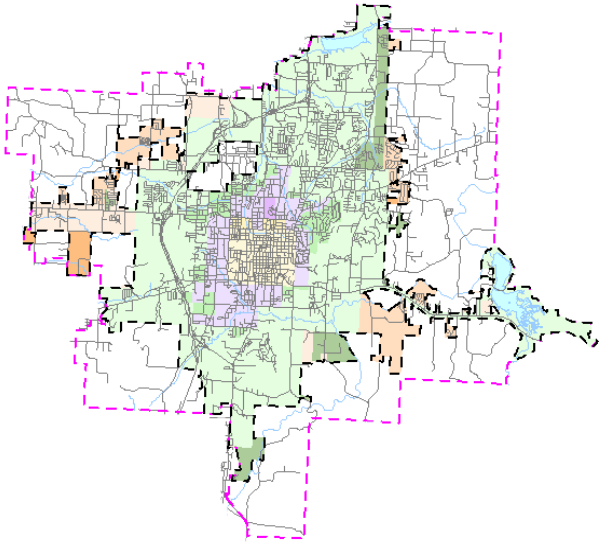
Final Impact Fee Study:
Wastewater, Water, and Roads

Including an Update of the Parkland Dedication and Fee-in-Lieu Requirements

Fayetteville, Arkansas



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April 2002

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EXECUTIVE SUMMARY

This study calculates the maximum impact fees that could be adopted by the City of Fayetteville to help fund growth-related infrastructure improvements for water and wastewater facilities as well as improvements to major roadways. It also updates the City's existing park land dedication and fee-in-lieu requirements.

An impact fee is a one-time charge on new development, typically collected at time of building permit issuance or connection to the water or wastewater system. Impact fees are designed to ensure that new development contributes a fair share of the cost of the capital improvements needed to serve growth.

The study was prompted by the need to find alternative sources of revenue to fund capital improvements necessitated by the community's rapid growth. The City's population has been growing at a rate of more than 3.2 percent annually, over twice as fast as the state as a whole. The City has traditionally funded capital improvements primarily on a pay-as-you-go basis, largely with sales tax and utility fee revenues.

The purpose of this project is to assist the City of Fayetteville in developing a system of development impact fees to ensure that new development pays a fair share of the cost of infrastructure needed to serve it. The project has been divided into two phases. The first phase, termed a "feasibility study," reviewed the legal framework, local data and potential fees, and determined in conjunction with local officials the type of impact fee system that should be developed in the second phase.[1] It also included a survey of impact fees and development exactions in comparable communities, which was provided as a separate document.[2]

Phase Two is the impact fee study. The facilities selected at the conclusion of Phase One to be included in the impact fee study include water transmission, distribution and storage facilities; wastewater collection and treatment plant facilities; arterial and collector roads; and parks. The park component is limited to updating the City's park land dedication requirements, as well as updating the fees paid in lieu of dedication.

Phase Two was originally broken into two parts that were addressed in two separate reports. An initial draft of Part One, covering water and wastewater impact fees, was prepared in October 2001 and was finalized in March 2002. An initial draft of Part Two, which covered road impact fees and park land dedication and fees in-lieu, was prepared in February 2002. This report is the final draft of Parts One and Two combined.

The potential impact fees for the three facility types (water, wastewater and roads), along with the updated park fees in-lieu of dedication, are presented in Table 1 below by generalized land use categories. The three impact fees will vary by unit size for new single-family construction, based on the lower demands for services associated with smaller units.

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[1]Duncan Associates, *Fayetteville Impact Fee Study: Policy Directions Memorandum*, April 2001.

[2]Cooper Consulting Company, *Development Fee Survey for Fayetteville, Arkansas*, April 2001.

Table 1
IMPACT FEE SUMMARY

Land Use (Dwelling Size)	Unit	Water	Waste-water	Roads	Parks	Total
Single-Family (up to 1,300 sq. ft.)	Dwelling	$229	$619	$618	$578	$2,044
Single-Family (1,301 to 1,700 sq. ft.)	Dwelling	$290	$784	$689	$578	$2,341
Single-Family (1,701 to 2,300 sq. ft.)	Dwelling	$329	$891	$787	$578	$2,585
Single-Family (more than 2,300 sq. ft.)	Dwelling	$369	$998	$849	$578	$2,794
Multi-Family	Dwelling	$214	$578	$588	$370	$1,750
Mobile Home	Dwelling	$290	$784	$425	$463	$1,962
Retail*	1,000 sq. ft.	$49	$132	$1,407	$0	$1,588
Office*	1,000 sq. ft.	$49	$132	$787	$0	$968
Industrial*	1,000 sq. ft.	$49	$132	$586	$0	$767

* nonresidential water and wastewater fees assume 3" meter for a 100,000 sq. ft. building
Source: Water fees from Table 33; wastewater fees from Table 42; road fees (including ROW costs) from Table 59; park fees-in-lieu from Table 64.

The calculated maximum fees per new single-family dwelling are compared with national average impact fees in Table 2. The four proposed fees for Fayetteville combined are less than half of the national average fees for the same four facilities. Most of this discrepancy can be explained by the fact that the proposed fees do not cover the full range of cost components for the identified facilities. For example, the water fee does not include treatment costs or any line costs that would typically be provided by developers, the wastewater fee includes only treatments plant costs, and the park fee covers only land costs.

Table 2
IMPACT FEE SUMMARY PER SINGLE-FAMILY UNIT

Facility Type	Fayetteville's Maximum Fees	National Average Fees
Major Roads	$849	$1,546
Neighborhood Parks and Trails	$578	$1,214
Water Transmission, Storage and Distribution Line Oversizing	$369	$2,199
Wastewater Treatment	$998	$1,929
Total	$2,794	$6,888

Source: Maximum fees for Fayetteville (for single-family unit of more than 2,300 square feet) from Table 1; national average fees from non-random survey of 141 communities that have impact fees prepared by Dr. James C. Nicholas, University of Florida at Gainesville, October 2001.

BACKGROUND

An impact fee is a form of "exaction," through which a developer or builder is required to contribute to the costs of public improvements required to serve the development. Generally, impact fees are designed to pay for the new development's proportionate share of the cost of off-site improvements, and credit against the fees is given if the developer is required to contribute to the system of facilities for which the fees are charged through on-site dedication, construction or monetary payment. Typically the fee is levied on some easily measurable unit of activity, such as the construction of one dwelling unit or of a specified number of square feet of commercial or industrial space, and is collected at the time of building permit issuance or water meter purchase.

A major impetus for this project is the need for a major wastewater treatment plant expansion and associated collector system improvements. With an estimated total project cost of $120 million, the wastewater improvements could well be the most costly and extensive capital project ever undertaken by the City.

The City finances most capital improvements on a pay-as-you-go basis. This is done utilizing revenues from the one-percent City sales tax adopted in 1993 (of which, by City Council resolution, at least 75 percent is used to fund capital projects), the one-percent Hotel, Motel, Restaurant sales tax adopted in 1996 to fund park improvements, and operating revenues from the City's enterprise funds, including water, wastewater and solid waste.

The City's last five-year capital improvements program (CIP), excluding bond funding, included almost $86 million in capital funding for the five-year period. Over half of the pay-as-you-go funding is from the one-percent sales tax, as shown in Table 3.

Table 3
CAPITAL FUNDING BY SOURCE, 2000-2004

Revenue Source	Amount	Percent
Sales Tax	$45,758,000	53.3%
Water & Sewer Fund	$14,472,000	16.8%
Shop Fund	$8,690,000	10.1%
Off-Street Parking Fund	$6,564,000	7.6%
Airport Fund	$3,486,000	4.1%
Parks Development Fund	$3,457,000	4.0%
Community Dev't Block Grant Fund	$2,015,000	2.3%
Solid Waste Fund	$756,000	0.9%
General Fund	$700,000	0.8%
Total	$85,898,000	100.0%

Source: City of Fayetteville, *Five Year Capital Improvements Program, 2000-2004*, November 1999 (excludes bond funding).

Three-quarters of the City's one-cent sales tax is dedicated to capital improvements. The City's sales tax capital funding is spent on a wide variety of improvements. Foremost among these are streets, water and wastewater and parks, as shown in Table 4.

Table 4
SALES TAX CAPITAL FUNDING, 2000-2004

Project Type	Amount	Percent
Streets	$19,390,000	42.4%
Wastewater	$7,968,500	17.4%
Parks	$3,393,000	7.4%
Water	$3,205,500	7.0%
Bridge & Drainage	$3,042,000	6.6%
Fire	$2,121,000	4.6%
Police	$1,395,000	3.0%
Library	$852,000	1.9%
Transportation	$650,000	1.4%
Other	$3,741,000	8.2%
Total	$45,758,000	99.9%

Source: City of Fayetteville, *Five Year Capital Improvements Program, 2000-2004*, November 1999.

The City has about $31 million in outstanding debt. Two-thirds of that is in water and sewer revenue bonds, as shown in Table 5.

Table 5
OUTSTANDING DEBT

Bond Issue	Original Issue	Original Amount	Outstanding*
Hotel & Restaurant, Series 1995 (Continuing Ed Center)	1979	$2,675,000	$1,335,000
Sales Tax, Series 1997 (Walton Arts Center)	1986	$2,610,000	$1,700,000
Water & Sewer, Series 1999 (Water Transmission Main)**	1992	$8,365,000	$7,815,000
Water & Sewer, Series 1994 (Water Transmission Main)	1994	$5,500,000	$3,585,000
Hotel & Restaurant, Series 1998 (Town Center)	1998	$6,950,000	$6,765,000
Water & Sewer, Series 2000 (Wastewater Improvements)	2000	$10,000,000	$10,000,000
Total		$36,100,000	$31,200,000

* as of December 31, 2000
** 12% for wastewater improvements per utility rate study
Source: City of Fayetteville, *Annual Budget and Work Program, 2001*, December 2000.

Impact fees are most appropriate for communities that are experiencing rapid growth. The Fayetteville-Springdale-Rogers Metropolitan Statistical Area (MSA), comprised of Washington and Benton Counties, was the sixth fastest growing MSA in the country in the 1990s.[3] Washington County, of which Fayetteville is the county seat, has been growing at a compound annual growth rate of 3.4 percent since 1990, and one-third of the population added since then has been in Fayetteville. The City itself has been growing at 3.2 percent annually, over twice as fast as the state as a whole. It is not surprising that this pace of growth has created problems in terms of the City's ability to finance the capital improvements needed to accommodate new development.

[3]U.S. Census Bureau, *Statistical Abstract of the United States: 2000*, Table No. 34, p. 33.

Table 6
POPULATION GROWTH, 1990-2000

	1990	1996	2000	Increase	Annual Rate
Fayetteville	42,249	52,976	58,047	15,798	3.23%
Springdale *	29,941	37,700	43,787	13,846	3.87%
Other Municipalities*	10,503	15,156	17,540	7,037	5.26%
Unincorporated	30,716	36,077	38,341	7,625	2.24%
Washington County	113,409	141,909	157,715	44,306	3.35%
State of Arkansas	2,350,624	n/a	2,673,400	322,776	1.30%

* only the Washington County portion of Springdale and Elm Springs
Source: U.S. Census Bureau; Northwest Regional Planning Commission

Over the last twelve years, the City has issued permits for an average of about 750 new dwelling units annually, as shown in Table 7.

Table 7
RESIDENTIAL BUILDING PERMITS, 1990-2001

Year	Single-Family	Townhouse	Duplex	Multi-Family	Total
1990	251	2	16	91	360
1991	259	0	62	297	618
1992	356	2	74	257	689
1993	434	0	256	342	1,032
1994	439	0	246	754	1,439
1995	452	60	186	320	1,018
1996	445	47	80	154	726
1997	265	0	64	281	610
1998	281	0	30	40	351
1999	357	8	54	515	934
2000	279	40	44	188	551
2001	411	17	48	223	699
Total	4,229	176	1,160	3,462	9,027
Annual Avg.	352	15	97	289	752

Source: City of Fayetteville, *General Plan 2020*, 2001 revision, p. 4-4; Planning Department, 3/26/02.

Only limited data has been released to-date from the 2000 census. In terms of housing units, only the total number of units has been released. However, the number of units by housing type can be estimated from the 1990 distribution and the building permits issued since that time. The census count is taken as of April 1. Based on building permit trends for the last twelve years, it is estimated that Fayetteville will have over 27,000 dwelling units by April 2002, as shown in Table 8.

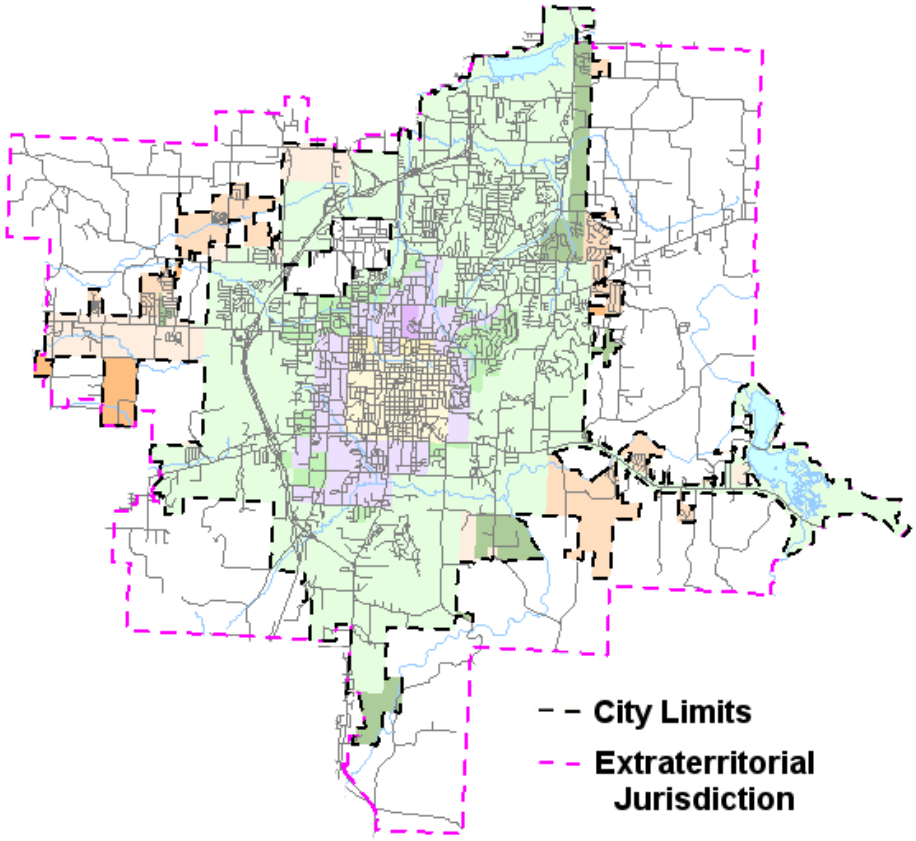
Table 8
HOUSING UNITS BY TYPE, 1990-2002

Housing Type	April 1990	12 Years of Permits	April 2002
Single-Family	9,276	4,229	13,505
Townhouse	460	176	636
Duplex	1,180	1,160	2,340
Multi-Family	6,907	3,462	10,369
Mobile Home	859	0	859
Other	153	0	153
Total	18,835	9,027	27,862

Source: 1990 units by type from U.S. census; units permitted over last 12 years from Table 7.

In addition to development within its incorporated limits, the City is also affected by, and has some control over, development in unincorporated areas within its extraterritorial jurisdiction. Within this area, which extends up to two and one-half miles from the corporate limits, the City exercises joint subdivision authority with Washington County. The combined corporate and extraterritorial jurisdictions are referred to as the City's planning area, which covers approximately 86 square miles.

Figure 1
PLANNING AREA



WATER

The City does not currently charge new water customers an impact fee to help defray the off-site capital costs to the utility system associated with a new customer (the City does charge a connection fee to cover costs associated with connection to the City's water line). Such a one-time, up-front fee, called by many names including capital recovery fee and system development charge, is one of the most common forms of development impact fees. While cities lack explicit statutory authority to impose water or wastewater impact fees in Arkansas, these fees have a long history and have been litigated in Arkansas. Consequently, there appears to be adequate legal authority for the City to impose water impact fees.

Service Area

The City sells water on a wholesale basis to four customers: the Washington Water Authority, the Mount Olive Water Association, the City of Elkins and the City of West Fork. In addition, the City provides retail water service, including water pipes, meters and billing, to development in the cities of Farmington and Greenland, as well as a portion of Johnson. As shown in Table 9, 81 percent of the City's water sales are to customers within Fayetteville's city limits.

Table 9
CURRENT WATER CUSTOMERS

Jurisdiction	June 2001 Consumption (100 gallons)	Percent
Fayetteville	2,903,568	81%
Elkins (wholesale)	46,291	1%
Farmington	95,658	3%
Greenland	28,578	1%
Growth Area	324,186	9%
Mount Olive (wholesale)	44,379	1%
West Fork (wholesale)	80,520	2%
RDA/WWA (wholesale)	0	0%
White River	47,411	1%
Total	3,570,591	100%

Source: Fayetteville Water and Sewer Department, "Consumption of Water Customers, June 2001."

It is recommended that the City's entire water service area should be treated as a single impact fee service area. A service area is an area subject to a uniform fee schedule. A single service area can be justified from several perspectives. First, from the perspective of an individual customer, the lay-out of the utility system and the customer's geographic relationship to components of the system, including location of treatment plants, size and placement of lines, and so forth, are discretionary decisions made by the utility. Moreover, water systems are designed with features to ensure system-wide reliability. This is illustrated by the fact that special mains are often installed to allow treatment facilities to serve several areas. Also, many systems are "looped" to provide redundant transmission facilities. These

system reliability aspects make it difficult or impossible to assign certain costs by geographic area. Additionally, there are facilities that serve various geographic areas and therefore present geographically unallocatable costs. Finally, the utility's entire rate revenue is pledged as security for the repayment of revenue bonds, making it impossible to allocate debt payment costs to subgroups of customers. In summary, because (1) many siting and design decisions are discretionary rather than locational; (2) systems are often designed with redundant facilities for system reliability; (3) some facilities have no geographic-specific service area; and (4) revenue bonds are backed by system-wide revenues, it can be argued that each utility operates as a complete, integrated system. Therefore, any customer who receives service from such a system may reasonably be considered to be receiving sufficient benefit from the payment of an impact fee, thus meeting the benefit nexus of the rational nexus test.

Water Demand

The City's 1996 *Water Master Planning Study* was based on 20-year population growth projections (1995-2015) for Fayetteville and four other communities whose water is provided by the City. The 2000 Census, however, revealed that the projections used in the master plan were significant underestimates. As shown in Table 10, the population served with City water in 2000 was very close to the population projected to be served by the year 2005.

Table 10
WATER MASTER PLAN POPULATION PROJECTIONS

Municipality	1990	1995	2000 Projected	2000 Actual	2005 Projected	2015 Projected
Fayetteville	42,099	49,264	54,046	58,047	60,647	76,364
Farmington	1,322	1,579	1,837	3,605	2,094	2,609
Greenland	757	858	958	907	1,059	1,260
Elkins	692	813	934	1,251	1,055	1,297
West Fork	1,628	1,768	1,908	2,042	2,048	2,329
Total	46,498	54,282	59,683	65,852	66,903	83,859

Source: All except 2000 actual from McGoodwin, Williams and Yates, Inc., *Fayetteville Water Master Planning Study*, October 1996; 2000 actual from 2000 U.S. census.

