ALL
+ map in pieces

95219833

STATUS: PENDING 20120926 **OCLC #:** 60608872

REQUEST DATE: 20120926 **NEED BEFORE:** 20121026 **SOURCE:** ILLiad

BORROWER: NKM **RECEIVE DATE:** **DUE DATE:**

RENEWAL REQ: **NEW DUE DATE:** **SPCL MES:**

LENDERS: *ZAP, CUY, CUY

TITLE: Duke Power transit improvement plan, Charlotte, North Carolina /
EDITION: keyed by ACD
IMPRINT: [Charlotte, N.C. : Traffic Engineering Dept., 1950]
ARTICLE TITLE: May we have a copy of the report?
ARTICLE AUTHOR: Charlotte Traffic Engineering Dept.
ISSUE DATE: 1950
VERIFIED: <TN:267013><ODYSSEY:206.107.44.77/ILL> OCLC
SHIP TO: ILL Borrowing/J.Murrey Atkins Library,UNC Charlotte/9201 University City Blvd./Charlotte,
NC 28223-0001

BILL TO: SAME ***FEIN 56-0791228***
SHIP VIA: Odyssey, Email PDF, Web PDF
MAXCOST: IFM - 30.00
COPYRIGHT COMPLIANCE: CCL
BILLING NOTES: To assist our business office your FEIN # must be on the invoice. Thank you
ODYSSEY: 206.107.44.77/ILL
FAX: 704- 687-3473
EMAIL: interlibraryloan@uncc.edu
AFFILIATION: KUDZU, ASERL
BORROWING NOTES: Please send copies via Odyssey,Email PDF or Web PDF. Thank you NKM (maxCost: $30.
00)

PATRON: Schuster, Marilyn

DZ 608 541

D/ Ariel (E)
RLF Access Ser
Date 10/01/12
Initials
PS
Pages 27

NKM.014

DUKE POWER TRANSIT IMPROVEMENT PLAN

CHARLOTTE, NORTH CAROLINA

JUNE 1950

PREPARED BY

CITY OF CHARLOTTE
TRAFFIC ENGINEERING DEPARTMENT
H. J. HOOSE – TRAFFIC ENGINEER

CITY OF CHARLOTTE

NORTH CAROLINA

OFFICE OF
TRAFFIC ENGINEER

August 1, 1950

The Mayor and Members of the
Charlotte City Council
Charlotte, North Carolina

Subject: DUKE POWER TRANSIT
IMPROVEMENT PLAN

Gentlemen:

The Traffic Engineering Department of the City of Charlotte does hereby transmit to you through Mr. Henry A. Yancy, City Manager, a Transit Study and Report covering on and off count, corridon count, transfer habits, population distribution, and origin and destination studies, in an effort to collect factual data aimed towards the following transit improvements:

1. Routes to best serve Charlotte, which will include expansion of system.
2. Schedules
   A. Running times between route points
   B. Maintenance of schedule and reasonable variations
   C. Headways (i.e. time between service)
3. Stops, their location and size.
4. Transfer points, citywide by location and relation to other lines.

The study and report is supported with maps and charts which are included as part of the survey for your examination and reference.

Your attention is directed to the recommendations, which are based upon the factual data collected. The recommendations are for immediate consideration and do not include any long-range planning.

Respectfully submitted,

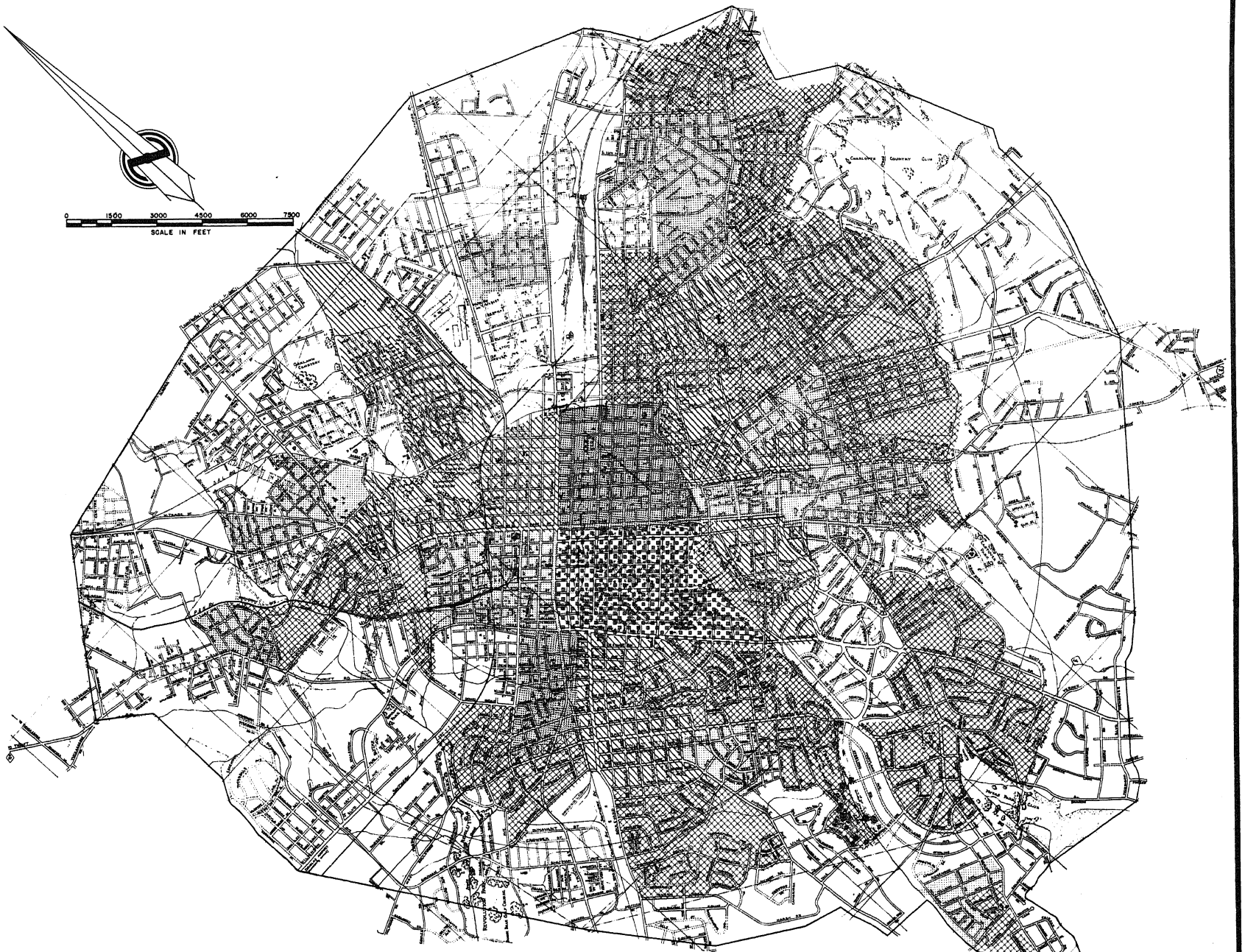
H. J. Hoose,
Traffic Engineer

HJH:pg

TABLE OF CONTENTS

PARTS OF REPORT

ILLUSTRATIONS



POPULATION DENSITY MAP

CITY OF CHARLOTTE
TRAFFIC ENGINEERING DEPARTMENT
H.J.HOOSE TRAFFIC ENGINEER

PERSONS PER ACRE

0 – 4.9	5 – 9.9	10 – 14.9
15 – 19.9	20 – 24.9	25 – & OVER

Data from US Department of Commerce 1950 Census
as reported by Charlotte Chamber of Commerce

PLATE 1

PART I

INTRODUCTION

The continued growth of Charlotte is in part dependent upon the adequacy of its transit system. This system must be on the competitive basis with private transportation if it is to thrive. Competition is closely related to time and convenience of transit service versus that of private vehicle.

With increased vehicular registration, the use of private automobiles in going to the central business district will be less practical due to limited parking and roadway facilities. Attractive transit will therefore naturally induce more patrons.

Consequently this report is aimed toward the principle of "The best transit service for the greatest number of the citizens of Charlotte consistent with economic realities". The following basic objectives are sought to be attained:

(a) To eliminate wasteful duplications which burden the entire system and impair the service.
(b) To extend service into new areas within the City having sufficient density of population.
(c) To operate non-self-supporting crosstown (feeder) service on the most economic basis possible so as not to cast an undue burden on the sustaining riders.
(d) To secure the maximum service at the minimum cost by providing direct and logical routes, and adopting sound transfer practices.

With these points in mind, the Mayor and City Council of Charlotte authorized on May 17th, 1950, this survey to be conducted by the Traffic Engineering Department of the City.

PART II

BASIC FACTS

Full and accurate facts, freely recognized and intelligently interpreted, are necessary in any discussion of even the smallest transportation question. A solution of the problem of urban transit operation will come only when these problems are approached soberly, rationally and with a willingness to ascertain all of the facts and to understand what those facts signify.

Population Densities: U. S. Census data completed in 1950 is illustrated graphically on a population density basis on Plate 1. It is evident therefrom that with the exception of the residential sections in the northeastern and southeastern quadrants of the City, a two mile circle with its center at the Square will enclose those areas of highest density and therefore greatest potential transit patronage.

Daily and Hourly Variations in Riding Habits: Daily transit patronage in Charlotte is shown on Plate 2. This chart indicates Saturday to be the heaviest day with approximately seventeen per cent of the average week's total of riders. Sunday is the lighest day with less than seven percent of the average week's fares.

Hourly variations are also presented on Plate 2. Extreme peak riding conditions exist between 7 A. M. and 9 A. M. each morning and also between 3 P. M. and 7 P. M. each afternoon during the normal week-day. Other hours were found to maintain a relatively consistent trend in riding habits.

Paralleling the chart of hourly variation of passengers, Plate 3 illustrates the number of buses scheduled by fifteen minutes periods throughout an average week-day. Similarly, Table I shows complete operational data of existing bus routes.

Transit Desire Lines: Origins and Destination of transit riders were reported by the N. C. State Highway and Public Works Commission in 1946. These data, presented on Plate 4, verify the attraction of the central business district of Charlotte as the prime area of origin or destination, whereas Plate 5 indicates a decided desire for a crosstown movement south and east of the central business district.

Transit Passenger Turnover by Stops All passengers boarding and leaving each bus for a week-day in June 1950 were recorded at each bus stop on the entire transit system. These volumes are presented graphically on Plate 6.

It can be seen that the principal point of turnover in Charlotte is at the Square. This represents 24% of riders on the system. Further analysis reveals that a substantial portion of this 24% is represented by transferees.

These facts are completely tabulated in the Appendix to this report.

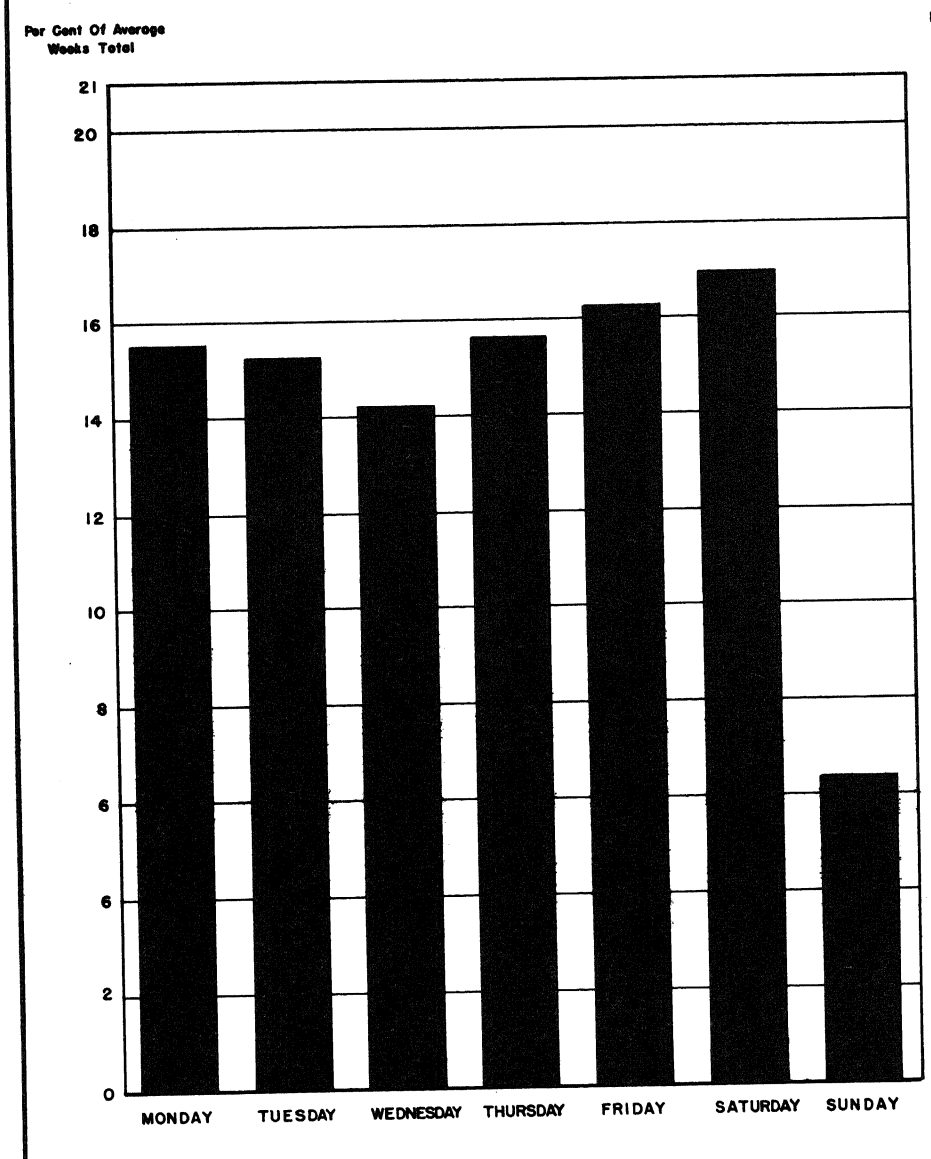
Cordon Count: The Cordon Count was composed of a check of all persons entering and leaving the central business district by each street and by each means of transportation. Observations were recorded by half-hour periods from 7 A. M. to 7 P. M. to make possible a detailed analysis of the fluctuation throughout the day. The results are presented under two major headings: Persons and Vehicles.

