

AMG

4-6-81

Traffic Impact Study

by Abbington - Noy for

AMG

Pgs. 26

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TRAFFIC IMPACT STUDY
PROPOSED TOWNHOUSE ZONING

Township of Warren

County of Somerset

New Jersey

Prepared by:

ABBINGTON-NEY ASSOCIATES
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65 Gibson Place
Freehold, N.J. 07728

Prepared for:

AMG Realty Company
130 Davidson Avenue
Somerset, N.J. 08873

April 6, 1981

HENRY J. NEY, P.E.

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INTRODUCTION

AMG Realty Company has requested of the Township of Warren consideration of rezoning a 90 acre parcel of land located along Mt. Horeb Road (Somerset County Route 525) in the south-westerly portion of the Township.

The proposed use is for residential townhouse development at a density of approximately 5 units per acre, resulting in a total of 450 dwelling units. Access to and from the development would be confined to Mt. Horeb Road along the site frontage.

Inasmuch as the change in zone would result in a more intensive land use pattern, resulting in higher traffic generation, a Traffic Impact Study was requested. The purpose of the study was to review and advise with regard to the site access and to determine the traffic impact of the proposed development on the surrounding roadway system. In addition, a general review was made of future highway and traffic considerations in the area.

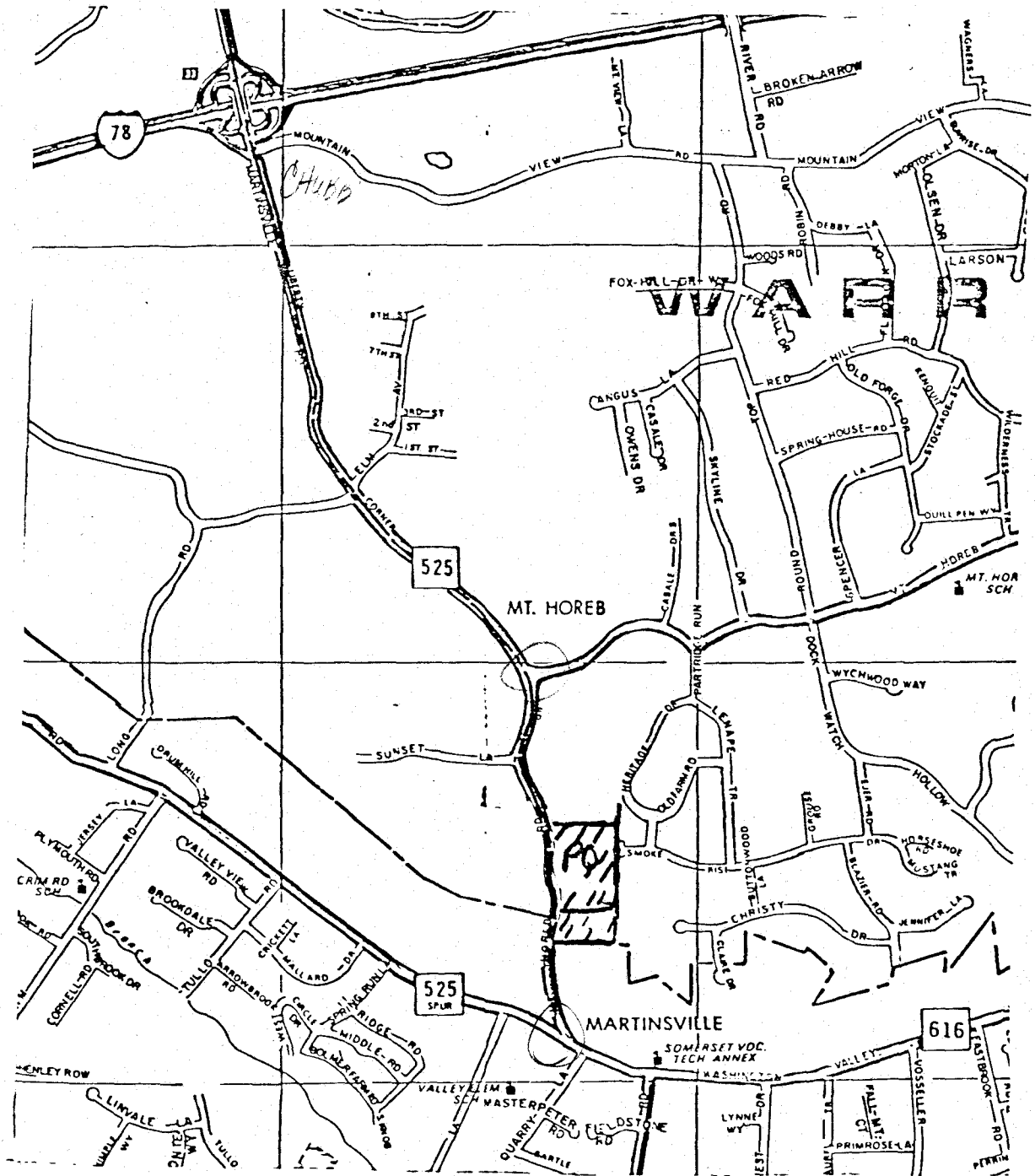
SCOPE OF STUDY

A detailed field inspection was conducted at and in the vicinity of the proposed development in order to obtain an inventory of existing traffic controls, highway conditions, and to observe peak hour traffic operation in the area. Traffic counts were conducted on the surrounding roadways to obtain an indication of current peak hour loadings. In addition, background traffic volume information was obtained from the Somerset County Traffic Engineer's office.

Estimates were made of the amount of traffic that would be anticipated to be developed from a 450 unit townhouse development. Peak hour traffic distributions were analyzed and capacity computations conducted under the existing roadway conditions. In addition, an evaluation was made of capacity implications under an improved cross section along Mt. Horeb Road.

The general overall site plan was reviewed with regard to adequacy of internal circulation, parking and proposed access locations. Upon accumulation of the aforementioned data, a report setting forth the results of our study was prepared.