The water master plan analyzed historic water usage, and noted that water usage had been growing significantly faster than population. The plan used service population projections and the assumption that average day demand per person would continue to increase to project future average day demand. The per capita demand assumptions included nonresidential as well as residential demand. However, actual demand did not increase nearly as much as was projected, despite significantly more rapid population growth than was anticipated. In 2000, water demand averaged only 13.04 million gallons per day (mgd), not the 13.67 mgd that had been forecast. The reason that demand did not increase as expected is that two major water customers, Pinnacle Foods and Washington Water Authority, both made significant reductions in water usage since the master plan was prepared. For example, water purchased by Washington Water Authority went from 17 mg in June 1996 to zero in June 2001. Thus, the lower-than-expected increase in demand does not appear to be due to increased conservation by most customers, but to changes in demand by a couple of major users.

The water master plan noted that the ratio of maximum to average day water demand over the prior twenty years ranged from 1.25 in 1992 to 1.85 in 1990. It noted that "the potential certainly exists for a maximum day of approximately 2.0 times the average day in any given year," and used a two-to-one ratio to estimate potential maximum day demand from average day demand, as shown in Table 11.

Table 11
WATER DEMAND PROJECTIONS, 1995-2015

	1990	1995	2000 Projected	2000 Actual	2005 Projected	2015 Projected
Average Day Demand (mgd)	10.21	12.44	13.67	13.04	16.07	22.23
Service Population	46,498	54,282	59,683	65,852	66,903	83,859
Daily Demand per person (gpd)	220	229	229	198	244	265
Average Day Demand (mgd)	10.21	12.44	13.67	13.04	16.07	22.23
Maximum Day Demand (mgd)	15.69	21.56	27.34	n/a	32.15	44.46
Ratio of Max. to Avg. Demand	1.54	1.73	2.00	n/a	2.00	2.00

Source: All except 2000 actual from McGoodwin, Williams and Yates, Inc., *Fayetteville Water Master Planning Study*, October 1996; 2000 actual average day demand from memo from Fayetteville water/sewer maintenance superintendent, July 30, 2001; 2000 actual service population from Table 10.

Service Unit

A water utility must be able to supply water to satisfy demand that fluctuates over a wide range. Yearly, monthly, daily and hourly variations must all be accommodated. Water demand rates most important to the design and operation of a water system are average day, maximum day and maximum hour. The allocation of capital costs in this analysis is based on both average and maximum day water demand.

To calculate water impact fees, the water demand associated with different types of customers must be expressed in a common unit of measurement, called a "service unit." Water system components must be designed to meet peak demand. Consequently, water impact fees should reflect maximum potential demand, which is determined by the capacity of the water meter. This can be accomplished by developing factors that convert each meter size into multiples of a "Single-Family Equivalent" meter, or SFE. An SFE is a common denominator that converts all classes of customers into a common unit of expression. An SFE is the water demand associated with the smallest water meter used in the system (5/8" by 3/4"), which is the meter typically used by a single-family residence.

In order to calculate the cost of various types of water facilities to serve a service unit, it is necessary to determine the average amount of water consumed by a typical single-family unit. Dividing the average day demand generated by single-family customers in Fayetteville during the most recent 12-month period (July 2000 through June 2001) by the estimated number of single-family dwelling units in Fayetteville in 2001 yields a reasonably good estimate of average day water demand per single-family equivalent service unit. Multiplying that by the two-to-one ratio of maximum to average day demand provides the maximum day demand per service unit. These calculations are summarized in Table 12.

Table 12
WATER DEMAND PER SERVICE UNIT

Average Day Demand from Single-Family Customers, 2001 (gpd)	3,467,731
Estimated Single-Family Units in Fayetteville, 2001	13,069
Average Day Demand per Single-Family Equivalent (gpd)	265
Maximum Day Demand Factor	2.00
Maximum Day Demand per Single-Family Equivalent (gpd)	530

Source: City of Fayetteville, "Consumption of Water Customers," residential (single-family) users in Fayetteville, July 2000 through June 2001; 2001 single-family units in Fayetteville estimated from Table 8 using 2002 units and reducing by average annual growth rate; maximum day demand factor from Table 11.

The total number of existing service units served by the City's water system can be estimated from recent water consumption records. Increasing year 2000 water demand for two years by the annual percent increase in population during the last decade results in the estimate of current demand. Dividing that by the average day demand per single-family equivalent yields the current number of service units.

Table 13
WATER SERVICE UNITS, 2002

Average Day Water Demand, 2000 (mgd)	13.04
Annual Percent increase in Population, 1990-2000	3.23%
Average Day Water Demand, 2002 (mgd)	13.88
Average Day Demand per SFE (gpd)	265
Single-Family Equivalents, 2002	52,377

Source: 2000 average day demand from Table 11; average day demand per SFE from Table 12; annual percent increase in population from Table 6.

The fact that the City's water master plan did not precisely forecast population growth in the water service area or growth in demand during the first five years of the 20-year planning period does not invalidate it as a reasonable basis for the development of water impact fees. The improvements that were identified as needed during the planning period were based on the projected growth in demand, and the cost per increment of demand should be reasonably accurate, regardless of whether the growth, and thus the need for the improvements, occurs over 20 years or a somewhat different time period. As shown in Table 14, the projected growth in demand anticipated in the master plan is the equivalent of 36,943 new single-family units, regardless of whether one looks at growth in average day or maximum day demand.

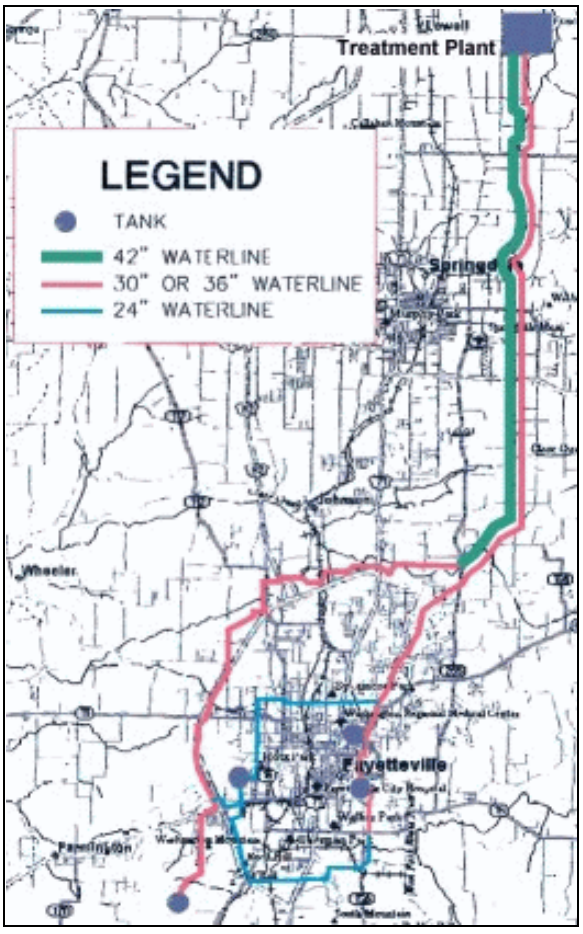
Table 14
PLANNED NEW WATER SERVICE UNITS, 1995-2015

	Average Day	Maximum Day
Projected Water Demand, 2015 (mgd)	22.23	44.46
Water Demand, 1995 (mgd)	12.44	24.88
New Water Demand, 1995-2015 (mgd)	9.79	19.58
Water Demand per SFE (gpd)	265	530
New Single-Family Equivalents (SFEs), 1995-2015	36,943	36,943

Source: 2015 and 1995 demand from Table 11 (1995 maximum day is 2 times average day); water demand per SFE from Table 12.

Treatment and Supply

Figure 2
WATER FACILITIES



The City of Fayetteville and three other cities make up the Beaver Water District, which operates two regional water treatment plants located east of Lowell, Arkansas (see Figure 2). The District pays only for the plants, with the cities responsible for constructing the transmission lines needed to get the water to their distribution systems. The regional water treatment plants were expanded about five years ago. The City's water master plan did not provide costs for centralized facilities, since the City does not own the water treatment plants. It may be difficult to charge impact fees for water treatment capacity because the City does not directly own the facilities. Insufficient information is available to determine the capital cost of the treatment plants paid by Fayetteville, and no such costs will be included in the impact fee calculations for the purpose of this study.

The treated water supplied by the Beaver Water District is pumped through parallel 36-inch and 42-inch diameter transmission lines. The high service pump station at the Beaver Water District is equipped with four vertical turbine pumps, capable of delivering about 30.6 mgd of treated water to the City of Fayetteville each day. The pump station and the new 42-inch line were put into full-time operation in 1993. The lines run south from the plant, over Fitzgerald Mountain and into the Fayetteville system east of Lake Fayetteville. A surge tank 20 feet in diameter by 100 feet tall is located on top of Fitzgerald Mountain. The surge tank has a capacity of 0.25 million gallons (mg) and functions as a buffer for the operation of the high service pumps at the Beaver Water District. A hydraulic model indicates that the maximum capacity of the parallel transmission lines is approximately 46 mgd.

The 1996 water master plan determined that the capacity of the transmission lines from the Beaver Water District would be adequate to accommodate projected growth in water demand through 2015, but that the capacity of the pumping station would be reached shortly after the year 2000. However, it noted that facilities are in place for adding a new pump or pumps to meet this demand.

Although the water master plan did not provide any cost estimates for expanding the capacity of the pumping stations or transmission lines, Fayetteville's water utility has incurred the cost of constructing the existing facilities in order to provide capacity for its growing customer base. In fact, the majority of the City's existing water revenue bond debt is continuing to pay for these water supply facilities. The current replacement cost of the transmission lines and associated facilities is estimated to be about $16.3 million. Dividing the current replacement cost by the capacity of the lines results in the cost to new customers of 35 cents per gallon per day of maximum day water demand, as shown in Table 15. Multiplying this by the maximum day demand generated by a single-family unit results in the water supply cost per service unit.

Table 15
WATER SUPPLY COST PER SERVICE UNIT

Original Cost of 36" Line and Associated Facilities	$7,332,339
Original Cost of 42" Line (in operation 1993)	$5,744,922
Total Original Cost of Supply Facilities	$13,077,261
Cost Inflation Factor, 1993-2002	1.248
Current Replacement Cost of Supply Facilities	$16,320,422
Transmission Line Capacity (gpd)	46,000,000
Supply Facility Cost per Maximum Day Gallon	$0.35
Maximum Day Demand per SFE (gpd)	530
Supply Facility Cost per SFE	$186

Source: Original costs from City of Fayetteville; cost inflation factor is *Engineering News-Record* Construction Cost Index, ratio of March 2002 to annual average for 1993; line capacity from McGoodwin, Williams and Yates, Inc., *Fayetteville Water Master Planning Study*, October 1996, p. 3-3; maximum day demand per SFE from Table 12.

Water Storage Tanks

The City's water distribution system is divided into five pressure planes. The primary pressure plane, which receives all of the water delivered from the Beaver Water District, currently has six ground storage tanks and two elevated storage tanks located at five sites with a total capacity of 27.75 mg. Because many areas of the city are above the overflow elevation of the primary pressure plane, water must be repumped to supply four additional areas of high elevation. Two of these have small elevated storage tanks, while adequate pressure in the other two is maintained by the use of variable speed pump stations. The entire system has just over 28 mg of storage capacity (see Table 16).

Table 16
EXISTING WATER STORAGE FACILITIES

Existing Tanks	Capacity(mg)
Baxter Ln at North St	1.000
Baxter Ln at North St	5.000
Rogers Dr	4.000
Rogers Dr	4.000
Kessler Mountain	6.000
Kessler Mountain	6.000
Markham Hill (elevated)	1.000
Gully Road (elevated)	0.750
Subtotal, Primary Pressure Plane	27.750
Sequoyah/Hyland Park Pressure Plane (elevated)	0.250
Township Pressure Plane (elevated)	0.075
Highway 45 E Pressure Plane (pump)	0.000
South Mountain Pressure Plane (pump)	0.000
Total System	28.075

Source: McGoodwin, Williams and Yates, Inc., *Fayetteville Water Master Planning Study*, October 1996.

According to the water master plan, storage requirements in the water distribution system are determined by the needs of operational storage, fire flow and emergency storage. Operational storage should be about 20 percent of maximum day demand. Fire flow requirements are based on judgement on the required duration of flows based on the level of risk in the community, and were determined in cooperation with the City fire department. Emergency storage needs are generally set at about two days of average usage.

The water system's current needs at the time the water master plan was prepared were determined to be over 32 mg, which is considerably higher than the existing storage capacity, which is just over 28 mg. This deficiency has no doubt increased somewhat in the intervening five years, as demand has grown while no additional storage capacity has been added. As can be seen in Table 17, the capacity needs projected by the master plan show a strong relationship to water demand, with an average of 2.63 gallons of storage capacity needed per gallon of average day demand.

Table 17
WATER STORAGE NEEDS, 1995-2015

Storage Requirements	1995	2000	2005	2015
Operational (mg)	4.30	5.50	6.40	8.90
Fire Flow (mg)	3.00	3.50	4.00	5.00
Emergency (mg)	24.90	27.30	32.10	44.50
Total System (mg)	32.20	36.30	42.50	58.40
Average Day Water Demand (mgd)	12.44	13.67	16.07	22.23
Gallons of Storage per Gallon of Avg. Day Demand	2.59	2.66	2.64	2.63

Source: McGoodwin, Williams and Yates, Inc., *Fayetteville Water Master Planning Study*, October 1996.

Applying the ratio of storage capacity to demand to current conditions indicates that the existing capacity deficiency is on the order of 8 million gallons, as shown in Table 18.

Table 18
WATER STORAGE DEFICIENCY, 2002

Average Day Water Demand, 2002 (mgd)	13.880
Gallons of Storage per Gallon of Avg. Day Demand	2.630
Current Storage Capacity Needs (mg)	36.500
Current Storage Capacity (mg)	28.075
Existing Storage Capacity Deficiency (mg)	8.425

Source: 2002 average day demand from Table 13; storage capacity per mgd of demand is average from Table 17; current capacity from Table 16.

The cost of new storage capacity varies significantly depending on whether the tanks are elevated or ground storage. Of the improvements called for in the water master plan, the bulk of the new capacity should be in ground storage. The average cost of new storage capacity is about $0.44 per gallon, as shown in Table 19.

Table 19
PLANNED WATER STORAGE COSTS, 1995-2015

Planned Storage Improvements	Capacity (mg)	Cost	Cost/Gallon
Hwy 45E Elevated Storage Tank	2.0	$2,800,000	$1.400
Mt. Sequoyah Elevated Storage Tank	2.0	$2,800,000	$1.400
Primary Pressure Plane Ground Storage (1-5 yrs)	6.0	$1,900,000	$0.317
Primary Pressure Plane Ground Storage (5-10 yrs)	12.0	$3,800,000	$0.317
Primary Pressure Plane Ground Storage (10-15 yrs)	12.0	$3,800,000	$0.317
Total	34.0	$15,100,000	$0.444

Source: McGoodwin, Williams and Yates, Inc., *Fayetteville Water Master Planning Study*, October 1996.

Based on the average cost per gallon to expand storage capacity derived from the water master plan, the storage cost per single-family equivalent is shown in Table 20.

Table 20
WATER STORAGE COST PER SERVICE UNIT

Average Storage Cost per Gallon	$0.444
Gallons of Storage per Gallon of Average Day Demand	2.63
Cost per Gallon of Average Day Demand	$1.17
Avg Day Demand per SFE (gpd)	265
Storage Cost per Single-Family Equivalent (SFE)	$310

Source: Storage cost per mg from Table 19; ratio of storage to average day demand from Table 17; average day demand per SFE from Table 12.

A portion of the cost of planned improvements, however, is attributable to existing customers due to the existing storage capacity deficiency. The cost to remedy this deficiency is about $3.1 million, as

shown below. Dividing this cost by the number of existing service units represents the cost of remedying the deficiency per existing customer, which will be paid by new customers as well.

Table 21
WATER STORAGE DEFICIENCY COST PER SERVICE UNIT

Existing Storage Capacity Deficiency (gallons)	8,425,000
Average Storage Cost per Gallon	$0.444
Storage Deficiency Cost	$3,740,700
Estimated 2002 SFEs	52,377
Storage Deficiency Cost per SFE	$71

Source: Storage capacity deficiency from Table 18; cost per gallon from Table 19; 2002 SFEs from Table 13.

To avoid double-charging new customers by charging them the full cost of the storage capacity they will require, while also charging them, through their rate payments, to remedy existing capacity deficiencies, the deficiency cost per service unit calculated above is deducted from the cost of new growth-related storage capacity to determine the net cost per service unit, as shown in Table 22.

Table 22
WATER STORAGE NET COST PER SERVICE UNIT

Storage Cost per Single-Family Equivalent (SFE)	$310
Storage Deficiency Cost per SFE	$71
Storage Net Cost per SFE	$239

Source: Cost per SFE from Table 20 ; deficiency cost per SFE from Table 21.

Transmission Lines

The costs per service unit for the other components of the water system have been calculated by determining an average cost per unit of capacity. This approach is not feasible for water transmission and distribution lines, since we do not have detailed demand and capacity data for all existing lines. There are two reasonable methodologies for determining line costs: the improvements-driven approach and the buy-in approach.

The improvements-driven approach divides the cost of planned improvements by projected growth in service units over the planning period. The concept here is that while the planned improvements may create some excess capacity beyond what is needed by projected growth, it is likely that the existing system also has some excess capacity that will be used by new customers, and that over the long term these tend to balance out.