Plate 7 indicated by mode of transportation the number of persons brought into and taken out of the cordon area. By a comfortable majority, the private passenger auto is the principal carrier of persons, 66,301 autos entering with 109,332 passengers or an average of 1.65 passengers per auto. Duke Power buses were found to render invaluable service through concentrating the passenger load, 1,609 buses entering with 27,238 passengers or an average of 16.95 passengers per bus.

The excess of vehicles and persons entering the cordon area over those leaving during the early morning hours causes the number of vehicles and persons present within the area to build up rapidly. Plate 8 shows that the peak of vehicles was reached at 12 Noon when 9,059 vehicles were recorded as being within the area (considering 2,420 vehicles that were enumerated within the cordon at 7 A. M.)Similarly to peak of accumulation of persons as shown on Plate 8 was reached at 12 Noon when 22,622 persons were recorded as being in the area.

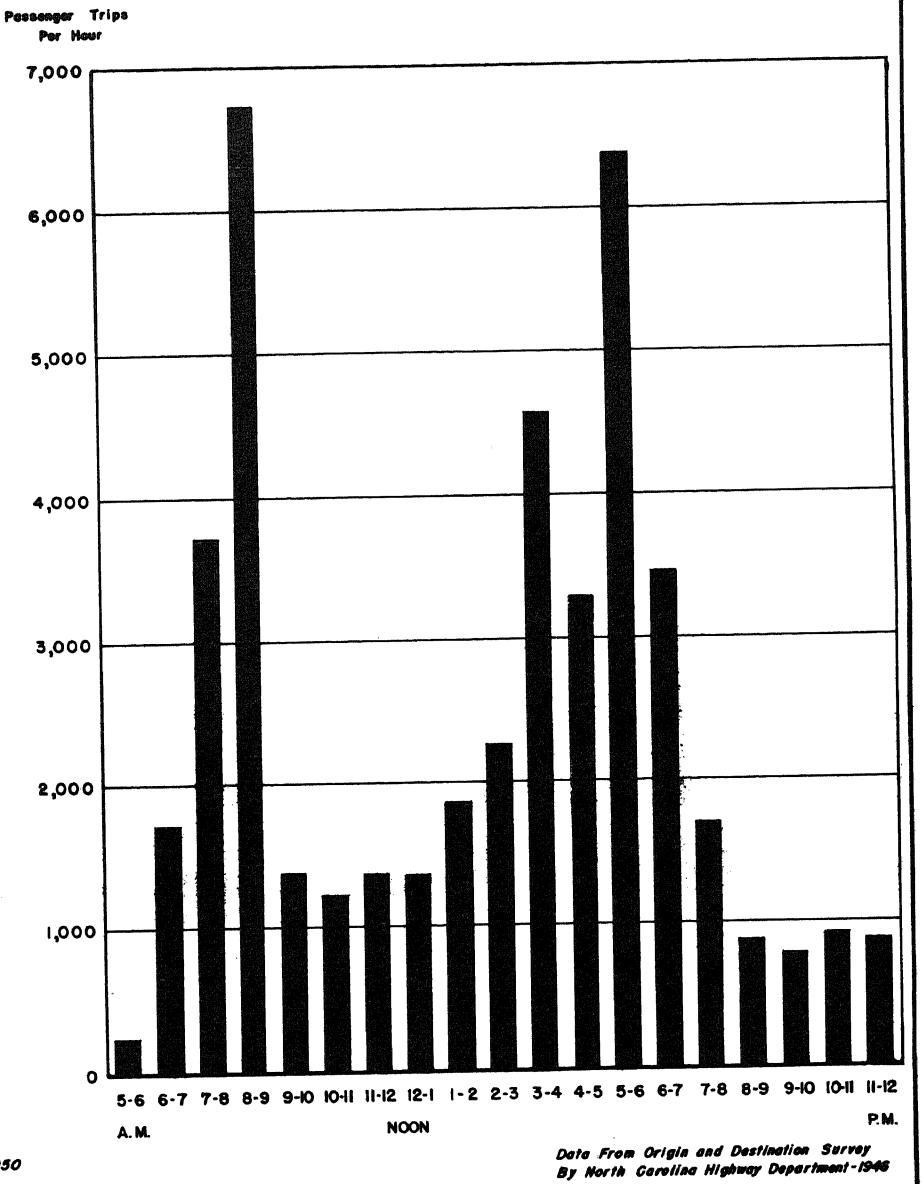
Plate 9 graphically shows the number of vehicles entering and leaving the cordon area via each street between 7 A. M. and 7 P. M., and in a like manner, Plate 10 shows the number of people crossing the cordon line by streets during this period. It is evident that the streets on which transit operates carry more people per vehicle than streets on which transit is not routed.

CHARLOTTE BUS PASSENGER TRIPS



Data From Duke Power Company - 1950

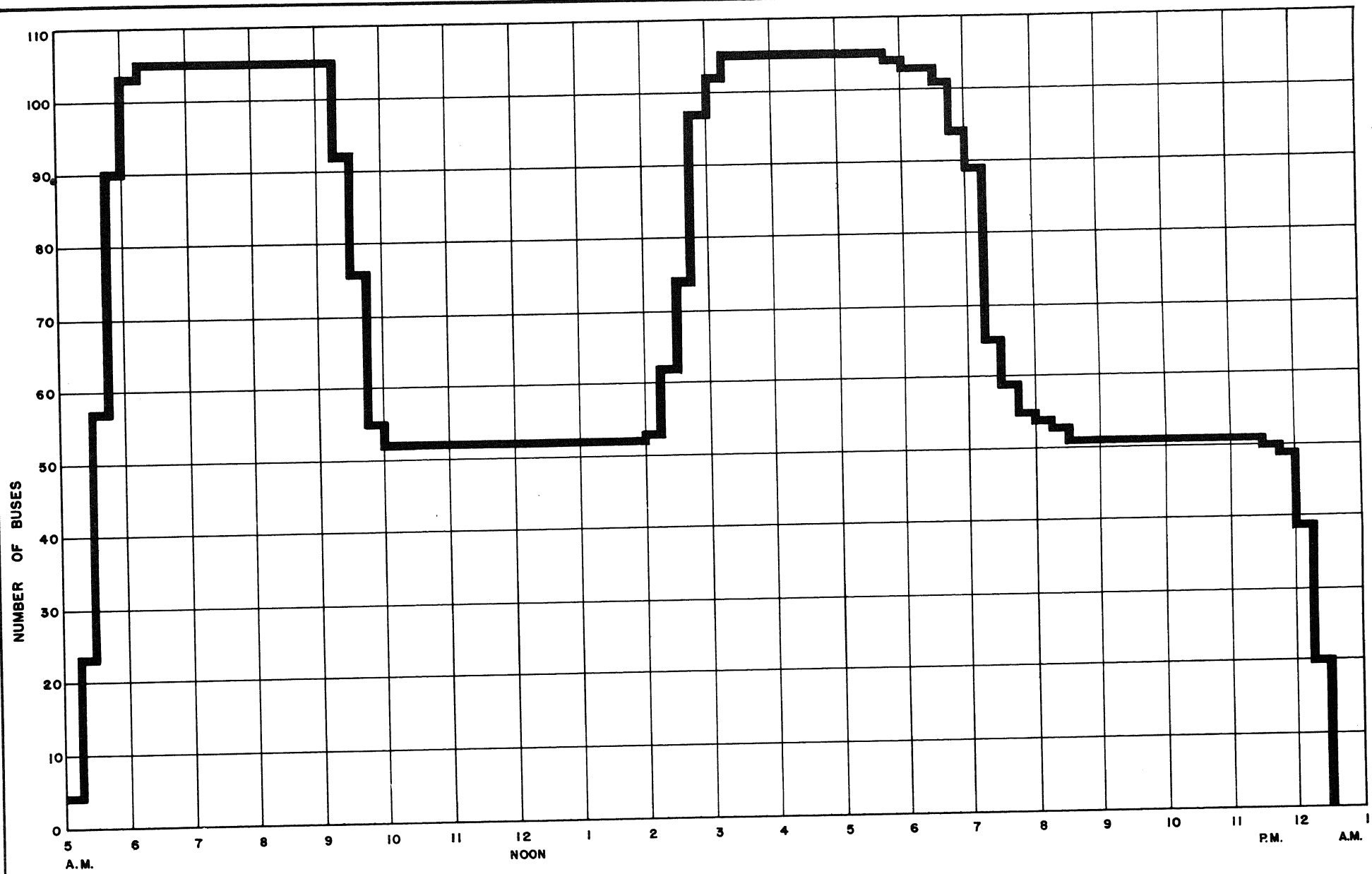
DAY OF WEEK



Data From Origin and Destination Survey By North Carolina Highway Department - 1946

HOUR OF DAY

PLATE 2



NUMBER OF BUSES SCHEDULED BY FIFTEEN MINUTE PERIODS

AVERAGE WEEK DAY

JUNE, 1950

DUKE POWER COMPANY – CHARLOTTE, N.C. BRANCH

PLATE 3

Duke Power Co. - Charlotte Operation

SUMMARY OF DATA ON EXISTING LINES

Average Week Day - June 1950

Rt.	No.	Hrs. Of Op.	No. Rnd. Trips	Seats & Passengers			Veh. Mi. Op'd	Pass. per Veh. Mi.	Av. Sp. MPH	Base Period		Peak Period		Percent Transfer Pass'grs.
				Seats Fur.	Pass. Car'd	% Seats Occup'd				No. Veh.	Headway Min.	No Veh.	Headway Min.	
1	1	90.16	61.80	7910	5464	69.08	1132	4.83	12.15	4	20	6	15	15.7%
2	2	104.83	76.60	9030	5612	62.09	1095	5.13	10.65	4	20	8	10	16.3%
3	3	141.75	95.33	12076	8157	67.55	1491	5.47	11.60	4	20	12	7 1/2	16.9%
4	4	150.00	112.25	14642	9135	62.39	1708	5.35	11.80	5	15	13	6	19.0%
5	5	149.58	112.05	14791	7966	53.86	1535	5.19	10.60	5	15	13	6	20.4%
6	6	94.75	92.70	10709	5612	52.40	840	6.68	9.00	3	20	8	7 1/2	18.6%
7	7	110.83	127.75	16352	8502	51.99	1031	8.25	9.50	5	10	7	7 1/2	18.2%
8	8	93.25	65.85	8605	5103	59.30	1185	4.31	12.10	4	20	6	15	15.2%
9	9	70.00	61.75	7212	4009	55.59	711	5.64	9.15	3	20	5	15	24.4%
10	10	105.75	77.60	9622	5977	62.12	999	5.98	9.70	4	20	8	10	20.4%
11	11	70.75	64.20	8218	4700	57.19	702	6.70	8.80	3	20	5	15	22.3%
12	12	62.33	61.75	7472	3534	47.30	638	5.54	10.40	3	20	4	15	22.2%
13	13	63.16	54.70	6619	2902	43.84	688	4.22	9.45	3	20	4	20	20.2%
14	14	32.33	30.75	3321	1680	50.57	335	5.01	10.85	0	0	4	15	17.9%
15	15	52.58	75.50	4832	2561	53.00	486	5.27	9.30	2	20	4	10	22.4%
System Total			1169.58	141420	80914	57.22	14576	5.55		52		105		19.2%

TABLE I

PART III

AREA OF SERVICE AND ALIGNMENT OF ROUTES

It is a commonly accepted standard that persons can reasonably be expected to walk a quarter of a mile to reach a transit line. This is true in normally developed residential districts but in outlying and sparsely settled sections, this area of service can be extended to a half of a mile.

The central business district is the convergent point of most lines; therefore, such routes are located less than a half a mile apart as they approach this district and this can be partially overcome by locating more than one line upon a single street. In addition to connecting residential districts to the central business district, major industrial sections are desirable areas for transit service.

A majority of operated transit vehicles should enter not only the heart of the central business district but should, when practical, pass through and extend to another outlying section. This is known as "through" routing in contrast with "loop" routing where the line enters the business district, turns around and exits via that same entrance route. Through routing provides better crosstown movement between different sections of the city and minimizes turns in the central area. Each end of a through route should have a comparable turnover of passengers per mile as the other end.

Recommended Routing: Applying the principles hereinbefore outlined, a system of transit routes has been located based upon factual findings. These are shown on Plate 11. Sections of the City more than a quarter of a mile from any transit line are also illustrated by the shaded areas on this Plate. A discussion of each of these routes follows.

Recommended East-West Routes

East-west routes (odd numbers) pass through the Square on Trade Street. To the west, they all follow West Trade Street until they diverge abruptly. To the east, routes likewise follow one delineation to Hawthorne Lane via East Trade Street and Elizabeth Avenue with the exception of those routes that adruptly change their direction.

One of the major advantages of this routing is that the routes serving the outlying residential sections will converge upon one street as they approach the more heavily populated areas near the central business district, and by proper arrangement of schedules very frequent service will be afforded along these streets. This will insure more adequate seating space for persons last boarding the bus, and will also encourage more patrons to ride short distances since they will have a minimum wait for service.

Route 1 - Double Oaks-Second Ward: One of the shortest routes on the proposed system, this line will tap a new, fast growing, thickly populated area on the west, pass through the Square into the Second Ward area. The Second Ward area has the highest present population density in the City of Charlotte, see Plate 1. The character of the areas served by either end of this route is somewhat similar.

