STREET AND HIGHWAY NEEDS

FOR THE

PROPOSED NEW TOWN IN HOWARD COUNTY

ALAN M. VOORHEES AND ASSOCIATES, INC.
1420 New York Avenue, N. W.
Washington, D. C. 20005

October 29, 1964

INTRODUCTION

This report describes the general street and highway requirements for the New Town in Howard County, Maryland. These requirements were determined by analyzing the proposed land uses and the intensities of development. The street and highway system will require further analysis as planning progresses, particularly with respect to some of the elements such as interchange design, intersection layout and numbers of lanes for each section of the major routes. In total, the plan calls for 35 miles of divided major routes. This figure was arrived at by assuming that all routes carrying over 8,000 vehicles per day should be developed as divided multi-lane highways.

The recommendations in this report were checked with studies made by and for the Maryland State Roads Commission. Total travel has also been checked against total travel figures from other cities. These checks verify the general validity of the basic assumptions and assure overall conformance with previous planning for the area.

Total travel demand depends on the land use, the intensity of land development and the availability of transportation facilities. The twelve thousand acres of contiguous land included in the New Town will be developed for residential, commercial, recreational and industrial uses. The approximate proportions of the total land used for each purpose are shown below.

Residential	-	51%
Industrial	-	19%
Commercial	-	2%
Public Use	-	28%

Previous reports have proposed a general transportation system which would include transit vehicles of a special design operating in part on exclusive rights of way and in part on the public streets. The impact of this proposal was taken into account in developing the trip generation and attraction figures for each zone.

This system and the overall street and highway system are shown, together with the planned land uses, in Figure 1. Individual land uses and their trip generating characteristics will be described below.