The City's 1996 water master plan identifies the major water transmission lines, ranging in size from 12 to 24 inches in diameter, that will be needed to accommodate projected growth in the planning area over the 20-year planning horizon covered by the master plan (1995 to 2015). These line improvements are summarized in Table 23 and illustrated in Figure 3. The costs shown in Table 23 represent the portion of the cost typically paid by the City. When a line needs to be extended to provide service to a new development, developers pay the cost of the line needed to serve the

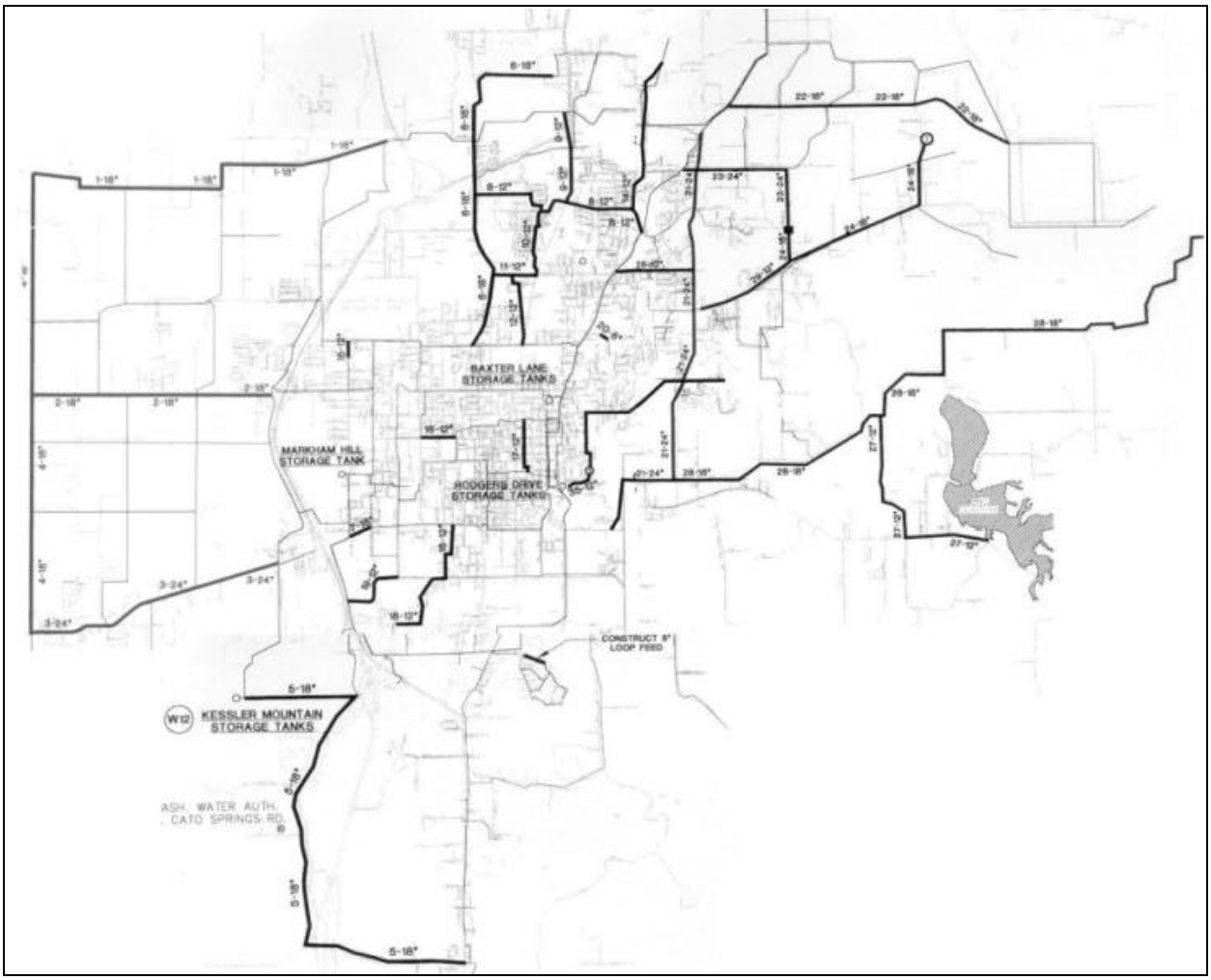
subdivision, which in most cases is an eight-inch line (six-inch water lines are acceptable under some situations). If the line needs to be oversized to serve other developments, the City pays for the cost of the oversizing. In a few cases, the City has required a developer to front the entire cost of a water line, and used a pro rata agreement to recoup some of line cost from subsequent developers benefitting from the line, which is then remitted to the original developer. Consequently, the line costs shown are the total costs, less the cost of installing the same length of eight-inch line.

Table 23
PLANNED WATER LINE IMPROVEMENTS, 1995-2015

Line Description	Size (in.)	Linear Feet	Cost/Foot	Cost
Mall West on Joyce, S on Gregg to Sycamore	18	20,000	$54	$1,080,000
Phillip East on 6th to Lewis	18	1,500	$54	$81,000
Appleby & Gregg W to Old Wire Rd	12	12,000	$14	$168,000
Millsap S on College to Rolling Hills	12	5,000	$14	$70,000
Deane S on Sang to Lawson	12	1,000	$14	$14,000
6th and Ellis S to Cato Springs and Vale	12	8,000	$14	$112,000
Oakland Zion W on Hwy 45 to Crossover	12	6,000	$14	$84,000
Crossover W to Prop Hwy 45E Pump Station	24	10,000	$66	$660,000
Prop Hwy 45E Pump Station to Prop Hwy 45E Tank	18	15,000	$54	$810,000
Rebecca S on Washington to Spring	12	3,000	$14	$42,000
Fiesta Square S to Township	12	4,000	$14	$56,000
Gregg E on Township to College	12	3,000	$14	$42,000
Township S on Green Acres to Sycamore	12	4,000	$14	$56,000
Joyce S on Old Missouri to Rolling Hills	12	6,000	$14	$84,000
Garland E on Maple to Whitham	12	2,000	$14	$28,000
Bypass W along Hwy 16	18	14,000	$54	$756,000
Bypass W along Hwy 62	24	15,000	$66	$990,000
Zion S on Old Missouri to Joyce	12	3,500	$14	$49,000
Old Wire S on Crossover to 15th St	24	32,000	$66	$2,112,000
Old Wire E on Township to Crossover	12	5,000	$14	$70,000
Mt. Sequoyah Tank to Hyland Park	16	16,000	$27	$432,000
Rodgers Pump Station to Mt Sequoyah Tank	12	2,400	$14	$33,600
Bypass W along Salem Rd	18	22,000	$54	$1,188,000
Kessler Tanks to Greenland	18	27,000	$54	$1,458,000
15th St W to Bypass	12	4,000	$14	$56,000
Crossover E to Goshen (N Loop)	18	20,000	$54	$1,080,000
Wyman S on Harvey Owl to Elkins	12	15,000	$14	$210,000
Crossover E to White River System (S Loop)	18	20,000	$54	$1,080,000
Farmington N to Wheeler	18	26,000	$54	$1,404,000
Total		322,900		$14,305,600

Source: McGoodwin, Williams and Yates, Inc., *Fayetteville Water Master Planning Study*, October 1996, Tables 10.1 and 10.2 (excludes line required to connect to White River Rural Water System);.

Figure 3
PLANNED WATER IMPROVEMENTS



Dividing the line improvement cost over the 20-year planning horizon from the water master plan by the growth in service units implicit in the plan's projections of water demand results in the water line cost per single-family equivalent, shown in Table24. This amount is warranted if the improvement-driven approach is used to calculate water line costs.

Table 24
WATER LINE COST PER SERVICE UNIT, IMPROVEMENT APPROACH

Planned Line Improvements, 1995-2015	$14,305,600
New Single-Family Equivalents (SFEs), 1995-2015	36,943
Water Line Cost per SFE	$387

Source: Planned line improvement costs from Table 23; new SFEs from Table 14.

The alternative to the improvements-driven approach for calculating line costs is the buy-in approach. In this approach, the total replacement value of the City share of costs for existing lines is calculated and divided by existing service units. The concept here is that the existing ratio of line costs to customers is a reasonable guide to future costs to accommodate new customers. In other words, the system of transmission and distribution lines will need to be expanded proportionately to accommodate future growth. At current replacement costs, the City share of existing line costs is about $8.5 million. Dividing this by current single-family equivalents yields a line cost of $170 per SFE, using the buy-in approach. This is less than one-half of the cost per service unit derived using the improvements-driven approach, and is the method recommended in this study. Besides being more conservative, it has the advantage that it is not tied to a specific list of improvements.

Table 25
WATER LINE COST PER SERVICE UNIT, BUY-IN APPROACH

Size (inches)	Length (Feet)	City Cost per Foot	Replacement City Cost
10	16,421	$7	$115,000
12	152,698	$14	$2,138,000
14	9,451	$20	$189,000
16	11,722	$26	$305,000
18	5,280	$53	$280,000
20	11,722	$60	$703,000
24	62,568	$66	$4,129,000
30	9,029	$72	$650,000
Total City Replacement Cost			$8,509,000
Estimated 2002 SFEs			52,377
Line Cost per SFE			$162

Source: Water line lengths by size from City of Fayetteville, October 8, 2001 memorandum; costs per foot excluding cost for an 8" line from Table 23 or interpolated; 2002 SFEs from Table 13.

Revenue Credits

New water customers connecting to Fayetteville's water system will pay an impact fee to cover the cost of providing the capacity needed to serve them. They will also pay through their rate payments to retire the outstanding debt from past improvements. In some cases, a credit against the impact fees for debt retirement may be warranted. Finally, new development pays sales tax on construction materials, a portion of which is earmarked for capital improvements and spent on water system improvements, and a credit should be provided for this contribution.

When a credit should be given for debt service payments can be illuminated with an example. Imagine that impact fees are being imposed just prior to the issuance of bonds to pay for a treatment plant expansion to serve growth. The impact fees could be used to repay all of the debt, in which case new customers would not be paying any of the debt service through their rates, and are obviously not deserving of a credit. To the extent that the impact fees are not sufficient to retire the debt, because, for example, they are insufficient to cover the interest, here again no credit is due, since the impact fees were not designed to pay for the interest. Similarly, if the impact fees are used to pay for other growth-

related costs and cannot also cover the debt service on the treatment plant expansion, some of new customers' rate payments are being used to retire the debt, but again this only points to the fact that the impact fees were not high enough to cover the full costs of growth.

When credit is due is when new customers are helping to retire debt for capacity that is being used by existing customers. Most of the water utility's outstanding debt was incurred to pay for the parallel transmission lines and associated facilities used to convey water from the Beaver Water District. The capacity of these lines has been determined to be 46 mgd. Current maximum day demand from existing customers can be estimated to be about 28 mgd. However, existing customers have already retired about 18% of the debt. Of the remaining unpaid-for capacity in the lines, existing development is using about one-half (see Table 26). This percentage of the debt should not be paid for by new customers.

Table 26
ELIGIBLE SHARE OF WATER SYSTEM DEBT

Total Transmission Line Capacity (mgd)	46.00
Percent of Original Debt Outstanding	82.2%
Capacity Not Paid For (mgd)	37.81
Current Maximum Day Water Demand, 2001 (mgd)	27.76
Used Capacity Paid For (mgd)	8.19
Used Capacity Not Paid For (mgd)	19.57
Used Capacity Share of Total Capacity Not Paid For	0.518

Source: Transmission line capacity from McGoodwin, Williams and Yates, Inc., *Fayetteville Water Master Planning Study*, October 1996; percent of original debt outstanding from City of Fayetteville, *Annual Budget and Work Program, 2001*, December 2000; current maximum day demand is two times average day demand from Table 13; used capacity paid for is difference between total capacity and capacity not paid for.

Applying the percentage calculated above to the outstanding debt yields the portion of the debt that is attributable to capacity already consumed by existing customers. All customers, existing and new, will retire this portion of the debt. Dividing the eligible debt portion by the number of current single-family equivalent customers results in the debt credit per service unit, as summarized in Table 27.

Table 27
WATER DEBT CREDIT PER SERVICE UNIT

Outstanding Water System Debt	$10,462,200
Portion of Debt Eligible for Credit	51.8%
Eligible Outstanding Water System Debt	$5,419,420
Water Single-Family Equivalents (SFEs), 2002	52,377
Water Debt Credit per SFE	$103

Source: Outstanding debt from City of Fayetteville, *Annual Budget and Work Program, 2001*, December 2000; portion of debt eligible for credit from Table 26; 2002 SFEs from Table 13.

In addition to paying off outstanding debt for facilities used by existing customers, new customers will pay a one-time sales tax on construction materials that will be used to fund some water capital

improvements. They will also pay sales tax annually on taxable purchases in Fayetteville, a portion of which will be used to pay for capital improvements to the water system. In the City's current Capital Improvements Program, almost one-quarter of planned water improvements are to be funded from sales tax revenues. Since six percent of sales tax revenue comes from the sale of construction materials, the water impact fee should be reduced by about one and one-half percent to account for new customers' contribution through sales tax paid on construction materials. In addition, new water customers, along with existing development, will be paying sales tax on other purchases over the next 25 years, a time period often used as the useful life of capital improvements. The portion of this future stream of tax payments that would be used for water system improvements has an equivalent present value of $170 per service unit, as shown in Table 28.

Table 28
WATER SALES TAX CREDIT

Sales Tax Funding for Planned Water Projects, 2000- 2004	$3,205,500
Total Water Projects, 2000-2004 CIP	$13,043,000
Percent of Water/Sewer Improvements Funded by Sales Tax	24.6%
Percent of Sales Tax from Construction Materials	6.0%
Percent Credit for Construction Sales Tax	1.5%
Sales Tax Funding, Excluding Construction Tax, 2000-2004	$3,157,418
Annual Non-Construction Sales Tax Funding	$631,484
Water Single-Family Equivalents (SFEs), 2002	52,377
Annual Non-Construction Sales Tax Funding per SFE	$12.06
Net Present Value Factor (25 Years at 5% Discount Rate)	14.09
Non-Construction Sales Tax Credit per SFE	$170

Source: Total water/sewer project costs and sales tax funding for water sewer projects form City of Fayetteville, *Five Year Capital Improvements Program, 2000 - 2004*; percent of sales tax from construction materials for 1996-2000 from City Budget Office, October 8, 2001 memorandum; 2002 water SFEs from Table 13.

Maximum Impact Fees

The net cost per service unit is the capital cost to serve new customers, less any credits to account for existing capacity deficiencies or other revenues that will be generated by new development to pay for facilities benefitting existing customers. A credit was provided in the calculation of the cost of water storage facilities to account for existing capacity deficiencies in that component of the water system. Adding the costs per service unit of transmission lines, storage tanks and major distribution lines results in the total cost per service unit. Deducting the credit for debt payments attributable to facilities serving existing development and sales tax that will be generated by new development and used for water system capital improvements results in the net cost per service unit. This represents the maximum impact fee that can be charged to new customers of Fayetteville's water system.

Table 29
WATER NET COST PER SERVICE UNIT

Water Supply Cost per SFE	$186
Net Storage Cost per SFE (After Deficiency Credit)	$239
Line Cost per SFE (Buy-In Approach)	$162
Total Cost per SFE	$587
Debt Credit per SFE	$103
Construction Sales Tax Credit per SFE (1.5%)	$9
Non-Construction Sales Tax Credit per SFE	$170
Net Cost per SFE	$305

Source: Water supply cost from Table 15; storage cost from Table 22; distribution line cost from Table 25; debt credit from Table27; construction sales tax credit is total cost times percent credit from Table 28; non-construction sales tax credit from Table 28.

While the impact fees for nonresidential development will be based on water meter size, the fees for residential uses will be assessed on a per dwelling unit basis. In general, water usage is proportional to the number of people, witness the widespread employment of per capita consumption ratios to project future water demand.[4] Single-family units tend to have more residents than multi-family or mobile home units, and larger single-family units tend to have larger households than smaller homes. These relationships can be used to develop water (and wastewater) impact fees per dwelling unit that distinguish between types of housing and that also vary the fee for single-family units based on dwelling unit size.

The best available source of data on household size by type of dwelling unit in Fayetteville is still the 1990 U.S. Census. Comparable data from the 2000 census will not be available for a couple of years. The 2000 census data that is available indicates that the average household size for all types of units in Fayetteville has declined slightly since 1990, from 2.26 to 2.21 persons per unit. This slight decline could easily be due to a slight increase in the proportion of multi-family units, and tends to indicate that 1990 household sizes by housing type have been relatively stable.

[4] U.S. Geological Survey, *Estimated Use of Water in the United States in 1995*, U.S. Government Printing Office, 1998

The census has two variables that are related to dwelling unit size: rooms and bedrooms. Of the two, rooms was chosen as likely to be the more objective measure. The Census Bureau defines rooms as excluding hallways, bathrooms, porches and unfinished attics and basements. Average household sizes for single-family units by number of rooms was derived from the 1990 U.S. Census five-percent sample data. This data is available only for geographic areas of at least 100,000 population, and consequently it is only available for Washington County. However, the data for Washington County should be reasonably representative of Fayetteville, since Fayetteville's population was 37 percent of Washington County's population in 1990.

To convert single-family units with a certain number of rooms into square footage ranges, the consultant took a 50 percent sample of all single-family homes listed for sale in Fayetteville from the National Association of Realtors website (www.realtor.com). The on-line listings give square footage ranges and the number of rooms. A comparison of the distribution of units from the census with the distribution from the realtor website indicates that the realtors tend to report a higher number of rooms (6.4 rooms per unit on average, compared to 5.6 room from the census data). To adjust for this difference, the number of rooms reported by the realtors were reduced by one, and the resulting distributions were much more comparable. The results are displayed in Table 30.

Table 30
SINGLE-FAMILY UNIT SIZE

No. of Rooms*	Sample Size	Average (sq. ft.)	Range (sq. ft.)
4 or fewer	178	1,170	1,300 or less
5	187	1,506	1,301 to 1,700
6	131	1,881	1,701 to 2,300
7 or more	133	2,807	more than 2,300
Total	629		

*reduced by one to be comparable with census data
Source: 50% sample (every other 5 listings in order of asking price) of single-family units listed for sale in Fayetteville from www.realtor.com on March 5, 2002; ranges broken at approximate midpoints between averages.

The 1990 U.S. Census five-percent sample data include records for 1,613 single-family households in Washington County. These occupied dwelling units are distributed relatively evenly into four size categories based on the number of rooms in the unit. The average number of residents in each size category is shown in Table 31.

Table 31
SINGLE-FAMILY HOUSEHOLD SIZE BY ROOMS

No. of Rooms	Sample Size	Avg. Household Size
4 or fewer	281	1.97
5	578	2.49
6	382	2.81
7 or more	372	3.15
Total	1,613	

Source: 1990 U.S. Census 5% sample Public Use Micro Sample (PUMS) data for Washington County, AR.

The number of service units (single-family equivalents) associated with residential units by type and size (for single-family units only) are based on the ratio of average household size to the average household size of a typical single-family unit, which represents one service unit. Single-family units below 1,700 square feet tend to have smaller-than-average households and therefore represent less than one SFE, while larger units represent more than one service unit, as shown in Table 32.

Table 32
RESIDENTIAL WATER SERVICE UNITS

Housing Type	Average Household Size	SFEs/ Unit
Multi-Family (average)	1.82	0.70
Single-Family, up to 1,300 sq. ft.	1.97	0.75
Single-Family, 1,301 to 1,700 sq. ft.	2.49	0.95
Mobile Home (average)	2.49	0.95
Single-Family (average)	2.61	1.00
Single-Family, 1,701 to 2,300 sq. ft.	2.81	1.08
Single-Family, more than 2,300 sq. ft.	3.15	1.21

Source: 1990 U.S. Census data for Fayetteville; average household sizes for average single-family, multi-family and mobile home units from 100% count census data; average household sizes for single-family units by size categories from Table 31; SFEs/unit is ratio of average household size of unit to average household size of average single-family unit.

As described earlier, a water service unit represents the water demand of a typical single-family connection, which is a 5/8" x 3/4" meter. The number of nonresidential service units associated with larger meters are based on the relative hydraulic capacity of the meter compared to the smallest meter size. The meter capacity ratios are based on safe maximum continuous duty flow standards promulgated by the American Water Works Association. These ratios, which represent the number of service units, or SFEs, associated with a meter of a given size, are shown in Table 33.

The maximum water impact fees are calculated by multiplying the service units per dwelling unit or per nonresidential meter by the net cost per service unit. The maximum fees calculated in this report are presented in Table 33.

Table 33
WATER MAXIMUM FEE SCHEDULE

Land Use (Dwelling Size or Meter Size)	Meter Capacity (gpm)	SFEs/ Unit or Meter	Net Cost/ SFE	Net Cost/ Unit or Meter
Single-Family (up to 1,300 sq. ft.)	n/a	0.75	$305	$229
Single-Family (1,301 to 1,700 sq. ft.)	n/a	0.95	$305	$290
Single-Family (1,701 to 2,300 sq. ft.)	n/a	1.08	$305	$329
Single-Family (more than 2,300 sq. ft.)	n/a	1.21	$305	$369
Multi-Family	n/a	0.70	$305	$214
Mobile Home	n/a	0.95	$305	$290
Nonresidential (5/8" x 3/4" Meter)	10	1.00	$305	$305
Nonresidential (1" Meter)	25	2.50	$305	$763
Nonresidential (1-1/2" Meter)	50	5.00	$305	$1,525
Nonresidential (2" Meter)	80	8.00	$305	$2,440
Nonresidential (3" Meter)	160	16.00	$305	$4,880
Nonresidential (4" Meter)	250	25.00	$305	$7,625
Nonresidential (6" Meter)	500	50.00	$305	$15,250
Nonresidential (8" Meter)	800	80.00	$305	$24,400
Nonresidential (10" Meter)	1,150	115.00	$305	$35,075

Source: SFEs per residential unit from Table 32; meter capacities are maximum safe continuous duty flows in gallons per minute from the American Water Works Association; SFEs per meter are ratios of meter capacities to capacity of smallest meter; net cost per SFE from Table 29.

