
NORMAN 2025 LAND DEMAND ANALYSIS

City of Norman, Oklahoma

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Land Demand Analysis

Norman 2025

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NORMAN 2025 LAND DEMAND ANALYSIS

INTRODUCTION

This Land Demand Technical Memorandum is an analysis of past, present and future patterns of growth and change in the City of Norman and the region. This analysis is the basis of projections for estimating the amount of land that will be needed to accommodate new residential, commercial, industrial and institutional (educational and recreational) uses between now (2004) and the planning horizon of the Land Use Plan Update—2025.

This analysis provides an estimate of the net land that actually will be used by new development, both private and public. This is particularly important when it is time to identify land for future development on the year 2025 Land Use Plan Map. In addition, consideration will be given at that time to land availability, constraints to development, and the goals and objectives of the Land Use Plan.

This analysis estimates net land demand in three broad categories:

- Private sector nonresidential uses, such as retail stores, offices and industries, that will be needed to accommodate future employment growth.
- Public sector uses, specifically schools and parks.
- Residential uses, including single-family houses, duplexes, triplexes, townhouses and multi-family units, that will be needed to accommodate future household growth.

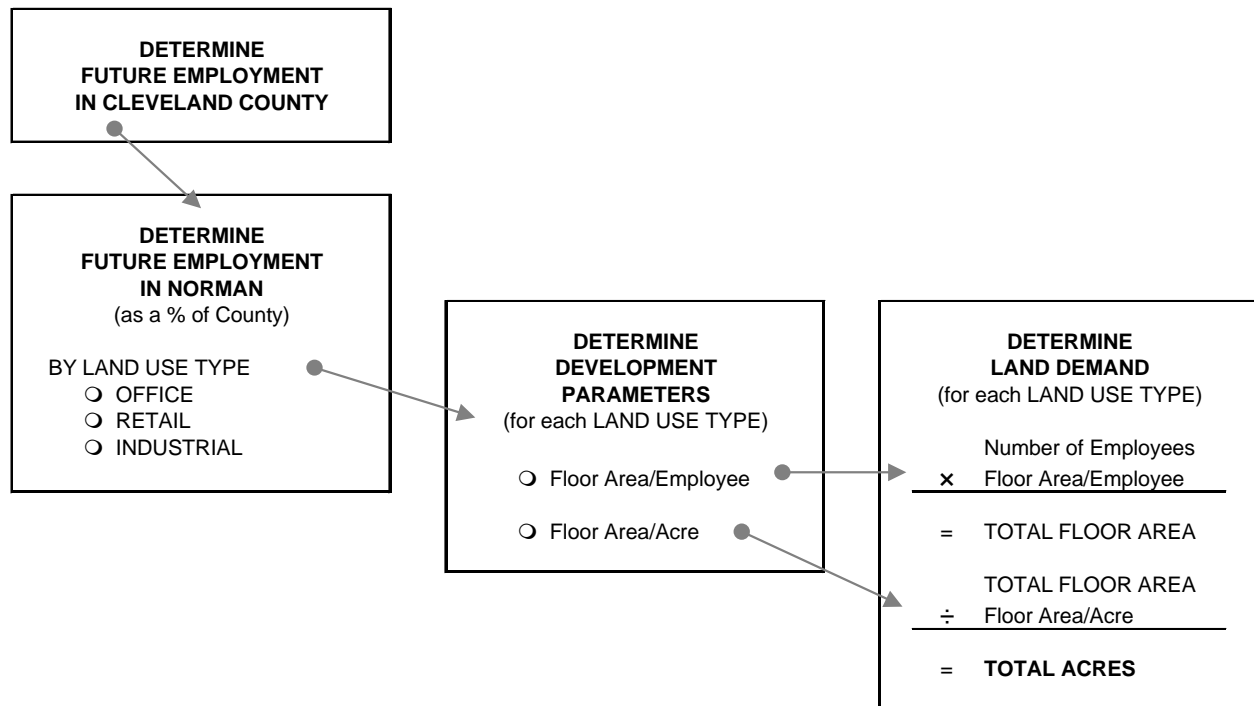
Throughout this report, the words “forecast” and “projection” are used interchangeably, and mean future data that is estimated by the applicable methodology or statistical technique.

NONRESIDENTIAL – PRIVATE SECTOR

Land will be needed in the future for new stores, offices and industries as the city's employment base grows. Some of this land will be needed for growing companies that need room to expand, whether on-site or at a new location. New businesses will move into the city; some will replace existing businesses moving to new sites while others will look for raw land. This section estimates the amount of employment growth expected, and the land that will be consumed by new development for these new employees.

Summary of Methodology - Private Sector

Given the data available, the methodology is based on breaking down employment projections by the types of land use those employees occupy, and then determining the number of acres on which the buildings, parking lots, associated streets and other development will be located. The text and tables that follow present the methodology in detail, which can be summarized in a very general fashion as follows:



Employment Forecasts

Detailed data by employment sector is available for Cleveland County, but not for the City of Norman. Thus, the county data must be interpreted in order to estimate employment figures for the City of Norman.

Table E-1 shows past employment trends in Cleveland County from 1970 to the year 2000 prepared by Woods & Poole Economists, Inc.

Table E-1
EMPLOYMENT TRENDS -- 1970-2000
CLEVELAND COUNTY -- BY PLACE OF WORK

	1970	1975	1980	1985	1990	1995	2000
TOTAL EMPLOYMENT*	22,801	31,407	43,064	55,285	61,622	73,112	87,481
FARM	719	824	1,073	1,092	994	1,171	1,258
NON-FARM (PRIVATE + GOVERNMENT)	22,082	30,583	41,991	54,193	60,628	71,941	86,223
PRIVATE EMPLOYMENT	14,353	19,228	27,546	37,758	42,712	52,623	65,033
MINING	305	531	1,634	2,898	1,874	1,489	1,218
CONSTRUCTION	2,072	2,207	3,052	3,642	2,893	4,415	5,448
MANUFACTURING	1,172	1,633	3,163	3,075	3,558	4,305	4,545
TRANSPORT, COMM & PUBLIC UTILITIES	564	662	806	925	1,458	1,519	2,089
WHOLESALE TRADE	305	494	798	1,005	1,060	1,763	1,714
RETAIL TRADE	4,414	6,225	8,393	11,100	12,039	14,850	17,607
FINANCE, INSURANCE & REAL ESTATE	1,443	2,408	2,607	3,787	3,408	3,970	6,106
SERVICES**	4,078	5,068	7,093	11,326	16,422	20,312	26,306
GOVERNMENT EMPLOYMENT	7,729	11,355	14,445	16,435	17,916	19,318	21,190
FEDERAL CIVILIAN	372	367	375	576	655	863	806
FEDERAL MILITARY	768	762	766	1,054	1,160	1,104	1,120
STATE AND LOCAL	6,589	10,226	13,304	14,805	16,101	17,351	19,264

* Employment figures INCLUDE all full-time and part-time sole proprietors.

** All service categories, including agricultural services such as veterinarians, feed supply and farm labor services.

SOURCES: Historical data 1970-2000 from U.S. Dept. of Commerce, Bureau of Economic Analysis, as adjusted by Woods & Poole to July 1 of each year. *Cleveland County 2003 Data Pamphlet*, Woods & Poole Economics, Washington, D.C.

Woods & Poole are nationally recognized for their demographic and economic forecasting expertise. Woods and Poole employment figures are the most comprehensive of all such data sets available in that the figures include all full-time and part-time workers, whether wage and salary employees or self-employed sole proprietors. Since the wage and salary information is derived from place of work survey,¹ part-time employees who hold two jobs will be counted twice. Similarly, an employee who also works part-time for themselves will also be counted twice. Thus, Woods and Poole figures will be higher than other employment data sets in that they fully report jobs, not employees, and cover all forms of employment, including those not covered by unemployment insurance programs (and thus not reported to the State). Since the purpose of this

¹ The current Woods and Poole model relies on historical data (1969-2002) from the U.S. Dept. of Commerce, Bureau of Economic Analysis (BEA). See the Appendix for a detailed description of their methodology.

analysis is to estimate future demand for land to accommodate new growth, using job data rather than employee-based data will provide a truer view of actual future land needs.

In 2000,² 75.4% of the non-farm jobs in the County were in the private sector, while the remaining 24.6% were public employees. This represents roughly a three-quarters/one-quarter ratio, which is comparatively high for the public sector. Of those employed in government, the vast majority (90.9%) were state and local employees, which includes city and county employees, public school teachers and, notably, University of Oklahoma professors and staff.³

The employment trends shown on Table E-1 indicate past and continuing emphasis on sales and services in Cleveland County. Between 1990 and 2000, total private sector employment increased by 52%. Over two-thirds of all jobs in the private sector were in the “retail trade” or “services” employment sectors in 2000, a 54% increase (although services outpaced retail trade 60% to 46%). Of the next two highest employment sectors in 1990, “manufacturing” and “finance, insurance and real estate” (FIRE), which were virtually tied in 1990 numerically, manufacturing had grown by only 28% by 2000, but FIRE had increased by 79%. Jobs in “construction” increased 88%, reflecting the up-tick in development during the 1990s, while jobs in “mining” (principally the oil industry) declined.

Table E-2 shows employment projections for the county in five-year⁴ increments beginning with 2000, as prepared by Woods & Poole.

Woods and Poole forecasts are developed from an integrated model that is based on an extensive county-by-county data base containing over 900 variables. The model relates all counties within the U.S. simultaneously so that changes in economic activity around the country are reflected in each region within the context of national totals. The model begins with a forecast to 2025 of total personal income, earnings and employment by industry, population, inflation and other variables for the U.S. as a whole. Employment forecasts are then disaggregated to Economic Areas (EAs)⁵ throughout the country using an “export-base” approach. The employment forecasts are used to generate earnings in each EA which, together, become principal variables in estimating population and number of households. Lastly, the EAs provide control totals for disaggregating the forecasts to each county.

Over the 2004-2025 forecast period, Woods & Poole projects a 36.7% increase in countywide employment growth in the private sector. Of the private sector categories, only retail trade (at 38.6%) and services (at 45.6%) outpace total employment growth. At the low end, manufacturing is projected to grow by only 15%, followed by mining, TCU⁶ and wholesale trade at 18-19% each.

² All figures have been adjusted by Woods & Poole to July 1 of the year indicated.

³ A complete description of all of the employment sectors is included in the Appendix.

⁴ Since 2004 is the start date for estimates of future development, it is shown on the table instead of 2005.

⁵ There are 172 EAs as defined by the BEA.

⁶ Transportation, communication and public utilities.