FIGURE 1
SITE LOCATION MAP



EXISTING CONDITIONS

The subject property lies in the southwesterly portion of Warren Township. The land immediately to the south of the property is located in Bridgewater Township while property to the west is located within Bernards Township. Access to and from the site will be from Mt. Horeb Road, a County facility. Adjacent intersections impacted by the development consist of Mt. Horeb Road and its intersection with Washington Valley Road and County Route 525 and its intersection with I-78.

Mt. Horeb Road in the vicinity of the subject property is a 20 foot wide blacktop roadway. Two foot wide blacktop shoulders flank either side of the roadway for a total cross section width of 24 feet. The surrounding terrain can be described as rolling and across the site frontage the roadway rises on approximately a 6 to 8 percent grade from south to north cresting approximately 450 feet to the north of the southerly property line. At that point, County Route 525 drops on a more gradual grade to a low point which is near the northerly boundary of the property. There are a series of curves along Mt. Horeb Road in this area. However, with one exception, curve warning signs are absent in the area because the speed limit has been reduced to 35 miles per hour. North of the subject property, County Route 525 changes names and becomes known as Liberty Corner-Martinsville Road. In this section, the roadway

widens to a paved width of 24 feet with 6 foot wide shoulders flanking both sides of the roadway. South of the subject property, within a distance of approximately a half a mile, Mt. Horeb Road intersects Washington Valley Road, forming a T-type intersection.

Major arterial routes servicing the area run basically east-west. To the north, County Route 525 is intersected by I-78. At its interchange with County Route 525, I-78 provides for full access for all traffic movements. This interchange is located approximately 3 miles to the north of the subject property. South of the subject property, Route 22 provides east-west access for this area. There are two alternate choices to gain access to Route 22, one of which involves the utilization of Chimney Rock Road which would service eastbound traffic, the other the use of Newmans Lane, which would provide access to westbound traffic. Route 22 eastbound is approximately 7 miles from the subject property.

