



# RENAISSANCE PLANNING GROUP

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TO: WILLIAM VAUGHN

FROM: JASON ESPIE, AICP

ORGANIZATION: ROCKINGHAM COUNTY

DATE: FEBRUARY 16, 2010

PHONE NUMBER:

SENDER'S REFERENCE NUMBER:

RE: NORTH VALLEY PIKE CORRIDOR STRATEGIC PLAN

YOUR REFERENCE NUMBER:

## MEMORANDUM

URGENT

FOR REVIEW

PLEASE COMMENT

PLEASE REPLY

PLEASE RECYCLE

### Preliminary Future Alternatives

As part of the future conditions analysis for the North Valley Pike Corridor Strategic Study, Renaissance utilized Cube Voyager / TP+ software and the regional travel demand model to examine several different preliminary roadway network alternatives. Through this process, we identified several variables that could significantly alter the outcome of each scenario. This memo describes each preliminary alternative, the resulting traffic volume projections from the travel demand model, and the associated variables.

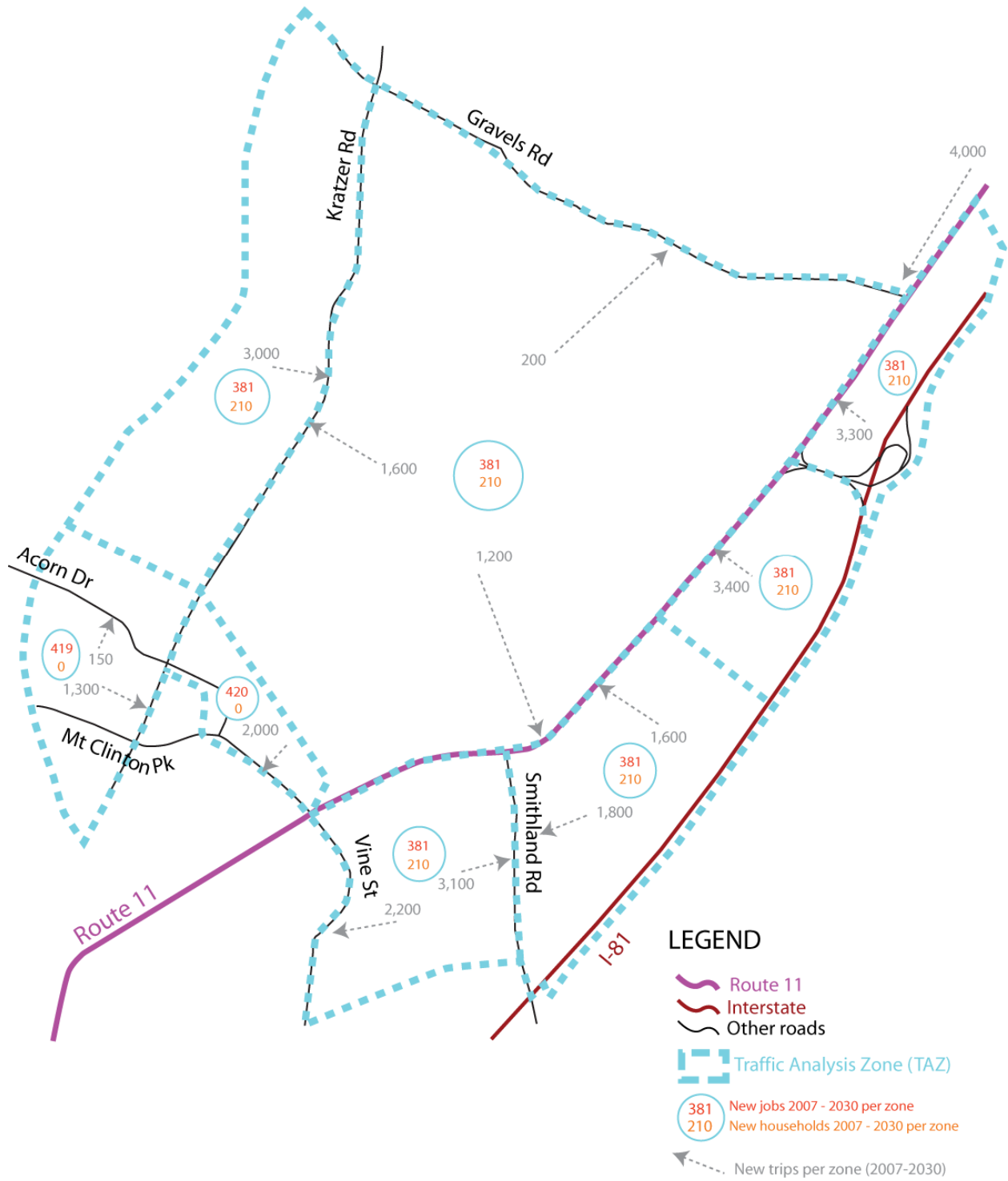
### Model Assumptions

The Harrisonburg-Rockingham MPO's travel demand model has several traffic analysis zones (TAZs) within the North Valley Pike study area, as shown in Figure 1. Most of these zones are within the area of Rockingham County that is projected to experience moderate growth in jobs and households within the next 20 years. The broad scope of the travel demand model assigns a designated number of new jobs and households within each TAZ; these new jobs and households correspond to an amount of daily trips that are distributed to the existing roadway network. For most of the TAZs within the study area, the designated growth is approximately 210 households and 381 jobs.

The transportation network for the model contains several assumptions for each road, including posted speeds, number of lanes, and functional class. In these preliminary analyses, the transportation assumptions were held constant. Route 11 was modeled as a 45 mph two-lane major collector, and I-81 was modeled as a 65 mph four-lane highway. As we move forward with refining the possible future alternatives, these assumptions may be changed and could impact the model results, thus directly affecting the transportation recommendations.