**Table E-2
EMPLOYMENT PROJECTIONS -- 2000-2025
CLEVELAND COUNTY -- BY PLACE OF WORK**

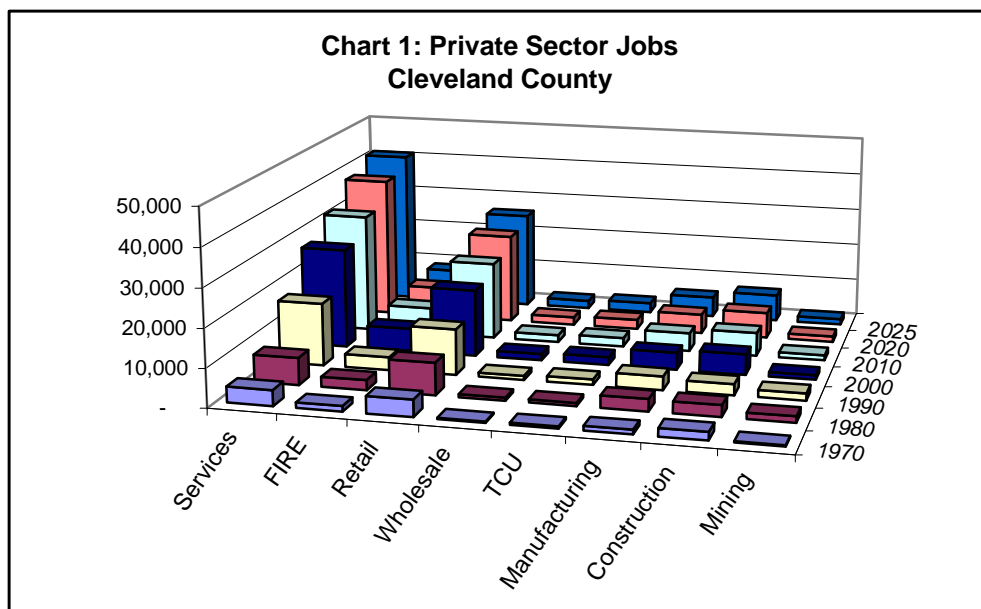
	2000	2004	2010	2015	2020	2025
TOTAL EMPLOYMENT*	87,481	92,266	100,162	107,190	114,637	122,527
FARM	1,258	1,304	1,347	1,374	1,392	1,401
NON-FARM (PRIVATE + GOVERNMENT)	86,223	90,962	98,815	105,816	113,245	121,126
PRIVATE EMPLOYMENT	65,033	68,762	75,239	81,076	87,323	94,001
MINING	1,218	1,271	1,354	1,408	1,460	1,515
CONSTRUCTION	5,448	5,719	6,121	6,459	6,802	7,152
MANUFACTURING	4,545	4,675	4,865	5,026	5,195	5,374
TRANSPORT, COMM & PUBLIC UTILITIES	2,089	2,173	2,303	2,403	2,495	2,577
WHOLESALE TRADE	1,714	1,781	1,887	1,972	2,051	2,122
RETAIL TRADE	17,607	18,576	20,392	22,044	23,828	25,752
FINANCE, INSURANCE & REAL ESTATE SERVICES**	6,106	6,425	7,023	7,529	8,036	8,537
26,306	28,142	31,294	34,235	37,456	40,972	
GOVERNMENT EMPLOYMENT	21,190	22,200	23,576	24,740	25,922	27,125
FEDERAL CIVILIAN	806	875	965	1,029	1,085	1,136
FEDERAL MILITARY	1,120	1,134	1,159	1,173	1,182	1,185
STATE AND LOCAL	19,264	20,191	21,452	22,538	23,655	24,804

* Employment figures INCLUDE all full-time and part-time sole proprietors.

** All service categories, including agricultural services such as veterinarians and farm labor services, and nonprofit organizations.

SOURCES: Historical data for 2000 from U.S. Dept. of Commerce, Bureau of Economic Analysis, as adjusted by Woods & Poole to July 1. Projections 2005-2025 by Woods & Poole Economics, *Cleveland County 2003 Data Phamplet*.

Chart 1 illustrates these historic and forecasted employment trends in Cleveland County.



Employment by Land Use Type

While Woods & Poole reports employment by general employment sector, some employment sectors include employees located in several land use categories. For instance, in the “services” employment sector, some employees are located in retail-type space (like barber shops and auto repairs), some are in office-type space (such as doctor's offices and architects), some are in industrial space (such as waste remediation and maintenance companies), and some are in institutional space (such as religious and nonprofit organizations). Fortunately, more detailed data is available for employment sectors broken down to lower NAICS⁷ codes so that employees in the general sectors can be assigned to the various land use categories. This allows an analysis of employees by private sector land use type—generally, those who occupy retail space, office space and industrial/warehousing space. The table also reflects government employees occupying space in private office buildings.

Table E-3, “Non-Farm Employment by Land Use Type—2000,” has been prepared from data reported in 2000 in *County Business Patterns* published by the U.S. Department of Commerce, Bureau of the Census. This publication provides valuable data on private sector wage and salary employees that can be aggregated by land use type.

Based on this more detailed data, Table E-3 indicates the percentage of employees for each employment sector normally housed in the retail, office and industrial land use categories, as well as public/institutional uses, with two exceptions. Many employees in the “mining” and the “construction” sectors work directly on-site and do not create demand for new office or industrial

space. Therefore, it is necessary to reduce the percentage of employees in these land use categories to reflect only land-consuming employment and thus actual demand for new land. For mining, the percent of land-consuming employees is only 25.8% of the total employment in that category. For “construction,” the types of companies in this employment sector break down between office-type uses (e.g., general contractor's offices) and industrial-type space (materials and

**Table E-3
NON-FARM EMPLOYMENT BY LAND USE TYPE -- 2000
CLEVELAND COUNTY**

	Percent of Economic Sector			
	Retail	Office	Industrial	Pub/Inst*
MINING**	0.00%	25.84%	0.00%	0.00%
CONSTRUCTION**	0.00%	18.84%	18.84%	0.00%
MANUFACTURING	0.00%	1.05%	98.95%	0.00%
TRANSPORT, COMM & PUBLIC UTILITIES	5.53%	25.93%	68.54%	0.00%
WHOLESALE TRADE	0.00%	14.67%	85.33%	0.00%
RETAIL TRADE	92.91%	0.91%	6.18%	0.00%
FINANCE, INSURANCE & REAL ESTATE	21.25%	78.75%	0.00%	0.00%
SERVICES	34.99%	49.80%	7.02%	8.18%
GOVERNMENT EMPLOYMENT	0.00%	3.80%	0.00%	96.20%

* Public and Institutional.

** Mining and Construction discounted for employees who create no demand for land. See text.

Source: Private, non-farm employment categories -- County Business Patterns, U.S. Bureau of the Census. Government categories -- Woods & Poole Economists, 2003.

⁷ North American Industrial Classification System, U.S. Office of Management and Budget, 1997.

equipment storage, heavy construction contractors, etc.). The office-type and industrial-type land-consuming construction-related employment comprises 18.8% of this sector each.

The percentages on Table E-3 are then multiplied times the county employment projections shown on Table E-2 to determine the future employment mix by land use type, as shown on Table E-4. Since some of the employees on Table E-2 do not create a demand for land, those employees are not shown on Table E-4. In addition, government employees occupying private space are included under “office uses,” while services employment occupying public/institutional lands are excluded. Thus, of the 2004 total of 68,762 private sector employees, only 62,795 are estimated to occupy land devoted to office, retail and industrial/warehousing uses.

Table E-4
COUNTY EMPLOYMENT TRENDS BY LAND USE TYPE -- 2000-2025
CLEVELAND COUNTY

	2000	2004	2010	2015	2020	2025
OFFICE USES						
MINING	315	328	350	364	377	392
CONSTRUCTION	1,026	1,077	1,153	1,217	1,282	1,347
MANUFACTURING	48	49	51	53	55	57
TRANSPORT, COMM & PUBLIC UTILITIES	542	563	597	623	647	668
WHOLESALE TRADE	251	261	277	289	301	311
RETAIL TRADE	160	169	186	201	217	235
FINANCE, INSURANCE & REAL ESTATE	4,808	5,059	5,530	5,929	6,328	6,723
SERVICES	13,101	14,016	15,585	17,050	18,654	20,405
GOVERNMENT EMPLOYMENT	806	844	897	941	986	1,032
RETAIL USES						
TRANSPORT, COMM & PUBLIC UTILITIES	115	120	127	133	138	142
RETAIL TRADE	16,358	17,258	18,945	20,480	22,137	23,925
FINANCE, INSURANCE & REAL ESTATE	1,298	1,366	1,493	1,600	1,708	1,814
SERVICES	9,206	9,848	10,951	11,980	13,108	14,338
INDUSTRIAL/WAREHOUSING USES						
CONSTRUCTION	1,026	1,077	1,153	1,217	1,282	1,347
MANUFACTURING	4,497	4,626	4,814	4,973	5,140	5,317
TRANSPORT, COMM & PUBLIC UTILITIES	1,432	1,489	1,579	1,647	1,710	1,766
WHOLESALE TRADE	1,463	1,520	1,610	1,683	1,750	1,811
RETAIL TRADE	1,089	1,149	1,261	1,363	1,473	1,592
SERVICES	1,847	1,976	2,197	2,403	2,630	2,876
LAND DEMAND EMPLOYMENT--TOTAL*	59,388	62,795	68,756	74,146	79,923	86,098

* Figures are net of Mining and Construction employees who create no demand for land, and exclude Government Employment on public land.

SOURCE: Woods & Poole figures multiplied by 2000 County Business Patterns percentages by economic sector.

Employment Projections—City of Norman

As discussed earlier, employment data to the specificity needed in this Land Demand Analysis is only available at the county level; therefore, land demand-related employment figures for the City of Norman are derived as a percentage of the county projections. To do this, it is assumed that the relationship between the city and county will conform to the ratios established by the Assn. of Central Oklahoma Governments' staff. These ratios were made for 1990 and the year 2020 for two categories of employment (“retail” and “other”) and are shown on Table E-5. Also shown on Table E-5 is the percentage of county employment in the city for intervening years calculated on a straight-line basis between the 1990 and 2020 percentages.

**Table E-5
CITY TO COUNTY EMPLOYMENT RATIOS
CITY OF NORMAN AND CLEVELAND COPUNTY**

	1990	1995	2000	2004	2010	2015	2020	2025
RETAIL EMPLOYMENT								
City as a Percent of County	71.0%	71.2%	71.3%	71.5%	71.7%	71.8%	72.0%	72.2%
OTHER EMPLOYMENT								
City as a Percent of County	72.1%	72.4%	72.8%	73.1%	73.5%	73.9%	74.3%	74.7%

SOURCE: Assn. Of Central Oklahoma Governments, 1990 and 2020. Intervening years and projection to 2025 interpolated on a straight line basis.

Table E-6 provides projections of future employment for each of the private sector industry groups by land use type in the city. These projections are derived by multiplying the county projections on Table E-4 by the city/county employment ratios from ACOG's projections on Table E-5. Employment sectors categorized as retail uses are multiplied by the “retail” percentages for the appropriate year, while the “other employment” percentages are used for all others.

As noted above, some “government” employment is located in private office buildings. Such employees are shown under “office uses” on Table E-6. Additionally, employees in the “services” industry that occupy public/institutional lands, such as religious and other nonprofit organizations, are excluded in order to focus on private sector land development.

**Table E-6
CITY EMPLOYMENT TRENDS BY LAND USE TYPE -- 2000-2025
CITY OF NORMAN**

	2000	2004	2010	2015	2020	2025
OFFICE USES						
MINING	229	240	257	269	280	293
CONSTRUCTION	747	787	848	899	952	1,006
MANUFACTURING	35	36	38	39	41	43
TRANSPORT, COMM & PUBLIC UTILITIES	395	412	439	460	481	499
WHOLESALE TRADE	183	191	204	214	224	232
RETAIL TRADE	116	124	137	149	161	175
FINANCE, INSURANCE & REAL ESTATE SERVICES	3,500	3,698	4,067	4,382	4,700	5,019
SERVICES	9,538	10,245	11,461	12,602	13,856	15,232
GOVERNMENT EMPLOYMENT*	587	617	660	695	732	770
RETAIL USES						
TRANSPORT, COMM & PUBLIC UTILITIES	82	86	91	96	99	102
RETAIL TRADE	11,671	12,336	13,579	14,712	15,939	17,265
FINANCE, INSURANCE & REAL ESTATE SERVICES	926	976	1,070	1,149	1,230	1,309
SERVICES	6,568	7,039	7,849	8,606	9,438	10,347
INDUSTRIAL/WAREHOUSING USES						
CONSTRUCTION	747	787	848	899	952	1,006
MANUFACTURING	3,274	3,381	3,540	3,676	3,818	3,969
TRANSPORT, COMM & PUBLIC UTILITIES	1,042	1,088	1,161	1,217	1,270	1,318
WHOLESALE TRADE	1,065	1,111	1,184	1,244	1,300	1,352
RETAIL TRADE	793	840	927	1,007	1,094	1,188
SERVICES	1,345	1,444	1,616	1,776	1,954	2,147
LAND DEMAND EMPLOYMENT--TOTAL**	42,843	45,438	49,976	54,091	58,521	63,272

* Leased private-market space occupied by governmental activities.

