Clay-Cicero Route 31 Transportation Study

APPENDIX E

Detailed discussion of travel demand modeling inputs

FUTURE BASE CONDITIONS

Introduction

"Future Base" represents the conditions that are expected to exist in the year 2027 if the Town of Clay and Town of Cicero land use plans are fully implemented without any modifications.

Prior to this study, the SMTC travel demand model had included the household and employment estimates for 2027 shown in Table E-1. Note that the "existing base year" for the SMTC travel demand model is 2003.

Table E-1: Household and Employment Growth Summary from Current SMTC Model, 2003 and 2027

Town	Households			Employees		
	2003	2027	Change	2003	2027	Change
Clay	21,864	24,848	2,984	17,559	21,363	3,804
Cicero	10,358	13,000	2,642	7,135	9,071	1,936

The numbers in the table above were developed through meetings between SMTC staff and Town planning staffs prior to November 2006 and are based on historic development trends and future development predictions from the municipal staffs. These numbers were developed prior to the completion of the Town of Clay Northern Land Use Study and the Town of Cicero Comprehensive Plan Update.

SMTC staff compared the 2027 household and employment projections in the current SMTC model to the information contained in the Town of Clay Northern Land Use Study and the Town of Cicero Comprehensive Plan Update and found that the Town plans indicate a more intense level of development. Since one of the goals of the Route 31 Transportation Study is to use the SMTC travel demand model to evaluate the transportation impact of the Towns' land use plans, the 2027 household and employment figures in the model were modified to reflect the information in the Town of Clay Northern Land Use Study and the Town of Cicero Comprehensive Plan. SMTC staff consulted with the Town of Clay Department of Planning and Development and the Town of Cicero Department of Zoning and Planning on the household and employment projections during the development of the Full Build-out conditions.

Town of Clay Development

Residential

The Town of Clay Northern Land Use Study calculated the total number of buildable residential lots available in the study area (north of Route 31 and Route 481) based on recommended zoning. Existing lots less than 5 acres in size, more than 50 percent DEC wetlands or 100-year flood plain, or currently zoned industrial or commercial were considered undevelopable. No time frame was specified for the residential build-out. The SMTC determined, in consultation with the Department of Planning and the Supervisor's Office, that the full build estimate should be used as the 2027 Full Build-out condition for this modeling effort.

The Northern Land Use Study divided the study area into nine sections. SMTC staff matched the sections in the Northern Land Use Study to the transportation analysis zones (TAZs) in the travel demand model and allocated the residential units accordingly for the developable area (avoiding major environmental constraints) north of Route 31/Route 481, in consultation with the Town of Clay Department of Planning. The previous allocation of households to TAZs (in the current SMTC model) in the southern part of the Town was not modified.

Commercial

The Northern Land Use Study did not include estimates of future non-residential development. However, the Route 31 & Route 57 Corridor Study included five-year build-out estimates for retail and office development in that study area (Route 31 from the Seneca River to Henry Clay Boulevard, Route 57 from the Oneida River to Redwing Drive). Based on the existing level of development in that area, it is reasonable to assume that the 5-year development estimate represents full build-out. Additional retail development was included based on proposals that had been submitted to the Town at the time of the Route 31 Transportation Study.

The location of future office and retail development was identified in the Route 31 & Route 57 Corridor Study. SMTC staff generally followed these assumptions when assigning the commercial development to the TAZs (one minor modification was made to account for a zoning change that had occurred since the completion of the Route 31 & Route 57 corridor study).

Industrial

The Clay Industrial Park consists of 1,156 acres of land currently zoned industrial (I-2). This includes 250 acres owned by the Onondaga County Industrial Development Agency (OCIDA). OCIDA is marketing this site for a large-use facility. The remaining 906 acres are still privately-held. Based on input from OCIDA, it was assumed that the entire OCIDA site would be fully developed by the year 2027, but that the remaining acres in the Clay Industrial Park would be developed at more modest levels. The Clay Industrial Park is located in three different TAZs. Parcel data were used to determine the share of total land area located in each TAZ.

