

Memo

To: West Windsor Township
From: Gary W. Davies
Re: Route 571 Princeton Junction
Revised Concept Plan
Date: August 15, 2005

The Township of West Windsor has retained Urbitran Associates to prepare a concept plan for improvements to County Route 571, also known as Princeton – Hightstown Road, in Princeton Junction. The limits of the section under consideration extend from south of Clarksville Road to the Amtrak Northeast Corridor overpass.

A previous report dated March 7, 2005, described a set of alternatives for the improvement which provided various configurations to the roadway. A public meeting was held at the March 16, 2005, Planning Board meeting, at which the alternatives were presented and public comments were received. In response to those comments the Township Administration has selected a single concept for improvement of Route 571 which it seeks to progress through further study, design, and implementation by Mercer County.

The purpose of this memorandum is to describe the preferred concept.

Alternatives Considered

To organize the presentation of alternatives the March 7 report divided the corridor into two segments. The NORTHERLY segment is from a point approximately midpoint between Clarksville Road and Alexander Road, northward (or westward) to the railroad. The CLARKSVILLE segment is from the same point southward (or eastward) through the Clarksville Road intersection.

For the Northerly segment, three schemes were presented for the general roadway: Intersection layouts were separately considered:

- **Scheme I: 60' cartway with raised islands** – This scheme featured a single through lane in each direction, a continuous 10' wide shoulder, and a median left turn lane that either had raised islands where possible to limit left turns, or a painted left turn lane at particular locations, or a painted continuous two-way left turn lane at other locations. A bike lane was suggested within the shoulder area between intersections, and at major intersections the bike lane was shifted to the sidewalk area so bicyclists would use pedestrian actuation buttons and crosswalks.

- **Scheme J: 60' cartway without raised islands** – This scheme removed the raised islands from the median and provided either a continuous two-way left turn lane or painted left turn lanes. It retained the 10' wide shoulders. The bike lane treatment was similar to Scheme I.
- **Scheme K: 50' cartway without raised islands** – This scheme was similar to Scheme J in that it had no raised islands, but it narrowed the shoulders from 10' to 6' wide, and narrowed the center left turn lane from 16' to 14' wide, resulting in a 50' cartway width. Assuming the same 90' wide right of way, a 10' wide planting strip was provided between the curb and sidewalk, instead of the 5' wide strip proposed in Schemes I and J. The bikeway was relocated from the shoulder to the sidewalk area, widening the sidewalk from 4' to 8' wide.
- **Wallace Road / Cranbury Road intersection** – Two through lanes plus a single left turn lane were proposed in each direction on Route 571. On Wallace and Cranbury the approaches were proposed to be widened to provide separate left, through, and right turn lanes. This treatment was the same for all three Schemes.
- **Sherbrooke Drive / Acme Center intersection** – Left turn lanes and crosswalks on Route 571 and a possible future traffic signal were proposed.
- **Alexander Road intersection** – This intersection was proposed to be configured essentially as it is today, with a single northbound left turn lane on Route 571 to Alexander.

For the Clarksville segment, four schemes were presented which provided either one or two left turn lanes from Route 571 northbound to Clarksville Road, and provided either painted or raised islands. The schemes were as follows:

- **Scheme 1: One left turn lane, with raised islands**
- **Scheme 2: Two left turn lanes, with raised islands**
- **Scheme 3: One left turn lane, without raised islands**
- **Scheme 4: Two left turn lanes, without raised islands**

Public Comments Received

At the March 16 Planning Board meeting comments were received from the Board and the public. In addition the public was given opportunity to submit written comments. A total of 43 public comments and 17 Board member comments were received. Since many of these comments were repetitive, they have been categorized into the following concerns and suggestions:

Concerns

- Clarksville Road intersection appears to be out of scale with the remainder of the project and could present challenges to bike and pedestrian crossings.
- Bike lanes should be in and along the entire roadway including the intersections. Bike lanes outside the roadway may present safety issues at intersections and driveways.

