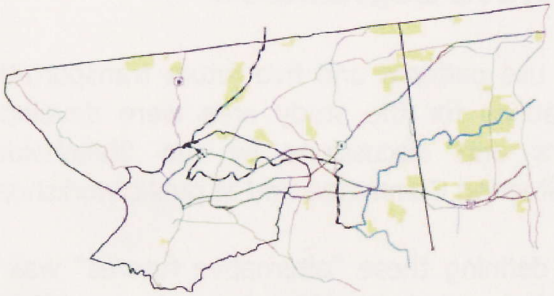
Scenario 2: Enhanced Centers
All potential development on vacant lands would be shifted to three central locations. All vacant lands would be preserved for open space.



Scenario 3: Reduced Development
Potential development on vacant lands outside three target areas would be reduced by 50%. Development will remain the same within the target area.



Scenario 4: Reduced Development and Transfer
Potential development on vacant lands outside the target areas would be reduced by 50%, then shifted to lands within the target areas.



Scenario 5: Limit Development
There would be no future development on the vacant lands.

Potential development on vacant parcels larger than five acres, located outside of the three target areas, is reduced by 50%. This reduced level of development is shifted (transferred) to land within the target areas. The vacant parcels outside the target areas remain undeveloped and preserved as open space.

Scenario 5: Limit Development. No future development on any vacant parcel larger than five acres within the study area.

2. Transportation System Scenarios

The five alternative transportation system improvement scenarios are described below.

Scenario 1: Bear Mountain Parkway Connection. This scenario creates a limited access facility extending from the Taconic State Parkway west to Route 9 in Peekskill. It is accomplished through construction of a limited access connection between the Bear Mountain Parkway Extension end point at Route 202/35 in Yorktown and the Bear Mountain Parkway end point at Route 202/35 in Cortlandt.

Scenario 2: Route 202/35 Widening. This scenario creates a multi-lane Route 202/35 boulevard between the Bear Mountain Parkway Extension end point at Route 202/35 in Yorktown and the Bear Mountain Parkway end point at Route 202/35 in Cortlandt. The new Route 202/35 would have parallel service roads in sections. Some commercial establishments along the south side of Route 202/35 would be limited to rear entrances only from Old Crompond Road.

Scenario 3: Route 6 Widening. This scenario creates a seamless four-lane facility between the Taconic State Parkway and the Peekskill city line. It includes the widening of Route 6 through the Mohegan Lake hamlet to a four-lane facility.

Scenario 4: Route 6 Bypass (One-Way Pair). This scenario converts the existing Route 6 through the Mohegan Lake hamlet into a one-way eastbound road. A new road is created to serve as Route 6 westbound. This one-way pair configuration would extend from the Route 6/Strawberry Road/East Main Street intersection on the east to a point on Route 6 in Cortlandt west of the Lexington Avenue intersection. In essence, the new westbound road would serve as a Mohegan Lake hamlet bypass.

Scenario 5: Lexington Avenue North Extension. This scenario extends Lexington Avenue north from the vicinity of the Strawberry Road/Red Mill Road intersection to Peekskill Hollow Road in the Town of Putnam Valley, allowing for a direct route from Putnam Valley and Northeast Cortlandt to Route 6.

B. LAND USE AND TRANSPORTATION MODEL

The land use and transportation model used in this study was based on the New York Metropolitan Transportation Council's

regional "Interim Analysis Method and Best Practice Model." The model was modified to reflect conditions within the study area in several specific ways:

Transportation Analysis Zones. The Transportation Analysis Zones (TAZs) are geographical areas used to group trip origins and destinations. The trip data by TAZ is used to calculate travel demand over the transportation network. The large TAZs defined in the Best Practice Model were subdivided into smaller areas so as provide more detail and precise results for the study area. The TAZs that were utilized are shown in **Figure 27**.