Table E-2 summarizes the development assumptions for the Town of Clay.

Table E-2: Future (2027) Development – Town of Clay

Land Use	Additional development, 2003-2027	Notes/source
Residential	6,370 buildable lots	Maximum buildable lots from Northern Land Use Study (north of Route 31/Route 481).
	1,604 additional households	Previously included in the SMTC travel demand model (south of Route 31/Route 481).
Commercial	1,000,000 SF retail	For the Route 31 & Route 57 Corridor Study area (Route 31 from the Seneca River to Henry Clay Boulevard, Route 57 from the Oneida River to Redwing Drive).
	360,000 SF office	
	280,000 SF retail	Existing proposals outside of Route 31 & Route 57 Corridor Study area.
Industrial	250 acres	Currently owned by OCIDA.
	906 acres	Remaining land in the Clay Industrial Park (land zoned I-2).

Town of Cicero Development

Residential

The Town of Cicero Comprehensive Plan Update included 10-year and full build-out projections for residential, commercial, and industrial development. For consistency with the Town of Clay analysis, the full build-out figures were used as the 2027 Full Build-out condition. According to the Comprehensive Plan, the potential future full build development was determined based on the size of parcels and previous development trends within the Town.

SMTC staff met with the Town of Cicero Department of Zoning and Planning to allocate residential development to individual TAZs based on existing development proposals, future land use as identified in the Comprehensive Plan, and existing aerial photographs.

Commercial

The Comprehensive Plan included 4,000,000 square feet of commercial development at full build-out. As part of the traffic analysis included in the Comprehensive Plan, commercial development[1] was allocated to general areas within the Town. This information was provided to the SMTC by the Town's engineer (O'Brien and Gere Engineering). SMTC staff allocated commercial development to specific TAZs based on this information along with parcel data and existing aerial photographs.

Industrial

Full buildout projections from the Town of Cicero Comprehensive Plan include 328 acres of industrial growth in the area of Pardee Road. The Plan assumes that 82 of these acres will be developed by 2016. For modeling purposes, future industrial development along Pardee Road was divided between two TAZs based on the amount of developable land in each TAZ (identified through parcel data and aerial photographs).

The future land use diagram in the Comprehensive Plan also showed industrial use along Northern Boulevard, north of Route 481, which totals approximately 330 acres (based on GIS data). The industrial development along Northern Boulevard was included in the SMTC's previous 2027 model development.

Table E-3 summarizes the development assumptions for the Town of Cicero.

[1] Note that O'Brien and Gere's traffic analysis for the Comprehensive Plan assumes 4,090,296 square feet of commercial development. This development figure, although higher than that cited in the Comprehensive Plan, was used for this analysis.

Table E-3: Future (2027) Development – Town of Cicero

Land Use	Additional development, 2003-2027	Notes/source
Residential	3,160 additional households	Full build-out from Comprehensive Plan Update.
Commercial	4,090,000 SF	Full build-out from Comprehensive Plan Update (per O'Brien & Gere).
Industrial	328 acres	Pardee Road area (from the Comprehensive Plan).
	330 acres (approx.)	Northern Boulevard area.

Employment calculations

The travel demand model requires as an input the number of employees in each TAZ. Therefore, SMTC staff needed to determine the expected number of employees associated with the commercial and industrial development in each TAZ. This was accomplished by estimating the amount (square feet or acres) of new development in individual TAZs, then calculating the associated number of new employees using a series of rates. These rates and their sources are described below.

Commercial
After consulting numerous sources to determine an appropriate ratio of employees to square feet (or acres) of development, SMTC staff decided to use the ratios provided by the TMODEL Corporation for office and retail development, as follows:

Shopping Center (less than 100 KSF)	2.19 employees/KSF
Shopping Center (100-500 KSF)	1.75 employees/KSF
General Office	3.51 employees/KSF

Industrial
OCIDA has estimated that 1,500 employees could be expected for a single-user, high-tech manufacturing facility on its 250-acre site in the Clay Industrial Park. Likewise, the Town of Cicero's Comprehensive Plan estimates that, by 2016, approximately 600 people will be employed on 82 acres of industrial land developed on Pardee Road. These estimates reflect similar employment rates, between 6 and 8 industrial employees per acre.

