A UNION TERMINAL
FOR
HYANNIS, MASSACHUSETTS
PLANNING A COMBINED RAIL, BUS AND AIR TERMINAL

by

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May 19, 1950

Professor Frederick J. Adams, Head
Department of City and Regional Planning
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Dear Professor Adams,

I respectfully submit "A Union Terminal for Hyannis, Massachusetts - Planning a Combined Rail, Bus and Air Terminal" as my thesis in partial fulfillment of the requirements for the degree of Master in City Planning.

Sincerely yours,

Franz J. Vidor

ACKNOWLEDGMENTS

I wish to express my sincere appreciation to the entire faculty of the Department of City and Regional Planning for their guidance during my stay at M.I.T.

In the course of the base studies for this thesis, helpful advice and useful information was given me by the following persons and agencies:

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and many other citizens and officials of Hyannis.

F. J. V.

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THE PROBLEM

It is very seldom that a combined terminal serving air, bus and rail passengers can be even considered for discussion due to the generally existing physical separation of airports from rail and bus terminals. The situation in Hyannis, on the other hand, suggests just such an approach.

The airport is situated about three quarters of a mile from the center of the village and the railroad tracks run parallel to and within fifteen hundred feet of the present administration building. There is no bus terminal per se; the buses merely stop at the railroad station but do not serve the airport at all. In addition to the physical characteristics which seem to favor a union terminal, there exists at present a situation which would call for an immediate consideration of such a terminal: the New York, New Haven and Hartford Railroad is contemplating the construction of a new railroad station north of its present location, and the airport administration building is about to be moved due to operational exigencies. What better opportunity than to combine the two and add bus services, thus centralizing all means of public transportation, providing modern, adequate and convenient facilities and thereby adding to the already existing renown of Cape Cod in general and Hyannis in particular!

No project would serve the public well and be justified unless its usefulness would meet future demands. For purposes

of this study the population and transportation trends have been estimated for 1970 and the needs of the Union Terminal are based on the anticipated passenger volume at that time. The plans are flexible enough to build the terminal from a moderate unit in the beginning to its ultimate size and also to allow for future expansion should that be warranted.

In order to arrive at logical forecasts, three basic assumptions had to be made:

(a) the railroad is going to continue operations

(b) the Mid-Cape highway will be constructed

(c) the economic condition of the United States in general and of the area in particular will remain about at its present level

The first assumption cannot be substantiated at this time but must be accepted prima facia; the second assumption is likely to take place since the first section of this highway is already under construction; the last assumption again cannot be made with any accuracy. If, however, a depression should occur, it seems likely that the period of prosperity following it would tend to balance the economic situation over the twenty year period in question.

In addition to these basic assumptions certain factors had to be omitted and some limitations overcome. For instance, it was not possible to examine the freight and express aspects of the problem due to the limited time available. The financial conditions and the role which each of the three participating carriers would play in the operation of the

terminal have only been lightly touched. Furthermore, if time had permitted, a number of passenger counts should have been made. Lacking these, estimates were made in all cases where date were not available. With regard to forecasts of population and passengers, cognizance must be taken of the comparatively small area in question and thus the greater possibility of error. In addition, public carriers usually restrict their predictions to five years only.

I. ECONOMIC BASE STUDIES

A. DELINEATION OF AREA SERVED BY UNION TERMINAL

Although a union terminal at Hyannis would influence the transportation pattern of the entire Cape, the most direct influence would be exercised over those towns which lie to the east of and including Barnstable. This area comprises the County of Barnstable except for the towns of Bourne, Falmouth, Mashpee and Sandwich. (See Map 1)

With regard to rail passengers, these four towns can be reached either directly by rail or by transfer to either private automobile or bus without approach to the Hyannis Terminal. The same applies to bus passengers. Although two Class I airports are located in Falmouth, neither is large enough to serve schedule airlines and it is not expected that these fields would be enlarged or additional fields built within the next twenty years. Therefore, passengers on scheduled airlines destined for these four towns will use the Hyannis Terminal. However, since they number only a fraction of one per cent of the total population of Cape Cod, their quantitative insignificance has allowed the omission of population forecasts for the towns of their destination.

Cognizance must also be given the two islands south of Cape Cod, Martha's Vineyard and Nantucket. Their influence is felt primarily by the commercial airlines operating at Hyannis, and the forecast of commercial air passengers takes

this into account thus eliminating the need to include the islands in the planning area.

The area falling within the scope of the thesis then includes the following towns: Barnstable, Brewster, Chatham, Dennis, Eastham, Harwich, Orleans, Provincetown, Truro, Wellfleet and Yarmouth. They are referred to in this report as the Planning Area. Density varies between a low of 28 persons per square mile of land area in Truro and a high of 439 in Provincetown. The total planning area comprises 254 square miles, or about 62% of Barnstable County. Population-wise, the planning area totaled 68% of the county in 1940 and 66% in 1945.[1)]

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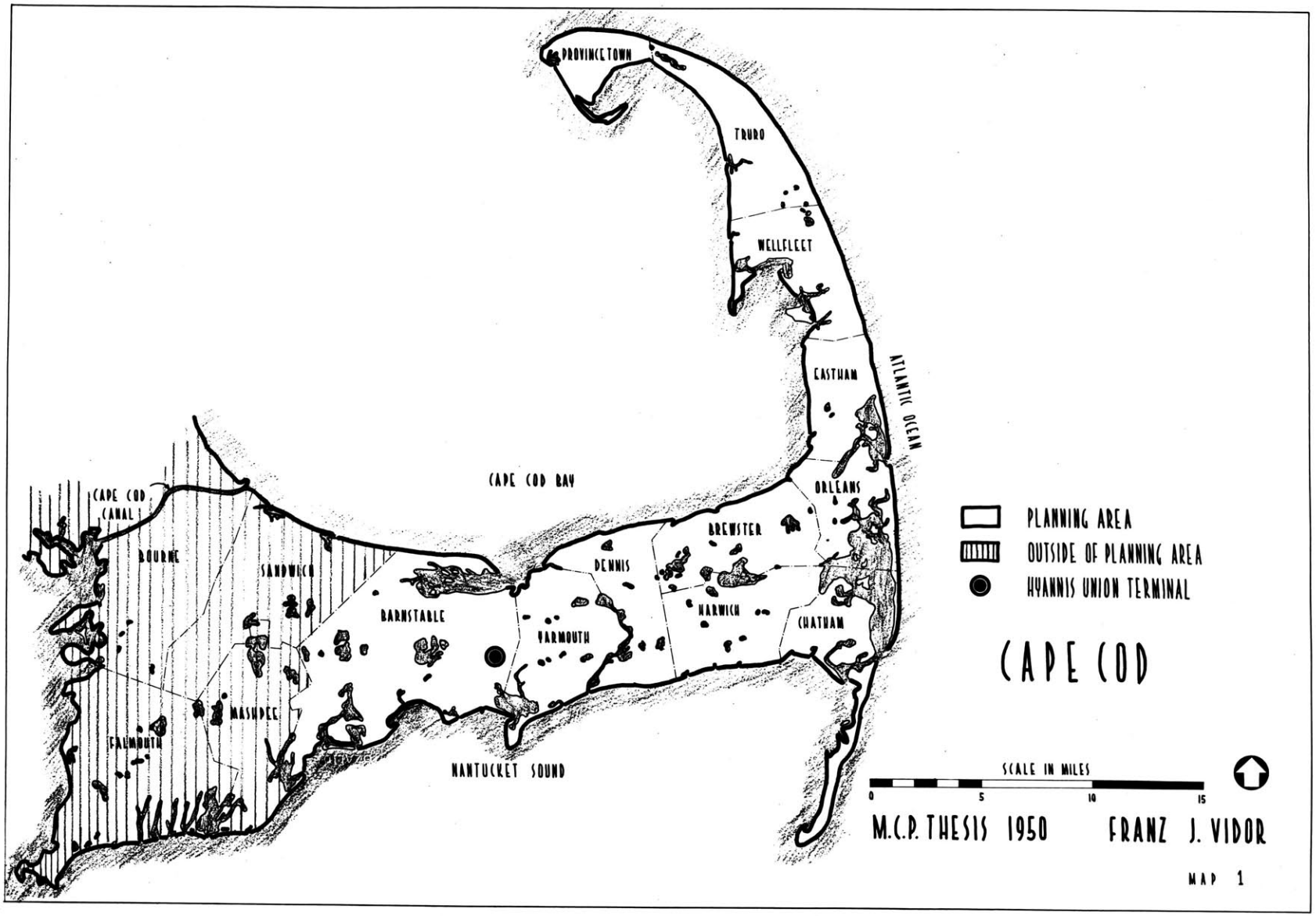
1) Mass. State Planning Board, Statistics of Mass. Cities and Towns by Planning Regions.


PROVINCETOWN
TRURO
WELLFLEET
EASTHAM
ATLANTIC OCEAN
ORLEANS
CAPE COD BAY
CAPE COD CANAL
BOURNE
SANDWICH
BREWSTER
DENNIS
BARNSTABLE
HARWICH
YARMOUTH
CHATHAM
MASHPEE
FALMOUTH
NANTUCKET SOUND
PLANNING AREA
OUTSIDE OF PLANNING AREA
HYANNIS UNION TERMINAL
CAPE COD
SCALE IN MILES
0
5
10
15
M.C.P. THESIS 1950
FRANZ J. VIDOR
MAP 1

B. ECONOMIC CHARACTER OF AREA

Cape Cod, including the planning area, is principally a vacation and resort region, deriving its main source of income and primary recognition from the tourist trade. Agriculture and fishing are next in importance but neither are of the magnitude they used to be a few generations ago. Manufacturing, although increasing, is still at a very low level and provides income to less than 5% of the total number of employed persons. The type of industrial activity indicates its local nature inasmuch as printing and publishing, food, transportation equipment and lumber products, which are primarily for local needs, comprise over one half of all manufacturing establishments.[1)]

Inasmuch as the vacation business constitutes the major economic asset of the area, a few observations regarding its influence on the proposed Union Terminal appear to be justified at this time. The tourist season extends from the July fourth weekend to the Labor Day weekend although the pre- and postseasons have become increasingly popular. Hardly any tourists visit the area in the winter. The result of this seasonal activity is the great taxation on all means of public and private transportation during the summer months and a great slump in wintertime. Generally speaking, the vacationists may be grouped into two categories: those who spend all or the greater part of the summer at one place and those who

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1) U. S. Census of Manufactures, 1947

spend a week or two on the Cape, travelling about more or less constantly during their stay. There is another category, however, which deserves attention: those members of the household, usually the head, who spend the weekends with their family on the Cape but commute to work, usually by means of a public carrier. It is all of those plus of course the permanent residents who would benefit by a new union terminal, especially since over 50% of all passengers on public carriers are destined beyond Hyannis and so need to transfer from one means of transportation to another.

The magnitude of the vacation industry can easily be seen by the three- to fourfold increase in population during the summer months as compared with the permanent all year residents. In terms of economics this increase means employment for many service and domestic workers as well as for the self-employed during the summer months and submarginal operations or closed business during the remainder of the year. Fortunately, however, the type of person now migrating to the Cape Cod area for permanent residence is not entirely dependent on a source of income limited to seasonal work only; a great many newcomers are retired businessmen or craftsmen who supplement their annuities with revenues obtained as the result of the vacation industry and thus are not a burden on the community during the off season. On the contrary the expected increase of financially independent families will tend to stimulate the business and commercial activities during the submarginal

winter months and may make it possible for some of them to operate profitably. This in turn might benefit the summer visitor in that reduced overhead may bring about reduced prices instead of the present practice of charging what the traffic will bear to make up for losses incurred during the winter.