- The use of Sherbrooke Drive for the commercial use (CDNJ) presents concerns for local residents. (If Scheme K is utilized and turning movements are limited out of Acme, it may be appropriate to re-examine the need to utilize Sherbrooke Drive for this project).

Suggestions

- Reduction of speed limit (County to examine upon completion of project)
- Relocation of utilities underground
- Improved bike and pedestrian access over NE Corridor rail line
- Pedestrian actuated crosswalk warning signal at Sherbrooke Drive
- Expanded use of Carlton Place and extension to Sherbrooke Drive
- Installation of a roundabout at the intersection of Wallace Road and Route 571
- Traffic calming on Alexander Road for cars entering and exiting Acme

In addition to the above public comment opportunities, technical review meetings were attended with Township Administration and staff and with Mercer County Engineering Department staff at which various technical issues and concerns were identified and discussed.

Proposed Revised improvement Concept (L5)

As a result of the above process a general consensus emerged among the public, Planning Board, and Township Administration that the general principles of Scheme K (cartway reduced to 50' wide) and Scheme 3 (single left turn lane at Clarksville without raised islands) were preferred. Several reasons were advanced for this preference:

- A reduced width cartway would be less intrusive and more compatible with the emerging land use plan for Princeton Junction. Pedestrian crossings would be eased by the reduced width.
- Providing additional width for the planting strip between the curb and sidewalk (10' instead of 5') would significantly improve the visual character of the community.
- Due to a limited number of opportunities for alternative driveway access via side streets or for u-turns, eliminating left turns into or out of properties with raised islands was not practical in most cases. The resulting islands shown in Scheme I were small and limited in number, could not provide either significant landscaping or pedestrian refuge areas, and would be an overall maintenance (snowplowing) problem.
- At the Clarksville Road intersection provision of a double left turn lane would increase traffic and congestion to the south on Clarksville Road in front of two schools, and would cause the intersection to be extremely wide and out of scale with the community. Raised islands also would substantially increase the roadway width yet would not provide significant pedestrian refuge.

The configuration of the proposed bike lanes received considerable discussion and attention. It was concluded that the Township prefers the bike lanes to be within the shoulder area, and that the bike lanes

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be extended through the signalized intersections within the roadway, instead of behind the curb and in the sidewalk area as proposed in Scheme K3. It was concluded that the additional cartway and right of way width requirement would be an acceptable tradeoff.

Reflecting these conclusions, a new set of schemes (Scheme L for the Northern segment and Scheme 5 for the Clarksville intersection) was developed, and is shown in the attached plans. Key features of this new scheme are as follows;

1. A cartway generally 50' wide, with two 12' wide through lanes, one 14' wide continuous left turn lane, and two 6' wide shoulder / bike lanes.
2. Behind the curb, a 10' wide planting strip, 4' wide sidewalk, and 6' wide utility strip on each side of the roadway, for a total of 20'. The total proposed right of way width, then, would be 90' wide.
3. At the Wallace Road / Cranbury Road intersection, through lane widths would be reduced from 12' to 11'. With the 6' wide shoulder / bike lane on each side, the total cartway width at the intersection would be 68'.
4. Provision of a bicycle and pedestrian crossing of the NEC railroad is strongly recommended. However the optimal means of providing this connection has not been determined. As development of this Route 571 improvement and of the Princeton Junction Transit Village on the west side of the railroad proceeds, a pedestrian / bicycle connection should be developed to link the two communities.
5. Bikeways are needed on Wallace Road and Cranbury Road, in particular to provide bicycle access to the Princeton Junction railroad station. The provision, location, and design of these bike lanes should be determined as a separate consideration from this Route 571 improvement project.
6. At the Sherbrooke Drive intersection left turn lanes have been painted by the County. It is recommended that no direct access be permitted from the CDNJ development in the northeast quadrant to Sherbrooke Drive, and that all access be via a single driveway located on Route 571 to the north of Sherbrooke Drive. It is possible that a future traffic signal could be warranted at this location, but it would likely be tied to redevelopment of the Acme shopping center site.
7. Carlton Place is located to the east of and parallel to Route 571, extending southward from Cranbury Road approximately half way to Sherbrooke Drive. The CDNJ site plan currently provides a connection to a future extension of Carlton Place. It is recommended that the Township pursue completion of Carlton Place as either a public or private street, and that access to properties on the east side of Route 571 be rearranged to easily use Carlton Place.
8. At the Clarksville Road intersection shoulder and bike lanes have been added to both sides of Route 571, increasing the cartway width from 60' to 72'. It is proposed that the northbound bike lane end at Hendrickson Drive and follow roadways within the park area. It is proposed that the southbound bike lane be extended to South Mill Road.
9. Bikeways are needed on Clarksville Road and Grovers Mill Road, in particular to provide bicycle access to the schools. The provision, location, and design of these bike lanes should be determined as a separate consideration from this Route 571 improvement project.