Route 3 - Biddleville-Second Ward: This route, by dovetailing it into the schedule of proposed Route 1, completes the balance of transit riding between the west ends of combined Routes 1 and 3 as recommended and the east end, Second Ward, in both cases. Such makes for more efficient operation and provides excellent headway where most needed.

Route 5 - Hoskin-Eastway: This through route extends from Bradford Drive outside the western city limits toward Eastway via Rozzells Ferry Road, Trade Street, Caldwell Street, East Seventh Street and Central Avenue to Eastway. On-and-off passenger counts show that each end of this new line, averaged approximately 825 passenger turnover per mile of line, an excellent balance.

Route 7 - Glenwood-Selwyn Avenue: The Glenwood end of this proposed route is a combination of the lines which now serve the Glenwood and State Street sections west of Five Points. The Selwyn Avenue end is not recommended to be changed except for an extension to Wakefield Drive. This new through route traverse s sections of the City with similar population density characteristics and demand for transit service since each end will have an estimated 1, 200 passenger turnover per mile.

Route 9 - Greene Street-Franklin Avenue: New residential developments in the Greene Street area necessitate the additional service to be rendered by this route. This service in the form of a two-way loop also takes the place of lack of service on Thrift Road between State and Morehead Streets when the proposed Glenwood line is inaugurated. On the east end, the present Rosemont loop is proposed to be abandoned and the line routed eastward from Hawthorne Lane via Fifth Street, Caswell Road, and East Seventh Street to an extension of this route in the vicinity of the intersection of East Seventh Street and Franklin Avenue.

Route 11 - Wilmore-Providence Road: Both ends of this line tap new beautiful and well groomed sections of Charlotte. The Wilmore end is recommended to be extended south and looped via West Boulevard, Shuman, Cowles, Beechnut, Barringer and West Boulevard. This route will continue to transport a considerable number of domestic helpers.

Route 13A-13B-Oakhurst-Square-Queens Road: Plate 4 clearly delineates the excessive demand for transit service to the east of the central business district when compared with that to the west. Therefore, it is practical to loop a line from the east at the center of the City. This is done by combining balanced legs of two present routes, Oakhurst and Queens Road. The looping route within the central area, via West Trade, Poplar, West Fifth, Church and Trade, will be on streets where one-way operations reduces intersectional conflicts, especially the left turning type, to a minimum.

Recommended East-West Turnbacks

Peak period service in practically all cases is most critical within two miles of the Square. In this area the greatest density of population exists, Plate 1. In addition to base service, during peak periods, turnback service to provide the most service for the greatest number of patrons is recommended to be routed as follows:

Route 5X - Smallwood-Plaza: This route overlaps proposed Route 5 and turns back on the west end via the same routing now used by the Smallwood bus. On the east end the turnback is recommended to be via Central, Plaza, Westmoreland, Pecan and Central. The eastern trunback will touch proposed Routes 5, 10 & 13A.

Route 7X - State Street-Memorial Hospital: Overlapping proposed Route 7, this turnback line will be approximately four miles in length from one end to the other, with its center at the Square. The State Street end is recommended to be turned back on State Street north of the Piedmont and Northern Railway tracks and the other end to be turned back at the Memorial Hospital.

Route 9X - Walnut Avenue-Mercy Hospital: Route 9X as proposed follows the same routing as Route 9 as previously described except that it turns back at the intersection of W. Morehead Street and Walnut Avenue on the west end and circles the Presbyterian Hospital via Hawthorne Lane, East Fifth Street, North Caswell Road, East Fourth Street and Hawthorne Lane on the east end.

Recommended North-South Routes

The four north-south routes (even numbers) traverse Tryon Street each way from Eleventh Street to Morehead Street. Three of the four routes overlap on their south end as far as the intersection of South Boulevard and East Boulevard. This routing provides frequest service along this entire length of street system.

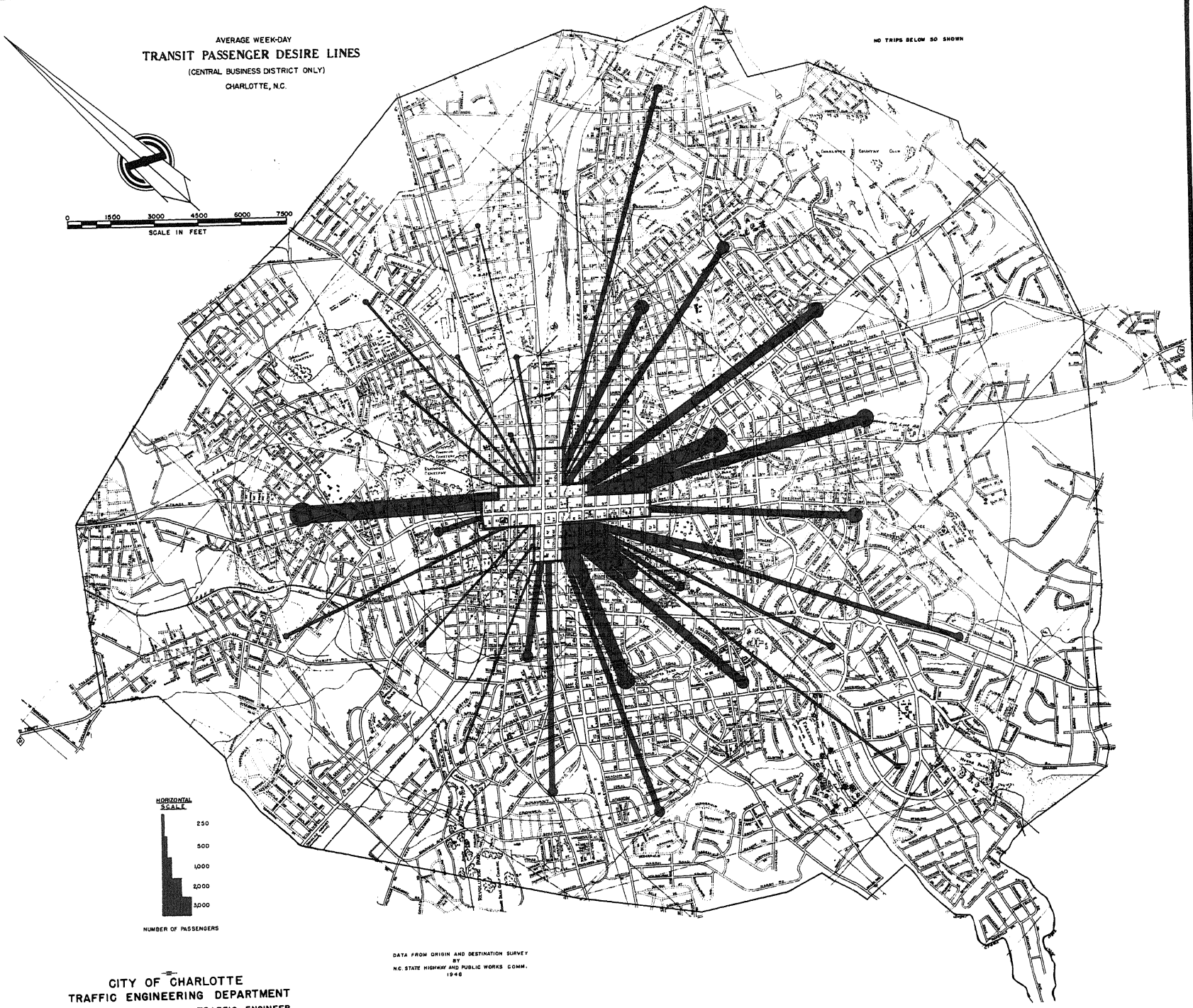

AVERAGE WEEK-DAY
TRANSIT PASSENGER DESIRE LINES
(CENTRAL BUSINESS DISTRICT ONLY)
CHARLOTTE, N.C.
NO TRIPS BELOW 50 SHOWN
0 1500 3000 4500 6000 7500
SCALE IN FEET
HORIZONTAL SCALE
250
500
1,000
2,000
3,000
NUMBER OF PASSENGERS
DATA FROM ORIGIN AND DESTINATION SURVEY BY N.C. STATE HIGHWAY AND PUBLIC WORKS COMM. 1948
CITY OF CHARLOTTE
TRAFFIC ENGINEERING DEPARTMENT
H.J.HOOSE TRAFFIC ENGINEER

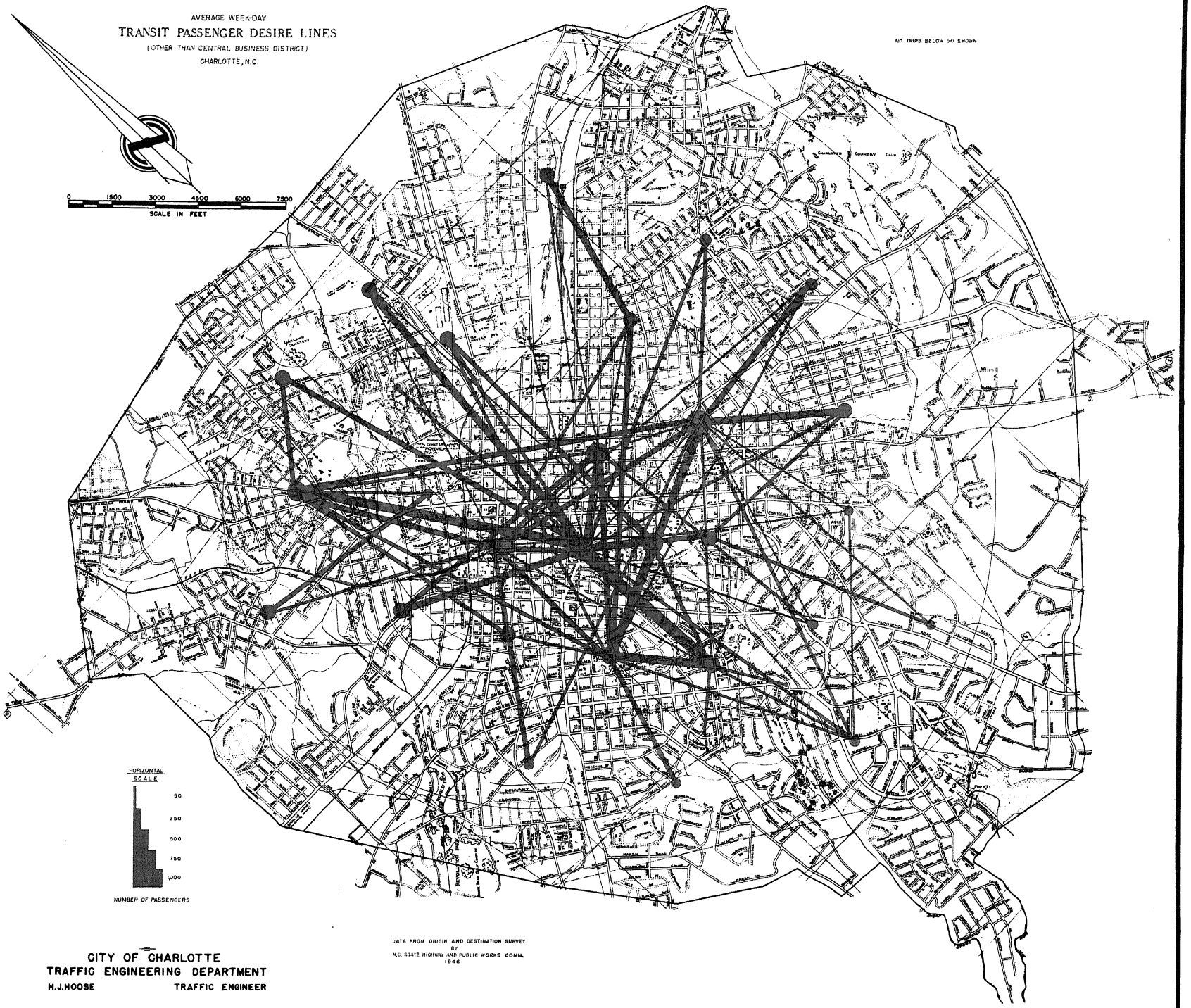
PLATE 4

AVERAGE WEEK-DAY

TRANSIT PASSENGER DESIRE LINES

(OTHER THAN CENTRAL BUSINESS DISTRICT)

CHARLOTTE, N.C.



DATA FROM ORIGIN AND DESTINATION SURVEY BY N.C. STATE HIGHWAY AND PUBLIC WORKS COMM. 1946

CITY OF CHARLOTTE
TRAFFIC ENGINEERING DEPARTMENT
H.J.HOOSE TRAFFIC ENGINEER

PLATE 5

Route 2 - Hutchinson-South Boulevard: Proposed Route 2 is a combination of two present routes, 12 on the north and 11 on the south. These routes were found to give adequate coverage of the area served.

Route 4 - North Tryon-South Tryon: Straight through movement on Tryon Street will be achieved with this route. The northern end is recommended to remain as it is (present Route 11). The south end supplants present Route 6 in this area and gives extended services into the neighborhood of the intersection of South Tryon Street and Fairwood Avenue.

Route 6 - North Charlotte-Cumberland Avenue: No changes are recommended for the north end of this route (present Route 5); however, on the south end, the route is recommended to be extended from the intersection of East Boulevard and Charlotte Avenue to East Boulevard and Cumberland Avenue, thence south on Cumberland Avenue to Lilac Road.

Route 8 - Belmont-Park Road: Route 8 follows in its entirety present Route 4 with the exception of an extension at its southern extremity on Park Road from Marsh Road to Willow Oak Road and a rerouting of the loop on its northern end via Parkwood, The Plaza, Belvedere, Mecklenburg, and Parkwood.

Recommended North-South Turnbacks

Route 6X - Cordelia Park-Dilworth: This is an overlapping line following the same route as proposed Route 6. It will turnback on the north via North Davidson, 21st Street, North Caldwell, 20th Street and North Davidson. On the south end each bus will turn back via East Boulevard, Dilworth Road East, Rommey Road and Dilworth Road West.