Figure 1. Traffic Analysis Zones with New Growth

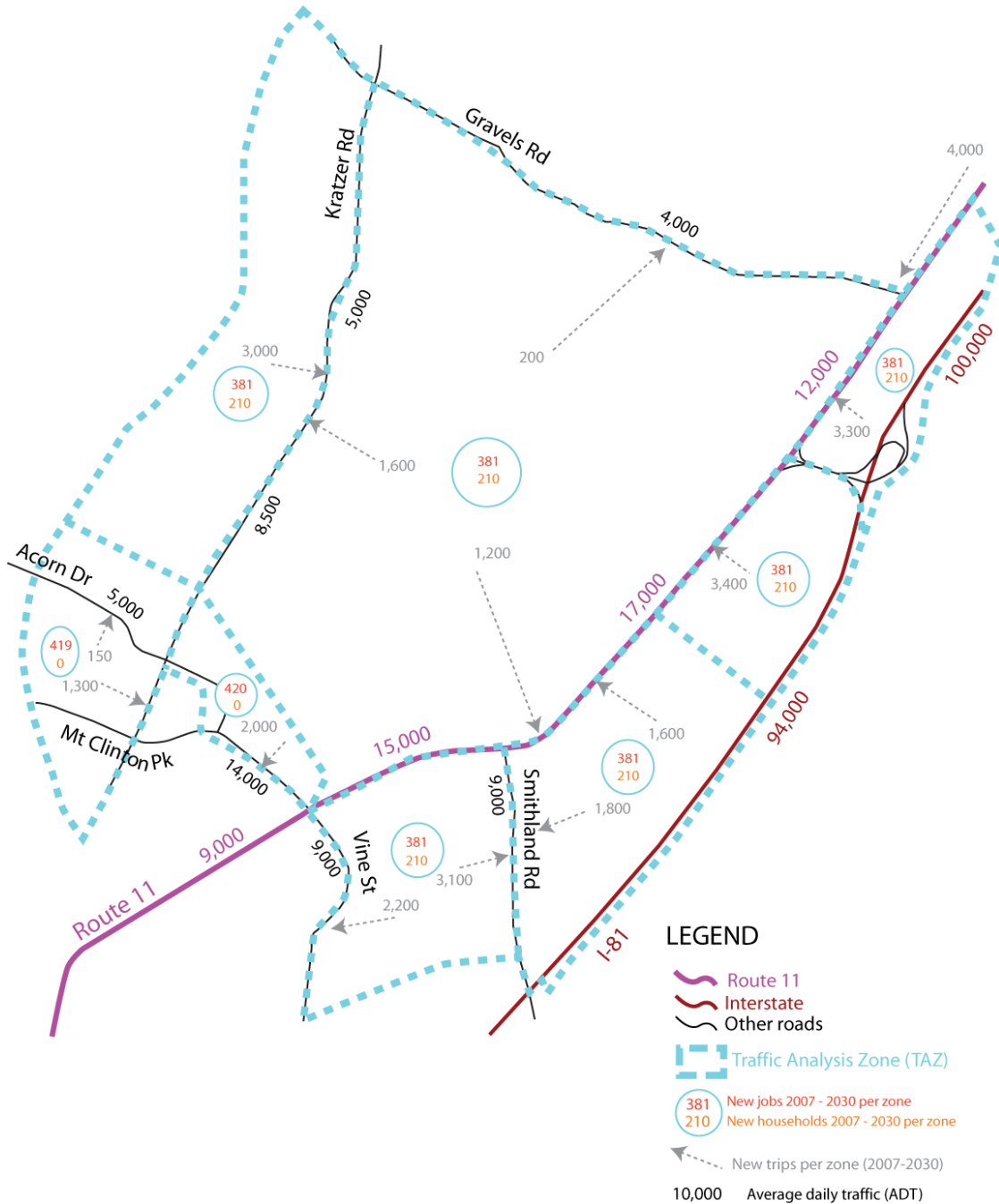




2030 Model Results

Using the transportation and land use growth assumptions previously detailed, the travel demand model produced the traffic projections shown in Figure 2.

Figure 2. 2030 Base Model Traffic Volumes





The model shows that the volume on Route 11 reaches 17,000 vehicles per day in 2030, which would require four travel lanes, two in each direction, to function at an acceptable level of service.

Holding the growth assumptions constant, we tested several preliminary alternatives to determine the impact on the network of adding:

- 1a. an east-west connection from Route 11 to Kratzer Road
- 1b. an east-west connection from Route 11 to Route 42
2. a north-south connection from Research Drive to exit 251 of I-81
3. an east-west connection from Route 11 to Kratzer Road and a north-south connection from Research Drive to exit 251 of I-81

The resulting impacts of all four alternatives were similar. Generally, the new connections removed traffic from Route 11 south of the I-81 interchange, from Gravels Road, and a small amount of traffic from I-81 south of exit 251. Figures 3 – 6 show the difference in daily traffic along the roads in the study area.

Alternative 1a – East-West Connection from Route 11 to Kratzer Road

- 8,000 vehicles per day on the new connection
- Relieves Route 11 by 3,000 vehicles (20% of 2030 traffic) between I-81 interchange and Smithland Road
- Relieves Gravels Road by 3,000 vehicles (75% of 2030 traffic)
- Adds 4,500 vehicles to Kratzer Road (additional 50% added to 2030 traffic)
- Removes 3,000 vehicles from Mt Clinton Pike (20% of 2030 traffic)
- Adds 1,000 vehicles to Smithland Rd (10% of 2030 traffic)
- Removes 2,000 vehicles from I-81 (2% of 2030 traffic)

Alternative 1b – East-West Connection from Route 11 to Route 42

- Very similar results as Alt 1a
- Adds 2,500 vehicles to Kratzer Road (additional 30% added to 2030 traffic)
- Removes 3,000 vehicles from I-81 (3% of 2030 traffic)

Alternative 2 – North-South Connection from Research Drive to Exit 251 of I-81

- 7,000 vehicles per day on the new connection
- Relieves Route 11 by 4,000 vehicles (20% of 2030 traffic) between I-81 interchange and Smithland Road
- Relieves Gravels Road by 1,000 vehicles (25% of 2030 traffic)
- Relieves Kratzer Road by 1,500 vehicles (20% of 2030 traffic)
- Adds 1,000 vehicles to Smithland Rd (10% of 2030 traffic)
- Removes 2,000 vehicles from I-81 (2% of 2030 traffic)

Alternative 3 – East-West Connection from Route 11 to Kratzer Road and North-South Connection from Research Drive to Exit 251 of I-81

- 10,000 vehicles per day on the new connections
- Relieves Route 11 by 4,000 vehicles (20% of 2030 traffic) between I-81 interchange and Smithland Road
- Relieves Gravels Road by 2,000 vehicles (50% of 2030 traffic)
- Removes 1,000 vehicles from Mt Clinton Pike (10% of 2030 traffic)



- Adds 1,000 vehicles to Smithland Rd (10% of 2030 traffic)
- Removes 3,000 vehicles from I-81 (3% of 2030 traffic)

## Interpretation of Results

Generally, roads with 17,000 vehicles per day or more require four lanes to function at an acceptable level of service. Similarly, roads with 12,000 vehicles per day or less can adequately operate with two lanes. A road with daily volumes between 12,000 and 17,000 may or may not be able to function with an acceptable level of service, depending on factors like frequency of signalized intersections, surrounding area characteristics, adjacent development patterns, posted speed, presence of turn lanes, and directional distribution, and peaking (k) factor among others. Recently, 'road diets' have been proven to work in many areas of the nation and in some instances can accommodate up to 20,000 vehicles per day with two lanes for automobile travel. A road diet is the term given to reduction of three or four lane roads to an enhanced two lane road to allow for improved walking and biking conditions and to better fit the context of the abutting development.

The travel demand model shows that each alternative scenario removes approximately 3,000 to 4,000 vehicles per day from Route 11, which would serve approximately 14,000 vehicles per day in 2030. Given the current assumptions of the model, it is unclear as to whether this road could adequately function as a two lane typical roadway section. Adjusting some of the model assumptions may produce different results, possibly removing more traffic from Route 11. It may be possible to create an alternative where the volume on Route 11 decreases such that a two lane section is a definite possibility. In any case, refinement of the demand model to more accurately reflect the local land use plans may provide a more accurate portrayal of future conditions, as discussed in the following section.