Origin and Destination Survey. The Origin and Destination Survey completed as part of this study (discussed in **Chapter II**) was used to determine the travel flow among the Traffic Analysis Zones and to calibrate the model.

Programmed Improvements. The current, adopted multi-year regional Transportation Improvement Program (TIP) was reviewed to identify projects that would add significant capacity to the study area's roadway system. The completion of the Taconic State Parkway widening was the only project identified. The model was modified to incorporate this project.

Intersection Improvements. A number of intersection improvements (including the installation of traffic signals, signal timing changes and geometric changes) are identified in this study and recommended for implementation to correct existing operational problems. The modeling assumed that these improvements would be in place when forecasting future conditions.

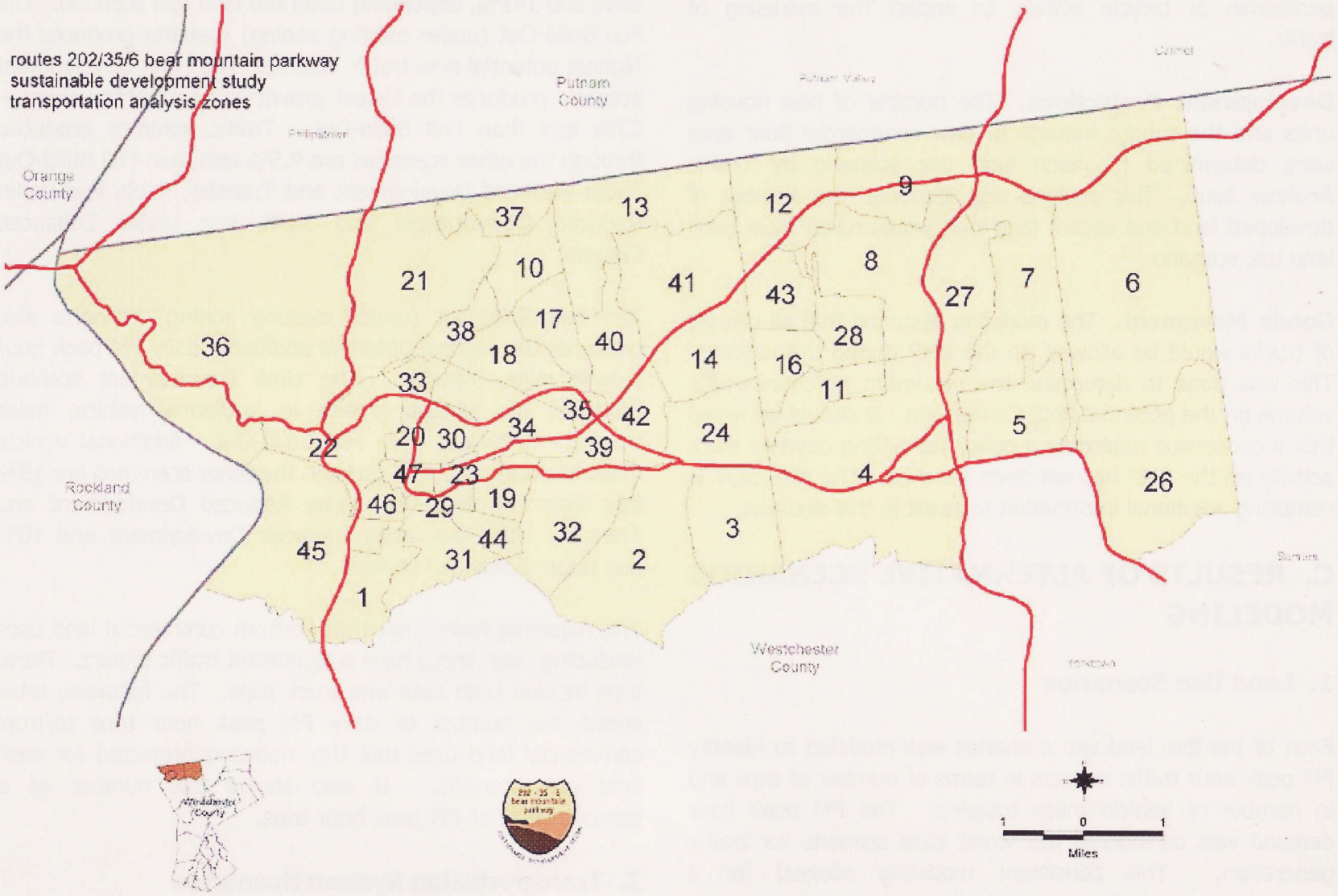
Access Management. This study identified or confirmed the benefits of improved access management along sections of Route 6 and Route 202/35. Access management techniques include limiting curb cuts, revising driveway alignments and providing for shared and interconnected parking lots. The model assumed that many of these access revisions would be in place when forecasting future conditions. This assumption, alone, resulted in slight improvements to the operations at intersections along Routes 6 and 202/35.