** Figures are net of Mining and Construction employees who create no demand for land, and exclude Government Employment on public land.

SOURCE: Woods & Poole figures multiplied by 2000 County Business Patterns percentages by economic sector.

Table E-7 summarizes employment forecasts by private sector land use category from the present (2004) to 2025, and calculates the net increase in employment in each category over the forecast period.

**Table E-7
LAND DEMAND EMPLOYMENT BY LAND USE -- 2004-2025
CITY OF NORMAN**

	2004	2010	2015	2020	2025	Net Increase
TOTAL LAND DEMAND EMPLOYMENT	45,438	49,976	54,091	58,521	63,272	17,834
OFFICE USES*	16,350	18,111	19,709	21,427	23,269	6,919
RETAIL USES	20,437	22,589	24,563	26,706	29,023	8,586
INDUSTRIAL/WAREHOUSING USES	8,651	9,276	9,819	10,388	10,980	2,329

* Includes government offices in the Services category.

Land Demand—Private Sector

In order to convert employment projections into land consumption, several assumptions are made as to average development characteristics in the city for each land use type. As shown on Table E-8, the average floor area for each employee is estimated from national experience and local observations by the city's planning staff. An estimate is also made of the density that new development projects are currently achieving on average in the city, in terms of floor area per acre.

National averages contained in traffic study information published by the Institute of Transportation Engineers (ITE) in Trip Generation, 6th Edition were used to determine the average floor area per employee by land use type.⁸ This analysis uses the “general office” average of 300

**Table E-8
NONRESIDENTIAL DEVELOPMENT PARAMETERS
CITY OF NORMAN**

	Gross Floor Area per Employee	FAR*	Gross Floor Area per Acre
OFFICE USES	300	21.56%	9,391.1
RETAIL USES	500	15.86%	6,906.7
INDUSTRIAL/WAREHOUSING	800	21.61%	9,412.2

*Floor Area Ratio, reflecting new construction 2000-2003.

SOURCES: Gross floor area per employee based on data from ITE Trip Generation Manual; FAR from Planning and Development Department building permit data.

⁸ The figures were derived by comparing trip generation per employee data and trip generation per 1,000 square feet of floor area data, yielding the employees per 1,000 square feet.

square feet of gross floor area per employee (sf/emp). As a point of reference, other office type averages were: medical and dental offices—200 sf/emp; drive-in banks—275 sf/emp; business park buildings—330 sf/emp; and research & development centers—400 sf/emp. Retail uses in the Trip Generation manual ranged from approximately 100 sf/emp for fast-food restaurants, to 550 sf/emp for specialty retail centers, 650 sf/emp for discount stores, and 1,050 sf/emp for hardware and paint stores. For this analysis, 500 sf/emp was therefore considered average for the retail category.

In the industrial and warehousing category, the ITE data ranged from 430 sf/emp for truck terminals, 500 sf/emp for general light industrial buildings, 535 sf/emp for manufacturers, and 800 sf/emp for warehouses. At the high end, new modern “high-cube” warehouses, which are highly automated and mechanized, averaged 5,500 sf/emp. This analysis therefore considers 800 sf/emp as a reasonable average reflecting development trends in the city.

To determine the gross floor area per acre shown on Table E-8 for office, retail and industrial/warehousing uses, a ratio of the floor area to site acreage⁹ was developed. Building permitting data from 2000 to 2003 was examined to determine actual development trends over the recent past, and averaged by land use category. These percentages result in the average gross floor area per acre figures shown on Table E-8, in square feet.

Table E-9 shows the net increase in land use demand by office, retail and industrial categories based on the city's employment projections through year 2025.

**Table E-9
NONRESIDENTIAL LAND DEMAND BY LAND USE -- 2004-2025
CITY OF NORMAN**

	2004 - 2010	2011 - 2015	2016 - 2020	2021 - 2025	TOTAL
OFFICE USES					
EMPLOYMENT INCREASE	1,761	1,598	1,718	1,842	6,919
FLOOR AREA GENERATED	528,300	479,400	515,400	552,600	2,075,700
NET ACRES CONSUMED	56.3	51.0	54.9	58.8	221.0
RETAIL USES					
EMPLOYMENT INCREASE	2,152	1,974	2,143	2,317	8,586
FLOOR AREA GENERATED	1,076,000	987,000	1,071,500	1,158,500	4,293,000
NET ACRES CONSUMED	155.8	142.9	155.1	167.7	621.6
INDUSTRIAL/WAREHOUSING USES					
EMPLOYMENT INCREASE	625	543	569	592	2,329
FLOOR AREA GENERATED	500,000	434,400	455,200	473,600	1,863,200
NET ACRES CONSUMED	53.1	46.2	48.4	50.3	198.0

SOURCE: For each incremental period, employment increase multiplied by average floor area per employee (in square feet), divided by average density (square feet of floor area per acre) yields Net Acres Consumed by new development.

⁹ The “floor area ratio,” or FAR.

To arrive at estimates of land that will be needed for development in each of the increments from 2004 to 2025 for office, retail and industrial uses, the city's employment projections summarized from Table E-7 were used along with the land consumption per employee from Table E-8. Floor areas are generated by multiplying the average floor area per employee times the number of employees. Lastly, the number of acres consumed by the new development is calculated using the average density (floor area per acre) figures. Large land users that have relatively small associated floor areas, such as automobile dealerships, are accommodated in the average density figures used. As an example, from 2004 to 2010, Norman is projected to have an increase of 2,152 retail employees. Each of these employees is projected to consume an average of 500 sf (Table E-8) of floor area for a total of 1,076,000 sf. Using the gross floor area per acre for retail of 6,906.7 sf/acre (Table E-8) divided into the 1,076,000 sf results in a demand of 155.8 acres of retail land uses between 2004 and 2010.

The "total" figures on Table E-9 represent the net acres anticipated to be consumed by actual development over the forecast period.

NONRESIDENTIAL – PUBLIC SECTOR

In addition to future land consumption by private sector development, estimates are also made of the future need for park lands and educational facilities.

Parks

The city has a wealth of parklands available to its citizens, providing a wide and varied range of recreational opportunities. The city has three categories of parks: Neighborhood Parks serving local areas; Community Parks that serve much larger portions of the city (Andrews, Griffin, Reaves, Saxon and Westwood); and Special Parks with special or unique amenities or resources. These special use parks are Legacy Trail (linear trail), Little Axe (sports and social services), Sutton Wilderness (nature park) and in October of 2003 the City acquired 50 acres from the annexation of Hall Park into Norman (greenbelts and trails).

Demand for Neighborhood and Community Parks is related to the city's population⁹. For Neighborhood Parks, the City has an adopted standard of 2.5 acres of parkland for each 1,000 residents. This standard is 25% higher than the National Recreation and Park Association (NRPA) standard for Neighborhood Parks. A standard for Community Parks has not yet been adopted and it is hereby recommended that the City work toward officially adopting one. With no Community Park standard in place, one has been generated for the purposes of this Land Demand Analysis. The standard recommended by the NRPA for Community Parks is 5 to 8 acres per 1,000 residents. Based on this national standard, the median recommended acreage for Community Park land is 6.5 acres. While not as aggressive as the City's adopted Neighborhood Park standard it is believed that for purposes of planning the median national standard is a fair and just measure for determining Community Park needs.

Table P-1 shows the calculations for demand over the planning horizon.

The City currently has 282.1 acres in Neighborhood Parks, which is more than enough to meet current (2004) demand of 257.8 acres at minimum standards. By the year 2010, however, the excess will be absorbed by population growth and new neighborhood park acres will be required to meet the standard. By the year 2025, the need for additional Neighborhood Park land will have increased by 60.8 acres over the current supply (a 22% increase). However, the Neighborhood Park acreage is expected to keep pace with development due the Parkland Dedication Ordinance that requires developers of new additions to supply parkland or a fee-in-lieu of parkland.

For Community Parks, in 2000 the City had a shortfall of over 160 acres, which has grown to a current (2004) deficiency of 210.2 acres. To meet minimum standards in 2025, a total of 431.5 acres of Community Parkland will need to be added to the current supply (a 194% increase).

Table P-1 shows the cumulative total of additional park acreage needed to meet population demands between now and 2025, and the net acres that will need to be acquired in each of the five year increments. The increment for the year 2004 is higher than the others because it includes the current deficiency in Community Park acreage.

Overall, new growth coupled with the current shortfall in community park acreage will generate the need to expand the City's park system by almost 500 acres between now and 2025.

**Table P-1
DEMAND FOR PARK LAND
CITY OF NORMAN**

	2000	2004	2010	2015	2020	2025
POPULATION						
POPULATION	95,694	103,101	112,208	120,152	128,404	137,147
NET POPULATION INCREASE		7,407	9,107	7,944	8,252	8,744
NEIGHBORHOOD PARKS						
GROSS DEMAND -- ACRES*	239.2	257.8	280.5	300.4	321.0	342.9
PARK LANDS AVAILABLE	282.1					
NET DEMAND (EXCESS)	(42.9)	(24.3)	(1.6)	18.3	38.9	60.8
COMMUNITY PARKS						
GROSS DEMAND -- ACRES**	622.0	670.2	729.4	781.0	834.6	891.5
PARK LANDS AVAILABLE	459.9					
NET DEMAND (EXCESS)	162.1	210.3	269.5	321.1	374.7	431.6
NEW ACRES NEEDED						
TOTAL	162.1	210.3	269.5	339.4	413.6	492.3
BY EACH INCREMENT		210.3	59.2	69.9	74.3	78.7

* Neighborhood Park Standard -- 2.5 acres per 1,000 population.

** Community Park Standard -- 6.5 acres per 1,000 population.

SOURCE: Existing park land acreages--City of Norman Parks and Recreation Department.
2000 population--U.S. Bureau of the Census. Population projections--see Table R-3.

In assessing the findings concerning the adequacy of land available for Neighborhood and Community parks based on national standards of acreage per 1,000 people, it must be remembered that a city can meet or exceed national standards yet still not fully meet the recreational service needs of its residents. Location, services and individual site size also come into play when determining the overall adequacy of the park facilities.

Public Schools

Within the City of Norman there are portions of five public school districts: Norman, Moore, Robin Hill, Little Axe and Noble. The predominant public school system is the Norman School System that encompasses three-fourths of the city's land mass and the majority of its population. The four other districts share only a small portion of the city's boundaries and account for a limited number of Norman's school-aged population. The Little Axe and the Robin Hill School Districts are the only districts of the other four that actually operate school facilities inside the city limits. Little Axe operates an elementary, middle and high school at Highway 9 and 168th Avenue, while Robin Hill operates a school at 4801 E. Franklin Road. Due to the manner in which records are maintained, there was no way of obtaining an accurate accounting of Norman children enrolled at schools within these other four districts. Therefore, this analysis focuses on an

assessment of public school facilities needed in the future related only to the Norman Public School System. The analysis also does not consider the impact on demand by privately-operated schools.

The Norman Public School System currently operates 15 elementary schools (Pre-K through 5th grade), four middle schools (6th-8th grade), and two high schools (9th-12th grades) and four support sites. In addition, the system has several undeveloped sites in reserve for future school construction.

**Table P-2
PUBLIC SCHOOLS INVENTORY
NORMAN SCHOOL DISTRICT**

	Elementary School Acres	Middle School Acres	High School Acres
Adams Elementary	4.24		
Alcott Middle School		20.00	
Cleveland Elementary	11.68		
Eisenhower Elementary	11.31		
Irving Middle School		83.86 *	
Jackson Elementary	7.00		
Jefferson Elementary	3.11		
Kennedy Elementary	11.41		
Lakeview Elementary	7.60		
Lincoln Elementary	3.10		
Longfellow Middle School		5.31	
Madison Elementary	20.45		
McKinley Elementary	5.20		
Monroe Elementary	11.26		
Norman High School			40.00
Norman High School North			64.59
Roosevelt Elementary	15.25		
Truman Elementary	24.60 **		
Washington Elementary	20.00		
Whittier Middle School		20.00	
Wilson Elementary	3.10		
TOTAL	159.31	129.17	104.59

* Includes 63.86 acres available for future use.