## Possible Model Revisions

As previously mentioned, there are several features within the model structure that may be adjusted to more accurately reflect future conditions along the corridor. Adjusting these features may produce results that are significantly different to those presented in this memo; yet it is important to agree upon the assumptions for future conditions so that the model can most precisely represent what may actually happen in the future.

One possible adjustment to the model would be to split the large TAZ in the middle of the study area into two or three different zones. The current model was developed for the broad purposes of regional planning, but for a more fine-grained analysis, it would be advantageous to redistribute the expected growth in jobs and households. We expect most of the growth to happen along the western side of the Route 11 corridor, where currently most of the growth is allocated along the eastern side. Splitting the large TAZ into three zones and redistributing the growth, as shown in Figure 7 below, could more accurately reflect the conditions of the future, and would be consistent with the proposed future land use component of the plan. We expect that redistributing the growth would show the possible north-south connection to serve more vehicles, which may further promote the desired development types for the corridor.



Figure 3. 2030 Model Alternative 1a

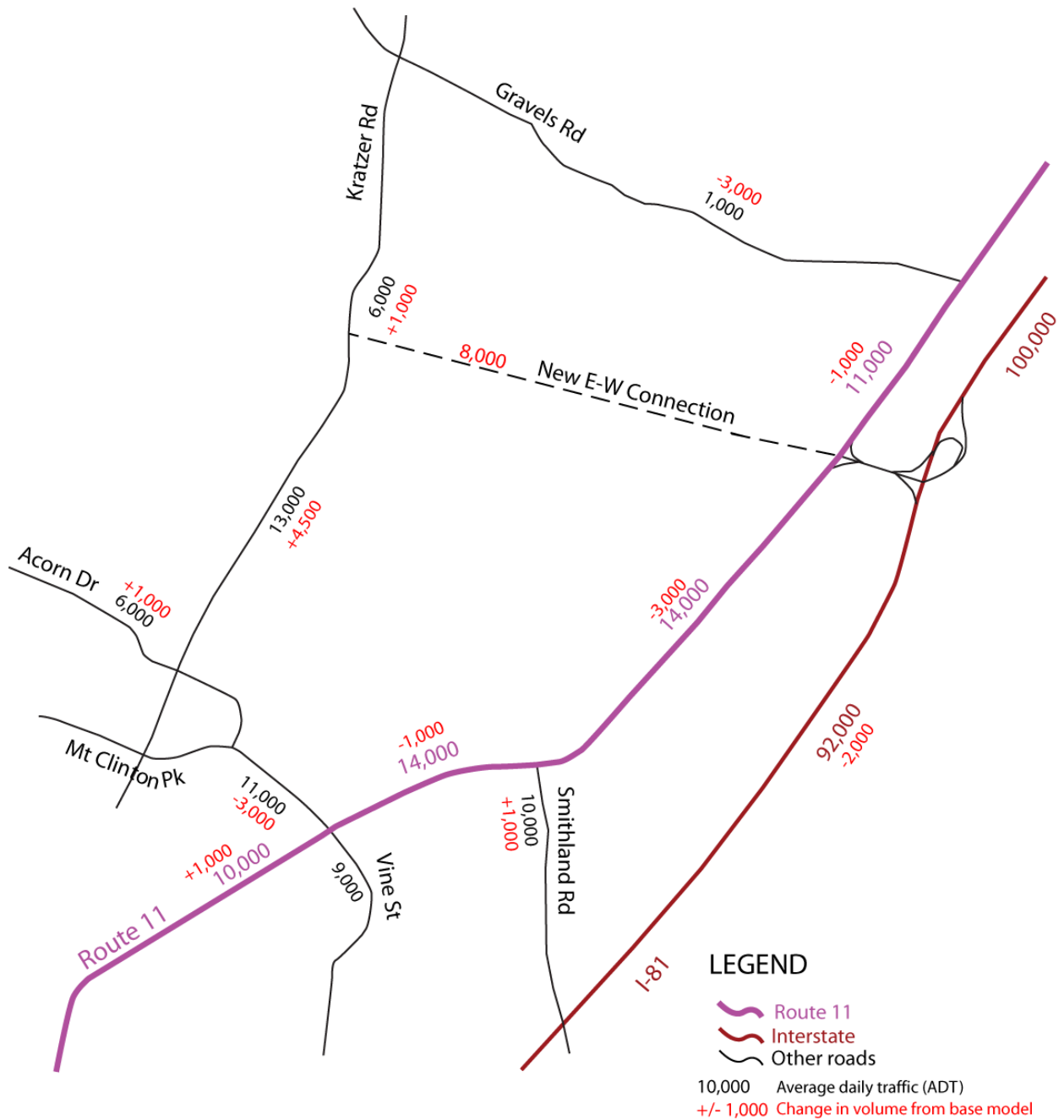




Figure 4. 2030 Model Alternative 1b

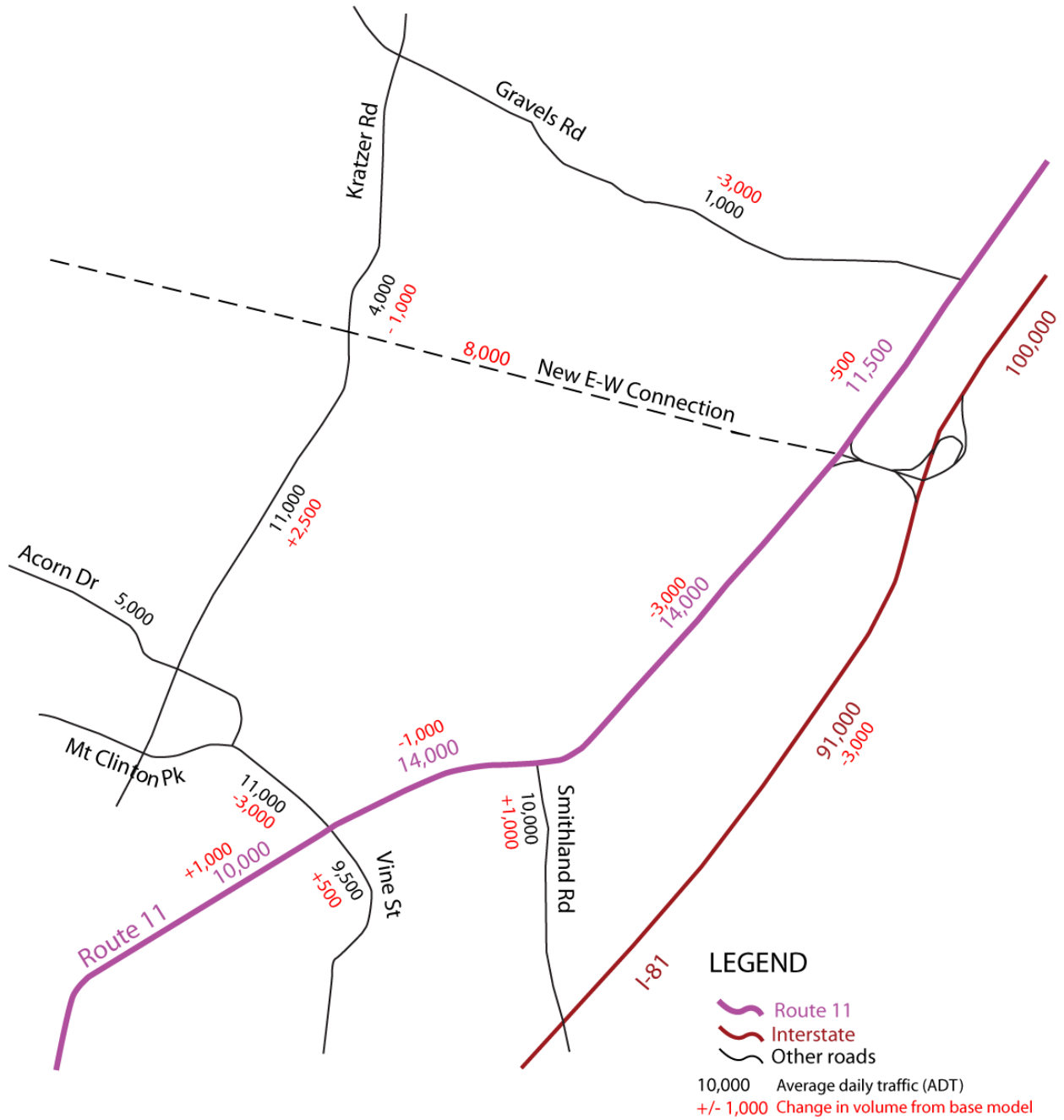




Figure 5. 2030 Model Alternative 2

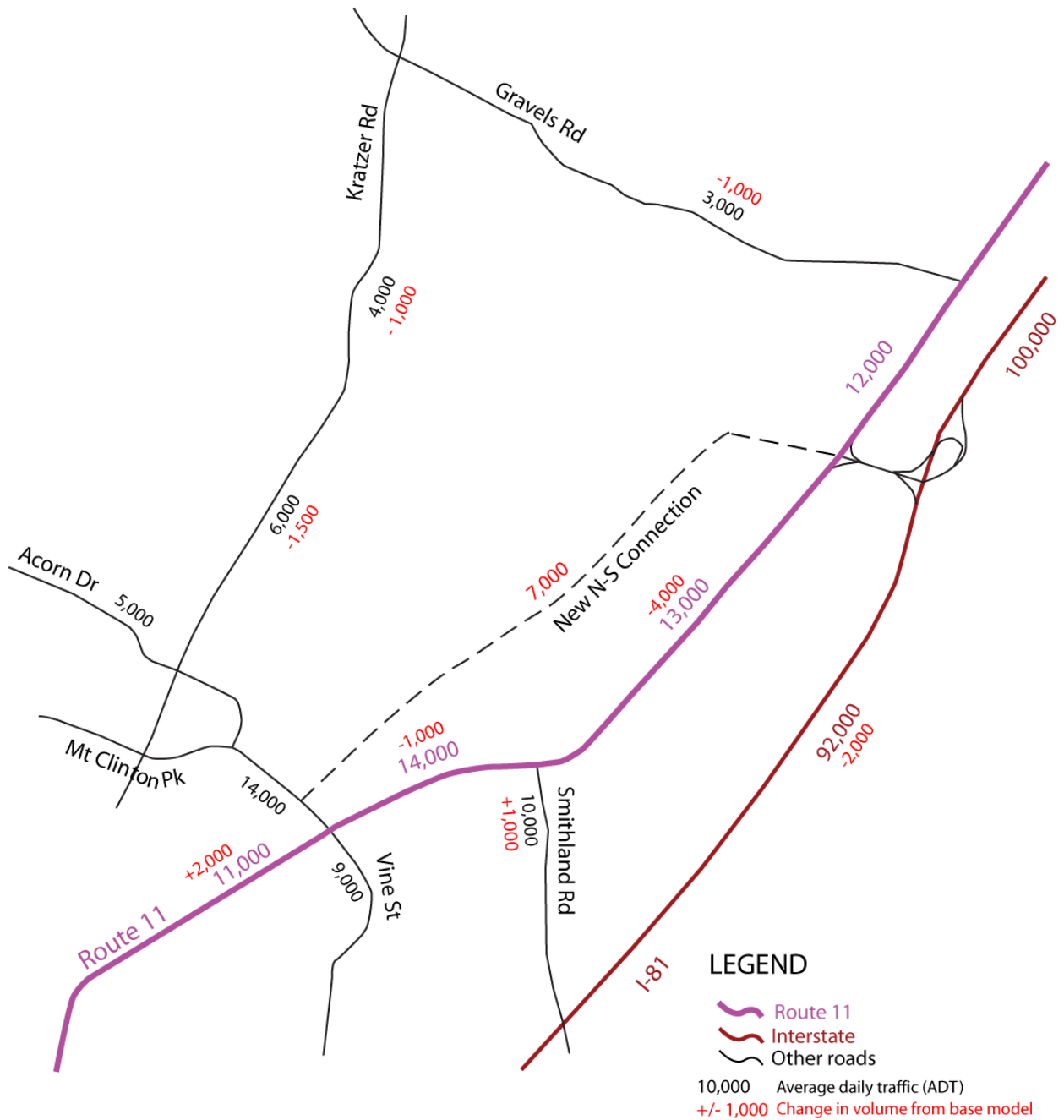
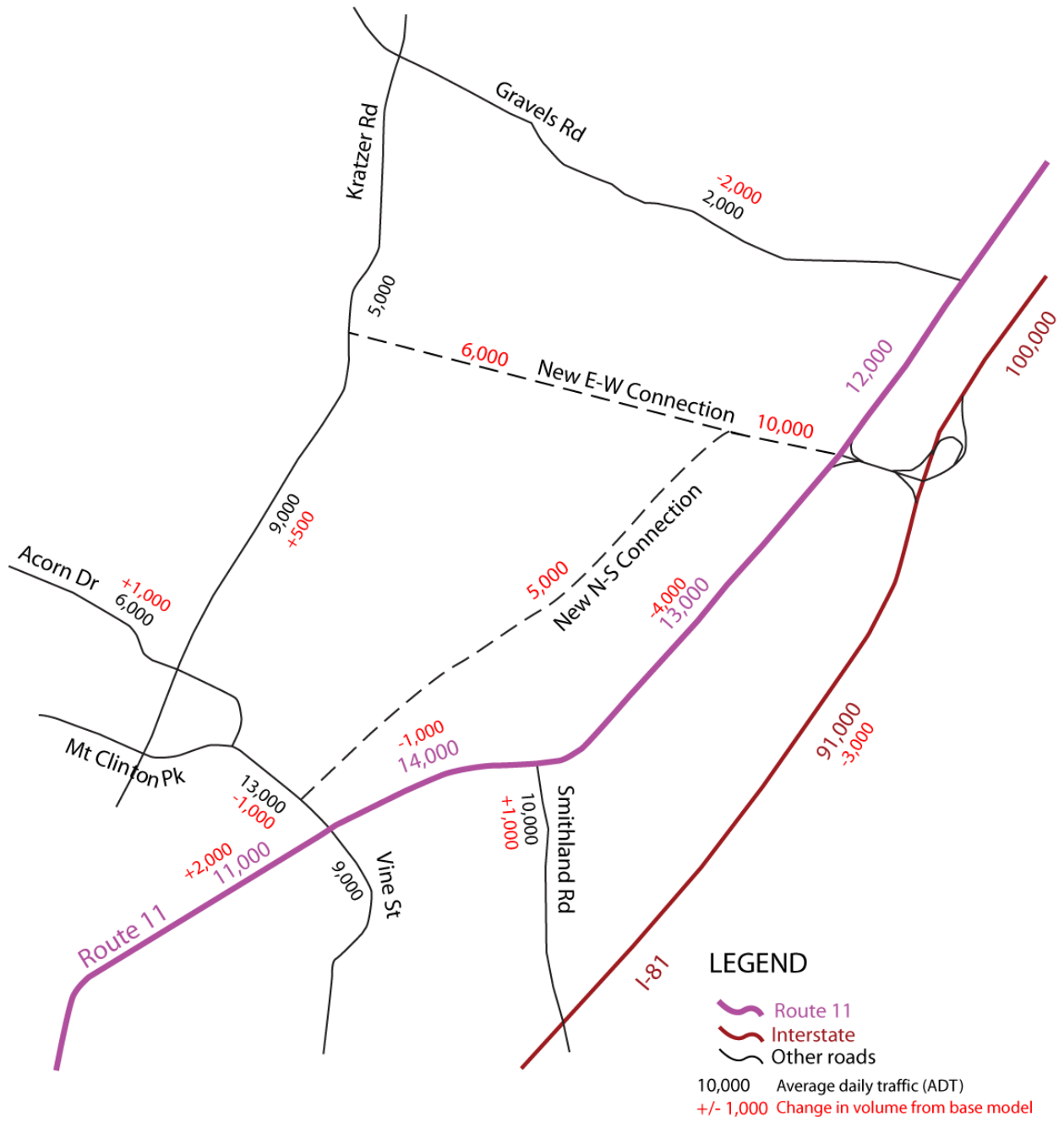