Transit Ridership. The impact of transit use was incorporated into the modeling. Current transit ridership was estimated for the study area and then auto trip tables were reduced accordingly.

No Transit Improvements. The potential for land uses in the study area to support additional transit service was assessed. In general, seven residential units per acre within a walking distance of 1,500 feet are needed to make bus transit viable. None of the land use scenarios meet this density threshold. Therefore, for purposes of modeling, no new transit improvements, such as additional service or new routes, were incorporated into the model. This assumption does not mean that some types of new or revised transit service should not be identified as part of the final Plan.

Bicycle/Pedestrian Considerations. It was determined

Figure 27. Transportation Analysis Zones



that none of the land use scenarios created sufficient pedestrian or bicycle activity to impact the modeling of traffic.

Development Projections. The number of new housing units and the square footage of new commercial floor area were determined for each land use scenario by Traffic Analysis Zone. This analysis also identified the acreage of developed land and vacant land that would result from each land use scenario.

Goods Movement. The modeling assumed that all classes of trucks would be allowed on the BMP during the daytime. This was done to determine the maximum potential traffic volume on the potential BMP Connection. It should be noted that a consensus regarding a policy permitting daytime truck activity on the BMP has not been reached. The NYS DOT is compiling additional information to assist in this decision.

C. RESULTS OF ALTERNATIVE SCENARIOS MODELING

1. Land Use Scenarios

Each of the five land use scenarios was modeled to identify PM peak hour traffic impacts in terms of number of trips and in number of vehicle miles traveled. The PM peak hour demand was considered the worst case scenario for traffic generation. This consistent modeling allowed for a comparison among the scenarios.

By 2025, PM peak hour traffic was forecast to grow between 85% and 141%, depending upon the land use scenario. The Full Build-Out (under existing zoning) scenario produces the highest potential new traffic volume. The Limit Development scenario produces the lowest growth in new traffic volume—23% less than Full Build-Out. Traffic volumes produced through the other scenarios are 9.5% less than Full Build-Out under Reduced Development and Transfer, 8.1% less under Reduced Development and 3.8% less under Enhanced Centers.

The Full Build-Out (under existing zoning) scenario also produces the highest potential additional daily PM peak hour vehicle miles traveled. The Limit Development scenario produces the lowest growth in additional vehicle miles traveled—43% less than Full Build-Out. Additional vehicle miles traveled produced through the other scenarios are 18% less than Full Build-Out under Reduced Development and Transfer, 14% less under Reduced Development and 10% less under Enhanced Centers.

The modeling found that trips to/from commercial land uses (including retail trips) have a significant traffic impact. These trips include both auto and truck trips. The following table shows the number of daily PM peak hour trips to/from commercial land uses that the modeling projected for each land use scenario. It also shows this number as a percentage of all PM peak hour trips.