Intersections affected by the subject development will be that of Mt. Horeb Road and Washington Valley Road and Chimney Rock Road and Washington Valley Road. Both intersections are T-type intersections controlled by stop signs. Turning movement counts conducted at both intersections show that they are operating well within their capacity. However, at the intersection of Chimney Rock

Road and Washington Valley Road, we noted a site obstruction caused by an existing building on the southeast corner.

FUTURE DEVELOPMENT

There are a number of proposals in the area which will affect traffic conditions in the vicinity of the site. Within Warren Township, recently Chubb Insurance Company has received site plan approval for a major corporate facility right off of County Route 525 at Mountain View Road. In addition, within Bernards Township, AT&T long lines has acquired a large parcel of property which may be developed at some future date for an office complex.

North of I-78 there are a number of residential developments which are currently in various stages of either construction or approval. These projects involve the Dean tract and the Bonnie Brae tract.

Future highway improvements in the area basically involve a considerable upgrading of the interchange of I-78 and County Route 525 in connection with the Chubb office building and the extension of I-78 to Newark Airport. It is anticipated that the Chubb improvements will be in place by the fall of 1982 and that the I-78 "missing link" will be completed by 1985. Both of these projects, therefore, would be in place before any development of this parcel or adjacent parcels were likely to be completed.

EXISTING TRAFFIC VOLUMES

Traffic volume information for the surrounding roadways was obtained from the Somerset County Traffic Engineer's office and supplemented by both manual and machine counts conducted by this firm. The County information was in the form of annual average daily traffic (AADT) figures for Mt. Horeb Road, Washington Valley Road and Chimney Rock Road. Turning movement counts were conducted by this firm at Mt. Horeb Road and Washington Valley Road and the intersection of Chimney Rock Road and Washington Valley Road during the peak hours. In addition, an automatic traffic recording device (ATR) was placed on Mt. Horeb Road along the site frontage to obtain a 24 hour recording of the traffic volumes.

On the basis of these counts, the following is the projected 1981 AADT and peak hours for the surrounding roadways:

TABLE I

Existing Traffic Volumes

<u>Route</u>	<u>Location</u>	<u>AADT</u>	<u>Peak Hour</u>
Mt. Horeb Road	North of Wash. Valley Rd.	2750	325
Wash. Valley Road	West of Mt. Horeb Rd.	6200	740
Wash. Valley Road	Between Mt. Horeb and Chimney Rock Road	8000	960
Wash. Valley Road	East of Chimney Rock Rd.	6800	770
Chimney Rock Road	South of Wash. Valley Rd.	4800	575

SITE TRAFFIC

Traffic generated by a residential development normally has its major impact on the adjacent street system during the morning and evening peak street hours. This is, in the case of the morning hours, primarily a result of the work trip which is a major traffic generator for a residential development. During the evening peak hour, the hour when traffic to and from a residential development is maximum, it is normal to find a mixture of work trip related traffic as well as recreational shopping and other non critical traffic movements. Of the morning and evening peak street hours, the evening peak hour experiences the higher total traffic volume and is therefore the most common design hour. This hour was chosen for our capacity evaluations since, if hours of peak operation can adequately be accommodated within the adjacent street system, then all other hours of less traffic demand can also be accommodated.

Numerous studies have been conducted of traffic generation rates for various types of residential developments and are published by such organizations as the Institute of Transportation Engineers. Further, this firm has conducted a number of traffic generation studies at existing townhouse developments in the New Jersey area. The availability of data clearly indicates that on a per unit basis, the townhouse type of residential dwelling generates in the range

of 50 to 60 percent of the traffic that would be generated by the normal single family detached housing. On the basis of our studies, as well as other published studies, the following table has been prepared to depict our estimated traffic generation from the proposed 450 townhouse units for the subject property:

TABLE II
Estimated Traffic Volumes

A.M. Peak Street Hour

<u>In</u>	<u>Out</u>	<u>Total</u>
55	210	265

P.M. Peak Street Hour

<u>In</u>	<u>Out</u>	<u>Total</u>
240	120	360

Daily

3150

Once the hours of peak traffic generation are known, it is then necessary to assign the traffic movements to the adjacent road system to determine the impact of that traffic. Due to the rural nature of the surrounding area, and the lack of significant major employment in the vicinity of the tract, two alternate methods were utilized in analyzing the site traffic impact.