The annual revenue that could be generated if the water impact fees are adopted at the maximum amount is estimated to be about $340,000, as shown in Table 34.

Table 34
POTENTIAL ANNUAL WATER IMPACT FEE REVENUES

Net Cost per Single-Family Equivalent	$305
Average Annual New Single-Family Units in Fayetteville, 1990-2001	352
Potential Annual Revenue from Fayetteville's Single-Family Growth	$110,000
Fayetteville Single-Family Customers as Share of Total System Usage	32.2%
Potential Annual Water Impact Fee Revenue	$340,000

Source: Net cost per SFE from Table 29; average new single-family units from Table 7; Fayetteville single-family customers' share of total water usage from Fayetteville Water and Sewer Department, "Consumption of Water Customers (Usage in 100 Gallons)," July 2000 through June 2001.

WASTEWATER

The City does not currently charge new wastewater customers an impact fee to help defray the off-site capital costs to the utility system associated with a new customer (the City does have a connection fee to cover costs associated with connecting to the system). Such a one-time, up-front fee, called by many names including capital recovery fee and system development charge, is one of the most common forms of development impact fees. While cities lack explicit statutory authority to impose water or wastewater impact fees in Arkansas, these fees have a long history and have been litigated in Arkansas. Consequently, there appears to be adequate legal authority for the City to impose wastewater impact fees.

Service Area

The City's wastewater treatment plant processes wastewater for the cities of Fayetteville, Elkins, Farmington, Greenland and parts of Johnson. The City also maintains the sewer collection systems for the cities of Farmington and Greenland, although the cities own the pipes. However, 95 percent of the wastewater treated by the City is generated within the city limits, as shown in Table 35.

Table 35
CURRENT WASTEWATER CUSTOMERS

Jurisdiction	June 2001 Usage (100 gal)	Percent
Fayetteville	2,552,797	95%
Elkins (wholesale)	15,591	1%
Farmington	84,961	3%
Greenland	22,656	1%
Johnson	7,513	0%
Total	2,683,518	100%

Source: Fayetteville Water and Sewer Department, "Consumption of Sewer Customers, June 2001."

As with the water system, it is recommended that the City's entire wastewater service area should be treated as a single impact fee service area. The arguments in favor of a single service area, laid out in detail in the water section, can be summarized as follows: (1) many siting and design decisions are discretionary rather than locational; (2) systems are often designed with redundant facilities for system reliability; (3) some facilities have no geographic-specific service area; and (4) revenue bonds are backed by system-wide revenues. The decision to implement a wastewater system improvement project with a split watershed concept, discussed in detail below, is an excellent illustration of the first point cited above. The City could expand the existing treatment plant and continue to use lift stations to transport sewage from the Illinois River basin, but instead has decided to construct a second plant on the west side of town. While this decision will result in two largely separate wastewater collection and treatment systems, the new plant to the west will create capacity for additional growth in the east by diverting flows from the existing plant. In these ways, it can be seen that the wastewater utility operates as a complete, integrated system. Therefore, a new customer who receives service from this system may reasonably be considered to be receiving sufficient benefit from the payment of an impact fee, thus meeting the benefit nexus of the rational nexus test.

Wastewater Demand

Two of the most significant measures of wastewater demand are average daily flow and average daily flow during the peak month (usually calculated as a 30-day moving average). Peak daily and hourly flows are also important for some components of the collection system. The 1997 *Fayetteville Wastewater Facility Plan* conducted an analysis of historic water usage from 1992 through 1995. From this analysis, the plan determined that peak month flows would be estimated based on a factor of 1.56 times average daily flows. Current annual average flow to the plant is estimated to be 11.8 mgd.[5]

The *Wastewater Facility Plan* projections of average daily flows for 2020 were based on a number of factors. Residential flows from Fayetteville were projected based on 1995-2020 population growth projections from the Northwest Arkansas Regional Planning Commission and a residential generation rate of 68 gallons per capita per day (gpcd). Flows from outlying areas were estimated based on projected population growth and historic flows. Most of the existing industrial flows are generated by the four largest industries–Pinnacle Foods, Tyson Foods, Mexican Original and Hiland Dairy (1.5 of 2.2 mgd). An additional two mgd was added to current industrial usage to allow for anticipated industrial growth. Future dry weather infiltration was projected using the existing ratio of 30 gpcd. The components of projected average daily wastewater flows are summarized in Table 36.

Table 36
WASTEWATER AVERAGE DAILY FLOW, 2020

City Population	85,090
Residential Flow per Capita (gpd)	68
City Residential Flow (mgd)	5.8
City Commercial Flow (mgd)	2.2
City Industrial Flow (mgd)	4.2
Elkins/Farmington/Greenland (mgd)	0.7
Dry Weather Infiltration (mgd)	2.6
Subtotal, Dry Weather Flow (mgd)	15.5
Wet Weather Inflow (mgd)	6.0
Total Average Daily Flow (mgd)	21.5

Source: CH2M-Hill, *Fayetteville Wastewater Facility Plan*, February 1997.

[5]City of Fayetteville, *Wastewater System Improvement Project, Overview of Project Facility Plan and Environmental Information Document, RLF Project No. 05-CS-050760-03*, September 20, 2001.

Service Unit

To calculate wastewater impact fees, the wastewater demand associated with different types of customers must be expressed in a common unit of measurement, called a "service unit." As with the water impact fee, the service unit for the wastewater impact fee is the "Single-Family Equivalent" customer, or SFE. An SFE is a common denominator that converts all classes of customers into a common unit of expression. As with the water impact fee, the wastewater impact fee for nonresidential uses will be based on the size of the water meter (or on an individual analysis of wastewater demand if no water meter is used). A wastewater SFE is the wastewater demand associated with the smallest water meter used in the system (5/8" by 3/4"), which is the meter typically used by a single-family residence.

In order to calculate the cost of various types of wastewater facilities to serve a service unit, it is necessary to determine the average amount of wastewater generated by a typical single-family unit. Dividing the average daily flows generated by single-family customers in Fayetteville during the most recent 12-month period (July 2000 through June 2001) by the estimated number of single-family dwelling units in Fayetteville in 2001 yields a reasonably good estimate of average daily wastewater demand per single-family equivalent service unit. Multiplying that by the 1.56 ratio of peak month to average daily demand provides the peak month demand per service unit. These calculations are summarized in Table 37.

Table 37
WASTEWATER DEMAND PER SERVICE UNIT

Average Daily Flows from Single-Family Customers, 2001 (gpd)	3,335,717
Estimated Single-Family Units in Fayetteville, 2001	13,069
Average Daily Flow per Single-Family Equivalent (gpd)	255
Peak Month Factor	1.56
Peak Month Flow per Single-Family Equivalent (gpd)	398

Source: City of Fayetteville, "Consumption of Sewer Customers," residential (single-family) users in Fayetteville, July 2000 through June 2001; 2001 single-family units in Fayetteville from Table 12; peak month factor from CH2M-Hill, *Fayetteville Wastewater Facility Plan*, February 1997.

The total number of existing service units served by the City's wastewater system can be estimated from current daily flow. Dividing that by the average daily flow per single-family equivalent yields the number of existing service units.

Table 38
WASTEWATER SERVICE UNITS

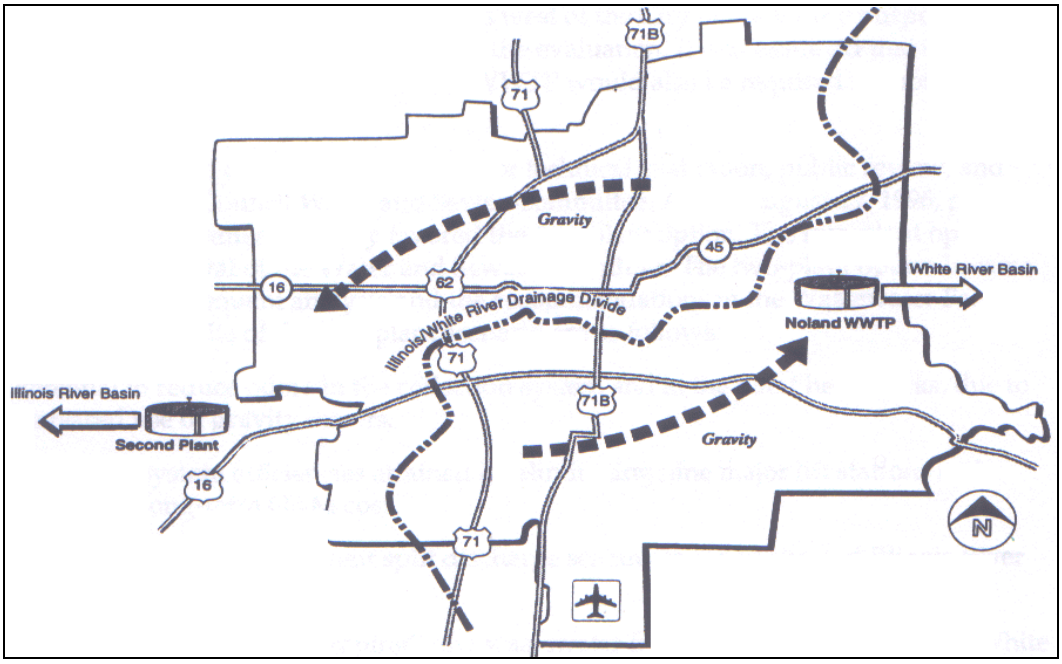
Average Daily Wastewater Flow (mgd)	11.80
Average Daily Flow per SFE (gpd)	255
Single-Family Equivalents	46,275

Source: Average daily flow City of Fayetteville, *Wastewater System Improvement Project, Overview of Project Facility Plan and Environmental Information Document, RLF Project No. 05-CS-050760-03*, September 20, 2001; average daily flow per SFE from Table 37.

Treatment Plant

The current Paul Noland Wastewater Treatment Plant was built in 1988, with a biological treatment capacity of 12.6 mgd. The City's *Wastewater Facility Plan*, originally completed in 1997 and updated this year, evaluated the alternatives of expanding the existing treatment plant versus building a second plant in the Illinois River basin. About half of the city is in the Illinois River basin, and currently wastewater from that basin is transferred by lift stations and force mains to the White River basin, where the Noland treatment plant is located. Locating a second treatment plant in the Illinois River basin would eliminate the need for several costly, high maintenance lift stations and allow most of the collection system to convert to gravity mains. While expanding the existing plant would be more cost-effective in terms of treatment costs, the second plant alternative would have offsetting savings in terms of lower collection system costs. In the recommended two-plant option, construction of the new treatment plant would establish a clear distinction between the flows from the two watersheds. Nine lift stations would be abandoned.

Figure 4
WATERSHEDS AND DIRECTIONS OF FLOWS



The new plant will add 10 mgd to the City's current treatment capacity, which will provide about the amount of new capacity required by the year 2020. The new treatment plant and its outfall line are currently estimated to cost $42.5 million. Dividing the capital cost by the new average day capacity yields the cost per gallon per day. Finally, dividing that by the average daily flow per service unit results in the treatment plant cost per single-family equivalent (see Table 39).

Table 39
WASTEWATER TREATMENT COST PER SERVICE UNIT

New Treatment Plant and Outfall Line	$42,500,000
New Average Day Capacity (gpd)	10,000,000
Cost per Gallon per Day	$4.25
Average Daily Flow per SFE (gpd)	255
Treatment Plant Cost per SFE	$1,084

Source: Treatment plant cost and new capacity from CH2M-Hill, *Fayetteville Wastewater Facility Plan*, February 1997 and 2001 update; flow per SFE from Table 37.

Collection System

Fayetteville's existing wastewater collection system consists of more than 400 miles of gravity sewers, 25 lift stations and 40 miles of force mains. The *Wastewater Collection System Master Plan*, which was prepared by RJN Group in April 1997, identifies new sewer lines and lift stations needed to serve the City's wastewater customers at the ultimate build-out of the City-defined service area. However, for the purposes of the wastewater facility plan, RJN Group provided additional analysis to define the year 2020 collection system improvement needs. The year 2020 improvements were further refined to reflect converting the Fayetteville system to a two-treatment plant configuration.

The reanalysis performed by RJN Group for the Wastewater Facility Plan reduced the total collection system cost from $77.9 million for the ultimate build-out of the service area to $39.2 million for 2020 conditions. However, some of the improvements to existing gravity mains are needed to address existing deficiencies in line capacity to reduce the incidence of sewer overflows.

The City's current policies on line extensions and developer cost participation can be briefly described as follows. When a line needs to be extended to provide service to a new development, developers pay only the cost of the line needed to serve the subdivision, which in most cases is an eight-inch line. If the line needs to be oversized to serve other developments, the City pays for the cost of the oversizing. In a few cases, the City has required subdivisions in an area to pay at the time of final plat to upgrade an overloaded lift station or to build parallel force main. If the projects are not built, the City will refund the money. For example, the City collected $200 per lot from new subdivisions platted within one-half mile on either side of the Salem Road line to pay for the eight-inch parallel force main. If the City adopts wastewater impact fees that include the collection system costs, developers who participate in the cost of improvements identified in the City's collection system master plan should receive credit for such contributions against their impact fees.

Given the rather extensive deficiencies in the existing collection system that will be remedied by the planned improvements, it is recommended that the wastewater impact fees be limited to treatment plant costs. No credits would be due against this fee for developer improvements to the collection system.

Revenue Credits

The net cost per service unit is the capital cost to serve new customers, less any credits to account for existing capacity deficiencies or other revenues that will be generated by new development to pay for facilities benefitting existing customers. The analysis presented in this study excluded line costs and based the proposed fees solely on treatment plant costs. No significant capacity deficiencies or outstanding debt were identified for the existing treatment plant. Consequently, no revenue credits are due to account for retiring debt on the existing plant or remedying deficiencies.

The estimated cost of the new treatment plant and needed collection system improvements totals $120 million. The primary funding source will be the 3/4 cent sales tax approved by referendum in November 2001 and slated to go into effect after the one-cent sales tax for the library ends in April 2002. The 3/4 cent sales tax will be used to repay a state revolving loan fund over a ten-year period.

The sales tax-supported state revolving loan will be enough to finance the City's entire $120 million capital program. The wastewater impact fees would be earmarked exclusively to be used to help defray growth-related improvements to expand the City's wastewater treatment capacity. One alternative would be to use the impact fee revenues to retire the state revolving loan, which would allow the sales tax to expire earlier than would be the case without the impact fee.

As noted earlier in the water section, approximately six percent of all sales tax receipts are derived from the sale of construction materials, much of it for new construction. Consequently, the cost will be reduced by that percentage to account for the fact that new development will be paying a portion of the cost of expanded treatment capacity through payment of sales tax on construction materials.

In addition to paying sales tax on construction materials, new development will also generate a portion of the non-construction sales tax. Extrapolating Fayetteville's population growth during the 1990s, new development over the next 14 years that the sales tax to fund the wastewater improvements is in place would generate approximately 19 percent of the non-construction sales tax revenue. New development will generate, through non-construction sales tax, about 18 percent of the overall sales tax revenue that will be used to fund the wastewater improvements, as shown in Table 40.

Table 40
WASTEWATER SALES TAX CREDIT

Percent of New Development over 14 Years	38.10%
Average New Development Share	19.05%
Non-Construction Share of Sales Tax	94.00%
New Development's Non-Construction Sales Tax Share of Costs	17.91%

Source: Percent of new development over 14 years based on straight-line projection of 1990-2000 population growth from Table 6; average growth share is one-half of new development percentage.

Reducing the treatment plant cost per service unit by 6 percent to account for the construction sales tax and by another 18 percent to account for non-construction sales tax revenues that will be generated by new development during the period when the 3/4 cent sales tax will be in effect yields the net cost per service unit, as shown in Table 41.

Table 41
WASTEWATER NET COST PER SERVICE UNIT

Treatment Plant Cost per SFE	$1,084
Credit for Construction Materials Sales Tax (6%)	$65
Credit for Non-Construction Sales Tax (17.91%)	$194
Total Net Cost per SFE	$825

Source: Treatment plant cost from Table 39; credit based on percent of sales tax revenues received by Fayetteville from 1996-2000 from building construction, City Budget Office, October 8, 2001 memorandum.

Maximum Impact Fees

As described in the water section, wastewater impact fees for residential development will be charged on a per unit basis, depending on the type and size of the dwelling unit. Nonresidential development will be charged on the basis of the number of service units associated with the water meter. A wastewater service unit, called a single-family equivalent or SFE, represents the wastewater demand of a typical single-family connection, which is a 5/8" x 3/4" meter. The service units associated with larger meters are based on the relative hydraulic capacity of the meter compared to the smallest meter size. The number of SFEs per meter is multiplied by the net capital cost per SFE to determine the maximum impact fee per meter, are shown in Table 42.

Table 42
WASTEWATER MAXIMUM FEE SCHEDULE

Land Use (Dwelling Size or Meter Size)	SFEs/ Unit or Meter	Net Cost/ SFE	Net Cost/ Unit or Meter
Single-Family (up to 1,300 sq. ft.)	0.75	$825	$619
Single-Family (1,301 to 1,700 sq. ft.)	0.95	$825	$784
Single-Family (1,701 to 2,300 sq. ft.)	1.08	$825	$891
Single-Family (more than 2,300 sq. ft.)	1.21	$825	$998
Multi-Family	0.70	$825	$578
Mobile Home	0.95	$825	$784
Nonresidential (5/8" x 3/4" Meter)	1.00	$825	$825
Nonresidential (1" Meter)	2.50	$825	$2,063
Nonresidential (1-1/2" Meter)	5.00	$825	$4,125
Nonresidential (2" Meter)	8.00	$825	$6,600
Nonresidential (3" Meter)	16.00	$825	$13,200
Nonresidential (4" Meter)	25.00	$825	$20,625
Nonresidential (6" Meter)	50.00	$825	$41,250
Nonresidential (8" Meter)	80.00	$825	$66,000
Nonresidential (10" Meter)	115.00	$825	$94,875

Source: SFEs per residential unit or meter size from Table 32; net cost per SFE from Table 41.

The annual revenue that could be generated if the wastewater impact fees are adopted at the maximum amount is estimated to be about $730,000, as shown in Table 43.

Table 43
POTENTIAL ANNUAL WASTEWATER IMPACT FEE REVENUES

Net Cost per Single-Family Equivalent	$825
Average Annual New Single-Family Units in Fayetteville, 1990-2001	352
Potential Annual Revenue from Fayetteville's Single-Family Growth	$290,000
Fayetteville Single-Family Customers as Share of Total System Usage	39.8%
Potential Annual Wastewater Impact Fee Revenue	$730,000

Source: Net cost per SFE from Table 41; average new single-family units from Table 7; Fayetteville single-family customers' share of total wastewater usage from Fayetteville Water and Sewer Department, "Consumption of Sewer Customers (Usage in 100 Gallons)," July 2000 through June 2001.

