Facility Fee Study

Prepared for the

City of Raleigh, North Carolina

Prepared by

duncan associates

In association with

Kimley-Horn and Associates, Inc.

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EXECUTIVE SUMMARY

In 1987, the City of Raleigh adopted facility fees for thoroughfares and open space. In 2005, the City of Raleigh retained the services of Duncan Associates, Kimley-Horn and Associates, Inc. and Dr. James C. Nicholas to conduct the first comprehensive review and update of its facility fee study and ordinance. The first phase of the project culminated with the preparation of a policy report in May 2005.[1] This second and final phase presents detailed findings and recommendations for updating the City's facility fee schedules and developer reimbursement schedules.

Key Findings

The most general conclusion that can be derived from the analysis is that the facility fee program has not stayed current with increases in the costs of land acquisition and construction. This is apparent in both the facility fee amounts and the developer reimbursement rates:

- Average area new home prices have almost doubled since 1988, while facility fees are essentially unchanged over the same period.
- Current fee levels are only about one-third of the average road and park impact fees charged by other jurisdictions in North Carolina and around the country.
- Fee revenues are paying less than 20 percent of eligible thoroughfare and open space projects.
- Reimbursement rates for land are significantly lower than current average costs.
- Reimbursement rates for paving costs are reasonable, but rates for many other typical thoroughfare cost components are significantly lower than current costs.
- Low fee collections are contributing to lengthy reimbursement periods in some zones.
- Low reimbursement rates and lengthy repayment periods mean that some developers who make frontage improvements contribute substantially more than other developers whose projects have similar impacts but who do not have to make frontage improvements.

[1] Duncan Associates, et al., *Facility Fee Analysis: Policy Report*, May 2005

Policy Recommendations

The purpose of this phase is to update the City of Raleigh's thoroughfare and open space facility fee schedules and reimbursement schedules to reflect current costs. Currently, the City of Raleigh assesses fees only for roadways (thoroughfares and collector roads) and open space acquisition (parks and greenways). The City's thoroughfare fees apply to all types of new development, while open space fees are assessed only on new residential development. Facility fee related policy considerations from the Phase 1 report are also discussed in this report; these include the following policy recommendations:

1. Update the thoroughfare fee schedule using the most recent trip generation and cost data.

2. Update the open space fee schedule to include park development costs as well as land acquisition costs.

3. Simplify the facility fee methodologies so that they can be more easily updated on a regular basis.

4. Update the developer reimbursement schedule to reflect current construction and land costs.

5. Annually update the reimbursement schedule to keep it close to current costs.

6. Increase thoroughfare facility fees significantly to ensure that reimbursement commitments can be met.[2]

7. Consider increasing the maximum percentage of funds to be used for reimbursements.

8. Consider implementing annual fee adjustments tied to a nationally recognized and relevant price index in order to ensure that fees track prevailing costs more closely between periodic updates.

9. Consider variable rates for facility fees based on dwelling unit size for single-family units.

10. Consider reducing thoroughfare fees for residential development in the downtown area to acknowledge greater transit usage.

11. Consider the use of facility fee revenues to pay debt service for growth-related improvements.

12. Phase in any fee increases to minimize potential negative effects upon pipeline projects and the local real estate market.

[2] If thoroughfare fees are adopted at the maximum rate, outstanding reimbursements in Zone 1 could be repaid in about 5.6 years (see discussion on page 27).

Facility Fee Summary

The potential changes to Raleigh's facility fees calculated in this report are summarized for five major land use categories in Table 1. The combined thoroughfare and open space fees for a single-family unit would be $3,404 if adopted at one hundred percent of the maximum eligible amounts calculated in this report (the open space fees would be higher if improvement costs are included). This would represent an increase of $2,722 over the current combined thoroughfare and open space fees of $682.

Table 1
FACILITY FEE SUMMARY

	Single-Family per dwelling	Multi-Family per dwelling	Retail per 1000 sf	Office per 1000 sf	Industrial per 1000 sf
Max. Thoroughfare Fee	$2,198	$1,542	$3,749	$2,859	$1,807
Max. Open Space Fee, Land Only	$1,206	$905	NA	NA	NA
Total Maximum Fee	$3,404	$2,447	$3,749	$2,859	$1,807
Current Thoroughfare Fee	$307	$187	$1,092	$543	$181
Current Open Space Fee	$375	$272	NA	NA	NA
Total Current Fee	$682	$459	$1,092	$543	$181
Thoroughfare Fee Increase	$1,891	$1,355	$2,657	$2,316	$1,626
Open Space Fee Increase, Land Only	$831	$633	NA	NA	NA
Total Potential Increase	$2,722	$1,988	$2,657	$2,316	$1,626

Source: Maximum thoroughfare fees from Table 34 and maximum open space fees from Table 50; current fees from City of Raleigh Code of Ordinances, Chapter 8, Facility Fees (open space fee shown is for Zone 2).

The facility fees calculated in this report could be adopted at less than 100 percent of the levels shown in Table 1. For example, in 1987 the thoroughfare facility fees were adopted at about 39 percent of the maximum level calculated in the study for the zone with the lowest maximum fees.

It is recommended that the City phase in any fee increases to minimize the potential negative effects upon proposed projects and the local real estate market. Following any phase-in period, the City might want to consider adjusting the fees annually for inflation. Doing so minimizes the amount of the periodic fee increases that accompany comprehensive facility fee updates.

Facility Fee Revenue Projection

If adopted at the maximum levels calculated in this report, it is estimated that facility fees could generate approximately $23.4 million annually, as shown in Table 2 (open space revenues would be considerably higher if updated fees include improvement costs). Current facility fee revenue is approximately $4.7 million annually. Based on 2005 building permit data, the City could expect annual facility revenue that is 4.9 times the current facility fee revenue if the fees were adopted at the maximum level calculated in this report. Approximately three-quarters of the revenue would come from the thoroughfare facility fee. It should be noted that not all of the facility fee revenue would be available for new projects, since a portion of the facility fee revenue would need to be set aside in the reimbursement accounts.

Table 2
POTENTIAL ANNUAL FACILITY FEE REVENUE

	Single-Family	Multi-Family	Retail	Office	Industrial	Total
Unit of Measurement	Dwelling	Dwelling	1000 sf	1000 sf	1000 sf	
Annual Growth	2,543	2,200	1,006	1,683	407	
Thoroughfare Fee Rev.	$5,589,300	$3,392,200	$3,771,400	$4,811,900	$735,400	$18,300,200
Open Space Fee Rev.*	$3,066,900	$1,991,000	$0	$0	$0	$5,057,900
Total Revenue	$8,656,200	$5,383,200	$3,771,400	$4,811,900	$735,400	$23,358,100

* if updated fees are based on land acquisition costs only
Source: Projected annual growth based on 2005 building permit data from City of Raleigh Planning Department, January 17, 2005; revenue projections based on potential facility fees from Table 1.

Facility Fee Comparisons

National average facility fees from an on-going survey conducted by the consultant are summarized in Table 3. The survey includes 258 jurisdictions, five of which are in North Carolina. As shown in the table, facility fee assessments in North Carolina tend to be significantly lower than the national average for all land use types.

Table 3
AVERAGE NATIONAL IMPACT FEES

Facility Type	No.*	Single-Family	Multi-Family	Retail (1000 sf)	Office (1000 sf)	Industrial (1000 sf)
Roads	203	$2,061	$1,413	$4,156	$2,471	$1,412
Parks**	173	$1,869	$1,459	$628	$674	$492
Drainage	50	$1,186	$659	$869	$661	$849
Library**	63	$351	$265	$330	$330	$330
Fire	113	$337	$275	$309	$274	$184
Police	79	$309	$272	$387	$260	$160
General Government	55	$693	$538	$469	$411	$309
Schools**	106	$3,834	$2,430	$333	$323	$333
Other	48	$1,841	$1,510	$2,537	$1,733	$1,476
Average Non-Utility Fees	249	$5,681	$3,906	$4,877	$3,116	$2,060
Water	130	$2,625	$1,293	$513	$486	$477
Wastewater	134	$2,515	$1,453	$558	$470	$462
Average of Total Fees***	260	$8,074	$5,102	$4,871	$3,258	$2,272
Average North Carolina Fees	5	$3,826	$2,434	$1,646	$1,271	$958

* number of jurisdictions in survey charging the fee
** fees not typically charged for nonresidential development
*** average of total fees actually charged, not sum of average fees by type
Source: Duncan Associates telephone and internet survey, March 22, 2006; where fees vary by area, the average was taken, where fees vary by land use characteristics, the following assumptions were made: single-family detached-three-bedroom, 2,000 sq. ft. house on 10,000 sq. ft. lot and value of $200,000; multi-family-two bedroom, 1,000 sq. ft. with 7 2" water meters (2 for irrigation) per 240-unit apartment complex, density of 12 units/acre and value of $100,000/unit; nonresidential-100,000 sq. ft. building with 3" water meter and 0.15 FAR (0.25 for office).

Tables 4 through 6 show Raleigh's current and potential fees compared to the non-utility fees charged by the neighboring jurisdictions of Cary and Durham and the average non-utility facility fees charged in other jurisdictions nationally. The City may want to adopt updated thoroughfare and open space facility fees somewhat lower than the maximum potential fees calculated in this report in order to maintain its jurisdictional competitiveness. However, the City should recognize that the fees adopted must be high enough to ensure adequate funds are available to reimburse developers when necessary.

Table 4
COMPARATIVE FEES PER SINGLE-FAMILY UNIT

	City of Raleigh Fees				
Facility	Current	Maximum	Cary	Durham	U.S. Average
Roads	$307	$2,198	$1,243	$806	$2,061
Parks*	$375	$1,206	$1,031	$349	$1,869
Schools	$0	$0	$0	$2,000	$3,834
Total**	$682	$3,404	$2,274	$3,155	$5,681

* Raleigh's fee is for land costs only; Cary's fee is fee-in-lieu of 1/35 acre per unit at assumed average value per acre used in Raleigh's fee calculation from Table 39
**Total US average fee is average non-utility fee charged, not sum of facility averages
Source: Duncan Associates telephone and internet survey, March 22, 2006; Raleigh's current and maximum fees from Table 1.

Table 5
COMPARATIVE FEES PER MULTI-FAMILY UNIT

	City of Raleigh Fees				
Facility	Current	Maximum	Cary	Durham	U.S. Average
Roads	$187	$1,542	$762	$495	$1,413
Parks*	$247	$905	$1,031	$216	$1,459
Schools	$0	$0	$0	$1,155	$2,430
Total**	$434	$2,447	$1,793	$1,866	$3,906

* Raleigh's fee is for land costs only; Cary's park fee is fee-in-lieu of 1/35 acre per unit at assumed average value per acre used in Raleigh's fee calculation from Table 39
**Total US average fee is average non-utility fee charged, not sum of facility averages
Source: Duncan Associates telephone and internet survey, March 22, 2006; Raleigh's current and maximum fees from Table 1.

Table 6
COMPARATIVE NONRESIDENTIAL ROAD FEES PER 1,000 S.F.

	City of Raleigh Fees				
Facility	Current	Maximum	Cary, N.C.	Durham, N.C.	U.S. Average
Retail	$1,247	$3,749	$1,341	$2,873	$4,156
Office	$438	$2,859	$1,833	$1,692	$2,471
Industrial	$181	$1,807	$1,131	$591	$1,412

Source: Duncan Associates telephone and internet survey, March 22, 2006; Raleigh's current and maximum fees from Table 1.

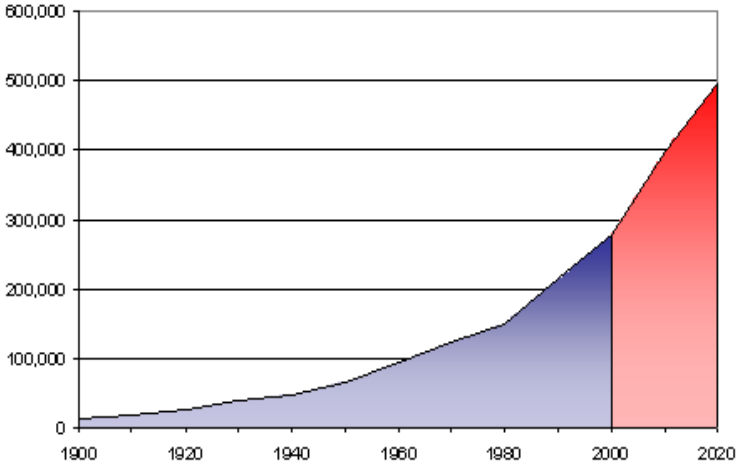
INTRODUCTION

Facility fees, also called "impact fees," are charges that are assessed on new development to help pay for the capital facility burden created by new development. Unlike other types of developer exactions, facility fees are based on a standard formula and a pre-determined fee schedule. Essentially, facility fees require that each new residential or commercial project pay its proportionate share of the cost of new infrastructure facilities required to serve that development.

Growth Context

Facility fees are most appropriate for communities that are experiencing rapid growth. The City of Raleigh is located in one of the fastest growing areas in the nation. According to the Census Bureau, the Raleigh-Durham-Chapel Hill Metropolitan Statistical Area (MSA) was the 11th fastest growing metropolitan area in the United States during the 1990s, and the City of Raleigh has grown by almost 19 percent over the past five years to its current population of 328,880.