10. Pavers or textured pavement treatments have been proposed at certain locations such as crosswalks and the Sherbrooke Drive / Acme intersection. The specific design and location of these treatments need to be determined during the design process.
11. Street furniture, lighting fixtures, and other amenities needed to provide a unified architectural treatment of the Princeton Junction community should also be determined and provided for during the design process. Special (non-highway) funding sources may need to be identified for these treatments.

Traffic and Levels of Service

Existing and future peak hour traffic volumes were presented in the March 7, 2005 report, and are shown in Figures 1A and 1B for existing 2005 morning and evening peak hours respectively, and in Figures 2A and 2B for future morning and evening peak hours. As was indicated in that report, the future volumes were estimated by applying a 38 percent overall growth factor and represent either ten years' growth at 3 percent per year, or as long as 20 years' growth at 1 percent per year. The less aggressive, 20-year condition is more likely.

Figure 3 shows existing and future intersection levels of service, with and without improvements at the intersections.

At the Wallace Road / Cranbury Road intersection all movements currently operate at Level of Service D or better in the morning peak hour. During the evening peak hour the Cranbury and Wallace Road approaches operate at Level of Service E and F respectively, while the Route 571 approaches operate at Level of Service D.. At the Alexander Road intersection the southbound through movement operates at Level of Service E in the evening peak hour. At the Clarksville Road intersection the northbound Route 571 left turn fails (Level of Service F), and the eastbound Clarksville left turn operates at Level of Service E in the morning peak hour. In the evening peak hour the eastbound right turn from Clarksville Road and the southbound Route 571 approach both operate at Level of Service E..

With the above growth added but without improvements to the intersections, all three intersections at Wallace / Cranbury, Alexander, and Clarksville will fail. Many movements in each intersection will fall to Level of Service E or F.

The proposed improvements at the Wallace / Cranbury intersection will restore operations to essentially existing conditions or better, with an overall Level of Service C in the morning and Level of Service D in the evening peak hour. Average delays will be virtually the same as existing with the improvements in place, and all movements will operate at Level of Service D or better.

At the Alexander intersection the improved roadway will provide essentially the same number of lanes as are currently in that intersection without improvement. The eastbound Alexander Road approach will be widened to provide separate right and left turn lanes, and the northbound Route 571 approach will be widened to provide two full-width lanes instead of the single wide lane that presently serves both left turning and through vehicles. Optimization of the signal timing could improve the overall intersection operation from Level of Service E to C in the morning peak hour, and from F to E in the evening peak hour. The northbound left turn from Route 571 into Alexander could improve from Level of Service F to D in the future during the morning peak hour.