MAJOR ROADWAYS

The City does not impose a road impact fee on new development, but there are a number of developer exactions for roads in the subdivision regulations. A "large scale development," defined as any development larger than one acre, must dedicate sufficient right-of-way (ROW) to bring any abutting or intersecting major road to the standards of the master street plan. A lesser dedication may be recommended by the Planning Commission and approved by the City Council in cases of undue hardship or practical difficulties.[6] When commercial, industrial or multi-family development is proposed adjacent to any street not constructed to current city standards, the developer is required to dedicate sufficient ROW and install paving, curb and gutter, and sidewalks necessary to bring the street into conformity with current standards. The City Council may reduce the dedication requirement, and the cost of required improvements shall be in proportion to the needs created by the development.[7] Finally, off-site road improvements may be required where a proposed subdivision has access to paved streets only by way of substandard or unimproved streets. In such cases, the subdivider is required to contribute a proportionate share of the cost of the off-site improvements. The proportionate share is based on the acreage of the subdivision as a share of the acreage of all property benefitting from the improvement, or by an alternative method determined by the planning commission.[8]

In general, these requirements mean that development abutting an unimproved or substandard street must dedicate the required ROW and construct the adjacent half of the street improvement. The developer does have the option to do a traffic study to attempt to demonstrate that the required improvement exceeds the impact of the development. Even lot splits can trigger the requirements to improve abutting roadways.

The proposed road impact fees differ from the proposed water and wastewater fees in that a significant portion of the fees would be used to compensate developers who have frontage on major roadways and are required to construct or improve them. In contrast, the proposed water and wastewater fees do not include the local component of line costs, so no credits to developers for line extensions would be required. This is much more difficult to accomplish in the context of road impact fees, because, unlike pipes, roads only come in a few basic sizes (e.g., two-lane and four-lane roads).

If the road impact fees calculated in this report are adopted, the City would need to give credit against the fees to developers for the value of required improvements to arterial and collector roadways. No credit would need to be given for the value of ROW dedications if ROW costs are not included in the impact fee calculations.

There are a variety of ways that credit provisions can be structured, and these issues should be addressed in the impact fee ordinance. Examples of some of these issues that should be addressed in the ordinance include:

- Should a developer be reimbursed directly from impact fee funds collected from all developments, or should the impact fees paid within the developer's project be reduced?

[6] Section 159.54: Large scale development.

[7] Section 159.55: Street improvements.

[8] Section 159.33: Required off-site improvements.

- If credits are accomplished by fee reductions, what happens when the amount of the credit exceeds the impact fees that would be due from the development project?

- To what extent should credits be given for past contributions for development projects that have not yet been completed?

Service Units

Service units create the link between supply (roadway capacity) and demand (traffic generated by new development). An appropriate service unit basis for road impact fees is vehicle-miles of travel (VMT). Vehicle-miles is a combination of the number of vehicles traveling during a given time period and the distance (in miles) that these vehicles travel. The unit of capacity that is consumed by the demand unit represented by a VMT is a vehicle-mile of capacity (VMC). VMC is calculated as the capacity of a roadway segment multiplied by the length of the segment in miles.

The two time periods most often used in traffic analysis are the 24-hour day (average daily trips or ADT) and the single hour of the day with the highest traffic volume (peak hour trips or PHT). Available traffic counts for area roadways are for average daily trips. Consequently, average daily VMT will be used as the service unit for Fayetteville's road impact fees.

Road Impact Fee Methodology

The major alternative methodologies for calculating road impact fees are the "improvements-driven" and "consumption-based" approaches. These are described below.

The "improvements-driven" approach essentially divides the cost of growth-related improvements required over a fixed planning horizon (or to build-out) by the number new service units (e.g., vehicle trips) projected to be generated by growth over the same planning horizon in order to determine a cost per service unit. The improvements-driven approach depends on accurate planning and forecasting. For example, the fees will be accurate only if the forecasted increase in traffic actually necessitates all of the improvements identified in the transportation master plan. If many of the planned improvements will provide excess capacity that will be available to serve additional development beyond the planning horizon on which the fees are based, the fees may be too high.

The "consumption-based" approach does not depend on knowing in advance what improvements will be made or what type or density of development will occur. The consumption-based model simply charges a new development the cost of replacing the capacity that it consumes on the major roadway system. That is, for every service unit of traffic (e.g., mile of vehicle travel) generated by the development, the road impact fee charges the net cost to construct an additional service unit of capacity. The consumption-based system can be based on a transportation plan, but the total cost of the plan does not affect the amount of the fee, which is based on the unit cost of creating new capacity. In the absence of a transportation plan, a consumption-based fee could be based on the average cost of new capacity derived from a list of historical improvements. In Arkansas, however, road impact fees should be tied as closely as possible to a set of planned improvements due to the language of state law relating to the implied authority to impose impact fees.

The major drawback of the consumption-based system is that it generally under-estimates the full cost of growth. Since travel is never evenly distributed throughout a roadway system, actual roadway systems require more than one unit of capacity for every unit of demand in order for the system to function at an acceptable level of service. Suppose for example, that the City completes a major arterial widening project. The completed arterial is likely to have a significant amount of excess capacity for some period of time. If the entire system has just enough capacity to accommodate all of the vehicle-miles of travel, then the excess capacity on this segment must be balanced by another segment being over-capacity. Clearly, roadway systems in the real world need more total aggregate capacity than the total aggregate demand, because the traffic does not always precisely match the available capacity. Consequently, the standard consumption-based model generally underestimates the full cost of growth. The consumption-based system is, however, a conservative, legally sound and relatively simple approach to the calculation of road impact fees.

The major obstacle to employing the improvements-driven methodology in Fayetteville today is the lack of an adequate long-range transportation master plan. This is not to suggest that the City and the regional planning organization have not done some good transportation planning, but that the plans are not adequate to support an improvements-driven road impact fee methodology. As noted above, the quality of the transportation plan is absolutely critical to the defensibility of the resulting fees when this methodology is used. The City's five-year Capital Improvements Plan (CIP) for roads, the 25-year Regional Transportation Plan and the three-year regional Transportation Improvement Program (TIP) serve as guides to spending roadway dollars, but lack the analysis needed to determine the portion of the cost attributable to a new increment of travel demand (e.g., a new VMT).

In order to support improvements-driven road impact fees, the transportation plan, at a minimum, would need to (1) project growth over a reasonably long planning horizon (15-25 years), (2) model the resulting traffic on the existing roadway network, (3) identify the roadway improvements that would be needed to accommodate the projected traffic at the desired level of service (without creating large amounts of excess capacity that will not be required during the planning horizon), and (4) develop reasonable cost estimates for all of the needed improvements. Ideally, the plan would also identify new roads that could relieve existing or projected congestion on existing roads and provide access to newly-developing areas, and model the effects of alternative future networks. The final step would be to apply fiscal and political reality checks (some improvements may be objectively needed to attain desired level of service but are not cost-effective or politically feasible) in order to select the preferred mix of widening and new road projects.

The development of such a transportation plan has much to recommend it, regardless of whether it is used as the basis of road impact fees. However, it is not an essential prerequisite to developing and adopting road impact fees if the consumption-based approach is used. A defensible consumption-based road impact fee could be based on the existing CIP and TIP. This is the recommended approach for Fayetteville. The recommended formula for the road impact fees is shown in Figure 5.

Figure 5
IMPACT FEE FORMULA

MAXIMUM FEE	=	**VMT x NET COST/VMT**
Where:		
VMT	=	TRIPS x % NEW x LENGTH ÷ 2
NET COST/VMT	=	COST/VMT ! CREDIT/VMT
Where:		
TRIPS	=	Trip ends during a weekday
% NEW	=	% of trips that are primary, as opposed to passby or diverted-link trips
LENGTH	=	Average length of a trip on the major roadway system
÷ 2	=	Avoids double-counting trips for origin and destination
COST/VMT	=	Average cost per lane-mile divided by average daily capacity per lane
CREDIT/VMT	=	Revenue credit per daily VMT

Major Roadway System

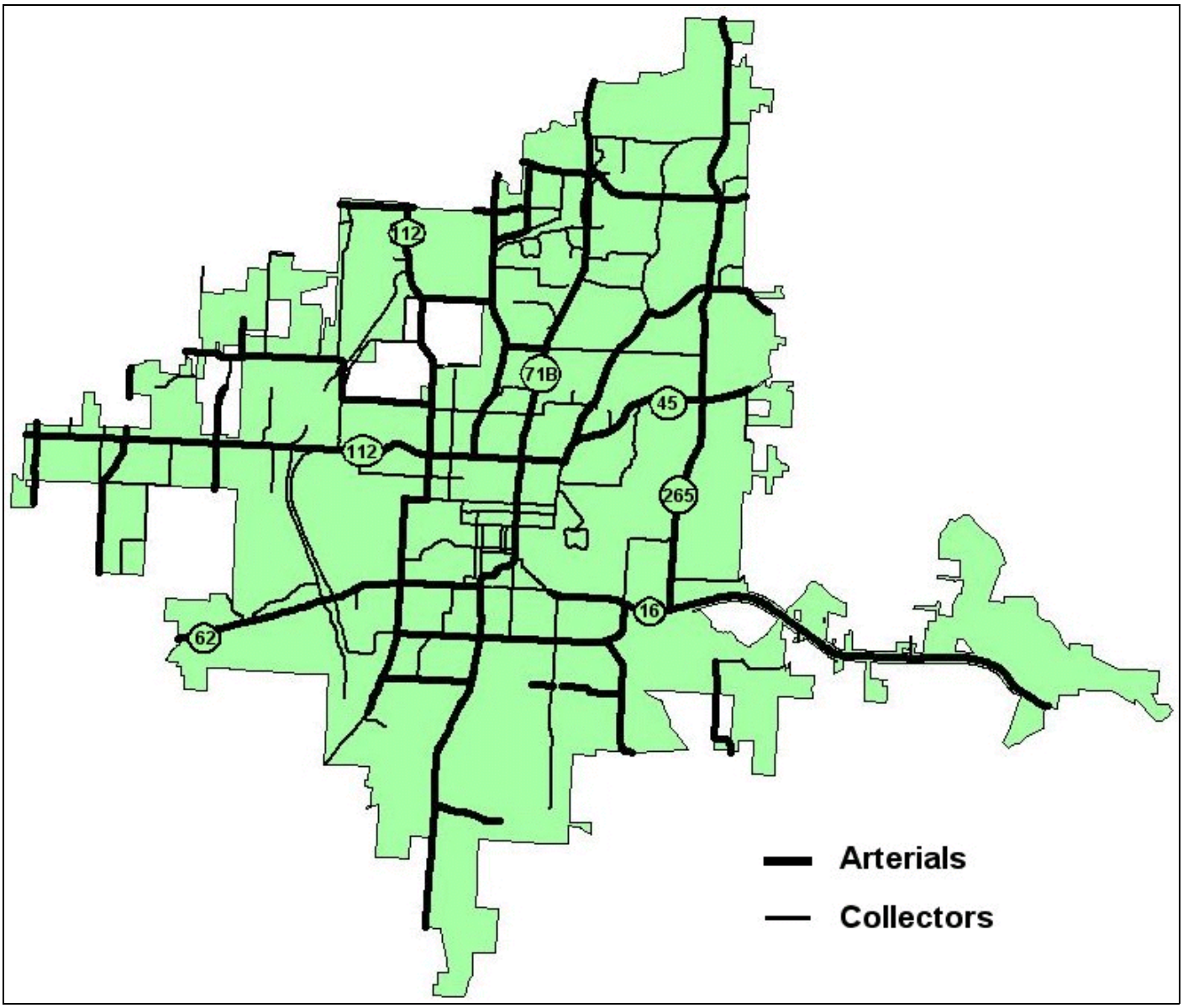
A road impact fee system should include a clear definition of the major roadway system that is to be funded with the impact fees. The major roadway system to be funded with the proposed impact fees is comprised of arterials and collectors within the City's incorporated area, including most state roads but excluding freeways and expressways. These roadways are identified on the City's *Master Street Plan*, which is an official map that is used in conjunction with the Circulation Element of the 2020 *General Plan*. It classifies streets into a number of functional types, including freeway/expressways, principal arterials, minor arterials, collectors and local streets. The *Master Street Plan* shows the location of new roads and allows the City to preserve corridors for roadways expected to need widening or extension.

An inventory of the existing major roadway system was compiled in order to identify existing capacity deficiencies and to determine the average length of a trip on the major roadway system (see Appendix A). The roadway segment descriptions include the street name, roadway termini, number of lanes and roadway length and width. Average daily traffic volumes were estimated for most segments from 2000 state highway department counts. Planning level 24-hour capacity estimates based on the functional classification of each roadway from the 1992 transportation analysis prepared by DeShazo, Starkec & Tang were used. The existing major roadway system within Fayetteville's incorporated limits is illustrated in Figure 6.

Existing Deficiencies

In most rapidly growing communities, some roadways will be experiencing an unacceptable level of congestion at any given point in time. One of the principles of impact fees is that new development should not be charged, through impact fees, for a higher level-of-service than is provided to existing development. Another common way of expressing this concept, although it is somewhat less precise and subject to misinterpretation, is that impact fees should not be used to pay for remedying existing deficiencies. In the context of road impact fees, this has sometimes been interpreted to mean that impact fees should not be spent on roadways that are already over-capacity. A variant of this approach is that impact fees should only be used to fund a percentage of the project that can be attributed to providing additional capacity beyond what is needed to remedy any existing deficiency.

Figure 6
EXISTING MAJOR ROADWAY SYSTEM



There are a number of practical problems with these approaches. First, impact fees are restricted from being spent on roadways that are most in need of improvement, while the fact that fee-funded improvements to other roadways may also relieve the deficient segments is ignored. Second, these approaches complicate impact fee administration by requiring that the portion of the cost of each improvement that is attributable to remedying deficiencies be funded from a different source than impact fees.

The most significant objection to these approaches, however, is that they are not consistent with the conservative nature of the consumption-based road impact fee methodology. The consumption-based system does not promise that all road segments will function at a given level of service (e.g., LOS C or

LOS D). All the consumption-based model does is assume that for every unit of capacity that is consumed, another will be constructed to replace it. Implicitly, the level of service used in a consumption-based impact fee is a one-to-one ratio of capacity to demand in the major roadway system as a whole. As long as the current system provides at least this capacity/demand ratio, the impact fees are not charging for a higher level of service.

To determine the capacity/demand ratio, the first step is to estimate total VMT on the major roadway system. This figure will also be used in the average trip length and revenue credit calculations. Year 2000 daily traffic counts are available for road segments accounting for almost three-fourths of all lane-miles in the major roadway system. Multiplying the average count per lane for each functional classification of roadway by the total lane-miles in that classification and summing yields a estimate of about 1.2 million daily vehicle-miles of travel on Fayetteville's major roadway system.

Table 44
TOTAL DAILY VEHICLE-MILES OF TRAVEL

Functional Classification	Counted VMT	Lane-Miles w/Counts	Average ADT/Lane	Total Lane-Miles	Total VMT
Principal Arterials	671,697	162.32	4,138	168.48	697,170
Minor Arterials	134,025	32.02	4,186	41.11	172,086
Collectors	75,294	36.41	2,068	100.89	208,641
Historic Collectors	60,716	21.83	2,781	32.15	89,409
Total	941,732	252.58		342.63	1,167,306

Source: Derived from Table 67; counted VMT is product of miles and ADT for segments with traffic counts; lane-miles with counts is product of miles and existing number of lanes for segments with counts; total lane-miles includes segments without counts; total VMT is product of average ADT per lane and total lane-miles.

The next step is to estimate total vehicle-miles of capacity in the major roadway system. A byproduct of these calculations is the average capacity per lane, which will be used later to determine the cost per service unit. The 1992 analysis by the City's transportation consultant established capacity estimates for the majority of the City's major roadway system. The average capacity of a lane, weighted by total lane-miles in the major roadway system, is 6,157 vehicles per day, as shown in Table 45. Total system capacity is about 2.1 million daily vehicle-miles. This is almost double the total VMT in the system. Clearly, the one-to-one ratio of capacity to demand on which the impact fees are based is not resulting in new development being charged for a higher level of service than is being enjoyed by existing development.

Table 45
TOTAL DAILY VEHICLE-MILES OF CAPACITY

Functional Classification	Selected VMC	Selected Lane-Miles	Average Capacity/Lane	Total Lane-Miles	Total VMC
Principal Arterials	1,019,370	149.42	6,822	168.48	1,149,371
Minor Arterials	206,225	33.60	6,138	41.11	252,333
Collectors	336,774	63.89	5,271	100.89	531,791
Historic Collectors	135,509	24.73	5,480	32.15	176,182
Total	1,697,878	271.64	6,157	342.63	2,109,677

Source: Derived from Table 67; selected VMC is product of capacity and miles for segments with capacity estimates; selected lane-miles is product of existing lanes and miles for segments with capacity estimates.

While there are a few individual road segments that appear to be over-capacity, the extent of existing segment-specific capacity deficiencies is relatively small compared to the total amount of daily travel. The bottom line, however, is that a segment-by-segment analysis of capacity deficiencies is not necessary or appropriate in the context of a consumption-based road impact fee. The system-wide ratio of capacity to demand is the appropriate level of service measure, and it is clear that the fees are based on a one-to-one ratio that is considerably lower than the existing ratio. As shown in Table46, Fayetteville's major road system currently has 81 percent more capacity than existing demand. Consequently, there are no existing deficiencies on a system-wide basis.

Table 46
SYSTEMWIDE RATIO OF CAPACITY TO DEMAND

Daily Vehicle-Miles of Capacity (VMC)	2,109,677
Daily Vehicle-Miles of Travel (VMT)	1,167,306
Systemwide Capacity/Demand Ratio	1.81

Source: VMT from Table 44; VMC from Table 45.

Cost per Service Unit

The long-range transportation plan for the two-county region (Washington and Benton Counties) is the *2020 Regional Transportation Plan for Metropolitan Northwest Arkansas*, which was developed in 1995. The five-year update to that plan, the *2025 Regional Transportation Plan*, is currently in draft form. The Transportation Improvement Program for FY 2001-2003 has $2.5 million programmed for two major widening projects within the City of Fayetteville over the three-year period. The City also has road improvements programmed in its *2002-2006 Capital Improvements Program* (CIP), which is updated every two years.

Right-of-way (ROW) is the most variable component of road improvement costs, as well as the most common type of developer exaction for roads. If ROW costs are excluded from the impact fee calculations, the fees will be lower, and the City will not have to give credit against the fees for ROW that is dedicated by developers. In order to give the City the option to include or exclude ROW costs, the road impact fees will be calculated both ways in this report.

The cost estimates for planned road improvements may not be the most reliable cost data on which to base the impact fees. Instead, historical projects will be used to derive a cost per lane-mile of road improvements. The City's CIP, however, can be used to derive an estimate of the percent of road costs attributable to ROW acquisition costs. As shown in Table47 below, ROW costs are estimated to account for 16 percent of area road costs over the next five years.