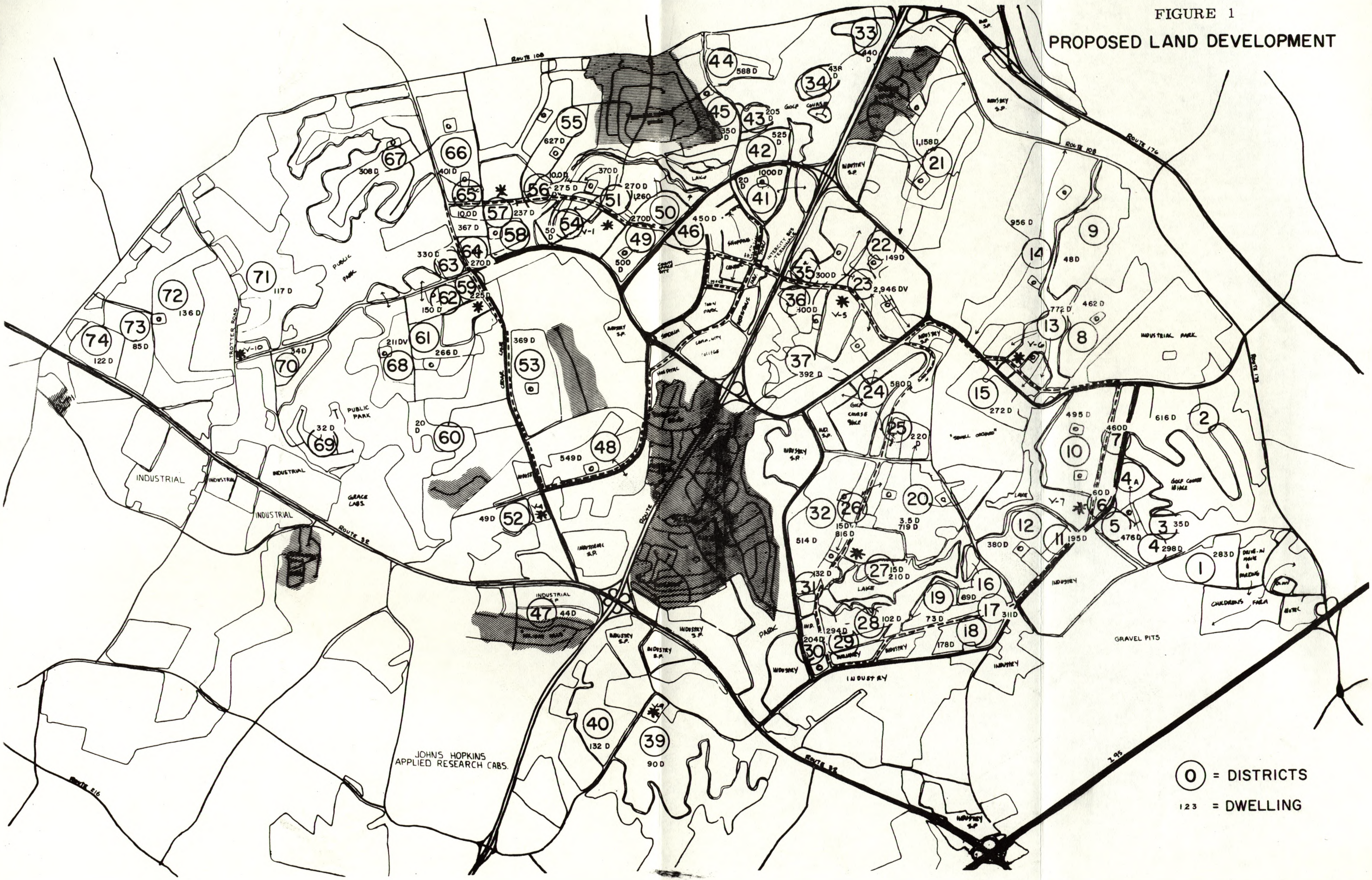
TRIP GENERATION FOR RESIDENTIAL AREAS

The plan calls for approximately 28,000 residential units distributed throughout the New Town. Of these, 13,000 would be located within 500 feet of the proposed transit routes. Different trip generation assumptions were made for these two classes of residential units. These are shown below.

Density Class	Auto Trip Frequency
1 dwelling unit per acre	7 trips per dwelling unit
3.5 dwelling units per acre	6 trips per dwelling unit
10 dwelling units per acre	5 trips per dwelling unit

FIGURE 1

PROPOSED LAND DEVELOPMENT



These patterns of trip production agree with the findings of the State Roads Commission Study for the Baltimore Region.

In residential areas served by the proposed Minibus system, the auto trip frequency would be as follows:

Density Class	Auto Trip Frequency
3.5 dwelling units per acre	4.0 trips per dwelling unit
10 dwelling units per acre	3.5 trips per dwelling unit
High-rise areas	3.0 trips per dwelling unit

It will be noted that the auto trip generation for the residences located near the transit routes is lower than that for the residences not served by transit. An analysis of travel patterns in the Baltimore Area showed that people living close to a transit route used transit for an average of one trip every day for each two persons. For the average family, this would amount to two trips per day via transit. That total has been deducted from the auto trip generation.

The trip generation figures were applied to each cluster of residences according to the density and the proximity of the transit routes to develop total generation for each cluster or zone. This is shown in Table I. The numbers of residences and the densities are shown in Figure 1.

COMMERCIAL AREAS

The plan for the New Town calls for three types of commercial development. The first and most significant of these is the Town Center which will

TABLE I

AUTO TRIP GENERATION BY ZONE

Zone	Du/Acre	Du Served by Transit *	Du Served by Auto	Auto Trip Generation
1	3.5	0	283	1698
2	3.5	66	550	3564
3	1	0	35	245
4	3.5	0	178	1068
4a	3.5	60	60	600
5	20	286	190	1951
6	15	60	0	210
7	10	460	0	1610
8	3.5	46	416	2680
9	0.4	0	48	336
10	3.5	247	248	2476
11	15	195	0	683
12	3.5	128	252	2024
13	15	386	386	3281
14	3.5	48	908	5640
15	3.5	91	181	1450
16	3.5	30	59	474
17	10	311	0	1088
18	3.5	178	0	712
19	3.5	49	24	340
20	3.5	72	647	4170
21	3.5	0	1158	6948
22	3.5	75	74	744
23	10-15	1984	962	11754
24	10	464	116	2204
25	10	220	0	770
26	15	816	0	2856
27	15	42	168	987
28	15	34	68	459
29	10	294	0	1029
30	20	204	0	714
31	10	132	0	462
32	3.5	257	257	2570
33	10	0	440	2200
34	10	0	438	2190