2. Transportation System Scenarios

Each of the five transportation improvement scenarios was tested individually with each land use scenario to determine individual benefits and constraints. The results include the following:

All trips to/from commercial land uses		
Scenario	**Number of PM Peak Trips to/from Commercial Land Uses**	**Percent of Total PM Peak Trips**
Full Build-Out	9,189	45%
Enhanced Centers	9,266	51%
Reduced Development	8,407	49%
Reduced Development and Transfer	8,169	49%
Limit Development	5,504	53%

a. Bear Mountain Parkway Connection. The traffic volumes between the existing Bear Mountain Parkway and the Taconic State Parkway indicate the need for this new facility. In addition, there would be sufficient capacity on the new facility to accommodate traffic that could be diverted from Route 6 to use the new connection to the Taconic State Parkway. If located in the reserved BMP right-of-way, the facility could encroach on wetlands, a trout stream, an aquifer and floodplain and possibly impair the aesthetic character of the north side of Route 202/35. There is potential for the new road to be shifted to the north to lessen environmental impacts. The facility would create additional capacity on Route 202/35 to serve adjacent commercial land uses but would reduce the flow of traffic passing in front of those uses.

b. Route 202/35 Widening. In order to accommodate the forecast traffic volumes, Route 202/35 would need to be widened to 6-lane facility. This would require encroaching on the Bear Mountain Parkway (BMP) right of way. The widened roadway could be rebuilt as a boulevard to improve community character and to incorporate improved bicycle, pedestrian and transit facilities. This type of road would maintain the flow of traffic in front of commercial land located uses along Route 202/35 but would require the construction of new intersections to accommodate the turning movements into the businesses. Construction under this scenario would be likely to have some impacts on a trout stream, wetlands, an aquifer and floodplain.

c. Route 6 Widening. The widening of Route 6 in Mohegan Lake hamlet would impact or eliminate some existing land uses on the north side of Route 6 in the hamlet. The widening would also require substantial widening of the Route 6/Lexington Avenue intersection to accommodate turning lanes; this could have a positive impact on Route 6 eastbound traffic as it approaches Lexington Avenue. The widening would potentially adversely impact pedestrian activity in Mohegan Lake. Wetland and stream impacts at the outlet to Mohegan Lake would be a potential constraint.

d. Route 6 Bypass (One-Way Pair). The new roadway eliminates the need to expand the Route 6/Lexington Avenue intersection and allows preservation of the commercial establishments on the north side of Route 6 in the Mohegan Lake hamlet. As existing Route 6 would not be widened, pedestrian activity would be unchanged and could be enhanced.

e. Lexington Avenue North Extension. Various road connections to Putnam Valley roads are under consideration. Such a new road(s) would provide direct access to and from Putnam County to Route 6. This connection could improve traffic operations on some local roads in Northeast Cortlandt although it could also bring more traffic onto other local roads, particularly those providing connections to Route 6 east of Mohegan Lake hamlet such as Strawberry Road. Better access may also be a growth inducement for parts of Putnam Valley north of the study area. Steep slope, wetland and stream corridor impacts may be a concern along the potential alignment.

D. IMPACT OF TRAVEL DEMAND MANAGEMENT

An analysis of Travel Demand Management (TDM) was conducted to determine the number of trips that would need to be removed from the study area at full build out under existing conditions in order to establish an operating Level Of Service (LOS) D if none of the transportation system scenarios were implemented. (An intersection is considered to be operating acceptably at LOS A through D.)

A common TDM technique to reduce future congestion is to reduce the future amount of potential development. To reach a level of service D under the Full Build-Out Scenario, trips would need to be reduced by an average of 38% across the study area. Necessary reductions would range from 0 to 67%, depending upon the Traffic Analysis Zone. The most substantial reductions would be required in northeast Cortlandt and central Yorktown.