The improvements proposed for the Clarksville Road intersection will not fully mitigate the effects of traffic growth, but a significant improvement is possible nonetheless. Without improvements the intersection will

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operate at Level of Service F in the morning peak hour with an average delay per vehicle of 256 seconds. This morning peak hour failure would be improved to Level of Service D by the proposed plan, with an average delay of 51 seconds per vehicle. Depending on the final signal timing, some problem movements would remain, particularly the eastbound left turn from Clarksville to Route 571 (Level of Service F), the eastbound through and right turn from Clarksville (Level of Service E), and the northbound left turn from Route 571 to Clarksville (Level of Service E). In the evening peak hour the intersection will fail without improvements, with a Level of Service F and average delay of 151 seconds. This could be improved somewhat to an average delay of 134 seconds by the proposed plan, but Level of Service F conditions would still prevail on key movements during the evening peak hour.

During the morning peak hour it is estimated that about 1,786 vehicles will travel northbound through the Clarksville Road intersection on Route 571, and they will be joined by an additional 305 vehicles turning northward from Clarksville Road. Thus a total of about 2,100 vehicles will travel northbound on Route 571 between Clarksville and Alexander. The concept plan proposes a northbound lane drop between Clarksville and Alexander. Typically it would not be possible to serve such a high volume with a single lane. However, at the same location that the lane drop is occurring, the left turn lane for Alexander Road will be forming. It is estimated that between 30 and 40 vehicles will typically be in queue for the left turn, with the back of queue at approximately the same location as the lane drop. It can be expected, therefore, that during the most critical morning peak hour turning vehicles (about 850 vehicles per hour) will move into the left turn lane shortly after crossing Clarksville Road, leaving the single lane section to serve only traffic destined through at Alexander Road (about 1,150 vehicles per hour). Therefore it is concluded that during the morning peak hour the lane drop will be in balance with traffic demands, and that during other time periods the lane drop will operate in a more conventional manner.

It is concluded from this analysis that future traffic demands can be served by the proposed improvements at Wallace / Cranbury and Alexander with significant improvement from the no-build condition. At Clarksville the failing conditions expected without improvements will be essentially mitigated during the morning peak hour, and will be significantly improved during the evening peak hour.