** Includes 15.25 acres available for future use.

Table P-3 shows population projections by age from 4 to 17 years old. Population by age data for 2000 for Cleveland County and the City of Norman (including Hall Park¹⁰) is taken from the 2000 Census.

Population forecasts are available for Cleveland County, including age breakdowns for school-aged persons, from Woods and Poole Economists, Inc. Forecasts for the city are derived from the

¹⁰ Hall Park is included in order to recognize its annexation into Norman in 2003 and include it in future demand calculations.

county data by assuming that the proportion of school-aged persons in future years will remain the same as the proportion reported in the 2000 Census.

**Table P-3
POPULATION FORECASTS BY AGE -- 2000-2025
CLEVELAND COUNTY AND CITY OF NORMAN**

	2000	2004	2010	2015	2020	2025
CLEVELAND COUNTY						
SCHOOL AGED POP:						
4 YEARS	2,606	2,730	2,922	3,161	3,397	3,570
5 YEARS	2,638	2,784	2,955	3,187	3,436	3,641
6 YEARS	2,544	2,683	2,930	3,137	3,395	3,619
7 YEARS	2,799	2,687	2,935	3,119	3,384	3,627
8 YEARS	2,852	2,681	2,948	3,108	3,373	3,627
9 YEARS	2,860	2,732	2,957	3,092	3,352	3,608
10 YEARS	2,931	2,673	2,948	3,126	3,370	3,641
11 YEARS	2,916	2,939	3,008	3,159	3,384	3,665
12 YEARS	2,878	3,023	2,925	3,162	3,364	3,659
13 YEARS	2,902	2,967	2,915	3,155	3,331	3,625
14 YEARS	3,001	3,030	2,898	3,181	3,333	3,620
15 YEARS	3,097	3,070	2,951	3,131	3,321	3,592
16 YEARS	3,092	2,985	2,854	3,148	3,308	3,555
17 YEARS	3,255	3,005	3,077	3,038	3,294	3,514
TOTAL--COUNTY	40,371	39,989	41,223	43,904	47,042	50,563
CITY OF NORMAN*						
SCHOOL AGED POP:						
4 YEARS	1,086	1,138	1,218	1,317	1,416	1,488
5 YEARS	1,111	1,172	1,245	1,342	1,447	1,533
6 YEARS	1,014	1,069	1,168	1,250	1,353	1,442
7 YEARS	1,131	1,086	1,186	1,260	1,367	1,466
8 YEARS	1,055	992	1,091	1,150	1,248	1,342
9 YEARS	1,114	1,064	1,152	1,204	1,306	1,405
10 YEARS	1,128	1,029	1,135	1,203	1,297	1,401
11 YEARS	1,135	1,144	1,171	1,230	1,317	1,427
12 YEARS	1,111	1,167	1,129	1,221	1,299	1,412
13 YEARS	1,169	1,195	1,174	1,271	1,342	1,460
14 YEARS	1,176	1,187	1,136	1,247	1,306	1,419
15 YEARS	1,233	1,222	1,175	1,247	1,322	1,430
16 YEARS	1,229	1,186	1,134	1,251	1,315	1,413
17 YEARS	1,312	1,211	1,240	1,225	1,328	1,416
TOTAL--NORMAN	16,004	15,862	16,354	17,418	18,663	20,054

* Including Hall Park.

SOURCES: 2000, U.S. Bureau of the Census. 2004-2025 Cleveland County, Woods & Poole Economics.
2004-2025 City of Norman projected at same ratio of city to county persons by age group as in 2000.

Table P-4 shows the number of school-aged children estimated on Table P-3 for 2004 and the public school enrollment for the 2003-4 school year based on information provided by the Norman School System, as well as projections to the year 2025.

While population data is available by age, public school enrollment data is available by grade. Thus, there is not a one-to-one match of age category to grade level. For instance, some children will delay entering kindergarten because their birthday occurs early in the calendar year, while other kindergartners will turn 6 during the school year; in any given grade, some of the children will be a year older or younger than the class “average.” For the purposes of these land demand calculations, however, the generalization of ages to grades will not affect the results because of the broad nature of relating land to enrollments. The percentages of enrollment to population for each age category are therefore approximations.

For 2025, enrollment estimates are made for each year of age at the same percentage of the school-aged population (taken from Table P-3) that was determined for 2004.

These projected enrollments for the year 2025 are shown on Table P-5, and are grouped by type of school. The change in enrollment is also shown for the forecast period (2004 to 2025).

The ratio of total projected enrollment to projected school-aged population in 2004 and 2025 is 79.9%. Keep in mind that this does not mean that 20.1% of Norman's school-aged

**Table P-4
POPULATION TO ENROLLMENT--2004 AND 2025
NORMAN SCHOOL DISTRICT**

	2004		2025	
	Total	Enrolled	Total	Enrolled
SCHOOL AGED POP:				
4 YEARS	1,138	526	1,488	688
5 YEARS	1,172	812	1,533	1,062
6 YEARS	1,069	1,050	1,442	1,416
7 YEARS	1,086	889	1,466	1,200
8 YEARS	992	884	1,342	1,196
9 YEARS	1,064	873	1,405	1,153
10 YEARS	1,029	927	1,401	1,262
11 YEARS	1,144	883	1,427	1,101
12 YEARS	1,167	886	1,412	1,072
13 YEARS	1,195	970	1,460	1,185
14 YEARS	1,187	1,103	1,419	1,319
15 YEARS	1,222	1,021	1,430	1,195
16 YEARS	1,186	927	1,413	1,104
17 YEARS	1,211	908	1,416	1,062
TOTAL	15,862	12,659	20,054	16,015

NOTE: Enrollments in 2004 by grade. Enrollments in 2025 calculated in same proportion as 2004 enrollment by age.

**Table P-5
PUBLIC SCHOOL ENROLLMENTS -- 2004 AND 2025
NORMAN SCHOOL DISTRICT**

	2004	2025	
	Enrollment	Enrollment	Change
Pre-K	526	688	162
Kindergarten	812	1,062	250
1st Grade	1,050	1,416	366
2nd Grade	889	1,200	311
3rd Grade	884	1,196	312
4th Grade	873	1,153	280
5th Grade	927	1,262	335
ELEMENTARY SCHOOLS	5,961	7,977	2,016
6th Grade	883	1,101	218
7th Grade	886	1,072	186
8th Grade	970	1,185	215
MIDDLE SCHOOLS	2,739	3,359	620
9th Grade	1,103	1,319	216
10th Grade	1,021	1,195	174
11th Grade	927	1,104	177
12th Grade	908	1,062	154
HIGH SCHOOLS	3,959	4,680	721

population does not attend school. The majority of the remaining percentage is children attending private schools or enrolled in one of the other four public school districts in the city.

Summary—Public Schools

Over the coming years to 2025, elementary school enrollment is projected to increase by a total of over 2,000 students. Assuming an average elementary school enrollment of ± 400 , the equivalent of 5 new schools will be needed by 2025,. Depending on the location of growth and flexibility in redistricting, the future demand may be met through new school development or expansion of existing facilities (including replacement of aging facilities with larger schools). For planning purposes, new elementary schools are assumed to require a site of roughly 20 acres as suggested by the school system, although only two existing elementary schools approximate this standard.

One new middle school but no new high schools are expected to be needed to meet enrollment demand within the planning period to 2025. Between 2004 and 2025, middle school enrollment is projected to grow by over 600 pupils, which would require the equivalent of 30 new classrooms plus support space. This figure may justify construction of a new middle school unless the increased demand can be met through expansion on existing sites. High school enrollments are projected to increase by over 700 students over the planning period and would necessitate the equivalent of 35 new classrooms through construction or expansion to meet demand.

Mathematically, the amount of land currently owned by Norman Public Schools could accommodate three new elementary schools and a new middle school. Thus, additional land is projected to be needed to accommodate 2 additional elementary schools; at 20 acres each, this would total 40 new site acres. However, properly locating new or expanded school facilities relative to growth areas, coupled with replacement of aging schools having obsolete sites with new sites of adequate acreage, may require the acquisition of considerably more new school sites over the planning period.

University of Oklahoma

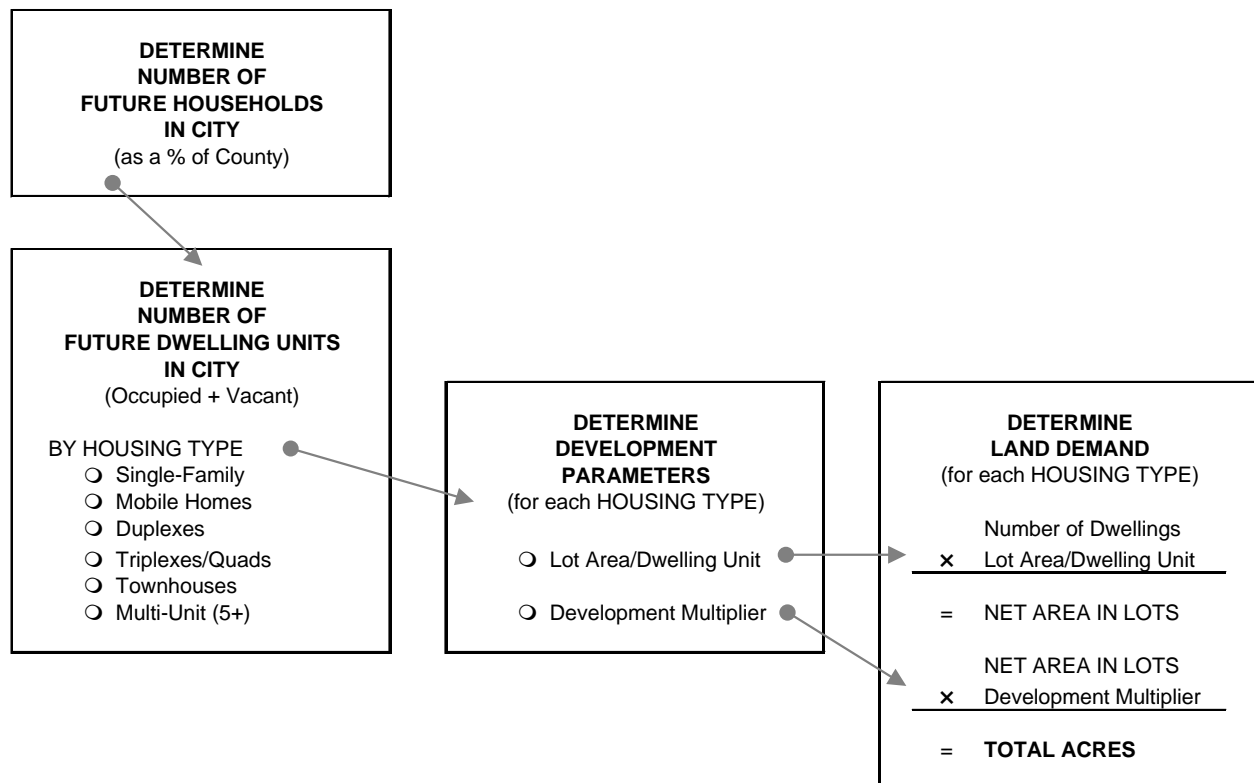
The university is not expected to significantly increase its land area within the planning horizon. Additional construction or enlargement of the university's facilities is expected to take place primarily on land already set aside for university purposes.