Based on the approximate midpoint between the site and I-78 and Route 22, it was decided to alternately assume that three-quarters of the traffic would either head northbound towards I-78 or, in the alternative, southbound towards Route 22. In this manner, it was possible to generate a maximum site impact under virtually any

condition of residential occupancy.

As can be seen from Table I, the maximum hour of traffic generation outbound occurs in the morning and amounts to 210 vehicles. The morning traffic assignment, therefore, alternately evaluated the possibility of 158 vehicles either turning right out of the site or left out of the site. Conversely, in the evening, when the peak inbound traffic amounted to 240 vehicles, capacity was tested on the assumption that 180 vehicles would either turn right into the site coming from the south or left into the site coming from the north.

SITE TRAFFIC IMPACT

In order to determine the impact that the additional traffic would have on existing traffic conditions, it was necessary to compute the current capacities and levels of service existing along Mt. Horeb Road in this area. Basically, there are two types of capacity computations that can be performed. One case involves the free flow conditions that would exist along County Route 525 between I-78 and Washington Valley Road. The second case would involve the actual capacities of the major intersections along County Route 525, these being Washington Valley Road and I-78.

Capacity along a free flowing section can further be refined to reflect the point to point conditions that exist. In the case of County Route 525, there are two very obviously different highway conditions. The first are the conditions that exist along the recently repaved and improved section of County Route 525 between I-78 and Mt. Horeb Road. The second set of conditions would be those existing between the intersection of County Route 525 and Mt. Horeb Road and Washington Valley Road. In both instances, separate capacity computations were performed in accordance with the standards as dictated in the 1965 Highway Capacity Manual. On the basis of these computations, it was determined that the D* level of service along Mt. Horeb Road directly adjacent to the site would be 250 vehicles per hour with

*See Appendix of this report.

an E level of 1335 vehicles. Therefore, current traffic loadings immediately adjacent to the site reflect a D to E level of traffic service.

The section of County Route 525 north of Mt. Horeb Road reflects a C level of service of 540 vehicles per hour and a D level of service of 1180 vehicles per hour. Based on the current traffic volumes, therefore, it can be seen that the section of 525 to the north of the subject property is operating at a B to C level of service.

Individual intersection capacities cannot be performed at the adjacent locations in the classical sense as outlined in the Highway Capacity Manual. It is, therefore, necessary to assume that these intersections are "signalized" and to perform standard capacity analyses. This has been done utilizing the "critical lane method" and has been determined that currently the adjacent intersections are operating at an A,B level of service.

In reviewing the current levels of traffic on Mt. Horeb Road adjacent to the site, it can be seen that because of the poor vertical and horizontal alignment at the site frontage, the current levels of service will be impacted by the development. In reviewing the requirements of the Somerset County Planning Board, it has been determined that the applicant will be required to provide for widening of the cross section of Mt. Horeb Road directly at the site frontage. This will have the effect of improving the levels

of service after the development is in place. Further, in viewing the existing alignment of Mt. Horeb Road in this area, it is our recommendation that the alignment be improved to provide for an improved horizontal alignment for traffic. The easing of the curves in this area will further improve the levels of service and insure that the development will have a positive impact on existing traffic conditions.

SITE ACCESS

The preliminary site plan provides for two means of access to the proposed development. One access location is at the southerly end of the property approximately 60 feet north of the existing access road to the telephone tower. The second access point is located approximately midway along the site frontage.