Route 8X - Villa Heights - Dilworth: The north end of this route is recommended to loop from proposed Route 8 via Pegram Street, Grove Street, Wilkinson Street, Parkwood Avenue and Pegram Street. This route will overlap Route 8 to the intersection of East Boulevard and Avondale Avenue thence southeastward to a turn-around point via Dilworth Road East, Ideal Way and Dilworth Road West.

Recommended Crosstown Route

Origin and Destination data on Plate 5 clearly indicate the need from transit service on a crosstown basis south of the business district. It shows the desire for movement between the Belmont-Midwood and the Dilworth areas; similarily there is a desire for transit movement connecting the Memorial Hospital-Brooklyn-West Trade Street section. Based on these facts it is apparent that a crosstown line will render necessary and convenient service. It can be anticipated that a large number of riders using this crosstown service will be transferees who at present go to the Square, and already overburden and congested ares.

Route 10 - Crosstown: This proposed crosstown route begins in the North Charlotte section at 36th Street and The Plaza and is located east, south and west of the business district, terminating at the intersection of West Trade and Irwin. This route is fully delineated on Plate 11.

The Routing Plan as outlined above is such that a complete change in conformity with it is not an impractical task; however, changes in the growth of Charlotte should be carefully observed for making necessary route adjustments as conditions warrant.

It is apparent that this proposed routing will necessitate additional traffic control measures such as stop-and-go traffic signals at points at which buses will be required to enter heavily traveled arteries, curb parking restrictions where the present roadway width is too narrow, and others. It is recommended that the Traffic Engineer of the City be empowered to make necessary studies of these conditions and make such changes as he finds warranted by conditions.

PART IV

SCHEDULES AND HEADWAYS

Throughout the nation, fifteen minute headways have been found in most cases to be the maximum desirable. Longer intervals between buses necessitate the potential patron's knowledge of schedules and are often little better than no service at all. Much shorter headways are possible on the more heavily traveled routes and it is often found that the provision of more frequent service will encourage more than enough additional riders to compensate for the increased operating cost. The headways should, of course, be varied during different periods of the day and/or week and should also be adapted to the riding habits of the population along each of the several routes.

Schedules: Each schedule for Duke Power Company buses is now predicated upon the time the bus leaves the near end of the line, leaves the Square, and leaves the other end of the line on the return trip. These time check points are in some cases more than four miles apart, thereby giving considerable leeway to the bus drivers. For example, under light loading characteristics a driver can leave the Selwyn Avenue end of present Route 3 and arrive at the Square early enough to lay over 5 or 7 minutes and leave the Square on schedule. This creates three principal disadvantages to the public.

1. Irregular time passing any given point on the route is a burden to the public.
2. Too much space is required in the heart of the central business district for buses waiting to depart on schedule from the Square.
3. The bus following an "early" bus may run at a normal speed but become overloaded by patrons who were left at stops along the route by the preceding bus.

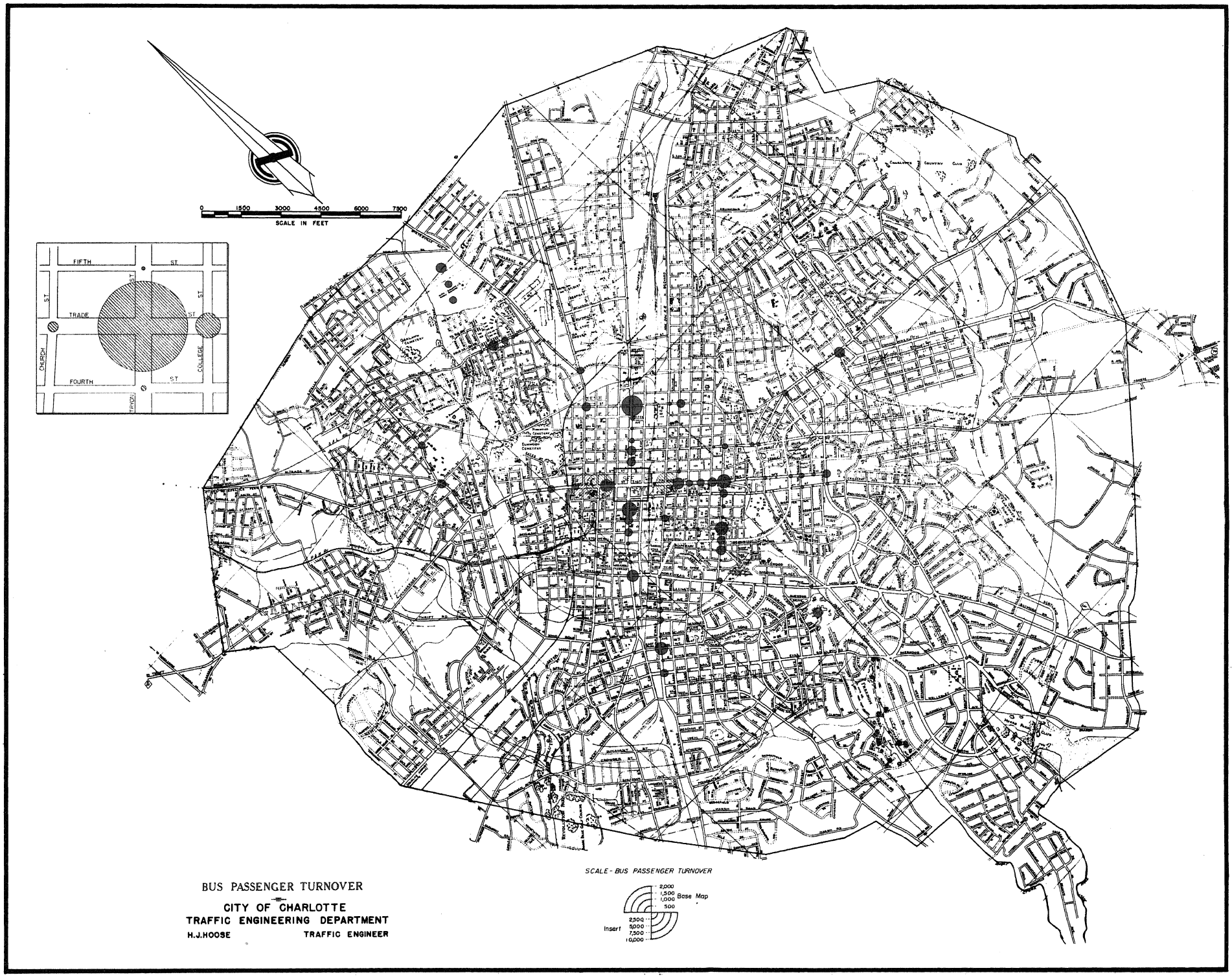
It is recommended that the additional time check points be established by Duke Power Company. One set of these new check points should be in the vicinity of a three-quarter mile radius from the Square and on routes that radiate from the Square as much as four miles, still another time check point is recommended.

Similarly, these time check points will give each driver a better guide as to how he is maintaining his schedule. One minute ahead or one minute behind schedule is a reasonable variance but when an operator consistently allows, during normal operating conditions as scheduled, his bus to get two minutes ahead or behind schedule, immediate steps should be taken by the Company to ascertain the reasons, and, if necessary, corrective steps should be taken by the Company.

A factor that might be better controlled by the City is parades which wreck havoc on transit schedules as well as upon downtown traffic in general.

No effort is made in this report to set up schedules for the Company to follow. This is a function of the Schedule Department of the Company which is in daily contact with varying conditions which necessitate schedule changes - such as a new source of heavy employment, revisions in shift change times, and many others. However, it is not desirable for the operating schedules to be such that buses of the same or different routes traversing the same street in the same direction to be scheduled to depart from time check points at the same time.

Headways: Eleven of the fourteen present bus lines in Charlotte operate on a 20 minute headway (time interval between buses in same direction on same route) during the base period, 9:15 A. M. - 2:15 P. M. and 7:15 P. M. - 12 Mn. Additional buses are operated during the A. M. and P. M. peak which reduce the present general policy of a 20 minute base period headway. The present operating headways are as follows in Table II.



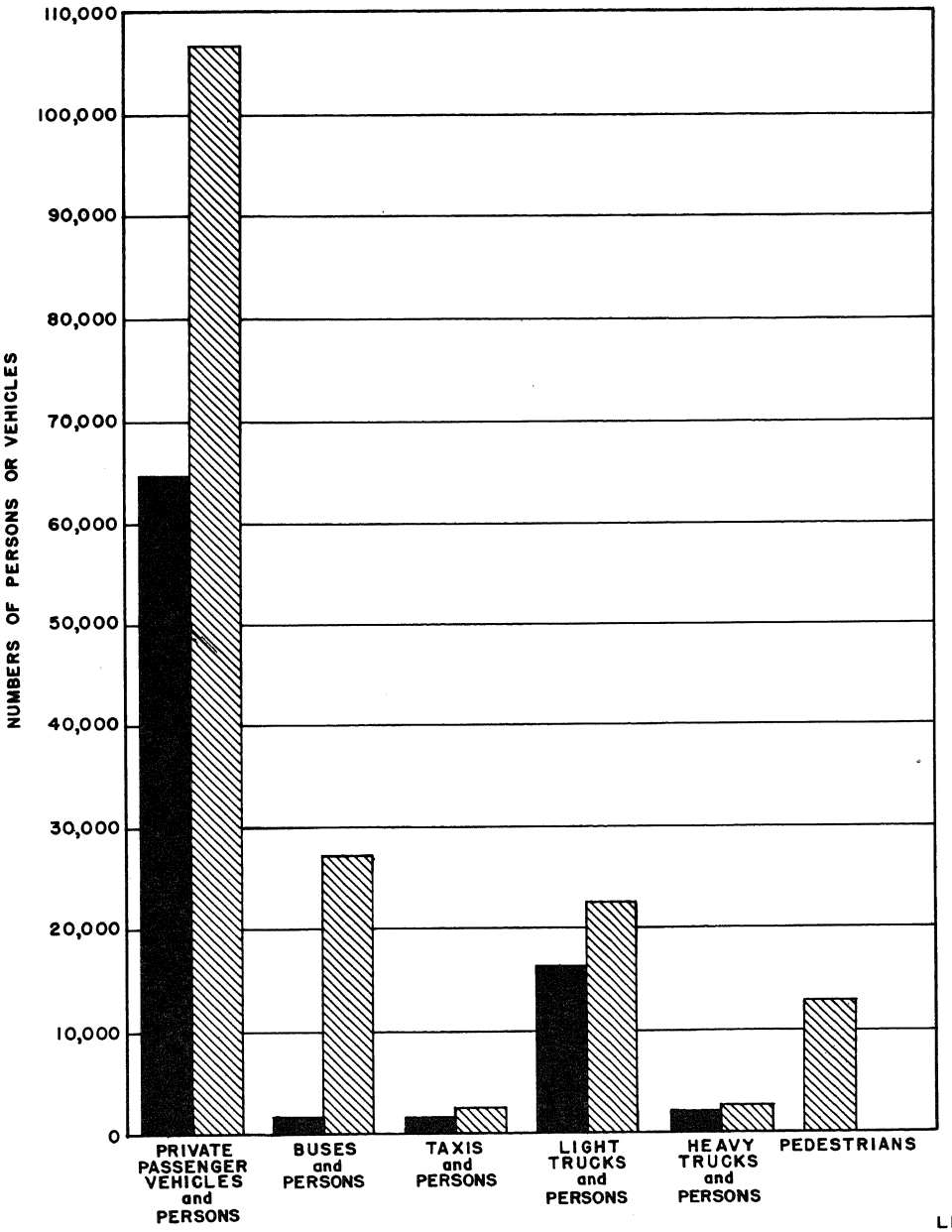
BUS PASSENGER TURNOVER

CITY OF CHARLOTTE

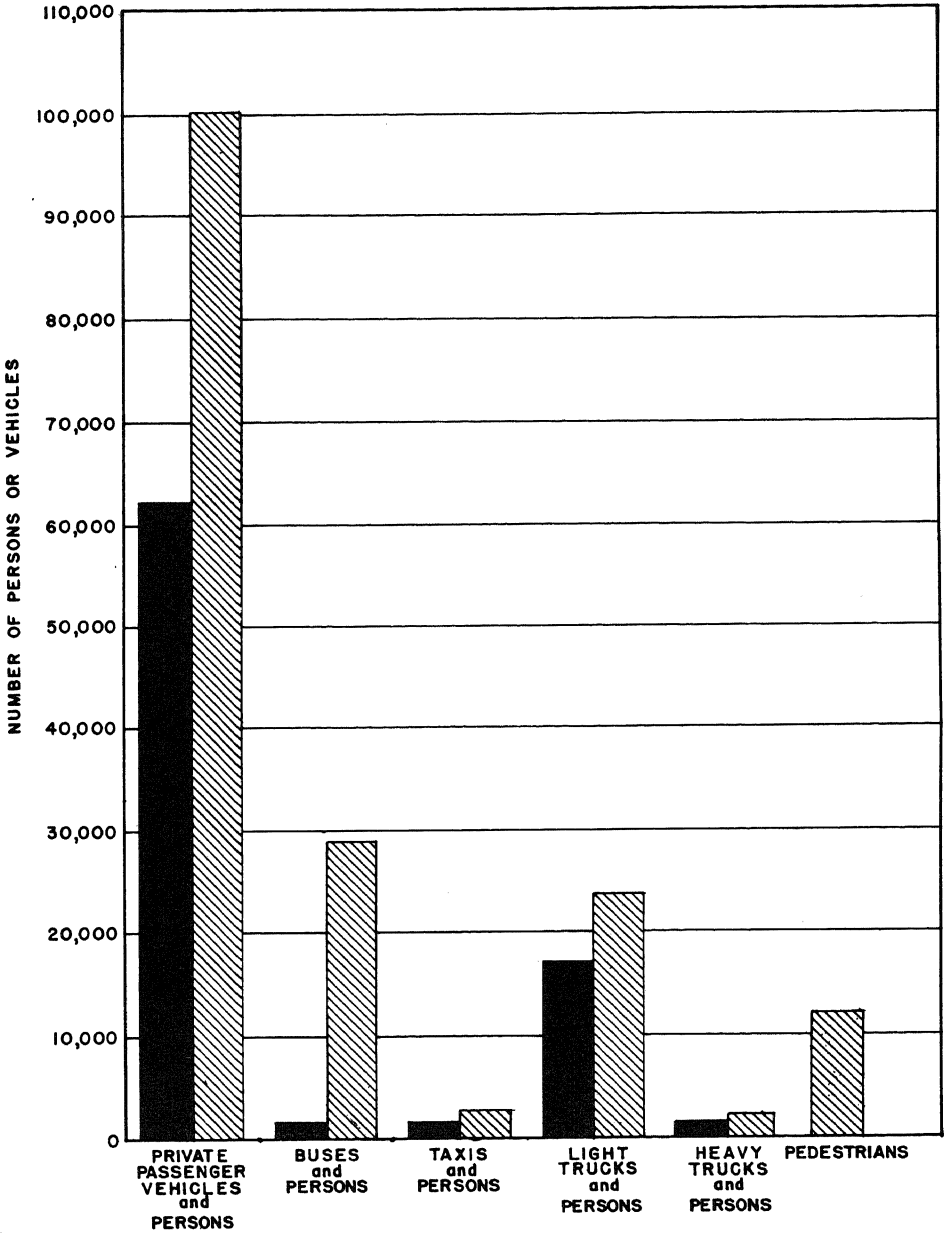
TRAFFIC ENGINEERING DEPARTMENT

H.J.HOOSE TRAFFIC ENGINEER

PLATE 6



ENTERING
CENTRAL BUSINESS DISTRICT
7A.M. - 7P.M.