Figure 6. 2030 Model Alternative 3





**Results of the Revised Model**

Revising the model to redistribute the growth in households and jobs and splitting the large TAZ provided a more precise picture of traffic volumes in the future. The 2030 base model and all four alternatives were reanalyzed; these results are shown in Figures 8 through 12.

Overall, each of the alternatives provides an alternate avenue for travel, taking vehicles off of Route 11 between the I-81 interchange and Vine Street. Without any improvements, Route 11 will see 16,000 vehicles per day. Alternatives 1a, 1b and 2 remove approximately 2,000 to 3,000 vehicles per day; alternative 3 removes 3,000 to 5,000 vehicles per day from Route 11. Although adjusting the socioeconomic growth distribution and splitting the TAZs provided more precision in the future alternatives, the overall results are similar as before. In Alternatives 1a, 1b and 2, Route 11 will serve approximately 13,000 to 14,000 vehicles per day. In Alternative 3, approximately 11,000 to 13,000 vehicles will use Route 11 daily.

A road that serves 13,000 to 14,000 vehicles each day is much more likely to operate as a two-lane road with adequate traffic conditions than a road that serves 16,000 to 17,000 vehicles daily, especially if access points are well managed. Route 11 could function as a two-lane boulevard and serve as a gateway road to the City of Harrisonburg if a connector is constructed and access to the road is shared between properties by consolidating driveways. “Road diets” (as described earlier) have been successfully implemented in several areas of the nation and serve anywhere from 10,000 to beyond 15,000 vehicles per day. If Route 11 should serve as a “Main Street” for this transitioning area of Rockingham County, with walkable mixed-use centers, commercial destinations and employment facilities, a two-lane boulevard with a raised median, bike lanes and sidewalks could adequately serve automobiles and encourage walking and biking within the corridor through year 2030. As development occurs it is advisable to obtain right-of-way for a four lane typical section that would provide opportunities for the addition of two lanes in the distant future – years past 2030.

	Route 11 between Vine Street and Smithland Road	Route 11 between Smithland Road and I-81 interchange	Gravels Road	Krazter Road just north of city limits	East-West Connection	North-South Connection just north of city limits
Base - Do Nothing	16,000	16,000	4,000	12,000	-	-
Alt 1a - EW	14,000	13,000	2,000	14,000	8,000	-
Alt 1b - EW ext	14,000	13,000	1,000	12,000	9,000	-
Alt 2 - NS	13,000	14,000	3,000	6,000	-	8,000
Alt 3 - NS & EW	11,000	13,000	2,000	12,000	8,000	7,000

- Functions adequately with two lanes with no improvement\*
- Functions adequately with two lanes and managed access\*\*
- Requires four lanes\*\*\*

\*Typically daily volumes of 12,000 vehicles per day or less

\*\*Roads with volumes between approximately 12,000 and 17,000 may function adequately with two lanes if access is managed and other modes of travel are viable options

\*\*\*Daily volumes from 15,000 to 17,000 and above usually require four travel lanes to function at acceptable levels of service



