

DR 70-17 - 1990 Land Use Projection
John Smith

ACTION

DATE

COMMITTEE _____

M.A.P.C. _____ *Spence* _____ *7-23-70*

B.C.C./B. CO. C. _____

Motion:

Move that we approve this report with its accompanying tables and maps as a reflection of anticipated growth to 1990 consistent with our previously adopted guided growth concept.

WICHITA-SEDGWICK COUNTY

DATE
July 21, 1970

METROPOLITAN AREA PLANNING DEPARTMENT



TO Wichita-Sedgwick County Metropolitan Area
Planning Commission
FROM John T. Smith, Senior Planner, Advanced Plans
SUBJECT 1990 Land Use Projections (Re: Agenda Item #7, July 23
meeting)

Enclosed is the draft copy of the 1990 land use projections and preliminary development plan. This draft and its accompanying land use plan are essentially the same as presented to you at your informal meeting July 9 and to which there was no major disagreement. However, certain adjustments have been made reflecting some of your expressed thoughts. It is our recommendation that you adopt this draft as an updating of the land use plan. We will then proceed to prepare a final report for public distribution.

JTS:bh

Enclosure

D R A F T

1990 LAND USE PROJECTIONS
AND PRELIMINARY DEVELOPMENT PLAN

WSCMAPD

July 1970

In May of this year the Kansas State Highway Commission requested MAPD prepare residential, commercial, industrial and public land use projections for the year 1990. The data, to be aggregated by origin-destination (O-D) zone and measured in either acres or square feet, was to cover the Wichita urbanized area. The request was based on the need for preparing a functional street classification plan for the state, such a plan to become a part of the federal highway program to follow the current interstate highway program which is to expire in 1974. Our land use projection to 1990 will serve as input to computer models with which the State Highway Commission will prepare a transportation network for the urbanized portion of Sedgwick County. This network, along with networks from other areas of the state, will then become a part of the state plan.

The Mechanical Forecast Area (MFA) defined in the 1963 Land Use Technical Report and shown on Map 1, was used as the area for the initial 1990 projections. The 1960 land use within the MFA is shown on Table 1 along with the land use for 1975 and 1985 as projected in 1960 and based on the guided growth concept.¹ The new projections for 1990 are also shown and likewise based on the concept

¹Land Use Technical Report, WSCMAPD, January 1963, p. 122.

of guided growth. These projections will serve as the control total in allocating the various land uses to the individual O-D zones.

The residential area projected for 1990 is less than what had been projected for 1985 and reflects the recent trend of approximately five multiple family units built for every ten total housing units built.² The considerable increase in commercial land area reflects the spread of shopping centers and shopping areas around the city. The commercial, the transportation, communication and public utilities, and the streets and alleys projections were based on the extension of the 1975-1985 trend line to 1990. The wholesale, the manufacturing, the public/semi-public, and the public open space projections were based on the actual 1960 acres-per-thousand population as applied to the 1990 estimated MFA population of 483,818.

As mentioned earlier, the Wichita urbanized area is the area of prime concern for growth to 1990. For this reason mapping and land use assignments were made within the same cordon line as set forth in the Technical Report. This cordon line is shown on Map 1 as the urbanized area and is the area for which detailed land use tabulations have been made.

A base map of the 1960 land use was prepared to correspond

²Based on building permits issued 1960-1969.

with the 1960 urbanized area land use figures. To this base was added the growth to 1968 as taken from the 1968 aerial photos. For planning purposes, and in line with the state request, land use was generalized into the four categories of residential, commercial, industrial and public.

The eight year growth pattern showed a trend quite different from that as mapped in the Land Use Technical Report as the developed area for 1985. On the Technical Report map virtually all new growth to 1985 was shown taking place to the northeast with some scattered fillin around the remainder of the city. Actual growth from 1960 to 1968, however, has not followed this pattern. The growth has been more equal around the city with considerably more taking place to the south, west and north than had been anticipated.

The 1960-1968 growth pattern was used as the primary determinant in showing the direction of growth to 1990. The balance of the area filled in as 1990 growth was based on this trend, major known or proposed development, and judgment with assignments by MAPD staff. Major review was made by Young, Galbraith and Lakin.

As in the Land Use Technical Report, it is assumed that within Ring 3 all development as forecast to be in place by 1985 would in fact be developed by 1990.³ To these 1985 Technical Report figures

³Land Use Technical Report, p. 90.

were added areas for major or significant changes not previously accounted for. These were mapped on an overlay and included the commercial, industrial and public uses. From the gross area of these uses approximately 15% (based on recent land platting and development estimates) was added to transportation, communication and utilities with the remaining 85% to the respective land uses. This growth was added to the previously projected growth to get the total developed area for 1990 within Ring 3. No adjustment was made for residential use because 100 percent of the residential capacity figure was used as the 1990 residential figure. The 1990 Ring 3 development was then subtracted from the 1960-1990 increase to derive the remaining growth needed outside of Ring 3.

Since transportation, communication and utilities could not be readily measured on the map, a formula was derived to take a certain percentage of the four remaining land uses on a gross basis to make the added transportation, communication and utilities net figure. This procedure, described below, was used in allocating all land use out of Ring 3.

The gross commercial area of 1160 acres outside of Ring 3 less 15% would yield the net needed area of 985 acres. After this rough area was marked on the map, the gross industrial area of 745 acres was marked likewise, yielding a net area of 633 acres.

The map showed only the major public areas to 1990. Not shown were the lesser public buildings, churches, common open space, etcetera, which would be interspersed throughout the developed area and generally located on small parcels. Approximately 937 acres in the public land use category were needed from the developed area to make up the total public 1990 needs. It was assumed that this acreage would come from the gross residential area marked on the map. This was then added to the net residential area of 6582 acres.

The transportation, communication and utilities area outside of Ring 3 needed 3513 acres. It was assumed that this area would also come from the gross residential area so it was added to the net residential acreage along with public. The result totaled 11,033 gross residential acres. Thus, of the gross residential area shown, 59.7% was net residential, 8.5% net public and 31.8% for transportation, communication and utilities.

The final overlay showed the various areas by land use that would be developed by 1990. The procedure for totalling the 1990 developed area by O-D zone was as follows: The gross residential area shown on the map was divided into 59.7% net residential, 8.5% net public and 31.8% net transportation, communication and utilities. The commercial areas were divided 85% for net industrial and 15% for transportation, communication and utilities. The public was

added 85% for net and 15% for transportation, communication and utilities. To this net public figure was added 8.5% of the gross residential area to get the total public area. Transportation, communication, and utilities was then on a net basis derived by adding 31.8% of the gross residential, 15% of the gross commercial, 15% of the gross industrial, and 15% of the gross public as mapped.

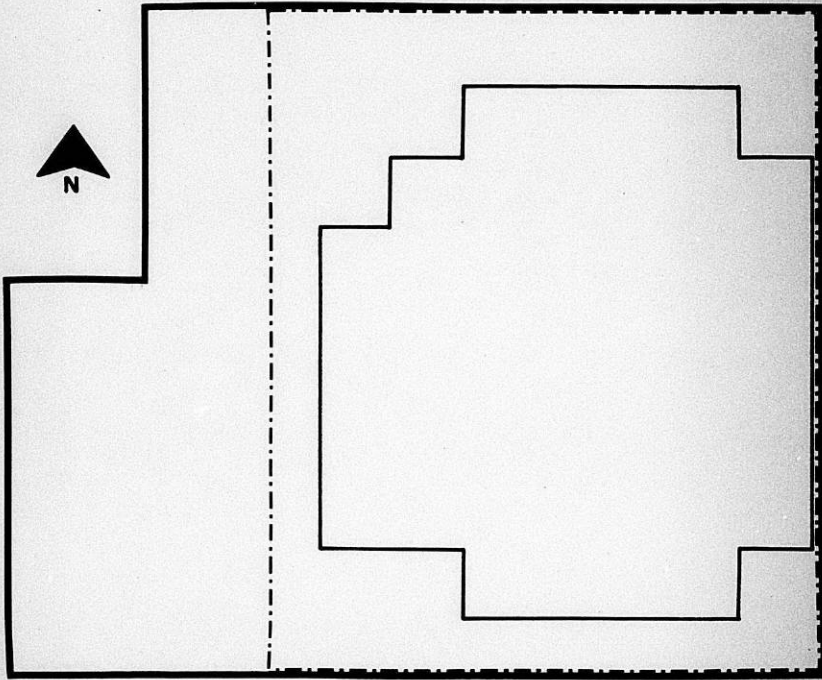
The 1990 developed area resulting from the above described process is shown on Map 2 along with the land use existing in 1960. From this map it is easy to see the significant amount of growth projected to take place to the west and south in addition to that taking place to the east and northeast. The net result is that growth to 1990 within the urbanized area should be for the most part rather evenly placed around the edge of the city.

The growth to 1990 represented on Map 2 is summarized by origin-destination district on Tables 2 and 3. These tables show the 1960 and 1990 land use area in thousand square feet and are referenced to Map 3.

Tables of the detailed land use area by O-D zone will be included in the final report along with the complete documentation on the procedure followed. Also included in the final report will be dwelling unit counts and residential density assignments for 1990 for each zone.

MAP I

STUDY AREA BOUNDARIES



LEGEND

- SEDGWICK COUNTY
- - - MECHANICAL FORECAST AREA (MFA)
- EXTERNAL CORDON LINE (URBANIZED AREA)

Table 1

GENERALIZED LAND USE - GUIDED GROWTH CONCEPT

Mechanical Forecast Area Land Use	Area (000,000 sq. ft.)				Increase 1960 - 1990
	1960*	1975*	1985*	1990	
Residential	925.2	1,059.5	1,288.3	1,287.5	362.2
Commercial	75.4	98.4	131.4	148.0	72.6
Wholesale	56.5	60.5	72.6	81.6	25.1
Manufacturing	79.6	92.1	107.3	114.8	35.2
Public/Semi-Public	237.8	266.6	306.4	343.1	105.3
Public Open Space	117.4	125.8	148.8	169.4	52.0
Trans., Comm., Pub. Utilities	263.6	268.4	280.0	286.0	22.4
Streets and Alleys	<u>875.3</u>	<u>928.7</u>	<u>1,020.5</u>	<u>1,065.0</u>	<u>189.7</u>
Total Developed Land	2,630.8	2,900.0	3,355.3	3,495.4	864.5

Percentage

Residential	35.2	36.5	38.4	36.8	39.2
Commercial	2.9	3.4	3.9	4.2	96.3
Wholesale	2.1	2.1	2.2	2.3	44.4
Manufacturing	3.0	3.2	3.2	3.3	44.2
Public/Semi-Public	9.0	9.2	9.1	9.8	44.3
Public Open Space	4.5	4.3	4.4	4.9	44.3
Trans., Comm., Pub. Utilities	10.0	9.3	8.4	8.2	8.5
Streets and Alleys	<u>33.3</u>	<u>32.0</u>	<u>30.4</u>	<u>30.5</u>	21.7
Total Developed Land	100.0	100.0	100.0	100.0	32.7