Figure 1
RALEIGH POPULATION 1900 - 2020



Raleigh is both the county seat for Wake County and the State capital. Within North Carolina, it was the third fastest-growing county, increasing in population by 37.7 percent during the 1990s. This strong regional growth is projected to continue. According to projections prepared by the North Carolina Office of State Planning, Wake County will add the most residents in the state during the next decade, increasing from 606,403 in 2000 to 777,346 by 2010.

The City itself was the second fastest-growing large municipality in North Carolina during the 1990s, adding over 64,000 people and 26 square miles. As shown in Figure 1, current City projections indicate that the population will increase to about 400,000 by 2010 and almost 500,000 by 2020.

Background

In 1985, the City of Raleigh sought and obtained authority from the North Carolina legislature to enact "road or drainage fees and open space project fees." This legislation was amended in 1987 to allow the use of facility fee revenue to retire debt for fee-eligible projects and to allow open space fees to be used for the construction of recreation facilities as well as land acquisition. Raleigh completed the original facility fee study in May 1987,[3] and the facility fee ordinance was adopted in December 1987. The fee program established by that ordinance collects fees for open space acquisition and thoroughfare improvements.

[3] City of Raleigh, *Implementation Report on Facility Fees of the City of Raleigh*, May 1987.

At the time of their adoption, Raleigh was the first major city in North Carolina and among the first in the country to use facility fees to aid in the financing of capital facility costs resulting from new growth and development. Since then, many cities and counties around the state and the nation have implemented fee programs to help pay for new roads, parks, water and wastewater systems, schools, and other capital facilities.

The thoroughfare and open space facility fees are assessed on new development within the city limits and within Raleigh's extra-territorial jurisdiction. The facility fee rates adopted 18 years ago are basically unchanged. The thoroughfare fees have been increased by only about five percent, and the open space fees have never been raised.

The City's thoroughfare facility fees were originally calculated in 1987 to cover the cost of freeways, arterial roads and thoroughfares, but the ordinance was modified in 1993 to allow the fees to be spent on collector road improvements as well. The open space fees were calculated only to include land costs for parks and greenways, consistent with the limitation imposed by the special enabling act. Although the enabling act was revised in 1987 to allow the fees to cover park improvement costs as well, the City's open space fees have never been calculated or used for that purpose.

The thoroughfare fees were calculated in the 1987 study using an improvements-driven methodology. Improvements needed to accommodate ten years of growth (1986-1996) at level of service "D" were identified for each of the three zones. Attributable growth costs were summed for each zone and then, after deducting revenue credits, were divided by the projected growth in trip ends to determine the net cost per trip end for each zone. The City chose to charge uniform city-wide fees that were lower than the theoretical maximum fees in all zones. The fees were adopted at about 39 percent of the maximum level in the zone with the lowest fees. Today the thoroughfare facility fees stand at about 41 percent of the maximum amounts calculated 18 years ago.

The open space impact fees were calculated in the 1987 study using a comparable methodology. The calculations were based on the adopted levels of service for parks and greenways contained in the City's comprehensive plan (5.7 acres per thousand residents for each, for a combined 11.4 acres per thousand persons). The cost to accommodate projected population growth over the ten-year period in each zone was determined based on the acres needed to maintain the adopted level of service and average costs per acre. The original study recommended that the open space fees be adopted at about 52 percent of the maximum levels calculated for each zone. The open space fees adopted by the City were about 70 percent of the maximum amounts calculated for Zones 1 and 2, but slightly more than the maximum amounts calculated for Zones 3 and 4. The fees originally adopted in 1987 have never been increased.

The City's facility fee revenues, including both project and reimbursement revenues, over the last five fiscal years are summarized in Table 7. The project revenue represents the funds set aside for City-initiated thoroughfare and open space projects, and the reimbursement revenue represents the amount of facility fees set aside for developer reimbursements (27 percent of thoroughfare fees and 20 percent of open space fees). Over the past five years, the City has been receiving an average of $3.6 million in thoroughfare facility fee revenue and $1.7 million in open space facility fee revenue. The overall trend shows slight growth since FY 2002, when facility fee revenue experienced a significant decline. The decline in 2002 was related to a reduction in the City's growth rate and the corresponding reduction in

the total number of new building permits issued for all residential and commercial units compared with 2001.

Table 7
FACILITY FEE REVENUES, FISCAL YEARS 2001-2005

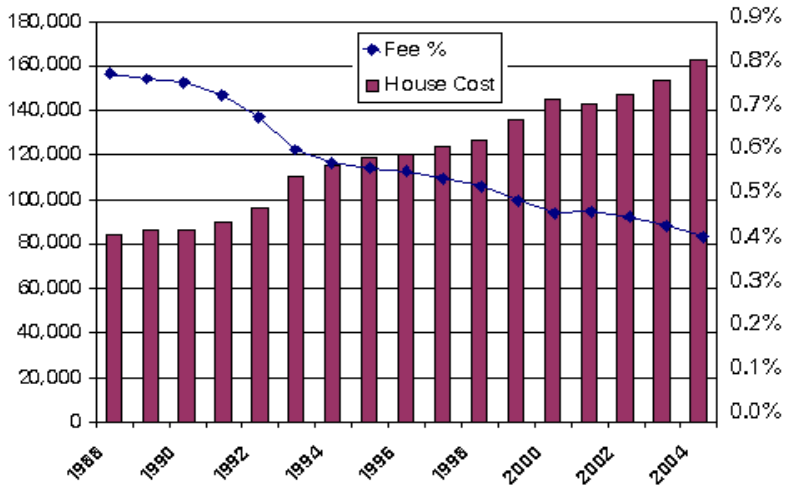
Fee	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Average
Project Revenue	$3,556,011	$2,148,297	$2,343,394	$2,713,115	$2,242,591	$2,600,682
Reimbursement Revenue	$1,343,361	$845,388	$909,127	$1,060,086	$855,449	$1,002,682
Total Thoroughfare Fees	$4,899,372	$2,993,685	$3,252,521	$3,773,201	$3,098,040	$3,603,364
Project Revenue	$1,561,317	$1,279,028	$1,242,868	$1,396,787	$1,290,831	$1,354,166
Reimbursement Revenue	$403,653	$333,809	$315,269	$353,170	$325,870	$346,354
Total Open Space Fees	$1,964,970	$1,612,837	$1,558,137	$1,749,957	$1,616,701	$1,700,520

Source: City of Raleigh Finance Department.

Facility Fees Compared to Housing Costs

Comparing facility fees adopted in 1987 to the current fees, it is apparent that fee amounts have fallen far behind new home costs in Raleigh over the past 18 years (See Figure 2). In 1988, the average price of a new home in the Raleigh-Durham area was about $84,000 and the combined thoroughfare and open space facility fee for were $667 (based on park fee in Zone 2) and represented approximately 0.8% of the cost of a new home. In 2004, the average price of a new home had almost doubled to $162,600, while facility fees had only risen by $15 to $682, representing just 0.4% of the cost of a new home. If fees had been adjusted for inflation by the Consumer Price Index (CPI), a fee of $667 in 1988 would be the equivalent of a fee of $1,065 in 2004 dollars.

Figure 2
Facility Fee as a Percentage of New Home Cost



LEGAL FRAMEWORK

In North Carolina, municipalities derive their authority to implement facility fee programs through individual special acts by the State legislature. Typically, this enabling legislation identifies the facilities eligible for facility fee funding and establishes the parameters under which the fee program is to be adopted and operated. Once the authority to collect and expend fees is granted, a formal study is conducted to determine maximum fee amounts and an ordinance is drafted, which contains the rules for day-to-day operation of the fee program and the actual fee schedule or fee rates.

State Enabling Act

Raleigh received special authorization to impose development fees on new development from Senate Bill 213, passed during the 1985 session of the North Carolina General Assembly. The bill was ratified and became effective on June 28, 1985, modifying Section 22 of the City Charter.

The original enabling legislation mandates that all fee revenues be placed in a separate trust fund (one for roads and drainage fee revenue and one for open space fee revenue). These funds may then be used to pay the capital costs of facility improvement projects. However, the legislation explicitly states that no single project may receive more than 50 percent of its capital funding from these trust funds. Therefore, the City is required to track the funding sources for each capital project using facility fee funding to ensure that no project is receiving more than 50 percent of its funding from facility fee revenue. Furthermore, the City is required to spend facility fees within six years after collecting them, although this period may be extended to ten years when the City is providing the facility improvements in conjunction with another unit of government, such as improvements to a State roadway.

Senate Bill 213 also includes the requirement that the City provide a credit or reimbursement for a developer who "installs and dedicates ... projects for which the use of the fee is designated ... ." The City has interpreted this to require reimbursements only for the portion of thoroughfare improvements that exceed the minimum requirement for a local or collector street. The 1987 study concluded that the 50 percent limitation on the use of facility fees for projects applied to the use of facility fees to reimburse developers for their improvements as well as to the use of facility fees for City-initiated projects. Given the City's policy of only reimbursing for costs in excess of improving a road to a local street or collector standard, however, the 1987 study concluded that reimbursements would be unlikely to exceed 50 percent of a developer's cost.

Senate Bill 130, passed during the 1987 legislative session, included a number of modifications to the original enabling act. This bill expressly states that facility fee revenues can be used to retire debt on facility fee-eligible projects. In addition, it authorized the use of open space revenues to fund the construction of recreation facilities. However, the City has not used facility fees for this purpose.

Constitutional Requirements

While Raleigh's enabling act grants the City authority to collect fee revenues from new development, facility fees must also comply with constitutional standards that have been developed by the courts to ensure that local governments do not abuse their power to regulate the development of land. The courts have developed guidelines for constitutionally valid facility fees, based on a "rational nexus" that must

exist between the regulatory fee or exaction and the activity that is being regulated. The rational nexus standard requires that a facility fee meet a two-part test:

1) The need for new facilities should be created by new development; and

2) Fee revenues should reasonably benefit the fee-paying development.

Implicit in the first prong of the rational nexus test is that impact fees for various types of developments should be proportional to the impact of each development on the need to construct additional or expanded facilities.

One of the most fundamental principles of impact fees, rooted in both case law and norms of equity, is that impact fees should not charge new development for a higher level of service than is provided to existing development. While impact fees can be based on a higher level of service than the one existing at the time of the adoption of the fees, two things are required if this is done. First, another source of funding other than impact fees must be identified and committed to fund the capacity deficiency created by the higher level of service. Second, the impact fees must generally be reduced to ensure that new development does not pay twice for the same level of service, once through impact fees and again through general taxes that are used to remedy the capacity deficiency for existing development. In order to avoid these complications, our general practice is to base the impact fees on the existing level of service.

A corollary principle is that new development should not have to pay more than its proportionate share when multiple sources of payment are considered, a concept sometimes referred to as "avoiding double-charging." As noted above, if impact fees are based on a higher-than-existing level of service, the fees should be reduced by a credit that accounts for the contribution of new development toward remedying the existing deficiencies. A similar situation arises when a community has not fully paid for the existing level of service. Outstanding debt on existing facilities that are counted in the existing level of service will be retired, in part, by revenues generated from new development. Given that new development will pay impact fees to provide the existing level of service for itself, the fact that new development may also be paying for the facilities that provide that level of service for existing development could amount to paying for more than its proportionate share. Consequently, impact fees should be reduced to account for future payments that will retire outstanding debt on existing facilities.

The issue is less clear-cut when it comes to other types of revenue that may be used to make capacity-expanding capital improvements of the same type being funded by impact fees. If the fee is based on the level of service actually provided to existing residents, arguably no credit is warranted in most cases, since, while new development may contribute toward such funding, so does existing development, and both existing and new development benefit from the higher level of service that the additional funding makes possible.

The University of North Carolina consultants who advised the City at the time of the original 1987 study addressed this issue with the following language:

> *There are practical, theoretical, and legal reasons for not charging new development the full cost of infrastructure that serves it. When new development becomes part of a community, it must pay taxes, utility charges, and other community-wide fees to finance public infrastructure for established residents.*

If new development pays the full cost of its own infrastructure through facility fees (and also pays taxes and other charges for infrastructure used by established residents), it ends up paying twice for its infrastructure .... As long as facility that serve established residents are financed on a community-wide basis, development fees must be adjusted to prevent the double charging of new residents.[4]

Based on this theoretical perspective, the City's 1987 study gave credit for outstanding debt, existing deficiencies and depreciation (rehabilitation and maintenance) costs for existing thoroughfares that would be paid by new development over the ten-year planning period.

As described above, credit for outstanding debt is required to prevent double-charging. No deficiency credit is required, since the proposed method is based on the existing systemwide level of service (LOS). The credit for depreciation provided in the 1987 study was unique when it was proposed and is rarely seen in modern impact fee methodology. The more prevalent philosophy is that since impact fees cannot be used for replacement or maintenance of existing facilities, no credit against fees for funding used for such purposes is warranted. It is more common to provide a credit in impact fee calculations for dedicated revenues or grants that will be available to fund capacity improvements. While credits for other sources of funding are not necessarily warranted, as discussed above, credits will be provided in this study for State and Federal roadway funds and park grants available for capacity improvements.