C. POPULATION TRENDS AND ESTIMATES

In order to determine the size of a house it is necessary to know the number and type of persons who are going to live in it. Likewise in order to determine the size of a terminal it is essential that one know the potential number of its users. An essential step in that direction is the forecast of the future population to be served by the terminal.

To make a population forecast of a large area is difficult at best and to arrive at figures for a comparatively low density region such as the planning area is subject to a great many variables which cannot be measured. It is believed that the method of population forecast used in this thesis is rational and that time will prove the data to be reasonably accurate.

Due to the seasonal characteristics of the planning area the population data have been broken down into two categories:

(a) those living in the area permanently on a year around basis

(b) those living in the area at any one time during the summer

This was necessary in order to determine the potential users of the Union Terminal both during a peak period as well as during a low period.

The permanent all year population of the planning area has shown a slight decline in the first two decades of the twentieth century--from 20,918 in 1900 to 18,940 in 1920. During the next twenty years it increased to 25,308 but by

1945 had decreased again to 25,079.[1] This decline during the war years is explainable by the comparative absence of industrial war activities in the area and the consequent migration of workers to the better paid war jobs in larger industrial centers. This movement was further aided by the decrease in the vacation industry with its resulting financial decline. On the other hand, the expansion of Camp Edwards in Sandwich did not materially affect the population pattern in the planning area.

As to the summer population no figures are available to show a general trend over the last forty or fifty years. In 1948 the Cape Cod Chamber of Commerce estimated the summer population which, for the planning area, amounted to 93,900 and is less than 1% off the estimates made here.

The method of population forecast in this report is based principally on the number of new houses built since 1945. It was felt that no other data were available which would show the relationship between permanent and summer population better. Although the data used between 1940 and 1948 were those of dwellings assessed[2], it was found that in 1940 they were within 3% of the number of dwellings enumerated by the U. S. Census of Housing and thus considered accurate enough for the purposes of this study.

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1) U. S. Massachusetts Census
2) Massachusetts Department of Corporations and Taxation

The forecast of the permanent all year population is based on two assumptions:

(a) 25% of all new dwellings are occupied on a year around basis

(b) there are 3 people per dwelling in winter

Estimates made by assessors in the various towns in the planning area substantiate the first assumption. It was felt that the number of new houses built after the war did not indicate a continuing trend but rather an artificial increase which was caused by the absence of residential construction during the war years and which is not likely to be sustained at that rate for the next twenty years. The second assumption is lower than the 3.3 given by the 1940 Census but was considered a more likely indication of trend for this area in view of the economic character of the region and the recent influx of older age groups. Three ranges of future population were obtained by varying the number of new dwellings from 300 per year for the low to 600 for the medium and 1,000 for the high estimates. The results of the forecast are shown in Table 1-A.

The forecast for the total summer population is based on the same number of dwellings used in the prediction for the permanent all year population. The assumptions were modified, however, to take cognizance of the different characteristics of the summer population and are

(a) 100% of all dwellings are occupied

(b) there are 4.0 persons per dwelling during the summer

(c) 100% occupancy of hotels and tourist lodgings

Although there may be some vacancies in the number of dwellings, the total number of people affected would be negligible and is therefore omitted. With regard to the size of a family unit, it is generally known that not only do the permanent residents invite friends or relatives during the summer but also that the summer resident's family size usually includes children and sometimes servants. So an average of 4.0 persons per family appears to be a conservative figure. A compromise has been made in the assumption of 100% occupancy of hotels and tourist lodgings. Although during the summer months of 1947, 1948 and 1949 the average occupancy was only about 83%, the assumed increased capacity of 100 units annually over the next twenty years is very conservative and hence a greater rate of increase than predicted would tend to average the higher occupancy percentage.[1] The low, medium and high estimates for the summer population will be found in Table 1-B.

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1) Federal Reserve Bank of Boston, New England Vacation Business Index, July and August 1947-1949.

TABLE 1-A

Permanent, All Year Population in Planning Area 1940-1970

Year (Dec.31)	Dwelling Units Increase	Dwelling Units Total	Population Increase	Population Total
1940 1)		15,138 2)		25,308 3)
1945 1)		15,882 2)		25,079 4)
1945	415 5)	16,297	311 5)	25,390
1946	969	17,266	730	26,120
1947	271	17,537	200	26,320
1948	3,086	20,623	2,300	28,620
Low Estimate				
1949	300	20,923	225	28,845
1950	300	21,223	225	29,070
1960	3,000	24,223	2,250	31,320
1970	3,000	27,223	2,250	33,570
Medium Estimate				
1949	600	21,223	450	29,070
1950	600	21,823	450	29,520
1960	6,000	27,823	4,500	34,020
1970	6,000	33,823	4,500	38,520
High Estimate				
1949	1,000	21,623	750	29,370
1950	1,000	22,623	750	30,150
1960	10,000	32,623	7,500	37,650
1970	10,000	42,623	7,500	45,150

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1) April
2) Commonwealth of Mass., Dept. of Corporations and Taxation
3) Sixteenth U. S. Census, 1940
4) Commonwealth of Mass., Census of Population, 1945
5) May - December only (75% of annual increase)

TABLE 1-B

Total Summer Population in Planning Area 1948-1970

Year (Dec.31)	Total Dwelling Units 1)	Population	Capacity of Hotels, etc.	Total Summer Population
1948	20,623	82,500	12,000	94,500
		Low Estimate		
1950	21,223	84,900	12,100	97,000
1960	24,223	96,900	13,100	110,000
1970	27,223	108,900	14,100	123,000
		Medium Estimate		
1950	21,823	87,300	12,100	99,400
1960	27,823	111,300	13,100	124,400
1970	33,823	135,300	14,100	149,400
		High Estimate		
1950	22,623	90,500	12,100	102,600
1960	32,623	130,500	13,100	143,600
1970	42,623	170,500	14,100	184,600

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1) From Table 1A

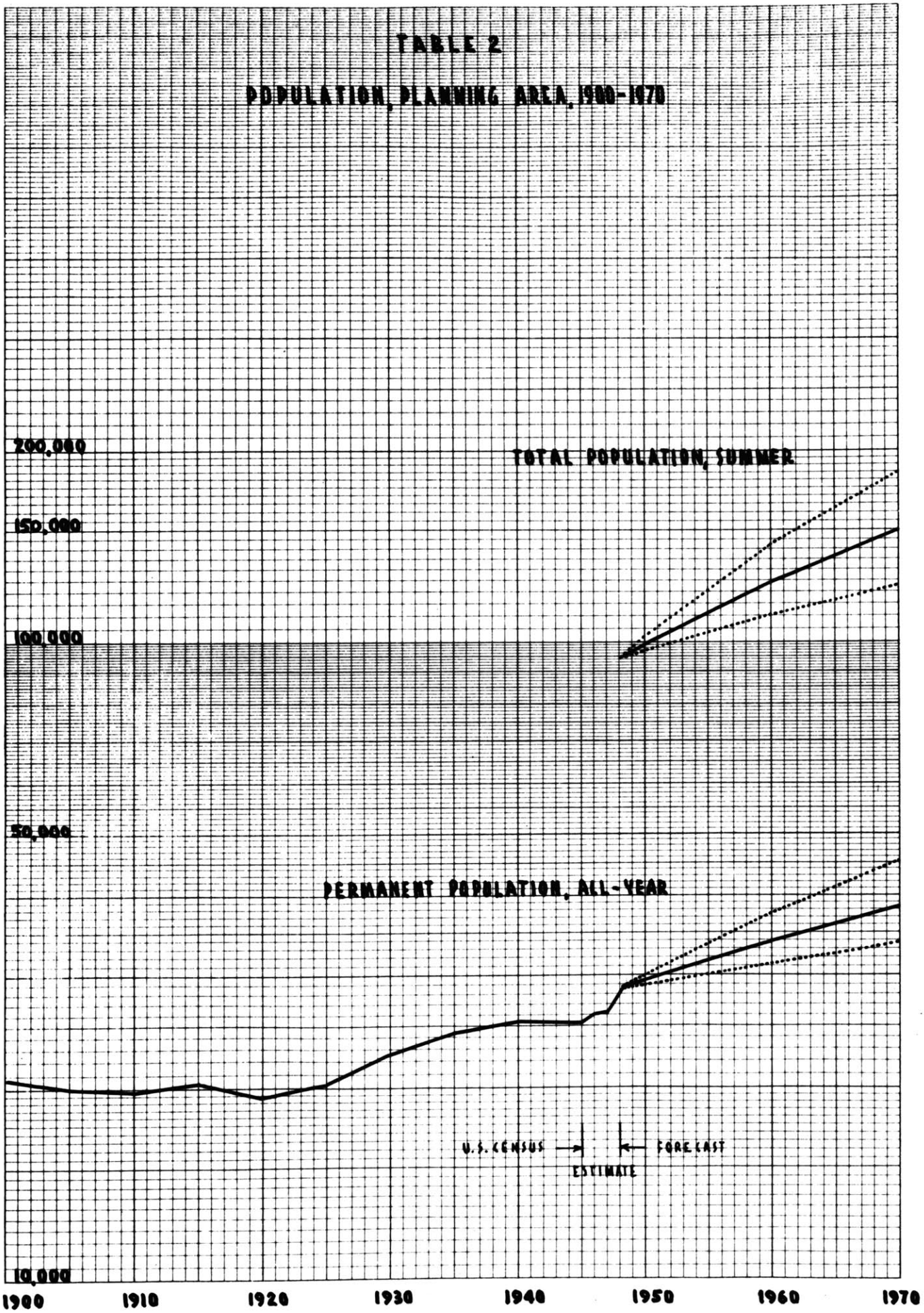


TABLE 2
POPULATION, PLANNING AREA, 1900-1970
200,000
150,000
100,000
50,000
10,000
TOTAL POPULATION, SUMMER
PERMANENT POPULATION, ALL-YEAR
U.S. CENSUS
ESTIMATE
FORECAST
1900
1910
1920
1930
1940
1950
1960
1970

D. TRANSPORTATION PATTERNS

In addition to the private automobile, there are three types of public carrier engaged in moving passengers to and within the planning area: airplane, railroad and bus. Table 3 shows the importance of Hyannis as the transportation center and transfer point of the Cape Cod region.

Here again, like the population pattern, or rather because of it, the influence of the summer season is reflected in the vast difference in the number of passengers between that season and the winter period. For purposes of this study it will become necessary to analyse the existing and potential passengers and carrier movements for periods of both low and peak activity. The low traffic activities occur during the midweek days in winter - Tuesday, Wednesday and Thursday. Peak traffic takes place on summer weekend days - Saturday and Sunday. Fridays and Mondays fall somewhere between peak and low activities and thus passenger traffic occuring on those two days is not considered of significance in the determination of the size of the Union Terminal. A day of low passenger activity is estimated as comprising 2.5% of the monthly traffic volume whereas a peak day will account for 5% of the total number of monthly passengers.