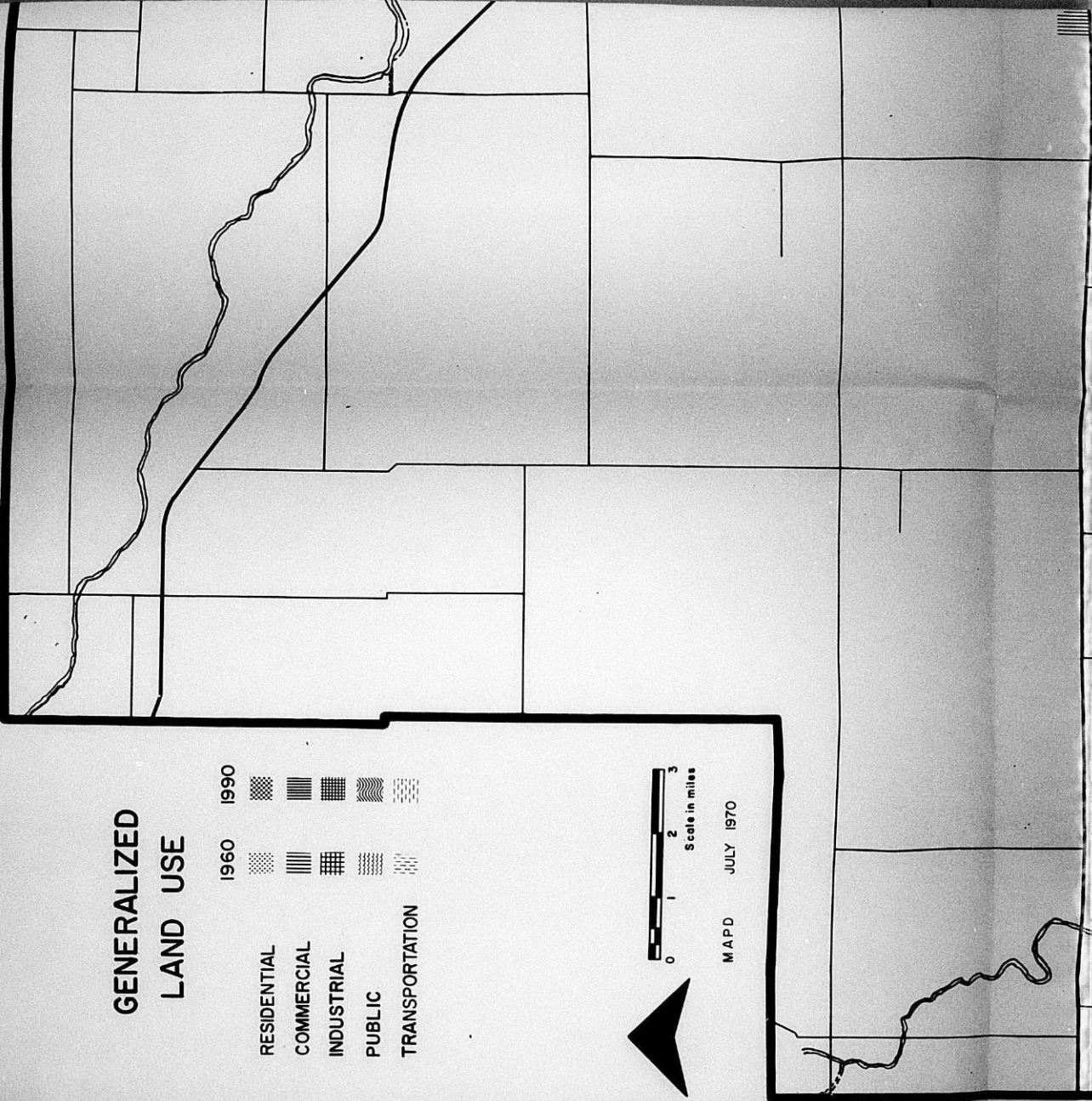
* Land Use Technical Report, WSCMAPD, 1963

GENERALIZED LAND USE

	1960	1990
RESIDENTIAL		
COMMERCIAL		
INDUSTRIAL		
PUBLIC		
TRANSPORTATION		



MAPD JULY 1970



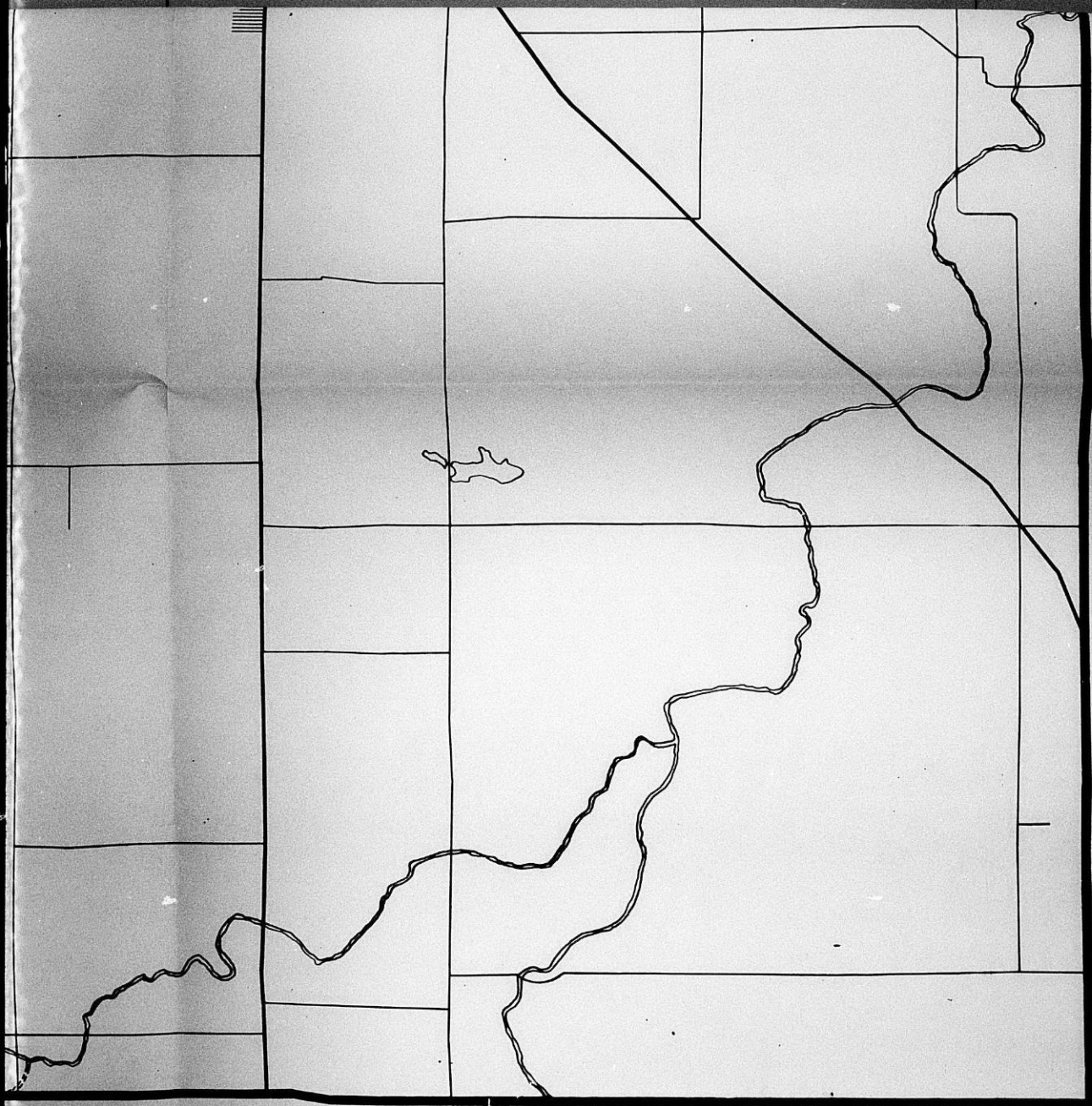






Table 2

1960 LAND USE
(000 sq. ft.)

District	Residential	Commercial	Industrial	Public	Transportation
10	2165	4678	4359	897	12749
11	62872	5805	6427	15541	42637
12	66908	6162	6381	14430	49604
23	61878	4558	3222	10141	31979
33	34586	2708	894	21008	33198
43	96707	4068	359	12265	45241
53	59422	1273	488	33729	30115
63	56504	5412	18458	3145	33806
73	42220	1384	365	7265	24892
83	61033	2643	1609	15112	33916
93	29670	3144	6775	4905	36019
24	38800	3420	2848	5395	30059
34	11280	2619	25306	109765	21133
44	19554	7816	17656	13798	26511
54	4779	1654	4165	190	12548
64	38739	3363	7247	7806	10867
74	5479	1199	444	1722	12333
84	32276	5883	2532	2695	50313
94	5723	397	8908	6938	46128
25	20918	1785	830	3834	19224
35	8435	257	454	20989	21946
45	13559	200	2883	3127	18729
55	6878	184	168	338	35010
65	15606	591	917	2105	13075
75	12384	73	8356	1687	16797
85	11034	242	198	7614	11743
95	5895	535	10666	1265	25823
26	10612	241	361	277	21239
36	9889	747	96	8703	23572
46	2915	226	--	181	11748
56	313	--	20	221	13988
66	11406	385	1697	4682	26918
76	1420	113	226	710	12823
86	3315	--	40	--	26097
96	306	13	--	40	13849

Within Ring 3

Out of Ring 3

Table 3

1990 LAND USE
(000 sq. ft.)

District	Residential	Commercial	Industrial	Public	Transportation
10	2444	4678	4359	944	13141
11	62872	5805	10259	15541	42681
12	66908	6162	6904	14430	49648
23	66774	6287	3222	12711	33982
33	44568	5799	894	24101	33417
43	101060	6559	359	13355	45241
53	74900	7397	488	35951	30786
63	58491	7781	25758	3145	34721
73	60668	6097	365	14017	29582
83	65395	8637	1609	16245	34979
93	45455	6271	27851	4909	47169
24	67875	8843	6203	12970	46741
34	12325	2619	31232	113642	23399
44	71260	17442	17656	23034	55958
54	49821	2698	7737	18443	39469
64	49150	3363	12038	9237	27270
74	10924	4466	444	18449	22991
84	79696	14421	6235	38544	83482
94	25847	397	15573	9769	58064
25	27191	2351	860	4705	22621
35	9480	257	454	21120	22512
45	31811	2291	2883	13711	30098
55	14284	925	168	1383	39061
65	21879	3771	917	3020	16909
75	12384	73	8356	1687	16797
85	25670	1026	939	14890	20629
95	13344	535	10666	14551	31921
26	12224	241	361	495	22067
36	14811	747	96	10140	26316
46	7837	1232	--	6280	15451
56	313	--	20	221	13988
66	15501	690	2786	7034	28573
76	1420	113	226	710	12823
86	3315	--	40	--	26097
96	306	13	--	40	13849

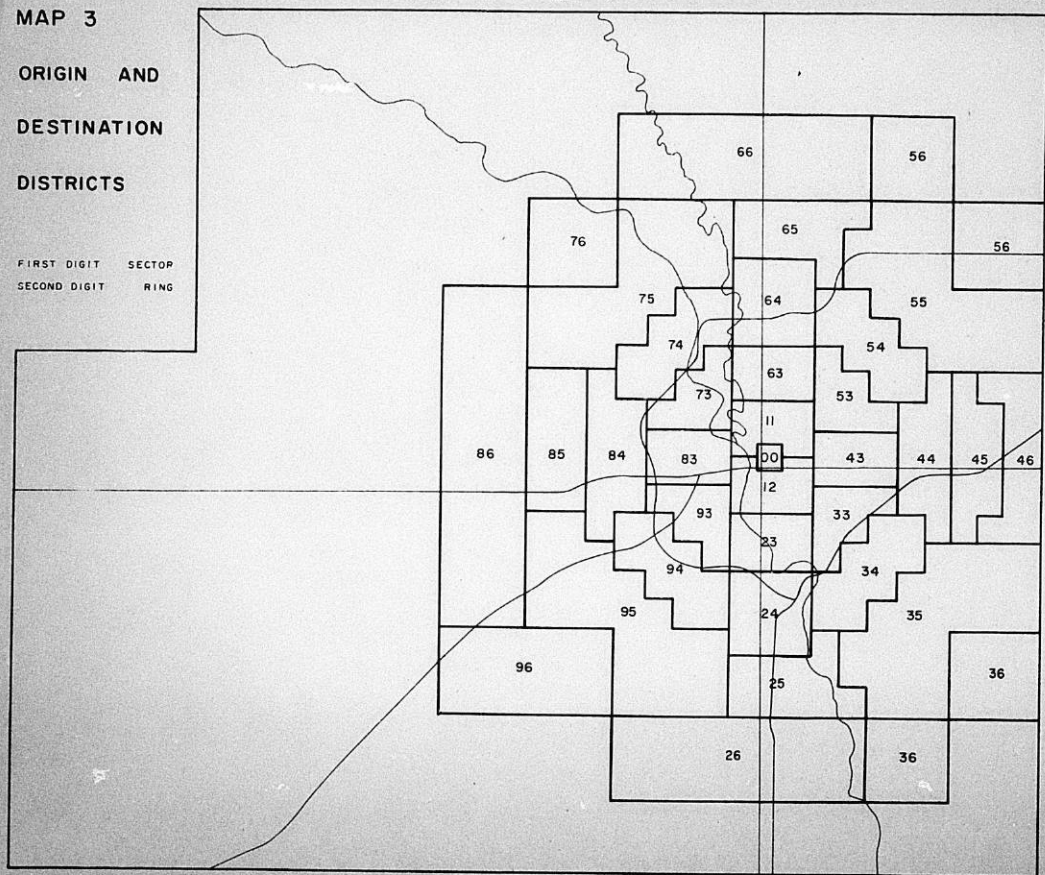
Within Ring 3

Out of Ring 3

MAP 3

ORIGIN AND
DESTINATION
DISTRICTS

FIRST DIGIT SECTOR
SECOND DIGIT RING



1990 LAND USE PROJECTIONS

In May, the Kansas State Highway Commission requested MAPD prepare residential, commercial, industrial and public land use for the year 1990. It was to be aggregated by origin-destination zone and measured in either acres or square feet. The request was based on the need for preparing a functional street classification plan for the state, such a plan to become a part of the federal highway program to follow the current interstate highway program which is to expire in 1974. Our land use projection to 1990 will serve as input to computer models with which the State Highway Commission will prepare a transportation network for the urbanized portion of Sedgwick County. This network, along with networks from other areas of the state, will then become a part of the state plan.

The Mechanical Forecast Area (MFA) defined in the 1963 Land Use Technical Report was used as the boundary for the urbanized area. The 1960 land use within the MFA is shown on Table 1 along with the land use for 1975 and 1985 as projected in 1960 and based on the guided growth concept. The new projections for 1990 are also shown and likewise based on the concept of guided growth.