Both access locations were reviewed for adequacy of safe stopping sight distance to determine conformance to the Somerset County requirements. The Somerset County Site Plan and Subdivision Resolutions require that for roadways intersecting the same side of a County highway, there be a minimum separation of 800 feet between such intersections. Further, for a 50 mile an hour design speed, a minimum sight distance of 400 feet is required. The site plan calls for approximately 1800 feet between intersections along Mt. Horeb Road and a site distance review of both locations show that the 400 foot standard is met.

It should be pointed out that the 400 foot standard is met under the existing conditions, and with the intended improvement to Mt. Horeb Road by the applicant, in all probability the sight distance will exceed considerably the 400 foot minimum established by the County. Therefore, it is concluded that the access locations will operate safely with sufficient sight distance to allow for

the safe entry and exit of traffic from the development.

As stated previously, it is our opinion that an attempt should be made by the developer to improve the horizontal alignment of County Route 525 in this area. There are three exceptions to the property along the site frontage which will limit, to some extent, the improvements that can be made. However, it is recommended that the applicant utilize the minimum standards as established by the American Association of State Highway Officials to provide for improved geometry along the site frontage. If possible, a design speed of 50 miles an hour should be maintained. The overall impact of the improvements to the horizontal alignment will be to improve both capacity and safety along this section of the roadway.

SITE PLAN

The site plan basically provides for an interior loop roadway from which various access drives will provide direct access to the townhouse clusters. The design of the site plan is such to insure that the possibility of parking occurring on the loop roadway will be minimal and, therefore, it is possible to keep this collector roadway to a minimum width. We would recommend that the width be established somewhere between 26 feet and a maximum of 36 feet. The secondary, or local roads can be maintained at a width of from 22 to 30 feet, again depending upon local preference.

Parking is to be provided at a ratio of 2 parking spaces at each unit, one in the garage and one directly behind the garage unit. In addition, the plan calls for additional parking to be located within the cluster units. Based on previous experience, we would recommend a minimum of an additional one-quarter to one-third parking spaces per unit to be provided in surfaced paved parking areas. The site plan basically is consistent with this recommendation and we, therefore, see no demand for parking occurring within the internal loop roadway or on the internal street system.

CONCLUSIONS

On the basis of the data as set forth in this report, it is our conclusion that the proposed rezoning requested to allow 450 townhouse units on a 90 acre parcel of property can be granted without exerting a detrimental impact on traffic or safety on the adjacent street system of the Township of Warren. Our conclusions are based on the following:

A. Traffic to be generated by the proposed development will operate compatibly with the existing traffic.

B. With the recommended improvements to the geometry along County Route 525 at the site frontage, there will be an actual improvement to both safety and capacity as reflected in the level of service.

C. Sight distance from the proposed access locations meets and exceeds both the requirements of the Somerset County Planning Board and the American Association of State Highway and Transportation officials.

D. The proposed site plan provides adequate access to all of the units for daily, as well as emergency, access situations.

E. The proposed parking supply is more than adequate to meet the anticipated demands.

A P P E N D I X

TRAFFIC IMPACT STUDY
PROPOSED TOWNHOUSE ZONING

Township of Warren

County of Somerset

New Jersey

Prepared by:

ABBINGTON-NEY ASSOCIATES
Consulting Engineers-Planners
65 Gibson Place
Freehold, N.J. 07728

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130 Davidson Avenue
Somerset, N.J. 08873

April 6, 1981

LEVELS OF SERVICE

Level of service A describes a condition of free flow, with low volumes and high speeds. Traffic density is low, with speeds controlled by driver desires, speed limits, and physical roadway conditions. There is little or no restriction in maneuverability, due to the presence of other vehicles, and drivers can maintain their desired speeds with little or no delay.

Level of service B is in the zone of stable flow, with operating speeds beginning to be restricted somewhat by traffic conditions. Drivers still have reasonable freedom to select their speed and lane of operation. Reductions in speed are not unreasonable, with a low probability of traffic flow being restricted. The lower limit (lowest speed, highest volume) of this level of service has been associated with service volumes used in the design of rural highways.