Because more modest levels of employment are expected on the remaining industrially-zoned land in Clay and Cicero, a more conservative rate was used to develop employment estimates for these areas. This rate was based on employment assumptions from OCIDA for the 906 privately-owned acres in the Clay Industrial Park (750 employees – or half the number employed on the OCIDA site – on 906 acres, or 0.83 employees per acre).

Industrial employment estimates are shown in Table E-4.

Table E-4: Future (2027) Industrial Employment – Clay and Cicero

Town	Total land zoned industrial	Industrial development assumed in existing studies*			Remaining industrial zoned land			Total industrial employees
		Acres	Employees	Rate	Acres	Rate	Employees	
Clay	1,156 acres	250 acres	1,500	6/ acre	906	.83/ acre	750	2,250
Cicero	328 acres**	82 acres	600	7.3/ acre	246		204	804

* Including OCIDA's projections for their Clay Industrial Park site and the Town of Cicero Comprehensive Plan.
** Pardee Road area only. Employment figures for the 330 acres of industrial land on Northern Boulevard are already captured in the model.

There were a number of TAZs in both Towns that showed an increase in employment in the SMTC's current 2027 model but that did not have new development allocated to them based on the Towns' planning documents. Generally, the increases in employment shown in the current 2027 model for these TAZs were minor and could be considered normal "background" growth; these employment increases were maintained for the Route 31 Transportation Study modeling. For TAZs that had new development allocated to them based on the Towns' planning documents, the employment change shown in the SMTC's current model was replaced by the new estimate based on the procedures described above.

Employment calculations are summarized in Table E-5.

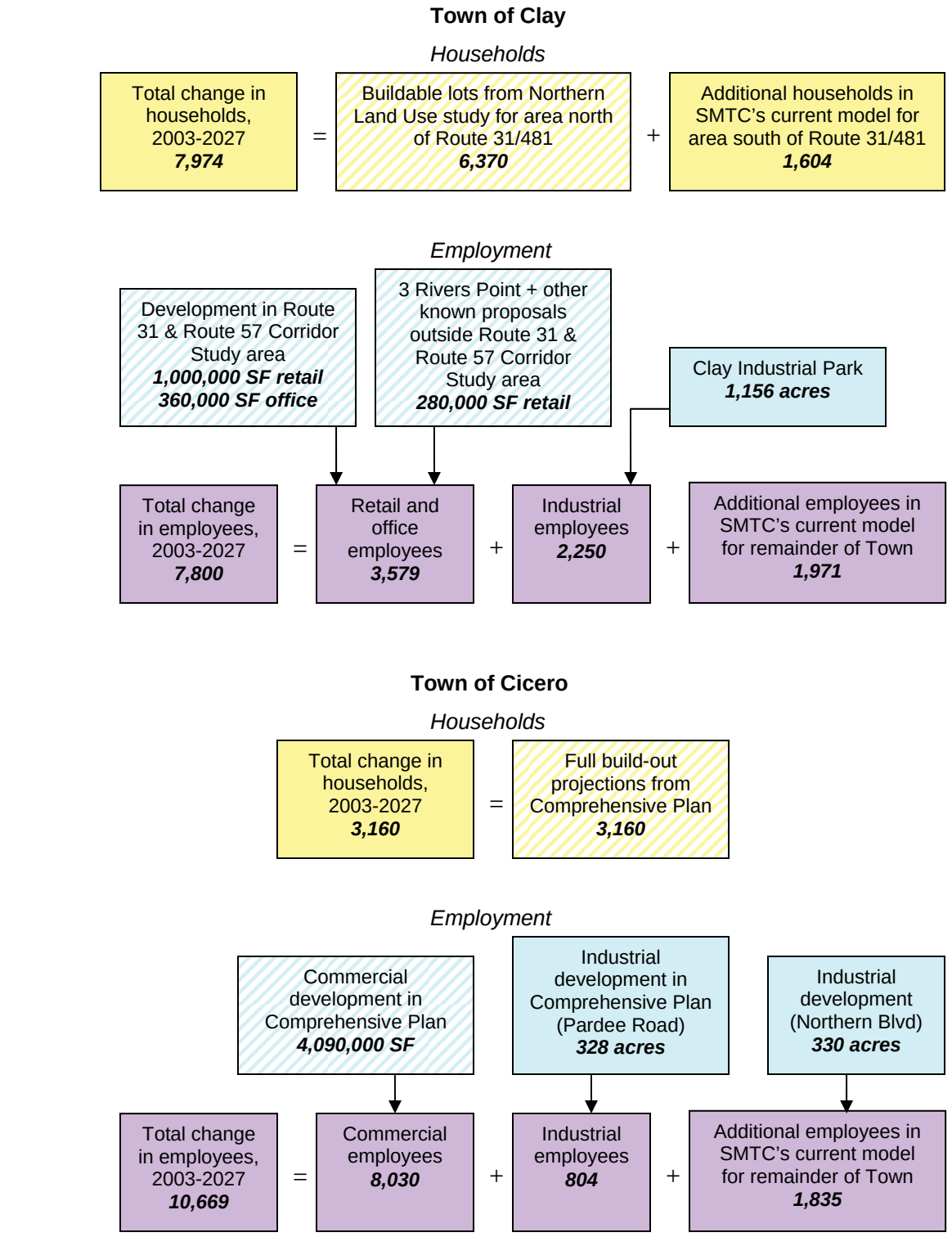
Table E-5: Employment changes, 2003-2027