RESIDENTIAL LAND USES

Residential uses cover the full gamut of housing, from single-family homes to duplexes, triplexes and quadriplexes, to townhouses and multifamily developments. Group quarters are also residential, and include institutional uses such as the jail, college dormitories and homeless shelters. Such group quarters were not considered for purposes of projecting future land use demands. This section of the Land Demand Technical Memorandum projects residential development of single-family, duplex, triplex and quadriplex, townhouse and multi-family housing units from 2000 to 2025. Based on these projections, estimates of future gross demand for land consumption for residential development are made for future years (2004-2025).

Summary of Methodology—Residential

Once the total number of new households in Norman is estimated, the first major step is to determine how many of those households will demand single-family houses versus other types of housing. These future number of dwelling units by structure type plus an average number that will be vacant at any given point in time, tell us how much land will be needed for each type of development, based on average development densities and efficiency in development layout. The methodology can be summarized in a simplistic way as follows:



Population and Household Forecasts

The population and household data for Cleveland County shown on Table R-1 were prepared by Woods and Poole Economists, Inc., as of July 1 for each year. Table R-1 also shows the number of households reported in the past four censuses for the City of Norman, and the percentage of the county's households that were located in Norman.

**Table R-1
POPULATION AND HOUSEHOLD TRENDS -- 1970-2000
CLEVELAND COUNTY**

	1970	1975	1980	1985	1990	1995	2000
TOTAL COUNTY POPULATION	82,951	104,829	134,526	164,533	174,716	192,741	208,016
NUMBER OF HOUSEHOLDS							
CLEVELAND COUNTY	24,672	33,424	46,132	55,718	64,070	71,636	79,186
CITY OF NORMAN*	15,755	19,443	24,798	28,597	31,907	35,374	38,834
	63.86%	58.17%	53.75%	51.32%	49.80%	49.38%	49.04%

* Years between decennial censuses estimated based on growth rate of County.

SOURCES: Historical data 1970-1995 for County from U.S. Bureau of the Census, adjusted by Woods & Poole Economics from April 1 to July 1 each year. Historic data for 2000 AND City reflects decennial Census figures from U.S. Bureau of the Census.

Table R-2 presents the population and household forecasts from 2000 to 2025 in five-year increments. (Since 2004 is the start date for estimates of future development, it is shown on the table instead of 2005.)

**Table R-2
POPULATION AND HOUSEHOLD PROJECTIONS -- 2000-2025
CLEVELAND COUNTY**

	2000	2004	2010	2015	2020	2025
TOTAL COUNTY POPULATION	208,016	221,002	238,215	253,104	268,504	284,521
NUMBER OF HOUSEHOLDS						
CLEVELAND COUNTY	79,186	85,406	93,296	99,589	105,215	110,196
CITY OF NORMAN*	38,834	42,199	45,964	48,946	51,586	53,897
	49.04%	49.41%	49.27%	49.15%	49.03%	48.91%

* Percentage of Countywide households in Norman based on continuation of 1990-2000 trend, representing an average annual rate of change of: -0.04840% Figures have been adjusted for the 2003 annexation of Hall Park.

SOURCES: 2000 -- U.S. Bureau of the Census. County forecasts, 2005-2025 -- Woods & Poole Economics, *Cleveland County 2003 Data Pamphlet*. City of Norman, 2005-2025 -- ROSS+associates.

The county forecasts shown on Table R-2 were prepared as part of the national model used by Woods and Poole, from which the employment forecasts were also obtained. Because of the close link between local economic activity and living patterns, the Woods and Poole residential forecasts are particularly relevant and interrelated with the overall projections for the county and, ultimately, the City of Norman.

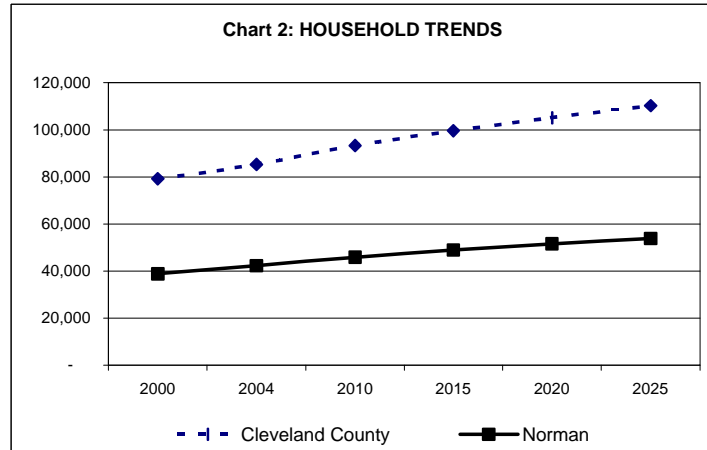


Chart 2 illustrates the trends in number of households for the county and Norman to 2025.

These data provide the basis for preparation of population projections for Norman. Table R-3 shows more detailed population and household information for the county and city beginning with the 2000 Census figures.

**Table R-3
POPULATION FORECASTS -- 2000-2025
CLEVELAND COUNTY AND CITY OF NORMAN**

	2000	2004	2010	2015	2020	2025
TOTAL COUNTY POPULATION	208,016	221,002	238,215	253,104	268,504	284,521
POPULATION IN GROUP QUARTERS*	9,487	10,049	10,573	11,103	11,779	12,337
POPULATION IN HOUSEHOLDS	198,529	210,953	227,642	242,001	256,725	272,184
NUMBER OF HOUSEHOLDS	79,186	85,406	93,296	99,589	105,215	110,196
AVERAGE HOUSEHOLD SIZE	2.51	2.47	2.44	2.43	2.44	2.47
City Avg. Household Size as a % of County**	92.05%	92.82%	93.98%	94.96%	95.96%	96.96%
AVERAGE HOUSEHOLD SIZE IN CITY	2.31	2.29	2.29	2.31	2.34	2.39
NUMBER OF HOUSEHOLDS	38,834	42,199	45,964	48,946	51,586	53,897
POPULATION IN HOUSEHOLDS	89,623	96,747	105,404	112,949	120,779	129,074
POPULATION IN GROUP QUARTERS	6,071	6,354	6,804	7,203	7,625	8,073
TOTAL CITY POPULATION	95,694	103,101	112,208	120,152	128,404	137,147

* Group quarters include institutionalized persons and persons in dormitories and other nonhousehold living arrangements.

** Year 2000 drawn from Census data. Percentage of countywide household size in Norman, 2004-2025, based on continuation of the 1990-2000 trend, representing an average annual rate of change of: 0.20788%

SOURCES: City and County: 2000, U.S. Bureau of the Census, SF1. Cleveland County, 2005-2025 -- Woods & Poole Economics, *Cleveland County 2003 Data Phamplet*. City of Norman -- 2004-2025, ROSS+associates.

For the county as a whole, Woods and Poole provided 2004-2025 estimates of the total county population, the number of households and the average household size. The population in house-

holds for the county is calculated based on the number of households times the average household size, and subtracted from the total population to determine the number of persons living in group quarters.

For Norman, the known population, population in group quarters, number of households and average household size was obtained from the 2000 census. To this is added the projected number of households for future years, taken from Table R-2.

The average household size for 2004-2025 in the city is assumed to vary in proportion to the changes in the county's average household size. Between 1990 and 2000, the city's average household size increased from 90.16% to 92.05% of the countywide figure, representing an average annual increase of 0.20788%. This convergence between the city and county figures is projected to continue at the same annual rate of increase as the past decade, such that by 2025 the city's average household size is expected to be 96.96% of the countywide figure. The city's average household size for each multi-year increment is calculated by multiplying that year's county average household size by the percentage of household size projected for the city for that year. The population in households for the city is then calculated based on the number of households times the average household size.

The number of persons living in group quarters is also determined by looking at the trend of the 1990s. Between the 1990 and 2000 Censuses, the population in group quarters in the city increased at an average annual rate of 1.14633%. Estimates of the group quarters population for each increment is calculated using the 1990-2000 rate of increase. The population in households and those in group quarters is then combined to produce the total population figures.

Dwelling Unit Projections

The number of households provides the basis for estimating the future number of occupied dwelling units, to which will be added vacant units for an estimate of the total number of units that are anticipated to be built. Because land consumption for residential uses varies according to density of development, and different types of residential construction reflect different average densities, a breakdown of housing forecasts by structure type is needed.

Table R-4 begins this process by examining trends in building permit activity in Norman

**Table R-4
HOUSING CONSTRUCTION -- 1980-2003
CITY OF NORMAN**

	Single-Family*	Multiple Unit**	Total
1980	781	268	1,049
1981	582	249	831
1982	1,051	686	1,737
1983	937	1,511	2,448
1984	581	1,354	1,935
1985	391	414	805
1986	347	523	870
1987	293	21	314
1988	243	2	245
1989	228	63	291
1990	283	3	286
1991	386	2	388
1992	515	6	521
1993	585	-	585
1994	629	54	683
1995	602	284	886
1996	689	93	782
1997	572	22	594
1998	627	472	1,099
1999	687	196	883
2000	477	21	498
2001	526	12	538
2002	535	87	622
2003 est.	613	371	984
1990-1999			
TOTAL	5,575	1,132	6,707
PERCENT	83.12%	16.88%	100.00%
2000-2003			
TOTAL	2,151	491	2,642
PERCENT	81.42%	18.58%	100.00%

* Includes manufactured homes.

** Number of dwelling units in all structures containing 2 or more units.

SOURCE: Norman Planning & Community Development.

from 1980 through 2003. Note that mobile homes have been included in the category “single-family detached” because, from a land consumption viewpoint, mobile homes generally are being placed on individual lots and most nearly reflect normal home construction instead of mobile home parks. Also note that the term “multiple unit” is used here to include all residential structures containing 2 or more dwelling units (which would include duplexes, triplexes, quadruplexes, townhouses, garden apartments, etc.).

As shown on Table R-4, over the 1990 through 1999 period, single-family housing accounted for more than 83% of all new units. Since the beginning of 2000, however, single-family permits have dropped slightly to 81.42%. This trend is anticipated to continue over the forecast period. The continuation of this trend, and the affect on future permitting, is shown on Table R-5.

**Table R-5
DWELLING UNIT MIX -- 2004-2025
CITY OF NORMAN**

	Single-Family		Multi-Family		TOTAL UNITS	New Dwelling Units		
	Permits	Percent	Permits	Percent		Total	Single-Fam	Multi-Fam
1990-1999	5,575	83.12%	1,132	16.88%				
2000-2003	2,151	81.42%	491	18.58%				
CHANGE		-1.71%		1.71%				
ANNUAL CHANGE		-0.427%		0.427%				
ANNUAL MIX					44,524			
2004		80.99%		19.01%	45,156	632	512	120
2005		80.56%		19.44%	45,797	641	516	125
2006		80.14%		19.86%	46,447	650	521	129
2007		79.71%		20.29%	47,107	659	525	134
2008		79.28%		20.72%	47,775	669	530	139
2009		78.86%		21.14%	48,454	678	535	143
2010		78.43%		21.57%	49,141	688	540	148
2011		78.00%		22.00%	49,763	622	485	137
2012		77.58%		22.42%	50,393	630	489	141
2013		77.15%		22.85%	51,030	638	492	146
2014		76.72%		23.28%	51,676	646	496	150
2015		76.30%		23.70%	52,330	654	499	155
2016		75.87%		24.13%	52,882	553	420	133
2017		75.44%		24.56%	53,441	559	422	137
2018		75.02%		24.98%	54,005	564	423	141
2019		74.59%		25.41%	54,576	570	425	145
2020		74.16%		25.84%	55,152	576	427	149
2021		73.74%		26.26%	55,631	479	353	126
2022		73.31%		26.69%	56,115	483	354	129
2023		72.88%		27.12%	56,602	487	355	132
2024		72.46%		27.54%	57,094	492	356	136
2025		72.03%		27.97%	57,590	496	357	139

The changes in percentage of permits issued for single-family and multi-family units in the two time periods are shown on Table R-5. Overall, single-family permitting has dropped by 1.71 percentage points over the 2000-2003 period, or 0.427% per year. (Simultaneously, of course, multi-family permitting has increased by the same percentage points.) These average annual changes

are applied to the years 2004-2025 to estimate the percentage splits between single-family and multi-family construction each year.¹¹

The number of total dwelling units anticipated in each of the coming years, beginning with the current 44,524 units, is also shown on Table R-5. The number of units is based on the household projections from Table R-3 (which would equate to the number of occupied dwelling units), increased by the year 2000 vacancy rate. Years intervening between the benchmark years (2004, 2010, 2015, 2020 and 2025) are estimated using the average annual rate of increase for each increment. The net new units each year are determined by subtracting the current year's total from the previous year's total. The percentage splits between single-family and multi-family are then applied to the net annual increases to estimate the number of single-family and multi-family units that are projected to be constructed.