Figure 7. Proposed Model Revisions

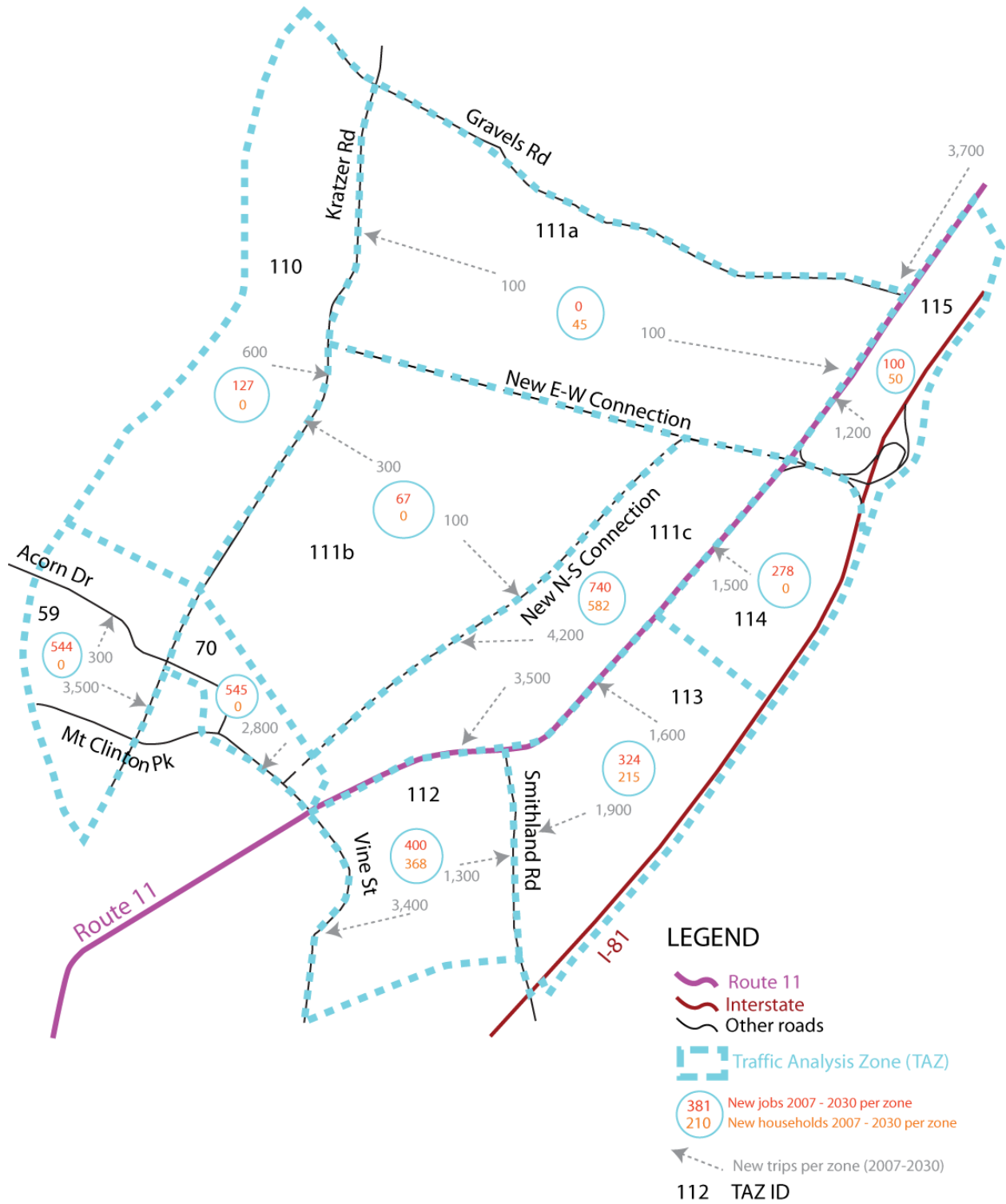




Figure 8. Revised 2030 Base Model Traffic Volumes

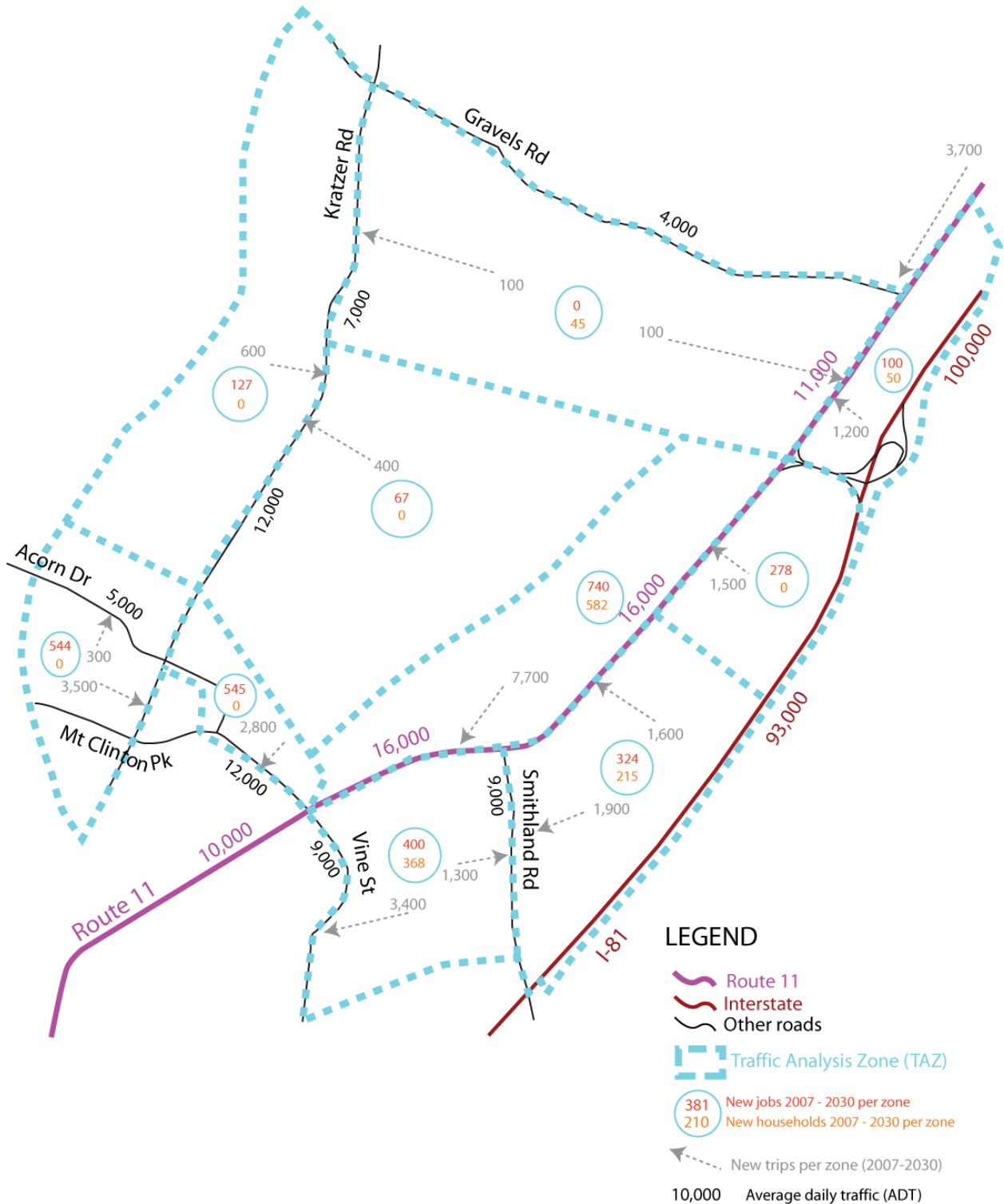