Table 47
RIGHT-OF-WAY SHARE OF PLANNED ROAD COSTS, 2002-2006

Street	Segment	Construction	ROW	Total
Rupple Road	S of Hwy 16 W	$750,000	$0	$750,000
Old Missouri Rd	Mud Creek to Rolling Hills Dr	$1,267,505	$30,000	$1,297,505
Shiloh & Futrall	Intersection and Signalization	$200,000	$0	$200,000
Gregg & Appleby	Intersection and Signalization	$129,000	$0	$129,000
Gregg Ave	Township to Mud Creek	$1,750,000	$500,000	$2,250,000
Old Missouri Rd	Rolling Hills to Old Wire Rd	$484,000	$29,000	$513,000
Old Missouri Rd	Joyce Blvd to Mud Creek	$701,000	$116,000	$817,000
Shiloh Dr	Dorothy Jeanne to Shiloh	$1,130,000	$160,000	$1,290,000
Mission Blvd (AR 45E)	North St to E City Limits	$7,000,000	$1,388,000	$8,388,000
Huntsville Rd (AR 16E)	Happy Hollow to W Fork	$3,150,000	$600,000	$3,750,000
Old Wire Rd	Mission to Township	$1,800,000	$300,000	$2,100,000
Van Asche Blvd	W of Steele to Gregg Ave	$950,000	$0	$950,000
Traffic Signals	Various Intersections	$598,000	$0	$598,000
Total		$19,909,505	$3,123,000	$23,032,505
ROW as Percent of Construction Costs			16%	

Source: City of Fayetteville, *2002-2006 Capital Improvements Program*, October 2001 and City Engineer, January 9 and January 28, 2002 memoranda; construction costs do not include engineering costs; Mission Boulevard and Huntsville Road projects are advance ROW acquisition for future state highway projects.

The average cost to create an additional vehicle-mile of capacity can be derived by dividing the cost of a representative set of improvements by the additional capacity created by the improvements. The improvements used to determine the average construction cost per lane-mile are the City bid projects and cost-share projects with developers undertaken over the last five-to-six years. The approach taken was to divide the total construction cost by the total number of improved lane-miles, rather than by the number of new lane-miles. This is conservative, since a typical two-lane to four-lane widening project creates only two new lanes, not four. However, it does avoid any argument over whether the incidental reconstruction of existing lanes as part of a widening project benefits existing development and should not be included in the impact fees. In addition, three projects with extensive off-site drainage costs and one project that may have included engineering and ROW costs were removed from the sample. The cost of road improvements undertaken by the City over the last five years, including construction, engineering and ROW costs, is estimated to have averaged $600,000 per lane-mile, as summarized in Table 48.

Table 48
ROAD COST PER LANE-MILE

Street	Lanes	Miles	Ln-Mi	Original Amount	Date	Cost Factor	Current Cost	Cost/ Ln-Mile
Plainview	2	0.14	0.28	$146,339	6/98	1.098	$160,680	$573,857
Joyce Blvd Extension W	5	0.50	2.50	$749,846	8/96	1.157	$867,572	$347,029
Sunbridge Dr Extension	3	0.12	0.36	$268,174	4/99	1.073	$287,751	$799,308
Township Rd Extension	2	0.16	0.32	$161,313	7/95	1.188	$191,640	$598,875
24th St Reconstruction	2	0.53	1.06	$647,856	12/96	1.157	$749,569	$707,141
Joyce Blvd Extension E	4	0.58	2.32	$676,414	9/96	1.157	$782,611	$337,332
Arlington Terrace Reconstruct	2	0.16	0.32	$195,509	2/98	1.098	$214,669	$670,841
Subtotal, City Bid Projects			7.16				$3,254,492	$454,538
Happy Hollows/Cliffs Blvd	4	0.50	2.00	$1,001,802	2000	1.045	$1,046,883	$523,442
Steele/Van Asche	4	0.56	2.24	$1,364,405	2000	1.045	$1,425,803	$636,519
Joyce, Old Missouri E	4	0.58	2.32	$860,097	1997	1.116	$959,868	$413,736
Joyce, W of Mall Ln	4	0.51	2.04	$916,547	1998	1.098	$1,006,369	$493,318
Subtotal, City Cost-Share Projects			8.60				$4,438,923	$516,154
Total Construction Cost			15.76				$7,693,415	$488,161
Engineering Cost (15%)								$73,224
Right-of-Way Cost (16%)								$76,641
Total Construction and Engineering Cost per Lane-Mile								$638,026

Source: Project descriptions, original amounts and bid/construction dates from City Engineer, November 15, 2001 memorandum; cost factor based on Engineering News-Record Construction Cost Index as of March 2002; engineering cost based on 15% per City Engineer, January 9, 2002 telephone conversation; ROW cost percentage from Table 47.

Dividing the average cost per lane-mile by the average capacity of a lane yields the average cost per vehicle-mile of capacity, as shown in Table 49.

Table 49
ROAD COST PER SERVICE UNIT

	Without ROW	Including ROW
Average Cost per Lane-Mile	$561,385	$638,026
Vehicle Trips per Lane	6,157	6,157
Cost per Vehicle-Mile	$91.18	$103.63

Source: Cost per lane-mile from Table 48;daily capacity per lane from Table 45.

Revenue Credits

In the calculation of impact fees, credit must be given for dedicated or intergovernmental revenues that will be generated by new development and used to pay for the same kind of facilities funded through the impact fees. In the case of road impact fees, revenue credits will be calculated for state and federal funding for City arterial and collector road improvements. No credit needs to be calculated for outstanding debt payments for road bonds, since the City has no outstanding debt for past road

projects. Finally, a credit needs to be provided for sales tax revenues that will be used for capacity-expanding road improvements.

A review of the regional three-year *Transportation Improvement Program* (TIP), as well as the *2025 Regional Transportation Plan*, indicate that over 90 percent of direct federal and state funding for the improvement of roads in Fayetteville is for state roads. Total federal and state funding for Fayetteville amounts to $2.8 million annually over the next 25 years, as shown in Table 50.

Table 50
FEDERAL/STATE HIGHWAY FUNDING, 2001-2025

Roadway Segment	State Roads	City Roads	Total Funding
Hwy 112, Maple St to Hwy 112 S	$1,500,000	$0	$1,500,000
Gregg Street, Hwy 71B to Mud Creek	$0	$1,000,000	$1,000,000
Subtotal, 2001-2005	$1,500,000	$1,000,000	$2,500,000
AR 45, North St to City Limit	$7,000,000	$0	$7,000,000
AR 16, Happy Hollow to W.F. Bridge	$3,150,000	$0	$3,150,000
Old Wire Rd, Township to AR 45	$0	$1,000,000	$1,000,000
Subtotal, 2006-2010	$10,150,000	$1,000,000	$11,150,000
AR 180, Gregg to US 71B	$2,500,000	$0	$2,500,000
AR 265, AR 45 to N City Limits	$11,000,000	$0	$11,000,000
Joyce, AR 265 to Old Wire	$0	$1,000,000	$1,000,000
Subtotal, 2011-2015	$13,500,000	$1,000,000	$14,500,000
AR 180, Township to US 71	$2,800,000	$0	$2,800,000
AR 112, North St to I-540	$6,250,000	$0	$6,250,000
AR 112, 15th to Maple	$2,800,000	$0	$2,800,000
North, Gregg to 71B	$0	$1,000,000	$1,000,000
Rupple, Holt Middle Sch to Howard Nichols	$0	$825,000	$825,000
Subtotal, 2016-2020	$11,850,000	$1,825,000	$13,675,000
AR 112, Razorback to Garland	$2,500,000	$0	$2,500,000
AR 16, Meadowland to W City Limit	$5,500,000	$0	$5,500,000
US 71 Flyover, College to US 71W	$4,000,000	$0	$4,000,000
AR 16 Bypass, Washington to Happy Hollow	$4,000,000	$0	$4,000,000
AR 16E, W.F. Bridge to E City Limit	$11,750,000	$0	$11,750,000
Mt Comfort, Rupple to I-540	$0	$1,000,000	$1,000,000
Subtotal, 2021-2025	$27,750,000	$1,000,000	$28,750,000
Total, 2001-2025	$64,750,000	$5,825,000	$70,575,000
Average Annual Funding	$2,590,000	$233,000	$2,823,000

Source: Northwest Arkansas Regional Planning Commission, *Transportation Improvement Program, Northwest Arkansas Regional Transportation Study, FY 2001-2003*, undated, and *2025 Regional Transportation Plan for Metropolitan Northwest Arkansas*, Feb. 2001.

An equally significant source of funding for City thoroughfares is the one-cent sales tax. As noted in the Background section, the sales tax is the primary source of funds for the City capital improvements program, and 42 percent of sales tax-funded capital improvements in the five-year CIP are for road improvements. The City plans on spending about $2.6 million annually in sales tax funds on capacity-expanding road improvements over the five-year CIP period. Excluding expenditures for ROW acquisition, annual expenditures for construction are anticipated to be about $1.9 million.

Table 51
SALES TAX ROAD CAPACITY PROJECTS, 2002-2006

	Without ROW	With ROW
Rupple Road Extension South of Hwy 16 West (new 2-lane)	$750,000	$750,000
Shiloh & Futrall, Intersection Improvements and Signalization	$200,000	$200,000
Gregg Avenue & Appleby Road Intersection	$129,000	$129,000
Gregg Avenue, Hwy 71B to Mud Creek Bridge (widen 2-4 lanes)	$1,390,000	$1,890,000
Old Wire Rd, Mission to Township (widen 2-4 lanes)	$800,000	$1,100,000
Old Missouri Rd, Joyce to Mud Creek Bridge (widen 2-3 lanes)	$1,250,000	$1,250,000
Old Missouri Rd, Stubblefield Rd to Rolling Hills Dr (widen 2-3 lanes)	$570,000	$570,000
Old Missouri Rd, Rolling Hills Dr to Old Wire Rd (widen 2-3 lanes)	$817,000	$817,000
Shiloh Dr Ext, Dorothy Jeanne St to existing Shiloh (new 2-lane road)	$1,452,000	$1,452,000
Van Asche Boulevard, Gregg to West of Steele (widen 2-4 lanes)	$950,000	$950,000
Traffic Signal Improvements	$598,000	$598,000
Huntsville Rd (Hwy 16 E), Happy Hollow to W Fork White River Br (ROW)	$0	$600,000
Mission Blvd (Hwy 45 E), North St to E City Limits (ROW)	$0	$1,388,000
Street ROW/Intersection/Cost Sharing	$575,000	$1,150,000
Total, Capacity-Enhancing Projects	$9,481,000	$12,844,000
Annual Sales Tax Financed Capacity Road Projects	$1,896,000	$2,569,000

Source: City of Fayetteville, *2002-2006 Capital Improvements Program*, October 2001.

Over the 25-year period that is typical of the useful life of road improvements, new development will generate sales tax revenues and highway user fees that will be returned to the City in the form of State and Federal funding for capacity expanding road improvements that is equivalent to about $65 per VMT generated by the new development. Excluding funding for ROW, the revenue credit per VMT is about $57, as shown in Table 52.

Table 52
ROAD REVENUE CREDIT PER SERVICE UNIT

	Without ROW	With ROW
Annual Federal/State Funding for Capacity Road Improvements	$2,823,000	$2,823,000
Annual Sale Tax Funding for Capacity City Road Improvements	$1,896,000	$2,569,000
Total Annual Funding for Capacity City Road Improvements	$4,719,000	$5,392,000
Existing Vehicle-Miles of Travel (VMT) on Major Roadway System	1,167,306	1,167,306
Annual Funding per VMT	$4.04	$4.62
Net Present Value Factor (25 Years at 5% Discount Rate)	14.09	14.09
Revenue Credit per VMT	$56.92	$65.10

Source: Annual Federal/State funding from Table 50; annual sales tax funding from Table 51; existing VMT from Table 44.

Subtracting the revenue credit from the cost per service unit yields the net cost per service unit. Depending on whether ROW costs are included in the fees, the net cost per service unit ranges from $34 to $39 per daily vehicle-mile of travel.

Table 53
ROAD NET COST PER SERVICE UNIT

	Without ROW	With ROW
Average Cost per VMT	$91.18	$103.63
Revenue Credit per VMT	$56.92	$65.10
Net Cost per VMT	$34.26	$38.53

Source: Average cost per VMT from Table 49;revenue credit per VMT from Table 52.

Travel Demand Factors

The travel demand generated by specific land use types is a product of three factors: 1) trip generation, 2) percent primary trips and 3) trip length. The first two factors are well documented in the professional literature, and the average trip generation characteristics identified in studies of communities around the nation should be reasonably representative of trip generation characteristics in Fayetteville. In contrast, trip lengths are much more likely to vary between communities, depending on the geographic size and shape of the community and its major roadway system.

Trip generation rates were based on information published in the most recent edition of the Institute of Transportation Engineers' (ITE) *Trip Generation* manual. Rates were established for specific land use types within the broader categories of residential, commercial, office/institutional and industrial land uses. Trip generation rates represent trip ends, or driveway crossings from the site of a land use. Thus, a one-way trip from home to work counts as one trip end for the residence and one trip end for the work place. To avoid over-counting, all trip rates have been divided by two. This places the burden of travel equally between the origin and destination of the trip and eliminates double-charging for any particular trip.

A study by the Federal Highway Administration developed adjustment factors for average weekday vehicle trip rates for single-family units based on differences in household size. Using those adjustment factors and data on variations in household size by dwelling size for Fayetteville, the following single-family trip generation rates have been derived.

Table 54
SINGLE-FAMILY TRIP GENERATION RATES

Dwelling Size	Avg. HH Size	Adjustment Factor	Average Trip Rate	Adjusted Trip Rate
up to 1,300 sq. ft.	1.97	-2.60	9.57	6.97
1,301-1,700 sq. ft.	2.49	-1.80	9.57	7.77
1,701-2,300 sq. ft.	2.81	-0.70	9.57	8.87
more than 2,300 sq. ft.	3.15	0.00	9.57	9.57

Source: Size categories and average household sizes for Fayetteville from Table 32; adjustment factors from U.S. Federal Highway Administration, *Development and Application of Trip Generation Rates,* 1985, cited in ITE, Trip Generation, 5th Edition, 1991, p. 256 (factors for 3 smallest categories based on the -1.8 factor given for units with household sizes between 2 and 3 persons and -3.4 factor for households with 1 to 2 persons).

Trip rates also need to be adjusted by a "primary trip factor" to exclude pass-by and diverted trips. This adjustment is intended to reduce the possibility of over-counting by only including primary trips generated by the development. Pass-by trips are those trips that are already on a particular route for a different purpose and simply stop at a particular development on that route. For example, a stop at a convenience store on the way home from the office is a pass-by trip for the convenience store. A pass-by trip does not create an additional burden on the street system and therefore should not be counted in the assessment of impact fees. A diverted trip is similar to a pass-by trip, but a diversion is made from the regular route to make an interim stop. The reduction for pass-by and diverted trips was drawn from the ITE manual and other published information.

The average trip length is the most difficult travel demand factor to determine. In the context of a road impact fee based on a consumption-based methodology, we are interested in determining the average length of a trip on the major roadway system within Fayetteville. This can be approximated by dividing the total daily travel demand (VMT) on the major roadway system by the total number of average daily trips generated by existing development in the city.

Existing land uses in each of six general categories are multiplied by average daily trip generation rates and summed to determine a reasonable estimate of total city-wide trips. Dividing the total vehicle-miles of travel (VMT) on the major roadway system determined from the inventory (see Table 67) by the estimated trips generated by existing land uses in Fayetteville yields a reasonable estimate of the average distance traveled on the City's major roadway system per daily trip, as shown in Table 55.

Table 55
AVERAGE TRIP LENGTH

Land Use	Units of Development	2002 Units	Trip Rates	Daily Trips
Single-Family	Dwelling	13,505	4.79	64,689
Multi-Family	Dwelling	13,345	3.32	44,305
Mobile Home	Dwelling	859	2.41	2,070
Commercial	1,000 sq. ft.	14,805.3	10.49	155,308
Civic	1,000 sq. ft.	133.4	4.92	656
Industrial	1,000 sq. ft.	4,710.3	3.04	14,319
Total Daily Trips				281,347
Total Daily VMT on Major Roadway System				1,167,306
Average Trip Length, Miles				4.1

Source: 2002 dwelling units from Table 43; nonresidential square feet from Washington County Assessor, February 2001; trip rates are one-half of average daily trip ends on a weekday reported in Institute of Transportation Engineers (ITE), *Trip Generation*, Sixth Edition, 1998 for ITE land use codes 210 (Single-Family Detached), 220 (Apartment), 240 (Mobile Home Park), 820 (Shopping Center–used rate for 1 million sq. ft. center reduced by 30% pass-by rate plus additional 10% reduction for diverted-link trips), 710 (General Office Building), and 130 (Industrial Park); total peak hour VMT from Table 67.

The ratio of the average local trip length on Fayetteville's major roadway system to the national average trip length identified in the U.S. Department of Transportation's 1995 *Nationwide Personal Transportation Survey* is computed in Table 56. Fayetteville's average trip length on the major roadway system is lower than the national average because the major roadway system excludes travel on freeways/expressways, arterials and collectors outside the city limits, and local streets. Using this ratio, reasonable trip lengths were derived for specific trip purposes, including home-to-work trips, shopping, school/church and other personal trips. In addition, a residential trip length was determined, using a weighting of 40 percent work trips and 60 percent average trips.

Table 56
AVERAGE TRIP LENGTH BY TRIP PURPOSE

Trip Purpose	National Data	Local Data	Ratio	Est. Local Trip Lengths
To or from work	11.73	na	0.46	5.4
Residential	na	na	na	4.6
Doctor/Dentist	9.23	na	0.46	4.2
Average	8.92	4.10	0.46	4.1
School/Church	8.05	na	0.46	3.7
Family/Personal	6.88	na	0.46	3.2
Shopping	5.61	na	0.46	2.6

Source: Average trip lengths in miles; national data from US. Department of Transportation, *Nationwide Personal Transportation Survey*, 1995; local data from Table 55; ratio is average local divided by average national trip length; estimated local trip lengths are products of national data by ratio, estimated local residential trip length is weighted 40% local work trip length and 60% average trip length.

Average daily travel demand must be estimated for a broad variety of land uses in order to develop the fee schedule. The result of combining trip generation rates, new trip factors and average trip lengths is a travel demand schedule that establishes the vehicle-miles of travel (VMT) during the average weekday generated by various land use types per unit of development. The recommended travel demand schedule is presented in Table 57.