* Within 500 feet of transit route

TABLE I (Continued)

Zone	Du/Acre	Du Served by Transit	Du Served by Auto	Auto Trip Generation
35	H.R.	240	60	1020
36	H.R.	240	60	1020
37	3.5	0	392	2352
38	3.5	0	241	1446
39	0.4	0	90	630
40	1.0	0	132	924
41	20	500	500	4250
42	10-15	0	525	2625
43	10	0	205	1025
44	10	0	588	2940
45	3.5	0	350	2100
46	15	450	0	1575
47	1.0	0	44	308
48	3.5	439	110	2416
49	10-15	300	200	2050
50	3.5	108	162	1404
51	10-15	756	504	5166
52	3.5	10	39	274
53	3.5	258	111	1698
54	3.5	37	13	226
55	3.5	0	627	3762
56	10	275	0	962
57	15	237	0	830
58	3.5	74	112	968
59	15	225	0	788
60	0.4	0	20	140
61	3.5	0	266	1596
62	10	75	75	637
63	15	330	0	1155
64	10	270	0	945
65	10	367	0	1285
66	3.5	0	401	2406
67	1.0	0	308	2156
68	1.0	0	211	1477
69	0.4	0	32	224
70	0.4	0	34	238
71	0.4	0	117	819
72	0.4	0	136	952
73	1.0	0	85	595
74	3.5	0	122	732
		12,930	15,004	130,303

ultimately have over one million square feet of commercial space and will provide the major comparison shopping facilities for the Town.

Next in significance will be the Village Centers, each of which will have up to 50,000 square feet of commercial area along with other community services. Finally, there will be Neighborhood Centers which will have a small amount of retail space and will offer convenience shopping opportunities for 200 to 300 families in the immediate vicinity. The latter will not attract large volumes of traffic, but will reduce both auto and transit travel on the street system by offering convenient places to shop for incidental items which might otherwise require a trip to a Village Center. This has been taken into account in the estimates of trip generation by individual residences.

Each Village Center is expected to generate from 2,000 to 4,000 trips per day. Centers of this type commonly generate 40 trips per 1,000 square feet of retail area. The exact number depends on the location of the center with respect to clusters of residences and to other centers in the area.

The Town Center, in addition to being the major place for retail activity, will also have over one million square feet of office space, some residential units, a Community College and a research center which could employ as many as 5,000 persons. It is estimated that this complex would attract 100,000 trips per day, 10,000 of which would take place during the peak hour. The number of peak hour trips and their direction with respect to the Center are shown in Table II.

TABLE II

VEHICLE TRIPS RELATED TO THE TOWN CENTER
Weekday Afternoon Peak Hour

Activity	Estimated Size	Vehicle Trips In	Vehicle Trips Out
Retail	1,000,000 sq. ft.	1,400	1,200
Office	1,000,000 sq. ft. (5,000 employees)		1,500
Research Center	5,000 employees		1,500
Residential	2,000 dwelling units	1,600	800
Community College and other Miscellaneous Activities		1,000	1,000
	TOTAL	4,000	6,000
		10,000	

INDUSTRIAL AREAS

Industrial areas, like any other type of development, generate trips according to the intensity of their development. The industrial areas in the New Town are located throughout the Town, but they are generally planned so that they have access from major routes such as Route 32 or Route 176. Because no data are available regarding the planned intensities or the numbers of workers anticipated for each area, it was necessary to make some very general assumptions so that traffic volumes could be estimated. Studies in other areas have shown a range of values from 10 to 50 trips per acre for industrial park types of areas. Accordingly, a figure of 25 trips per acre was used as representing an average value. This resulted in a total of 30,000 trips per day for the industrial sites.

Using the assumptions previously described it was possible to determine the number of trips which would enter or leave each zone. In this case, the entire Town was subdivided into zones, generally by defining each cluster of residences, each industrial site and each Center as a zone.

To determine where these trips would go (or come from) it was necessary to subdivide them into classes according to purpose. For use in trip assignment, the trips were divided into four groups, as follows: work, shopping, social-recreational, and other. Each of these groups of trips has different trip length characteristics. Figure 2 shows the trip length characteristics for the four purpose groups.