Town	New employees from development in Town plans		"Background" employment growth	Total additional employees
	Commercial*	Industrial		
Clay	3,579	2,250	1,971	7,800
Cicero	8,030	804	1,835	10,669

* retail and office

Figure E-1 illustrates the household and employment projections for the Future Base scenario.

Figure E-1: Future Base household and employment projections



Future Base Transportation Network

The following transportation network changes were included in the Future Base transportation network. These changes are also shown on the Figure 5-2. This list was developed with input from the Town planning departments, the New York State Department of Transportation and the Onondaga County Department of Transportation.

Town of Clay

- Waterhouse Road extension to Fairway East and signalization of the Fairway North/Morgan Road intersection.
- New connection from Route 57 to Route 31 (northeast quadrant of that intersection) with extension to residential area on the south side of Route 31.
- Carling Road extension to Soule Road and reconfiguration of the Route 481 southbound on-ramp.
- Connection from Caughdenoy Road to Stearns Road south of Route 31.
- Two additional travel lanes (one in each direction) plus a two-way center left-turn lane on Route 31 from Morgan Road to Henry Clay Boulevard. (Note: this project is included in the SMTC's current 2027 model.)

Town of Cicero

- Capacity improvement at the existing I-81 interchange on Route 31.
- Upgrade Thompson Road from Northern Boulevard to Route 31.
- Connection from South Bay Road to Cicero Center Road on the north side of Route 31.
- Addition of a two-way center left-turn lane on Route 31 from Legionnaire Drive to Route 11 and from Lakeshore Road to Cicero-North Syracuse High School. (Note: Although a two-way center left-turn lane currently exists between Lakeshore Road and Cicero-North Syracuse High School, this is not included in the 2003 Existing model and, therefore, this was added to the 2027 Future Base.)
- Addition of a westbound travel lane on Route 31 from Lakeshore Road to Cicero-North Syracuse High School.
- Addition of a second travel lane in each direction on Route 31 from Cicero-North Syracuse High School to just east of Thompson Road.
- Connection from Sneller Road to Mud Mill Road, parallel to I-81.
- New access road from Route 31 to Pine Grove Road, west of I-81.