City Ordinance

Section 10, Chapter 8 of the City's Code of Ordinances contains the standards and procedures relating to the facility fee program. Key provisions of this Chapter include the circumstances under which facility fees will be imposed; the thoroughfare and open space fee schedules; method for computation of fees; and rules for the operation of the fee programs. Sec. 10-8001 of the City's Code of Ordinances provides the following purpose and intent for imposing facility fees on new construction:

The City Council finds that thoroughfare, collector street and open space systems and community service facilities are vital to the health and economic prosperity of the City, and that the overburdening of such community service facilities by new construction will make Raleigh and its environs an undesirable place to work and live. To finance the expansion of the public thoroughfare, collector street and open space, several combined methods of financing shall be employed, one of which will require new construction to pay appropriate share of the anticipated capital costs of expanding the thoroughfare, collector street and open space systems. The purpose of this chapter is to enable Raleigh to allow new construction to proceed in compliance with the adopted Comprehensive Plan and specifically, the transportation, parks and open space elements thereof, and also to regulate growth and greenway development so as to require growth and development to share in the burdens of growth by paying its pro rata share for the reasonably anticipated costs of expanding the thoroughfare, collector street and open space systems to serve this new construction…

In general, thoroughfare fees are assessed on all new construction, alterations or expansions, and changes of use. Open space fees are charged on all new residential construction. Fee assessments are exempted under certain circumstances, such as construction of government facilities, replacement or alterations that

[4] Michael Stegman and Thomas Snyder, *Establishing Facility Fees in Raleigh: Issues and Alternatives*, cited in City of Raleigh, *Implementation Report on Facility Fees of the City of Raleigh*, May 1987

do not create additional demand or capacity (e.g. no new residential units created), certain accessory uses, and other scenarios where no additional demand is created.

The ordinance establishes separate trust funds for each of the three thoroughfare zones and four open space zones. Fees collected within a zone are then deposited in the appropriate account. Interest obtained on these trust funds is deposited back into the applicable trust account. Of these individual trust funds, a certain percentage is allocated for developer reimbursements (27 percent for thoroughfare fees and 20 percent for open space). In 1990, the ordinance was amended to allow surplus balances in the reimbursement accounts to be transferred to the capital project account at the end of each fiscal year.

Funds are considered spent in the order in which they were collected, and fee revenues not spent within six years are to be returned to the fee payer (with interest at 6 percent per year). This time limit is extended to ten years for projects undertaken in conjunction with another unit of government. Furthermore, fees may be returned when construction is never started and the property is restored to its undeveloped state within seven months, or if the original collection amount for a shell permit (final occupant not identified at building permit) is for a more intensive land use than the ultimate occupant.

The current ordinance expressly prohibits the use of facility fee revenues for the administration of the facility fee program. However, nothing prevents the City from simply charging an administrative fee for processing of facility fee payments, similar to its fees for review of development plans.

The ordinance requires that a report be provided to Council every two years showing fee collections and project expenditures or reimbursements for each benefit district. The primary purpose of this report is to ensure that expenditure of fee revenues benefits the new construction paying the fees.

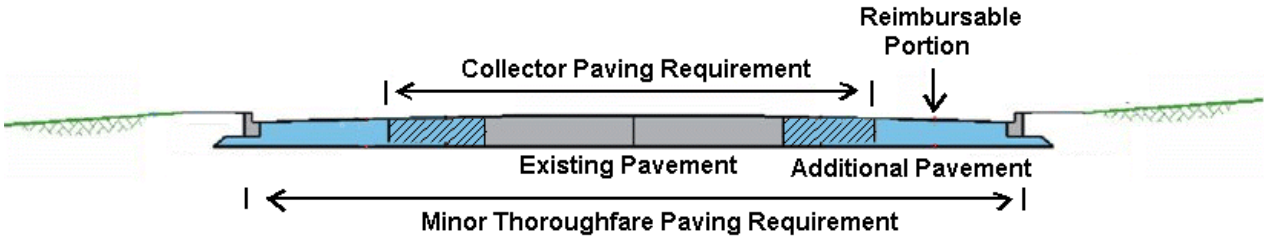
DEVELOPER REIMBURSEMENTS

The City currently reimburses developers who dedicate greenway easements or thoroughfare right-of-way (ROW) or who construct capacity-expanding thoroughfare improvements. The amount of the reimbursement is not based on the actual value of the land or the actual cost of the improvement, but rather on a schedule of reimbursable costs. This schedule has been infrequently updated and has tended to lag significantly behind actual costs.

Developers who dedicate open space or ROW or construct improvements to thoroughfares are eligible for reimbursements from facility fees collected in the same benefit district. The enabling act requires either reimbursement or fee reductions for a developer who "installs and dedicates ... projects for which the use of the fee is designated ... ." The 1987 study adds the following interpretation of this language: "Implicit in this requirement is the distinction between improvements that are needed to serve a development at a given minimum standard, and improvements that benefit the larger community or city." Reimbursements for thoroughfare improvements are generally provided only for dedication of ROW or construction of improvement in excess of what would be required for a local or collector road.

If a developer has frontage on a substandard collector, he is responsible for the cost of improving it to a local street standard, and is eligible for reimbursement for the additional cost to improve it to a collector standard. If a developer has frontage on a substandard thoroughfare, he is responsible for the cost of improving it to a collector standard, and is eligible for reimbursement for the additional cost to improve it to the adopted thoroughfare standard. The developer's responsibility and the portion of pavement cost that is reimbursable is graphically illustrated for a minor thoroughfare in Figure 3.

Figure 3
REIMBURSEMENT COST SHARE



For example, assume that a developer has frontage on a two-lane road that is classified as a collector, but has only 24 feet of pavement and 40 feet of ROW. The collector street standard is 41 feet of paving in 60 feet of ROW. A minor thoroughfare, however, requires 53 feet of pavement and 80 feet of ROW, while a major thoroughfare requires 65 feet of pavement and 90 feet of ROW. In this example, the developer would be eligible to be reimbursed for about half of the cost of improving the frontage to a minor thoroughfare standard, and about 40 percent of the cost of improving it to a major thoroughfare standard, as summarized in Table 8.

Table 8
REIMBURSEMENT SHARE OF TYPICAL FRONTAGE COSTS

	Pavement	Right-of-Way
Existing Road (assumed)	24 feet	40 feet
Collector Standard	41 feet	60 feet
Developer Responsibility (one side)	8.5 feet	10 feet
Minor Thoroughfare Standard	53 feet	80 feet
Additional Needed, Each Side	14.5 feet	20 feet
Percent Reimbursable	59%	50%
Major Thoroughfare Standard	65 feet	90 feet
Additional Needed, Each Side	20.5 feet	25 feet
Percent Reimbursable	41%	40%

The facility fee ordinance specifies the maximum percentages of the fees collected in each zone in any given year that may be used for reimbursements. These were set at 25 percent for thoroughfare fees and 20 percent for open space fees in the original 1987 ordinance, but the maximum for thoroughfare fees was later raised to 27 percent. In the original ordinance, these amounts were required to be set aside and kept in separate accounts to be used only for reimbursements, but the ordinance was subsequently amended to allow any excess funds not necessary for reimbursements to be transferred back to the project fund for that zone.

The reimbursement schedules are also used to calculate fees in-lieu of improvements for developments that are technically required to improve a substandard adjoining thoroughfare, but for which circumstances make providing the actual improvement impractical or undesirable. In such cases, the developer pays a fee-in-lieu of the thoroughfare improvement, calculated based on the unit costs in the reimbursement schedule.

Developer Reimbursement Process

In our experience, the City's general scheme of reimbursing individual developers, while setting a maximum percentage of facility fees collected in any one year to be used for reimbursements, is preferable to the much more common practice of providing credits that run with the land and are used to reduce facility fees paid on individual building permits issued within a subdivision or development project. Having to make a determination at the building permit counter on whether a fee reduction is due every time a building permit is issued poses a significant administrative burden. The City avoids this problem with a system that requires only an annual determination of the fee revenue available to be spent on reimbursements and the outstanding reimbursements due to developers.

That said, the system is not without its flaws. The most glaring flaw is that both the amount of the fees and the reimbursement schedule have been allowed to become substantially lower than actual costs. For the system to treat individual developers equally, reimbursements need to be reflective of actual costs, even if fees are not. If the developer who makes an improvement is reimbursed for only a fraction of his cost, he ends up paying much more than a developer who imposes equal impact on the road system but

is only required to pay a very low fee. Similarly, the fees need to come close to reflecting the true cost of road improvements if developers who make major improvements are to be reimbursed in a timely manner.

Raleigh is one of only a handful of jurisdictions that bases the value of developer credits or reimbursements on a previously-adopted schedule rather than on actual construction costs or land values. This approach does have the advantage of making it relatively easy for City staff to calculate the amount of reimbursement due to a developer. The main disadvantage is that the amount of the reimbursement will tend to be less than the actual value of the developer's contribution, both because the schedule is not updated regularly and because it invariably will not include all of the types of costs that actual construction projects entail. The resulting undervaluing of reimbursements creates inequities between developers. However, this tendency can be mitigated by regular updating of the reimbursement schedule.

The vast majority of impact fee systems in the country base the value of the developer's contribution on the cost of the improvement or the value of the land dedicated, rather than on a previously-adopted schedule. For construction projects, developers are typically required to submit contractor bids or cost estimates, which are reviewed by the City Engineer for reasonableness. If the City Engineer approves, the value of the credit or reimbursement is based on the estimated cost of the improvement. The value of land to be dedicated is generally determined by an appraisal submitted by the developer. If the City disputes the value, it can employ its own appraiser. If the developer does not accept the City's appraisal, the two appraisers select a third appraiser, whose appraisal value is binding on both parties. While this reimbursement process would avoid some of the problems with the City's current system, it could require significantly more staff time than the City's current approach.

Developer Reimbursement Accounts

In order for a developer to be issued a reimbursement, the City must accept the improvement and enter into an agreement with the developer. The reimbursement agreement identifies the benefit area where the project is located and establishes the reimbursement amount and reimbursement schedule. This agreement also identifies the priority of the project. Generally, Priority 1 is assigned to thoroughfare projects identified on the State Transportation Improvement Program, thoroughfare/collectors and park facilities identified in the City Capital Improvement Program and open space dedications. Other projects are considered Priority 2.

Reimbursement are paid over a five-year period if sufficient revenue exists in the zone, according to the priority assigned to the project in the Capital Improvement Program. Priority 1 projects receive a minimum of $1,000 per year for the initial five years of the reimbursement program. If there are inadequate funds in the reimbursement account, funds will be appropriated to meet this obligation. If additional reimbursement funds are available, then each Priority 1 project will receive a payment of 20 percent of the original project amount or a pro-rata share of the account balance if there aren't enough funds to make the 20-percent payments to all Priority 1 projects. If there are still funds available, then this will be used to make pro-rata payments on the Priority 2 projects.

In one thoroughfare zone, the reimbursement agreements for thoroughfare improvements within large development projects have exceeded the available revenues generated by fee collections within the contract period. This issue is discussed in greater detail in the section on Thoroughfare Facility Fees.

Developer Reimbursement Schedule

Developers are reimbursed based on an adopted reimbursement schedule codified in the City's subdivision and site plan regulations. This section provides an analysis of current reimbursement rates for greenway easements in floodways and the floodway fringe, thoroughfare right-of-way and slope easements, and thoroughfare improvements.

Greenway/Open Space Reimbursements

The costs for greenway easements have not been updated since the original 1987 ordinance. Table 9 shows the range of greenway acquisition costs based on properties acquired by the City since 2000. The acquisition data shows significant variation between the lowest and highest acquisition costs in each zone for both residential and commercial. The averages shown are simply the midpoints of the upper and lower limits, and should be viewed cautiously due to the small sample sizes. The average residential cost varies from a low of $3,049 in Zone 1 to $13,939 in Zone 3, with an overall average of $8,549 per acre. The nonresidential average costs do not vary significantly by district with an overall average of $11,471 per acre.

Table 9
GREENWAY EASEMENT ACQUISITIONS SINCE 2000

	Actual Cost Per Acre				
	Zone 1	Zone 2	Zone 3	Zone 4	Average
Low	$2,178	$2,614	$4,356	$7,405	$4,138
High	$3,920	$16,988	$23,522	NA	$14,810
Average Residential	$3,049	$9,801	$13,939	$7,405	$8,549
Low	$8,276	NA	$2,614	$3,920	$4,937
High	$16,553	NA	$17,424	$20,038	$18,005
Average Commercial	$12,415	NA	$10,019	$11,979	$11,471

Source: City of Raleigh Administrative Services Department, October 11, 2005.

The acquisition cost data does not specify if the property was located in the floodway or floodway fringe or the specific residential zoning classification. As a result, the R-6 zoning classification and the floodway fringe reimbursement rate were utilized as representative of the residential greenway cost per acre. The adopted costs in residential districts, which range from $875 to $4,500 per acre, depending on the zoning district and whether the land is in the floodway or floodway fringe, appear to be significantly below current easement values. However, based on recent acquisition data, the $20,000 per acre reimbursement rate for floodway fringe easements in nonresidential zoning districts appears still to be reasonable with actual costs less than the current reimbursement schedule. Current and estimated costs per acre are shown in Table 10.

Table 10
GREENWAY EASEMENT COST PER ACRE

	1987 Study	Current	Actual	Current as % of Actual
Floodway Easement				
Residential	$875	$871	NA	NA
Nonresidential	$4,000	$3,920	NA	NA
Floodway Fringe				
AG to R-4	$1,000	$1,015	NA	NA
R-6, Man. Home	$2,500	$2,614	$8,549	327.0%
R-10 or Other	$4,500	$4,356	NA	NA
Nonresidential	$20,000	$20,038	$11,471	57.2%

Source: Current and 1987 Study cost from City of Raleigh; actual average cost from Table 9.