Housing Forecasts by Structure Type

Table R-6 updates the 2000 Census breakdown of housing structure types to 2004 by adding in the units issued building permits during the 2000-2003 period and the Hall Park annexation. While the number of units permitted in duplexes is known, the other multi-family categories are estimated based on the proportional breakdown in 2000. The last column on the table shows the percentage distribution of dwelling units in 2004 by structure type.¹²

Table R-6
DWELLING UNITS BY TYPE -- 2000 AND 2004
CITY OF NORMAN

	Total	2000 Occupied	Vacant	Permits*	2004 Total	Distribution
Single-Family Detached	24,846	23,895		2,424	27,270	61.25%
Mobile Home	1,856	1,612		115	1,971	4.43%
SUBTOTAL SINGLE-FAMILY	26,702	25,507	4.48%	2,539	29,241	65.67%
Two-Family (Duplex)	1,252	1,136	9.27%	153	1,405	3.16%
Triplex/Quadriplex	3,146	2,784	11.51%	79	3,225	7.24%
Townhouses	1,832	1,647	10.10%	46	1,878	4.22%
Multi-Unit (5+)	8,562	7,737	9.64%	214	8,776	19.71%
SUBTOTAL MULTI-FAMILY	14,792	13,304	10.06%	491	15,283	34.33%
TOTAL**	41,494	38,811	6.47%	3,030	44,524	100.00%

* Units authorized by building permits through 2003, plus the Hall Park annexation (388 single-family units).

** The Census "other" category, which includes boats, RVs, vans, etc. used as residences, is not included.

SOURCES: U.S. Bureau of the Census, 2000 Census -- Summary File 3. 2004 estimates by ROSS+associates.

¹¹ These figures reflect an average rate of change over the long run. Variability on a year-to-year basis would be expected.

¹² The census figures are "as of" April 1, 2000. The 2004 figures correspond to April 1 in that all units issued permits in 2003 are assumed to have been constructed and occupied by that date.

The census figures are “as of” April 1, 2000. The 2004 figures correspond to April 1 in that all units issued permits in 2003 are assumed to have been constructed and occupied by that date.

Table R-7 shows the dwelling units in the city projected from 2004 to 2025, by structure type. The number of new units projected for single-family and multi-family in 2025 reflects the increase in units from Table R-5. The projected single-family and multi-family subtotals result in 2025 percentages of 76.78% of all new units being single-family and 23.22% being multi-family. These percentages are then distributed among the constituent structure types in the same proportions to the 2025 single-family and multi-family subtotals as were determined for 2004. For instance, in 2004, 65.67% of all units are single-family dwellings, including 61.25% of all units being single-family detached. In 2025, as a result of projected construction from Table R-5, the percentage of new units that are single-family dwellings is 76.78% which results in the percentage that are single-family detached proportionally to 71.60%.

The percentages distributed to each structure type in 2025 are multiplied times the total new units projected for 2025 to determine the number of new units in each category. Lastly, the increase in the number of units by structure type over the forecast period (2004-2025) is added to those existing in 2004 to determine the total number of units in 2025 (shown in the last column of Table R-7).

**Table R-7
HOUSING FORECAST -- 2025
CITY OF NORMAN**

	2004		Increase %	2025	
	Number	Percent		Increase	Total
Single-Family Detached	27,270	61.25%	71.60%	9,356	36,625
Mobile Home	1,971	4.43%	5.18%	676	2,648
SUBTOTAL SINGLE-FAMILY	29,241	65.67%	76.78%	10,032	39,273
Two-Family (Duplex)	1,405	3.16%	2.13%	279	1,684
Triplex/Quadriplex	3,225	7.24%	4.90%	640	3,865
Townhouses	1,878	4.22%	2.85%	373	2,251
Multi-Unit (5+)	8,776	19.71%	13.33%	1,742	10,518
SUBTOTAL MULTI-FAMILY	15,283	34.33%	23.22%	3,034	18,317
TOTAL	44,524	100.00%	100.00%	13,066	57,590

SOURCE: Forecasts by ROSS+associates.

Intervening benchmark years are calculated on the basis of projected construction activity shown on Table R-5. For each benchmark year, the number of units authorized by building permits for the increment is added to the preceding benchmark year to determine the total. As described previously, it is assumed that all units authorized by permits in a given year will have completed construction and will have been sold or rented by the early part of the following year. These fig-

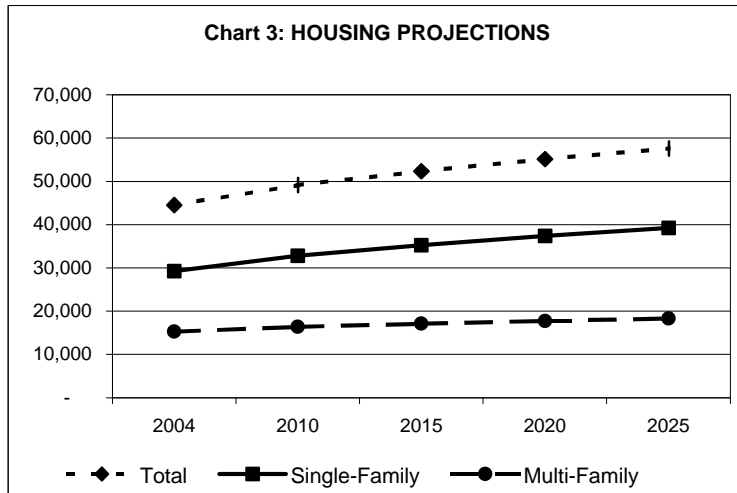
ures are shown on Table R-8, along with the percentage distribution and number of units calculated using the same approach as was used for 2025 on Table R-7.

Table R-8
HOUSING FORECAST BY STRUCTURE TYPE -- 2004-2025
CITY OF NORMAN

	2004		2010		2015		2020		2025	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Single-Family Detached	27,270	61.25%	30,576	62.22%	32,859	62.79%	34,880	63.24%	36,625	63.60%
Mobile Home	1,971	4.43%	2,210	4.50%	2,375	4.54%	2,521	4.57%	2,648	4.60%
SUBTOTAL SINGLE-FAMILY	29,241	65.67%	32,786	66.72%	35,234	67.33%	37,401	67.81%	39,273	68.19%
Two-Family (Duplex)	1,405	3.16%	1,504	3.06%	1,572	3.00%	1,632	2.96%	1,684	2.92%
Triplex/Quadriplex	3,225	7.24%	3,451	7.02%	3,607	6.89%	3,745	6.79%	3,865	6.71%
Townhouses	1,878	4.22%	2,009	4.09%	2,100	4.01%	2,181	3.95%	2,251	3.91%
Multi-Unit (5+)	8,776	19.71%	9,391	19.11%	9,817	18.76%	10,193	18.48%	10,518	18.26%
SUBTOTAL MULTI-FAMILY	15,283	34.33%	16,355	33.28%	17,096	32.67%	17,751	32.19%	18,317	31.81%
TOTAL	44,524	100.00%	49,141	100.00%	52,330	100.00%	55,152	100.00%	57,590	100.00%

SOURCE: Forecasts by ROSS+associates.

The resulting projections for single-family and multi-family dwelling units are illustrated on Chart 3, Housing Projections.



Land Demand—Residential

In order to convert future dwelling units into land consumption, several determinations must be made regarding the development characteristics of the various housing structure types. These assumptions are: the average amount of net land that will be needed for each dwelling unit in the category, and the amount of additional land that will be needed for streets and to accommodate inefficiencies of development.

Table R-9 shows the development parameters used in making the land demand calculations. The average lot area per dwelling unit figures reflect recent experience by the city with developments in each category as to average lot sizes or development densities. The figure for triplexes, quadriplexes and townhouses reflects a density of 8 units per acre, while the High Density Residential category reflects an average development density of 18 units per acre.

**Table R-9
RESIDENTIAL DEVELOPMENT PARAMETERS
CITY OF NORMAN**

	Avg. Lot Area per Dwelling	Land Development Multiplier
COUNTRY RESIDENTIAL	435,600	5.00%
VERY LOW DENSITY RESIDENTIAL	87,120	10.0%
LOW DENSITY RESIDENTIAL	10,500	25.0%
DUPLEX*	4,600	25.0%
TRIPLEX/QUADRIPLEX*	5,445	20.0%
TOWNHOUSE*	5,445	15.0%
HIGH DENSITY RESIDENTIAL	2,420	10.0%

*These types of housing combine into the "Medium Density Residential" category.

SOURCE: Recent building history, Planning and Community Development Department.

The land development multiplier is an average percentage of a development project that goes into streets, as well as losses in efficiency created by corner and cul-de-sac lots and oddly shaped parcels. These figures reflect experience with development projects in the city and allow estimation of the actual amount of land consumed for each lot or dwelling unit created.

Table R-10 shows the application of these development parameters to each of the multi-year increments. For each category, the increase in dwelling units over the previous increment is shown (calculated from the Table R-8 totals). For Country Residential, the city has consistently seen 12% of all single-family detached and 80% of all mobile homes being permitted in that area. In the Very Low Density Residential area, permitting experience has been 3% of all single-family detached and 20% of all mobile homes. All of the remaining (85%) single-family detached houses comprise the Low Density Residential category.

For each category, the number of new dwelling units times the average lot area per unit (from Table R-9) yields the number of acres occupied by the units, to which is added the land development multiplier to account for streets, inefficient lots and land lost to oddly shaped parcels.

These latter figures are the net number of acres of land consumed by development in each category. As noted, all of the single-family detached and mobile home units are distributed among the Country Residential, Very Low Density Residential and Low Density Residential categories in the percentages discussed above. The Medium Density Residential category combines all of the forecasted duplex, triplex, quadriplex and townhouse dwelling units, while Multi-Unit (5+) development makes up the High Density Residential category.

Table R-10
RESIDENTIAL LAND DEMAND BY LAND USE -- 2004-2025
CITY OF NORMAN

	2004 - 2010	2011 - 2015	2016 - 2020	2021 - 2025	TOTAL
COUNTRY RESIDENTIAL					
NEW HOUSING UNITS	588	406	359	311	1,664
NET ACRES IN LOTS	5,880.0	4,060.0	3,590.0	3,110.0	16,640.0
NET ACRES CONSUMED	6,174.0	4,263.0	3,769.5	3,265.5	17,472.0
VERY LOW DENSITY RESIDENTIAL					
NEW HOUSING UNITS	147	101	90	78	416
NET ACRES IN LOTS	294.0	202.0	180.0	156.0	832.0
NET ACRES CONSUMED	323.4	222.2	198.0	171.6	915.2
LOW DENSITY RESIDENTIAL					
NEW HOUSING UNITS	2,810	1,941	1,718	1,483	7,952
NET ACRES IN LOTS	677.4	467.8	414.2	357.4	1,916.8
NET ACRES CONSUMED	846.8	584.8	517.7	446.7	2,396.0
MEDIUM DENSITY RESIDENTIAL					
NEW HOUSING UNITS	456	315	279	241	1,291
NET ACRES IN LOTS	55	38	34	29	156
NET ACRES CONSUMED	65.8	45.5	40.3	34.8	186.3
HIGH DENSITY RESIDENTIAL					
NEW HOUSING UNITS	615	426	376	325	1,742
NET ACRES IN LOTS	34.2	23.7	20.9	18.1	96.8
NET ACRES CONSUMED	37.6	26.0	23.0	19.9	106.4

SOURCE: Net acres in lots determined by multiplying the increase in dwelling units by the average lot area per dwelling, and dividing by 1 acre (43560 s.f.). Net acres in lots increased by the Land Development Multiplier to determine Net Acres Consumed.