Figure 1A

EXISTING (2004) PEAK HOUR TRAFFIC VOLUMES
AM Peak Hour

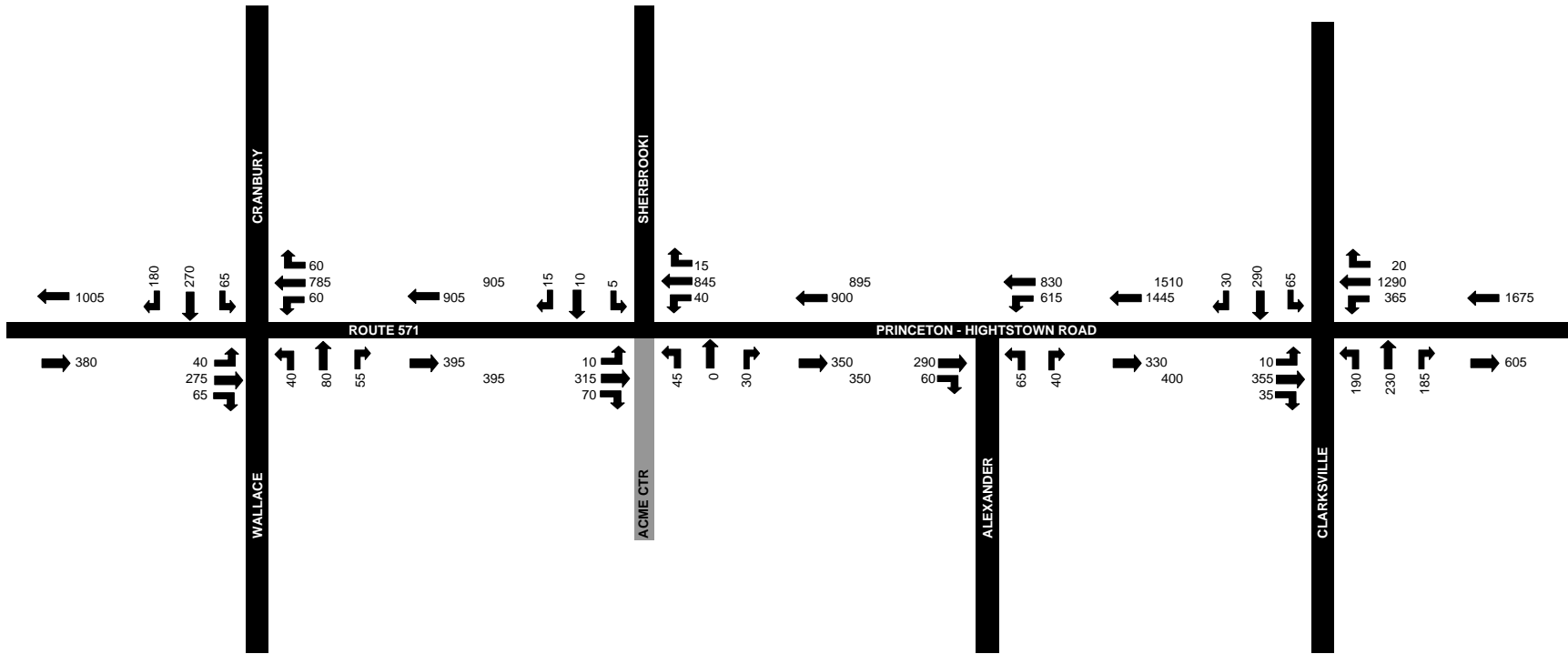
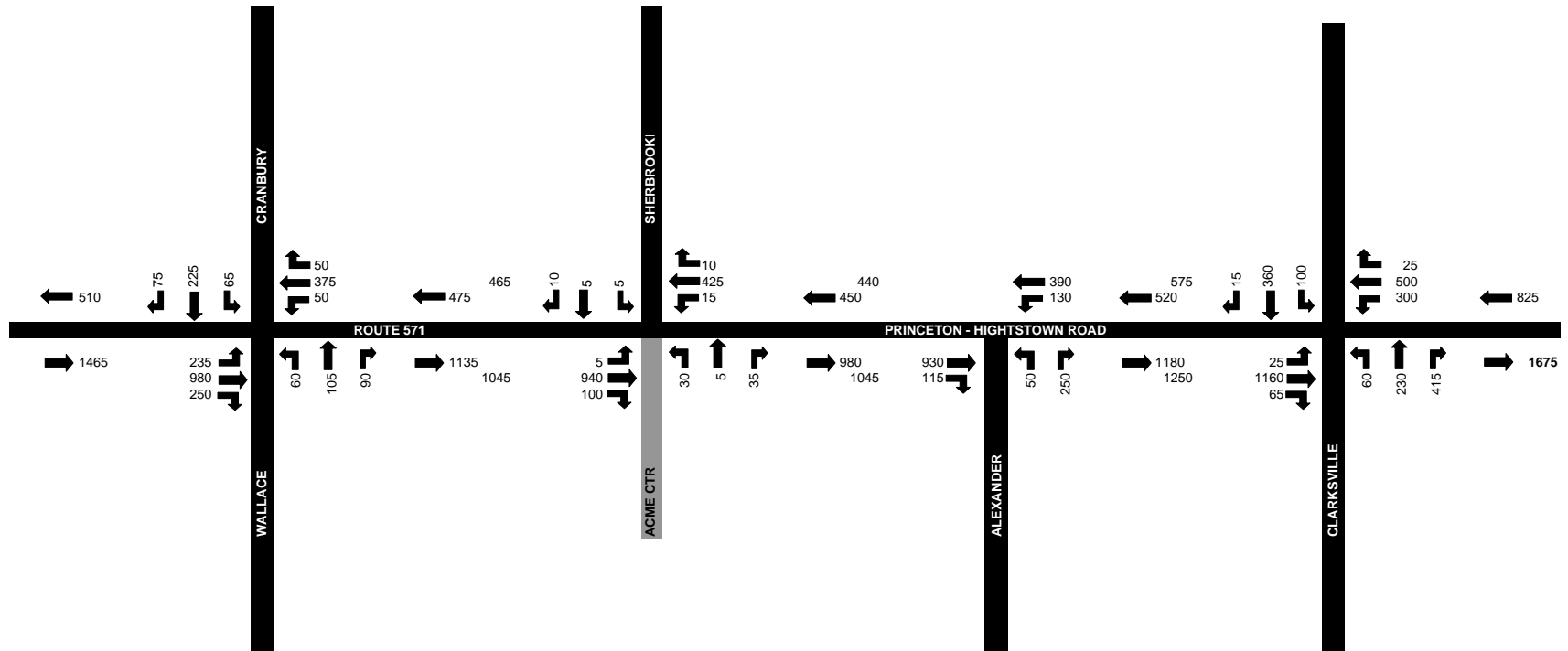