Figure 9. Revised 2030 Model Alternative 1a

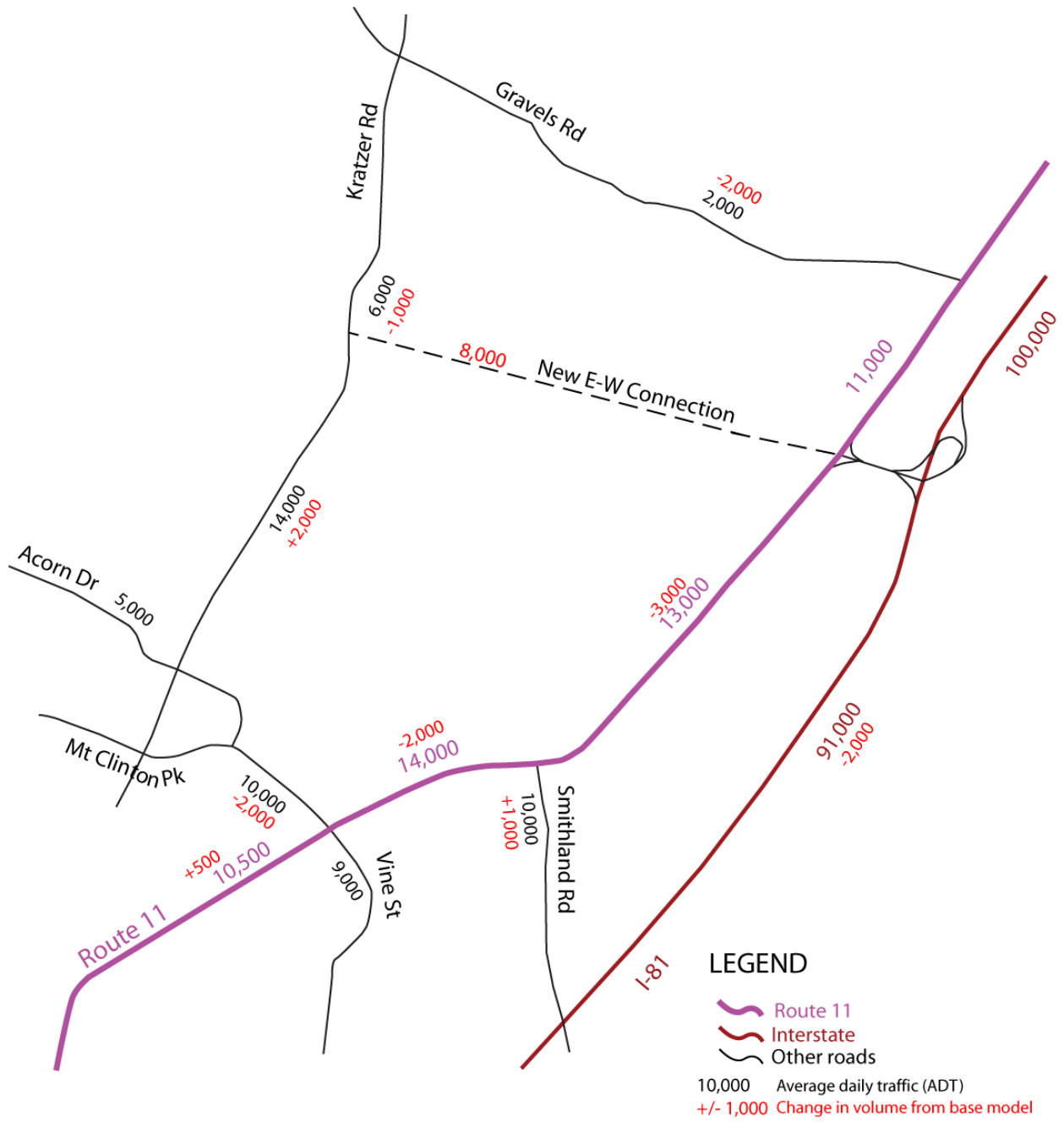




Figure 10. Revised 2030 Model Alternative 1b

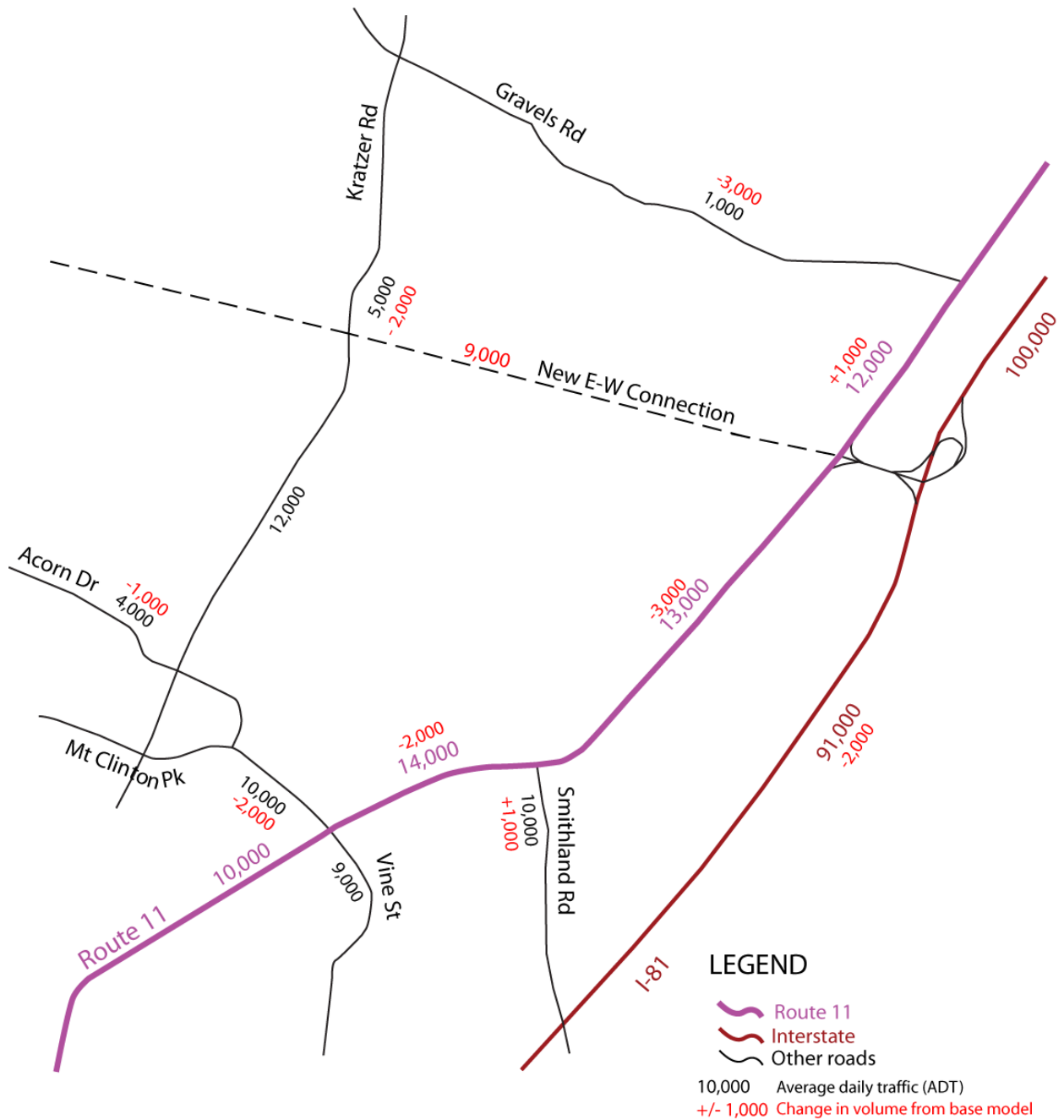




Figure 11. Revised 2030 Model Alternative 2