(1) Air Transportation

As indicated on Map 2 there are now five airports in the planning area, the largest being the Class III airport at Hyannis. A summary of the relevant data for these airports

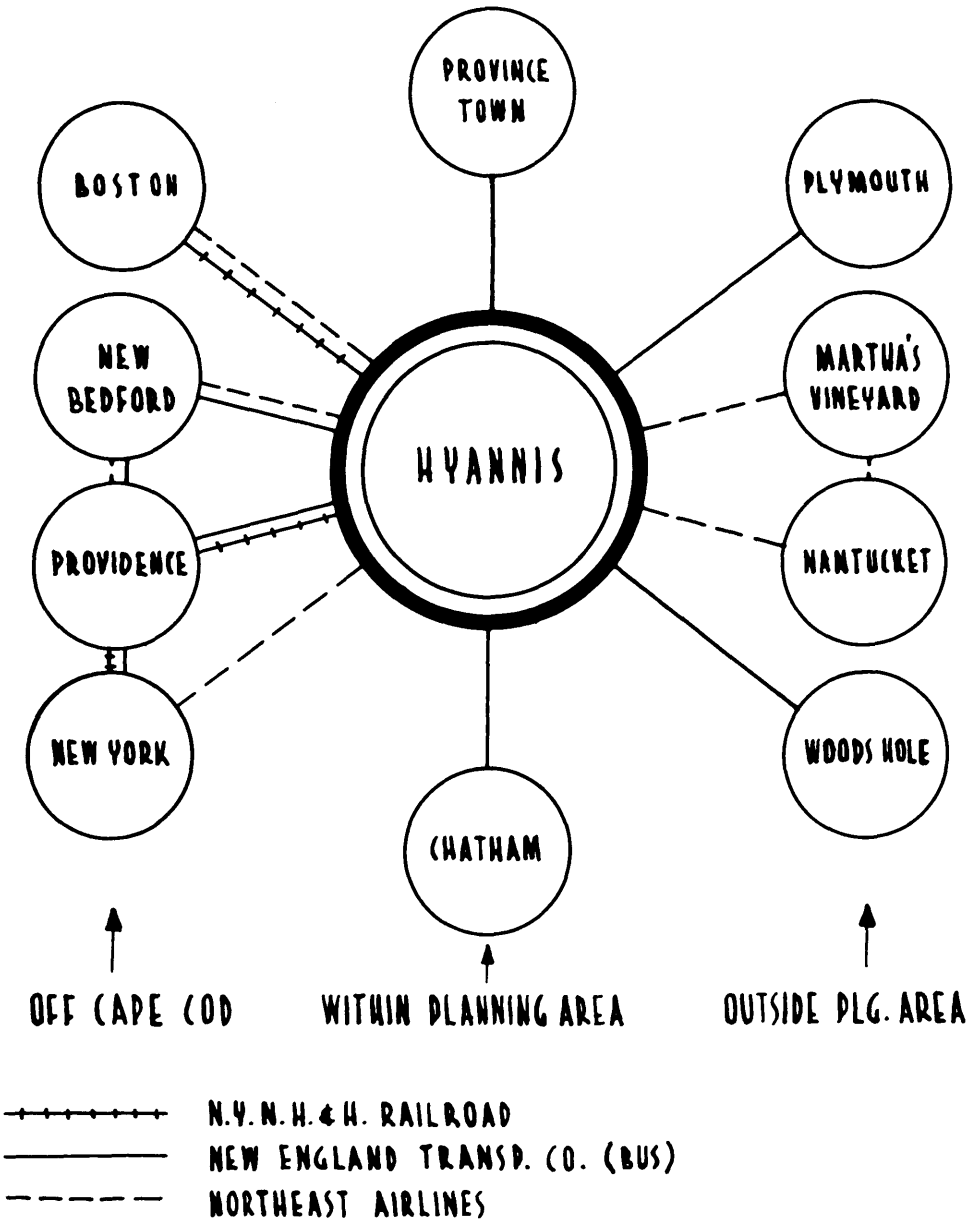
is given in Table 4. No increase in the number of airports is predicted by the State Planning Board for the period in question, although it is possible that a few landing fields for small private planes and helicopters might eventually be distributed throughout the area. In that case the larger, ixisting airports will still remain the servicing centers for most aircraft.

Air transportation can be grouped into two classes: (a) scheduled carriers and (b) itinerant planes. Northeast Airlines is at present the only scheduled air carrier, operating at Hyannis and serving the entire planning area as well as points outside the area. Itinerant planes include such commercial operations as sightseeing, chartered flights, aerial photography and other services as well as operations of planes owned by corporations and used for business purposes and privately owned and operated planes.

The monthly volume for both scheduled and itinerant flights and the number of itinerant planes using Hyannis airport during 1948 and 1949 are listed in Table 5. The number of scheduled flights of Northeast Airlines varies between two daily during the winter months and six daily during the summer, in addition to extra sections added occasionally during the latter period. It is interesting to note that the number of passengers on itinerant planes exceeds that of scheduled planes during the winter months whereas the opposite holds true for the summer. The only exception took place during the last

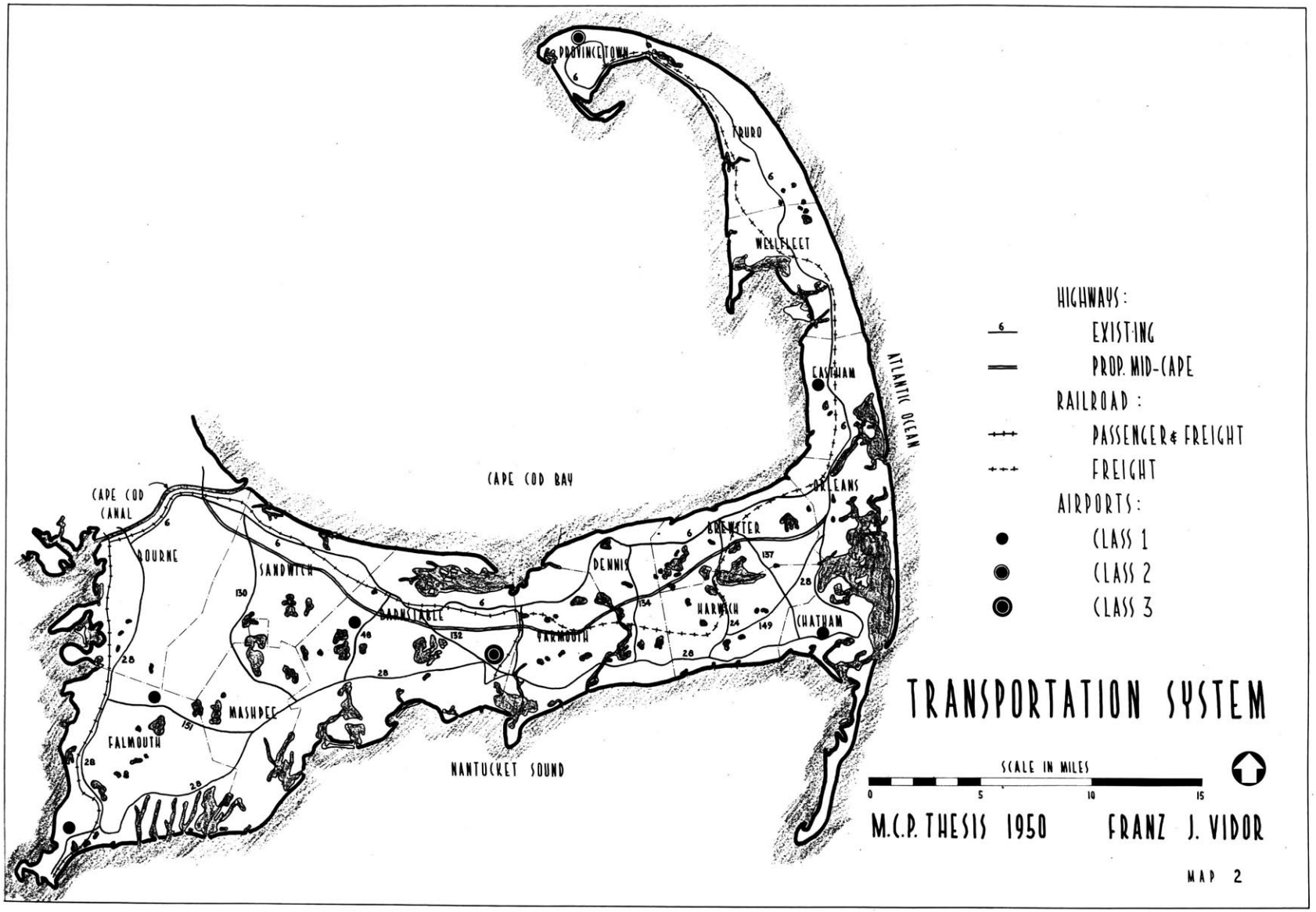
TABLE 3

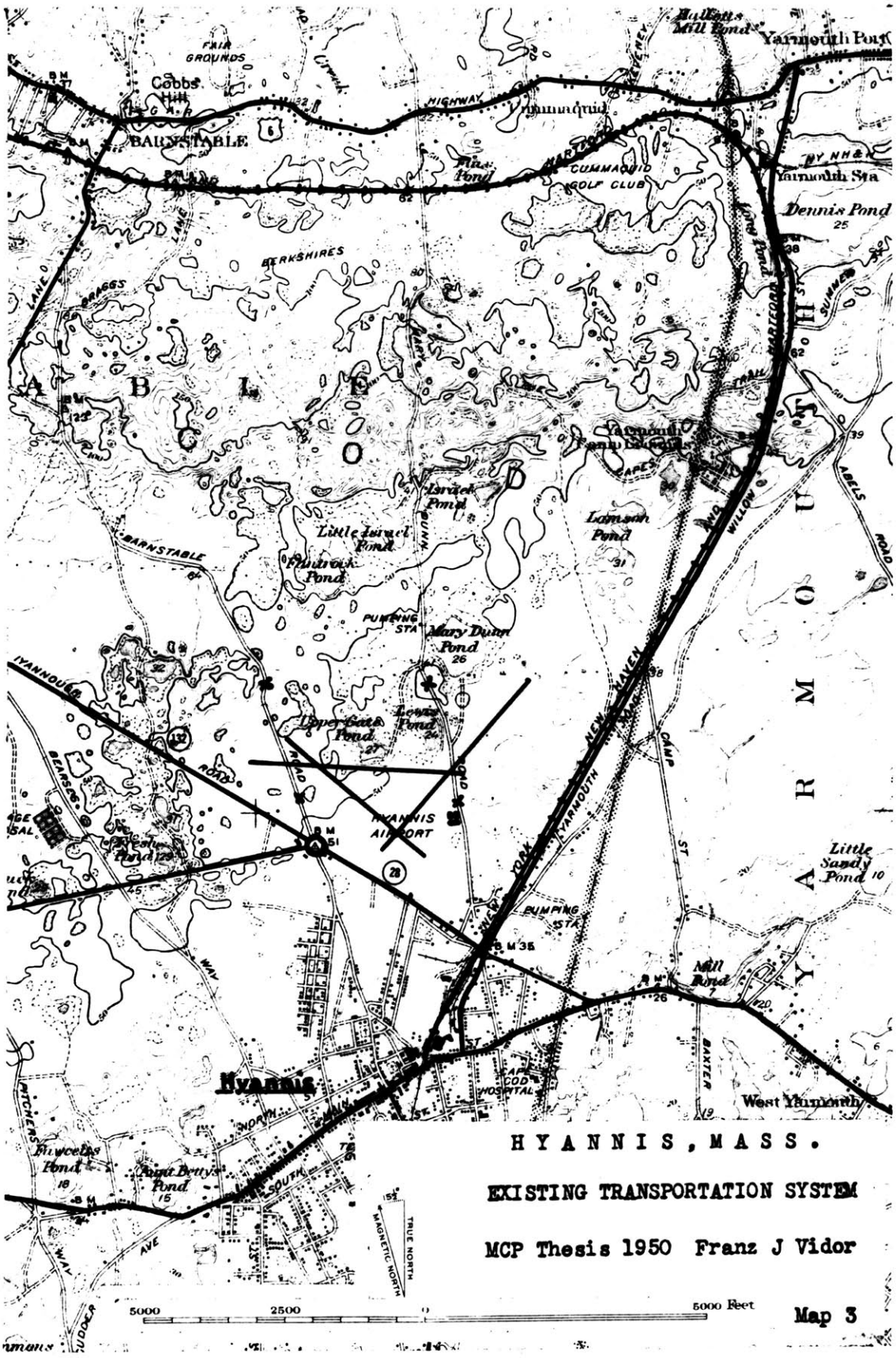
ORIGIN & DESTINATION OF PUBLIC CARRIERS



N.Y.N.H.&H. RAILROAD
NEW ENGLAND TRANSP. CO. (BUS)
NORTHEAST AIRLINES

M.C.P. THESIS 1950 FRANZ J. VIDOR


PROVINCETOWN
TRURO
WELLFLEET
EASTHAM
ORLEANS
ATLANTIC OCEAN
CAPE COD BAY
CAPE COD CANAL
BOURNE
SANDWICH
BARNSTABLE
DENNIS
BREWSTER
HARWICH
CHATHAM
FALMOUTH
MASHPEE
NANTUCKET SOUND
HIGHWAYS:
EXISTING
PROP. MID-CAPE
RAILROAD:
PASSENGER & FREIGHT
FREIGHT
AIRPORTS:
CLASS 1
CLASS 2
CLASS 3
SCALE IN MILES
0
5
10
15
TRANSPORTATION SYSTEM
M.C.P. THESIS 1950
FRANZ J. VIDOR
MAP 2



HYANNIS, MASS.