Figure 1B

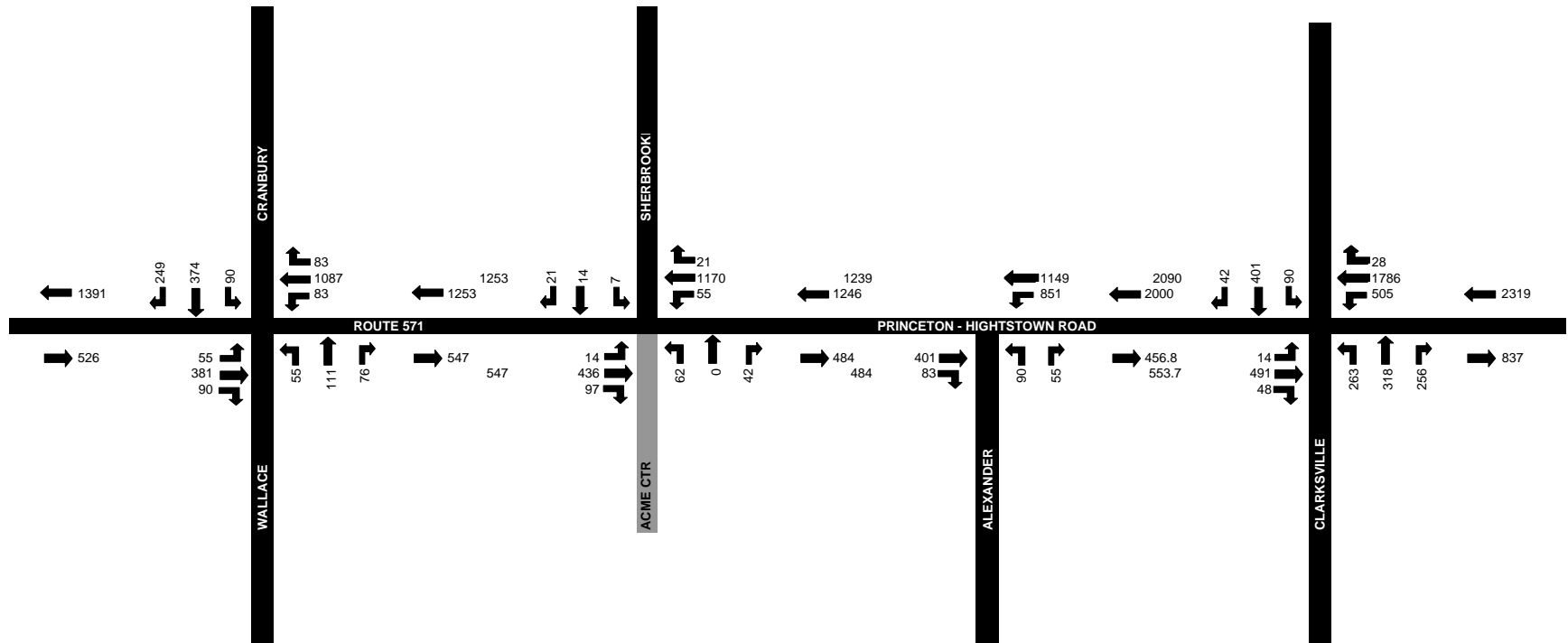
EXISTING (2004) PEAK HOUR TRAFFIC VOLUMES
PM Peak Hour