The residential area projected for 1990 is less than what had been projected for 1985 and reflects the recent trend of approximately two multiple family units for every single family

unit built. The considerable increase in commercial area reflects the spread of shopping centers and shopping areas around the city. The commercial, the transportation, communication and public utilities, and the streets and alleys projections were based on the extension of the 1975-1985 trend line to 1990. The wholesale, the manufacturing, the public/semi-public, and the public openspace projections were based on the actual 1960 acres-per-thousand population value as applied to the 1990 estimated population of 483,818.

A base map of the 1960 land use was used to correspond with the 1960 area figures. To this base was added the growth to 1968 as taken from the 1968 aerial photos. For planning purposes, and in line with the state request, land use was generalized into the four categories of residential, commercial, industrial and public.

The eight year growth pattern showed a trend quite different from that as mapped in the Land Use Technical Report as the developed area for 1985. The 1960 to 1968 growth pattern was used as the primary determinant in showing the direction of growth to 1990. The balance of the area filled in as 1990 growth was based on this trend, major known or proposed development, and judgment with assignments by MAPD staff. Major review was made by Young, Galbraith and Lakin.

As in the Land Use Technical Report, it is assumed that within

Ring 3 all development as forecast to be in place by 1985 would in fact be developed by 1990. To the 1985 Technical Report figures were added values for major or significant changes not accounted for. These are mapped on the overlay and include the commercial, industrial and public uses. From the gross area of these uses approximately 15% was added to transportation, communication and utilities with the remaining 85% to the respective land uses. This growth was added to the previously projected growth to get the total developed area for 1990 within Ring 3. No adjustment was made for residential because 100 percent of the residential capacity figure was used as the 1990 residential figure. The 1990 Ring 3 development was then subtracted from the 1960-1990 increase to derive the remaining growth needed outside of Ring 3.

Since transportation, communication and utilities could not be readily measured on the map, a formula was derived which would take a certain percentage of the four remaining land uses on a gross basis to make the added transportation, communication and utilities net figure. This procedure, described below, was used in allocating all land use out of Ring 3.

The gross commercial area (red) of 1160 acres outside of Ring 3 less 15% would yield the net needed of 985 acres. After this rough area was marked on the map, the gross industrial area (grey) of 745 acres was marked likewise, yielding a net area of

633 acres.

The map shows only the major public areas (blue) to 1990. Not shown are the lesser public buildings, churches, common open-space, etc. which would be interspersed throughout the developed area and generally located on small parcels. Approximately 937 acres in the public land use category were needed from the developed area to make up the total public 1990 needs. It was assumed that this acreage would come from the gross residential area (yellow) marked on the map. This was then added to the net residential area of 6582 acres.

The transportation, communication and utilities area outside of Ring 3 needed 3513 acres. It was assumed that this area would also come from the gross residential area so it was added to the net residential acreage along with public. The result totaled 11,033 gross residential acres. Thus, of the gross residential area shown in yellow, 59.7% was net residential, 8.5% net public, and 31.8% for transportation, communication and utilities.

The final overlay shows the various areas by land use that would be developed by 1990. The procedure for totalling the 1990 developed area by O-D zone was as follows: The gross residential area shown in yellow on the map was divided into 59.7% net residential, 8.5% net public and 31.8% net transportation, communication and utilities. The commercial areas in red were divided 85% of the gross for net commercial and 15% for transportation,

communication and utilities. Industrial, showing grey, was divided 85% for net industrial and 15% for transportation; communication and utilities. The public, shown in blue, was added 85% for net and 15% for transportation, communication and utilities. To this net public figure was added 8.5% of the gross residential area to get the total public area. Transportation, communication, and utilities was then on a net basis derived by adding 31.8% of the gross residential, 15% of the gross commercial, 15% of the gross industrial, and 15% of the gross public as mapped.

JTS
7/8/70

Table 1

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Mechanical Forecast Area Land Use	Area (acres)				Increase 1960 - 1990
	1960*	1975*	1985*	1990	
Residential	21,239.7	24,322.8	29,575.3	29,556.9	8,317.2
Commercial	1,730.9	2,258.9	3,016.5	3,397.6	1,666.7
Wholesale	1,297.1	1,388.9	1,666.7	1,873.3	576.2
Manufacturing	1,827.4	2,114.3	2,463.3	2,635.4	808.0
Public/Semi-Public	5,459.1	6,120.3	7,034.0	7,876.5	2,417.4
Public Open Space	2,695.1	2,888.0	3,416.0	3,888.9	1,193.8
Trans., Comm., Pub. Utilities	6,051.4	6,161.6	6,427.9	6,565.7	514.3
Streets and Alleys	<u>20,094.1</u>	<u>21,320.0</u>	<u>23,427.4</u>	<u>24,449.0</u>	<u>4,354.9</u>
Total Developed Land	60,394.8	66,574.8	77,027.1	80,243.3	19,848.5

	Percentage				
Residential	35.2	36.5	38.4	36.8	39.2
Commercial	2.9	3.4	3.9	4.2	96.3
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* Land Use Technical Report, WSCMAPD, 1963

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1990 LAND USE PROJECTIONS
AND PRELIMINARY DEVELOPMENT PLAN

AUGUST 1970

Wichita-Sedgwick County
Metropolitan Area Planning Department
104 South Main
Wichita, Kansas 67202

CITY COMMISSION

A. Price Woodard, Mayor
Walter Keeler
Donald K. Enoch
Jack Greene
John S. Stevens

COUNTY COMMISSION

Earl Rush, Chairman
Elmer Peters
Tom Scott

METROPOLITAN AREA PLANNING COMMISSION

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Alvin J. Hennessy

Floyd Souders, V. Chrm.
Harlan Kamen
John W. Trout, Jr.
Ronald J. Wilkinson

METROPOLITAN AREA PLANNING DEPARTMENT

Robert A. Lakin PLANNING DIRECTOR
Willard Stockwell CHIEF PLANNER

Staff Participants

John T. Smith SENIOR PLANNER
Jack H. Galbraith CHIEF PLANNER
Bette Hoenig SECRETARY
Berniece Rathke ADMIN. SECRETARY

CONTENTS

	Page
1990 Land Use Projections and Preliminary Development Plan	1
Appendix A	
1990 Land Use Projections	A-1
Population	A-2
Residential	A-3
Commercial	A-6
Industrial	A-6
Public	A-7
Transportation	A-8
Summary	A-9
Appendix B	
1990 Land Use Zone Allocations and Assignments	B-1
Projection/Assignment Comparisons	B-9
Appendix C	
1990 Dwelling Unit Count	C-1
Dwelling Unit Comparison	C-3

TABLES

	Page
1 Generalized Land Use-Guided Growth Concept	4
2 1960 Land Use	10
3 1990 Land Use	11
4 1990 Urbanized Area Dwelling Unit Summary	13
A1 Population Estimates	A-3
A2 Industrial Land	A-7
A3 Public Land	A-7
A4 Projected Land Area (Square Feet)	A-10
A5 Projected Land Area (Acres)	A-11
B1 Land Estimates Outside Ring 3	B-5
B2 Land Estimating Procedure Outside Ring 3	B-6
B3 Gross-Net Conversion Formula	B-9
B4 1990 Land Use	B-10
B5 1990 Urbanized Land Area	B-13
B6 Expected/Assigned Land Comparison	B-13
C1 1990 Urbanized Area Dwelling Unit Count	C-4
C2 Dwelling Unit Comparison	C-5

MAPS

	Page
1 Study Area Boundaries	3
2 Generalized Land Use	9
3 Origin and Destination Districts	12
B1 Origin and Destination Zones	B-11

FIGURES

A1 Commercial Land	A-6
A2 Transportation, Commercial & Public Utilities	A-8
A3 Streets & Alleys	A-8
B1 Land Use Area	B-3

1990 Land Use Projections
and Preliminary Development Plan

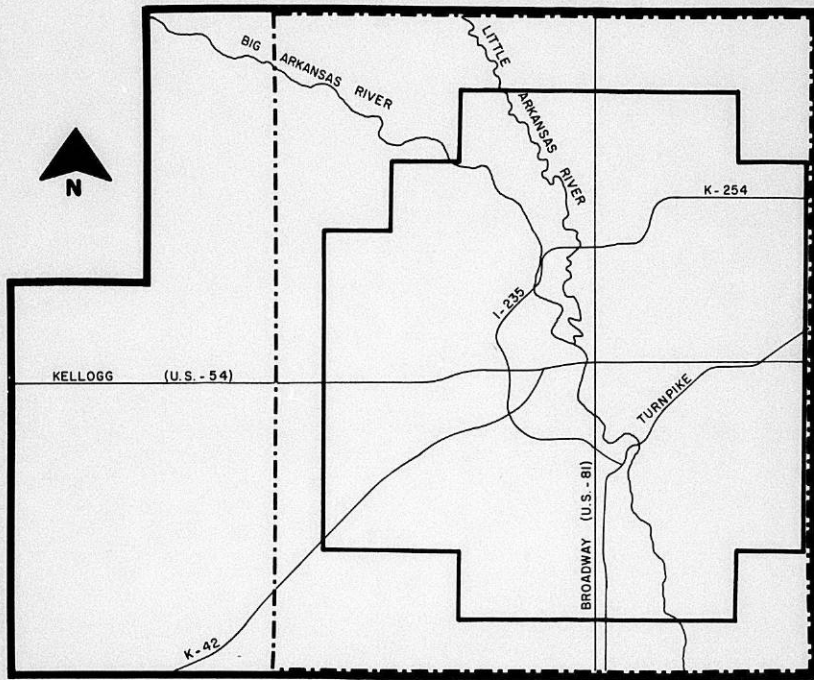
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A secondary use for which these projects will be put is in formulating an interim or preliminary development plan for growth to 1990. Such a development plan, in line with the Planning Commission's previously adopted guided growth concept,¹ will serve as an updated guide to new development until such time as a full land use study can be completed and a more detailed plan prepared.

The Mechanical Forecast Area (MFA) defined in the 1963 Land Use Technical Report and shown on Map 1 was used as the area for

¹ The "guided growth concept" refers to the more efficient and logical land development which occurs under properly written and enforced building, subdivision and zoning ordinances. Land Use Technical Report, WSCMAPD, January 1963, p. 122ff.

STUDY AREA BOUNDARIES



LEGEND

-  Sedgwick County
-  Mechanical Forecast Area (MFA)
-  External Cordon Line (Urbanized Area)

the 1990 projections.² The 1960 land use within the MFA is shown on Table 1 along with the land use for 1975 and 1985 as projected

Table 1

GENERALIZED LAND USE - GUIDED GROWTH CONCEPT

Mechanical Forecast Area Land Use	Area (000,000 sq. ft.)			
	1960*	1975*	1985*	1990
Residential	925.2	1059.5	1288.3	1287.5
Commercial	75.4	98.4	131.4	148.0
Industrial	136.1	152.6	179.9	196.4
Public	355.2	392.4	455.2	512.5
Transportation	1138.9	1197.1	1300.5	1351.0
Total Developed Land	2630.8	2900.0	3355.3	3495.4

	Area (Acres)			
	1960*	1975*	1985*	1990
Residential	21,239.7	24,322.8	29,575.3	29,556.9
Commercial	1,730.9	2,258.9	3,016.5	3,397.6
Industrial	3,124.5	3,503.2	4,130.0	4,508.7
Public	8,154.2	9,008.3	10,450.0	11,765.4
Transportation	26,145.5	27,481.6	29,855.3	31,014.7
Total Developed Land	60,394.8	66,574.8	77,027.1	80,243.3

	Percentage			
	1960	1975	1985	1990
Residential	35.2	36.5	38.4	36.8
Commercial	2.9	3.4	3.9	4.2
Industrial	5.1	5.3	5.4	5.6
Public	13.5	13.5	13.5	14.7
Transportation	43.3	41.3	38.8	38.7
Total Developed Land	100.0	100.0	100.0	100.0

* Land Use Technical Report, WSCMAPD, 1963

in 1960³ and based on the guided growth concept. The new projections for 1990 based on the concept of guided growth are also

² Ibid., p 43.

³ Ibid., p 152.

shown. These projections will serve as the control totals in allocating the various land uses to the individual O-D zones.

The residential area projected for 1990 is slightly less than what had been projected for 1985 and reflects the recent construction trend of approximately five dwelling units out of every ten total units being in the multiple family category.⁴ The considerable increase in commercial land area reflects the growth of shopping centers and shopping areas around the city. The commercial and the transportation projections were based on the extension of the 1975-1985 trend line to 1990. The industrial and the public space projections were based on the actual 1960 acres-per-thousand population as applied to the 1990 estimated MFA population of 483,818. The procedure followed in obtaining these projections is detailed in Appendix A.