LEGEND:
VEHICLES
PERSONS

LEAVING
CENTRAL BUSINESS DISTRICT
7A.M. - 7P.M.

JUNE 13, 1950

PLATE 7

PRESENT WEEKDAY HEADWAYS

Route Number	Name	Base Period (Minutes)	Peak Period (Minutes)
1.	Queens-Road - Mt. Holly Road	20	15
2.	Oakhurst - Wesley Heights	20	10
3.	Selwyn Avenue - Oaklawn Avenue	20	7 1/2
4.	Belmont - Park Road	15	6
5.	North Charlotte - Dilworth	15	6
6.	Elizabeth - South Tryon	20	7 1/2
7.	Second Ward - Biddleville	10	7 1/2
8.	Providence Road - Thrift Road	20	15
9.	Eastover - Wilmore	20	15
10.	Midwood - State Street	20	10
11.	North Tryon - South Boulevard	20	15
12.	Hutchinson - East Morehead	20	15
13.	Greene Street - Cumberland Avenue	20	20
14.	Morningside - Smallwood	0	15
15.	Double Oaks - Square	20	10

TABLE II

The proposed routing shown on Plate 11 in some cases combines several routes into one, minimizes duplication, extends service into new areas and provides turnback service during peak periods. This, coupled with shorter headways (Table III) will provide a sounder and more balanced service to the citizens of Charlotte.

RECOMMENDED WEEKDAY HEADWAYS

Proposed Route	Name	Before 7:00 A. M. (Minutes)	7:00 A. M. 9:00 A. M. (Minutes)	9:00 A. M. 3:30 P. M. (Minutes)	3:30 P. M. 6:30 P. M. (Minutes)	After 6:30 P. M. (Minutes)
1.	Double Oaks - Second Ward	9	5	7 1/2	5	9
3.	Biddleville - Second Ward	9	5	7 1/2	5	9
5.	Hoskins - Eastway	20	15	15	15	20
7.	Glenwood - Selwyn Avenue	20	15	15	15	20
9.	Greene St. - Franklin Ave.	20	15	15	15	20
11.	Wilmore - Providence Road	20	15	15	15	20
13.	Oakhurst-Square-Queens Road	20	15	15	15	20
2.	Hutchinson Ave. -South Boulevard	20	15	15	15	20
4.	North Tryon - South Tryon	20	15	15	15	20
6.	North Charlotte-Cumberland Ave.	20	15	15	15	20
8.	Belmont - Park Road	20	15	15	15	20
10.	Crosstown	20	15	15	15	20
5X.	Smallwood - Plaza	0	15	0	15	0
7X.	State St. - Memorial Hospital	0	15	0	15	0
9X.	Walnut Ave. - Mercy Hospital	0	15	0	15	0
6X.	Cordelia Park - Dilworth	0	15	0	15	0
8X.	Villa Heights - Dilworth	0	15	0	15	0

TABLE III

It is estimated that the early morning and late evening schedules will necessitate a maximum of 50 buses, the mid-day period 61 buses and the peak periods 97 buses.

PART V

BUS STOPS

Present stops in the central business district are clearly defined. These are located as shown on Plate 12. Outside of the business district, except at critical points, there is an absence of established stops, each operator picking up and discharging passengers at random.

Stop Locations: Within the central business district it is recommended that a substantial majority of stops be made on the far-side of the intersections; Plate 12. Far-side stops have the advantage of alleviating intersectional congestion, ease of entrance and exit, reducing the curb space required, and protecting pedestrians at the crosswalks by allowing them to walk behind the standing bus. Furthermore, far-side stops are most feasible for left turning movements by buses.

Outside of the central congested area far-side or near-side stops should be designated according to the dictates of the situation. There should be no mid-block stops unless the length of the block is such that one is required and is so designated. Stops should normally be no more than 1000 feet nor less than 350 feet apart, and should have an average weekday turnover of not less than twenty-five persons.

Indiscriminate stopping of buses interrupts schedules and running speeds and must be abstained from if any system is to operate effectively and efficiently. Schedules and running speeds can be facilitated by eliminating unnecessary stops. It is much more logical and desirable for patrons in outlying sections to walk a slightly longer distance to reach a bus stop since this permits a large number of riders to move more quickly to their destination.

Responsibility: It is recommended that the stops out of congested areas be marked by the Power Company and those within by the City. All signs should conform with standard bus stop signs as recommended in the Manual on Uniform Traffic Control Devices and the stops should be at least of the following lengths:

MINIMUM DESIRABLE BUS STOP LENGTH IN FEET*

Approximate Bus Seating Capacity	Stop for one bus		Stop for two buses		Stop for three buses	
	Near	Far	Near	Far	Near	Far
25 passengers or less	60'	50'	90'	80'	120'	110'
30 passengers	70'	50'	100'	80'	130'	110'
35 passengers	75'	55'	110'	90'	145'	125'
40 passengers and more	80'	60'	120'	100'	160'	140'

TABLE IV

The lengths in Table IV are such that a bus can comfortably pull into the curb for picking up or discharging a passenger, then pull away from the curb upon departure. Proper lengths for stops minimize congestion to other street users created by a bus "sticking its rear end out" from a too short bus stop.

* Traffic Engineering Handbook, p. 224.

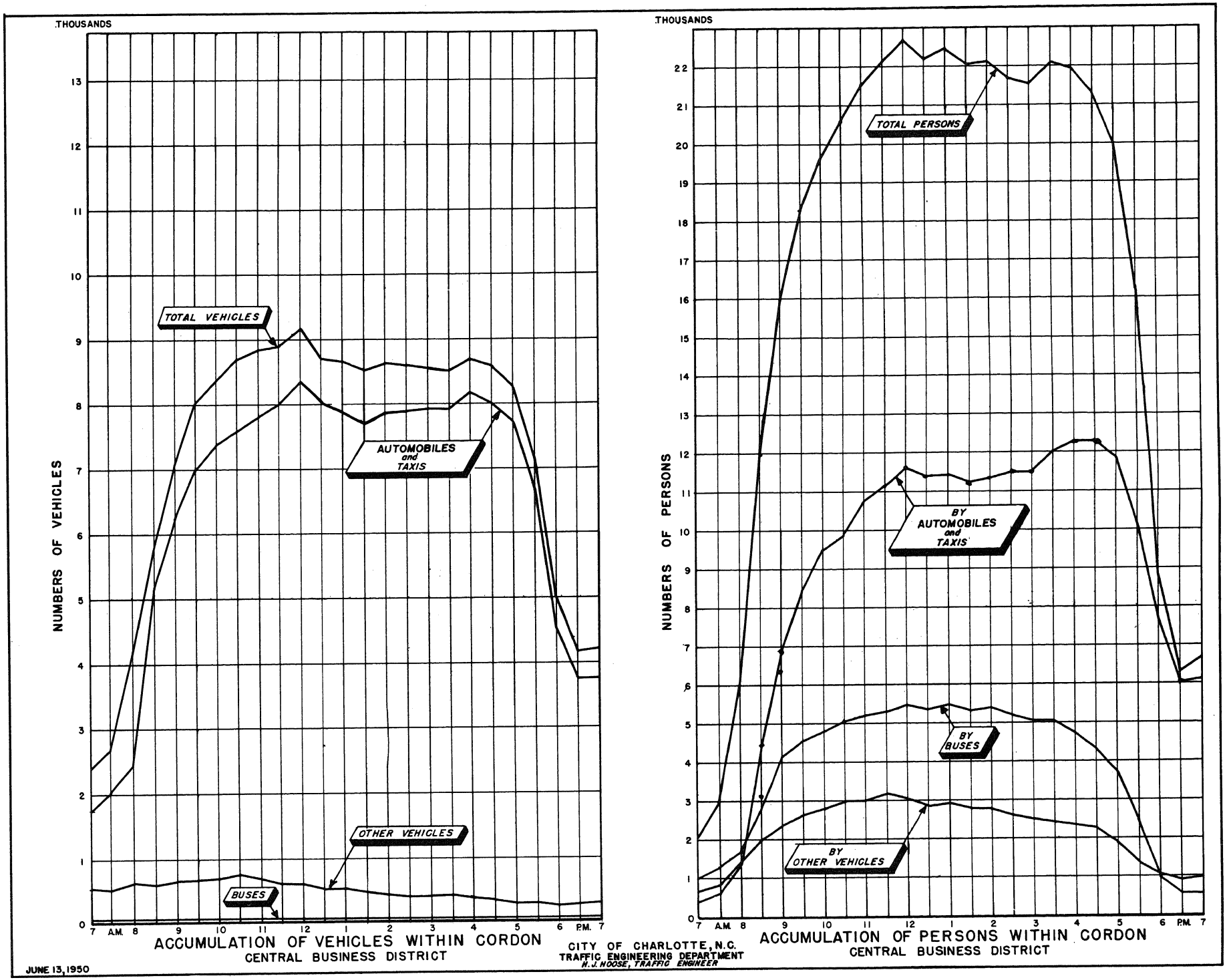
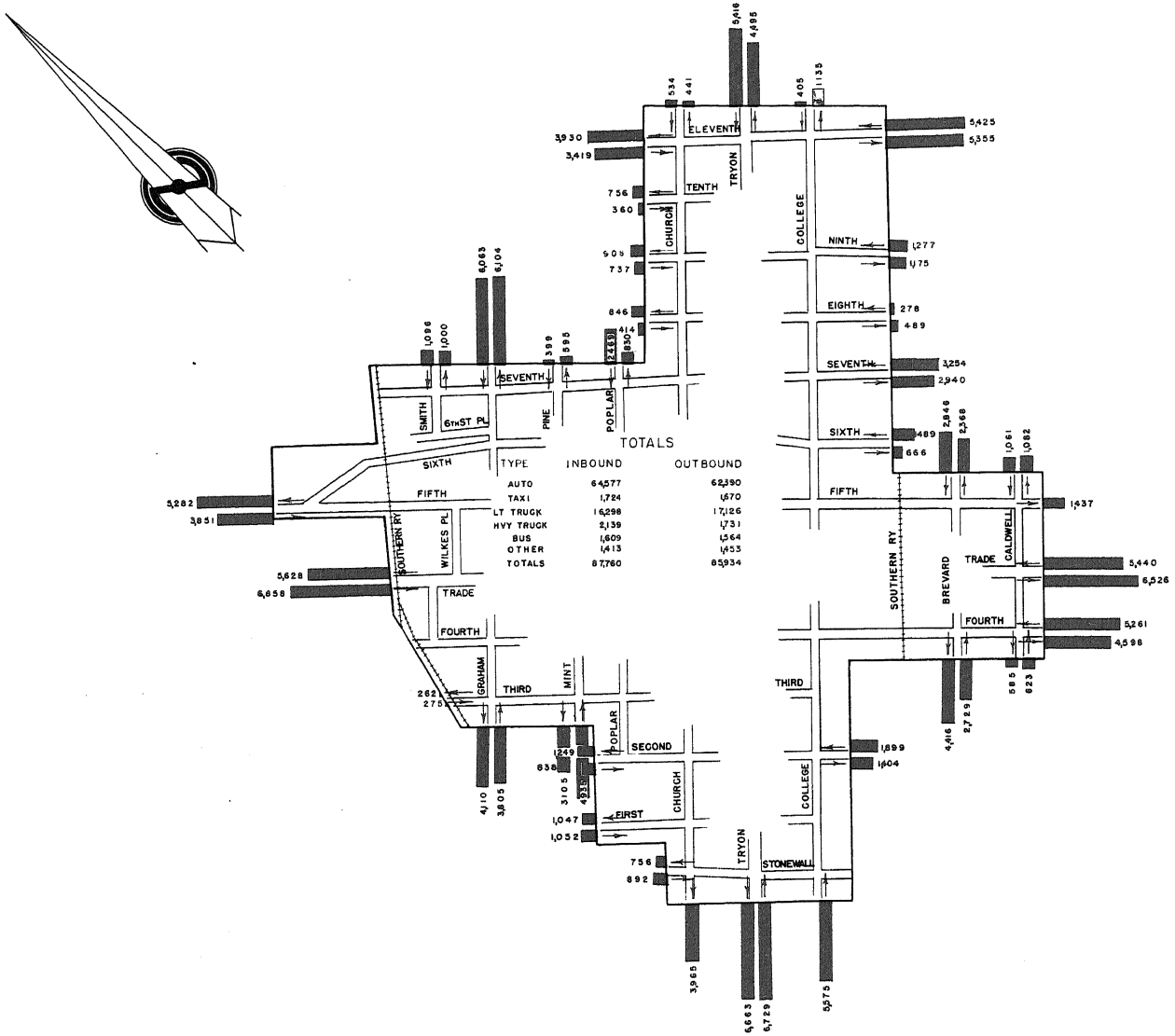