EXISTING TRANSPORTATION SYSTEM

MCP Thesis 1950 Franz J Vidor

Map 3

TABLE 4

Airport Date in Planning Area

	Hyannis	Marston Mills	Eastham	Chatham	Province-town
Operator	Municipal	Private	Private	Private	Municipal
No. of Runways	1 NE/SW 1 NW/SE 1 E/W	1 E/W 1 NE/SW 1 NNW/SSE	1 NE/SW 1 NW/SE	1 E/W 1 NW/SE 1 NE/SW	1 NE/SW
Length of Runways	4000 x 150 4000 x 150 4140 x 150	2450 x 50 1750 x 50 1575 x 50	1850 x 100 1200 x 110	1400 x 300 1225 x 300 1500 x 300	3500 x 100
Condition of Runways	Bit. Paving Bit. Paving Bit. Paving	Sod Turf Turf	Sand Gravel	Sod Turf Sand/Sod	Bit. Paving
Lights	x				
Hangars	2	1		1	
Misc. Services 1)	x	x	x	x	x

Source: Mass. State Planning Board

1) Includes any of the following: Gasoline, Minor Aircraft and Engine Repair, Flight Instruction, Charter and Passenger Flights, Sales and Rentals, Aerial Photography, Hangar Storage.

TABLE 5

Traffic Volume at Hyannis Airport 1947-1949

Month		Number of Northeast Airline Passengers	Number of Itinerant Passengers	Number of Itinerant Planes
1947	Jan.	122	270	130
	Feb.	125	227	66
	Mar.	157	676	197
	Apr.	276	569	151
	May.	332	589	160
	Jun.	803	1,142	300
	Jul.	1,867	1,639	419
	Aug.	2,397	1,710	449
	Sep.	1,113	1,254	321
	Oct.	315	490	134
	Nov.	221	563	133
	Dec.	172	390	110
1948	Jan.	120	136	45
	Feb.	170	232	71
	Mar.	267	309	93
	Apr.	254	349	114
	May	1,111	507	143
	Jun.	1,323	773	212
	Jul.	2,139	2,095	503
	Aug.	1,995	2,001	459
	Sep.	1,504	937	236
	Oct.	544	205	63
	Nov.	231	318	87
	Dec.	181	253	72
1949	Jan.	155	318	94
	Feb.	174	351	99
	Mar.	189	324	85
	Apr.	389	617	157
	May	611	890	251
	Jun.	1,663	1,442	340
	Jul.	3,219	1,940	445
	Aug.	4,167	2,021	461
	Sep.	2,364	1,024	240
	Oct.	750	371	110
	Nov.	374	267	75
	Dec.	234	176	59

Source: Manager, Hyannis Municipal Airport

three months of 1949 when scheduled airline passengers outnumbered those of itinerant planes.

In terms of daily travel the total number of airplane passengers utilizing Hyannis airport on an average low day during the winter season 1948-1949 averaged 11 as compared with 308 for a weekend day during the following summer. This 28-fold increase represents the spread for which facilities will have to be provided. In terms of population 0.04% were traveling by air on a low winter day as compared with 0.31% on a peak summer day.

The forecast of the number of airplane passengers is based on general observations rather than on past performance since no data are available for the years prior to 1947 and, even if there were, they would not be representative due to the effect of the war. It is taken for granted that air travel will play an important part in the future transportation system not only by transporting more people than at present but also by carrying them over greater distances. With reference to the planning area, this means that a greater number of people from a larger section of the United States will use the airlines and thus the Hyannis terminal. There are too many variables and unknown factors involved to forecast the number of airline passengers twenty years hence with any reasonable accuracy, among them being the safety factor, plane loads, passenger capacity, all-weather flying, price differentials between airlines and surface carriers, potentialities of

aircoach travel, etc. Therefore only a rough estimate of the number of airplane passengers in 1970 can be attempted at this time.

Assuming a 200% increase in the number of airplane passengers carried on an average Saturday or Sunday during the summer of 1970 over a comparable period in 1949, this would result in a total of 924 passengers or 0.61% of the population. This assumed 200% increase averages 9.5% annually. Excluding the impetus the aviation industry achieved during the year immediately following the war when the number of passengers increased by 86% on scheduled air carriers, and comparing it with the annual average of almost 4% for the years 1946 to 1948 (or with a 41% annual increase over the six year period 1936 to 1942), makes this assumption reasonable when additional factors are considered. First, the tremendous growth of the aircraft industry during the past twenty years cannot be sustained at that rate in the future. Second, the comparatively small increase during 1947 and 1948 was due to a large extent to the unusually large number of airplane accidents during that period. Third, the almost doubling of the ratio of air passengers to total population over 1949 appears reasonable in view of the characteristics of the area, as mentioned briefly under Chapter I B above. It seems quite likely that a greater number of persons will commute from their summer homes at the Cape to work in Boston, New York or other cities which will be within easy travel

time by air in another twenty years. This includes not only those traveling by scheduled airlines but also those owning their own planes.

With regard to the number of passengers on an average winter weekday in 1970, all but the last of the factors influencing the growth of aviation apply as listed in the preceding paragraph. In its stead another consideration was studied. The recent trend in the permanent all year population indicated that, of those families building homes, the majority consisted of retired business and professional men. If this trend continues (and there is no indication to the contrary), it would indicate that a comparatively high number of those people would attempt to reach the urban centers occasionally to keep up with their business and professional connections and enjoy the cultural events which cannot be found extensively on the Cape during the winter months. It is primarily these sociological reasons which were considered in increasing the number of passengers by 220% rather than by 200%. This 20% differential is purely arbitrary, however, and actually indicates more a thought than any significance, because the Union Terminal would be designed for maximum use and so any slight variance of the minimum capacity would not influence the plan. In terms of passengers, 35 may be expected daily during a weekday in the winter of 1970. This amounts to 0.09% of the total population, or about twice the existing ratio. A summary of the significant data discussed in this section will be found in Table 9.

HYANNIS MUNICIPAL AIRPORT, 1941

(2) Rail Transportation

The Old Colony Branch of the New York, New Haven and Hartford Railroad Company enters Cape Cod at Buzzards Bay and continues its main line to Hyannis with a branch from Buzzards Bay to Woods Hole. The spur between Yarmouth and Provincetown is now used for freight only. Map 2 shows the location of the lines on Cape Cod.

As stated above, one of the basic assumptions of this thesis is the continued existence of passenger traffic on the Old Colony Branch. This is a conjecture which, in the light of recent events on other branches of that line, cannot be entirely substantiated. An opinion of executives of the New York, New Haven and Hartford Railroad Company indicates their desire to maintain passenger traffic to Hyannis at all cost presumably in order to operate the financially successful New York run during the summer.

The new Union Terminal would combine the present stations at Hyannis and Yarmouth, the latter now being the transfer point for passengers with destinations between Yarmouth and Provincetown. Table 6 shows the number of passengers on and off at Hyannis and Yarmouth during a summer and a winter month in 1949.

TABLE 6

Railroad Passenger and Train Volume
Hyannis and Yarmouth Stations 1949

	Number of Passengers		Number of Trains	
	Winter Month	Summer Month	Winter Month	Summer Month
Yarmouth	1,496	6,000		
Hyannis	3,312	14,390		
Total	4,808	20,390	114	314

Converting the monthly totals to daily figures in a manner similar to that employed for air passengers in the preceding section results in 120 rail passengers for a midweek winter day of 1949 and 1,020 for a summer Saturday or Sunday at the Hyannis and Yarmouth stations combined. This corresponds to 0.41% and 1.03% respectively of the total population.

The national trend of railroad revenue passengers has been declining steadily with the exception of the war period and a few years in the mid-thirties. Percentage-wise this decrease amounted to 64% for the twenty year period up to 1940 or a 3.2% average annual decline. However, realizing that the Old Colony line does not quite follow national trends due to its size and type of passengers carried, a direct projection of that trend does not seem feasible. Furthermore, based on the premise that the Old Colony line will continue operations for the next twenty years, it must be assumed that the number of passengers carried will not drop below a level at which operations become impractical.

Therefore the trend has been estimated to decline an average of 0.95% annually between 1949 and 1970 during the

summer or a decrease in the number of passengers by 1970 of 20% of the 1949 total. A lesser rate of decrease for the winter months has been estimated for the passengers on the railroad, based on the same assumptions as were used to predict air travel during the winter months. Thus only a 15% decline for the 21 year period in question was predicted for the winter passengers. The number of passengers expected to arrive and depart by train at the new Union Terminal in 1970 is 102 on a winter day and 816 on a summer day, or 0.26% and 0.55% of the total population during those periods. This represents an almost 50% decline over the corresponding 1949 figures which appears reasonable in that a larger percentage of the future population is likely to use private automobiles or airplanes than at the present.

No significant changes are expected in the number of trains operating in and out of the Union Terminal as compared with the present. The decrease in the number of passengers will be absorbed by shortening the trains, thus maintaining about the same passenger load capacity. A minimum of four trains daily is thus predicted for a low winter day in 1970 and an average of sixteen for a summer weekend day.

A summary of the significant data discussed here will be found in Table 9.

HYANNIS - MAIN ST. & RAILROAD STATION

(3) Bus Transportation

The only bus line serving Cape Cod is the New England Transportation Company, a subsidiary of the New York, New Haven and Hartford Railroad. Within the planning area the buses follow Route 6 to Hyannis and from there continue either on Route 28 to Chatham or Route 6 and via Yarmouth to Provincetown. After completion of the Mid-Cape Highway, it is expected that at least one section of each scheduled bus will maintain its present run, whereas the extra sections will probably use the new express way. It is also important to note that all buses from Providence and New Bedford terminate at Hyannis and passengers traveling to points further east must transfer to a new bus at that station.

The number of passengers carried by bus on the various runs does not reflect the actual number handled at Hyannis, since the bus is the only means of public transportation in the planning area east of Barnstable, and so carried a great number of local fares. Estimates by an official of the New England Transportation Company reveal that on the Chatham run 80% of all passengers are handled at Hyannis; on the Provincetown run, 22%; on the Woods Hole and Providence and New Bedford runs, 100%. In addition 65% of those carried on the Provincetown run are taken care of at Yarmouth. The corresponding passenger volumes for Hyannis and Yarmouth are listed on Table 7 which indicates the summer and winter load per month.

The percentage of monthly passengers has again been estimated at 5% for a Saturday or Sunday and 2.5% for a Tuesday, Wednesday or Thursday. So on a low winter day 130 people, and on a summer weekend day, 1,184 people are using either Hyannis or Yarmouth bus facilities. Expressed as a percentage of the total population, these figures amount to 0.45 and 1.19 respectively.

On an average weekday during the winter season 1949-1950, 18 buses operated in and out of Hyannis. On a summer weekend day in 1949 the number amounted to 32 with a total of 8 additional extra sections added to some runs. During comparable periods of 1970 the expected number of buses will be 23 and 50.