The “total” figures on Table R-10 represent the net acres anticipated to be consumed by actual development over the forecast period.

SUMMARY

Summary of Land Demand Forecasts

Table S-1 summarizes all of the land demand forecasts made in this analysis. Over the forecast period, over 22,600 acres of land (35.4 square miles) are expected to be consumed by the construction of residences and businesses, and through public acquisitions for parks and schools. These figures represent only the actual land projected to be occupied by new construction and development. Additional land also will be “consumed” by the development of subdivisions and other projects but will be vacant at any given point in time, awaiting building construction.

Table S-1
SUMMARY--NET LAND DEMAND BY LAND USE -- 2004-2025
 CITY OF NORMAN

	2004 - 2010	2011 - 2015	2016 - 2020	2021 - 2025	TOTAL
NONRESIDENTIAL PRIVATE SECTOR					
OFFICE USES	56.3	51.0	54.9	58.8	221.0
RETAIL USES	155.8	142.9	155.1	167.7	621.6
INDUSTRIAL/WAREHOUSING USES	53.1	46.2	48.4	50.3	198.0
SUBTOTAL--PRIVATE SECTOR	265.2	240.1	258.4	276.9	1,040.6
PUBLIC SECTOR					
PARKS	269.5	69.9	74.3	78.7	492.3
SCHOOLS*	-	-	20.0	20.0	40.0
SUBTOTAL--PUBLIC SECTOR	269.5	69.9	94.3	98.7	532.3
RESIDENTIAL					
COUNTRY RESIDENTIAL	6,174.0	4,263.0	3,769.5	3,265.5	17,472.0
VERY LOW DENSITY RESIDENTIAL	323.4	222.2	198.0	171.6	915.2
LOW DENSITY RESIDENTIAL	846.8	584.8	517.7	446.7	2,396.0
MEDIUM DENSITY RESIDENTIAL	65.8	45.5	40.3	34.8	186.3
HIGH DENSITY RESIDENTIAL	37.6	26.0	23.0	19.9	106.4
SUBTOTAL--RESIDENTIAL	7,447.6	5,141.5	4,548.4	3,938.5	21,076.0
TOTAL	7,982.2	5,451.5	4,901.1	4,314.1	22,648.8

* New schools only, not including expansion of existing schools or replacement of aging and obsolete schools.

The projections in this Land Demand Analysis were developed to assess the finite amount of land needed to accommodate the projected growth in population and employment in the City of Norman, now through 2025. In the Future Land Use Plan there will be additional land shown as needed to accommodate what is considered the “market place’s” demand for a suitable inventory of vacant land that is appropriate for various types of land uses. In addition, the projections shown in this report are based on past trends and growth policies. If the city (or other entity such

as the university) adopts policies or takes actions in the future that impact future growth trends (either escalating or de-escalating population or employment growth), these land demand projections could change dramatically. In part, the purpose of undertaking a land use plan for the city is to determine what the appropriate level of growth and development is for the City of Norman and what actions the City will need to take to accomplish that goal.

Comparison to Other Projections

A number of forecasts have been made regarding future growth in Norman. These forecasts have been prepared as part of various studies and made at various points in time, including the forecasts made as part of the Norman 2020 Land Use Plan Update in 1995. In preparing the Land Demand Analysis, these forecasts were examined in an effort to identify a base set of forecasts to use throughout the preparation of the Land Use Plan Update.

Table S-2 compares the population forecasts developed in this Norman 2025 Land Demand Analysis to projections prepared as part of the previous Land Use Plan Update, and to projections prepared by others.

Table S-2
COMPARISON OF POPULATION PROJECTIONS
CITY OF NORMAN

	1995	2000	2003	2004	2005	2010	2015	2020	2025
NORMAN 2025 DEMAND ANALYSIS		95,694	101,760	103,101	104,446	112,208	120,152	128,404	137,147
NORMAN 2020 DEMAND ANALYSIS	87,243	93,315			99,233	105,182	111,146	117,033	
CENSUS BUREAU*		95,694	101,318						
OCARTS**	87,010								121,920
WASTEWATER MASTER PLAN***		96,065			103,757	111,449	119,140	126,832	134,523

* July 1, 2003 estimate including the annexation of Hall Park.

** Oklahoma City Area Regional Transportation Study, Association of Central Oklahoma Governments, September 28, 2000.

*** City of Norman Waste Water Master Plan, adopted September 2001.

The pace of population growth in Norman has quickened since the last Land Demand Analysis was prepared in 1995. That report underestimated the 2000 population by almost 2,400 people, and forecast a 2020 population of slightly more than 117,000. In comparison, this current Land Demand Analysis projects 11,371 more people in 2020, an 8.9% increase over the previous forecast.

The City’s more recently prepared Waste Water Master Plan anticipates a 2025 population of just over 134,500. This current Land Demand Analysis, forecasting a 2025 population of more than 137,000, exceeds the WWMP projection by 2,624 people, a difference of only 1.9%. This Norman 2025 Land Demand Analysis is more reflective of recent trends in growth and development, and is more detailed in its methodology.

APPENDIX

The primary resource for the employment and population forecasts used in this Land Demand Analysis is the data provided by Woods & Poole Economists, Inc. This Appendix presents background information on the methodology used by Woods & Poole in preparing their forecasts in general.

Woods and Poole Forecast Methodology

The following has been excerpted from the *2003 Data Pamphlet: Cleveland County, Oklahoma*, prepared by Woods & Poole Economists, Inc., Washington, D.C.:

Introduction

The Woods & Poole Economics, Inc. database contains more than 900 economic and demographic variables for every county in the United States for every year from 1970 to 2025. This comprehensive database includes detailed population data by age, sex, and race; employment and earnings by major industry; personal income by source of income; retail sales by kind of business; and data on the number of households, their size, and their income. All of these variables are projected for each year through 2025. In total, there are over 175 million statistics in the regional database. The regional model that produces the projection component of this database was developed by Woods & Poole. The regional projection methods are revised somewhat year to year to reflect new computational techniques and new sources of regional economic and demographic information. Each year, a new projection is produced based on an updated historical database and revised assumptions.

The fact that the proprietary Woods & Poole economic and demographic projections rely on a very detailed database, makes them one of the most comprehensive county-level projections available. A description of some characteristics of the database and projection model is contained in this chapter.

Overview of the Projection Methods

The strength of Woods & Poole's economic and demographic projections stems from the comprehensive historical county database and the integrated nature of the projection model. The projection for each county in the United States is done simultaneously so that changes in one county will affect growth or decline in other counties. For example, growth in employment and population in Houston will affect growth in other metropolitan areas, such as Cleveland. This reflects the flow of economic activity around the country as new industries emerge or relocate in growing areas and as people migrate, in part because of job opportunities. The county projections are developed within the framework of the United States projection made by Woods & Poole. The U.S. projection is the control total for the 2003 regional projections and is described in the "Overview of the 2003 Projections" chapter included in Woods & Poole publications.

The regional projection technique used by Woods & Poole - linking the counties together to capture regional flows and constraining the results to a previously determined United States total - avoids a common pitfall in regional projections. Regional projections are sometimes made for a city or county without regard for potential growth in surrounding areas or other areas in the country. Such projections may be simple extrapolations of recent historical trends and, as a re-

sult, may be too optimistic or pessimistic. If these county projections were added together, the total might differ considerably from any conceivable national forecast scenario; this is the result of each regional projection being generated independently without interactive procedures and without being integrated into a consistent national projection.

The methods used by Woods & Poole to generate the county projections proceed in four stages. First, forecasts to 2025 of total United States personal income, earnings by industry, employment by industry, population, inflation, and other variables are made. Second, the country is divided into 172 Economic Areas (EAs) as defined by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA). The EAs are aggregates of contiguous counties that attempt to measure cohesive economic regions in the United States (a list of all EAs and their component counties can be found in Appendix 4 following this chapter); in the 2003 Woods & Poole model, EA definitions released by the BEA in May 2002 are used. For each EA, a projection is made for employment, using an "export-base" approach; in some cases, the employment projections are adjusted to reflect the results of individual EA models or exogenous information about the EA economy. The employment projection for each EA is then used to estimate earnings in each EA. The employment and earnings projections then become the principal explanatory variables used to estimate population and number of households in each EA.

The third stage is to project population by age, sex, and race for each EA on the basis of net migration rates projected from employment opportunities. For stages two and three, the U.S. projection is the control total for the EA projections. The fourth stage replicates stages two and three except that it is performed at the county level, using the EAs as the control total for the county projections.

The "Export-Base" Approach

The specific economic projection technique used by Woods & Poole to generate the employment, earnings, and income estimates for each county in the United States generally follow a standard economic "export-base" approach. This relatively simple approach to regional employment projections is one that has been used by a number of researchers.

Certain industrial sectors at the regional level are considered "basic." This means that these sectors produce output that is not consumed locally but is "exported" out of the region for national or international consumption. This assumption allows these sectors to be linked closely to the national economy, and hence follow national trends in productivity and output growth. Normally, the "basic" sectors are mining, agriculture, manufacturing, and the Federal government. In contrast, "non-basic" sectors are those such as retail trade, transportation, communication, and construction, the output of which is usually consumed locally. The growth of the "non-basic" sectors depends largely on the growth of the "basic" sectors that form the basis of the region's economy.

Intuitively, this approach has great appeal and there are numerous examples that seem to support the "export-base" theory. Automobile production in Detroit, for instance, is obviously much more sensitive to national and international price and demand for transportation equipment than to local demand. In Texas, oil and natural gas exploration and production are tied closely to the worldwide demand and supply of petroleum resources and not tied primarily to energy consumption in Texas.

Although the theory is appealing, some shortcomings do exist in the "export-base" approach. For example, some "basic" commodities produced locally are consumed locally. Producers of durable equipment used in other manufacturing processes are often affected not by the national demand for their product but by the regional demand. Machine tool makers that supply the local automobile industry in Detroit will prosper to the extent Detroit's automobile producers prosper. In Houston, the strength of the local oil industry will affect the demand and production of equipment for oil and natural gas production and exploration. In both of these instances, some durable manufacturing industries exist to serve local, not national, markets.

However, despite the shortcomings, the availability of relatively clean data for sub-national geographic areas makes the "export-base" approach very useful. The analytical framework for projections using the "export-base" approach entails estimating either demand equations or calculating historical growth rate differentials for output by sector. The principal explanatory variable, or the comparative data series for growth rate differentials, is the national demand for the output of that sector. Employment-by-sector data are often used as a surrogate variable since county output-by-sector data are not available; employment-by-sector data is used by Woods & Poole. Earnings projections are then obtained by using earnings-per-employee data either estimated as part of the model or imposed exogenously on the system. The complementary relationship could also be estimated, i.e., using an earnings forecast to derive employment based on earnings-per-employee data; this procedure has been used previously in some Woods & Poole regional models.

Employment

The employment data in the Woods & Poole database are a complete measure of the number of full- and part-time jobs by place of work. Historical data, 1969-2000, are from the U.S. Department of Commerce, Bureau of Economic Analysis. The employment data include wage and salary workers, proprietors, private household employees, and miscellaneous workers. Wage and salary employment data are based on an establishment survey in which employers are asked the number of full- and part-time workers at a given establishment.

Because part-time workers are included, a person holding two part-time jobs would be counted twice. Also, since the wage and salary employment data are based on an establishment survey, jobs are counted by place of work and not place of residence of the worker; thus, a job in the New York Metropolitan Area is counted in the New York Metropolitan Area regardless of where the worker lives.