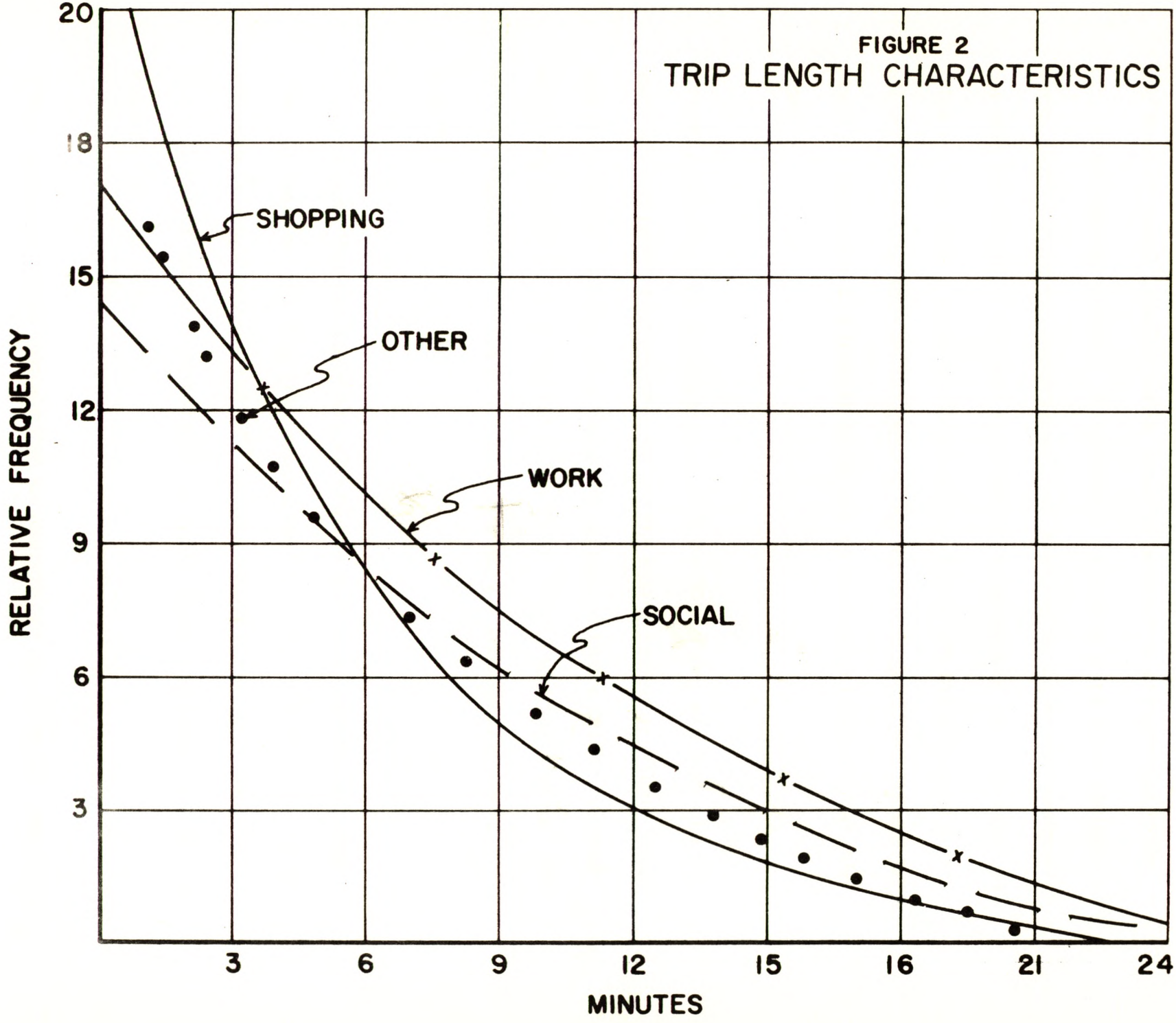


FIGURE 2
TRIP LENGTH CHARACTERISTICS
SHOPPING
OTHER
WORK
SOCIAL
RELATIVE FREQUENCY
MINUTES
20
18
15
12
9
6
3
3
6
9
12
15
16
21
24

This information, together with the total numbers of trips from each zone and time of travel between zones, made it possible to assign trips to the street and highway system. For example, shopping trips were assigned between zones having residences and retail area; work trips were assigned between residential areas and zones having employment, etc. In each case, trips were assigned to the shortest route. There are more refined techniques for making such an assignment but the accuracy of the data available about the land uses and intensities do not warrant such refinement at this time.