Level of service C is still in the zone of stable flow, but speeds and maneuverability are more closely controlled by the higher volumes. Most of the drivers are restricted in their freedom to select their own speed, change lane, or pass. A relatively satisfactory operating speed is still obtained, with service volumes perhaps suitable for urban design practice.

Level of service D approaches unstable flow, with tolerable operating speeds being maintained though considerably affected by changes in operating conditions. Fluctuations in volume and temporary restrictions to flow may cause substantial drops in operating speeds. Drivers have little freedom to maneuver, and comfort and convenience are low, but conditions can be tolerated for short periods of time.

Level of service E cannot be described by speed alone, but represents operations at even lower operating speeds than in level D, with volumes at or near the capacity of the highway. At capacity, speeds are typically, but not always, in the neighborhood of 30 miles per hour. Flow is unstable, and there may be stoppages of momentary duration.

Level of service F describes forced flow operation at low speeds, where volumes are below capacity. These conditions usually result from queues of vehicles backing up from a restriction downstream. The section under study will be serving as a storage area during parts or all of the peak hour. Speeds are reduced substantially and stoppages may occur for short or long periods of time because of the downstream congestion. In the extreme, both speed and volume can drop to zero.

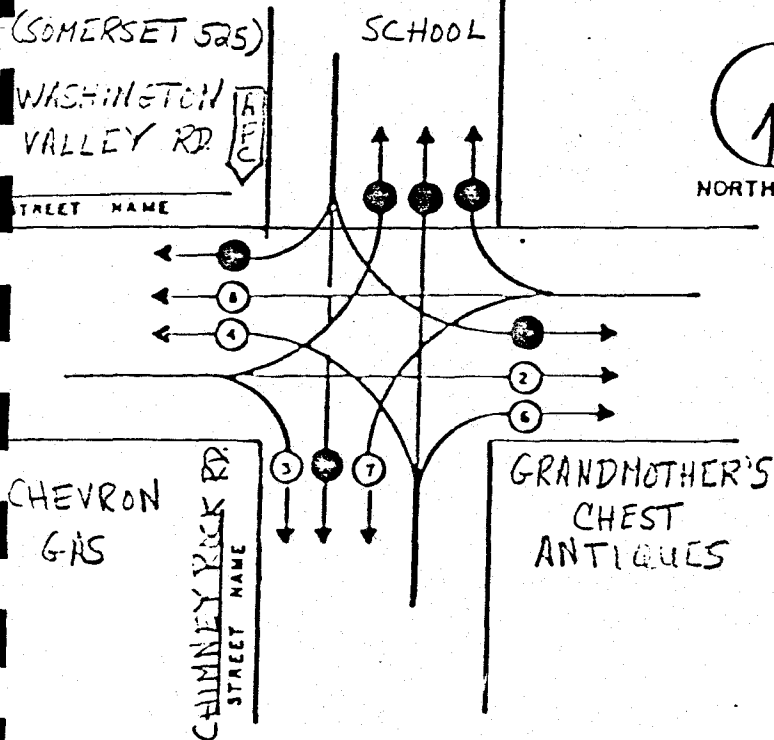
ABBINGTON-NEY ASSOC.

65 GIBSON PLACE
FREEHOLD, N. J. 07728

LOCATION: INTERSECTION CHIMNEY ROCK WASHINGTON
MUNICIPALITY: BRIDGEWATER TOWNSHIP
COUNTY: SOMERSET
DATE: APRIL 3, 1981
TIME: from 4:00 PM to 6:00 PM
S M T W T F S (Indicate Day)