THOUSANDS
NUMBERS OF VEHICLES
TOTAL VEHICLES
AUTOMOBILES and TAXIS
OTHER VEHICLES
BUSES
7 A.M. 8 9 10 11 12 1 2 3 4 5 6 P.M. 7
ACCUMULATION OF VEHICLES WITHIN CORDON
CENTRAL BUSINESS DISTRICT
THOUSANDS
NUMBERS OF PERSONS
TOTAL PERSONS
BY AUTOMOBILES and TAXIS
BY BUSES
BY OTHER VEHICLES
7 A.M. 8 9 10 11 12 1 2 3 4 5 6 P.M. 7
ACCUMULATION OF PERSONS WITHIN CORDON
CENTRAL BUSINESS DISTRICT
CITY OF CHARLOTTE, N.C.
TRAFFIC ENGINEERING DEPARTMENT
N.J. NOOSE, TRAFFIC ENGINEER
JUNE 13, 1950

PLATE 8



7 A.M.- 7 P.M.

MOVEMENT OF VEHICLES AT CORDON

CENTRAL BUSINESS DISTRICT

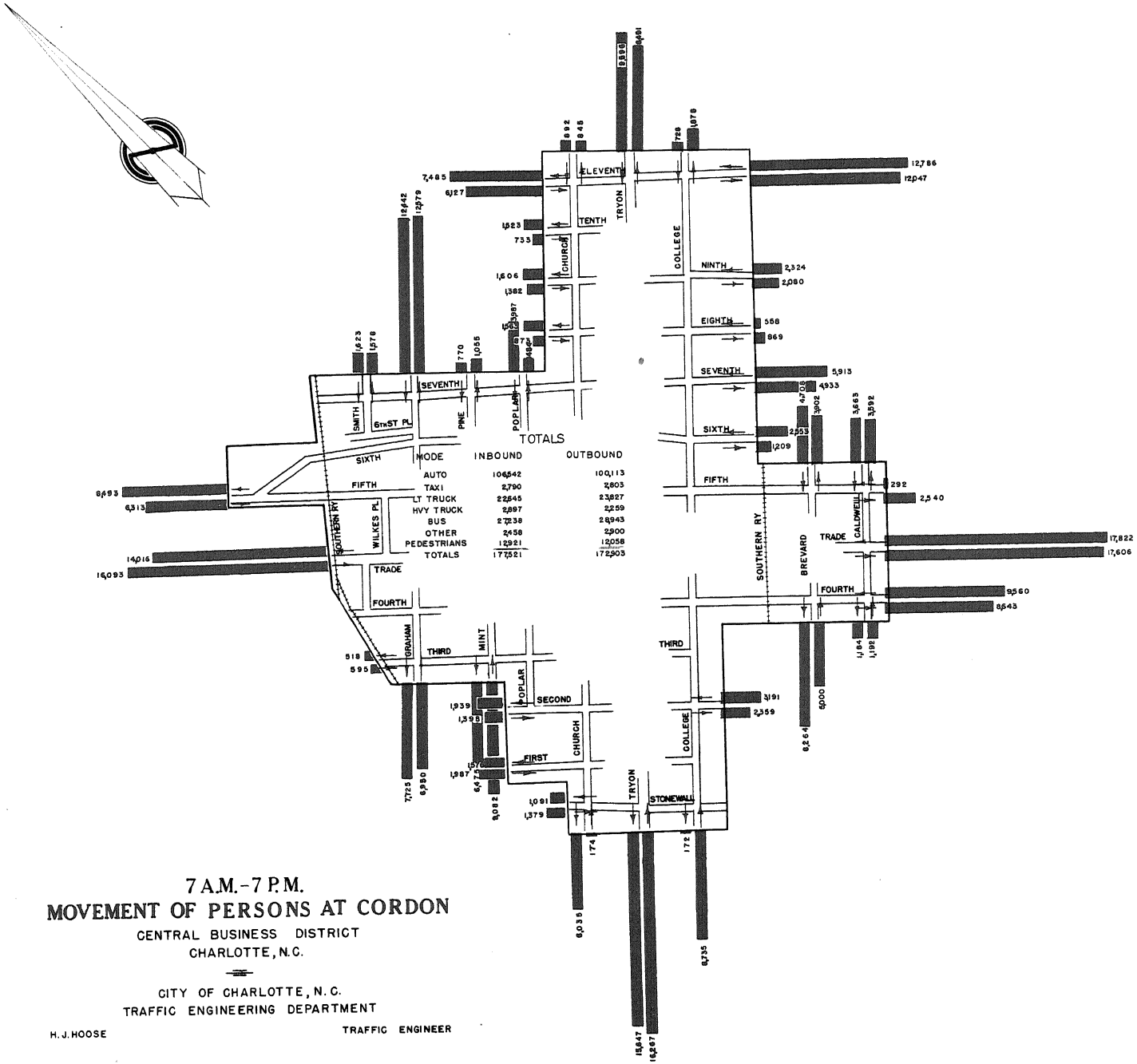
CHARLOTTE, N.C.

CITY OF CHARLOTTE, N.C.

TRAFFIC ENGINEERING DEPARTMENT

H. J. HOOSE TRAFFIC ENGINEER

PLATE 9



7 A.M.-7 P.M.
MOVEMENT OF PERSONS AT CORDON

CENTRAL BUSINESS DISTRICT
CHARLOTTE, N.C.

CITY OF CHARLOTTE, N.C.
TRAFFIC ENGINEERING DEPARTMENT

H. J. HOOSE TRAFFIC ENGINEER

PLATE 10

PART VI

TRANSFERS

It is generally accepted that one fare on a transit system should pay for one trip from any point of origin to any point of destination within the City. To accomplish this transit companies issue transfer tickets, a necessity and convenience to the public, but an operational problem for the company. The convenience to the public is that such transfers represent a definite monetary saving. However, transfers represent a great loss to the company if the public abuses the privilege.

During this survey the Company's policy was to issue a transfer which was honored by the drivers of buses on all routes except the one from which issued. Each transfer ticket was torn so as to indicate the time that it was issued. No real effort was made during that time by the Company to control the point at which transfers were honored. Consequently as indicated on Plate 13, there were 13,387 or 87.2% of all transfers made within the central business district and from the congestion at the Square the majority of these transfers were made at that point.

It is recommended that the Company establish a policy on transfers that will reduce the number of transfers at the Square by at least 50%, thereby making it unnecessary for any bus to lay over at the Square longer than the time required to unload and load. This policy would follow the basic plan outlined thus:

1. Transfers to be honored at the Square only from north-south lines to east-west lines and vice-versa.
2. Transfers to be honored from overlapping routes only at the point of deviation from travel in the same general direction. (Example: Transferee from westbound Route 3 to westbound Route 5, as proposed, will transfer at Five Points.)
3. Transfers to be honored only at point of contact when transfer is from inbound bus to outbound bus. (Example: Transfer from eastbound Route 5 to westbound Route 7, as proposed, will be made at Five Points.)

The present policy of the Company is to issue only one transfer ticket. This is recommended to be modified so that a person desiring to transfer from a downtown route to a crosstown route and then back to a downtown route will be permitted to receive a transfer ticket from a transfer ticket when boarding a crosstown bus. (Example: a patron boards proposed Route 5 near the eastern city limits, rides to the intersection of Independence Boulevard and Hawthorne Lane and transfers south on proposed crosstown Route 10 to Kenilworth Avenue and East Morehead; transfers again south on proposed Route 7 to Memorial Hospital.)

It is recommended that Duke Power Company provide each transfer location with an instructional sign designating which transfer tickets will be honored at that point

PART VII

RELATIONSHIP - RECOMMENDED ROUTES TO SCHOOLS

Daily, during the nine month school year, approximately 1,500 students ride to school in the morning and 2,500 ride home from school in the afternoon. This represents only nine percent of trips to and from school daily by the 21,037 pupils in the City School System.

With this small percentage of trips to and from the schools, direct bus service by the Company is not economically feasible, however, the recommended routes are such that the desires for transit service by school children is available within a reasonable walking distance from such routes, see Plate 14.

No effort has been made to curtail special services by the Company to or from specific schools to areas within the City when such provisions do not interfere with regular schedules and headways as recommended.

PART VIII

SUMMARY OF RECOMMENDATIONS

That the proposed bus routes as shown on Plate 11 be inaugurated in their entirety as soon as practical. These routes include through routes, a loop route, a crosstown route and peak hour turnback routes. No routes will turn at the Square.

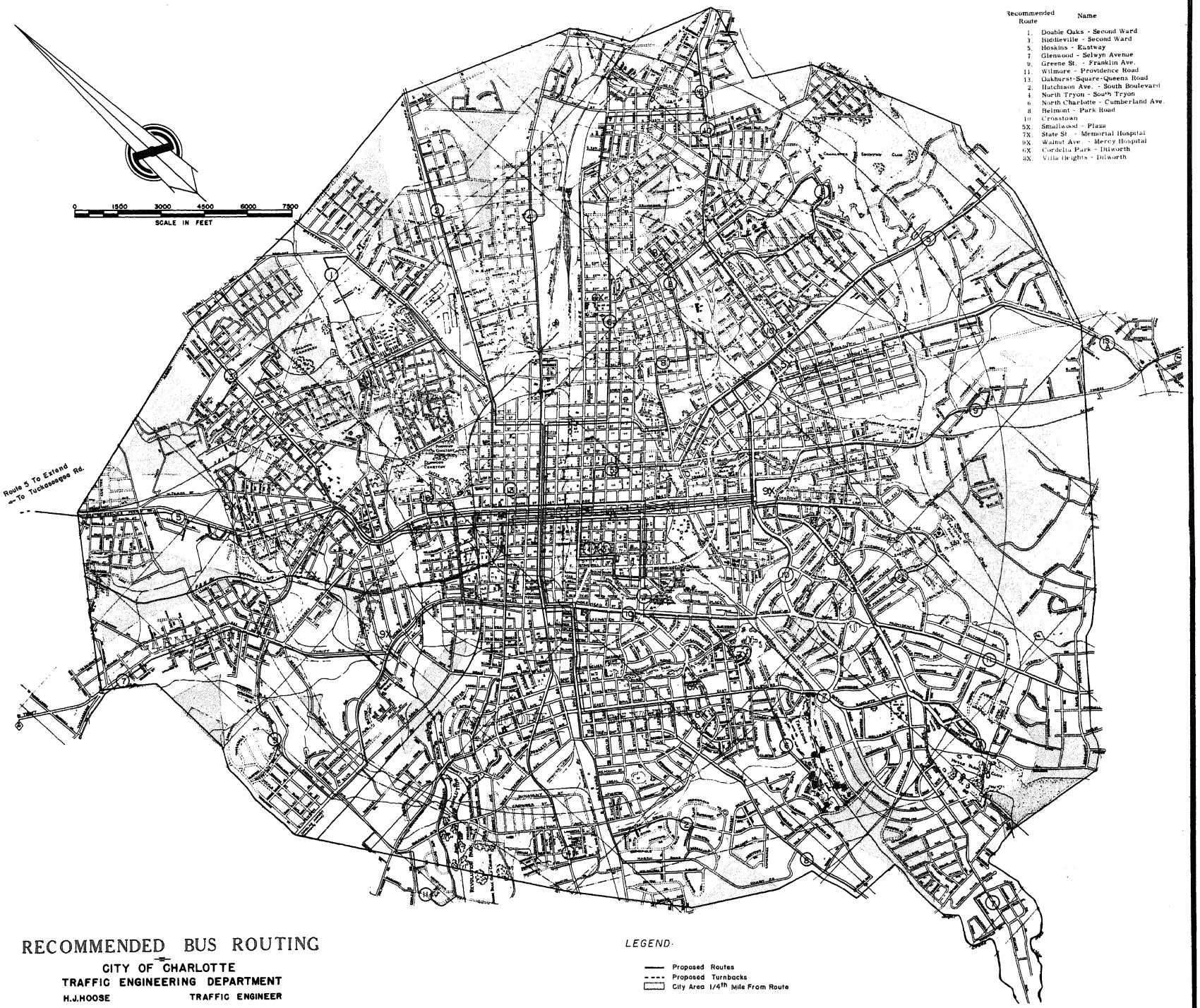
That East-West routes be distinctly marked by off numbers and North-South routes by even numbers. Turnback routes will have the same numbers as the base route plus an "X" following its number.

That the maximum headway (time interval between buses on the same route in same direction) be 15 minutes between 7:00 A. M. and 6:30 P. M.

That the Schedule Department of Duke Power Company set up operating schedules with a minimum of five "Time check points" for each line. These schedules should provide where practical even headways between buses operating along any street.

That the bus stops as shown on Plate 12 be adopted by the City Council of Charlotte.