Table 57
TRAVEL DEMAND SCHEDULE

Land Use Type	ITE Code	Unit	Trip Ends	1-Way Trips	% New Trips	Length (miles)	Daily VMT
Single-Family (up to 1,300 sf)	210	Dwelling	6.97	3.49	100%	4.6	16.05
Single-Family (1,301 to 1,700 sf)	210	Dwelling	7.77	3.89	100%	4.6	17.89
Single-Family (1,701 to 2,300 sf)	210	Dwelling	8.87	4.44	100%	4.6	20.42
Single-Family (more than 2,300 sf)	210	Dwelling	9.57	4.79	100%	4.6	22.03
Multi-Family	220	Dwelling	6.63	3.32	100%	4.6	15.27
Mobile Home/RV Park	240	Pad	4.81	2.40	100%	4.6	11.04
Adult Cong. Living Facility (ACLF)	252	Dwelling	2.15	1.08	100%	4.6	4.97
Hotel/Motel	310/320	Room	9.02	4.51	80%	4.6	16.60
RETAIL/COMMERCIAL							
Shopping Ctr (0-99,999 sf)	820	1000 sq. ft.	68.17	34.09	51%	2.1	36.51
Shopping Ctr (100,000-249,999 sf)	820	1000 sq. ft.	49.15	24.58	60%	2.3	33.92
Shopping Ctr (250,000-499,999 sf)	820	1000 sq. ft.	38.37	19.18	66%	2.6	32.91
Shopping Ctr (500,000 sf +)	820	1000 sq. ft.	29.96	14.98	70%	2.9	30.41
Bank	911	1000 sq. ft.	156.48	78.24	27%	2.6	54.92
Car Wash, Self Service	847	Stall	108.00	54.00	50%	2.6	70.20
Convenience Store w/Gas Sales	851	1000 sq. ft.	737.99	369.00	16%	1.3	76.75
Golf Course (open to public)	430	Acre	5.04	2.52	80%	3.2	6.45
Movie Theater	443	1000 sq. ft.	78.06	39.03	50%	2.6	50.74
Restaurant, Sit-Down	831	1000 sq. ft.	89.95	44.98	38%	2.6	44.44
Restaurant, Fast Food	834	1000 sq. ft.	496.12	248.06	27%	1.3	87.07
OFFICE/INSTITUTIONAL							
Office, General (0-99,999 sf)	710	1000 sq. ft.	13.27	6.64	75%	4.1	20.42
Office, General (100,000 sf +)	710	1000 sq. ft.	11.30	5.65	75%	4.1	17.37
Office, Medical	720	1000 sq. ft.	36.13	18.07	75%	4.2	56.92
Hospital	610	1000 sq. ft.	16.78	8.39	75%	4.2	26.43
Nursing Home	620	1000 sq. ft.	4.70	2.35	75%	4.2	7.40
Church	560	1000 sq. ft.	9.11	4.56	75%	3.7	12.65
Day Care Center	565	1000 sq. ft.	79.26	39.63	24%	3.7	35.19
Elementary/Sec. School (private)	520/522/530	1000 sq. ft.	12.41	6.21	24%	3.7	5.51
INDUSTRIAL							
Industrial Park	130	1000 sq. ft.	6.96	3.48	95%	4.6	15.21
Warehouse	150	1000 sq. ft.	4.96	2.48	95%	4.6	10.84
Mini-Warehouse	151	1000 sq. ft.	2.50	1.25	95%	3.2	3.80

Source: "Trip Ends" is average daily trips (ADT) during weekday from Institute of Transportation Engineers (ITE), *Trip Generation*, 6th ed., 1997 (single-family trip rates by size category from Table 54; "1-Way Trips" = ½ Trip Ends; "ITE Code" is land use code from ITE manual used for land use category (where more than one code shown, rates were averaged); shopping center and general office rates based on upper end of range; nursing home ADT derived from peak hour trip (PHT) rate and ADT and PHT rates per bed; new trip percentages for most uses from ITE, *Trip Generation Handbook,* October 1998; percentage for day care center from paper by Hitchens, 1990 ITE Compendium; percentage for elementary/secondary school assumed same as for day care; percentages for movie theater, golf course and car wash assumed; percentages for other land uses taken from Kimley-Horn and Associates, Inc., *Lee County Impact Fee Transportation Data*, 1990; average trip lengths from Table 56; retail average trip length used for centers of 250,000 to 500,000 square feet, reduced by 10% and 20%, respectively for the next two smaller categories and increased by 10% for the next larger category, and reduced by 50% for convenience stores and fast food restaurants; average trip length used for office uses and residential trip length used for industrial/warehousing uses.

Maximum Fee Schedule

Based on the impact fee formula and the inputs calculated in this report, the maximum road impact fees per unit of development for various land uses, with and without ROW costs, are shown in Tables 58 and 59. Impact fees could be adopted at less than 100 percent of the levels shown in the net cost schedules, provided that the reduction is applied uniformly across all land use categories in order to retain the proportionality of the fees. The impact fee ordinance will contain a provision allowing the option of independent fee determination studies for those applicants who can demonstrate that their development will have less impact on the need for road facilities than indicated by the fee schedule.

Table 58
ROAD NET COST SCHEDULE WITHOUT RIGHT-OF-WAY COSTS

Land Use Type	Unit	Daily VMT	Net Cost/ VMT	Net Cost per Unit
Single-Family (up to 1,300 sf)	Dwelling	16.05	$34.26	$550
Single-Family (1,301 to 1,700 sf)	Dwelling	17.89	$34.26	$613
Single-Family (1,701 to 2,300 sf)	Dwelling	20.42	$34.26	$700
Single-Family (more than 2,300 sf)	Dwelling	22.03	$34.26	$755
Multi-Family	Dwelling	15.27	$34.26	$523
Mobile Home/RV Park	Pad	11.04	$34.26	$378
Adult Cong. Living Facility (ACLF)	Dwelling	4.97	$34.26	$170
Hotel/Motel	Room	16.60	$34.26	$569
RETAIL/COMMERCIAL				
Shopping Ctr (0-99,999 sf)	1000 sq. ft.	36.51	$34.26	$1,251
Shopping Ctr (100,000-249,999 sf)	1000 sq. ft.	33.92	$34.26	$1,162
Shopping Ctr (250,000-499,999 sf)	1000 sq. ft.	32.91	$34.26	$1,127
Shopping Ctr (500,000 sf +)	1000 sq. ft.	30.41	$34.26	$1,042
Bank	1000 sq. ft.	54.92	$34.26	$1,882
Car Wash, Self Service	Stall	70.20	$34.26	$2,405
Convenience Store w/Gas Sales	1000 sq. ft.	76.75	$34.26	$2,629
Golf Course (open to public)	Acre	6.45	$34.26	$221
Movie Theater	1000 sq. ft.	50.74	$34.26	$1,738
Restaurant, Sit-Down	1000 sq. ft.	44.44	$34.26	$1,523
Restaurant, Fast Food	1000 sq. ft.	87.07	$34.26	$2,983
OFFICE/INSTITUTIONAL				
Office, General (0-99,999 sf)	1000 sq. ft.	20.42	$34.26	$700
Office, General (100,000 sf +)	1000 sq. ft.	17.37	$34.26	$595
Office, Medical	1000 sq. ft.	56.92	$34.26	$1,950
Hospital	1000 sq. ft.	26.43	$34.26	$905
Nursing Home	1000 sq. ft.	7.40	$34.26	$254
Church	1000 sq. ft.	12.65	$34.26	$433
Day Care Center	1000 sq. ft.	35.19	$34.26	$1,206
Elementary/Sec. School (private)	1000 sq. ft.	5.51	$34.26	$189
INDUSTRIAL				
Industrial Park	1000 sq. ft.	15.21	$34.26	$521
Warehouse	1000 sq. ft.	10.84	$34.26	$371
Mini-Warehouse	1000 sq. ft.	3.80	$34.26	$130

Source: Daily VMT per unit from Table 57; net cost per VMT from Table 49.

Table 59
ROAD NET COST SCHEDULE WITH RIGHT-OF-WAY COSTS

Land Use Type	Unit	Daily VMT	Net Cost/ VMT	Net Cost per Unit
Single-Family (up to 1,300 sf)	Dwelling	16.05	$38.53	$618
Single-Family (1,301 to 1,700 sf)	Dwelling	17.89	$38.53	$689
Single-Family (1,701 to 2,300 sf)	Dwelling	20.42	$38.53	$787
Single-Family (more than 2,300 sf)	Dwelling	22.03	$38.53	$849
Multi-Family	Dwelling	15.27	$38.53	$588
Mobile Home/RV Park	Pad	11.04	$38.53	$425
Adult Cong. Living Facility (ACLF)	Dwelling	4.97	$38.53	$191
Hotel/Motel	Room	16.60	$38.53	$640
RETAIL/COMMERCIAL				
Shopping Ctr (0-99,999 sf)	1000 sq. ft.	36.51	$38.53	$1,407
Shopping Ctr (100,000-249,999 sf)	1000 sq. ft.	33.92	$38.53	$1,307
Shopping Ctr (250,000-499,999 sf)	1000 sq. ft.	32.91	$38.53	$1,268
Shopping Ctr (500,000 sf +)	1000 sq. ft.	30.41	$38.53	$1,172
Bank	1000 sq. ft.	54.92	$38.53	$2,116
Car Wash, Self Service	Stall	70.20	$38.53	$2,705
Convenience Store w/Gas Sales	1000 sq. ft.	76.75	$38.53	$2,957
Golf Course (open to public)	Acre	6.45	$38.53	$249
Movie Theater	1000 sq. ft.	50.74	$38.53	$1,955
Restaurant, Sit-Down	1000 sq. ft.	44.44	$38.53	$1,712
Restaurant, Fast Food	1000 sq. ft.	87.07	$38.53	$3,355
OFFICE/INSTITUTIONAL				
Office, General (0-99,999 sf)	1000 sq. ft.	20.42	$38.53	$787
Office, General (100,000 sf +)	1000 sq. ft.	17.37	$38.53	$669
Office, Medical	1000 sq. ft.	56.92	$38.53	$2,193
Hospital	1000 sq. ft.	26.43	$38.53	$1,018
Nursing Home	1000 sq. ft.	7.40	$38.53	$285
Church	1000 sq. ft.	12.65	$38.53	$487
Day Care Center	1000 sq. ft.	35.19	$38.53	$1,356
Elementary/Sec. School (private)	1000 sq. ft.	5.51	$38.53	$212
INDUSTRIAL				
Industrial Park	1000 sq. ft.	15.21	$38.53	$586
Warehouse	1000 sq. ft.	10.84	$38.53	$418
Mini-Warehouse	1000 sq. ft.	3.80	$38.53	$146

Source: Daily VMT per unit from Table 57; net cost per VMT from Table 49.

PARKS

Fayetteville provides a wide diversity of recreational areas and open space for its residents, from neighborhood and community parks to regional parks and trails. On November 14, 1995, the citizens passed a one-cent hotel, motel, restaurant (HMR) tax to implement the unfunded plans for existing and future park facilities.

The City's current park land dedication and fee in-lieu requirement has been litigated up to the state Supreme Court. Rather than attempt to develop park impact fees, our recommendation is that the City retain this system, and update it to reflect the current level of service as well as differences in household size by housing type.

Current Dedication Requirements

The City's subdivision regulations require developers of all new residential subdivisions to dedicate park land or pay a fee in-lieu of dedication. Major developments comprising more than 40 acres or more than 100 housing units are required to dedicate parkland unless no suitable park site is available. The dedication requirement per dwelling unit varies by housing type. The fee in-lieu of dedication is updated every two years based on the average cost of park land. In 1994, the fees were based on $12,000 an acre. This was increased to $15,000 per acre in November 1997 and subsequently to the current level of $18,750 per acre in December 1999. The dedication requirements and current fees-in-lieu of dedication are shown in Table 60. The city is divided into four quadrants, which serve as benefit districts for expenditure of the fees-in-lieu (see Figure 7). The fee revenue is spent within three years in the benefit district in which it is collected. The fees may be spent on park land acquisition and development.

Figure 7
PARK FEE-IN-LIEU DISTRICTS

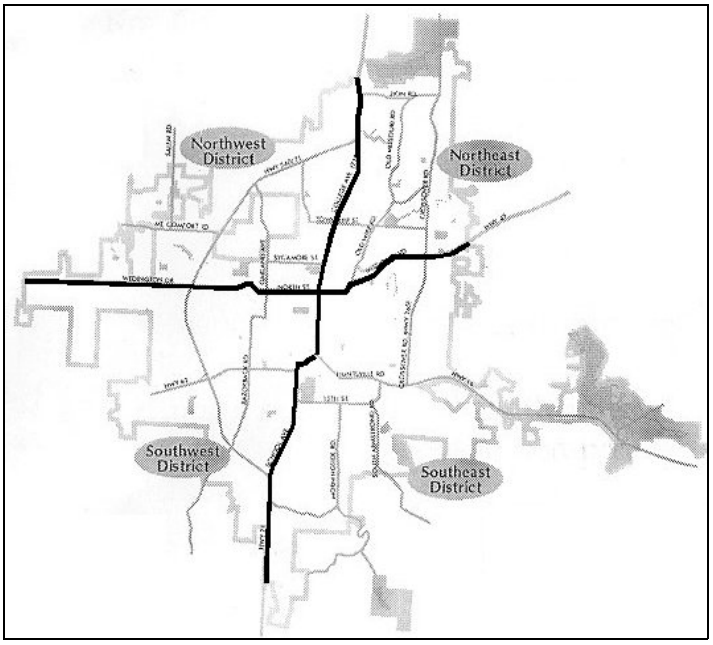


Table 60
CURRENT PARK DEDICATION REQUIREMENT/FEE-IN-LIEU

Housing Type	Acres/Unit	Cost/Acre	Fee/Unit
Single-Family	0.025	$18,750	$470
Multi-Family	0.020	$18,750	$375
Mobile Home	0.015	$18,750	$280

Source: Fayetteville Subdivision Regulations, Section 159.30(K), updated by Resolution 4199 passed November 11, 1999, effective December 10, 1999.

Household Size

The current dedication requirements for single-family and multi-family units accurately reflect the differences in average household sizes between owner-occupied and renter-occupied units. However, the correlation between housing type and tenure is not precise, and actual data on household size by housing type is available from the census and should be used. The source of the dedication requirement for mobile homes is less clear, and again this should be updated using available census data.

Current requirements are based on a national standard of 10 acres per thousand persons and average household sizes for owner and renter occupied units. There are a couple of problems here. One is the use of a national standard, rather than what the City actually provides, as the level of service, and this will be addressed in the next section. The main problem of concern here is that the ratios used are not comparable. This is true on three levels. First, the level of service is based on the ratio of acres of land to total permanent population, including group quarter residents. Second, the persons per unit ratios are based on the ratio of household population, excluding group quarters residents, to occupied units. Finally, the land requirement or fee-in-lieu per occupied unit is multiplied by the total number of new units. While some of these problems are counter-balancing to some extent (use of average household size excludes group quarters residents, but also implicitly assumes all new units will be occupied), the lack of comparability is troubling.

To address these problems, there is a need to develop a level of service standard that is equivalent to the persons per unit ratios used in the park land dedication and fee-in-lieu requirements. Our recommendation is to base the level of service (i.e., acres per person) on household population, excluding group quarters residents, while calculating the persons per unit ratios in terms of household population divided by total units, which includes vacant as well as occupied units.

Data from the 1990 census is still the best available data on household population by housing type. Comparable data from the 2000 census will not be available for at least another year. The 2000 census data that is available indicates that the ratio of household population to total units for all housing types in Fayetteville has increased slightly since 1990, from 2.03 to 2.07 persons per unit. This indicates that 1990 ratios should be reasonably representative of current actual ratios. The persons per unit ratios by housing type from the 1990 census are shown in Table 61.

Table 61
PERSONS PER HOUSING UNIT

Housing Type	Household Population	Total Units	Persons/ Unit
Single-Family	22,927	9,276	2.47
Multi-Family	13,559	8,700	1.56
Mobile Home	1,703	859	1.98
Total	38,189	18,835	2.03

Source: 1990 U.S. Census data for Fayetteville.

Existing Level of Service

The City has an excellent inventory of park land and facilities for the current effort to update the park master plan. This inventory should be used to ensure that the dedication requirement does not exceed the current level of service provided by the City.

Most park land dedication requirements are based on the needs for neighborhood and community parks. Regional parks are typically not addressed in land dedication requirements, since no development, no matter how large, is likely to contain a suitable dedication site large enough to be a regional park. In addition, the fee-in-lieu of dedication is based on an average cost per acre, which is likely to differ significantly between regional parks, which are normally in very large tracts, often with limited development potential, and neighborhood and community parks, which are often similar to developable residential tracts.

For this reason, the level of service will exclude regional parks. It will also exclude park sites that are on land owned by the school district. Undeveloped park sites owned by the City are included. Excluding regional parks and school-related facilities, the inventory of existing City neighborhood and community park sites, shown in Table 62, totals 564 acres.

Table 62
EXISTING PARK INVENTORY

Park Name	Park Type	Total Acres
Bayyari	Neighborhood (undev)	7.05
Braden	Neighborhood (undev)	2.25
Bundrick	Neighborhood	4.25
Butterfield Trail Expansion	Greenway	2.64
Clarence Craft	Neighborhood	4.75
Combs	Special use	87.00
Crossover	Undeveloped	20.00
Davis	Neighborhood	9.20
Eagle	Neighborhood (undev)	1.95
Finger	Neighborhood	19.00
Friendship	Mini (undeveloped)	0.38
Frisco	Mini (undeveloped)	0.57
Gary Hampton	Special Use	18.00
Gordon Long	Neighborhood	6.62
Greathouse	Neighborhood	6.00
Gregory	Neighborhood	19.38
Gulley Trail	Greenway	13.70
Gulley	Community	26.66
Hotz	Mini	0.60
Veterans Memorial	Community	40.00
Lake Fayetteville Softball	Community	21.26
Lewis Soccer	Special use	27.00
Mt. Sequoyah Gardens	Neighborhood (undev)	2.42
Mudcreek Trail	Greenway	19.92
Ozark View	Neighborhood (undev)	8.16
Ralph "Buddy" Hayes	Mini	0.40
Red Oak Park	Neighborhood	8.74

Park Name	Park Type	Total Acres
Ridgeway View	Greenway (undev)	6.00
Rocky Branch	Neighborhood (undev)	5.70
Routh	Neighborhood	1.64
Salem Village	Neighborhood (undev)	11.59
Square Gardens	Mini	0.33
Shiloh West	Greenway	0.46
Sweetbriar	Neighborhood	4.00
Trammel	Mini	0.70
Walker	Community	64.34
White River	Special use	49.24
Wildwood	Neighborhood (undev)	13.95
Wilson	Community	22.75
Youth Center	Neighborhood/Special Use	5.00
Total		563.60

Source: Lose and Associates, *Fayetteville Comprehensive Parks and Recreation Master Plan*, July 2001 draft (excludes school-owned facilities and regional parks); March 15, 2002 memo from Fayetteville Parks and Recreation Department.

The existing park level of service, based on the inventory of existing park land and an estimate of current household population, is 10.1 acres per thousand residents, as shown in Table 63.

Table 63
EXISTING PARK LEVEL OF SERVICE

Household Population, 1990	38,189
Household Population, 2000	52,697
Estimated Household Population, 2002	55,599
Acres of Neighborhood and Community Park Land	563.60
Acres per 1,000 Household Population	10.1

Source: 1990 and 2000 household population in Fayetteville from U.S. Census Bureau; estimated 2002 household population extrapolated, acres from Table 62.

Proposed Dedication Requirements

The land dedication requirements can be determined by multiplying the persons per unit associated with each housing unit by the existing level of service in terms of acres per person to determine the number of acres to be dedicated per housing unit. The fee in-lieu of dedication is determined by multiplying the dedication requirement by the average cost per acre. This has recently been determined to be $23,125 per acre. The updated park dedication and fee-in-lieu requirements are shown in Table 64.

Table 64
PROPOSED PARK DEDICATION REQUIREMENT/FEE-IN-LIEU

Housing Type	Persons Unit	Acres/ 1,000 Pop.	Acres/ Unit	Cost/ Acre	Fee-in-Lieu/ Unit
Single-Family	2.47	10.1	0.025	$23,125	$578
Multi-Family	1.56	10.1	0.016	$23,125	$370
Mobile Home	1.98	10.1	0.020	$23,125	$463

Source: Persons per unit from Table 61; acres per 1,000 population from Table 63; cost per acre is average cost of residential land in the city from a survey of local realtors conducted by City of Fayetteville Parks and Recreation Department, September 12, 2001.

The revised dedication requirements are compared with the current requirements in Table 65. The acres required to be dedicated per dwelling unit would be unchanged for single-family development, would be reduced for multi-family units, and would be increased for mobile homes.

Table 65
PARK DEDICATION REQUIREMENT COMPARISON

Housing Type	Current Acres/Unit	Revised Acres/Unit	Percent Change
Single-Family	0.025	0.025	0.0%
Multi-Family	0.020	0.016	-20.0%
Mobile Home	0.015	0.020	33.0%

Source: Current requirements from Table 60; revised requirements from Table 64.