SUMMARY SHEET

JOB NO. _____



DRAW SKETCH OF INTERSECTION ABOVE

TIME OF DAY	1	2	3	TOTAL 1-2-3	4	5	6	TOTAL 4-5-6	7	8	9	TOTAL 7-8-9	10	11	12	TOTAL 10-11-12	TOTAL
4:15	-	67	18	85	33	-	12	45	20	50	-	70					206
4:30	-	44	31	75	40	-	21	61	18	60	-	78					214
4:45	-	44	29	73	43	-	18	61	14	38	-	52					186
5:00	-	85	37	122	55	-	22	77	13	59	-	72					177
5:15	-	84	32	116	75	-	27	102	20	39	-	109					322
5:30	-	76	32	108	34	-	30	64	16	55	-	71					244
5:45	-	64	32	96	66	-	23	89	14	73	-	87					277
6:00	-	60	33	93	49	-	13	62	15	62	-	77					233
TOTAL	-	524	244	768	395		146	561	130	456		616					1911
5:45		309	133	442	220		102	332	63	276		339					1111



ABBINGTON - NEY ASSOCIATES

JOB NO. _____
 YEAR 1981
 SHEET NO. 1 OF 1

- ATR TRAFFIC COUNT SUMMARY -

LOCATION Mt. Hope Rd. 1000 FEET N OF Wash Vly Rd DIRECTION Both
 MUNICIPALITY WARREN COUNTY, Somerset STATE N.J.
 PATTERN NUMBER _____ AADT _____ ADT _____ AWDT _____ AWET _____
 PEAK HOURS: 237 A.M. 8-9 VEHICLES 5-6 P.M. 310 VEHICLES

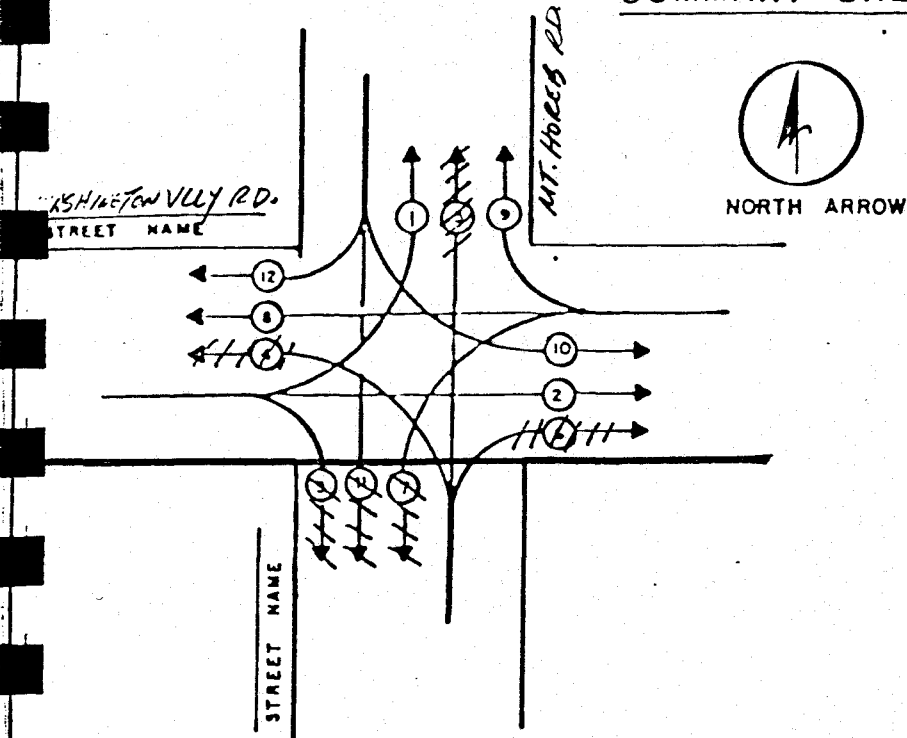
DATE	/	/	/	/	/	/	/	
DAY	SUN	MON	TUE	WED	THU	FRI	SAT	
0000-0100						20		
0100-0200						11		
0200-0300						7		
0300-0400						3		
0400-0500						4		
0500-0600						13		
0600-0700						54		
0700-0800						235		
0800-0900						237	←	
0900-1000						121		
1000-1100						109		
1100-1200						114		
1200-1300						106		
1300-1400						108		
1400-1500						130		
1500-1600					163	180		
1600-1700					230	238		
1700-1800					263	310	←	
1800-1900					167			
1900-2000					118			
2000-2100					83			
2100-2200					60			
2200-2300					54			
2300-2400					38			
TOTAL					2440	2520		

ABBINGTON-NEY ASSOC.