When the Steering Committer considered this data in combination with the findings of the Origin and Destination Survey (which found through traffic to be of far less concern and impact than traffic generated within the study area), the group concluded that reductions in development potential would be desirable to reduce future traffic growth and congestion. However, it was also clear that a recommendation for a total prohibition on future development would be unreasonable and potentially legally unsustainable. The municipalities agreed to address this subject through updates to their local comprehensive plans.

The findings of the study also indicated a major investment in new transportation infrastructure is also needed to improve mobility and quality of life in the study area, even with the recommended move toward reducing development potential.

E. PREFERRED LAND USE PLAN

All of the information developed through the study on land

use scenarios, transportation system scenarios, land use and transportation modeling and impacts of travel demand management was presented to the Stakeholders Committee and to the public at a series of meetings and workshops. The information was used by participants to develop a preferred land use plan for each municipality. As discussed in **Chapter V**, these recommendations were then taken by the municipalities and further developed as part of the update process of municipal comprehensive plans.

City of Peekskill. Enhanced Center with Optional Transfer of Development Rights. A modified Enhanced Centers scenario was selected as the preferred land use. It was determined that a voluntary transfer of development rights rather than a rezoning or mandatory transfer was the most appropriate tool for achieving the Enhanced Center in Peekskill. The Crossroads Plaza in the downtown was identified as the preferred location for redevelopment.

Town of Cortlandt. Reduced Development and Transfer. Potential development on vacant lands outside the target area would be reduced by 50% and then shifted to the proposed hamlet area along Route 6. The vacant parcels outside the hamlet area would be preserved for open space.

Town of Yorktown. Combined Reduced Development and Transfer and Limit Development. The potential development of parcels larger than five acres located south of East Main Street in the target area would be reduced by 75%. The Bear Mountain Parkway Triangle area would be developed in a hamlet style with mixed uses. Development would be discouraged on properties abutting the north side of the BMP right of way between Lexington Avenue and Stoney Street.

F. TRANSPORTATION IMPROVEMENT BUNDLES

The Stakeholders Committee and study participants used the modeling results to propose two different packages of major transportation improvements that could be used to model the preferred land use plan. Each package included a combination of the transportation system improvements that had been previously identified.

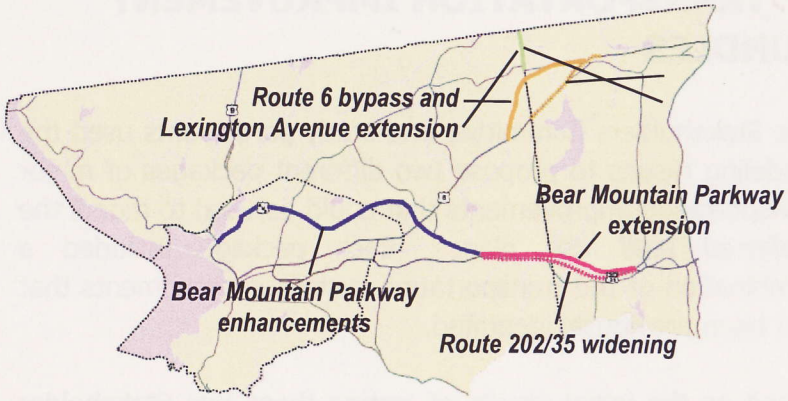
Based on the initial results of testing these two Stakeholder and participant devised packages, the study's consultant recommended that three revised transportation improvement bundles be defined and tested. The purpose of this revision would be to make the best use of the complicated modeling capability to determine if a more efficient combination of improvements could be developed to address traffic congestion.

The five major components of the transportation system improvements that were considered are shown in **Figure 28**. The results of the analysis are presented below.

1. Bundle 1

The major new transportation system component in this testing bundle is a four-lane Bear Mountain Parkway

Figure 28. Major Transportation System Improvements



Connection between the existing end points on Route 202/35 of the Bear Mountain Parkway and the Bear Mountain Parkway Extension.
The bundle would result in six travel lanes in the Route 202/35 corridor with two for Route 202/35 plus four lanes on the BMP. The four lanes on the BMP are needed due to the lack of other major highway improvements in study area.