Table 11 shows the recommended greenway reimbursement schedule. Based on the limited recent acquisition cost data available, we recommend doubling all residential greenway reimbursement rates. We do not recommend changing the reimbursement rate for nonresidential property.

Table 11
RECOMMENDED GREENWAY REIMBURSEMENT SCHEDULE

	Cost Per Acre		Cost Per Sq. Ft.		
	Current	Proposed	Current	Proposed	% Change
Floodway Easement					
Residential	$871	$1,742	$0.0200	$0.0400	100%
Nonresidential	$3,920	$3,920	$0.0900	$0.0900	0%
Floodway Fringe					
AG to R-4	$1,015	$2,030	$0.0233	$0.0466	100%
R-6, Man. Home	$2,614	$5,228	$0.0600	$0.1200	100%
R-10 or Other	$4,356	$8,712	$0.1000	$0.2000	100%
Nonresidential	$20,038	$20,038	$0.4600	$0.4600	0%

Source: Current reimbursement from City of Raleigh Code of Ordinances, Sec. 10-3022, Greenway Dedication and Reimbursement.

Right-of-Way Reimbursements

Table 12 shows the range of ROW costs based on properties acquired by the City since 2000. Data on low density residential (AG and R-2) zoning districts were unavailable. These data should be viewed cautiously, as the sample sizes are very small. In addition, City acquisition costs are likely to be considerably higher than the value of developer dedications, since they are more likely to occur in built-up areas were land costs are higher. Overall acquisition costs were highest in Zone 1 and lowest in Zone 2. Somewhat surprisingly, residential acquisition costs do not seem to vary significantly between zoning districts. Also, the assumption reflected in current reimbursement rates that land costs would be lowest in industrial districts, followed by office/institutional, thoroughfare and commercial districts in that order, is not supported by these admittedly limited data.

Table 12
RIGHT-OF-WAY ACQUISITION COST SINCE 2000

	Actual Cost Per Acre			
Zoning District	Zone 1	Zone 2	Zone 3	Average
Low	$56,628	$43,560	$60,984	$53,724
High	$217,800	$130,680	$108,900	$152,460
Average R4, R6, R40W, R80W	$137,214	$87,120	$84,942	$103,092
Low	$87,120	$43,560	$121,968	$84,216
High	$174,240	NA	NA	$174,240
Average R10	$130,680	$43,560	$121,968	$98,736
Low	$87,120	$76,230	$87,120	$83,490
High	$130,680	$87,120	NA	$108,900
Average R20 and R30	$108,900	$81,675	$87,120	$92,565
Low	$217,800	$87,120	$174,240	$159,720
High	$348,480	$109,771	$196,020	$218,090
Average O & I 1 and O & I 2	$283,140	$98,446	$185,130	$188,905
Low	$609,840	$76,230	$348,480	$344,850
High	NA	$130,680	$468,270	$299,475
Average I1 and I2	$609,840	$103,455	$408,375	$373,890
Low	$370,260	$119,790	$174,240	$221,430
High	$871,200	NA	$196,020	$533,610
Average NB, RB, BC, SC and CM	$620,730	$119,790	$185,130	$308,550
Low	$435,600	$87,120	$174,240	$232,320
High	NA	$104,544	NA	$104,544
Average TD	$435,600	$95,832	$174,240	$235,224
Average All Zoning	$332,301	$89,983	$178,129	$200,137

Source: City of Raleigh Administrative Services Department, October 11, 2005 e-mail.

Current and estimated average ROW costs per acre are shown in Table 13. Average costs for thoroughfare ROW in the original 1987 study were identified at $21,780 per acre in residential zoning districts and $65,340 in nonresidential districts. Slope easements were assumed to cost only half as much. Current reimbursement rates retain these figures for low-density residential (AG and R-2) and industrial districts, but are higher for other zoning districts. The current ROW reimbursement schedule is lower than the actual City ROW acquisition costs for all zoning districts, averaging less than one-third of City costs in residential districts and less than one-half in nonresidential districts.

Table 13
RIGHT-OF-WAY COST PER ACRE

	1987 Study	Current	Actual Average	Current as % of Actual
Residential				
AG to R-2	$21,780	$21,780	NA	NA
R-4, R-6, Man. Home	$21,780	$23,958	$103,092	23.2%
R-10	$21,780	$28,314	$98,736	28.7%
R-15 to R-30	$21,780	$30,492	$92,565	32.9%
Residential Average	$21,780	$26,136	$98,131	28.3%
Nonresidential				
Office and Institutional	$65,340	$98,010	$188,905	51.9%
Industrial	$65,340	$65,340	$373,890	17.5%
Commercial	$65,340	$174,240	$308,550	56.5%
Thoroughfare	$65,340	$119,790	$235,224	50.9%
Nonresidential Average	$65,340	$114,345	$276,642	44.2%

Source: Current reimbursement rate from City of Raleigh Code of Ordinances, Sec. 10-3024, Reimbursement for Streets; and 1987 Study cost from City of Raleigh; actual average cost from Table 12.

While, as noted above, it is likely that City-initiated ROW acquisitions will have substantially higher costs than the value of land subject to typical developer dedications, the above data does suggest that ROW reimbursement costs are lagging behind actual land costs. This appears to be especially true of residential land values. Table 14 shows the proposed ROW reimbursement schedule. The slope easement rate would remain at one-half the ROW rate for each land use, which is consistent with current practice.

Table 14
RIGHT-OF-WAY REIMBURSEMENT SCHEDULE

	Cost Per Acre		Cost Per Sq. Ft.		
	Current	Proposed	Current	Proposed	% Change
Residential					
AG to R-2	$21,780	$43,560	$0.500	$1.000	100%
R-4, R-6, Man. Home	$23,958	$47,916	$0.550	$1.100	100%
R-10	$28,314	$56,628	$0.650	$1.300	100%
R-15 to R-30	$30,492	$60,984	$0.700	$1.400	100%
Nonresidential					
Office and Institutional	$98,010	$147,015	$2.250	$3.375	50%
Industrial	$65,340	$98,010	$1.500	$2.250	50%
Commercial	$174,240	$261,360	$4.000	$6.000	50%
Thoroughfare	$119,790	$179,685	$2.750	$4.125	50%
Slope Easement: one-half the value of the adjoining right-of-way reimbursement					

Source: Current reimbursement rate from City of Raleigh Code of Ordinances, Sec. 10-3024, Reimbursement for Streets.

Thoroughfare Reimbursements

The full analysis of Raleigh's current thoroughfare improvement reimbursement costs is presented in Appendix D. The reimbursement costs are summarized in Table 15. As shown in Table 15, reimbursement rates for thoroughfare improvements appear to be much closer to current costs than the reimbursement rates for land. An analysis of low bids for recent City thoroughfare projects indicates that the rates for the basic components, such as paving, curb and gutter and storm drainage are close to or even slightly higher than recent project costs. However, reimbursement rates for excavation, erosion control, traffic control and sidewalks appear to cover less than half of current costs. In addition, current reimbursement schedules do not include some common project costs, such as utility relocation, retaining walls, rock excavation, guardrails, traffic signal upgrade and relocation, and median curb and gutter. These costs are recommended for addition to the City's reimbursement schedules.

Table 15
PROPOSED THOROUGHFARE REIMBURSEMENT SCHEDULE

Reimbursement Item Description	Unit	Current	Proposed	% Change
Mobilization	Lump Sum	5%	4%	-20%
Clear and Grub	Acre	$4,888	$7,839	60%
Common Excavation	Cu. Yd.	$4.75	$9.59	102%
Strom Drain Parallel to ROW (per side)	Lin. Ft.	$5.00	$6.15	23%
Storm Drain Perpendicular to ROW	In.-Ft.	$2.00	$1.55	-22%
Catch Basins (per side)	Lin. Ft.	$3.25	$13.19	306%
Curb and Gutter (per side)	Lin. Ft.	$9.73	$9.59	-1%
Paving Asphalt (Surface Course)	Sq. Yd-In.	$1.89	$1.73	-8%
Paving Asphalt (Binder Layer)	Sq. Yd-In.	$1.89	$1.78	-6%
Paving Asphalt (Base Layer)	Sq. Yd-In.	$1.89	$1.86	-2%
Paving Stone (ABC)	Sq. Yd-In.	$0.67	$0.43	-36%
Sidewalk (per side)	Lin. Ft.	$5.59	$10.98	96%
Seed and Mulch	Acre	$2,700	$1,330	-51%
Traffic Control	Lin. Ft.	$1.04	$11.34	990%
Erosion Control	Lin. Ft.	$1.37	$4.95	261%
Paint Striping	Lin. Ft.	$2.75	$2.82	3%
Rock Excavation	Cu. Yd.	NA	$47.00	NA
Guardrail	Lin. Ft.	NA	$21.06	NA
Retaining Wall Installation - Keystone Brick	Sq. Ft.	NA	$15.00	NA
Retaining Wall Installation - Pour-In-Place	Cu. Yd.	NA	$450	NA
Traffic Signal Upgrade - Wood Pole to Metal Pole	Pole	NA	$11,867	NA
Traffic Signal Relocation	Corner	NA	$3,637	NA
Multi-Purpose Path Installation	Lin. Ft.	NA	$7.61	NA
Relocate Fire Hydrant	Each	NA	$1,383	NA
Relocate Water Meter	Each	NA	$417	NA
Relocate Utility Pole	Each	NA	$5,000	NA
Relocate Backflow and Vault	Each	NA	$4,000	NA
18" Median Curb and Gutter	Lin. Ft.	NA	$7.25	NA

Source: Kimley-Horn and Associates, Inc, *Update to Schedule of Improvement Costs for Streets*, December 19, 2005 (see Appendix D).

GENERAL POLICY CONSIDERATIONS

The Phase 1 Policy Report contained a number of recommendations that have been incorporated into this study. The City may wish to consider these policy recommendations concurrent with the update of the facility fee schedule.

Progressive Rates for Residential Units

Typical impact fees charge a flat rate per dwelling unit, regardless of size. A wide range of housing sizes are being produced in today's housing market. Because smaller units tend to cost less and house families with lower incomes, the one-size-fits-all approach taken by most impact fee systems imposes a much larger burden, proportionately, on smaller units, which incidently tend to house residents less likely to be able to afford it.

The regressive nature of one-size-fits-all impact fees was clearly demonstrated in a seminal 1992 article by Dr. James C. Nicholas of the University of Florida.[5] The 1985 data he presented in that article have been updated with 2001 data in Table 16 below. These national data reveal the strong correlation between the size of the dwelling unit, whether measured by the number of bedrooms or square footage, the number of persons living in the unit, which is a measure of the demand on facilities, and the value of the unit and the income of the household, which are measures of the ability to pay.

Table 16
DWELLING CHARACTERISTICS BY NUMBER OF BEDROOMS

Bedrooms	Median Sq. Ft.	Mean Persons	Median Unit Value	Median Family Income	$2,000 fee as percent of income
0	500	1.2	n/a	$14,956	13%
1	828	1.5	$73,740	$21,716	9%
2	1,248	2.2	$83,655	$28,343	7%
3	1,692	2.8	$119,539	$44,649	4%
4+	2,406	3.5	$188,052	$68,834	3%

Source: U.S. Bureau of the Census, 2001 American Housing Survey (median square feet, mean persons and median family income based on all dwelling units; median unit value based on owner-occupied units only).

A flat $2,000 impact fee per dwelling unit, regardless of size or type, would constitute 13 percent of the annual income of the median household living in an efficiency apartment, but only 3 percent of the median income of a dwelling unit with four or more bedrooms (see Table 16 above). Also, since the demand on public facilities is often a function of the number of people living in a community, a large house tends to have about three times the demand for services as an efficiency apartment. Consequently, not only is a one-size-fits-all fee regressive, it tends to overcharge smaller units and undercharge larger units.

[5] Nicholas, James C., "On the Progression of Impact Fees," *Journal of the American Planning Association*, Vol. 58, No. 4, Autumn 1992, p. 517-525

While most impact fees do acknowledge the difference between housing types, such as single-family and multi-family units, few of them vary by unit size. This is changing, however. For example, 30 percent of the 20 Florida counties that assess school impact fees currently base the fees on some measure of dwelling unit size. Three of the counties base fees on the number of bedrooms in combination with housing type, two have translated bedrooms into four or five size categories (e.g., a one-bedroom unit is on average less than 800 square feet, etc.) and one county charges school fees on a per square foot basis.

There are several reasons for the continuing predominance of impact fees that do not vary by unit size. One obvious reason is that a flat fee per dwelling unit is easier to calculate and has fewer data requirements. While this is still the case, the data requirements are not insurmountable, and greater resources are now available. The other principal reason for the predominance of one-size-fits-all residential impact fees was legal in nature. In the early days of the development of impact fees in the late 1970s and early 1980s, there were no state impact fee enabling acts, and impact fees were based on the "police power" of local governments to regulate development in order to advance the health and welfare of the community. Great care had to be taken to ensure that impact fees would not be struck down by the courts as an illegal tax. However, this should no longer be a major concern, as the authority to enact impact fee ordinances is now well-established in most states.

Facility Fee Phase In and Indexing

Any increases to the facility fee schedule do not have to be made all at once. In fact, many communities adopt fee increases over an extended period of time, in order to allow developers who already have projects in the pipeline an opportunity to take such fees into account in their financial planning.

Along with phasing, many communities are also now indexing their fee increases over a specified period of time based on the annual Consumer Price Index or some other quantifiable index. Doing so minimizes the "jump" each time the municipality updates their fees and the corresponding shock to the cost of development.