TABLE 7

Bus Passengers for Hyannis andYarmouth 1949 and 1950 [1)]

Schedule	Number of Passengers July 1949	January 1950
Chatham	8,110	1,490
Provincetown	10,962	2,187
Woods Hole	1,004	--
Providence	3,587	1,538
Total	23,663	5,215

Recent trends in the number of intercity bus passengers across the nation do not parallel those of Cape Cod runs of the New England Transportation Company so that no valid comparison can be made between the two. For the country as a

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1) Source: Passenger Traffic Manager, New England Transportation Company.

whole the number of revenue intercity bus passengers on Class I carriers increased slightly whereas the bus traffic volume declined in the Cape Cod area during the post-war years. It appears justifiable to forecast an increase in the number of bus passengers for the New England Transportation Company at, however, a lower rate than that for the country as a whole. Not only will the population in the planning area increase faster percentage-wise than in the United States, thus adding potential bus passengers, but also, by making available convenient bus service to air passengers, the number of future bus passengers will be increased. This latter aspect of passenger interchange will be discussed in more detail below.

It is estimated that during the summer a 25% increase of bus passengers between 1949 and 1970 will occur, bringing the daily number of bus passengers at that time to 1,480 or 1% of the total population. In the winter the rate of growth is expected to be slower, because it is anticipated that other means of transportation than the bus will be used during periods of unfavorable highway conditions to points such as Providence or New York. Therefore an increase of only 20% has been assumed for the period up to 1970 with a daily total of 156 bus fares during midweek. This figure represents 0.40% of the total population. The possibility of error toward the low point in these estimates can again be stated in terms of its insignificance, because the Union Terminal would have to accommodate the maximum rather than minimum passenger capacity.

(4) Passenger Interchange

At any transfer point it is desirable to have an efficient and economical interchange of passengers from one means of transportation to another. The existing scheme allows for an interchange of rail and bus as well as of those using cab and private automobile. No direct interchange between air passengers and buses is possible at this time. The proposed Union Terminal will combine all facilities listed above and at the same time create an environment which would further the good will of those carried by enabling them to transfer without regard to weather conditions and to wait for the next stage in well equipped and adequate quarters. Although the actual number of transfers would not affect the size of the Union Terminal, to the extent that they have already been counted with the originating carrier they are of importance in providing additional station facilities such as waiting room, rest room, lunch counter and baggage room space and for that reason are being treated in this section.

Interchange of rail and air passengers is not the general rule at Hyannis due to the similarity of their respective routes as is shown in Table 3. Therefore this phase will not be discussed further.

Although no data are available regarding the number of airplane fares transferring to buses, some estimates are possible. As to passengers on the scheduled flights, their destination after deplaning at Hyannis Airport is known from spot checks

made during part of a summer month in 1949. This information is in Table 8. For purposes of estimating the number of transfers it has been assumed that (a) the percentage of enplaning passengers is identical with that of those deplaning, (b) people originating at or destined for Barnstable will not utilize the bus service and (c) those showing points off Cape Cod as their destination should be discounted as an index of air-bus transfers at Hyannis. Of the remaining 68% of passengers from scheduled air lines who are potential transfers, it was very conservatively estimated that 20% would use bus service at any time. Assuming the same percentages to hold true in 1970, the number of people from scheduled planes transfering to buses would then be 2 for an average day in the middle of a winter week and 85 for an average summer Saturday or Sunday as compared with 1 and 28 for the same days in 1949.

The distribution of airports within the planning area serving private and commercial planes reduces the radius of effective itinerant plane service at the Hyannis Municipal Airport to a much shorter distance. It is thus estimated that about 60% of all itinerant plane fares are destined for Barnstable, 30% for Yarmouth and Dennis and only 10% for the remaining planning area. Again assuming that plane passengers destined for Barnstable would not use bus services at all and that of the remaining number 20% would transfer to buses, this will leave an estimated 1 transfer for a winter day and 14 for

a summer day in 1949, or 3 and 42 for comparable days in 1970.

The total number of plane-bus transfers in 1970 will then amount to 5 for a weekday in winter and 127 for a weekend day in summer.

By far the most significant type of transfer occurs between rail and bus passengera. As already indicated previously there are two transfer points existing at the present time: Hyannis for points on the south shore toward Chatham and Yarmouth for points on the north shore toward Provincetown. In 1949, 20% of all bus passengers between Chatham and Hyannis transfered to trains at Hyannis and 65% of all on the Hyannis to Provincetown run transfered to trains at Yarmouth. The actual number transfering from bus to rail amounted to 43 on a weekday in winter and 437 on a weekend day during the summer.

Assuming no changes in the percentage of bus passengers transfering to the railroad in the future, their ratio to the total number of train passengers in 1949 had to be calculated and from that the number of bus-train transfers in 1970 was computed. This method was necessary because the rate of increase in the number of bus passengers is different from that of rail passengers between 1949 and 1970, and the original calculations were based on the percentage of bus passengers transfering to trains. The results show that in 1970 it will be likely that 37 passengers transfer between bus and train during a weekday in winter and 349 during a weekend day in summer.

TABLE 8

Destination of Northeast Airline Passengers Deplaning at Hyannis, Summer 1949

Destination	Per Cent	
Barnstable	28.0	
Brewster	4.8	
Chatham	8.4	
Dennis	9.1	
Eastham	1.7	
Harwich	10.2	
Orleans	4.5	
Provincetown	6.3	
Truro	4.2	
Wellfleet	1.8	
Yarmouth	4.5	
Total within Planning Area		83.5
Bourne	1.1	
Falmouth	9.2	
Mashpee	1.7	
Sandwich	0.5	
Total outside Planning Area		12.5
Off Cape Cod		4.0
		100.0

Source: Manager, Hyannis Municipal Airport

(5) Summary

Table 9 summarizes the passenger data for all means of public transportation discussed in this chapter for an average weekday in winter and an average day of a summer weekend both in terms of actual 1949 data as well as in the form of estimates for 1970. Table 10 shows the same data graphically.

The most significant observation is that, although the total number of passengers increase in absolute numbers by 1970, population-wise there will be a decrease in the number of people using the carriers listed over the 1949 data. The rapid increase in the number of privately owned automobiles is expected to continue and draw away passengers now utilizing public carriers.

The great difference in the number of passengers during a weekday in winter and a weekend day in summer has already been mentioned. Although the total increase of passengers in 1970 over 1949 varies between 12.5% for a winter day and 28.2% for a summer weekend day, the ratio in the number of people between a winter and summer day varies only from 9.62 in 1949 to 10.99 in 1970. The higher ratio in 1970 can be explained by the different percentage increases for the two seasons which resulted in a greater spread.

Finally it must be emphasized again that passenger forecasts for a twenty-one year period are very difficult undertakings and subject to a great amount of error in either

direction. The estimates have been on the conservative side it is believed. This is on purpose because the Union Terminal is expected to be built in different stages and, should later trends indicate a greater number of passengers than was forecast in this report, it would be easy to integrate such changes with the building program.

TABLE 9

Daily Passenger Summary for 1949 and 1970

Carrier	Number	Percent Increase	Percent Med.Est. Popul'n	Number	Percent Increase	Percent Med.Est. Popul'n
	Winter 1)			Summer 2)		
Scheduled Airlines						
1949	4			208		
1970	13	220.0		624	200.0	
Itinerant Planes						
1949	7			100		
1970	22	220.0		300	200.0	
Total of All Planes						
1949	11		0.04	308		0.31
1970	35	220.0	0.09	924	200.0	0.61
Total by Railroad						
1949	120		0.41	1,020		1.03
1970	102	- 15.0	0.26	816	- 20.0	0.55
Total By Bus						
1949	130		0.45	1,184		1.19
1970	156	20.0	0.40	1,480	25.0	1.00
Total by All Carriers						
1949	261		0.90	2,512		2.53
1970	293	12.5	0.76	3,220	28.2	2.16
Transfers Rail-Bus						
1949	43			437		
1970	37	- 15.0		349	- 20.0	
Air-Bus						
1949	2					
1970	5	150.0		42		
				127	200.0	

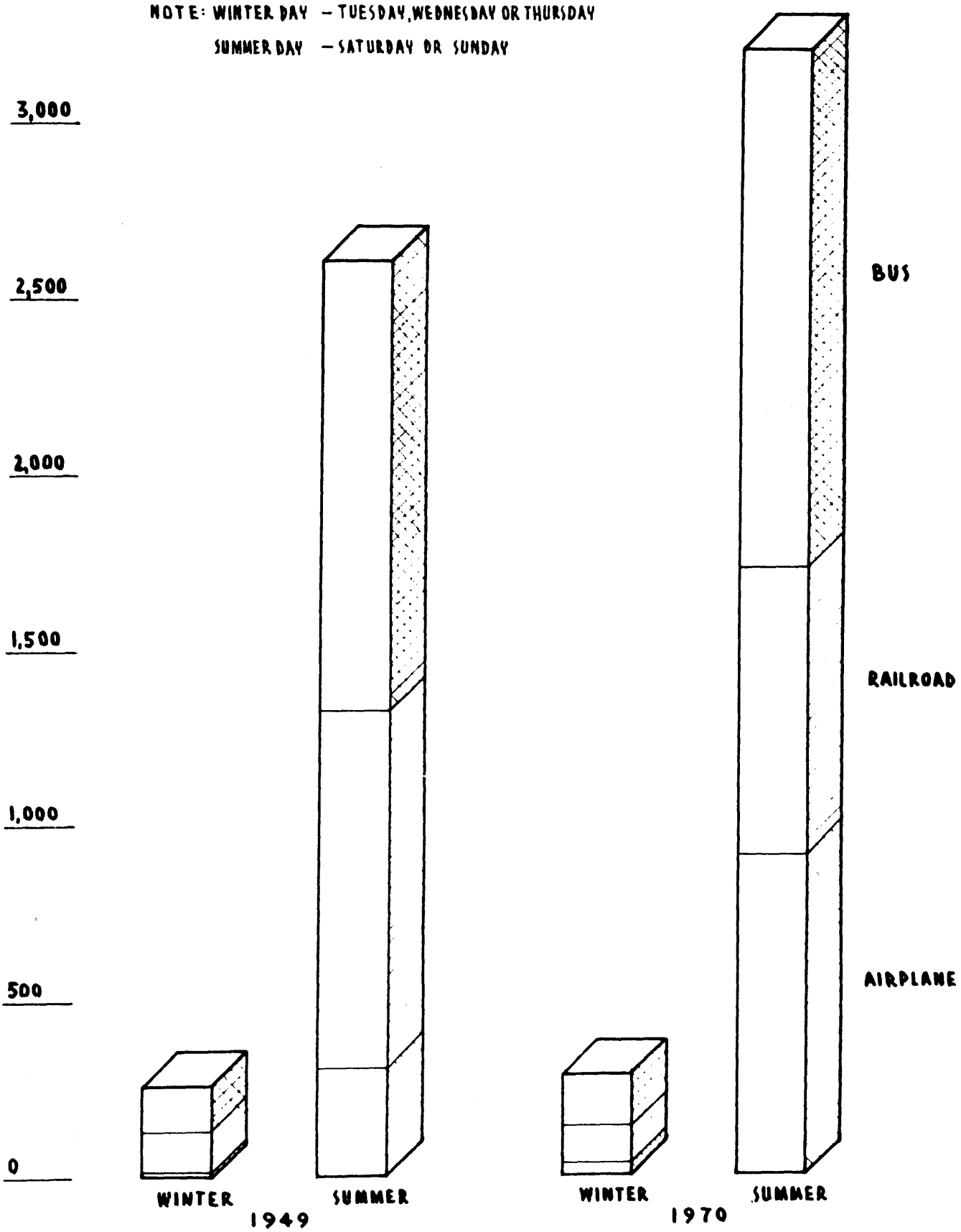
1) Tuesday, Wednesday, Thursday
2) Saturday, Sunday

TABLE 10

NUMBER OF DAILY PASSENGERS BY TYPE OF CARRIER

HYANNIS UNION TERMINAL

NOTE: WINTER DAY – TUESDAY, WEDNESDAY OR THURSDAY
SUMMER DAY – SATURDAY OR SUNDAY



II. PROGRAM REQUIREMENTS

The purpose af a Union Terminal is to join the facilities and functions of all participating carriers. It would make possible the interchange of passengers, baggage, mail and express within the terminal thereby conveniencing the people and reducing unnecessary movements of vehicles throughout the surrounding area. In addition it would reduce the costs of terminal operation for each carrier.