Two-way center left-turn lanes are not explicitly modeled in the SMTC's travel demand model. In order to account for the effects of the two-way center left-turn lanes noted in the list above, the capacities of those road segments were increased by 25 percent for the Future Base scenario.

ROUND 1 ALTERNATIVES ANALYSIS

Future alternative scenarios were analyzed in two rounds. Round 1 consisted of four transportation alternatives and one land use alternative that were developed by SMTC staff and SAC members. The Round 2 alternatives were developed after the Round 1 alternatives were presented to the public. The Round 1 Alternatives are listed in Table E-6 below.

Table E-6: Round 1 Alternatives

Alternative	Land Use	Transportation Network
1: I-81 interchange (north)	Full Build-out, as shown in town plans	Future Base plus: ▪ Connect Sneller Road east and west of I-81 ▪ New diamond interchange at Sneller Road. ▪ Upgrade Verplank Road and Mud Mill Road to current design standards for a collector road (no widening).
2: I-81 interchange (south)	Full Build-out, as shown in town plans	Future Base plus: ▪ Extend Caughdenoy Road to South Bay (east and west of I-81) ▪ New diamond interchange at Caughdenoy Road
3: Expanded local road network (Clay commercial area)	Full Build-out, as shown in town plans	Future Base plus: ▪ Upgrade Verplank Road and Mud Mill Road to current design standards for a collector road (no widening) ▪ Connection from Verplank Road to Great Northern Mall ▪ Connection from Verplank Road to Route 31 at a location between the railroad and Route 481 ▪ Connection from the COR Center/Route 31 intersection to the Carling Road extension
4: Expanded local road network (Clay Business Park area)	Full Build-out, as shown in town plans	Future Base plus: ▪ Upgrade Verplank Road and Mud Mill Road to current design standards for a collector road (no widening) ▪ Extension of Burnet Road to Mud Mill Road ▪ Extension of Van Hosen Road to Oak Orchard Road ▪ Extension of Verplank Road to Burnet Road ▪ Connection from Burnet Road to Route 11
5: Alternative Land Use Scenario	Same amount of development as Full Build-out, but with different spatial distribution	Future Base (no additional changes)

Alternatives 1, 2, 3, and 4 used the same household and employment data as the Future Base model. The Caughdenoy Road extension (Alternative 2) was entered into the travel demand model as a major collector; all other new road connections and extensions included in the Round 1 alternatives were entered into the travel demand model as local roads.

The land use pattern for Alternative 5 was developed by SMTC staff based on aerial photography, tax parcel data, site visits and communication with the Town planning staff. This alternative was reviewed by the full SAC prior to modeling. The following goals guided the development of Alternative 5:

- Encourage the creation of mixed-use nodes (hamlets) containing retail, office, and multi-family residential units.
- Discourage development of single-family residential districts north of Route 31 unless adjacent to a hamlet area.

- Encourage infill development south of Route 31.
- Cluster regional-scale commercial uses near existing areas with similar use; encourage infill on commercial sites.

Once the general land use pattern for Alternative 5 was determined, SMTC staff assigned households and commercial square footage to specific TAZs. Employment was calculated using the rates previously discussed. Modeling Alternative 5 required splitting some large TAZs into multiple smaller TAZs to capture the effects of denser, mixed-use areas. Generally, each hamlet area spanned multiple TAZs. SMTC staff divided the housing units and commercial square footage among the selected TAZs based on the approximate availability of land and location of nearby development (determined using aerial photography). The new TAZs were given household size and vehicle ownership characteristics similar to existing denser, "village-like" areas of the SMTC model (such as the Village of North Syracuse).

Note that only the *new* households and commercial development were redistributed for Alternative 5 (with "new" defined as the households and commercial development projected in the Town plans, i.e. not including the "background" employment growth from the current SMTC model as previously discussed).