Construction of this facility would require the acquisition of additional right of way to minimize potential environmental impacts.

The modeling identified the following benefits that could be achieved with implementation of this bundle:

- 27 million annual vehicle miles traveled savings
- 980,000 annual vehicle hours of travel savings
- 80% reduction in peak hour PM travel on Route 202/35
- 35% Reduction in peak hour PM travel on Route 6

2. Bundle 2

This bundle consisted of a more complicated set of major

new transportation system components plus significant revisions of a few existing conditions:

- A two-lane, limited access Bear Mountain Parkway Connection
- Route 6 Bypass (One-Way Pair) at Mohegan Lake hamlet
- Westbrook Drive Extension (from Route 6 intersection south to Bear Mountain Parkway with limited access to properties along new extension)
- A three lane Route 202/35 parallel to the new Bear Mountain Parkway Connection (two travel lanes and one center left-turn lane)

This bundle assumed that there would be a connection between Route 202/35 and the BMP at the current BMP end point on Route 202/35 in Cortlandt. It was determined that this access is required to avoid negative traffic impacts in the City of Peekskill. This bundle also assumed that access to the BMP Extension at Stoney Street in Yorktown would be eliminated.

Overall, the BMP Connection and Route 202/35 widening would comprise five lanes (four travel lanes and one center

left-turn lane) in the Route 202/35 corridor. Consequently, this bundle could require less right of way than would be required to implement Bundle 1. Construction of the Westbrook Drive Extension to the south and of the Route 6 Bypass (One-Way Pair) could present significant environmental impacts that would require thorough analysis. If this option is not feasible, another option would be to enhance the interchange of the Bear Mountain Parkway and Route 6.

The modeling identified the following benefits that could be achieved with implementation of this bundle:

- 31 million annual vehicle miles traveled savings
- 1 million annual vehicle hours of travel savings
- 50% reduction in peak hour PM travel on Route 202/35
- 50% reduction in peak hour PM travel on Route 6
- Dramatic improvement in operations at five Route 202/35 intersections due to new center left-turn lane

3. Bundle 3

This bundle also consisted of a complicated set of major new transportation system components plus significant revisions of a few existing conditions:

- A two-lane, limited access Bear Mountain Parkway Connection (Same as Bundle 2)
- A three lane Route 202/35 parallel to the new Bear Mountain Parkway Connection (two travel lanes and one center left-turn lane) (Same as Bundle 2)
- Enhanced interchange at Route 6 and Bear Mountain Parkway

This bundle made the same assumptions as Bundle 2 that there would be a connection between Route 202/35 and the BMP at the current BMP end point on Route 202/35 in Cortlandt and that access to the BMP Extension at Stoney Street in Yorktown would be eliminated.

This bundle was derived to provide an alternative to the construction of the Westbrook Drive Extension as projected in Bundle 2. There is some expectation that environmental constraints on the land necessary to construct such an extension could be so severe as to make it impossible. The study consultant suggested that an enhanced interchange at Route 6 and the Bear Mountain Parkway could provide a more attractive route for traffic between northeast Cortlandt/ Putnam Valley and the Taconic State Parkway south than a route through Mohegan Lake.

The modeling identified the following benefits that could be achieved with implementation of this bundle:

- 28 million annual vehicle miles traveled savings
- 1 Million annual vehicle hours of travel savings
- 80% reduction in peak hour PM travel on Route 202/35
- 35% reduction in peak hour PM travel on Route 6
- Dramatic improvement in operations at five Route 202/35 intersections due to new center left-turn lane

This bundle achieves these benefits because of the enhanced

connection between Route 6 and the BMP in the center of the study area. This enhanced interchange would provide the capacity needed in close proximity to all the major routes. In this manner, it would serve as a distributor of local trips within the study area. Furthermore, it will improve traffic congestion and safety at and in the vicinity of the existing intersections.