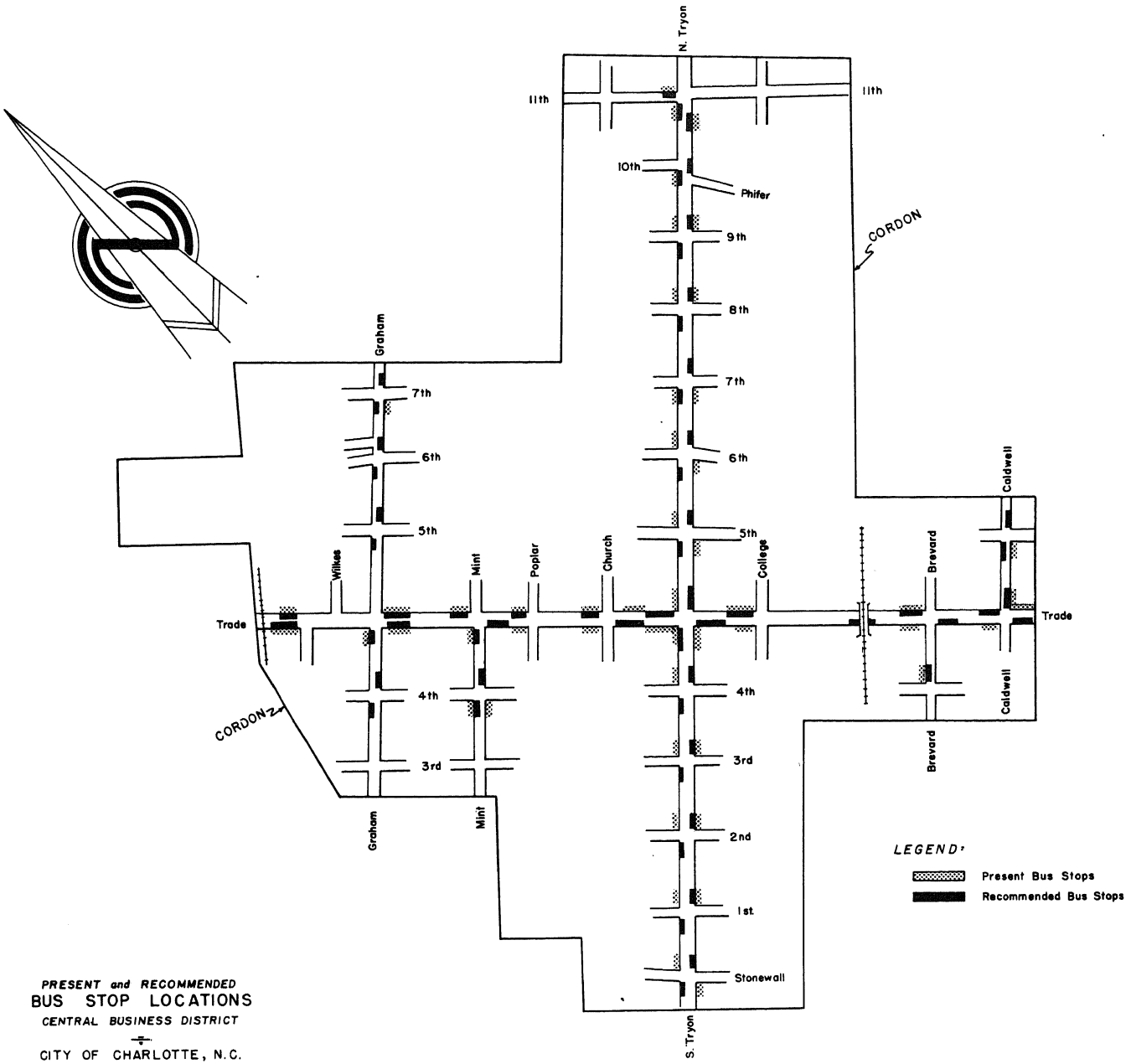
That Duke Power Company establish a workable system of transfers that will reduce the number of transfers at the Square by at least 50% and also as outlined in Part VI. This system will inclued a "transfer for a transfer" on the proposed Crosstown #10 line. The Company should provide each transfer location with an instructional sign designating which transfer tickets will be honored at that point.



RECOMMENDED BUS ROUTING

CITY OF CHARLOTTE
TRAFFIC ENGINEERING DEPARTMENT
H.J.HOOSE TRAFFIC ENGINEER

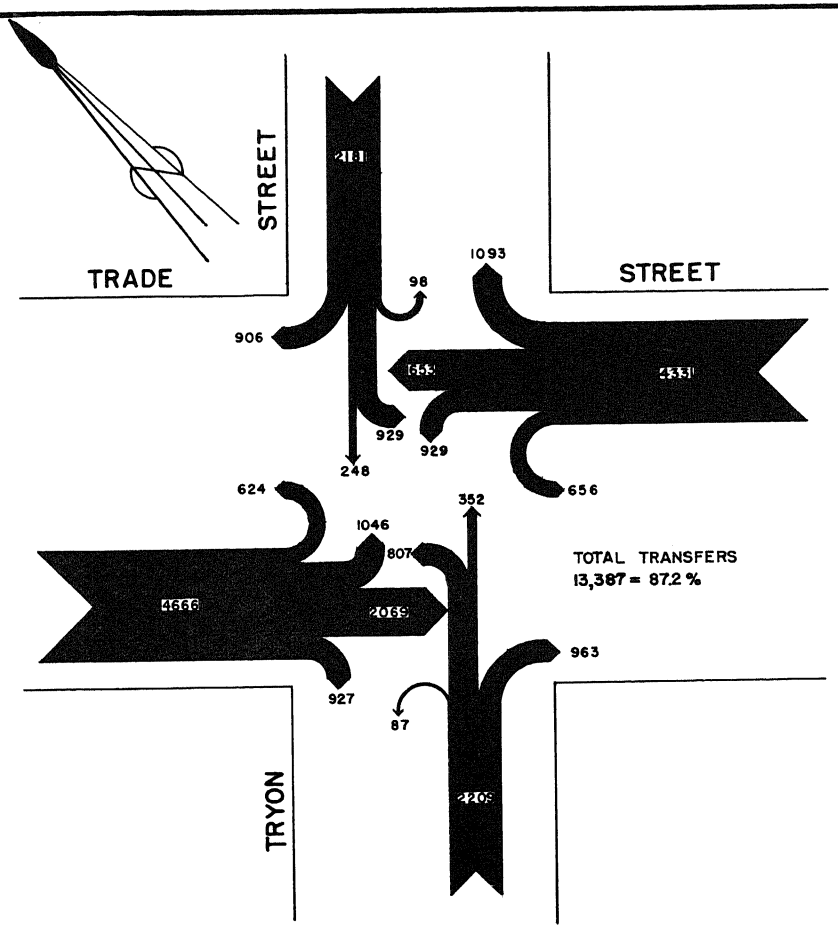
PLATE 11



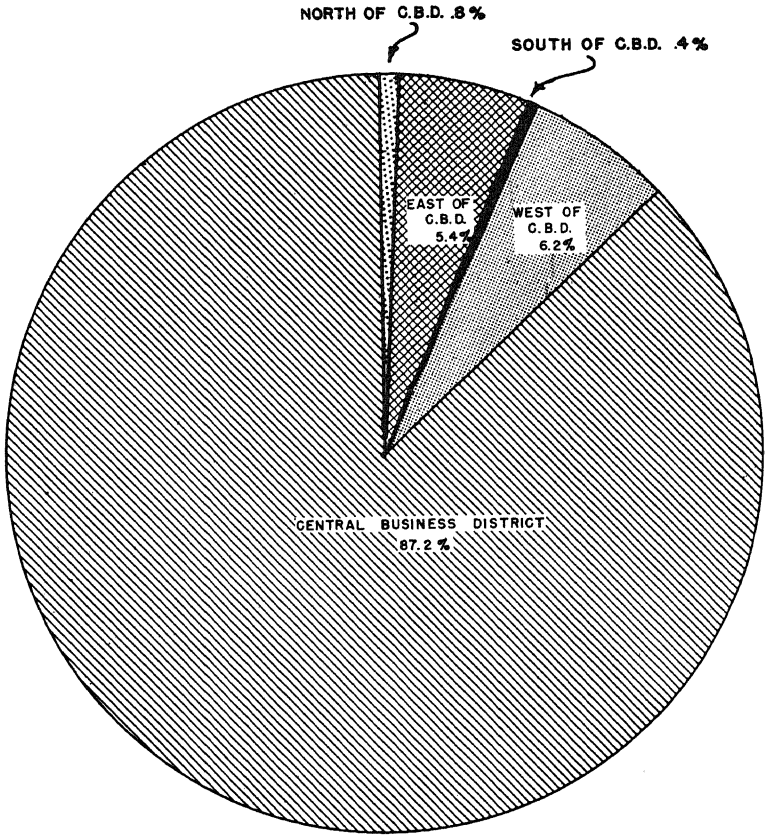
PRESENT and RECOMMENDED
BUS STOP LOCATIONS
CENTRAL BUSINESS DISTRICT

CITY OF CHARLOTTE, N.C.
TRAFFIC ENGINEERING DEPARTMENT
H. J. Hoose *Traffic Engineer*

PLATE 12



WITHIN CENTRAL BUSINESS DISTRICT



CITYWIDE

PRESENT TRANSFER HABIT

DUKE POWER COMPANY

CHARLOTTE, N.C.