As mentioned earlier, the Wichita urbanized area is the area of prime concern for growth to 1990. For this reason, mapping and land use assignments were made within the same cordon line as set forth in the Land Use Technical Report. This cordon line is shown on Map 1 as the "urbanized area" and is the area for which detailed land use projections and tabulations have been made.

A base map of the 1960 land use was prepared to correspond with the 1960 urbanized area land use figures. To this base was added the growth to 1968 as taken from the 1968 aerial photos. For planning purposes, however, projections of detailed land use were not required in this preliminary study. As a result, land

⁴ Based on City building permits issued 1960-1969.

use was generalized into the four categories of residential, commercial, industrial and public.

The growth pattern of the past eight years indicated a trend quite different from that as mapped in the Land Use Technical Report as the 1985 developed area.⁵ On the Technical Report map most new growth to 1985 was shown taking place to the northeast with some scattered fill-in around the remainder of the city. Actual growth from 1960 to 1968, however, has not followed this pattern. The growth has been more evenly distributed around the city with considerably more occurring to the south, west and near north than had been originally anticipated.

The 1960-1968 growth pattern was used as the primary determinant in showing the direction of growth to 1990. The balance of the area filled in as 1990 growth was based on this trend, major known or proposed development, and judgment with assignments made by MAPD staff.

As in the Land Use Technical Report, it is assumed that within Ring 3 all development as forecast to be in place by 1985 would in fact be developed by 1990.⁶ Major or significant changes in land use areas not previously accounted for were added to these 1985 Technical Report figures. These areas were mapped on an overlay and included the commercial, industrial and public use. From the gross area of these uses approximately 15% (based on recent land platting and development estimates) was added to the transportation, communication and utilities category, with the remain-

⁵ Land Use Technical Report, Figure 24.

⁶ Ibid., p 90.

ing 85% to the respective land use categories. This growth was added to the previously projected growth to obtain the total developed area for 1990 within Ring 3. No adjustment was made for residential use because 100 percent of the residential capacity figures was used as the 1990 residential land use figure. The 1990 Ring 3 development was then subtracted from the 1960-1990 increase to derive the remaining growth needed outside of Ring 3.

Since transportation, communication and utilities could not be readily measured on the map, a formula was employed which took a certain percentage of the gross area of the four remaining land uses to make the net area needed for transportation, communication and utilities. The procedure described in Appendix B was used in allocating all land use out of Ring 3. The gross residential, commercial and industrial areas outside of Ring 3 were then marked on the map along with the major public areas.

The final overlay showed the various major areas by land use that would be developed by 1990. The procedure for totaling the 1990 developed area by O-D zone was as follows: The gross residential area shown on the map was divided into 59.7% net residential land, 8.5% net public land and 31.8% net transportation, communication and utilities land. The commercial and industrial land areas were each divided 85% for net area and 15% for transportation, communication and utilities land. The public category was added 85% for net area and 15% for transportation, communication and utilities land. To this net public land area figure was added 8.5% of the gross residential area to get the total public land area. The transportation, communication, and utilities area

was then derived on a net basis by adding 31.8% of the gross residential area, 15% of the gross commercial area, 15% of the gross industrial area, and 15% of the gross public area as mapped. A complete explanation of the procedure with tables showing land use assignment by zone is contained in Appendix B.

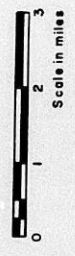
The 1990 developed area resulting from the above summarized process is shown on Map 2 along with the land use existing in 1960. From examination of this map it is easy to see that a significant amount of growth is projected to occur to the west and south in addition to that taking place to the east and northeast. The net result is that growth to 1990 should be for the most part rather evenly distributed around the periphery of the urbanized area.

The growth to 1990 represented on Map 2 is summarized by origin-destination district on Tables 2 and 3. These tables show the 1960 and 1990 land use area in thousand square feet and are referenced to the districts shown on Map 3.

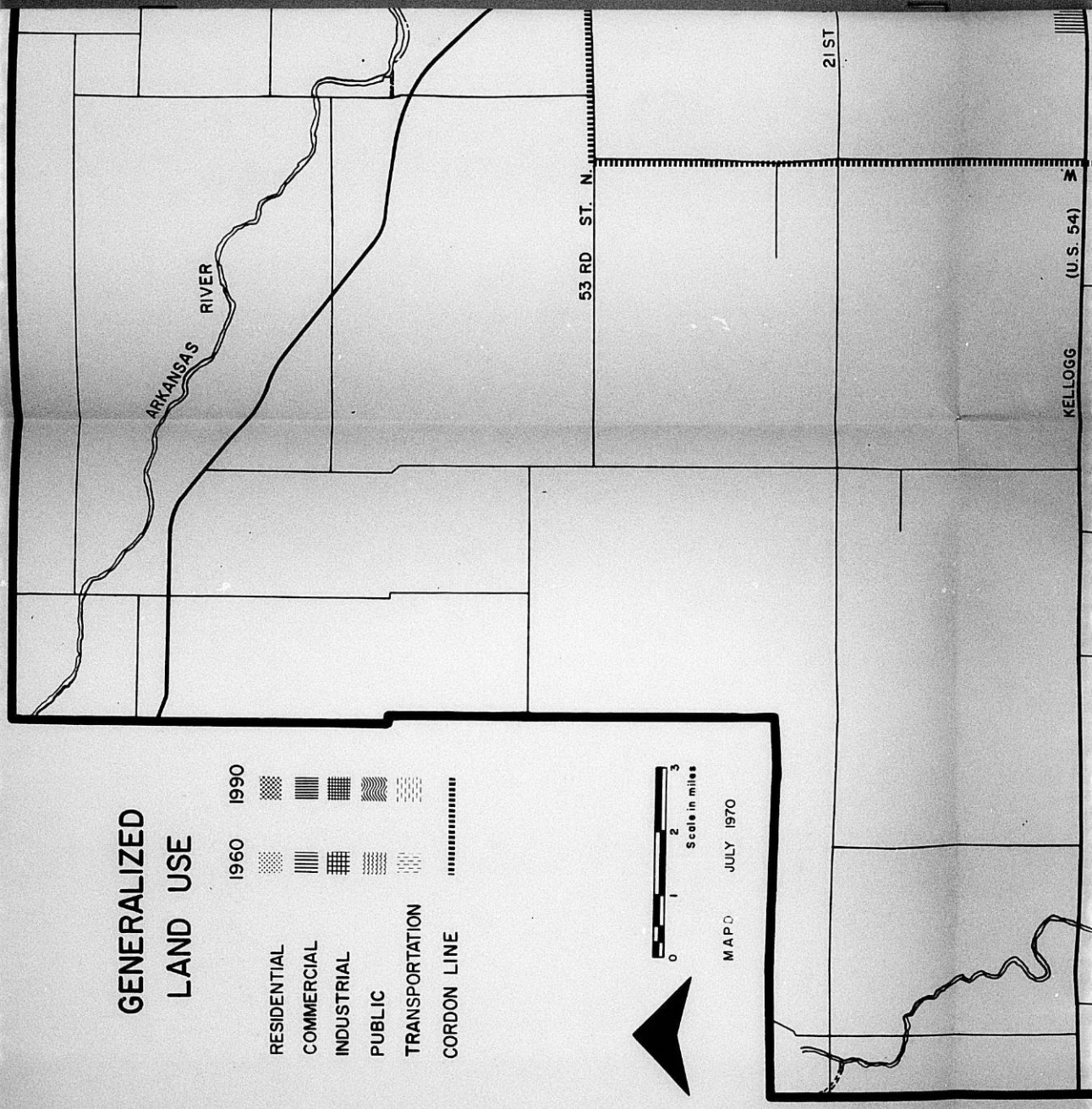
In addition to answering the initial request for land use assignments by O-D zone, an estimate was made of the number of dwelling units for 1990. For transportation planning purposes this helps in locating people at the home end of a trip. The basic method of estimating 1990 dwelling units was to apply 1960 zone densities to 1990 residential land use assignments and adjust where appropriate for multi-family construction. Table 4 summarizes by district the 1990 dwelling units. Appendix C contains the projection procedure as well as tables showing the number of dwelling units and the density for each zone.