In Orange County, Florida officials adopted a combined phasing and indexing approach in implementing their road impact fees. Instead of raising their fees immediately to the maximum amount allowed based on their new fee study, they phased in the increase over a five year period. And then they added on another annual increase that is indexed to the rate of inflation. By using this combined approach, dramatic and abrupt changes in fee assessments will be avoided when the County performs its next fee update in 2010.

The City should recognize that the fees adopted must be high enough to ensure adequate funds are available to reimburse developers when necessary. In fact, the current slow rate of reimbursement was one of the major complaints heard during interviews with staff. When the City updated its road construction reimbursable amounts in the mid 1990s, the accompanying adjustments to the fee schedule were not sufficient to maintain a balanced system, requiring some developers to wait years to receive full reimbursement.

Transportation facility fees, in particular, should not be adopted at very low percentages of maximum net costs. This is because developers often make in-kind contributions in the form of right-of-way dedication or actual roadway construction, and under a facility fee system receive a reimbursement for the equivalent

value of such contributions (above any required dedications) against the fee. Therefore, if the fee is adopted at a very low percentage, fees collected will be too low for a developer to be fully compensated with reimbursements. As noted in the discussion on page 27, if the thoroughfare fees are adopted at half the maximum level calculated in this report, the percentage allocated to reimbursements stays at 27 percent and no new reimbursement obligations are incurred, it would take 8.6 years to repay outstanding reimbursements in Zone 1.

Fee Revenues for Bond Debt Service

There isn't any provision within the City's enabling legislation or facility fee ordinance that precludes it from using facility fee funds from a certain benefit district to pay the principal on capital improvement bonds that expands capacity within that district.

For example, say the City passes a $10 million bond for park facilities. The City then uses $1 million of the bond to acquire new parkland in Benefit District 2 to maintain the adopted level of service standards because of an increased demand for parks attributable to new development. The City may then use open space facility fee revenues collected in District 2 to help pay off the principal on that $1 million portion of the bond (some communities do use fee revenues to pay both the principal and interest portions of the bond; however a conservative approach would use facility fee funds for principal only).

It should be noted that most lending institutions do not consider facility fee revenues as primary collateral when determining available revenue streams for financing a bond. The lender will expect the City to back the bond with the full faith and credit of the City and have primary revenue sources available, such as property taxes or sales taxes. Furthermore, the City must be prepared to turn to those other, primary revenue sources during periods of slow growth when lower fee amounts are being collected.

This issue is very timely as the City searches for funding sources for the 2003 $47 million parks and open space bond and the proposed multi-million transportation bond referendum. The City has tentatively targeted a 1-½ cent tax increase for the transportation bond program which could be redirected or reduced if facility fees were available to pay bond indebtedness. The new parks facility program is not proposed to be funded under a bonds program, so facility fee revenues could be applied directly to pay-as-you-go projects along with the 50/50 general funds match.

Geographic Fee Differentials

Fees can be developed that vary by geographic area, reflecting differences in cost to serve different areas or excess capacity to serve growth in certain areas. This approach is most compatible with an improvements-driven methodology, which we are not recommending in this study because of its advantages of simplicity and ease of updating..

An approach that is compatible with a consumption-based methodology is to exclude certain areas from the impact fee service area. For example, Kansas City, Missouri excluded all areas of the city annexed before 1950 from its arterial street impact fees. The rationale for this exclusion was that the excluded area was largely developed and needed few arterial street improvements. If this approach is taken, however, impact fees cannot be used to make improvements in the excluded area. A potential difficulty with this approach, however, is the systemic nature of arterial roadways. New development in the core area may

not necessitate arterial improvements within the immediate downtown area, but will attract travel from and generate trips to suburban developments that will create the need for road improvements in outlying areas.

Another approach that has been tried in conjunction with a consumption-based methodology is to use trip lengths that vary with distance from the urban core. The concept is that more suburban developments will tend to have longer trip lengths. However, this approach works better for an isolated jurisdiction where the urban core provides most of the employment and shopping opportunities. Raleigh's location in a large urban area with competing employment centers makes this approach unlikely to yield the desired result of encouraging development and redevelopment close to the City's core.

The one geographic distinction that we have available data to support is a reduction of thoroughfare fees for residential development in the downtown area. This analysis is presented on page 47.

THOROUGHFARE FACILITIES

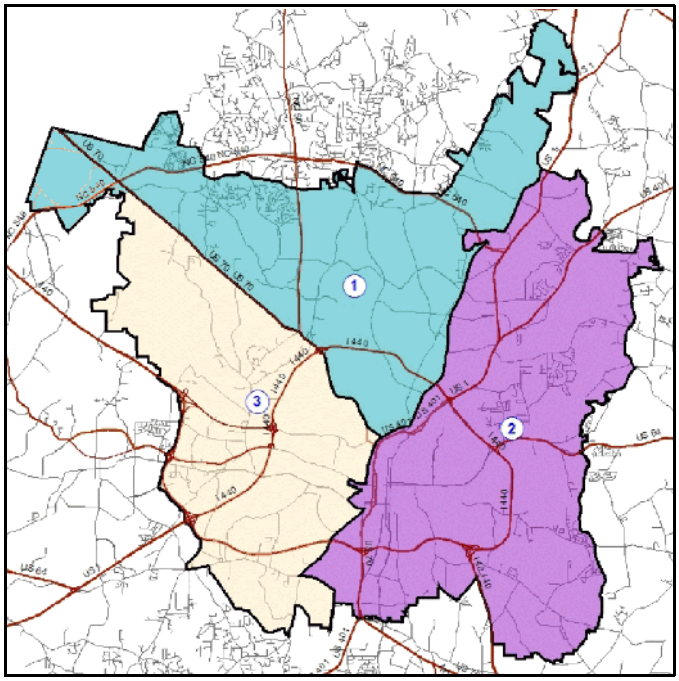
Currently, the City of Raleigh assesses thoroughfare facility fees to all types of new development. The current fee is based on a 1987 consultant report and was adopted in August of 1987. The fee amounts are virtually the same that were originally adopted 18 years ago. For example, the fee for a single-family detached unit was originally $292, and is now $307.

This study's scope includes a review of the City's thoroughfare facility fee methodology and fee schedule. In addition to thoroughfare facility fees, the City requires developers to make frontage improvements on certain roads, and certain portions of the cost of such improvements are reimbursable from facility fees paid by other developers according to an adopted reimbursement schedule. The thoroughfare reimbursement schedule was last adjusted in 1995 following an in-house review to reflect current costs at that time. Recommendation on updating the thoroughfare reimbursement schedule can be found in the "Developer Reimbursements" section of this report.

Service Areas and Benefit Districts

In an impact fee system, it is important to clearly define the geographic areas within which impact fees will be collected and within which the fees collected will be spent. There are really two types of geographic areas that serve different functions in an impact fee system: assessment districts and benefit districts. Assessment districts, which may also be called service areas, define the area within which a set of common capital facilities provides service, and for which a fee schedule based on average costs within that district is calculated. Benefit districts, on the other hand, represent an area within which the fees collected must be spent. They ensure that improvements funded with impact fees are constructed within reasonable proximity of the feepaying developments as a means of helping to ensure that feepaying developments benefit from the improvements.

Figure 4
THOROUGHFARE BENEFIT ZONES



The City's current thoroughfare benefit zones are shown in Figure 4. The City has one assessment district with a single fee schedule based on citywide

level of service and three benefit districts. Since their implementation in 1987, the only change to the three thoroughfare benefit zones is an outward expansion as the City has grown with Zone 1 and 2 capturing most of the City's new growth. As shown in Table 16, thoroughfare facility fee collections in benefit zones 1 and 2 are dramatically higher than collections in Zone 3. This corresponds to the rapid rate of growth to the east and north of the city, as well as the large amount of State-owned property (Umstead State Park, North Carolina Museum of Art, State Fairgrounds, etc.) in Zone 3.

Table 16
THOROUGHFARE FACILITY FEE REVENUES, FISCAL YEARS 2001-2005

Benefit Zone/Fund Type	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Average
Zone 1	$1,217,228	$891,410	$1,014,821	$1,048,198	$1,125,828	$1,059,497
Zone 2	$1,896,456	$962,033	$1,069,420	$1,407,506	$759,109	$1,218,905
Zone 3	$442,327	$294,854	$259,153	$257,411	$357,654	$322,280
Total Project Revenue	$3,556,011	$2,148,297	$2,343,394	$2,713,115	$2,242,591	$2,600,682
Zone 1	$464,255	$338,916	$377,786	$391,615	$421,740	$398,862
Zone 2	$703,128	$372,185	$435,407	$568,331	$299,745	$475,759
Zone 3	$175,978	$134,287	$95,934	$100,140	$133,964	$128,061
Total Reimbursement Rev.	$1,343,361	$845,388	$909,127	$1,060,086	$855,449	$1,002,682
Zone 1	$1,681,483	$1,230,326	$1,392,607	$1,439,813	$1,547,568	$1,458,359
Zone 2	$2,599,584	$1,334,218	$1,504,827	$1,975,837	$1,058,854	$1,694,664
Zone 3	$618,305	$429,141	$355,087	$357,551	$491,618	$450,340
Total Thoroughfare Fees	$4,899,372	$2,993,685	$3,252,521	$3,773,201	$3,098,040	$3,603,364

Source: City of Raleigh Finance Department.

The current status of thoroughfare reimbursement agreements for each Zone are shown in Table 17. In fiscal year 2005, Zone 1 had $11.0 million in outstanding reimbursements with annual collections earmarked for reimbursements of approximately $400,000. At this rate, even with no new reimbursement agreements, it would take 27.5 years to pay back outstanding reimbursements owed. The other zones have excess reimbursement funds available.

Table 17
THOROUGHFARE REIMBURSEMENT FUNDING

Thoroughfare Zone	Outstanding Reimbursements	Reimbursement Funds Available	Average Annual Reimbursement Revenues
Zone 1	$10,953,500	$72,400	$398,862
Zone 2	$133,800	$1,124,000	$475,759
Zone 3	$47,800	$1,070,800	$128,061
Total	$11,135,100	$2,267,200	$1,002,682

Source: Amounts as of December 31, 2005 from City of Raleigh Debt Manager, January 10, 2006.

The problem with the outstanding reimbursements in Zone 1 does not lie in the configuration of the benefit district boundaries, since this is the zone with the most growth and the most facility fee revenue.

Nor it is primarily due to the limitation of reimbursement revenues to 27 percent of total revenues collected in the zone, since even devoting all revenues in the zone would take over seven years to repay them. The main cause is the extremely low level of the facility fees, which are less than one-fifth of the national average. The imbalance between reimbursements owed and reimbursement revenue will get even worse when the reimbursement rates are updated to better reflect current costs. The primary solution will be to increase the facility fees to reflect actual costs to add capacity to the thoroughfare system. If thoroughfare facility fees were increased to the maximum levels calculated in this report, it would take approximately 5.6 years to meet the outstanding obligations in Zone 1, assuming the percentage spent on reimbursements remains capped at 27 percent and that no new reimbursement obligations are incurred in the interim. If the fees are adopted at one-half of the maximum levels, it would take 11.1 years to make the outstanding reimbursements, with the caveats just noted.