The scenario would result in a major shift of traffic from the Route 6 corridor onto the new BMP Connection. For example, motorists who currently use Oregon Road/Red Mill Road/Strawberry Road/Route 6 to access the Taconic State Parkway would (under this bundle) use Westbrook Drive and Route 6 west to the enhanced interchange at Route 6, enter the BMP and use the BMP Connection to reach the Taconic State Parkway. Westbrook Drive has sufficient capacity, based on its original design and recent improvements, to handle the projected traffic volumes.

The projected reduction in traffic volume on Route 6 through Yorktown is high enough that other major transportation system improvements, such as the Route 6 Bypass (One-Way Pair), may not be required to alleviate traffic congestion. However, access management enhancements would continue to be necessary along Route 6.

It is important to note that the Route 6 Bypass may offer numerous other benefits beyond traffic congestion relief and such benefits may warrant its implementation. As noted previously, a one-way pair of roads through the Mohegan Lake hamlet could improve pedestrian and bicycle opportunities and conditions as well as the functionality of the hamlet business area and provide for alternative routings for local traffic.

4. Special Improvement Bundles

Three special improvement bundles were also defined as part of the analysis. These three are: the intersection improvement package, the transit improvements package and the bicycle and trailways connections package. Selected components of each are shown in **Figure 29**, **Figure 30** and **Figure 31** respectively.

Elements of these three bundles can, and should, be implemented regardless of which major transportation system projects are selected for implementation.

Figure 29: Intersection and Access Improvements

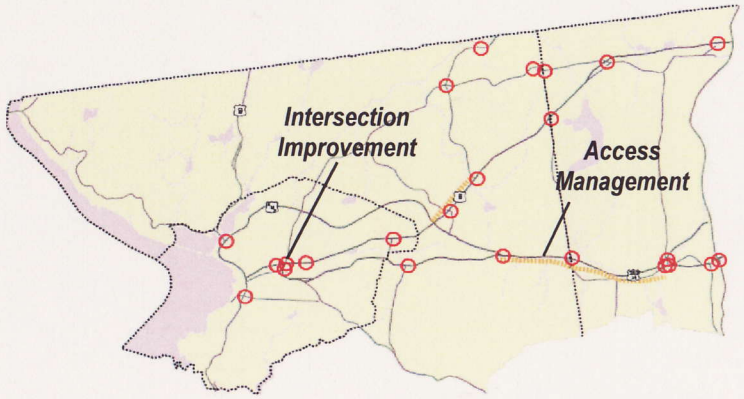


Figure 30: Transit Improvements

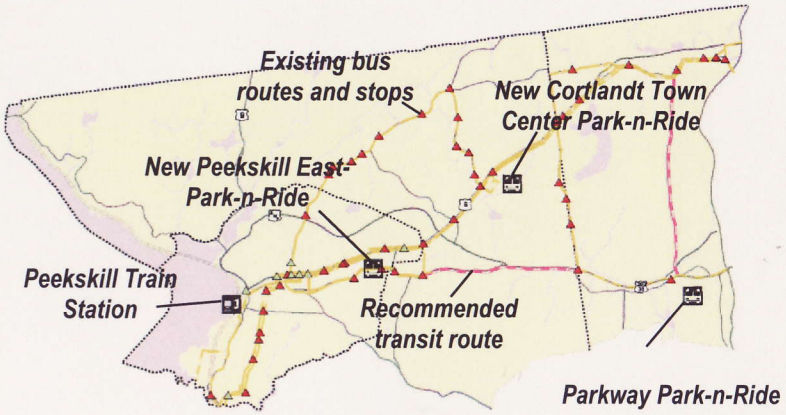


Figure 31: Bicycle and Pedestrian Connections