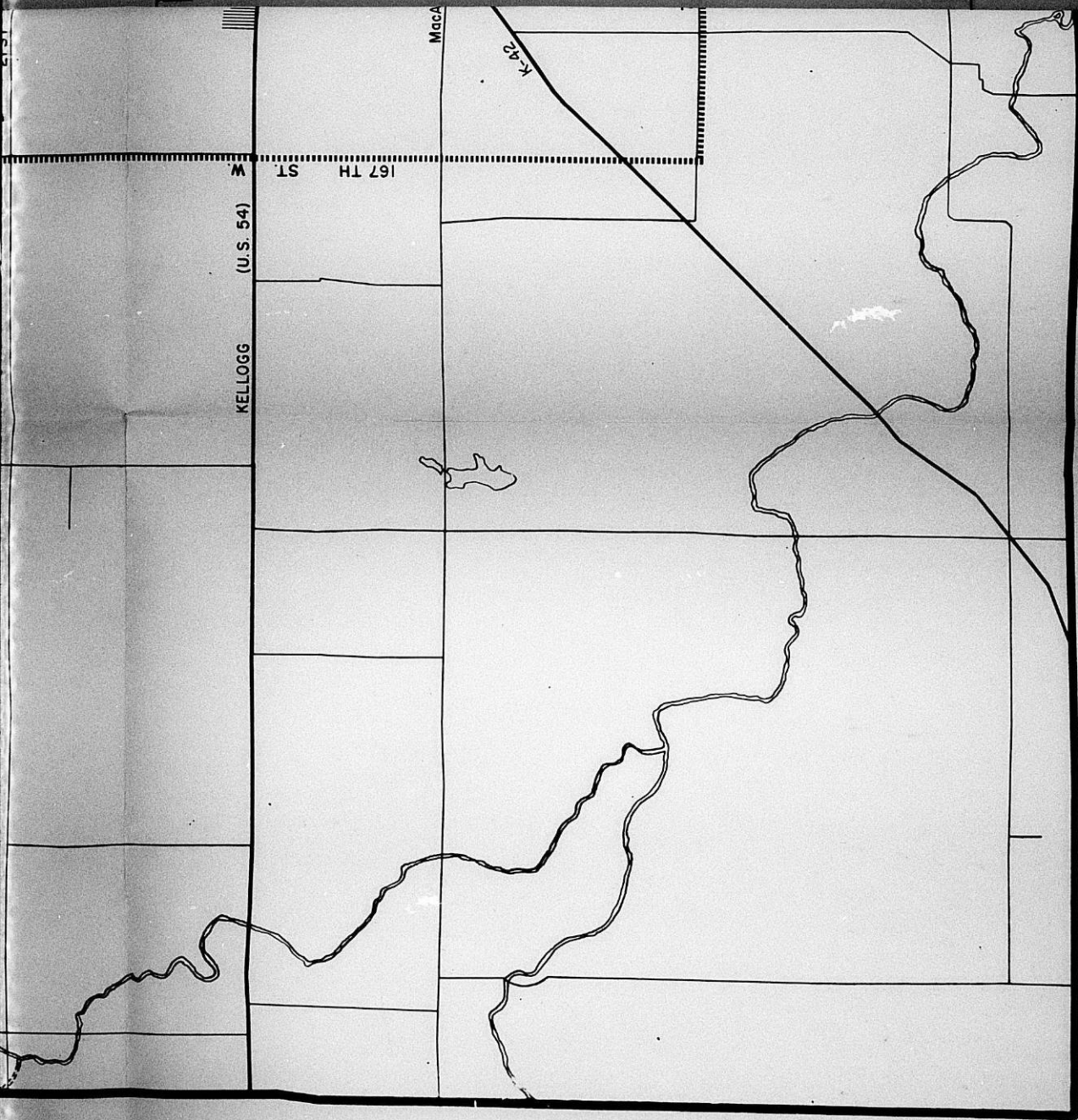
GENERALIZED LAND USE

	1960	1990
RESIDENTIAL		
COMMERCIAL		
INDUSTRIAL		
PUBLIC		
TRANSPORTATION		
CORDON LINE		



MAP D JULY 1970







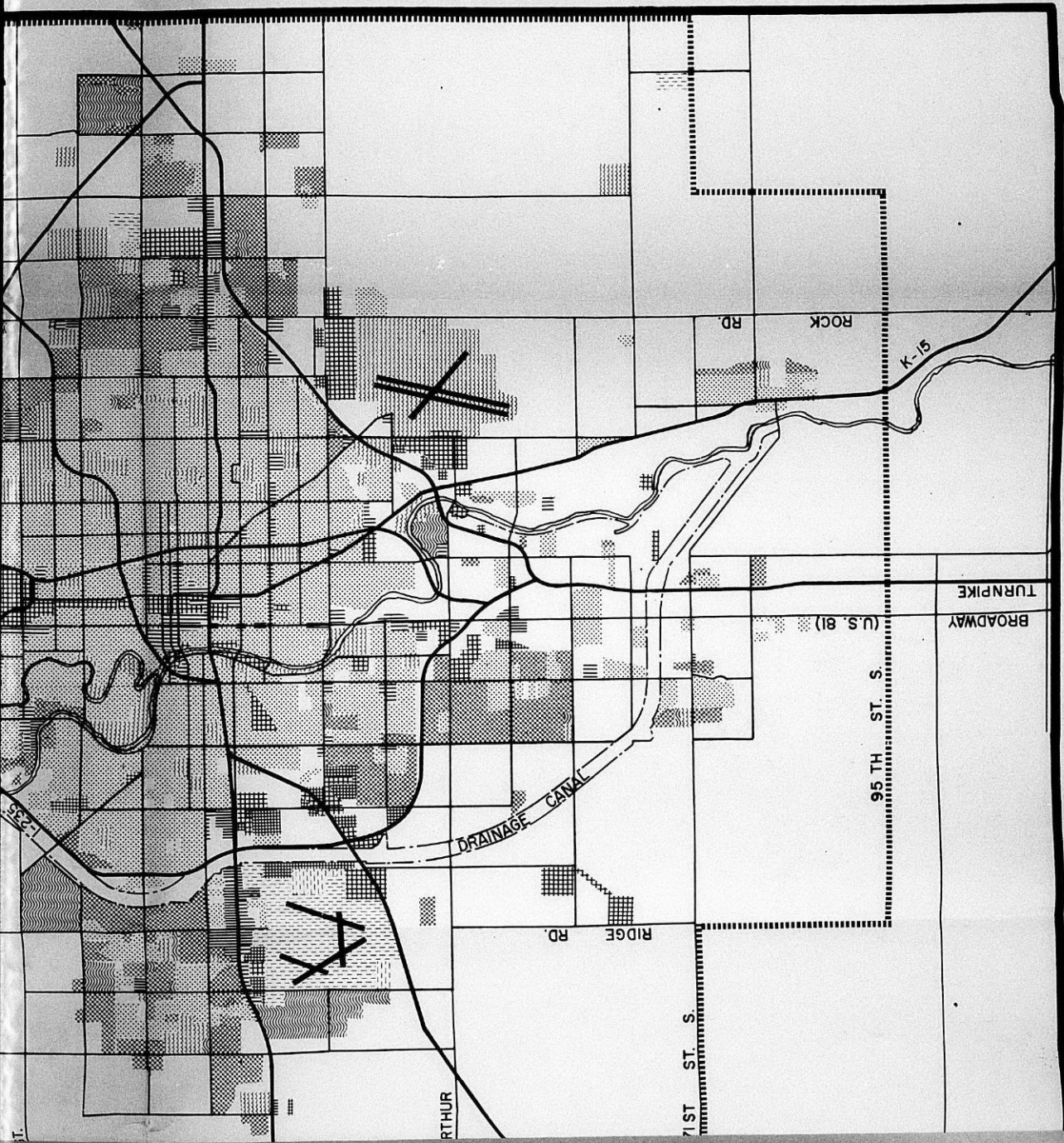


Table 2

1960 LAND USE
(000 sq. ft.)

District	Residential	Commercial	Industrial	Public	Transportation
Within Ring 3					
10	2165	4678	4359	897	12749
11	62872	5805	6427	15541	42637
12	66908	6162	6381	14430	49604
23	61878	4558	3222	10141	31979
33	34586	2708	894	21008	33198
43	96707	4068	359	12265	45241
53	59422	1273	488	33729	30115
63	56504	5412	18458	3145	33806
73	42220	1384	365	7265	24892
83	61033	2643	1609	15112	33916
93	29670	3144	6775	4905	36019
Outside Ring 3					
24	38800	3420	2848	5395	30059
34	11280	2619	25306	109765	21133
44	19554	7816	17656	13798	26511
54	4779	1654	4165	190	12548
64	38739	3363	7247	7806	10867
74	5479	1199	444	1722	12333
84	32276	5883	2532	2695	50313
94	5723	397	8908	6938	46128
25	20918	1785	830	3834	19224
35	8435	257	454	20989	21946
45	13559	200	2883	3127	18729
55	6878	184	168	338	35010
65	15606	591	917	2105	13075
75	12384	73	8356	1687	16797
85	11034	242	198	7614	11743
95	5895	535	10666	1265	25823
26	10612	241	361	277	21239
36	9889	747	96	8703	23572
46	2915	226	--	181	11748
56	313	--	20	221	13988
66	11406	385	1697	4682	26918
76	1420	113	226	710	12823
86	3315	--	40	--	26097
96	306	13	--	40	13849

Table 3

1990 LAND USE
(000 sq. ft.)

District	Residential	Commercial	Industrial	Public	Transportation
Within Ring 3					
10	2444	4678	4359	944	13141
11	62872	5805	10259	15541	42681
12	66908	6162	6904	14430	49648
23	66774	6287	3222	12711	32253
33	79988	5799	894	20001	33417
43	101060	6559	359	13355	50241
53	74900	7397	488	35951	30786
63	58491	7781	25758	3145	34721
73	60668	6097	365	14017	29582
83	65395	8637	1482	15782	34979
93	45455	6271	26370	4909	47169
Outside Ring 3					
24	67875	8843	6203	12970	46741
34	17702	2619	31232	113642	23399
44	71260	17442	17656	23034	55958
54	49821	2698	7737	18443	39469
64	49150	3363	12038	9287	27270
74	10924	4466	444	18449	22991
84	79696	14421	6235	38544	83482
94	25847	397	15573	9769	58064
25	27191	2351	830	4705	22621
35	9480	257	454	21120	22512
45	31811	2291	2883	13711	30098
55	14284	925	168	1383	39061
65	21879	3771	917	3020	16909
75	14464	73	8356	1687	16797
85	27750	1026	939	14890	20629
95	13344	535	10666	14551	31921
26	12224	241	361	495	22067
36	14811	747	96	10140	26316
46	7837	1184	--	6280	15451
56	313	--	20	221	13988
66	15501	690	2786	7034	28573
76	1420	113	226	710	12823
86	5135	--	40	--	26097
96	306	13	--	40	13849

Map 3

**ORIGIN AND
DESTINATION
DISTRICTS**

First Digit-Sector
Second Digit-Ring

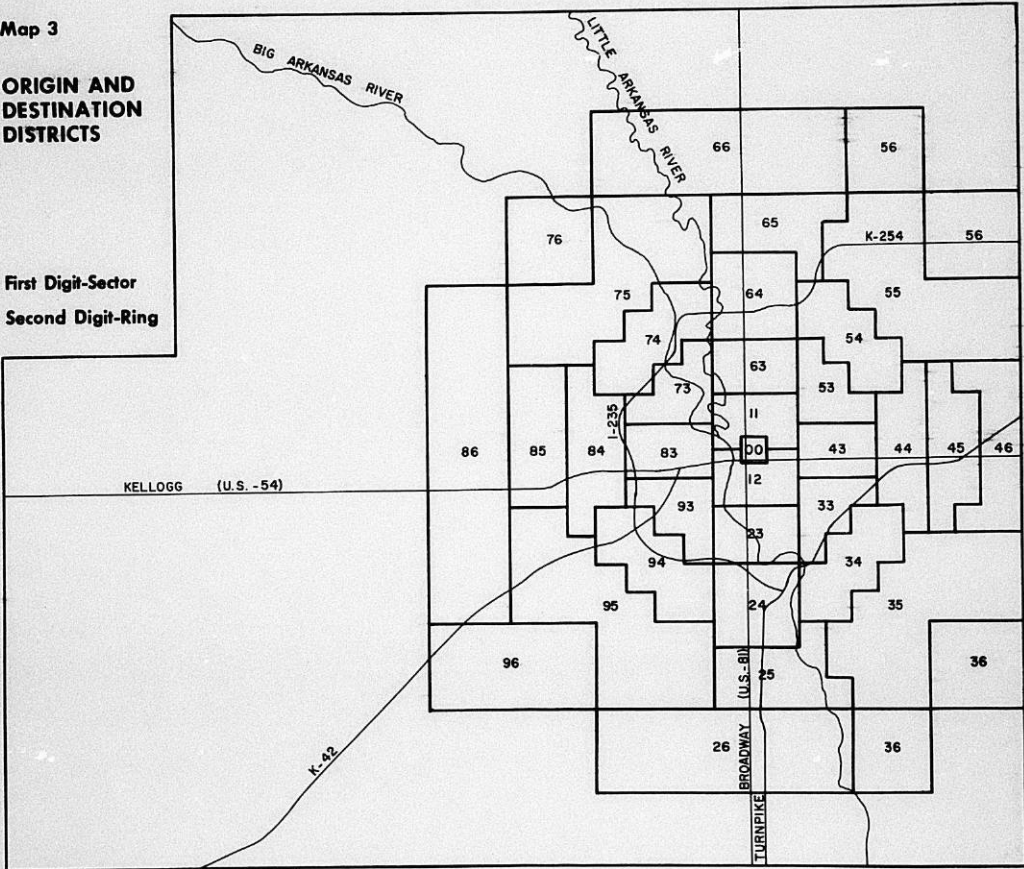


Table 4

1990 URBANIZED AREA DWELLING UNIT SUMMARY

Within Ring 3		Outside Ring 3			
O-D Districts	Dwelling Units	O-D Districts	Dwelling Units	O-D Districts	Dwelling Units
10	1177	24	10666	65	2727
11	12863	34	3507	75	582
12	11149	44	7796	85	1641
23	9495	54	3247	95	1249
33	13958	64	2017	26	996
43	13605	74	587	36	1635
53	8456	84	7342	46	439
63	6895	94	4858	56	116
73	6284	25	2160	66	1201
83	6488	35	900	76	170
93	7267	45	2598	86	1293
		55	1870	96	46

Dwelling Units in Urbanized Area: 157,280

Appendix A
1990 Land Use Projections

Before any land use assignments for 1990 could be made on an O-D zone basis, it was necessary to project the total land required to serve the needs of the forecast population. Such projections serve as control totals. For the purposes of this study, the actual land use assignments will make total somewhat different from the projection land tables. Differences between projection totals and assignment totals of as much as plus-or-minus five percent will be considered within acceptable tolerances.

Contained in this Appendix is the methodology used to project the land use as well as the population. The area used for determining the control total projections is that of the mechanical forecast area (MFA) shown on Map 1.

POPULATION

The population estimates to 1990 used in this report were taken from the "Population Forecast to 1990 for the Wichita-Sedgwick County Metropolitan Area", released in May 1970. This forecast showed a population of nearly 495,000 for Sedgwick County for the year 1990. The MFA population of 483,818 was derived by subtracting the 1960 population of the eight westernmost townships of the County (outside the MFA) and the 1990 population of Mount Hope, Andale, Garden Plain, Cheney and Viola from the 1990 projected population of the County. Table A1 lists the population for the various areas.

Table A1

POPULATION ESTIMATES

1960 Population Outside MFA¹

Township		Municipality		Population
Grand River	260			260
Morton	1,353	Cheney	1,101	2,454
Erie	139			139
Greeley	682	Mt. Hope	539	1,221
Sherman	1,004	Andale	432	1,436
Garden Plain	1,027	Garden Plain	560	1,587
Afton	259			259
Viola	418	Viola	203	621
	<u>5,142</u>		<u>2,835</u>	<u>7,977</u>

1960 Population Inside MFA

1960 Sedgwick County Population ¹	343,231
1960 Population Outside MFA	<u>7,977</u>
1960 Population Inside MFA	335,254

Population Added to 1990²

Township		Municipality		
Assumed No		Cheney	934	
Population		Mt. Hope	504	
change in		Andale	612	
townships to 1990		Garden Plain	830	
		Viola	<u>16</u>	2,896
1960 Population Outside MFA				<u>7,977</u>
1990 Population Outside MFA				10,873
1990 Forecast Population for Sedgwick County	494,691			
1990 Population Outside MFA	<u>10,873</u>			
1990 Population Inside MFA	483,818			

- 1) From final published reports, 1960 U.S. Census of Population
 2) 1990 Population less 1960 population from Table III, Appendix D, "Population Forecast to 1990 for the Wichita-Sedgwick County Metropolitan Area."

RESIDENTIAL

Of all the changes in land development patterns taking place over the last ten years, both within Wichita and in the nation, the changes in residential development are probably more significant

than any other. These changes are mainly in the large amount of multiple-family development. This trend was just beginning in 1960 and its effect and influence was not recognized in the 1960 land use projections to 1985 contained in the Land Use Technical Report. The following methodology and assumptions were used in determining the 1990 residential land projections and attempt to recognize the changing residential development pattern. The net result was 1,287,500 thousand square feet or 29,575.3 acres by 1990.