Travel related to new development within the New Town was then added to estimates of future traffic prepared for the major routes by Wilbur Smith and Associates. This gives a complete picture of future traffic volumes assuming complete development of the Town and the highway system. The traffic volumes are shown pictorially in Figure 3 and numerically in Figure 4.

It can be seen that the major arterial routes will be Routes 29, 32, and 176. In addition, the Ring road around the Town Center will carry heavy volumes as would be expected. In addition, study of the interchange of traffic between major routes shows the types of interchanges which will be required in each case.

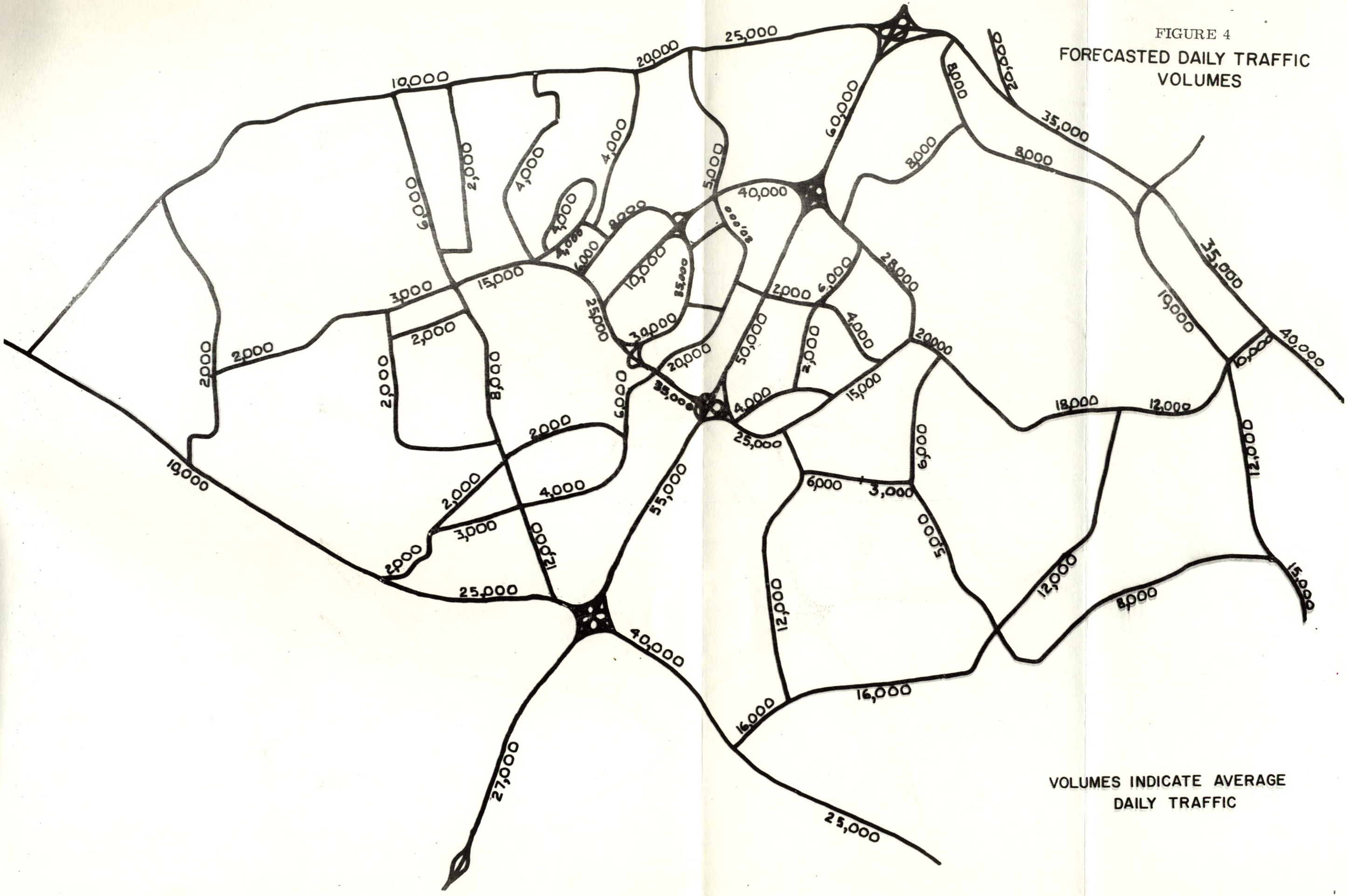
These estimates would indicate that an interchange should be built between Route 176 and Route 29. This could be the normal cloverleaf design