65 GIBSON PLACE
FREEHOLD, N. J. 07728

LOCATION WASHINGTON VALLEY RD & MT HOPE RD.
MUNICIPALITY WARRENTON TOWNSHIP
COUNTY SOMERSET
DATE 4-2-81 S M T W ① F S
TIME: from 4:00 PM to 6:00 PM (Indicate day)

SUMMARY SHEET CLEAR - 60° JOB NO. 436900



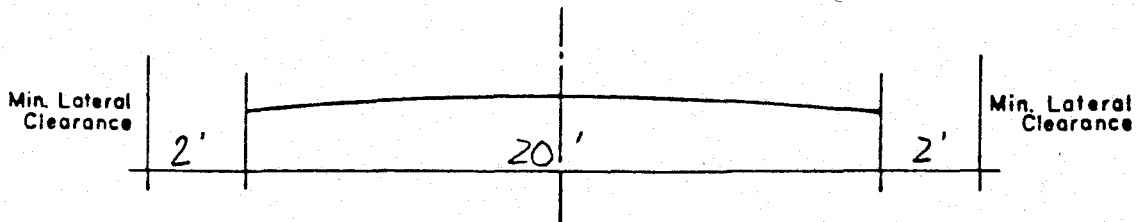
DRAW SKETCH OF INTERSECTION ABOVE

TIME A.M. OR P.M.	1	2	3	TOTAL 1-2-3	4	5	6	TOTAL 4-5-6	7	8	9	TOTAL 7-8-9	10	11	12	TOTAL 10-11-12	TOTAL
4:00-4:15	4	48	-	52	-	-	-	-	-	60	16	76	10	-	21	31	159
4:15-4:30	5	67	-	72	-	-	-	-	-	69	16	85	12	-	26	38	195
4:30-4:45	5	55	-	60	-	-	-	-	-	86	25	111	11	-	36	47	218
4:45-5:00	8	81	-	89	-	-	-	-	-	75	21	96	7	-	27	34	219
5:00-5:15	14	75	-	89	-	-	-	-	-	101	12	113	14	-	33	47	249
5:15-5:30	12	63	-	75	-	-	-	-	-	67	31	98	14	-	23	37	210
5:30-5:45	10	61	-	71	-	-	-	-	-	68	19	87	11	-	18	29	187
5:45-6:00	11	54	-	65	-	-	-	-	-	54	16	70	11	-	18	29	164
TOTAL	69	504	-	573	-	-	-	-	-	580	156	736	90	-	202	292	1601
4:30-5:30	39	274	-	313	-	-	-	-	-	329	89	418	46	-	119	165	896



CAPACITY ANALYSIS

PROJECT NO: 4369 CLIENT: AMG Realty
 LOCATION: Co. Rt 525 (Mt. Laurel Rd)
 MUNICIPALITY: Warren COUNTY: Somerset



CRITERIA

LEVEL OF SERVICE

		*	D	E
W_L		1.00	.73	.75
T_L	3% - Rolling Terrain	.89	.89	.89
$1/C$	0% PSD .19	.40	.19	1.0
* Mod. Fed Section				

Assume 30% PSD

EQUATION

$$SV = 2000 \frac{1}{C} W_L T_L$$

SERVICE VOLUME

LEVEL OF SERVICE		VOLUME	OPERATING SPEED
D	$2000 (.19) (.73) (.89)$	250	23.5
E	$2000 (1.00) (.75) (.89)$	1335	30
D *	$2000 (.40) (1.00) (.89)$	715	23.5
C	$2000 (.28) (1.00) (.96)$	540	
D	$2000 (.61) (1.00) (1.00) (.97)$	1180	

SOURCE - REFERENCE