As stated above the Union Terminal in Hyannis is to serve railroad, bus and airline. More specifically, Hyannis is the terminus of the railroad and a transfer point for all through bus passengers. It is also the only stop in the area for scheduled air carriers. Its importance as the primary passenger transfer point on Cape Cod is shown by diagram in Table 3.

With reference to Hyannis a Union Terminal must meet the following basic functional requirements:

a) Provide terminal facilities for railroad and bus lines

b) Serve as base for itinerant planes and provide facilities commensurate with a flight stop for scheduled air carriers

c) Provide adequate facilities for the transfer of passengers between public carriers and between them and private transportation

d) Have easy access to Hyannis and highways leading to all other points in the planning area

In addition to meeting the requirements as pertaining to actual passenger traffic, certain other considerations must be

given to the functions of the Union Terminal. First, sightseers to the airport must be provided with adequate observation space. Second, sufficient allowance for concessions must be made in order to provide the necessary services to the users of the Terminal. Third, the availability of rental office space is considered advisable. All three of these functions represent revenue producing activities which are essential to the financial solvency of a terminal of the type proposed.

Inasmuch as a gradual increase of the terminal activities is expected, the requirements as outlined above need not be met fully at the outset. Several stages of expansion are envisaged starting with the needs for about five years ahead, with periodic additions to meet the increased demand for space until finally the ultimate size is reached. It is essential, however, to allow for expansion even beyond a planned twenty year period in order to avoid premature obsolescence of the facilities especially in regard to air activities. Several examples of airports can be quoted which became inadequate only a few years after completion (Logan, LaGuardia, Washington National, etc.).

Another important requirement for the succesful operation of the Union Terminal is the establishment of adequate zoning regulations which would prohibit the encroachment of undesirable and incompatible land uses near the terminal area and would permit the orderly development of the surrounding area.

The establishment of the Union Terminal should not put a

financial burden on the town or county of Barnstable; on the contrary, it should prove to be an asset by providing better facilities for more passengers who - in the end - would add to the economic well-being of the whole planning area. Furthermore, the Union Terminal would tend to eliminate a considerable amount of traffic congestion in the center of Hyannis and so benefit the commercial establishments as well as residents and summer visitors.

The safety of the public would be greatly increased by the elimination of two grade crossings.

III. SPACE AND COST REQUIREMENTS

A. SPACE REQUIREMENTS

The determination of space requirements for the terminal building is made difficult for two reasons: (a) the great difference in the number of passengers using the facilities during the summer and winter and (b) the comparative unreliability of trends in the number of passengers and carrier movements twenty years hence. The first problem is primarily a matter of design and could be mastered by a competent architect. It involves a flexibility of layout so that certain parts of the building could be closed during periods of low activity without inconvenience to the public and with minimum maintenance costs. The second problem could be overcome by a plan calling for several stages of construction. The progress of each stage would be based on short term forecasts of expected traffic volume and, if the predictions made in this thesis prove reasonably accurate, the final stage would include the space requirements given below for 1970. It is important to note, however, that in the site selection due consideration was given to expansion of the terminal facilities beyond the estimates made here so that not only any unexpected growth prior to 1970 but also any potential increase in the number of users of the terminal beyond that date would not result in the premature obsolescence of the facilities.

In estimating space requirements for the Union Terminal, the functional interrelationships between the various facilities as well as the circulation patterns of patrons and employees were

taken into account. The actual design of the Union Terminal, beyond but not excluding the planning phase, is an architectural function and as such not within the scope of this thesis.

The Terminal must meet the needs of passengers on all means of transportation both private and public as well as of all others who may have occasion to use it. Each of the rail, bus and air lines demand some facilities such as ticket offices, access to the different carriers, etc. which are functionally unlike each other yet similar enough in nature to be compatible. On the other hand, many facilities can serve everyone alike and so can be combined, allowing for savings in cost and maintenance to all concerned. Included in this category are concessions, waiting rooms, washroom facilities and operational services.

Basically the railroad exercises the greatest influence over the size of the terminal facilities in that it generates a greater number of people per unit of travel than any of the other carriers. On the other hand, the different function of the Union Terminal pertaining to air operations requires a larger area per passenger than is needed for the other two carriers. Facilities for bus travel cause no special problems. It is these considerations which formed the nucleus of the space requirements.

In line with the forecasts of the number of passengers and the frequency of operations of each of the carriers, discussed in Chapter II, the following loading facilities appear

to be needed in 1970: two tracks for the railroad, four loading docks for buses and four plane positions for scheduled airlines, extra sections of flights and the commercial operators' needs. A peak hour volume of 10% of the total traffic during a summer weekend day was generally the basis for the above conclusions.

Unfortunately no space standards for terminals of any kind have been evolved. Therefore the requirements for the Union Terminal had to be derived from plans of existing terminals of approximately the same capacity as that of the former by 1970. The primary purpose of determining space requirements is to ascertain the floor area of the terminal building. Hence only those facilities which would be located on the ground floor are listed in Table 11. In addition, the following facilities are contemplated for the second floor: terminal manager's office, airport manager's office, kitchen, restaurant, washrooms, rental offices and observation deck. The operations and communications room for the airport would be located in the control tower. Offices for a weather bureau and the Civil Aeronautics Administration, if required, can also be located on the second floor.

TABLE 11

First Floor Square Foot Requirements

Ticket Offices	800	Revenue-producing; the ratio of 30-40% of non-revenue producing area to total floor space of building is in line with current practices.
Baggage room Excluding airplane passengers, whose baggage would be handled at scheduled airlines' ticket offices; includes time storage of all baggage	500	
Express room	450	
Telegraph office	100	
Pay telephones	50	
Commercial air operator	250	
Coffee shop	1,250	
Concessions	1,500	
Toilets	1,000	
Waiting room	3,500	
Concourse	3,000	
	12,700	

The space requirements for the loading facilities in the immediate vicinity of the terminal building include about 71,000 square feet for four airplane positions, 19,000 square feet for two railroad platforms, 1,250 square feet for four bus docks, and 800 square feet for four taxi stands.

Parking spaces for five hundred cars would have to be provided. This would accommodate one car for every non-transfering passenger per peak hour in addition to all day parking for employees, sightseers and some commuters. As the peak hours of the public carriers do not coincide with the time of expected visitors to the Union Terminal, no excessive parking space would be needed for that purpose. Additional parking space in the vicinity of the private plane storage would be provided.

In conclusion it must be emphasized again that the design of the Union Terminal plays a very important role in the success or failure of the project and therefore only the most competent architect should be entrusted with its planning. The importance of revenue producing facilities within the terminal building would, if properly controlled, provide an income capable of reducing the operating costs of the Union Terminal to a minimum.

B. COST ANALYSIS

It is proposed that the Town of Barnstable avail itself of the provisions of the Federal Airport Act which provides for grants by the federal and state governments up to 75% of total development costs. This aid, however, applies only to airport facilities subject to federal rules and regulations. Inasmuch as some of the facilities of the Terminal area would not be considered of an aviation nature and other facilities would only be partially considered so, federal and state grants would have to supplement by complete or partial financing.

The construction of the Union Terminal and all related facilities by the Town of Barnstable would not only result in its ownership but would also assure continuity of use for the intended purposes and create local pride and prestige in this novel undertaking. As will be discussed in the following chapter, a terminal corporation would lease the terminal facilities from the Town for purposes of complete management control. In return the terminal corporation would guarantee to pay the Town an annual sum at least equal to the amount the the latter would have to pay for interest and amortization. If, on the other hand, another operator should be willing to guarantee the Town a higher annual payment for the management, then certainly the highest bidder ought to be accepted.

The total costs for construction of all major equipment which would be required by 1970 are estimated at $810,500. With another 25% for additional expenditures such as airport

lighting, architectural services, etc., an amount of $1,000,000 appears to be adequate and is used as the basis for the estimates of financing.

Table 12 shows a detailed cost analysis of the entire terminal facilities for the needs of 1970.

Assuming a 2% rate of interest and a twenty year amortization period, which are the current rates for municipal obligations, the annual charges to the Town would amount to $30,000. Omitting the costs incurred for the apron and taxiways and part of the additional expenditures which are strictly for operational aviation facilities, the cost to the Town would be about $400,000. Annual charges on this would be $24,000. It is this amount which the terminal corporation should guarantee to pay for its lease. The difference of $6,000 per year should be borne initially by the Town as its contribution to the public function of the terminal area. It is expected, however, that at a later time, when air transportation has matured sufficiently, the users of the aviation facilities would pay for their cost. The Town's contribution of $6,000 annually during the first stages of operation compares favorably with its present net cost of airport operation amounting to about $20,000 per year.

TABLE 12

Construction Costs of Terminal Facilities

Type	Total Cost	Percent Aid [1]	Cost to Town
Aprons	$ 143,000	100	$ 35,750
Taxiways	152,500	100	38,125
Terminal building	375,000	66	187,500
Roads	27,000	66	13,500
Parking	30,000	66	15,000
Landscaping	10,000	66	5,000
Railroad facilities	41,000	-	41,000
Bus facilities	2,000	-	2,000
Hangars	30,000	-	30,000
Totals	$810,500		$367,875
Estimated allowance	$1,000,000		$500,000

1) Percent of federal and state aid; 100% meaning that aid is available for the entire facility. Example: parking - federal and state aid available for 66% of parking costs or for $20,000. Thus the Town's contribution of 25% of that amount, or $5,000 plus the full balance of $10,000, results in cost to the Town of $15,000 for parking facilities.

IV. MANAGEMENT CONTROL OF UNION TERMINAL

It is proposed that a terminal corporation be established for the purposes of managing the terminal building and all related facilities. All property would remain under public control. Business activities in the terminal building area require freedom of action, the assumption of financial risks and particularly skillful management, for which a public authority is not properly suited. Landing area operations and the maintenance of the airport property, on the other hand, involve tasks which a public agency is capable of administrating better than a private organization and so should remain in the hands of an airport manager appointed by the Airport Commission. The terminal corporation should be organized for the purpose of providing management functions with the financial aim of self-supporting terminal operations.

The above proposals would, first of all, involve the creation of a terminal corporation, the lease of certain portions of present airport property to it, and finally the operation of the terminal building and related facilities by the corporation. It is generally conceded that revenue producing facilities in publicly owned airports have not been utilized sufficiently, presumably because of the lack of initiative, rigid rules and inability to take financial risks, always inherent in public bodies. Likewise it has been established that concessions can pay a high share of the operating costs of a

terminal, provided they are properly selected and adequately controlled.

It is contemplated that the terminal corporation be composed of and financed by the presently participating public carriers and that the inclusion of potentially new participating carriers be provided for. In order to reduce the possibility of domination by any one group, the voting majority of the board of directors should consist of local citizen and public officials who are interested in the development of the Union Terminal but do not represent the interests of any particular carrier.