The actual procedure used for inputting household and employment data into the model for Alternative 5 was as follows:

Population

- Reverted Town of Cicero and Town of Clay population numbers to 2003 base. (Except area south of 481 in the Town of Clay, which was not included in the Town of Clay Northern Land Use Study. Growth in this area was allowed to remain the same as what was shown in the current SMTC 2027 model. This also met the goal of discouraging new development north of Route 31.)
- Added new households as shown on Alternative Land Use Plan (assigned to specific TAZs by SMTC staff).

Employment

- Calculated number of employees in each mixed-use and commercial area using the commercial square footage shown on the Alternative Land Use Plan and the rates (emp/SF or emp/acre) described above.
- For TAZ's where we previously added jobs (for full build), reverted to 2003 numbers.
- Added employees for commercial development shown on Alternative Future Development Pattern graphic.
- "Background" employment growth remained the same.

ROUND 2 ALTERNATIVES ANALYSIS

The Round 2 alternatives were developed based on the Round 1 analysis results and the input received from the SAC and the public. Table E-7 lists all the Round 2 alternatives.

Table E-7: Round 2 Alternatives

Alternative	Land Use	Transportation Network
6: Limited development + Alternative land use pattern	Follows same general pattern as Alternative 5 (Alternative Land Use), but with a reduction in the total amount of development	Future Base (no change)
7: South Bay upgrade with I-81 overpass	Same as Alternative 5. (Same amount of development as Full Build-out, but with different spatial distribution.)	Future Base plus: ▪ Upgrade South Bay Road (center turn lane and intersection turn lanes at Pine Grove and Route 31) ▪ Create a new I-81 overpass (no access to the interstate) at Pine Grove Road
8: Increased transit usage	Same as Alternative 5. (Same amount of development as Full Build-out, but with different spatial distribution.)	Future Base road network with new or modified transit routes: ▪ East-west service on Route 31 ▪ Express service from hamlet areas to downtown Syracuse
9: New interchange with new local roads in Business Park area	Full Build-out, as shown in Towns' plans	Future Base plus everything in Alternatives 1 and 4: ▪ Connect Sneller Road east and west of I-81 ▪ New diamond interchange at Sneller Road. ▪ Upgrade Verplank Road and Mud Mill Road to current design standards for a collector road (no widening). ▪ Extension of Burnet Road to Mud Mill Road ▪ Extension of Van Hosen Road to Oak Orchard Road ▪ Extension of Verplank Road to Burnet Road ▪ Connection from Burnet Road to Route 11
10: Expanded local road network (Clay commercial + Business Park)	Same as Alternative 5. (Same amount of development as Full Build-out, but with different spatial distribution.)	Future Base plus everything in Alternatives 3 and 4: ▪ Upgrade Verplank Road and Mud Mill Road to current design standards for a collector road (no widening) ▪ Connection from Verplank Road to Great Northern Mall ▪ Connection from Verplank Road to Route 31 at a location between the railroad and Route 481 ▪ Connection from the COR Center/Route 31 intersection to the Carling Road extension ▪ Extension of Burnet Road to Mud Mill Road ▪ Extension of Van Hosen Road to Oak Orchard Road ▪ Extension of Verplank Road to Burnet Road ▪ Connection from Burnet Road to Route 11

Alternative 6 required modifying the household and employment data from Alternative 5. There were three "guiding principles" used to develop this alternative:

1. the amount of development should be reduced, but the spatial pattern of development should be consistent with Alternative 5 (maintain hamlet areas);
2. the total amount of development should be closer to the figures that were developed for the current SMTC 2027 model (which were based on input from Town planning staff for "reasonable" 20-year development); and
3. the remaining capacity of the road network should be used to guide the location of future development.

To address the last point, SMTC staff identified 6 road segments that showed significant congestion (V/C ratio greater than 0.62) in the 2027 model for the Alternative Land Use Plan (Alternative 5). These segments were:

- Thompson Road from Route 31 to South Bay Road;
- Route 31 from I-81 to Lakeshore Road;
- Verplank Road from Caughdenoy Road to Mud Mill Road;
- Morgan Road from Route 481 to Wetzel Road;
- Route 31 from Henry Clay Boulevard to Caughdenoy Road; and
- Route 298 from Taft Road to Route 31.