Data on proprietors include farm and non-farm proprietors by sector. Proprietors include not only those people who devote the majority of their time to their proprietorship, but people who devote any time at all to a proprietorship. Thus, a person who has a full-time wage and salary job and on nights and weekends runs a small business legally defined as a proprietorship would be counted twice. The employment data therefore include full- and part-time proprietors.

Private household employment data include persons employed by a household on the premises, such as full-time baby-sitters, housekeepers, gardeners, and butlers. Miscellaneous employment data include judges and all elected officials, persons working only on commission in sectors such as real estate and insurance, students employed by the colleges or universities in which they are enrolled, and unincorporated subcontractors in sectors such as construction.

The employment data used by Woods & Poole comprise the most complete definition of the number of jobs by county. Woods & Poole data may be higher than that from other sources because they measure more kinds of employment.

Employment by Sector

The employment data is by one-digit SIC industry. The one-digit industries are defined in the 1987 Standard Industrial Classification Manual. The employment data in the Woods & Poole 2003 database is not based on the 1997 North American Industry Classification System (NAICS) definitions because the historical data from the Bureau of Economic Analysis is provided only by SIC definitions.

As a rule, employment is classified in a given industry depending on the primary activity of the establishment. For example, employees of a large oil company are classified in many different sectors depending on the specific establishment in which they worked, even though the company as a whole would be considered a mining company: employees at a refinery are in manufacturing; employees at the company headquarters are in services; pipeline operators are in transportation; and oil field workers are in mining. If a given establishment is engaged in activities in different sectors, all employees are classified according to the primary activity of the establishment regardless of their actual occupations; thus, a secretary for a trucking company is a transportation worker and an accountant at a small plumbing company is a construction worker. The main exception to this rule is the classification of government workers in the Woods & Poole database: all government employees are classified in Federal civilian, Federal military, or state and local government employment, regardless of the usual classification of the establishment in which they work. Definitions for each sector in the Woods & Poole database are as follows:

Farming includes all establishments such as farms, orchards, greenhouses, and nurseries primarily engaged in the production of crops, plants, vines, trees (excluding forestry operations), and specialties such as sod, bulbs, and flower seed. It also includes all establishments such as ranches, dairies, feedlots, egg production facilities, and poultry hatcheries primarily engaged in the keeping, grazing, or feeding of cattle, hogs, sheep, goats, poultry of all kinds, and special animals such as horses, bees, pets, and fish in captivity.

Agricultural services, forestry, fisheries, and other includes establishments primarily engaged in performing soil preparation, crop services, veterinary services, farm labor and management, and horticultural services. Forestry includes establishments engaged in the operation of timber tracts, tree farms, forest nurseries, and related activities such as reforestation. Fisheries include commercial fishing (including shellfish) and commercial hunting and trapping. Other includes the jobs of U.S. residents working for international organizations, foreign embassies, and consulates in the U.S.

Mining includes establishments primarily engaged in the extraction, exploration, and development of coal, oil, natural gas, metallic minerals (such as iron and copper), and nonmetallic minerals (such as stone and sand). Mining does not include refining, crushing, or otherwise preparing mining products; this activity is classified as manufacturing.

Construction includes establishments engaged in building new structures and roads, alterations, additions, reconstruction, installations, and repairs. It includes general contractors engaged in building residential and nonresidential structures; contractors engaged in heavy construction, such as bridges, roads, tunnels, and pipelines; and special trade contracting, such as plumbing,

electrical work, masonry, and carpentry. Employment is counted at the fixed place of business where establishment-type records are maintained and not at the job site. Establishments engaged in managing construction projects are classified under services. Establishments engaged in the selling and installation of construction materials are generally classified under trade, except for materials such as installed elevators and sprinkler systems. The installation of prefabricated building materials is included in construction.

Manufacturing includes establishments engaged in the mechanical or chemical transformation of materials or substances into new products. Included in manufacturing are establishments engaged in assembling component parts not associated with structures and those engaged in blending materials, such as lubricating oils or liquor. Broadly defined, manufacturing industries include the following: food processing, such as canning, baking, meat processing, and beverages; tobacco products; textile mill products, such as fabric, carpets and rugs; apparel; wood products, including logging, sawmills, prefabricated homes, and mobile homes; furniture; paper; printing and publishing; chemicals, such as plastics, paints, and drugs; petroleum refining; rubber and plastics; leather products; stone, clay, and glass; primary metals, such as steel, copper, aluminum, and including finished products such as wire, beams, and pipe; fabricated metals, such as cans, sheet metal, cutlery, and ordnance; industrial machinery, including computers, office equipment, and engines; electronics and electrical equipment; transportation equipment, such as cars, trucks, ships, and airplanes; instruments; and miscellaneous industries, such as jewelry, musical instruments, and toys.

Transportation, communications, and public utilities includes establishments providing, to the general public or to other business enterprises, passenger and freight transportation, communications services, electricity, gas, steam, water, or sanitation services, and the Postal Service. Transportation includes railroads, highway passenger transportation, trucking and warehousing, shipping, air transportation, pipelines, and transportation services such as travel agencies and tours. Communications includes point-to-point telephone and telegraph services, radio, television, and cable broadcasting. Sanitary services includes water supply and trash removal.

Wholesale trade includes establishments primarily engaged in selling merchandise to retailers; or to industrial, commercial, institutional, farm, construction contractors; or to professional business users; or to other wholesalers or brokers. The merchandise sold by wholesalers includes all goods used by institutions, such as schools and hospitals, as well as virtually all goods sold at the retail level. The three main types of wholesalers are merchant wholesalers who purchase goods from manufacturers or other wholesalers and sell them; sales branches of manufacturing, mining, or farm companies engaged in marketing the products of the company to retail establishments; and agents, merchandise or commodity brokers, and commission merchants.

Retail trade includes establishments engaged in selling merchandise for personal or household consumption and rendering services incidental to the sale of goods. Buying goods for resale to the consumer is a characteristic of retail trade establishments that distinguishes them from agricultural and extractive industries: farmers who sell only their own produce at or from the point of production are not classified as retailers. Retail establishments include hardware stores, garden supply stores, and mobile home dealers; department stores; food stores, including supermarkets, convenience stores, butchers, bakeries, and fruit stands; automobile dealers; gasoline service stations; apparel and accessory stores; furniture and home furnishing stores, including electronics and home appliances; eating and drinking places, including restaurants, bars, and take-out stands;

and miscellaneous establishments, including drug stores, liquor stores, thrift shops, bookstores, florists, mail-order houses, and pet stores.

Finance, insurance, and real estate includes the following establishments: depository institutions, such as commercial banks, savings and loans, and foreign banks; credit institutions; holding companies not engaged in operation; investment companies; brokers and dealers in securities and commodity contracts; security and commodity exchanges; carriers of all types of insurance; insurance agents and insurance brokers; real estate operators including operators of nonresidential facilities, apartments, other residential properties, mobile home parks, and railroad properties; real estate agents and managers; title offices; and developers not engaged in construction.

Services includes establishments primarily engaged in providing services for individuals, businesses, governments, and other organizations. Service industries include the following: hotels and other lodging places; personal services, such as laundries, dry cleaners, barber shops, shoe repair, and funeral homes; business services, such as advertising, employment agencies, office equipment repair, computer and data processing, credit reporting and collecting; automobile repair and automobile services, including car washes and car rental; motion pictures, including video rentals; entertainment, including theaters, casinos, amusement parks, and professional sports; health services, such as hospitals, clinics, nursing homes, and dentists; legal services; education services, such as private elementary and secondary schools, colleges, junior colleges, universities, and vocational schools; social services provided in privately owned establishments; private museums and zoos; membership organizations, including churches, labor unions, professional membership organizations, and political organizations; professional services, such as engineering, architecture, accounting, research services, and public relations; and private household employment, such as full-time baby-sitters, housekeepers, and butlers employed by a household on the premises.

Federal civilian includes all Federal government workers regardless of their establishment classification. Federal civilian employment includes executive offices and legislative bodies; courts; public order and safety; correctional institutions; taxation; administration and delivery of human resource programs, such as health, education, and public assistance services; housing and urban development programs; environmental programs; regulators, including air traffic controllers and public service commissions; and other Federal government agencies.

Federal military includes Air Force, Army, Marine Corps, National Guard, and Navy. In the Woods & Poole database, only personnel stationed in Alaska, Hawaii, and the continental U.S. are counted in employment and earnings. Civilians working on a military base are classified in the sector appropriate to their occupation.

State and local government is defined the same as Federal civilian except that the activities are run by state and local governments. At the local level, this includes all public schools as well as police and fire departments; at the state level, it includes all public junior colleges, colleges, and universities.

The Demographic Model

The demographic portion of the regional model follows a traditional cohort-component analysis based on calculated fertility and mortality in each county or EA. The "demand" for total population is estimated from the economic model: if the demand for labor is forecast to rise for a particular county or EA, then either the labor force participation rate will rise or population in-

migration will be positive. The inverse is true for counties and EAs with projected declines in employment. Therefore, future EA and county migration patterns for population by age, sex, and race are based on employment opportunities. Individuals and families are assumed to migrate, at least in part, in response to employment opportunities with two exceptions: for population aged 65 and over and for college or military-aged population, migration patterns over the forecast period are based on historical net migration and not economic conditions. The integration of economic and demographic regional analysis is a significant strength of the Woods & Poole approach.

The age, sex, and race distribution of the population is projected by aging the population by single year of age by sex and by race for each year through 2025 based on county or EA specific mortality, fertility, and migration rates estimated from historical data. In the Woods & Poole model, projected net mortality and migration are estimated based on the historical net change in population by age, race, and sex for a particular county or EA. Similarly, projected net births and migration of age zero population by race are estimated based on the historical change in age zero population by race per female population age 15 to 44 by race for a particular county or EA.

The United States population by age, sex, and race projections, 2002-2025, are based on Bureau of the Census population estimates. Woods & Poole adjusts these estimates to reflect current year population estimates. The U.S. population by age, sex, and race forecast is the control total for the EA projections. Each EA projection serves as the control totals for the county projections.

Households

Households are defined as occupied housing units. A housing unit is a house, an apartment, a group of rooms, or a single room occupied as separate living quarters. The occupants of a housing unit may be a single family, one person living alone, two or more families living together, or any group of related or unrelated persons who share living quarters. All people are part of a household except those who reside in group quarters. Group quarters include living arrangements such as prisons, homes for the aged, rooming houses, college dormitories, and military barracks. The average size of households is defined as total population less group quarters population divided by the number of households. Mean household income is defined as total personal income less estimated income of group quarters population divided by the number of households.

The Accuracy of the Projections

Unlike other sciences, economics and demographics cannot rely on experimentation to test theories and verify hypotheses. Rather, historical data are analyzed and theories are developed that explain the historical data. The resulting models are then used to make a projection. Woods & Poole projections, like all economic and demographic projections, utilizes this approach: analyzing historical data to make estimates of future data. There are, of course, inherent limitations to projections, and the Woods & Poole projections should never be interpreted as an infallible prediction of the future. In all Woods & Poole publications, the word "forecast" is used as a synonym for "projection" and refers to Woods & Poole estimated data for any year from 2001 to 2025 (2002 to 2025 for population); in Woods & Poole publications "projections", or "forecasts", both mean estimates of future data (2001 to 2025, or 2002 to 2025 for population).

One key limitation to all projections, and Woods & Poole projections in particular, is that the future is never known with any certainty. The model on which the projections are based may not accurately reflect future events. In addition, there is always the possibility of an unanticipated

shock to the economy, or of some other event that was not foreseen based on an analysis of historical data. For instance, a local government may enact a new industrial policy that has an unexpected, beneficial effect on employment growth. Or an abrupt economic change, although anticipated, may occur with much greater intensity or in a shorter time period than expected. For example, the projection may assume an increase in the price of a commodity, such as oil, over a five-year period, but an embargo may raise the price to that level in only one year. There are many other types of economic and demographic events that could create outcomes far different from Woods & Poole's projections.