In the case of Hyannis, the terminal corporation should lease from the Airport Commission all land necessary for the carrying out of its activities, in return for which it would guarantee the Town of Barnstable an annual income at least equal to the costs incurred by the town in payments for interest and amortization, or $24,000 per year as defined in the preceding chapter. It is recommended that the terminal corporation enter into an agreement with the town prior to the planning stage, so that it could participate in the development of the terminal facilities.

The terminal corporation would derive revenues from rental offices and concessionaires as well as the lease of hangar space. It would also, at a later stage, charge the aircraft for the use of airport facilities reasonable landing fees which would be turned over to the municipality in payment for the latter's investment in these conveniences. The difference

between the income derived in this way and the guaranteed annual payment to the town would be divided on an equitable basis among the participants of the terminal corporation. Under this scheme the carriers would not pay for franchises, office space in the terminal building or any other expenditures usually inherent in terminal operations but would merely pay a lump sum in the amount apportioned to them. Adjustments can be made annually or whenever agreed upon. In this connection the fixed-base private air operator should be considered as a participant in the terminal corporation, provided he has enough capital, or else he may be charged on the same basis as concessionaires. All revenues charged the latter should be on a percentage of gross income basis, except that such concessions as would be closed during the winter should also pay a fixed rental for periods of inactivity.

Several advantages are inherent in the above proposals. First, the terminal corporation, by providing skilled management and a better system of incentives for terminal area operations would assure the full development of all facilities and the maximum income from all potential sources of revenue. It might even find that it could itself operate certain of the business activities more profitably than through the granting of concessions. Moreover, it might advertise freely or make risk-taking expenditures in an effort to promote new activities. Thus, while the objectives would be the same under the jurisdiction of the terminal corporation as under public management, the inherent revenue potential could be translated into actual

cash income in a manner that appears difficult if not impossible under public administration. Furthermore, any increased income would benefit all carriers in that their share of the annual payment to the town would be reduced.

The Airport Commission, on the other hand, would retain control over all flight operations, the maintenance of the property, and of course the ownership of all facilities. It will not be burdened with business activities and yet will have a voice in the terminal corporation.

The public carriers would have no capital investments to tie their fiscal abilities, but would know in advance the expenses incurred in connection with the operation of the Union Terminal. Any increased activities would tend to reduce their annual payments, so a progressive advertising campaign coupled with adequate and modern units of transportation would benefit them financially.

The public at large stands to gain also by the establishment of the Union Terminal. Travelers would find convenient facilities which by increased use would bring about a reduction in cost. The taxpayers of Barnstable would have to pay a considerably smaller share for the operation of the airport than at present and would also benefit by ownership in a profitable enterprise. And finally, tourists and vacationists, who form the economic base for the whole planning area, would generate additional sources of income for many commercial activities in the terminal area which are at present lacking.

The above suggestions for the management control of the Union Terminal are believed to be a sound business proposition. A far more detailed study, involving all legal aspects as well as a thorough financial analysis, will have to be made prior to any recommendation for its adoption. Perhaps a revision of some of the proposals will then seem necessary within the general framework of these suggestions.

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Note: The primary source of information for this chapter originated in Terminal Airport Financing and Management by L. L. Bollinger, A. Passen, R. E. McElfresh; Boston, Harvard Graduate School of Business Administration, 1946. The recommendations contained in this book have been adapted to fit the special needs of a terminal serving carriers other than air.

V. SITE PLAN

As discussed previously, the most important problem in selecting the location of the Union Terminal is the correlation of its different functions to a workable solution. More specifically, it is desirable to place the terminal building as near the northeast-southwest and northwest-southeast runways as possible to reduce taxiing by airplanes. On the other hand, a location near the existing railroad tracks would be preferable from the railroad standpoint. Because buses are the most flexible of all the public carriers, the location of the terminal as it relates to them creates no special problems.

The solution shown on Map 5 represents a compromise between the various conflicting problems mentioned above. It also embodies a workable solution to the many other aspects which are involved in the planning of terminal facilities and which are briefly enumerated below:

(1) Airport facilities: An effort has been made to separate physically the areas used for private and itinerant air activities from those of scheduled and commercial operators and yet to keep them as close to each other as possible. The service hangar is so located that it is convenient to all potential users.

(2) Railroad facilities: Two platforms of fourteen hundred feet in length are provided. Although the one between the spurs appears to be sufficient, it was decided that the platform on the east side of the tracks would be used to great

advantage if it could be tied to the road system. So the first three hundred feet of that platform would also serve as the loading and unloading area for mail and express cars while another four hundred feet could be used for immediate transfer of rail passengers to private automobiles. The platforms are covered over a distance of seven hundred feet. After completion of the unloading, it is expected that the trains would back to the main tracks and then proceed to the south to within about one hundred feet of the access road until time of departure. The diesel engines can be attached to the other end of the train for the return trip by switches.

(3) Bus facilities: A platform, covered all the way from the south end of the terminal building, provides for the loading and unloading of buses. The facilities are entirely off street and allow for direct bus movements without reversing. The location of the bus stop at the opposite end of the terminal building from the railroad platform was chosen to allow for the uninterrupted flow of passengers between these two carriers through the Union Terminal building where tickets can be purchased. It was also considered desirable to route the passengers near the concessions area in order to generate any additional income for them.

(4) Parking: Two separate partking lots, properly identified, would serve to separate the users of the airport and bus areas from those of the railroad. It was felt that less traffic confusion and more convenience would be created by

locating the parking areas near the functions they are to serve. The railroad parking facilities are adequate to handle employees' parking as well as any overflow.

(5) Services: Mail and express, if desirable, can be unloaded directly from the train to trucks parked along the edge of the platform. A platform on the south-east corner of the Union Terminal also provides a direct approach to the building for service vehicles. A service entrance to the apron is provided between the maintenance hangar and the northernmost T-hangar.

(6) Road Systems: The terminal area is approached by means of a four lane divided road leading off Yarmouth Road. Whenever possible separation of traffic moving in opposite directions was made by dividing strips to provide for a safe and uninterrupted flow of traffic. A circle opposite the Union Terminal was designed especially to serve that purpose like, for example, that in front of the Union Station in Washington, D. C.

(7) Landscaping: A moderate amount of landscaping seems desirable in order to blend the manmade improvements with the existing surroundings. Hedges and planting around the parking areas and a flower bed on the traffic circle opposite the terminal building would add to the appearance of the site and emphasize the characteristics of the region.

(8) Activities in winter: Savings in maintenance may be achieved in this season by closing one parking space as well as by allowing buses to load and unload in front of the

terminal building rather than at the summer stop.

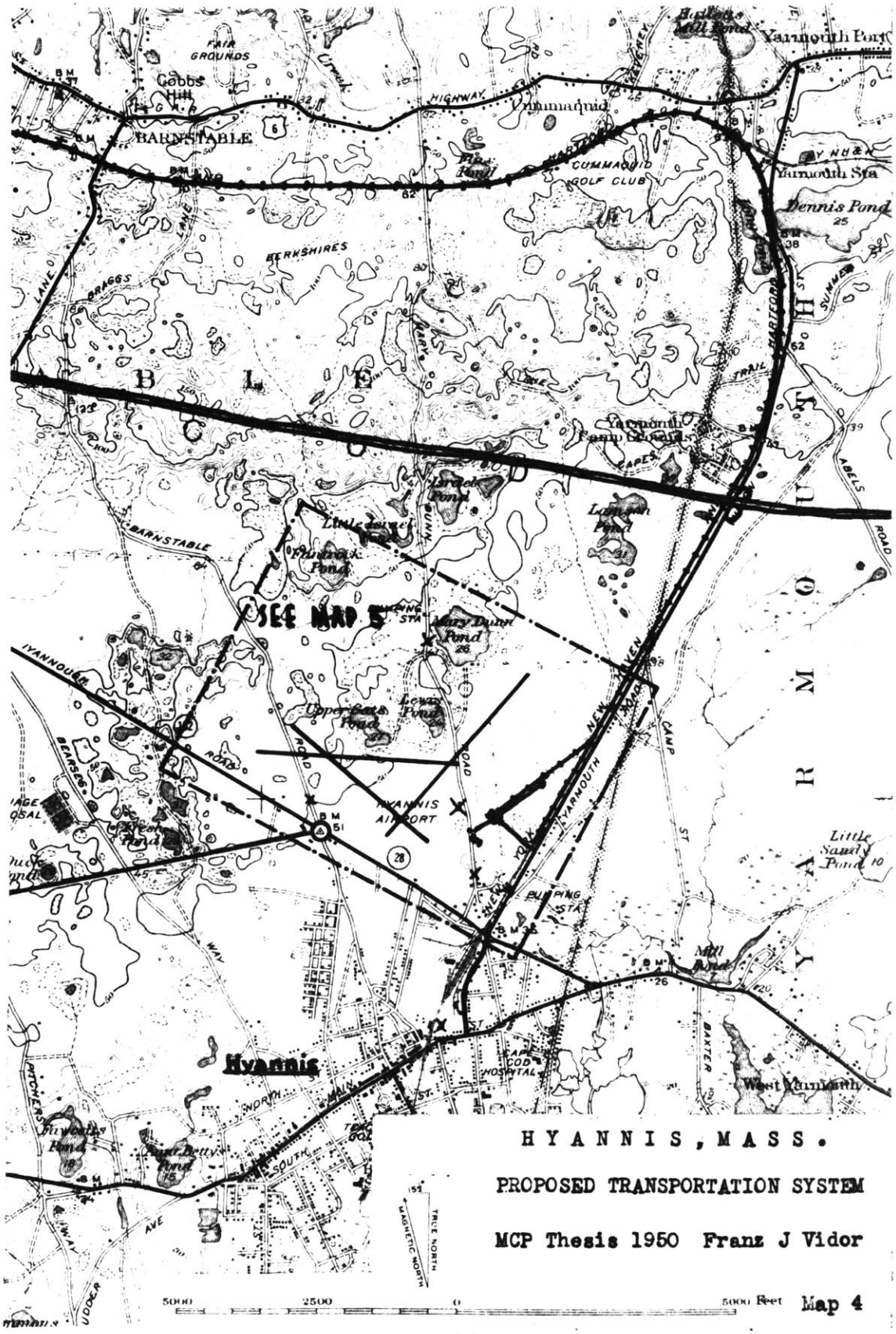
(9) Expansion: If conditions should warrant, the terminal building could be expanded to the south by moving bus loading accommodations a corresponding distance. The latter could be expanded by extending the loading ramps even further to the south. The apron, as shown on Map 5, provides for six airplane loading stations with room for more on either end. The railroad facilities could also be enlarged by adding a third spur on the airport side of the proposed new tracks. Private plane facilities such as hangars and open air storage of planes could be added to the south side of the area now suggested for it or additional room is available on the north side of the apron. Ample space for additional parking is also available.

The level topography of the proposed site is ideally suited to the establishment of a union terminal. All utilities are available in the immediate vicinity of the present airport administration building so that only short extensions to the proposed Union Terminal would be needed.

With the exception of a two hundred-foot strip for the proposed access road, the site is entirely on airport property which eliminates the problems of land assembly and costly acquisition.

Integration of the terminal facilities with the transportation pattern of the area, as shown on Map 4, has been achieved by a single access road which is within easy reach of Hyannis, of the proposed Mid-Cape highway, and of Routes

6 and 28. The extension of Mary Dunn Road to the existing airport facilities would be discontinued under the proposed solution due to the complications that would occur at its intersection with Route 28 as the result of the traffic volume expected by 1970.