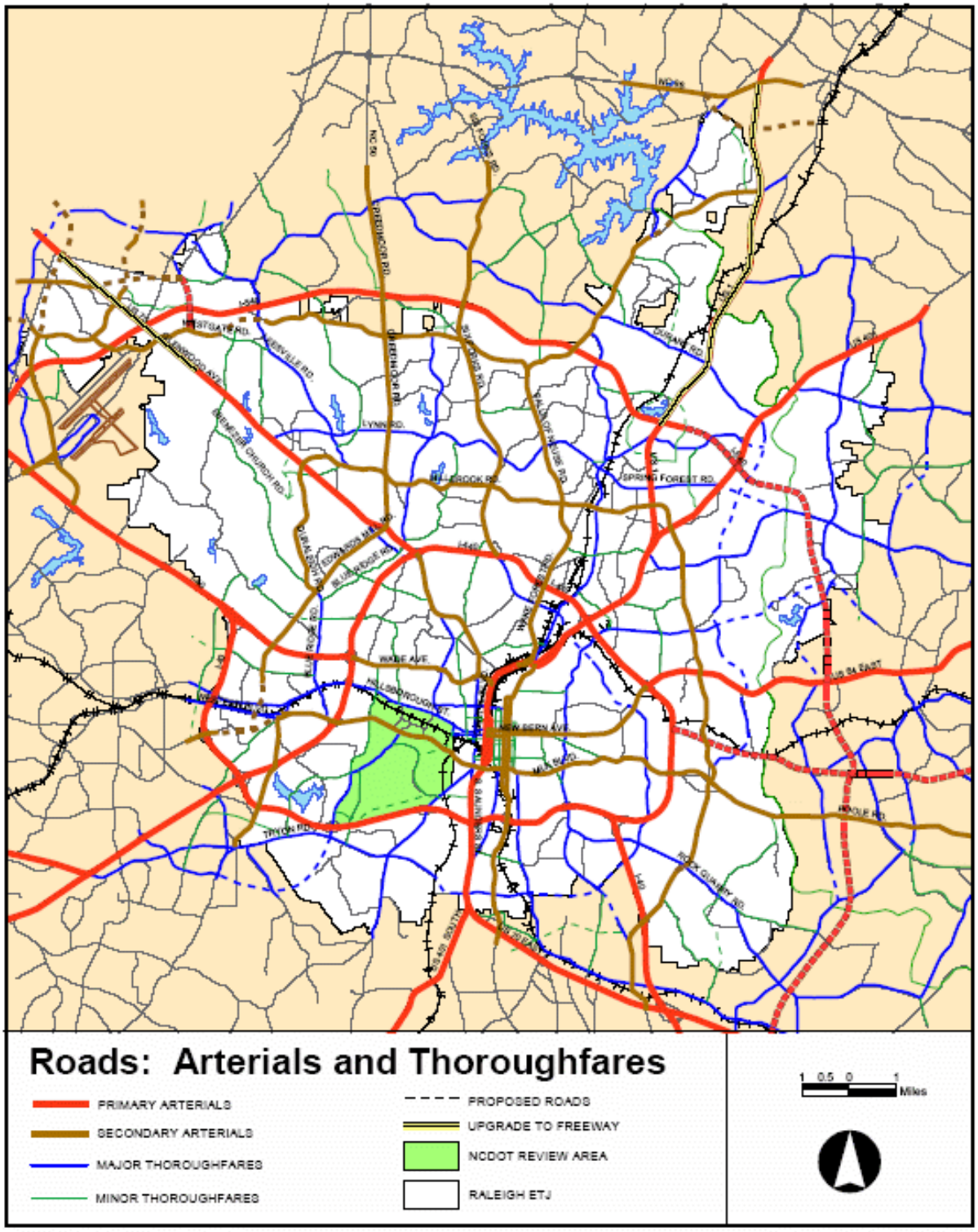
Major Roadway System

A road impact fee program should include a clear definition of the major roadway system that is to be funded with the impact fees. The *Raleigh Thoroughfare Plan* classifies the major roadway system into a number of functional types, including major arterial, minor arterial, major thoroughfare, minor thoroughfare and collector streets. The *Raleigh Thoroughfare Plan* also shows the location of future roads and allows the City to preserve corridors for roadways expected to need widening or extension. Freeways and expressways, such as I-40, I-440 and I-540, are excluded from the major roadway system to be funded by the facility fees, because the City is unlikely to bear any of the cost of improving these major regional facilities. The City's major roadway system (excluding collector roads) is illustrated in Figure 5.

An inventory of the existing major roadway system was compiled in order to determine the average length of a trip on the major roadway system (see Table 52 in Appendix A). The roadway segment descriptions include the street name, segment description (from-to), segment length, number of lanes, recent travel volume and existing capacity. Estimated average daily traffic volumes for 2003 were available for most segments from the North Carolina Department of Transportation Division of Highways.

Thoroughfare facility fees will only be allowed to be spent to make improvements to the major roadway system. By the same token, no reimbursement should be given unless the developer improves the major roadway system being funded by the fee, and the improvements go beyond the standard subdivision and site plan requirements for frontage improvements.

Figure 5
MAJOR ROADWAY SYSTEM



10/02 Raleigh Comprehensive Plan Transportation Plan 4-8.A

Service Unit

A service unit creates the link between supply (roadway capacity) and demand (traffic generated by new development). The 1987 study used average daily trip ends. A common alternative in road impact fee analysis is vehicle-miles of travel (VMT). VMT is a combination of the number of vehicles traveling during a given time period and the distance (in miles) that these vehicles travel. While fees can be calculated using an improvements-driven methodology like the one used in the 1987 study on the basis of either trips or vehicle-miles of travel (VMT), the consumption-based methodology recommended in this report can only be based on VMT. Consequently, VMT is the recommended service unit to be used in this update of the City's thoroughfare facility fees.

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). As noted above, the City's 1987 road facility fee study used average daily trips. Average daily trips is also the best measure for the amount of motor fuel tax that will be generated by new development, which may be used to calculate a revenue credit. Finally, average daily trip data are less variable than peak hour trips, which can vary considerably based on the size and demographic make-up of a community. For these reasons, we recommend utilizing average daily VMT as the service unit for the thoroughfare facility fee update.

Methodology

The major alternative methodologies for calculating transportation facility fees are the "improvements-driven" and "consumption-based" approaches.

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 must account for existing deficiencies, since it is based on the cost to have the entire system function at the desired level of service at the end of the planning period. The improvements-driven method does not charge for new development's consumption of existing excess capacity, and generally is not reduced to account for excess capacity remaining in improved roads at the end of the planning period, based on the implicit assumption that overall excess capacity at the beginning and end of the planning period will be roughly equal.

The consumption based approach simply charges new development the cost of replacing the capacity that it consumes on the major road 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 cost per service unit may be based on a list of historical or planned improvements. The key difference is that instead of dividing the total cost of the list of improvements by the growth in service units over a planning horizon, the consumption-based approach divides by the capacity added by the improvements. Consequently, the total cost of the list of improvements has no bearing on the fee. The only relevant factor is the unit cost to add vehicle-miles of capacity (VMC) to the major roadway system.

Improvements-Driven Approach

- Requires transportation plan
- Based on planned costs divided by projected new trips = cost/trip
- Based on desired LOS, needs to credit for existing deficiencies
- Charges for excess capacity at end of period but not excess capacity at beginning

Consumption-Based Approach

- Needs CIP only as spending guide
- Based on total project costs divided by capacity added = cost/ VMC
- Based on existing systemwide LOS, no need for deficiency credit
- Charges for capacity consumed, whether existing excess capacity or capacity in improved roads

In practice, the approach utilized in determining facility fees may be a blend of the two methodologies. The City's 1987 thoroughfare facility fee study has most of the characteristics of the improvements-driven approach. Improvements needed to accommodate ten years of growth (1986-1996) at level of service "D" were identified. Only the share of the capacity added by each improvement that would be needed by projected growth in traffic was attributed to new development. Attributable growth costs were summed for each zone. Then the amount of revenue anticipated to be generated by new development in each zone over the next ten years and used to remedy existing deficiencies, pay outstanding debt and pay for maintenance of existing roads was determined. Finally, the net cost (attributable cost less revenue) was divided by the projected growth in trip ends to determine the net cost per trip end for each zone.

The characteristic of the 1987 methodology that does not fit the pure improvements-driven model is that only the share of the capacity added by each improvement that would be needed by projected growth in traffic was attributed to new development. This characteristic makes it more conservative than the consumption-based system, because it charges only for capacity consumed in improved roads, while not charging for capacity consumed in existing roads that do not need to be improved during the planning period.

A variation of the consumption-based model is recommended for this thoroughfare facility fee update. The recommended methodology is considerably simpler to develop and update than the improvements-driven methodology used in the original 1987 study. It does not require a transportation planning process that prepares projections of future growth, models the resulting traffic increases likely to be experienced on the existing and planned roadway system, and identifies all improvements necessary to maintain LOS D on all thoroughfares. It can be based on a historical list of thoroughfare improvements with costs that can be more reliably identified than cost estimates for improvements to be made over a future ten-year period. It does not need to develop credits for revenues that new development will pay to remedy existing deficiencies, because it is based on the existing system-wide level of service.

The standard consumption-based methodology charges new development for the cost to replace the capacity that it consumes on a one-to-one basis. It implicitly assumes that the cost to accommodate an additional vehicle-mile of travel is the same as the cost to construct an additional vehicle-mile of capacity. However, 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 thoroughfare widening

project. The completed thoroughfare 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 accommodating new development at the existing level of service.

A modified consumption-based road impact fee model that more accurately identifies the full growth-related cost of maintaining desired service levels defines the level of service as the system-wide ratio of capacity to demand. Essentially, this approach requires that new development pay for the cost to construct more capacity than it directly consumes in order to maintain the system-wide ratio of capacity to demand. In this system, the cost per VMC is multiplied by the system-wide ratio of VMC/VMT to determine the cost per VMT. In contrast, under a standard consumption-based system, the level of service standard is implicitly a systemwide VMC/VMT ratio of one.

The City's existing major roadway system provides 1.55 units of capacity (VMC) for every unit of travel demand (VMT), as shown in Table 18. This is the existing level of service, defined at the system-wide level. Some roads may be functioning better than LOS D, and some roads may be functioning at a lower level of service. The modified consumption-based approach does not calculate the cost to have all roadways function at LOS D, only to replace capacity consumed so that the existing system-wide ratio of capacity to demand is maintained. Under this approach, there are no existing deficiencies on a system-wide basis.

Table 18
SYSTEM-WIDE RATIO OF CAPACITY TO DEMAND

Daily Vehicle-Miles of Capacity (VMC)	9,265,244
Daily Vehicle-Miles of Travel (VMT)	5,968,928
System-wide Capacity to Demand Ratio	1.55

Source: VMC and VMT from Table 52 of Appendix A.

The recommended formula for calculating the updated thoroughfare facility fees is presented in Figure 6.

Figure 6
THOROUGHFARE FACILITY FEE FORMULA

MAXIMUM FEE	=	**VMT x NET COST/VMT**
VMT	=	TRIPS x % NEW x LENGTH ÷ 2
NET COST/VMT	=	COST/VMC x VMC/VMT ? CREDIT/VMT
Where:		
TRIPS	=	Trip ends during an average week day
% NEW	=	Percent 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/VMC	=	Average cost to add a new daily vehicle-mile of capacity
VMC/VMT	=	System-wide ratio of VMC to VMT on the major roadway system
CREDIT/VMT	=	Revenue credit per daily VMT, if appropriate

Roadway Capacity

The capacity of an individual roadway depends on a number of factors, including number of lanes, lane width, topography, percent of truck traffic, etc. In impact fee analysis, generalized capacity estimates are typically used based strictly on number of lanes. The Florida Department of Transportation has done extensive work developing generalized capacity estimates to be used for planning purposes based on *Highway Capacity Manual* procedures, and their guidelines will be used to develop planning-level capacity estimates for use in this analysis. As can be seen in Table 19, major roadways tend to be able to accommodate about 6,500 vehicles per lane per day.

Table 19
DAILY VEHICLE CAPACITIES

	Total Capacity	Capacity/ Lane
2-Lane Undivided	13,000	6,500
2-Lane Divided or 3-Lane	17,100	5,700
4-Lane Undivided	25,900	6,475
4-Lane Divided or 5-Lane	34,500	6,900

Source: Data for Class II arterials (2.0-4.5 signalized intersections per mile) from Florida Department of Transportation, *2002 Quality/Level of Service Handbook*, 2002, Table 4-1: Generalized Annual Average Daily Volumes for Florida's Urbanized Areas.

Cost Per Service Unit

Expanding the capacity of the City's major roadway system is primarily accomplished by widening existing roadway cross-sections to accommodate additional through lanes and by building new roads. While facility fees can be used for intersection improvements and other types of capacity enhancements, it is more difficult to quantify the capacity added by these types of improvements in terms of vehicle-miles of capacity.

The thoroughfare facility fee is designed to cover the cost of adding capacity to the roadway system. All of the normal components of a roadway expansion project are eligible for facility fee funding, including engineering and design, right-of-way acquisition, construction of new lanes, reconstruction of existing lanes and relocation of utilities where necessary as part of a widening project, and installation of sidewalks, street lighting, and landscaping as part of an improvement project. However, thoroughfare facility fees should not be used for ancillary components of an expansion project when not part of a capacity-expanding improvement. For example, installing sidewalks along an existing road, landscaping an existing median or reconstructing an existing road would not be eligible improvements. This is consistent with City's current practices.

The current cost to add additional capacity to the existing major roadway system can be estimated using historical costs. Table 20 below summarizes the City's capacity-expanding improvements to its major roadway system from 2000 to 2005, including the cost and the vehicle-miles of capacity (VMC) added by each improvement. Projects for which it was impossible to quantify the vehicle-miles of capacity added by the improvement were excluded.