The revised fees in-lieu of dedication are compared with the existing fees in Table 66. The fees would increase for single-family units and mobile homes, but decrease slightly for multi-family units.

Table 66
PARK FEE-IN-LIEU COMPARISON

Housing Type	Current Fee-in-Lieu	Revised Fee-in-Lieu	Percent Change
Single-Family	$470	$578	23.0%
Multi-Family	$375	$370	-1.3%
Mobile Home	$280	$463	65.4%

Source: Current fees from Table 60; revised fees from Table 64.

Appendix A: Major Roadway Inventory

Table 67
MAJOR ROADWAY INVENTORY

Road	From	To	Mi.	Lns	ADT	Capacity
Archibald Yell Blvd	College Ave	School Ave	0.45	4	13,000	n/a
6th St	School Ave	City Limits	3.45	5	23,600	36,250
15th St	Happy Hollow Rd	College Ave	1.27	2	11,000	13,000
15th St	College Ave	Razorback Rd	1.26	4	9,000	26,000
Co. Rd. 649	City Limits	Persimmon St	1.00	2	n/a	n/a
College Ave	Archibald Yell Blvd	North St	1.13	4	23,250	29,000
College Ave	North St	Millsap Rd	2.72	5	26,500	36,250
College Ave	Millsap Rd	560' S of Joyce Blvd	0.97	2	34,000	16,000
College Ave	560' S of Joyce Blvd	980' N of Joyce Blvd	0.26	6	34,000	48,000
College Ave	980' N of Joyce Blvd	1973' S of City Limits	0.51	4	34,000	32,000
College Ave	1973' S of City Limits	City Limits	0.37	6	34,000	48,000
Crossover Rd	Old Missouri Rd	Mission Blvd	4.12	3	15,667	21,750
Crossover Rd	Mission Blvd	Huntsville Rd	2.39	5	12,500	36,250
Garland Ave	I-540	Wedington Dr	2.03	2	10,500	14,500
Garland Ave	Wedington Dr	Maple St	0.50	2	14,000	13,000
Happy Hollow Rd	Huntsville Rd	15th St	0.28	4	8,400	n/a
Highway 112	1,286' E of Cris Hollow	399' w/o D. Solomon	0.74	2	3,300	13,000
Highway 112	1-540	Van Asche Dr	0.81	2	4,500	13,000
Huntsville Rd	City Limits	Happy Hollow Rd	5.10	2	11,140	n/a
Joyce Blvd	City Limits	College Ave	0.76	5	18,000	36,250
Joyce Blvd	College Ave	Frontage Rd	0.09	6	18,000	43,500
Joyce Blvd	Frontage Rd	228' S of Front St	0.11	5	18,000	36,250
Joyce Blvd	228' S of Front St	Crossover Rd	1.37	4	8,900	29,000
Maple St	Garland Ave	Razorback Rd	0.25	2	12,000	13,000
Mission Blvd	North St	City Limits	2.37	2	9,120	14,500
North St	Garland Ave	Gregg Ave	0.50	4	18,000	29,000
North St	Gregg Ave	Mission Blvd	1.01	2	11,000	14,500
Old Missouri Rd	City Limits	Crossover Rd	0.22	3	14,000	15,750
Razorback Rd	Maple St	15th St	1.50	2	14,000	13,000
Razorback Rd	15th St	Ramp	0.84	5	5,700	32,500
Razorback Rd	Ramp	Highway 71	0.09	3	5,700	19,500
School Ave	Archibald Yell Blvd	3,477' S of Willoughby	3.33	5	11,200	26,250
School Ave	3,477' S of Willoughby	City Limits	0.65	4	11,200	21,000
Steele Blvd	Van Asche Dr	Joyce Blvd	0.50	4	n/a	n/a
Sunshine Rd	1510' S Jess Anderson	Adams Rd	0.33	2	n/a	n/a
Van Asche Dr	Highway 112	244' E of I-540	0.24	2	1,100	n/a
Van Asche Dr	1,073' W of Gregg Ave	Gregg Ave	0.20	2	1,100	n/a
Van Asche Dr	523' W of Steele Blvd	Steele Blvd	0.10	4	1,100	n/a
Wedington Dr	City Limits	709' W of 46th Ave	1.76	2	7,200	14,500
Wedington Dr	709' W of 46th Ave	Shiloh Dr	1.19	5	14,700	36,250
Wedington Dr	Shiloh Dr	Garland Ave	1.58	4	14,000	29,000

Road	From	To	Mi.	Lns	ADT	Capacity
Willoughby Rd	3981' E of School Ave	School Ave	0.75	2	n/a	13,000
Subtotal, Principal Arterials			49.10			
Black Oak Rd	Armstrong Rd	City Limits	1.79	2	4,600	n/a
Armstrong Rd	15th St	Black Oak Rd	1.08	2	4,600	13,000
Cato Springs Rd	School Ave	Razorback Rd	0.99	2	22,000	13,000
Dead Horse Mtn Rd	Goff Farm Rd	City Limits	1.14	2	800	n/a
Deane St	Garland Ave	Porter Rd	1.00	2	6,100	13,000
Double Springs Rd	City Limits	299' N of Dot Tipton Rd	0.90	2	n/a	n/a
Drake St	Gregg Ave	Garland Ave	0.78	2	5,300	13,000
Gregg Ave	City Limits	1103' S of City Limits	0.21	4	4,100	26,000
Gregg Ave	1103' S of City Limits	Township St	1.72	2	15,500	13,000
Gregg Ave	Township St	North St	1.30	4	14,500	26,000
Huntsville Rd	Mashburn Ave	Happy Hollow Rd	0.73	2	8,700	13,000
Mount Comfort Rd	City Limits	I-540	1.81	2	8,200	13,000
Old Wire Rd	Mission Blvd	Skillern Rd	2.64	2	7,633	10,500
Porter Rd	Deane St	Shiloh Dr	0.36	2	6,100	13,000
Pump Station Rd	567' E of City Lake Rd	Armstrong Rd	0.67	2	n/a	10,500
Rupple Rd	174' N of Double Tree	Mount Comfort Rd	0.42	2	n/a	10,500
Rupple Rd	Rupple Rd - Collector	Persimmon St	1.14	2	n/a	10,500
Shiloh Dr	Steele Blvd	Gregg Ave	0.39	2	n/a	n/a
Skillern Rd	Old Wire Rd	City Limits	0.65	2	n/a	n/a
Steele Blvd	Shiloh Dr	Van Asche Dr	0.25	3	n/a	n/a
Township St	Gregg Ave	College Ave	0.44	2	11,000	13,000
Subtotal, Minor Arterials			20.41			
Betty Jo Dr	Persimmon St	Wedington Dr	0.51	2	n/a	n/a
Beechwood Ave	15th St	18th St	0.25	2	n/a	13,000
Austin Dr	Ash St	Poplar St	0.15	2	n/a	n/a
Ash St	Walnut Ave	Samantha	0.58	2	n/a	10,500
Appleby Rd	Gregg Ave	Plainview Ave Ext.	1.03	2	n/a	10,500
15th St	Beechwood Ave	Razorback Rd	0.22	2	n/a	n/a
18th St	Futrall Dr	Beechwood Ave	0.26	2	n/a	13,000
46th Ave	Persimmon St	Wedington Dr	0.51	2	n/a	10,500
54th Ave	Persimmon St	Wedington Dr	0.65	2	n/a	n/a
59th Ave	Wedington Dr	1071' N of Wedington Dr	0.20	2	n/a	n/a
Brooks Ave	15th St	Boone St	0.21	2	n/a	10,500
Broyles Ave	City Limits	Persimmon	1.25	2	n/a	n/a
Cato Springs Rd	Highway 71	I-540	0.18	3	n/a	n/a
Cato Springs Rd	I-540	City Limits	0.58	2	n/a	n/a
Charlee Ave	Mission Blvd	Charlee Ave Ext.	0.23	2	n/a	n/a
City Lake Rd	Pump Station Rd	Willoughby Rd	1.39	2	1,700	10,500
Cliffs Blvd	Crossover Blvd	218' W of Crossover	0.04	2	n/a	n/a
Cliffs Blvd	218' W of Crossover	Happy Hollow Rd	0.48	4	n/a	n/a
Deane Solomon Rd	Mount Comfort Rd	Highway 112	1.76	2	910	10,500

Road	From	To	Mi.	Lns	ADT	Capacity
Dinsmore Trl	6th St	City Limits	0.40	2	n/a	n/a
Drake St	McConnell	Garland Ave	0.15	2	n/a	10,500
Drake St	1,278' W of Gregg Ave	Highway 71	0.62	4	n/a	21,000
Ernie Jacks Blvd	Garland Ave	314' W of Garrett Dr	0.13	2	n/a	n/a
Front St	Millsap Rd	Joyce Blvd	0.62	2	n/a	10,500
Frontage Rd	Joyce Blvd	Zion Rd	0.49	2	8,000	n/a
Futrall Dr	Wedington Dr	Freeway Ramp	1.74	2	3,200	10,500
Futrall Dr	Freeway Ramp	455' S of 6th St	0.21	3	3,200	15,750
Futrall Dr	455' S of 6th St	18th St	0.54	2	3,200	10,500
Futrall Dr	Gregg Ave	Millsap Rd	0.60	2	n/a	10,500
Garland Ave	Cato Springs Rd	Brooks Ave	0.33	2	n/a	10,500
Garrett Dr	Ernie Jacks Blvd	1,353' E of Leverett Ave	0.36	2	n/a	n/a
Goff Farm Rd	Dead Horse Mtn Rd	City Limits	0.80	2	n/a	n/a
Gypsum Dr	Salem Rd	Raven Ln	0.28	2	n/a	n/a
Happy Hollow Rd	Cliffs Blvd	886' S of Cliffs Blvd	0.17	4	n/a	21,000
Happy Hollow Rd	886' S of Cliffs Blvd	Huntsville Rd	0.55	2	480	10,500
Harold St	College Ave	Stubblefield Rd	0.25	2	n/a	10,500
Hollywood Ave	6th St	1210' S of 6th St	0.23	2	n/a	n/a
Joyce St	Joyce Blvd	City Limits	0.45	2	n/a	n/a
Leverett Ave	North St	Garrett Dr	0.96	2	6,800	10,500
Longview St	Plainview Ave	College Ave	0.15	2	n/a	n/a
Mall Ave	Joyce Blvd	1,211' S of Joyce Blvd	0.23	2	n/a	n/a
Mall Ave	1,211' S of Joyce Blvd	Shiloh Dr	0.29	3	n/a	n/a
Mally Wagnon Rd	City Limits	Huntsville Rd	0.25	2	n/a	n/a
Mcconnell Ave	Knapp Dr	Drake St	0.52	2	n/a	n/a
Miller St	Yates Ave	Gregg Ave	0.11	2	n/a	10,500
Millsap Rd	Futrall Dr	504' E of Plainview Ave	0.36	3	n/a	n/a
Millsap Rd	504' E of Plainview Ave	Vantage Dr	0.32	2	n/a	n/a
Monte Painter Dr	Northhills Blvd	Wimberly Dr	0.16	2	n/a	n/a
Morningside Dr	Huntsville Rd	Pump Station Rd	0.96	2	n/a	10,500
New Bridge Rd	155' E of High Ave	Settlemen Ln	0.51	2	n/a	n/a
Northhills Blvd	Monte Painter Dr	Futrall Dr	0.21	4	n/a	21,000
Old Farmington Rd	6th St	Shiloh Dr	0.88	2	n/a	n/a
Old Missouri Rd	Old Wire Rd	Zion Rd	2.01	2	6,000	10,500
Old Wire Rd	City Limits	1,570' N of Skillern Rd	0.46	2	1,500	10,500
Persimmon St	46th St	54th Ave	0.75	2	n/a	n/a
Plainview Ave	367' S of Kenray St	Millsap Rd	0.34	2	n/a	n/a
Poplar St	Yates Ave	College Ave	0.37	2	n/a	10,500
Porter Rd	Wedington Dr	Deane St	0.58	2	n/a	10,500
Raven Ln	Mount Comfort Rd	145' N of Quail Dr	0.22	2	n/a	n/a
Roberts Rd	Huntsville Rd	City Limits	0.16	2	n/a	n/a
Rolling Hills Dr	College Ave	Old Missouri Rd	0.71	2	9,000	10,500
Rupple Rd	600' S of New Bridge	Old Mt Comfort	0.44	2	n/a	10,500
Salem Rd West	Deane Solomon Rd	City Limits	0.15	2	n/a	10,500
Salem Rd North	City Limits	Mount Comfort Rd	1.16	2	n/a	10,500

Road	From	To	Mi.	Lns	ADT	Capacity
Salem Rd North	1,984' S of Mt Comfort	Wedington Dr	0.67	2	n/a	10,500
Samantha Ave	116' S of Ash St	Ash St	0.02	2	n/a	n/a
Shepherd Ln	Frontage Rd	195' E of Frontage Rd	0.04	2	n/a	n/a
Shiloh Dr	Joyce Blvd	1,157' S of Joyce Blvd	0.22	2	n/a	10,500
Shiloh Dr	Mall Ave	Steele Blvd	0.39	3	n/a	15,750
Shiloh Dr	Highway 112	1,925' S of Mt Comfort	1.73	2	n/a	10,500
Shiloh Dr	1,678' N of Wedington	433' N of 6th St	2.02	2	620	10,500
Shiloh Dr	433' N of 6th St	6th St	0.08	4	6,000	21,000
Shiloh Dr	6th St	345' S of 6th St	0.07	3	n/a	15,750
Shiloh Dr	345' S of 6th St	2,010' N of Cato Springs	1.09	2	n/a	10,500
Shiloh Dr	326' S of Cato Springs	End of Shiloh Dr	0.23	2	n/a	10,500
Starr Dr	Mission Blvd	City Limits	0.64	2	n/a	n/a
Stearns St	Joyce Blvd	120' E of Remington Dr	0.11	2	n/a	n/a
Stubblefield Rd	Harold St	Old Missouri Rd	0.56	2	n/a	10,500
Sunbridge Dr	Villa Blvd	College Ave	0.08	2	n/a	n/a
Sycamore St	Garland Ave	Leverett Ave	0.25	2	5,000	10,500
Sycamore St	Leverett Ave	Gregg Ave	0.32	4	8,600	21,000
Sycamore St	Gregg Ave	Walnut Ave	0.68	2	4,800	10,500
Township St	College Ave	Crossover Rd	1.75	2	7,700	n/a
Trucker's Dr	Gypsum Dr	Highway 112	0.17	2	n/a	n/a
Van Asche Dr	Steele Blvd	Mall Ave	0.37	3	n/a	n/a
Vantage Dr	Stearns St	Zion Rd	0.37	2	n/a	n/a
Vantage Dr	Joyce Blvd	169' N of Joyce Rd	0.03	2	n/a	n/a
Walnut Ave	Sycamore St	Ash St	0.13	2	n/a	10,500
Willoughby Rd	City Lake Rd	135' S of City Lake	0.03	2	n/a	13,000
Wimberly Dr	Monte Painter Dr	Futrall Dr	0.23	2	n/a	n/a
Wyman Rd	City Limits	Crossover Rd	0.84	2	n/a	n/a
Yates Ave	Poplar St	Miller St	0.07	2	n/a	10,500
Zion Rd	City Limits	College Ave	1.78	2	6,200	10,500
Subtotal, Collectors			47.63			
Block Ave	Dickson St	Center St	0.25	2	n/a	11,500
Block Ave	Center St	Mountain St	0.05	1	n/a	5,750
Assembly Rd	Skyline Dr	Mission Blvd	0.60	2	410	10,500
6th St	School Ave	Huntsville Rd	0.72	2	5,100	13,000
11th St	Duncan Ave	Hill Ave	0.08	2	1,200	10,500
Arkansas Ave	Dickson St	Maple St	0.25	2	9,600	11,500
California Blvd	Center St	Leroy Pond Rd	0.36	2	n/a	10,500
Center St	California Blvd	Block Ave	0.67	2	5,100	10,500
Center St	Block Ave	East Ave	0.05	1	5,100	5,750
Center St	East Ave	College Ave	0.10	2	5,100	11,500
Cleveland St	Sang Ave	Arkansas Ave	1.15	2	n/a	10,500
College Ave	Rock St	15th St	0.87	2	1,800	n/a
Dickson St	Fletcher Ave	College Ave	0.42	2	4,600	10,500
Dickson St	College Ave	Arkansas Ave	0.60	2	9,900	10,500

Road	From	To	Mi.	Lns	ADT	Capacity
Duncan Ave	15th St	11th St	0.25	2	1,200	10,500
East Ave	Mountain St	Dickson St	0.30	1	7,000	5,750
Fletcher Ave	Dickson St	Lafayette St	0.15	2	n/a	10,500
Government Ave	Prairie St	6th St	0.09	2	n/a	n/a
Greenview Dr	Mission Blvd	Viewpoint Dr	0.13	2	n/a	n/a
Hill Ave	6th St	11th St	0.31	2	1,200	10,500
Huntsville Rd	Mill Ave	Mashburn Ave	0.39	2	n/a	10,500
Lafayette St	Mission Blvd	Arkansas Ave	1.04	2	5,875	10,500
Leroy Pond Dr	California Blvd	Razorback Rd	0.21	2	n/a	10,500
Leverett Ave	Maple St	North St	0.50	2	6,800	10,500
Maple St	Mission Blvd	Garland Ave	1.43	2	12,900	10,500
Mashburn	Huntsville Rd	6th St	0.03	2	n/a	n/a
Mill Ave	Rock St	Huntsville Rd	0.08	2	n/a	10,500
Mission Blvd	Lafayette St	North St	0.60	2	12,000	13,000
Mountain St	School Ave	Block Ave	0.21	2	n/a	10,500
Mountain St	Block Ave	East Ave	0.05	1	n/a	5,750
Mountain St	East Ave	College Ave	0.10	2	n/a	11,500
Pembroke Rd	Rockwood Trail	Ridgeway Dr	0.27	2	480	n/a
Prairie St	West Ave	Government Ave	0.12	2	n/a	n/a
Ridgeway Dr	Pembroke Rd	Viewpoint Dr	0.16	2	n/a	n/a
Rock St	College Ave	Mill Ave	0.10	2	5,000	10,500
Rockwood Trail	Mission Blvd	Pembroke Rd	0.69	2	n/a	n/a
Sang Ave	Cleveland St	Wedington Dr	0.25	2	n/a	10,500
School Ave	Dickson St	Archibald Yell Blvd	0.58	2	3,000	13,000
Skyline Dr	Assembly Rd	Assembly Rd	0.88	2	190	n/a
Viewpoint Dr	Ridgeway Dr	Viewpoint Dr	0.47	2	460	n/a
West Ave	Prairie St	Lafayette St	0.74	2	n/a	10,500
Subtotal, Historic Collectors			16.30			

Source: City of Fayetteville Public Works Department; ADT is annual average daily traffic estimates for 2000 adjusted from counts made in January and February from Arkansas State Highway and Transportation Department, "2000 Traffic Volumes Map of Fayetteville-Springdale, Washington and Benton Counties" or, where 2000 counts not available, 1992 estimated volumes from DeShazo, Starek & Tang, Inc., Prioritization of Roadway Improvements in Fayetteville, Arkansas, August 1992; 24-hour capacities based on 10 times peak hour per lane capacities from DeShazo, Starek & Tang, op. cit.