FIGURE 3

FORECASTED DAILY TRAFFIC VOLUMES

FIGURE 4

FORECASTED DAILY TRAFFIC VOLUMES



VOLUMES INDICATE AVERAGE DAILY TRAFFIC

except for movements from the east to the south on Route 29. These movements would require a directional interchange ramp. The volumes on Route 29 would be around 60,000 while volumes on Route 176 would be in the 40,000 class.

An additional interchange is required north of the shopping center. This should be a cloverleaf design except for travel moving from the west to the north on Route 29. This would require a directional interchange. From 50,000 to 60,000 trips a day would be made on Route 29 in this vicinity with 40,000 to the west and 30,000 to the east of this interchange.

Just south of the Town Center there is need for another cloverleaf interchange; however, a directional interchange should be provided for traffic coming from the south on Route 29 going to the west. This interchange would handle around 50,000 on Route 29 and 35,000 to the west, and 25,000 to the east of Route 29.

Still another interchange is needed on Route 29 where it intersects with Md. 32. A cloverleaf interchange will be adequate. The volumes on Route 29 will be between 30,000 and 50,000 trips with 40,000 coming from the east and 35,000 from the west.

Two other interchanges will be needed to serve the Town Center, one from the south and one from the north. A trumpet type of interchange should be used. Volumes on the various approaches should be around 30,000.

RECOMMENDED STANDARDS

All the routes carrying over 8,000 trips a day should be developed as four-lane divided facilities with complete control of access. Sections carrying over 25,000 trips a day should be developed as six-lane facilities. The plan calls for 35 miles of divided facilities.

In developing the other streets in the area, the following standards should be used for curb-to-curb widths.

STREET WIDTH

Type of Parking	Less than 1000 Trips per Day	Between 1000-3000 Trips per Day	Over 3000 Trips per Day
No parking, or very limited	26	28	30
Frequent parking			
One side	28	30	32
Two sides	36	38	40

These standards are based on maintaining two ten foot lanes for moving traffic on low volume streets. Where parking is to be expected, an additional eight feet has been added for each side. On higher volume streets, wider lanes are required for moving traffic safely and conveniently. Therefore, the standards call for widening in two steps to two twelve foot lanes. Such standards should adequately handle traffic on the residential streets in the New Town. It is expected that the street system will be laid out so that travel on residential streets will be minimized. The determination of whether parking is required on both sides should be based on the amount of

off-street parking to be provided in conjunction with housing development.

As a general check on accuracy, the traffic projections were compared with cities of a similar size. For example, six vehicle miles per person were developed for this New Town (about 610,000 vehicle miles per day). In Erie, Pennsylvania, this figure was 5.4 miles per person. In Erie, 80,000 trips are made to the downtown area, in comparison with 100,000 estimated for the New Town. Regional shopping centers outside the Erie CBD probably account for this.

These tests verify that the estimated volumes were generally within the acceptable range of accuracy. If anything, they may be on the high side if the Minibus operation proves to be effective.

However, it must be recognized that these projections are built on several approximations and undoubtedly are subject to more final analyses when the plans are adopted. At that time the traffic forecast should be made in relation to the two metropolitan areas so that the proper amount of traffic in and out of the area can be established at the same time traffic flows within the New Town are developed.

SUMMARY

Although the street patterns and some of the land uses that are now anticipated for the New Town will be modified during their development, Figures 3 and 4

generally depict the traffic volumes that are likely to develop on the arterial street system. These volumes can be handled by the street system that has been proposed if built to the standards described in this report.