For each segment, SMTC staff calculated the number of trips that would need to be removed to achieve a volume-to-capacity ratio less than 0.62. A select link analysis (SLA) was then completed for each of these segments. The results of the SLA analysis were used to identify the TAZ (or TAZs) that were contributing the most traffic to that particular segment. A SLA was then performed for the centroid connector for each TAZ and the result was used to calculate the percent distribution of traffic from the selected TAZ. SMTC staff then used the TAZ trip distribution and standard trip generation rates to calculate the amount of development (households or square footage) that would need to be removed from the selected TAZ to result in the desired traffic volume reduction (to achieve V/C < 0.62).

The development reductions determined from the SLA were then used as a guide for Alternative 6. In some cases, existing traffic volumes were so great that the calculated reduction in development exceeded the projected new development for that TAZ. In other cases, the SLA for the road segments showed that a significant amount of traffic on that segment had an origin or destination outside of the current study area. In still other cases, the SLA showed that many TAZs contributed to the traffic volume on a selected road segment, so that the percentage of traffic from any single TAZ was small (and therefore, the reduction in development necessary to achieve the desired decrease in traffic was unreasonable large).

SMTC staff examined the land use pattern from Alternative 5 and made some assumptions about development reductions for Alternative 6, using the results from the SLA as a guide, with a focus on reducing large-scale retail developments and large-lot residential developments while maintaining density and mixed-use development in the proposed “hamlet” areas. SMTC staff also tried to achieve a total level of development for Alternative 6 that was more comparable to the current 2027 model than to the Future Base (Full-Build out) condition. As compared to the 2003 Existing model, the current 2027 model shows 19% growth in households, 23% growth in employment, and a 19% increase in 24-hour VMT for Clay and Cicero, cumulatively. The final figures for Alternative 6 resulted in 15% growth in households, 55% growth in employment, and 25% growth in 24-hour VMT as compared to the 2003 conditions.

Alternative 7 included the same household and employment data as Alternative 5. The capacity of South Bay Road in the travel demand model was increased by 25 percent to account for the addition of a center turn lane between Route 31 and I-81 and intersection turn lanes were added at Pine Grove Road and Route 31. The Pine Grove Road overpass was entered into the travel demand model as a collector and the existing segment of Pine Grove Road was upgraded from a local road to a collector in the model.

Alternative 8 included the same household and employment data as Alternative 5. This alternative included a new “cross-town” bus service on Route 31 between Moyers Corners and the Whiting Road/Cicero Center hamlet area. Two new express bus routes were also added in the Town of Clay: Three Rivers – Moyers Corners – downtown (via Route 481 and I-81) and Verplank Road – Euclid – Great Northern Mall – downtown (via

Route 481 and I-81). One existing route in the Town of Clay (Route 148: Great Northern Mall – Euclid – downtown via Morgan Road) was added to both the Future Base and Alternative 8 (this route currently exists, but was not included in the base model when SMTC's travel demand model was initially created). In Cicero, Route 388 (Central Square to downtown) was modified to travel on I-81 between downtown and Route 31 and on Route 11 from Route 31 to Brewerton with an additional stop in the Brewerton hamlet area (this route currently travels on Route 11 from Circle Drive to Brewerton). Also in Cicero, Route 88 was modified to travel from the Cicero Center hamlet to downtown via South Bay Road to I-81 (this route currently travels on Route 11 north of Mattydale). All new and modified bus routes were modeled with a headway of 20 minutes and a fare of $1.00, consistent with the Future Base scenario. No additional changes to the transportation network were included (i.e. the road network was the same as the Future Base).

Alternative 9 included the same household and employment data as the Future Base. All new road connections and extensions were included in the travel demand model as local roads.

Alternative 10 included the same household and employment data as Alternative 5. The Carling Road extension was modeled as a major collector (consistent with the current classification of Soule Road); all other new road connections and extensions were included as local roads in the travel demand model.