<u>1960</u>			<u>1990</u>	
A	335,254	Population	A'	483,818
B	106,411	Dwelling Units	B'	161,812
C	3.15	Persons/Dwelling Unit	C'	2.99
D	925.2	Residential Land Area (in 000,000 square feet)	D'	1,287.5
E	8,694	Square feet/Dwelling Unit	E'	7,957
F	2,760	Square feet/Person	F'	2,661
G	5.01	Dwelling Units/Net Acre	G'	5.47
H	12.1	Percent Multiple DU's	H'	23.7
I	12,876	Number Multiple DU's	I'	38,349
J	87.9	Percent Other DU's	J'	76.3
K	93,535	Number Other DU's	K'	123,463
L	3,111	Square feet/Multiple DU	L'	3,111
M	9,462	Square feet/Other DU	M'	9,462

Average density increase 1960 to 1990 = 9.2%

Given: A, B, D, A'

Find: Everything else

$$C = \frac{A}{B}$$

$$E = \frac{D}{B}$$

$$F = \frac{D}{A}$$

$$G = \frac{43,560}{E}$$

$C' = C - (C \times -.052)$ Initial Housing Element by Kallenbach showed 1960 family size of 3.27 persons estimated to decrease to 3.10 by 1990 or -5.2%; assumed this -5.2% rate would also apply to C'

$$B' = \frac{A'}{C'}$$

H = 1960 U.S. Census of Housing shows 12.1% of structures in Wichita urban area as having 3 or more units (12,622 of 104,609); assumed this percent for MFA

H' = Percent of multies in Wichita increased from 14.1% in 1960 to 17.6% in 1969 or 0.39%/yr.; assumed .39%/yr. rate will apply to MFA to 1990; 30 yr. \times .39%/yr. = 11.6% + 12.1.

'69 Census - City		Bldg. permits "60-'69		'69
12,464 multies	+	5,053	=	17,517
88,478 total	+	10,735	=	99,213
14.1% multies				17.6%

$$I = B \times H$$

$$J = 100 - H$$

$$K = B - I \text{ or } J \times B$$

$$I' = B' \times H'$$

$$J' = 100 - H'$$

$$K' = B' - I' \text{ or } J' \times B'$$

L = Based on table from p. 107 of Community Builders Handbook, conversation with Galbraith and judgment; assumed Citywide multies develop at 14 DU/Ac or $\frac{43560}{14}$

$$M = \frac{E - (H \times L)}{J} \text{ or } \frac{D - (I \times L)}{K}$$

$$L' = L$$

$$M' = M$$

$$D' = (I' \times L') + (K' \times M')$$

$$E' = (H' \times L') + (J' \times M') \text{ or } \frac{D'}{B'}$$

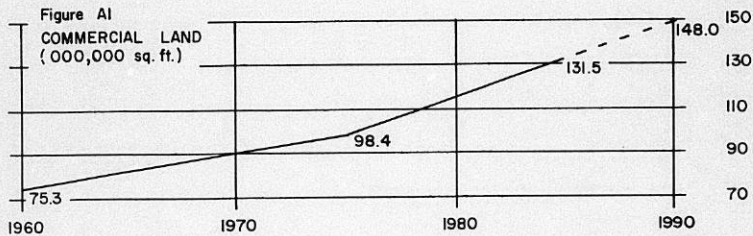
$$F' = \frac{D'}{A'}$$

$$G' = \frac{43,560}{E'}$$

$$\text{Density change} = \frac{G' - G}{G}$$

COMMERCIAL

The 1990 commercial land projection was derived as an extension of the projections contained in the Land Use Technical Report for the MFA.¹ These projections, shown on Figure A1, indicate 98.4 million square feet of commercial land by 1975 and 131.5 million for 1985. Extending the 1975-1985 line to 1990 gives an estimated 148 million square feet or 3997.6 acres.



INDUSTRIAL

Wholesale and manufacturing land use projections were both based on a ratio of acres-per-1,000 population. In both cases, it was assumed that the 1960 actual acres-per-thousand population would hold true for 1990. Using the 1960 population of 335,254, the 1990 land use was calculated as indicated on Table A2. The

¹ Land Use Technical Report, p 152.

total of wholesale and manufacturing land became the 1990 industrial land projection.

Table A2

INDUSTRIAL LAND

	1960 Land Area		1960	1990 Land Area	
	000,000 sq. ft. -a-	Acres -b-	Actual Acres/ 1000 Pop. -c-	Acres -d-	000,000 sq. ft. -e-
Wholesale Land	56.5	1297.1	3.87	1872.4	81.6
Manufacturing Land	79.6	1827.4	5.45	2636.8	114.8
Industrial	-	-	-	<u>4509.2</u>	<u>196.4</u>

a - From Land Use Technical Report, WSCMAPD, p. 152.
 $b = \frac{a}{.043560}$ $c = \frac{b}{335.254}$ $d = c \times 483.818$ $e = d \times .043560$

PUBLIC

Projections of public land to 1990 were obtained in a manner similar to that described above for industrial land. The public land was derived by adding the separate projections for public/semi-public and the public open space land. These figures are shown in Table A3 below.

Table A3

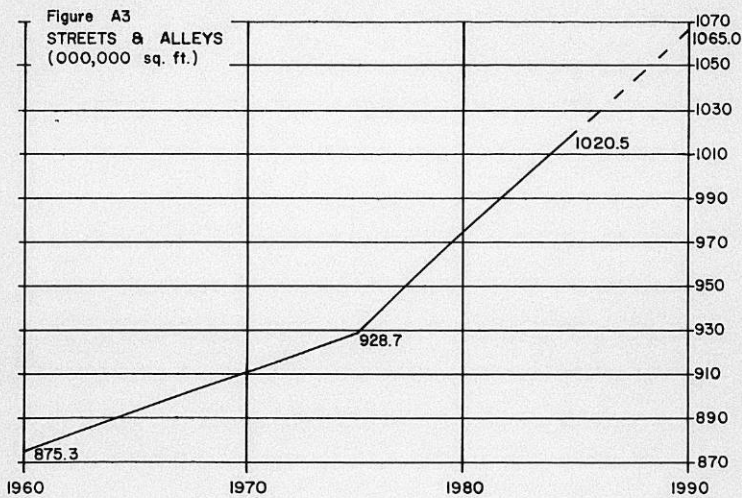
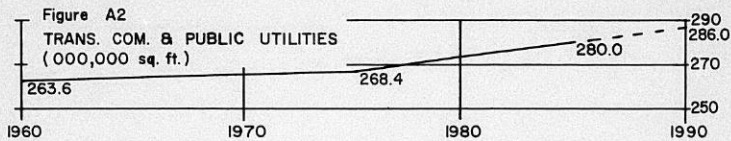
PUBLIC LAND

	1960 Land Area		1960	1990 Land Area	
	000,000 sq. ft. -a-	Acres -b-	Actual Acres/ 1000 Pop. -c-	Acres -d-	000,000 sq. ft. -e-
Public/Semi-Public	237.8	5459.1	16.28	7876.6	343.1
Public Open Space	117.4	2695.1	8.04	3889.9	169.4
Public	-	-	-	<u>11766.5</u>	<u>512.5</u>

a - From Land Use Technical Report, WSCMAPD, p. 152.
 $b = \frac{a}{.043560}$ $c = \frac{b}{335.254}$ $d = c \times 483.818$ $e = d \times .043560$

TRANSPORTATION

Like the commercial land, the 1990 projection for transportation, communication and utility land was derived from an extension of 1975-1985 trend lines. From the Land Use Technical report, the projection for transportation, communication and public utilities to 1985 was extended to 1990, giving a value of 286 million square feet or 6,565.7 acres. Similarly, the streets and alleys projection



provided 1065 million square feet or 24,449 acres. These projection lines are shown on Figures A2 and A3 respectively. The two projections were combined for a total transportation land use projection to 1990 of 1351.0 million square feet or 31,014.7 acres.

SUMMARY

The land use projections to 1990 for control purposes are summarized on the following tables. Table A4 shows the area in square feet while Table A5 shows the area in acres for the MFA. Also shown on the Tables is the 1960-1990 area increase.

Table A4

PROJECTED LAND AREA
(000,000 square feet)

Mechanical Forecast Area Land Use	Area				Increase 1960 - 1990
	1960*	1975*	1985*	1990	
Residential	925.2	1,059.5	1,288.3	1,287.5	362.2
Commercial	75.4	98.4	131.4	148.0	72.6
Wholesale	56.5	60.5	72.6	81.6	25.1
Manufacturing	79.6	92.1	107.3	114.8	35.2
Public/Semi-Public	237.8	266.6	306.4	343.1	105.3
Public Open Space	117.4	125.8	148.8	169.4	52.0
Trans., Comm., Pub. Util.	263.6	268.4	280.0	286.0	22.4
Streets and Alleys	875.3	928.7	1,020.5	1,065.0	189.7
Total Developed Land	2,630.8	2,900.0	3,355.3	3,495.4	864.5

A-10

	Percentage				
Residential	35.2	36.5	38.4	36.8	39.2
Commercial	2.9	3.4	3.9	4.2	96.3
Wholesale	2.1	2.1	2.2	2.3	44.4
Manufacturing	3.0	3.2	3.2	3.3	44.2
Public/Semi-Public	9.0	9.2	9.1	9.8	44.3
Public Open Space	4.5	4.3	4.4	4.9	44.3
Trans., Comm., Pub. Util.	10.0	9.3	8.4	8.2	8.5
Streets and Alleys	33.3	32.0	30.4	30.5	21.7
Total Developed Land	100.0	100.0	100.0	100.0	32.7

* Land Use Technical Report, WSCMAPD, 1963

PROJECTED LAND AREA
(Acres)

Table A5

Mechanical Forecast Area Land Use	1960*	Area		1990	Increase 1960 - 1990
		1975*	1985*		
Residential	21,239.7	24,322.8	29,575.3	29,556.9	8,317.2
Commercial	1,730.9	2,258.9	3,016.5	3,397.6	1,666.7
Wholesale	1,297.1	1,388.9	1,666.7	1,873.3	576.2
Manufacturing	1,827.4	2,114.3	2,463.3	2,635.4	808.0
Public/Semi-Public	5,459.1	6,120.3	7,034.0	7,876.5	2,417.4
Public Open Space	2,695.1	2,888.0	3,416.0	3,888.9	1,193.8
Trans., Comm., Pub. Util.	6,051.4	6,161.6	6,427.9	6,565.7	514.3
Streets and Alleys	20,094.1	21,320.0	23,427.4	24,449.0	4,354.9
Total Developed Land	60,394.8	66,574.8	77,027.1	80,243.3	19,848.5

II-V

	Percentage				
Residential	35.2	36.5	38.4	36.8	39.2
Commercial	2.9	3.4	3.9	4.2	96.3
Wholesale	2.1	2.1	2.2	2.3	44.4
Manufacturing	3.0	3.2	3.2	3.3	44.2
Public/Semi-Public	9.0	9.2	9.1	9.8	44.3
Public Open Space	4.5	4.3	4.4	4.9	44.3
Trans., Comm., Pub. Util.	10.0	9.3	8.4	8.2	8.5
Streets and Alleys	33.3	32.0	30.4	30.5	21.7
Total Developed Land	100.0	100.0	100.0	100.0	32.7

* Land Use Technical Report, WSCMAPD, 1963

Appendix B

1990 Land Use Zone Assignments

Following the projection of land use control totals covering the MFA, the next step was to determine the increase needed from 1960 to 1990 and distribute the increase throughout the area by O-D zone. A printed form was prepared for each zone which would show the 1960 land use, the growth to 1990 and the total 1990 land use. (A copy of the form with illustrative data is included as Figure B1.) The 1960 area figures were transferred to the new individual zone sheets from the 1964 work sheets.

A large base map of the County at a scale of 1 to 4,000 was obtained which showed the 1960 land use.¹ Overlaid on this base was the origin-destination zone boundaries with their zone numbers.² The land use was shown in zip-a-tone patterns for 1960. To highlight the zip-a-tone patterns on the black-line print, the 1960 residential and public land use was colored.

The growth occurring from 1960 to 1968 was added to this base in a very generalized manner. The source of this growth was from the aerial photographs taken for the Planning Department in early 1968. These areas were marked on the base map in the same color as the 1960 land use but in a lighter shading. In this manner, it was easy to ascertain that development in the eight-year period from 1960 to 1968 had not been taking place as had been predicted in the guided growth plan. Less growth was taking place to the east and northeast, while more was taking place to the south and west, yielding more evenly distributed development.

¹ MAPD Map file number 13-4A.

² MAPD Map file number 13-4C.

Sector 5
 Ring 4
 Zone 4

LAND USE AREA*
 (in 000 sq. ft.)