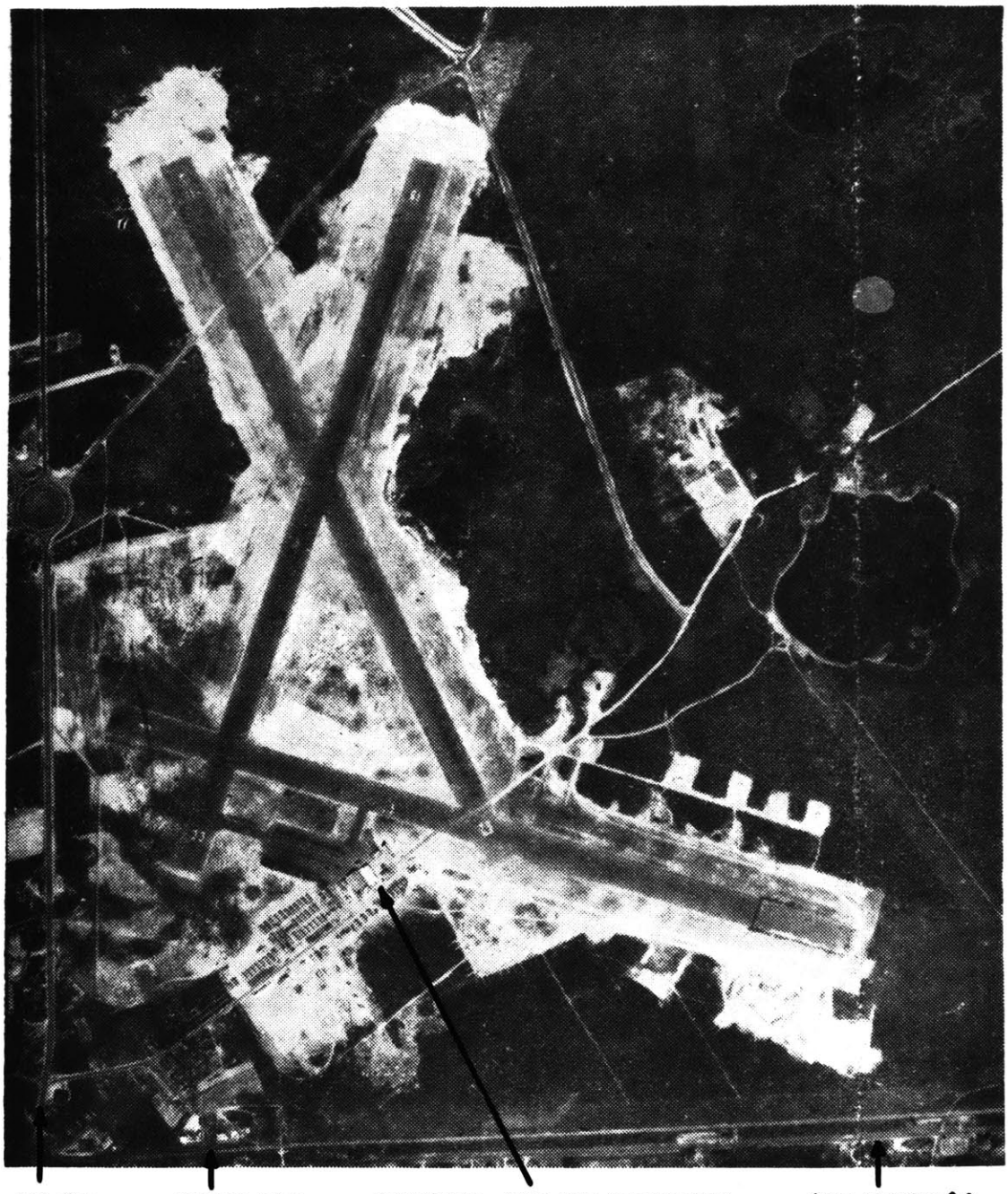


HYANNIS, MASS.

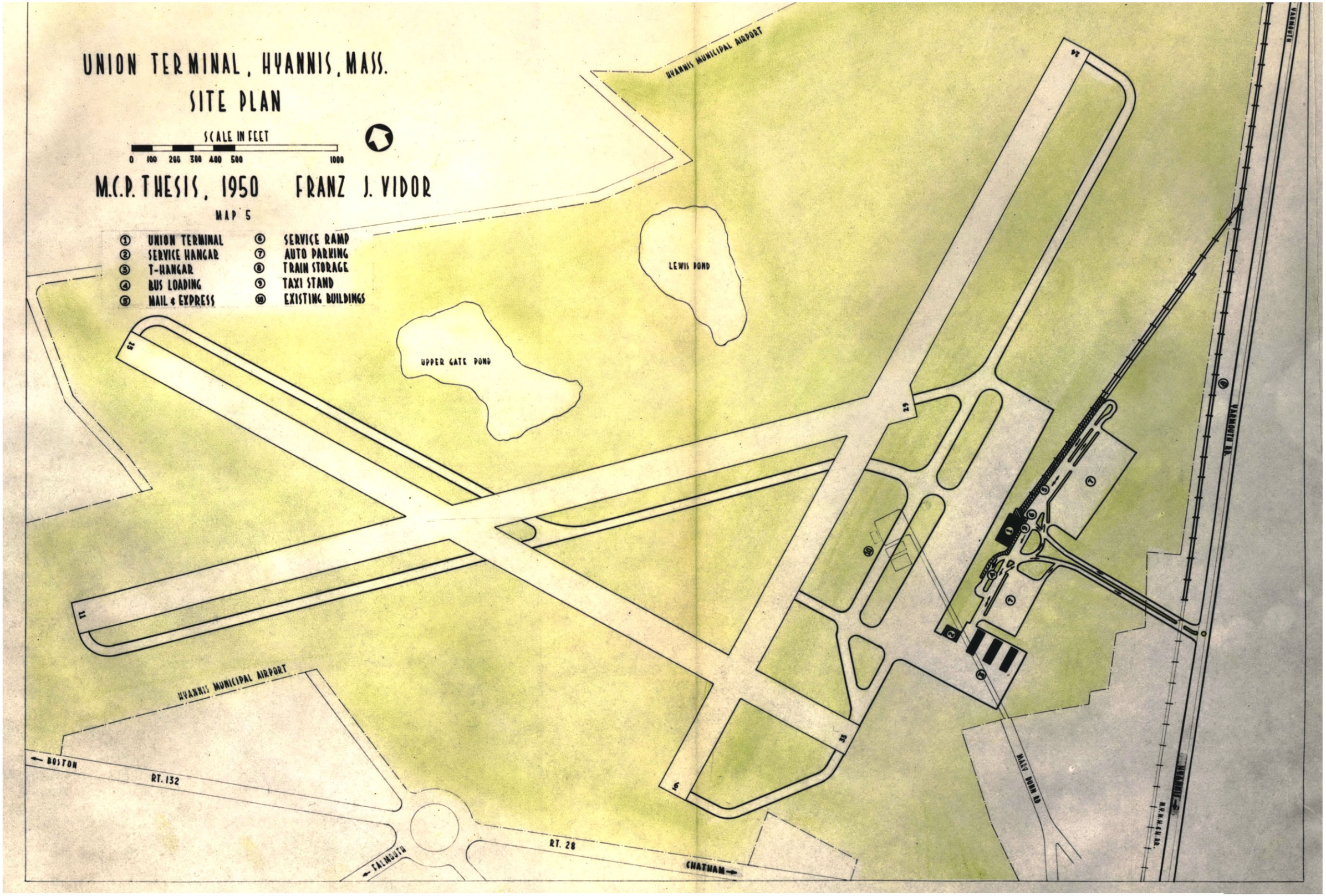
PROPOSED TRANSPORTATION SYSTEM

MCP Thesis 1950 Franz J Vidor

Map 4



HYANNIS AIRPORT AREA


UNION TERMINAL, HYANNIS, MASS.
SITE PLAN
SCALE IN FEET
0 100 200 300 400 500 1000
M.C.P. THESIS, 1950 FRANZ J. VIDOR
MAP 5
① UNION TERMINAL
② SERVICE HANGAR
③ T-HANGAR
④ BUS LOADING
⑤ MAIL & EXPRESS
⑥ SERVICE RAMP
⑦ AUTO PARKING
⑧ TRAIN STORAGE
⑨ TAXI STAND
⑩ EXISTING BUILDINGS
HYANNIS MUNICIPAL AIRPORT
LEWIS POND
UPPER GATE POND
24
19
29
11
35
5
HYANNIS MUNICIPAL AIRPORT
← BOSTON
RT. 132
← FALMOUTH
RT. 28
CHATHAM →
MARY DUNN RD
N.Y.N.H.&H.RR.
FALMOUTH RR
FALMOUTH

VI. CONCLUSIONS

An effort has been made in this report to indicate the needs of the planning area on Cape Cod for an integrated passenger terminal. Not only are the present facilities inadequate but the actual conditions at this time are such that both a new railroad station as well as a new airport administration building are likely to be constructed - a considerable distance apart - and completely ignoring their relationship to each other as well as to all other means of transportation.

A Union Terminal, as proposed in this thesis, would coordinate the activities of all carriers, public and private, and best serve the needs of the travel-weary passenger. It could be operated on a sound financial basis without becoming a burden to local taxpayers and it would add to the local pride and prestige. It would reduce traffic congestion in the main shopping district of Hyannis to an extent which would benefit the commercial enterprises and would also eliminate two dangerous grade crossings of the present tracks. Within the limitations inherent in forecasts over a comparatively long period of time, the size of the terminal building is adequate yet not presumptious or extravagant. The flexibility of design allows for additions to the facilities at various stages of construction with sufficient space available for any unforeseen developments. The Union Terminal would bring bus service to the air travelers and yet buses would continue

their runs into the center of Hyannis as now. On the other hand, the rail terminal would be moved from a central, although poorly chosen, location to a site away from the center of town which, nevertheless, seems advantageous from a traffic standpoint. This would presumably occur in any case so that the matter of location of the railroad station should be considered in the light of the overall traffic pattern.

The implementation of the program, however, depends foremost on two conditions: (a) the education of the citizens of Barnstable about having a modern terminal for which they are willing to authorize the town to spend money (which would be repaid by the operators of the terminal) and (b) the willingness of the New York, New Haven and Hartford Railroad Company, the New England Transportation Company and the Northeast Airlines to cooperate in bringing about the formation of the terminal corporation, or even to consider the advantages of such a Union Terminal. Success is possible if the carriers realize that they are not tied down with capital investments yet can provide to the public all the services which are needed but which each carrier by itself could not afford.

No attempt has been made to analyze the financial position of the carriers in this thesis, first, because it was not considered to be within its scope and second, because the records of the carriers were not available. Nevertheless, if the financial advantages to the carriers beyond what was indicated in Chapter III B can be adequately documented to each of the three carriers, the solution to the transportation problems in

the planning area along the lines indicated in this thesis is within the realm of possibility.

The following recommendations are made regarding the procedure to be followed in order to accomplish the establishment of a Union Terminal:

(1) A detailed financial analysis should be made. This would include the costs to each carrier on the basis of present operating conditions as well as estimates on the basis of combined operations.

(2) An earnest effort should be made by responsible citizens of the planning area to stimulate the interest of the three major public carriers in the Union Terminal.

(3) To further the transportation needs anticipated in the future, the opening to competition among scheduled air carriers seems advisable.

(4) Public schools, the Chamber of Commerce, and other civic organizations, as well as the newspapers, should provide the necessary information to the public especially pointing to the benefits which Hyannis would derive from a Union Terminal.

(5) The direction of publicity toward the summer population is considered of prime importance as it is they who would derive the most advantage from a centralized terminal.

(6) An adequate zoning ordinance, based on a long-range master plan for the Town of Barnstable should be prepared and adopted by the citizens. This would encourage the orderly development not only of the area adjacent to the proposed Union Terminal but also of all properties in the town and would

prevent the encroachment of undesirable or incompatible uses on the terminal area.

It is hoped that this thesis will stimulate the interest of the citizen of Barnstable and Cape Cod and thereby bring about the purpose for which it was written. Even if the plans should be altered or different financial and managerial approaches be used, the author would be very happy if the accomplished end were based upon this initial study.

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