Annual Growth Rate: 3.0% per year
Growth Factor: 1.384

Figure 2A

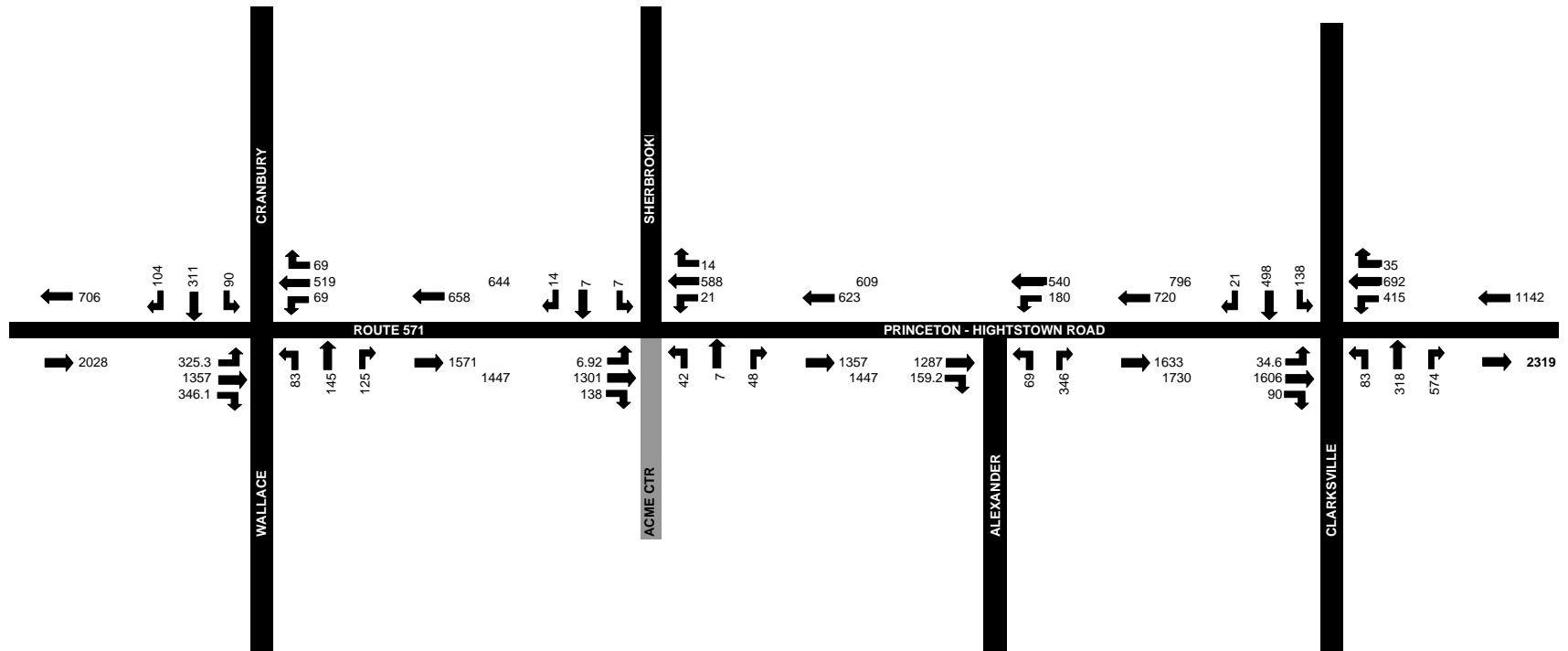
FUTURE (2015) PEAK HOUR TRAFFIC VOLUMES (UNCONSTRAINED)
AM Peak Hour