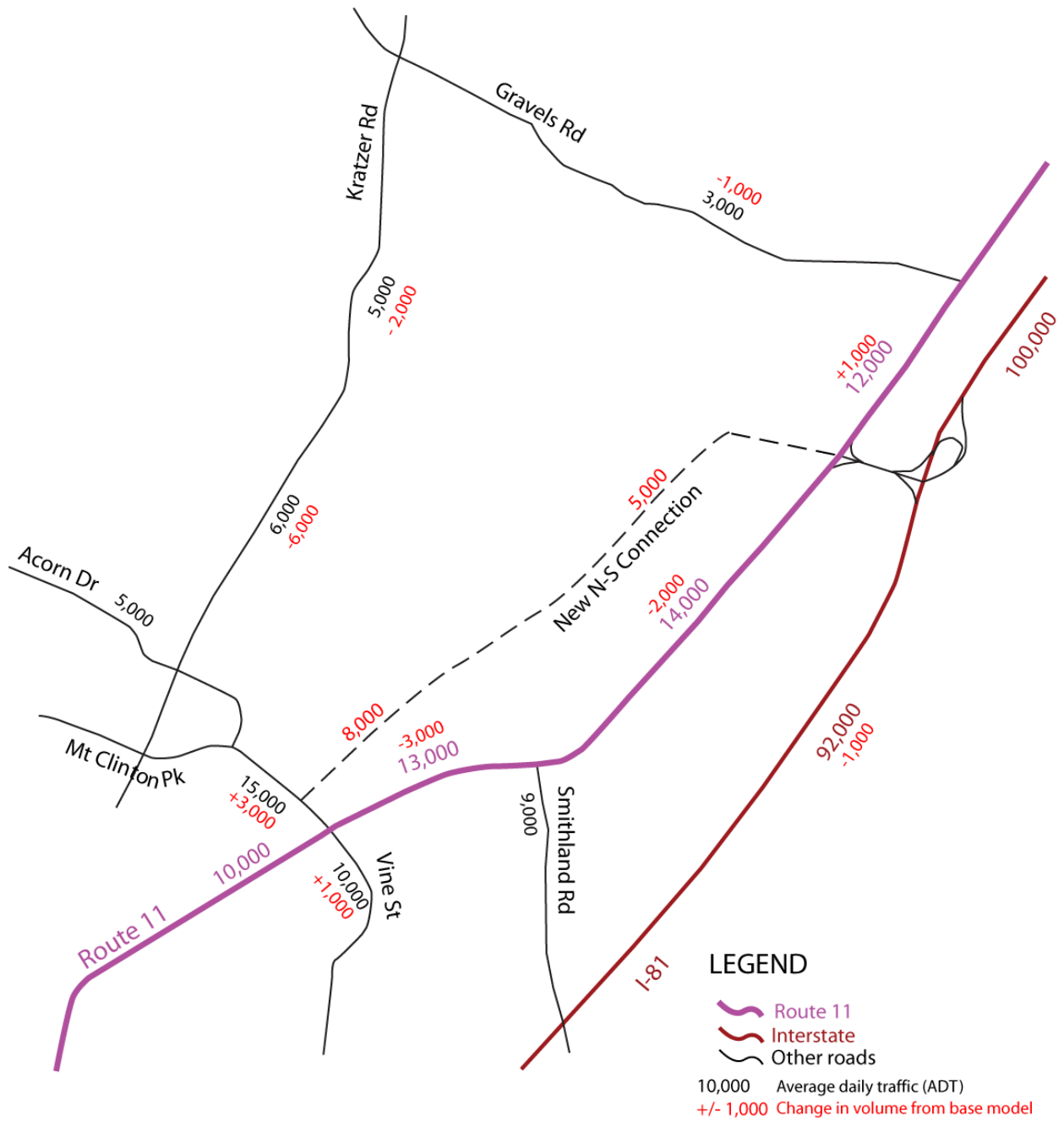
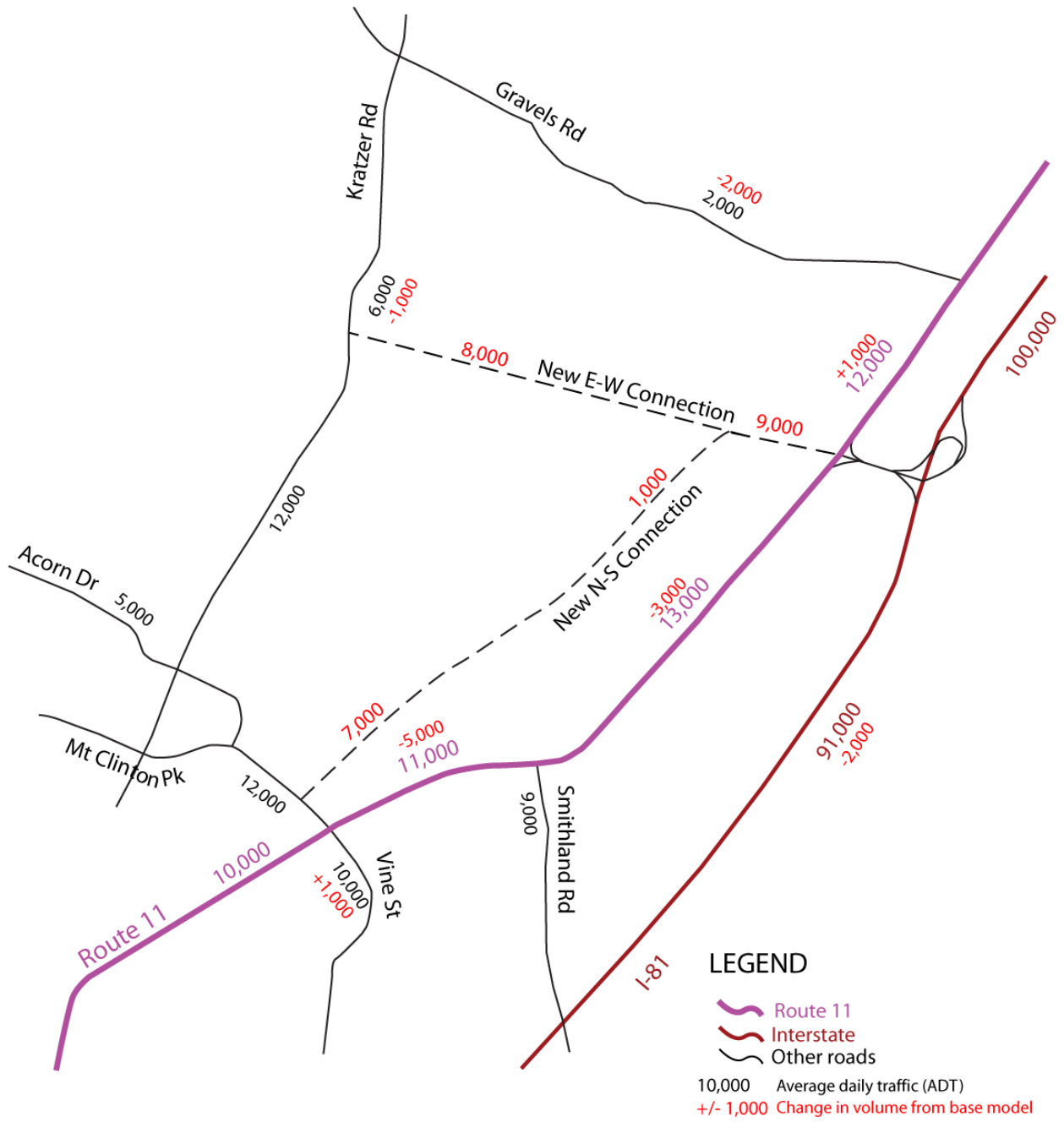




Figure 12. Revised 2030 Model Alternative 3



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