Table 20
RECENT THOROUGHFARE IMPROVEMENTS

Street	Segment	Mi.	No. of Lanes Before	No. of Lanes After	Capacity Before	Capacity After	Cost	Added VMC
Buffaloe	Old Buffaloe-New Hope	0.51	2	5	13,000	34,500	$2,160,038	10,965
Buffaloe	New Hope-Southall	0.85	2	5	13,000	34,500	$1,764,782	18,275
Creech Rd	Rock Quarry-Fox Hollow	0.62	2	3	13,000	17,100	$1,057,903	2,542
Durant	Capital-Falls of Neuse	2.58	2	5	13,000	34,500	$7,165,258	55,470
Ebenezer Ch.	US 70 Collector	0.25	0	3	0	17,100	$896,697	4,275
Faircloth St	Gorman-Hillsborough	0.49	2	3	13,000	17,100	$577,211	2,009
Falls of Neuse	Strickland-I-540	0.68	2	5	13,000	34,500	$2,634,236	14,620
Falls of Neuse	Litchford-Raven Ridge	1.10	2	5	13,000	34,500	$3,809,074	23,650
Garner	Tryon-Walnut Creek	1.82	2	3	13,000	17,100	$4,655,924	7,462
Garner	Walnut Crk-MLK Jr.	0.74	2	3	13,000	17,100	$2,179,453	3,034
Grove Barton	Lynn-Pinecrest	0.65	2	3	13,000	17,100	$1,722,921	2,665
Lead Mine*	N Hills-Millbrook	0.53	2	3	13,000	17,100	$1,401,920	2,177
Lead Mine*	N Hills-Millbrook	0.66	3	5	17,100	34,500	$3,433,856	11,484
Leesville Rd	Westgate-Strickland	0.45	0	5	0	34,500	$2,380,994	15,525
Litchford Rd	Old Wake Forest-Hunt Rid	0.98	2	3	13,000	17,100	$1,972,775	4,018
Litchford Rd	Hunting Ridge-Gresham	0.74	2	3	13,000	17,100	$2,077,121	3,034
Litchford Rd	Gresham-Falls of Neuse	1.30	2	3	13,000	17,100	$1,354,115	5,330
New Hope	Old Poole-Rock Quarry	1.68	0	2	0	13,000	$5,039,716	21,840
Pleasant Valley	Millbrook-Shadetree Ln	0.30	2	4	13,000	25,900	$987,507	3,870
Skycrest	New Hope-Southall	0.89	0	2	0	13,000	$3,632,875	11,570
Strickland/Lead	Six Forks-Creedmoor	2.41	2	5	13,000	34,500	$4,725,358	51,815
Sunnybrook	Poole-Rock Quarry	1.80	2	3	13,000	17,100	$788,186	7,380
Triangle Town	Sumner-Old Wake Forest	0.29	0	5	0	34,500	$3,608,365	10,005
Tryon	Gorman-Dillard	1.15	2	5	13,000	34,500	$3,046,705	24,725
Total							$63,072,990	317,740

* cost of project allocated between 2-3 lane and 3-5 lane sections based on same cost per lane-mile

Source: Road segments, miles, lanes and costs from the City of Raleigh Transportation Service Division of the Public Works Department, October 12 and December 8, 2005 (cost provided by staff reduced to account for sidewalks based on recommended reimbursement rate per linear foot from Table 15); total cost includes actual construction cost or bid cost if final cost not available, design cost and right-of-way cost if applicable; costs have been adjusted by *Engineering News-Record* Construction Cost Index from date of completion to December 2005; daily capacity before and after from Table 19; added VMC is added capacity (difference between before and after capacity) times segment length.

In theory, a consumption-based road impact fee recovers the full cost of the impact of new development on the need to expand the capacity of the major road system. However, in Raleigh, developers and adjacent property owners are required to make substantial improvements or monetary contributions to thoroughfares on which they have frontage, for which they are not fully reimbursed from facility fees. Consequently, not all of the costs of expanding the capacity of the major roadway system should be recovered through the facility fee.

The City requires developers to make improvements to adjacent thoroughfares that have not been improved to their ultimate cross-section. The required improvements are based on a property's right-of-way frontage, land use and the ultimate thoroughfare improvement included in the City's master roadway

plan. The City's regulations allow for reimbursements only for the portion of developer-installed improvements that will provide excess capacity over and above what would be required to serve the development. In practice, developers are responsible for half of a local street cross-section when abutting a collector, and half of a collector road cross-section when abutting a thoroughfare, not including curb and gutter. A fee-in-lieu of improvements based on the reimbursement schedule is required in cases where it is impractical or undesirable to have the developer make the required road frontage improvement.

In addition, when the City initiates an improvement, an assessment is levied on properties fronting on the roadway that had not previously made frontage improvements or paid a fee-in-lieu of improvements. The assessment is designed to recover a portion of the costs of frontage improvements that tend to increase the value of adjacent properties, such as curb and gutter and storm drainage. Separate assessments are made for sidewalks. The frontage assessments typically amount to $60 per foot of frontage for commercial property and $30 for residential property.

Given that developers and adjacent property owners pay for a portion of the cost of some thoroughfare improvements, for which they receive no credit or reimbursement against their facility fees, how are we to ensure that they are not double-charged? Our recommended approach is to cut the cost in half. As shown in the section on Developer Reimbursements, the typical developer who improves the thoroughfare on which he has frontage is reimbursed for about half of the pavement and ROW required to make the improvement. Of course, thoroughfare improvements must often be made in advance of development, so that not all of the frontage of a project has been improved or paid fees in-lieu of improvements. Some of the frontage properties may have already been improved before frontage improvement regulations were in effect, or may be publicly-owned or undevelopable. For these reasons, it is unlikely that required developer improvements or payments will pay for even close to half of the cost of most thoroughfare improvements. Nevertheless, it would be hard to argue that a developer who is required to make his frontage improvement should pay a higher facility fee to pay for the frontage improvement that another frontage property owner cannot be required to pay.

The calculation of the cost per vehicle mile derived from recent thoroughfare improvement projects must be adjusted account for the value of developments' contributions through frontage improvements and assessments. An assumed reduction of 50 percent is also consistent with the legal requirement that no more than 50 percent of the cost of any project may be funded with facility fees. As shown in Table 21, the cost per service unit is $99 per VMC. The cost per VMC is then multiplied by the system-wide ratio of capacity to demand to derive the cost per VMT, which is $154 per VMT.

Table 21
THOROUGHFARE COST PER SERVICE UNIT

Recent Thoroughfare Improvement Costs	$63,072,990
Assumed Value of Frontage Improvements	50%
Net Non-Assessed Thoroughfare Improvement Costs	$31,536,495
Added VMC	317,740
Cost per Vehicle-Mile of Capacity (VMC)	$99.25
System-Wide VMC/VMT Ratio	1.55
Average Cost per Vehicle-Mile of Travel (VMT)	$153.84

Source: Thoroughfare improvement cost and added VMC from Table 20; system-wide VMC/VMT ratio from Table 18.

Net Cost Per Service Unit

In the calculation of the impact of new development on roadway infrastructures, credit should be given for taxes that will be paid by new development and used to retire outstanding debt for past major roadway improvements. Credit will also be provided in this study for motor fuel taxes that will be generated by new development and used to pay for capacity-related road improvements on roads that are included in this study's inventory of existing major roads.

The major funding sources for the City's transportation projects include facility fees, the local share of the state gasoline tax (Powell Bill), and general obligation bonds as well as federal funding of improvement projects on some of the major roads.

Federal funding for Raleigh's major roads is generally provided for the maintenance, improvement and construction of federal highways and intersecting major state and city roads. Based on a review of the 2006 to 2012 Transportation Improvement Program (TIP), it is anticipated that $12.5 million in Federal funds will be available to pay for capacity related improvement programs on non-interstate highways in Raleigh. Funding for planned improvements on interstate highways (e.g., widening I-40) have been excluded since those segments have been excluded from the definition of the major roadways system to be funded by the City's facility fees. The current list of eligible improvements from the North Carolina Department of Transportation TIP is shown in Table 22.

Table 22
PLANNED FEDERALLY FUNDED ROADWAY IMPROVEMENTS, 2006 to 2012

TIP No.	Project	Segment Limits	Improvement	Estimated Project Cost
U-4901	Falls of Neuse	Raven Ridge to Neuse River	Widen	$10,400,000
U-2823	US 70	SR 1664 to SR 1876	Upgrade/Interchange	$1,600,000
U-4432	Tryon Rd.	Norfolk S RR to US 70	Add Lanes (Study)	$500,000
Total				$12,500,000

Source: North Carolina Department of Transportation, *State Transportation Improvement Program, Division 5, FY 2006 to FY 2012*, 2005.

Funding of $100.5 million is proposed for transportation infrastructure improvements in the City's 2005-06 to 2009-10 Capital Improvement Program (CIP). Facility fees may only be used for capacity-expanding improvements to the major roadway system. Eligible improvements account for $51.2 million of the total CIP costs. The current list of eligible improvements from the five-year CIP is shown in Table 23.

Table 23
FIVE-YEAR CAPITAL IMPROVEMENT PROGRAM, 2006 to 2010

Project	Eligibility	Estimated Cost	Eligible Costs
Perry Creek Road Widening	Yes	$615,000	$615,000
Tryon Road Widening	Yes	$655,000	$655,000
Hillsborough Street Roundabouts	Yes	$590,000	$590,000
Barwell/Rock Quarry/Pearl Intersection	Yes	$1,018,000	$1,018,000
Major Street Reserves	NA	$1,500,000	NA
Subtotal, Major Street		$4,378,000	$2,878,000
Street Resurfacing	No	$27,100,000	
Street Paving	No	$3,320,000	
Median Repair/Signage	No	$675,000	
Traffic Signal Installation	Yes	$810,000	$810,000
Traffic Signal System Upgrade	Yes	$1,000,000	$1,000,000
Traffic Calming and Ped. Safety	No	$450,000	
Traffic Engineering Center Improvement	No	$400,000	
Mt. Herman Facilities	No	$499,300	
West St. Salt Storage	No	$46,500	
City Bridge Repair	No	$180,000	
Subtotal, Street Improvements		$34,480,800	$1,810,000
Signal System Upgrade	Yes	$4,000,000	$4,000,000
Falls of Neuse Realign and Widen	Yes	$5,000,000	$5,000,000
Traffic Calming and Ped. Safety	No	$4,100,000	
Tryon Rd. Widening–Part D	Yes	$4,500,000	$4,500,000
Perry Creek Rd. Widening	Yes	$5,600,000	$5,600,000
Hillsbrough St. Roundabouts	Yes	$3,000,000	$3,000,000
Six Forks/Millbrook Intersection	Yes	$3,400,000	$3,400,000
Rock Quarry Rd. Widening–Part A	Yes	$5,700,000	$5,700,000
Poole Road Widening	Yes	$7,300,000	$7,300,000
Lake Wheeler Rd. Widening	Yes	$5,500,000	$5,500,000
Leesville Rd. Widening	Yes	$1,300,000	$1,300,000
Mitchell Mill Rd. Widening	Yes	$1,200,000	$1,200,000
Subtotal, Bond Projects		$50,600,000	$46,500,000
Transit Projects	No	$5,323,771	
Parking Improvements	No	$1,750,000	
Pedestrian Improvements	No	$3,934,600	
Total, Transportation Improvements		$100,467,171	$51,188,000

Source: City of Raleigh, FY 2005-06 to 2009-10 Capital Improvement Program, 2005.

The major funding sources for the transportation projects shown in Table 23 include facility fees, the local share of the state gasoline tax (Powell Bill), and general obligation bonds. The capital plan anticipates $24.7 million in Powell Bill funds over the next five years. However, state law prohibits the use of Powell Bill funds for capacity-related projects. As a result, all of the City's capacity-related projects will be funded through either the issuance of new bonds or facility fee revenue, so a credit for state gas tax funding is not necessary.

Dividing the capacity-related share of anticipated annual federal funding by existing travel on the major roadway system yields the annual federal capacity funding per VMT. Multiplying that figure by the appropriate net present value provides the equivalent current value of the future stream of funding over the next 20 years, a period that roughly corresponds to the life of roadway improvements. The result is a relatively low federal funding credit of $4.65 per VMT, as shown in Table 24.

Table 24
THOROUGHFARE FUNDING CREDIT PER SERVICE UNIT

Federal Capacity Improvement Funding, FY 2006 to FY 2012	$12,500,000
Total Years in Transportation Plan	6
Annual Funding	$2,083,333
Daily VMT on Major Roadway System	5,968,928
Annual Capacity Funding per VMT	$0.35
Present Value Factor (20 years at 4.25%)	13.29
Federal Funding Credit per VMT	$4.65

Source: Federal funding from Table 22; existing VMT from Table 52 of Appendix A; discount rate for net present value factor is based on average rate on 20-year, tax exempt AAA municipal bonds reported by fmsbonds.com on January, 18 2006.

The thoroughfare facility fees must also take into consideration that new development will be generating future revenues that will be used to retire outstanding debt for past capacity-related roadway improvements. Based on the current CIP, which utilizes road bonds primarily for capacity-enhancing projects, this analysis assumes that all the outstanding road-related debt was issued for capacity-enhancing projects. An analysis of past bond issues indicates that currently the City's outstanding debt related to roads is $115.1 million as shown in Table 25.

Table 25
CITY OF RALEIGH OUTSTANDING ROAD DEBT

Public Improvement Refunding Series, 1997	$9,112,992
G.O. Refunding Series, 1998	$2,003,195
Street Improvement Series, 1998	$16,300,000
Public Improvement Series, 2002	$1,814,172
Public Improvement Series, 2002A	$1,955,173
Public Improvement Series, 2002B	$35,834,035
Public Improvement Refunding Series, 2002C	$2,792,890
Public Improvement Series, 2004	$9,700,485
Street Improvement Series, 2005A	$10,600,000
Public Improvement Series, 2005B	$25,000,000
Total Outstanding Road Debt	$115,112,942

Source: City of Raleigh Finance Director, October 14, 2005 and January 10, 2006.

A simple method that ensures that new development is not required to pay for existing facilities, through property tax or other funds used for debt retirement, as well as new facilities, through facility fees, is to subtract the outstanding debt from the replacement cost of existing thoroughfare facilities. Essentially, this defines the existing level of service that new development is required to maintain as the equity value of the existing thoroughfare system. While it may be somewhat difficult to quantify the replacement value of the existing thoroughfare system, the same result is obtained by calculating a credit by dividing the outstanding debt by existing service units. The City of Raleigh's road related debt of approximately $115.1 million amounts to a debt credit of $19.29 per service unit, as shown in Table 26.

Table 26
THOROUGHFARE DEBT CREDIT

Total Outstanding Road Related Debt Principal	$115,112,942
Percent Attributable to Capacity	100%
Attributable Outstanding Road Debt Principal	$115,112,900
Daily VMT on the Major Roadway System	5,968,928
Debt Credit per VMT	$19.29

Source: Total outstanding debt from Table 25; percent attributable to capacity assumed; existing VMT from Table 52 of Appendix A.