Figure B1

	1960	+ growth =	1990
Residential	<u>1701</u>	<u>4182</u>	<u>5883</u>
Commercial	<u>44</u>	<u>—</u>	<u>44</u>
Industrial & Related			
Wholesale	<u>—</u>		
Manufacturing	<u>—</u>		
Total	<u>—</u>	<u>1481</u>	<u>1481</u>
Public & Semi-Public			
Public/Semi-Public	<u>190</u>		
Public Open Space	<u>—</u>		
Total	<u>190</u>	<u>610</u>	<u>800</u>
Trans., Com. & Utilities			
Trans., Comm. & Pub. Util.	<u>582</u>		
Streets & Alleys	<u>1491</u>		
Total	<u>2073</u>	<u>2483</u>	<u>4556</u>
Total Developed Land	<u>4008</u>	<u>8756</u>	<u>12764</u>
Other (flood plain, flight path, etc.) & Undeveloped	<u>23938</u>	<u>-8756</u>	<u>15182</u>
Total Land Area	<u>27946</u>	<u>X</u>	<u>27946</u>

*acres in parenthesis

6/16/70

On a tracing vellum overlay of the base map, all areas were marked by potential land use development for 1990 in the four land use categories of residential, commercial, industrial and public. The choice of assignment and marking of the projected land use was based on the concept of guided growth as spelled out in the Land Use Technical Report. The actual areas of future growth were selected primarily on the basis of development occurring adjacent to current development, the filling in of developable land and redeveloping within the existing development, and the utilization of platted but as yet undeveloped land. Staff comment and review by the Community Development Division in particular was relied on considerably.

Major effort in marking potential developed land was extended to the area outside of Ring 3. Adjustments not previously accounted for were made for commercial, industrial and public land within Ring 3. For residential land the total possible area as determined in the capacity study was used as the 1990 residential area.³ This study, in essence, assumed 100% development in Ring 3 by 1990.

After the above-described adjustments and assumptions, rough totals of all land uses within Ring 3 were made. The totals for each land use for 1960 and 1990 were made with the difference representing the growth inside Ring 3. This growth for each land use within Ring 3 was subtracted from the total projected growth to 1990 for the MFA. The difference here represented the growth

³
Land Use Technical Report, p. 42ff and original 1960 work sheets.

necessary outside of Ring 3 to approximate the projected land needs.

Table B1 represents the land estimates in and out of Ring 3.

Table B1

LAND ESTIMATES OUTSIDE RING 3

	1990 Net Acres in MFA	Acres Accounted for in Ring 3	= Net Estimated acres needed from outside Ring 3
Residential	8317.2	1735.0	6582.2
Commercial	1666.7	681.0	985.7
Industrial	1384.2	751.0	633.2
Public	3611.2	388.0	3223.2
Transportation	4869.2	486.0	4383.2

All of the land needed outside of Ring 3 was assumed to represent new growth which would cause a decrease in undeveloped land. In addition to the four primary land uses, an allowance had to be made on the individual zone sheets for transportation, communication and utilities land use which was, for all practical purposes, a measurement of streets and alleys. As this land could not be readily measured on the map, it was determined that the transportation land would be obtained as a factor of the other four land uses. The following described assumptions and procedure, illustrated on Table B2, give the order in which land needs outside Ring 3 were estimated.

Commercial. It was assumed that 15% of all new gross commercial development would be utilized for transportation, communication and utilities. The remaining 85% would be equal to the net commercial land. With net commercial land needs of 985.7 acres, the growth needs were estimated to be 1,160 acres.

Table B2

LAND ESTIMATING PROCEDURE OUTSIDE RING 3

Commercial	Acres
Net (assumed 85% of gross)	985.7
Transportation (15% of gross)	<u>174.3</u>
Gross	1160.0
 Industrial	
Net (assumed 85% of gross)	633.2
Transportation (15% of gross)	<u>111.8</u>
Gross	745.0
 Public	
Major Public Land mapped outside Ring 3	2689.0
Less 15% for transportation	<u>403.0</u>
Net public mapped	2286.0
Public inside Ring 3	<u>388.0</u>
Total public accounted for	2674.0
Public needed outside Ring 3	<u>937.2</u>
Total all public	3223.2
 Transportation	
From Commercial	174.3
From Industrial	<u>111.8</u>
From Public	403.4
Accounted for outside Ring 3	689.5
From inside Ring 3	<u>486.0</u>
Total accounted for	1175.5
Amount needed from Residential outside Ring 3	<u>3513.7</u>
Total all transportation	4689.2
 Residential	
Net Residential (59.7%)	6582.2
Miscellaneous Public (8.5%)	<u>937.2</u>
Transportation (31.8%)	3513.7
Gross Residential	<u>11033.1</u>

Industrial. It was similarly assumed that 15% of new gross industrial development would be utilized in transportation, communication and utilities, with the remaining 85% representing the net industrial land. With 633.2 net acres, the gross industrial

land was estimated to be 745 acres.

Public. The overlay showed only larger areas of public land outside of Ring 3. It was assumed that of these areas, 15% would be allocated to transportation, communication and utilities, with the remaining 85% or 2,286 acres being the net public land shown. Adding to this the Ring 3 public land accounted for 2,674 acres. This left a net need outside of Ring 3 of 937.2 acres. It was assumed that this balance would be a net figure and would provide for miscellaneous other public space (i.e., schools, common open space, small parks, churches, etc.) which would be obtained as part of the gross residential land. Hence, the 937.2 acres would be added to the net residential need.

Transportation. The transportation, communication and utilities land use was taken as 15% of the gross measured commercial, industrial and major mapped public land out of Ring 3, plus an amount needed to serve residential uses. The transportation, communication and utility land accounted for up to this point both inside and outside of Ring 3 was 1,175.5 acres. This left an amount of 3,513.7 acres needed outside of Ring 3. It was assumed that this needed transportation land would serve the residential land and hence would be added to net residential land to get the gross residential area mapped.

Residential. Gross residential land was determined by adding the net residential land, miscellaneous public land and transportation, communication and utilities land. The gross residential land to be mapped totaled 11,033.1 acres. Calculating it back gave a figure of 59.7% for net residential, 8.5% for public and 31.8% for

transportation, communication and utilities.

Adjustments were made on the overlay so as to have areas approximating those estimated above. With a certain degree of confidence that the land shown on the map approximated the projected control totals for 1990, measurement and tabulation of the land assignments in each zone was accomplished in the following manner.

The individual zone sheets outside Ring 3 were taken sequentially for adding 1990 estimates. The gross area of the four colored land uses on the overlay were measured with an acetate template showing a square mile broken down to a unit as small as 2-1/2 acres. The gross areas as measured were then broken down into net areas as indicated on Table B3. The net figures were converted into square feet and added to the 1960 figures on the respective zone form to get the 1990 land use totals for the zone. This procedure was followed until all zones in the urbanized area had been tabulated.

The land use assignments as mapped and tabulated was presented to the Planning Commission informally at a meeting July 9. Following their review and comment, certain adjustments were made and reflected on the map and on individual zone sheets. Various other changes and refinements were also made by MAPD staff to more realistically represent projected growth. The final assignments of land use by zone are listed on Table B4. The zone numbers are keyed to Map B1 which shows the O-D zones for the urbanized area of Wichita.

Table B3

GROSS-NET CONVERSION FORMULA

Gross land mapped and measured...	...was divided to yield net land.
Residential	Residential
	59.7% of gross = Net Residential
	8.5% of gross = Net Public
	31.8% of gross = Net Transportation
Commercial	Commercial
	85.0% of gross = Net Commercial
	15.0% of gross = Net Transportation
Industrial	Industrial
	85.0% of gross = Net Industrial
	15.0% of gross = Net Transportation
Public	Public
	8.5% from gross Residential
	85.0% of gross = Net Public
	15.0% of gross = Net Transportation
	Transportation
	31.8% from gross Residential
	15.0% of gross = Net Commercial
	15.0% of gross = Net Industrial
	15.0% of gross = Net Public

PROJECTION/ASSIGNMENT COMPARISON

One problem in evaluating and comparing land use assignments to land use projections was brought on by boundary differences. The land use control projections were made for the MFA. Because of the availability of 1960 zone data, land use assignments could be made for the urbanized area (cordon line) only. As evident on Map 1, the boundaries of these two areas are not coterminous.

1990 LAND USE

Table B4

Zone	Residential	Commercial	Industrial	Public	Transportation	O-D Zone	Residential	Commercial	Industrial	Public	Transportation	O-D Zone	Residential	Commercial	Industrial	Public	Transportation
9802	211	664	3138	10680	840	1031	4584	597	-	16798	750	-	-	-	-	-	739
11869	1872	870	88	7103	841	11141	570	-	1629	7219	751	-	-	-	-	-	392
5242	1233	8881	-	4780	842	13847	382	79	4316	8635	752	2192	-	-	-	-	208
16019	1174	-	1240	5403	843	11045	874	-	7595	8320	753	2150	-	-	-	-	580
1903	755	9869	443	8356	844	106	250	-	11948	9614	754	6262	-	-	725	-	575
620	1066	6085	-	10847	845	1782	3210	5541	2396	11117	755	1411	-	-	-	-	7983
45455	6271	26370	4909	47169	846	18527	936	-	2062	6743	756	1362	55	6771	9	1678	4619
552731	54828	58938	119871	293148	847	13391	3397	18	1357	7726	757	1087	18	860	-	-	1701
					848	8724	218	-	7271	6687	75	14464	73	8356	1687	-	16797
					849	102	-	-	70	623	-	-	-	-	-	-	-
					84	79696	14421	6235	18544	83482	850	3756	40	136	4008	4537	
					940	10530	-	10	915	5646	851	6656	34	-	4734	3672	
					941	6963	-	3963	1193	5719	852	10165	218	-	4701	4701	
					942	-	-	2962	-	8152	854	219	-	-	-	-	619
					945	5455	-	740	802	855	2217	64	803	-	3145	283	608
					944	763	252	68	60	777	856	2172	-	-	305	1782	
					945	58	-	6596	1357	857	267	-	-	-	-	540	
					946	-	-	576	6313	20412	858	59	-	-	-	524	
					947	1568	-	323	330	1654	859	181	-	-	-	553	
					948	173	-	145	1975	764	85	27750	1076	939	14890	20629	
					949	337	-	10663	-	-	-	-	-	-	-	-	-
					94	2547	397	15273	9769	58064	950	2427	-	29	1481	2051	
						372275	54249	97118	244138	357374	951	-	-	-	350	787	
											952	2445	-	-	305	21763	
											953	212	322	-	4443	1313	
											954	986	35	22	44	1509	
											955	70	-	-	1696	2831	
											956	5286	-	-	-	10106	
											957	470	-	10394	-	9874	
											958	1266	178	221	6232	9874	
											959	182	-	-	624	624	
											95	13344	535	10666	14551	31921	
												160203	11229	25213	75067	200548	
7049	260	855	4756	4588													
4445	1607	1130	145	2690													
12652	650	294	1836	10423													
5458	152	1223	844	5236													
1943	5147	2431	74	3841													
13912	219	77	1564	7999													
4690	-	11	1581	4309													
7355	302	67	113	2815													
8371	5067	115	2057	4840													
87875	8843	6203	12970	46741	Ring 5												
					250	36	560	-	514	638							
					251	43	548	-	948	288							
					252	1416	43	15	997	2181							
					253	2461	95	59	22	2878							
					254	3284	56	46	2493	463							
					255	2310	-	-	260	2574							
					256	-	-	-	-	394							
					257	4185	-	151	305	2966							
					258	1753	216	267	-	2448							
					259	11746	1313	225	2013	5761							
					25	27191	2351	830	4705	22621							
					350	13	-	-	300	596							
					351	43	-	-	10366	535							
					352	366	-	-	9607	288							
					353	923	-	-	-	2201							
					354	53	-	-	-	522							
					355	53	-	-	-	668							
					356	218	97	454	408	2093	Ring 6						
					357	532	-	-	925	3242	5410	64	341	268	11858		
					358	769	130	-	146	6092	260	177	20	227	10209		
					359	7042	30	-	293	8620	261	6565	-	-	-	-	-
					35	9480	257	454	21120	22512	262	249	241	361	495	22667	
					450	26	-	-	978	36	261	599	-	-	-	-	-
					451	205	-	-	993	460	6565	177	20	227	10209		
					452	4422	18	1475	436	5698	262	249	241	361	495	22667	
					453	4647	1740	-	348	5130	263	299	-	-	-	-	-
					454	2787	-	-	1657	2268	264	249	-	-	-	-	-
					455	8467	-	-	925	3242	265	249	-	-	-	-	-
					456	821	-	-	6494	1976	266	1419	64	341	268	11858	
					457	5445	533	-	3310	3991	267	262	-	-	-	-	-
					458	209	-	-	132	70	268	656	125	-	-	-	-
					459	4722	-	-	471	2512	269	58	-	-	-	-	-
					45	31811	2291	283	13711	30098	270	128	-	-	-	-	-
					550	286	-	-	1127	560	271	128	-	-	-	-	-
					551	8854	741	-	792	5550	272	103	-	-	-	-	-
					552	-	-	-	-	56	273	103	-	-	-	-	-
					553	27	-	-	-	614	274	103	-	-	-	-	-
					554	1097	54	-	190	1010	275	103	-	-	-	-	-
					555	-	-	165	20	1164	276	103	-	-	-	-	-
					556	113	-	-	48	14526	277	103	-	-	-	-	-
					557	2686	-	-	261	2255	278	103	-	-	-	-	-
					558	904	50	-	-	6161	279	103	-	-	-	-	-
					559	312	80	-	-	6087	280	103	-	-	-	-	-
					55	14284	925	168	1383	39061	281	103	-	-	-	-	-
					650	47	-	-	-	987	282	103	-	-	-	-	-
					651	5820	-	-	305	3926	283	103	-	-	-	-	-
					652	3434	3287	889	926	2634	284	103	-	-	-	-	-
					653	1832	464	1039	4036	862	285	103	-	-	-	-	-
					654	798	-	-	336	722	286	103	-	-	-	-	-
					655	-	-										

O-D Zone Residential Commercial Industrial Public Transportation O-D Zone Residential Commercial Industrial Public Transportation O-D Zone Residential Commercial Industrial Public Transportation O-D Zone Residential Commercial Industrial Public Transportation

Table with 16 columns and 926 rows. Columns represent different land use categories: Central Area, O-D Zone Residential, Commercial, Industrial, Public Transportation, and O-D Zone Residential, Commercial, Industrial, Public Transportation. Rows are numbered 10 through 926. The table contains numerical data for each category across all rows.