Annual Growth Rate: 3.0% per year
Growth Factor: 1.384

Figure 2B

FUTURE (2015) PEAK HOUR TRAFFIC VOLUMES (UNCONSTRAINED)
PM Peak Hour



Annual Growth Rate: 3.0% per year
Growth Factor: 1.384

Figure 3

INTERSECTION LEVELS OF SERVICE

	Existing		Future Volumes on Existing		Future Volumes on Improved	
	AM	PM	AM	PM	AM	PM
Route 571 / Wallace						
EB L+T+R	20.9 (C)	108.1 (F)	28.8 (C)	835.4 (F)	EB L	20.7 (C) 44.4 (D)
WB L+T	24.9 (C)	41.4 (D)	34.8 (C)	143.9 (F)	EB T	18.5 (B) 28.1 (C)
WB R	20.5 (C)	25.6 (C)	22.5 (C)	26.7 (C)	EB R	18.2 (B) 28.5 (C)
SB LTR	13.8 (B)	55.1 (E)	16.8 (B)	315.2 (F)	WB L	19.1 (B) 29.2 (C)
NB L	12.8 (B)	39.2 (D)	14.4 (B)	92.8 (F)	WB T	24.6 (C) 36.8 (D)
NB TR	16.4 (B)	10.2 (B)	20.3 (C)	12.6 (B)	WB R	22.5 (C) 27.6 (C)
OVERALL	18.0 (B)	50.2 (D)	22.9 (C)	284.5 (F)	SB L	51.0 (D) 45.5 (D)
					SB TR	26.6 (C) 52.2 (D)
					NB L	13.6 (B) 24.2 (C)
					NB TR	20.3 (C) 8.2 (A)
					OVERALL	22.4 (C) 39.1 (D)
Route 571 / Alexander						
EB L+R	33.4 (C)	48.5 (D)	36.0 (D)	117.8 (F)	Retimed	
SB T	28.1 (C)	61.4 (E)	34.5 (C)	225.9 (F)	EB L	46.2 (D) 40.5 (D)
SB R	22.1 (C)	11.5 (B)	22.7 (C)	12.1 (B)	EB R	6.0 (A) 54.9 (D)
NB L	25.9 (C)	16.9 (B)	169.7 (F)	47.4 (D)	SB T	50.8 (D) 100.8 (F)
NB T	11.7 (B)	8.2 (A)	33.0 (C)	9.7 (A)	SB R	26.8 (C) 6.7 (A)
OVERALL	20.3 (C)	42.0 (D)	77.3 (E)	137.7 (F)	NB L	48.8 (D) 20.0 (C)
					NB T	13.7 (B) 4.4 (A)
					OVERALL	32.1 (C) 61.5 (E)
Route 571 / Clarksville						
EB L	65.8 (E)	41.3 (D)	647.0 (F)	158.4 (F)	1-Lane Left Turn to Clarksville	
EB T	25.0 (C)	29.1 (C)	28.1 (C)	33.6 (C)	EB L	89.0 (F) 28.6 (C)
EB R	25.0 (C)	70.4 (E)	27.9 (C)	210.1 (F)	EB T+R	59.1 (E) 180.0 (F)
WB L	23.3 (C)	31.1 (C)	28.8 (C)	67.8 (E)	WB L	25.5 (C) 46.0 (D)
WB T+R	28.4 (C)	39.1 (D)	37.0 (D)	85.8 (F)	WB T+R	38.9 (D) 36.1 (D)
SB L+T+R	26.2 (C)	62.1 (E)	33.4 (C)	238.3 (F)	SB L	29.1 (C) 18.4 (B)
NB L+T+R	119.1 (F)	24.7 (C)	371.2 (F)	60.5 (E)	SB T+R	29.8 (C) 174.1 (F)
OVERALL	79.5 (E)	47.3 (D)	255.6 (F)	150.9 (F)	NB L	69.1 (E) 270.7 (F)
					NB T+R	48.2 (D) 12.1 (B)
					OVERALL	50.8 (D) 134.3 (F)

Legend: Average Delay, sec (Level of Service)

Approach directions are relative to Route 571 assumed to be North/South