JUNE 13, 1950

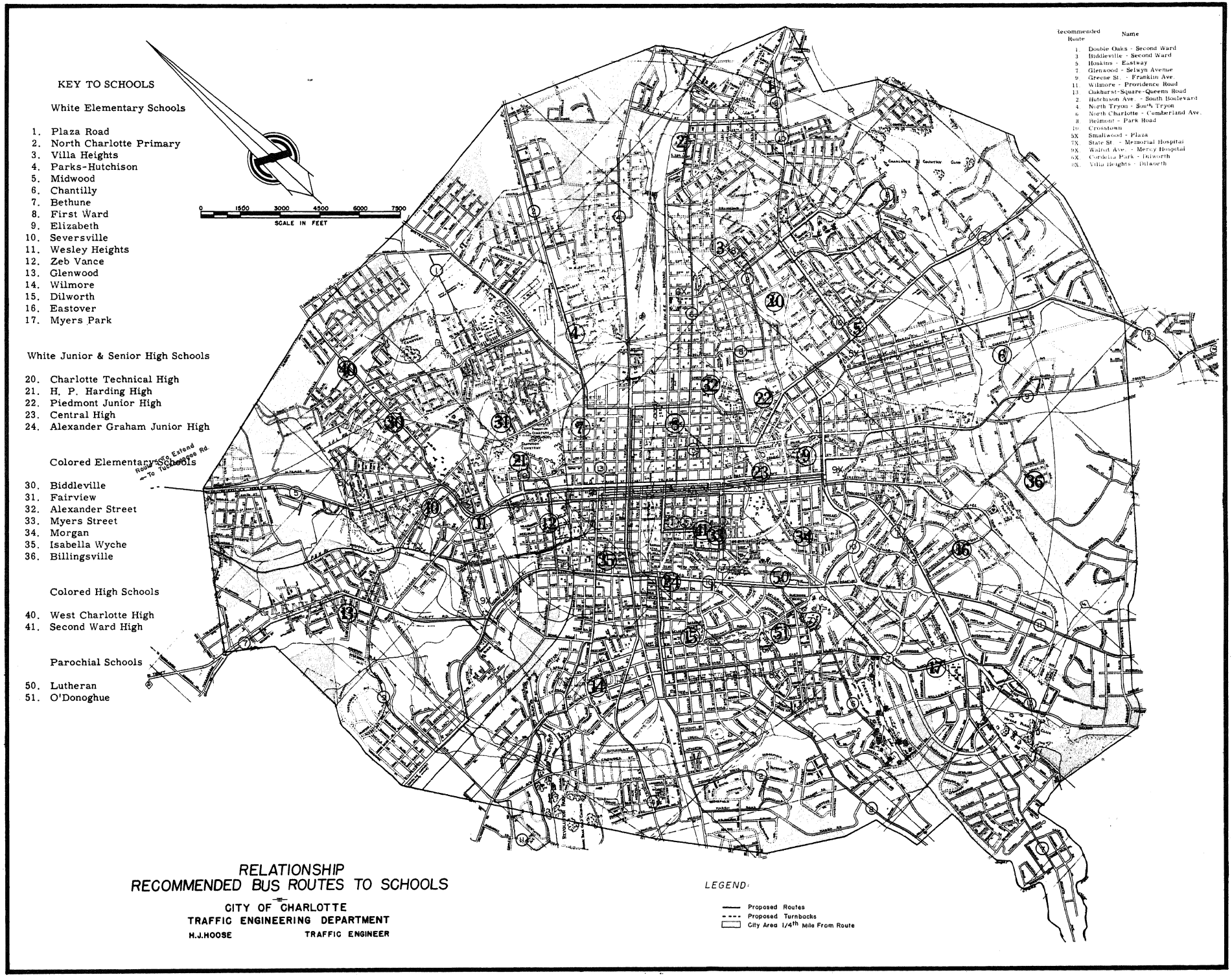
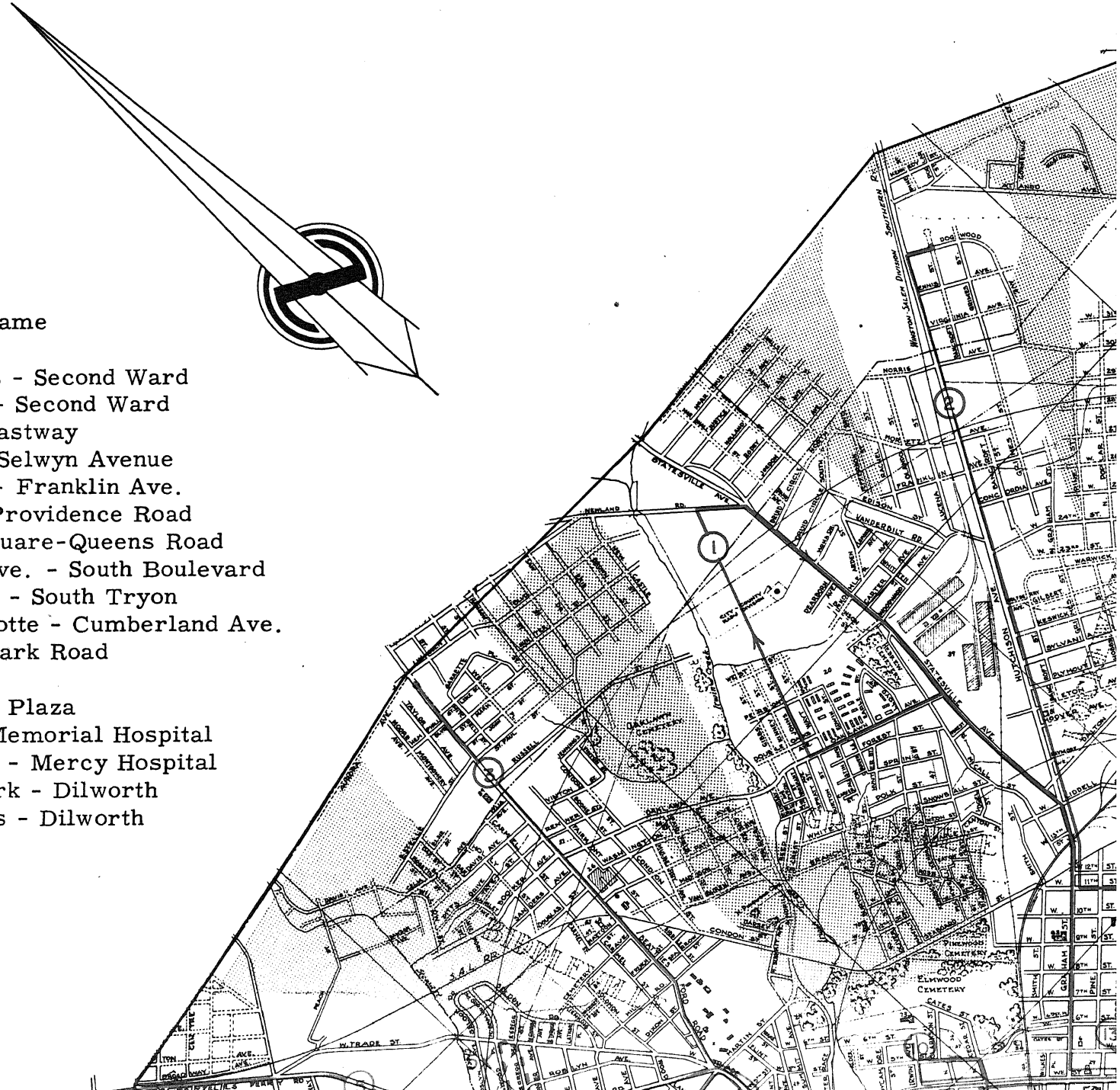
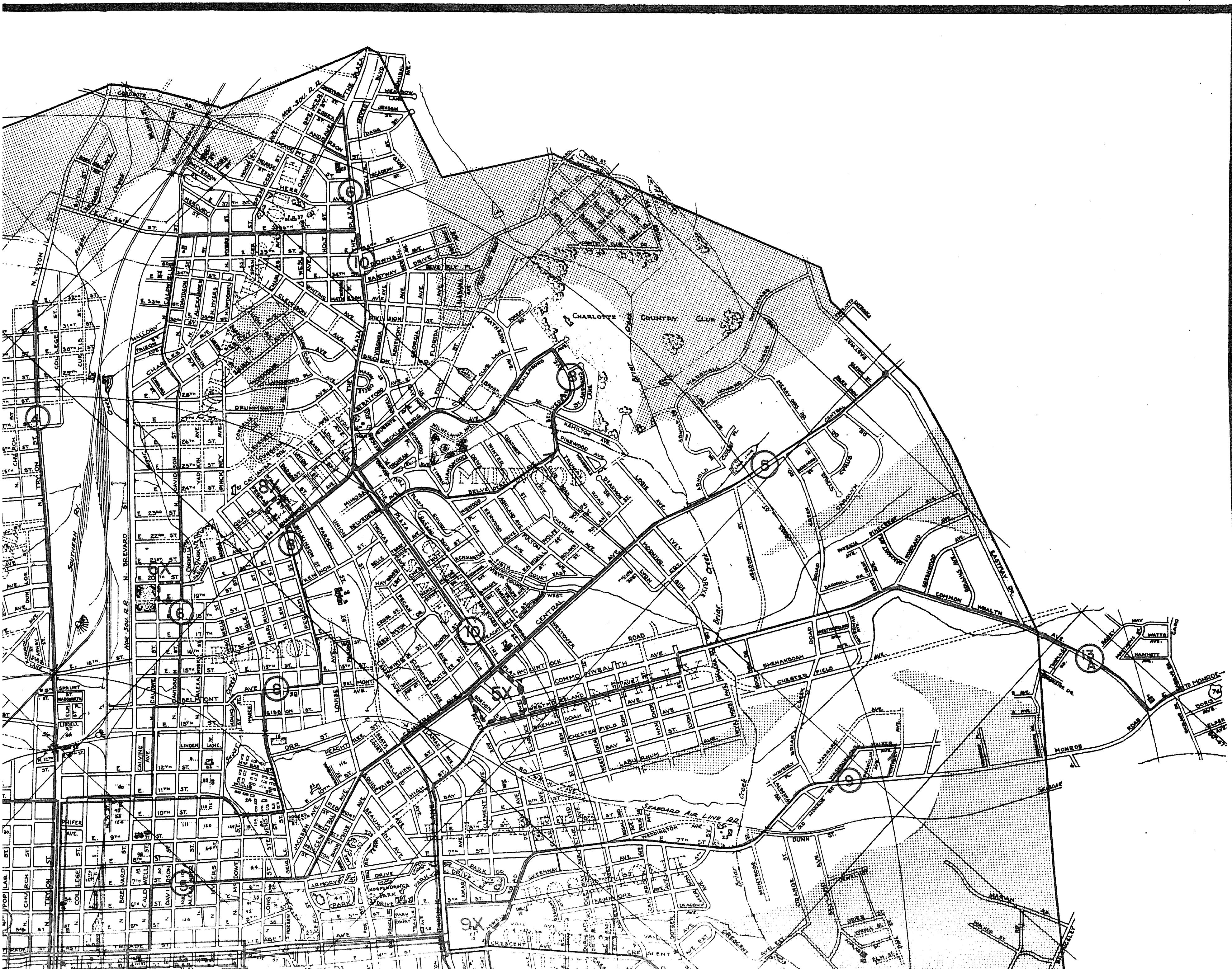

KEY TO SCHOOLS
White Elementary Schools
1. Plaza Road
2. North Charlotte Primary
3. Villa Heights
4. Parks-Hutchison
5. Midwood
6. Chantilly
7. Bethune
8. First Ward
9. Elizabeth
10. Seversville
11. Wesley Heights
12. Zeb Vance
13. Glenwood
14. Wilmore
15. Dilworth
16. Eastover
17. Myers Park
White Junior & Senior High Schools
20. Charlotte Technical High
21. H. P. Harding High
22. Piedmont Junior High
23. Central High
24. Alexander Graham Junior High
Colored Elementary Schools
30. Biddleville
31. Fairview
32. Alexander Street
33. Myers Street
34. Morgan
35. Isabella Wyche
36. Billingsville
Colored High Schools
40. West Charlotte High
41. Second Ward High
Parochial Schools
50. Lutheran
51. O'Donoghue
0 1500 3000 4500 6000 7500
SCALE IN FEET
Recommended Route
Name
1. Double Oaks - Second Ward
3. Biddleville - Second Ward
5. Hoskins - Eastway
7. Glenwood - Selwyn Avenue
9. Greene St. - Franklin Ave.
11. Wilmore - Providence Road
13. Oakhurst-Square-Queens Road
2. Hutchison Ave. - South Boulevard
4. North Tryon - South Tryon
6. North Charlotte - Cumberland Ave.
8. Belmont - Park Road
10. Crosstown
5X. Smallwood - Plaza
7X. State St. - Memorial Hospital
9X. Walnut Ave. - Mercy Hospital
6X. Cordelia Park - Dilworth
8X. Villa Heights - Dilworth
Recommend Extend Route 5 to Tuckaseegee Rd. To Touchstone
RELATIONSHIP
RECOMMENDED BUS ROUTES TO SCHOOLS
CITY OF CHARLOTTE
TRAFFIC ENGINEERING DEPARTMENT
H.J.HOOSE TRAFFIC ENGINEER
LEGEND:
Proposed Routes
Proposed Turnbacks
City Area 1/4th Mile From Route

PLATE 14

Recommended Route	Name
1.	Double Oaks - Second Ward
3.	Biddleville - Second Ward
5.	Hoskins - Eastway
7.	Glenwood - Selwyn Avenue
9.	Greene St. - Franklin Ave.
11.	Wilmore - Providence Road
13.	Oakhurst-Square-Queens Road
2.	Hutchison Ave. - South Boulevard
4.	North Tryon - South Tryon
6.	North Charlotte - Cumberland Ave.
8.	Belmont - Park Road
10.	Crosstown
5X.	Smallwood - Plaza
7X.	State St. - Memorial Hospital
9X.	Walnut Ave. - Mercy Hospital
6X.	Cordelia Park - Dilworth
8X.	Villa Heights - Dilworth




CHARLOTTE COUNTRY CLUB
MYERS PARK
ELIZABETH
BELMONT
PLAZA
THE PLAZA
CENTRAL AVE.
COMMONWEALTH AVE.
MONROE ROAD
SEABOARD AIR LINE RR.
SOUTHERN RY.
NOR.-SOU. R.R.
N. TRYON ST.
N. BREVARD ST.
N. DAVIDSON ST.
BELMONT AVE.
WESTOVER ROAD
EASTWAY DR.
INDEPENDENCE PARK
CRESCENT AVE.
PINEWOOD AVE.
HAMILTON AVE.
TO MONROE
6X
5X
9X

RECOMMENDED BUS ROUTING

CITY OF CHARLOTTE

TRAFFIC ENGINEERING DEPARTMENT

H.J.HOOSE TRAFFIC ENGINEER

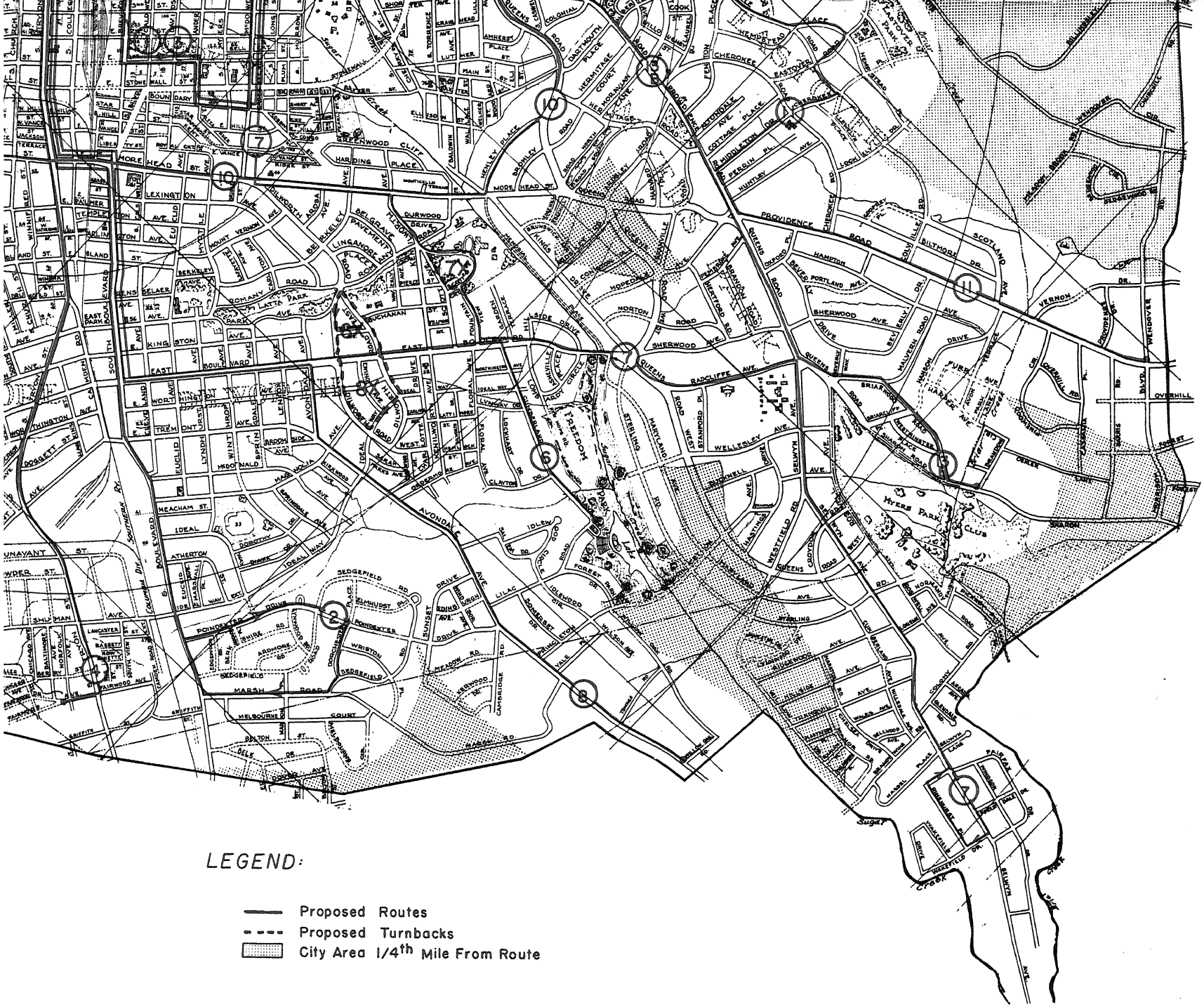

LEGEND:
Proposed Routes
Proposed Turnbacks
City Area 1/4th Mile From Route

PLATE 11