Ring 6

Ring 5

Ring 4

Ring 3

As the urbanized area is smaller than the MFA, it might be expected that land use assignments would be smaller than land use projections. Based on population it was assumed that the urbanized land area could be at least 2 percent less than the MFA projections for the four primary land uses. To account for the extensive number of county roads and highways, it was assumed that transportation land would at least be of an amount equal to the MFA projection less the transportation land existing in 1960 in the area between the urbanized area and the MFA line.

With the above assumptions, the 1990 expected urbanized land area was calculated as shown on Table B5. Comparing the expected and assigned land use on Table B6 shows that only the industrial land varies from the expected to a significant degree.

Table B5

1990 URBANIZED LAND AREA ¹					
	1990 MFA Projected Land Area	-	2% of MFA Projected Land Area ²	=	Expected Urbanized Land Area
Residential	1,287,500		25,750		1,261,750
Commercial	148,000		2,960		145,040
Industrial	196,400		3,928		192,472
Public	512,500		10,250		502,250
Transportation	1,351,000		224,877 ³		1,126,123
1) All land areas in 000 square feet					
2) Major population concentrations					
			Bentley		460
			Colwich		1481
			Goddard		2000
			Clearwater		2358
			Mulvane (2/3)		3667
					9966
	1990 MFA Population				483,818
	MFA Population outside cordon line				9,966
	1990 Urbanized Area Population				473,852
	<u>MFA Pop. Outside Cordon line</u>	=	9966	=	2.1%
	<u>1990 MFA Population</u>		483,818		
3) 1960 Transportation in Ring 6 - Trans. Com. 80,538					
			Streets	294,573	375,111
	1960 Trans. of Ring 6 inside cordon line				150,234
	1960 Trans. of Ring 6 in MFA & Outside cordon line				224,877

Table B6

EXPECTED/ASSIGNED LAND COMPARISON ¹			
	Expected Urbanized Land Area	Assigned Urbanized Land Area	Difference Percent of Expected
Residential	1,261,750	1,274,980	+1.0
Commercial	145,040	139,939	-3.5
Industrial	192,472	206,320	+7.2
Public	502,250	494,911	-1.5
Transportation	1,126,123	1,115,704	-0.9
Total	3,227,635	3,231,854	+0.1

1) Land area in 000 square feet

Appendix C
1990 Dwelling Unit Count

In February of this year, the Long Range Division conducted a count of dwelling units existing in 1969 within all O-D zones of the MFA. Certain adjustments were also made at this time to some of the 1960 counts and density figures which were found to be in error. The tables resulting from this count were used for estimating 1990 dwelling units according to the following described procedure.

The first step in estimating 1990 dwelling units was to make a check of the 1990 projected residential land area to see if it differed from the land area existing in 1960. If the 1960 and 1990 land areas were the same, the 1969 dwelling unit count was used as the 1990 dwelling unit estimate, the land area was converted to acres and the dwelling units-per-acre density was calculated for 1990.

If the 1960 and 1990 land area were different, the 1990 land area was converted to acres and multiplied by the 1960 dwelling units/acre density to derive a preliminary 1990 dwelling unit estimate. The preliminary 1990 dwelling unit estimate was then compared with the 1969 actual dwelling unit count. The greater of these two was used as the 1990 dwelling unit estimate. If the 1969 dwelling unit count was used for the 1990 estimate, a new density value was calculated, using the 1990 land estimate. This procedure was followed for all zones in the urbanized area.

Review was made of the land use work map noting all those residential areas where higher density residential development was most likely to occur. These areas were noted by zone on a supplemental sheet with a notation of size of the area involved.

Using the assumed average density of 14 units per acre, the number of units for that particular portion of each zone was calculated. These units were in turn added to the units estimated above for the respective zones. A new 1990 density value was recalculated, using the new dwelling unit count total.

For each district the 1990 land area and 1990 dwelling unit counts were totaled. After converting the square feet to acres, a density ratio was calculated for each district. Table C1 contains the 1990 residential density and dwelling unit count by O-D zone and district.

It might be noted that not only during the procedure described here but during the entire study certain liberties were taken. Based on staff judgment and knowledge and where the established procedure did not yield reasonable results, certain adjustments were made on individual zones as deemed appropriate.

DWELLING UNIT COMPARISON

As a cross check on the reasonableness of the 1990 dwelling unit projection and count, a comparison was made to the "Initial Housing Element" report estimates. This report, completed in June, indicated a demand for an additional 50,000 units by 1989 within Sedgwick County. Added to the units counted for 1969 gave a total of approximately 165,000. This is less than 2 percent over that projected for this land use study.

Using the same theory for dwelling units as was used for the land use assignments (that the urbanized area could have at least 2 percent fewer dwelling units than the MFA because of population differences), one could expect approximately 158,600 dwelling units

1990 URBANIZED AREA DWELLING UNIT COUNT

O-D Zone	Area in 000 sq. ft.	DU's Per Net Acre	DU's	O-D Zone	Area in 000 sq. ft.	DU's Per Net Acre	DU's	O-D Zone	Area in 000 sq. ft.	DU's Per Net Acre	DU's
100	2444	21.0	1177	930	9802	6.1	1356	840	1031	1.7	45
10	2444	21.0	1177	931	11869	2.2	265	841	11141	4.4	1135
110	7416	12.5	2128	932	5242	9.8	3599	842	13847	9.1	2900
111	4371	17.4	1747	933	16019	7.0	306	843	11045	4.0	1014
112	12522	8.6	2460	934	1903	5.6	79	844	106	0.8	2
113	13440	6.0	1851	935	45455	7.0	7267	845	1782	1.6	67
114	12914	8.2	2440	93				846	18527	1.2	519
115	12209	8.0	2237					847	13391	3.7	1132
120	12384	9.1	2529					848	8724	2.6	521
121	12447	3.6	1022					849	102	3.0	7
122	10042	8.6	1986					84	79591	4.0	7342
123	9556	9.0	1983					940	10530	10.8	2599
124	12085	8.0	2211					941	6963	9.2	1470
125	10394	5.9	1413					942	—	—	58
12	66908	7.3	11149					943	5455	4.0	501
								944	763	2.5	43
								945	58	6.0	8
								946	1568	4.0	152
								948	173	4.3	17
								949	337	1.3	10
								94	25847	8.2	4859
				Ring 4							
				240	7049	5.3	859				
				241	4445	7.0	717				
				242	12652	8.4	2435				
				243	8458	8.4	1049				
				244	1943	2.3	103				
				245	15912	7.9	2873				
				246	4690	8.2	883	Ring 5			
				247	7355	2.4	407	251	36	13.3	11
				248	8371	7.0	1340	252	1416	3.6	117
				24	67875	6.8	10666	253	2461	3.0	172
Ring 3				340	1015	5.1	120	254	3284	3.0	225
230	15441	6.7	2356	341	1166	22.1	591	255	2310	3.0	255
231	20306	6.9	1637	342	2790	9.4	605	256	—	—	7
232	10379	7.8	1648	343	844	—	352	257	4185	1.7	163
233	7445	4.8	844	346	7065	6.6	1074	258	1753	3.6	146
234	7659	4.7	1674	347	346	7.5	758	259	11746	4.3	1159
235	13544	6.2	9495	349	272	1.1	7	25	27191	3.5	2160
23	66774			34	17702	9.1	3507	350	13	13.4	4
330	14570	5.5	1850	440	4474	1.2	123	351	43	7.1	17
331	11395	11.9	3116	441	14518	5.4	1790	352	366	4.8	40
332	15764	5.1	1835	442	12982	4.3	1282	353	923	2.3	49
333	14561	7.5	2523	443	10842	12.6	3141	354	53	1.6	2
334	14798	7.6	2598	444	120	1.1	3	355	53	5.8	7
335	8900	10.0	2036	445	4289	1.1	108	356	218	0.9	3
33	79988	7.6	13958	446	4289	1.1	108	357	—	—	8
430	16031	7.1	2605	447	3398	7.5	584	358	769	4.7	83
431	16992	7.4	2823	448	11248	0.8	207	359	7042	4.3	695
432	18677	6.1	2615	449	130	1.7	6	35	9480	4.1	900
433	17473	6.3	2530	44	71260	4.8	7796	450	26	10.0	26
434	16040	3.0	1104	540	643	2.3	34	451	205	1.7	8
435	15847	5.3	1928	541	12677	1.3	378	452	4432	1.7	173
43	101060	5.9	13605	542	12559	4.0	1145	453	4647	14.2	1513
530	14423	6.6	2189	543	249	1.2	7	454	2787	1.3	83
531	16175	4.7	1745	544	5883	0.9	122	455	8467	1.3	253
532	10830	6.1	1511	545	5184	3.0	357	456	921	4.1	77
533	13149	3.7	1111	546	4236	4.7	457	457	5445	3.1	388
534	11311	0.9	234	547	1666	4.4	531	458	209	2.3	11
535	8922	8.1	1666	548	8456	3.0	144	459	4772	0.6	66
53	74900	4.9	8456	549	2091	3.0	144	45	31211	3.6	2598
630	13456	6.8	2107	54	1045	2.8	72	550	286	1.4	9
631	8814	7.3	1480	640	12276	1.3	366	551	8854	8.1	1648
632	10987	5.9	1488	641	5802	3.0	398	552	—	—	2
633	16878	2.6	1007	642	1339	5.7	376	553	27	3.2	2
634	6360	4.6	678	643	5199	1.7	194	554	1097	2.6	67
635	1596	2.9	335	644	4022	2.0	188	555	—	—	4
63	58491	5.1	3035	645	30	8.7	6	556	113	3.4	9
730	12695	3.6	1054	646	15881	1.3	474	557	2686	0.9	55
731	15298	8.3	1853	647	4060	2.2	205	558	904	1.3	27
732	12969	5.2	1541	648	541	0.8	10	559	317	6.5	47
733	5581	5.5	702	64	49150	1.9	2017	55	14284	5.7	1870
734	5400	5.0	615	740	1117	2.1	54	650	47	15.8	17
735	8725	2.6	519	741	—	—	3	651	5820	2.2	294
73	60668	4.5	6284	742	8298	2.2	419	652	3434	11.9	942
830	12572	6.5	1886	743	456	2.4	25	653	10432	5.5	1310
831	9130	5.4	1139	744	272	3.7	23	654	798	0.6	11
832	11417	4.3	1127	745	43	7.1	7	655	—	—	24
833	13837	3.7	1164	746	746	4.2	14	656	444	1.8	18
834	6898	2.2	348	747	146	12.3	9	657	844	4.7	92
835	11541	3.1	824	748	560	2.6	33	658	60	12.3	17
83	65395	4.3	6468	74	10924	2.3	587	659	—	—	2
								65	21879	5.4	2727

in the urbanized area by 1990. Following the procedure described in this appendix resulted in a 1990 dwelling unit count of 157,280, only 0.8 percent less than expected. Table C2 summarizes the dwelling units comparison.

Table C2

DWELLING UNIT COMPARISON

Dwelling units needed by 1989 in Sedgwick County ¹		50,265
Dwelling units existing in 1969 in MFA ²		<u>114,447</u>
		164,712
<u>DU's Estimated - Projected DU's</u>	=	<u>164,712-161,812</u>
<u>Projected DU's</u>		161,812
	=	1.8%
Projected MFA DU's		161,812
Less 2%		<u>3,237</u>
Estimated Urbanized area DU's		158,575
<u>Counted Du's - Urbanized DU's</u>	=	<u>157,280-158,575</u>
<u>Urbanized DU's</u>		158,575
	=	-0.8

- 1) Initial Housing Element, WSCMAPD, June, 1970, p. 13
 2) WSCMAPD Dwelling unit count, February, 1970