Reducing the cost per service unit by the road debt credit and the anticipated annual federal/state funding per service unit leaves a net thoroughfare cost of about $130 per VMT to maintain the existing level of service, as summarized in Table 27.

Table 27
THOROUGHFARE NET COST PER SERVICE UNIT

Cost per Vehicle-Mile of Travel (VMT)	$153.84
Federal/State Funding Credit per VMT	$4.65
Debt Service Credit per VMT	$19.29
Net Cost per VMT	$129.90

Source: Cost per VMT from Table 21; federal/state funding credit from Table 24; debt service credit from Table 26.

Travel Demand

The travel demand generated by specific land use types is a product of three factors: 1) trip generation; 2) percent new trips; and 3) trip length. The result is the vehicle-miles of travel (VMT) generated by a unit of development.

Trip Generation

Trip generation rates are based on information published in the most recent edition of the Institute of Transportation Engineers' (ITE) *Trip Generation* manual. Trip generation rates represent trip ends, or driveway crossings at the site of a land use. Thus, a single one-way trip from home to work counts as one trip end for the residence and one trip end for the work place, for a total of two trip ends. 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.

To date, few road impact fees have been adopted that vary by the size of single-family dwelling units. This is largely because road impact fees are generally based on national trip generation rate data, and the Institute of Transportation Engineers (ITE) *Trip Generation* manual does not provide rates by dwelling unit size. However, the fact that trip generation rates for residential uses vary by the size of the household is actually well documented in the transportation planning literature.

This study gives the City the option of charging single-family detached housing based on the size of the dwelling unit. The size of the dwelling unit is related to the number of residents, and the average number of vehicle trips generated is strongly related to the number of people living in the dwelling unit.

The average household size of single-family detached units by number of bedrooms is available from 2000 Census five-percent sample data, which is presented in Appendix B. This information is combined with the trip rate data by household size presented in the previous table to derive daily trip rates by the size of the unit, represented by bedrooms, as shown in Table 28.

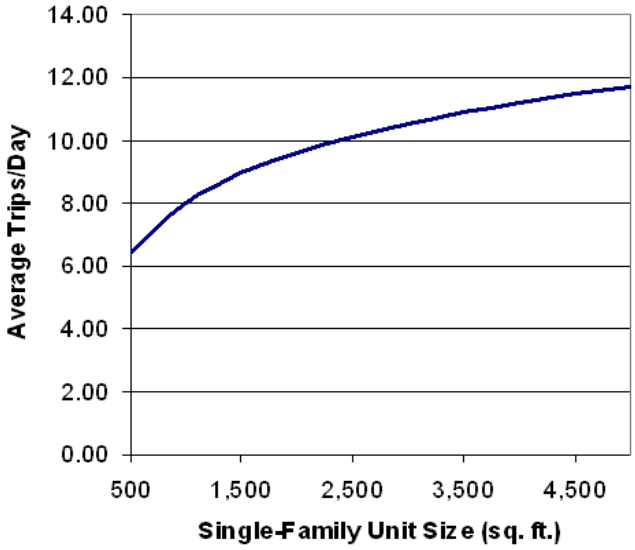
Table 28
SINGLE-FAMILY TRIPS BY BEDROOMS

Bedrooms	Avg. HH Size	Daily Trips
Up to Two	2.14	8.04
Three	2.45	9.10
Four	3.01	11.59
Five or more	3.27	12.33
Average	2.59	9.57

Source: Average household sizes from Table 55; daily trips derived from Transportation Research Board, NCHRP Report 365, "Travel Estimation Techniques for Urban Planning," Washington, D.C.: National Academy Press, Table 9 (for urban areas with populations of 200,000 to 499,999), 1998..

To determine a relationship between the average square footage of single-family detached units, the number of bedrooms and trip generation, the consultant analyzed a sample with half the single-family homes listed for sale in Raleigh from the National Association of Realtors website (www.realtor.com) on November 22, 2005. The on-line listing sample gave square footage of living area and the number of bedrooms for 1,098 of 2,237 homes offered for sale. To this data base, variables for daily trip rates were added, consisting of the trip rates by number of bedrooms presented in the previous table. Regression analysis was then performed to determine the relationship between unit size in square feet and trip rates. Linear, semi-logarithmic and logarithmic regressions were performed, and the semi-logarithmic equation was determined to provide the best explanation of the data.[6] The curve described by the equation for peak hour trips is shown in Figure 7.

Figure 7
AVERAGE TRIPS BY UNIT SIZE



Using the regression equation, average daily trip rates were derived for five square footage size categories. The results are shown in Table 29.

[6] The equation for average daily trips is y = 2.297674 * Ln(x) - 7.86471, where y is average daily trips and x is the floor area of the unit in square feet; the R^2 is 0.306 and the t-statistics are 21.96 for the x-coefficient and -9.73 for the y-intercept.

Table 29
SINGLE-FAMILY TRIPS BY SQUARE FOOTAGE

Dwelling Size Category	Midpoint	Daily Trips
Less than 1,000 sq. ft.	500	6.41
1,000 - 1,999 sq. ft.	1,500	8.94
2,000 - 2,999 sq. ft.	2,500	10.11
3,000 - 3,999 sq. ft.	3,500	10.89
4,000 sq. ft. or more	4,500	11.46

Source: Daily trips derived using the regression equation formula and the midpoints of the size categories.

New Trip Factor

Trip rates also need to be adjusted by a "new trip factor" to exclude pass-by and diverted-link 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-link 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-link trips was drawn from ITE and other published information.

Average Trip Length

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 Raleigh's jurisdiction. The average trip length of a trip on the City's major roadway system can be estimated by dividing the total vehicle-miles of travel (VMT) on the road system by the total number of trips that are generated by existing land uses in Raleigh and its ETJ. Multiplying trip generation rates by existing land use results in an estimate of 1.85 million daily trips generated by existing development. Dividing total VMT on the major roadway system by the estimated trip yields an average trip length of about 3.22 miles, as shown in Table 30.

Table 30
AVERAGE TRIP LENGTH

Land Use	Unit	Existing Units	Daily Trip Generation	Daily Trips
Single-Family Detached*	Dwelling	79,121	4.79	378,990
Multi-Family	Dwelling	87,407	3.36	293,688
Hotel/Motel	Room	9,380	4.51	42,304
Shopping Center/General Retail	1,000 sq. ft.	40,081	15.46	619,645
Office/Other Institutional	1,000 sq. ft.	48,643	5.51	268,024
Industrial	1,000 sq. ft.	11,437	3.48	39,801
Mini-Warehouse	1,000 sq. ft.	2,288	1.25	2,860
Warehouse	1,000 sq. ft.	28,638	2.48	71,022
Church/Synagogue	1,000 sq. ft.	4,165	4.56	18,991
Elementary/Secondary School	1,000 sq. ft.	13,042	5.21	67,951
Nursing Home	1,000 sq. ft.	1,161	3.05	3,540
Hospital	1,000 sq. ft.	2,897	8.79	25,463
Day Care	1,000 sq. ft.	534	39.63	21,145
Total Daily Trips				1,853,424
Total Daily Vehicle-Miles of Travel (VMT)				5,968,928
Average Trip Length (miles)				3.22

* includes mobile home

Source: Existing housing units from Table 53; existing nonresidential units from Table 57; existing hotel/motel rooms based on assumption of 500 sq. ft. per hotel/motel room; VMT from Table 52.

The national average trip lengths derived from the U.S. Department of Transportation's 2001 *National Household Travel Survey* for a variety of trip purposes, including home-to-work trips, doctor/dentist, school/church, shopping, and other personal trips are shown in Table 31 below. The average trip length on Raleigh's major roadway system included in the road inventory utilized for this study is about one-third the national average. This is not surprising, since the trip length calculation excludes travel on interstates, local roads and major roads outside the city limits. Reducing all of the national trip lengths by purpose by this adjustment factor yields the following estimates of local trip lengths by trip purpose.

Table 31
AVERAGE TRIP LENGTH BY TRIP PURPOSE

Trip Purpose	National Trip Length (miles)	Local Adjustment Factor	Local Trip Length (miles)
Visit Friends/Relatives	14.99	0.33	4.92
To or from work	12.19	0.33	4.00
Residential*	10.77	0.33	3.53
Doctor/Dentist	9.89	0.33	3.24
Average	9.82	0.33	3.22
Recreational	9.40	0.33	3.08
School/Church	7.50	0.33	2.46
Family/Personal	7.43	0.33	2.44
Shopping	6.61	0.33	2.17

* weighted based on 40% work trips and 60% average trips
Source: National trip lengths from US. Department of Transportation, National Household Travel Survey, 2001; local average trip length from Table 30.

The result of combining trip generation rates, primary trip factors and localized average trip lengths is a travel demand schedule that establishes the daily VMT during the average weekday on the major roadway system generated by various land use types per unit of development in Raleigh. The recommended travel demand schedule is presented in Table 32. The schedule provides the option of assessing single-family detached development based on the overall average trip generation or on trip generation rates that vary by the size of the dwelling unit.

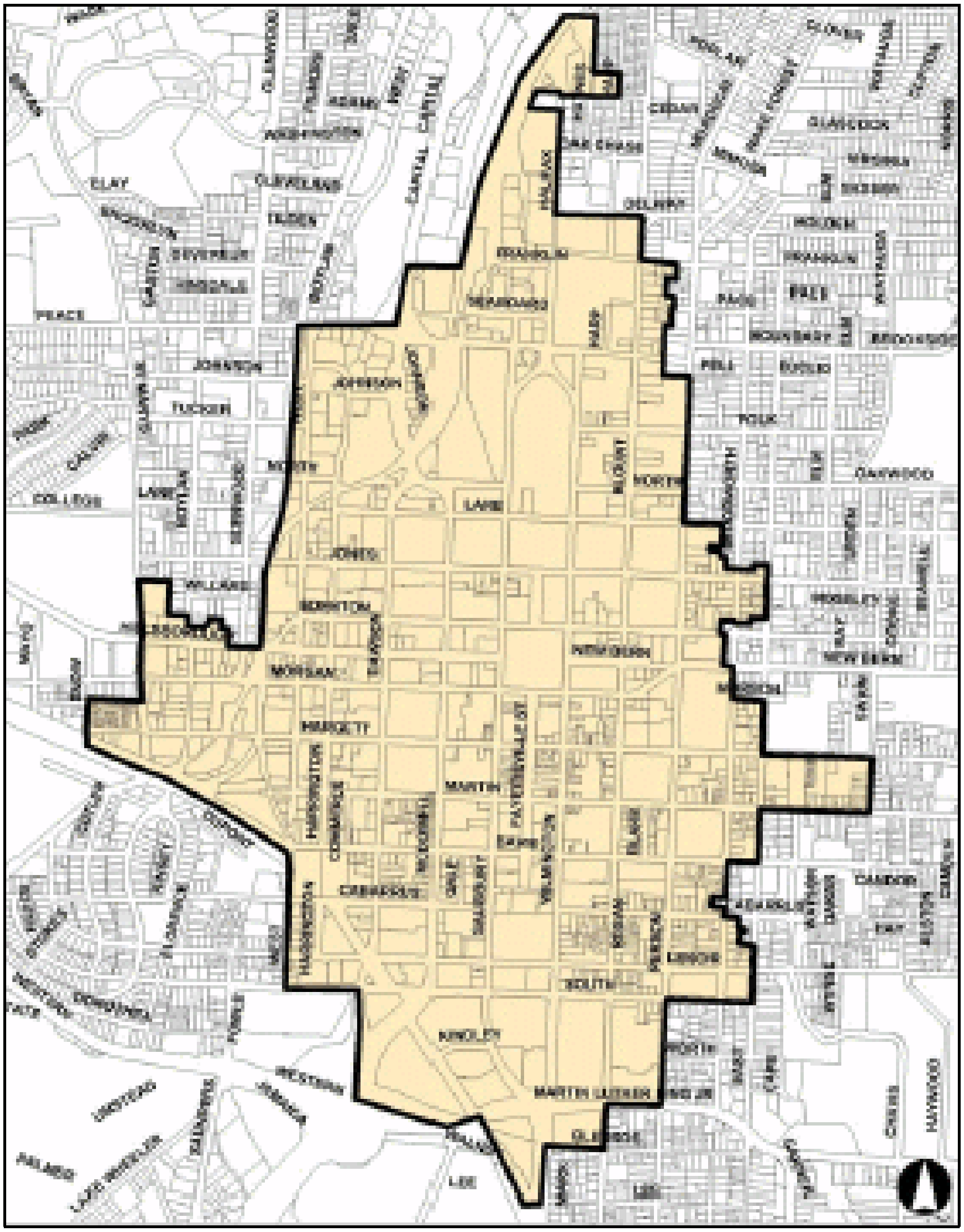
Table 32
TRAVEL DEMAND SCHEDULE

Land Use Type	ITE Code	Unit	ADT	Primary Trips	Length (miles)	Daily VMT
Less than 1,000 sq. ft.	210	Dwelling	3.21	100%	3.53	11.32
1,000 - 1,999 sq. ft.	210	Dwelling	4.47	100%	3.53	15.79
2,000 - 2,999 sq. ft.	210	Dwelling	5.06	100%	3.53	17.85
3,000 - 3,999 sq. ft.	210	Dwelling	5.45	100%	3.53	19.23
4,000 sq. ft. or more	210	Dwelling	5.73	100%	3.53	20.24
Single-Family Detached, Avg.	210	Dwelling	4.79	100%	3.53	16.92
Multi-Family	220	Dwelling	3.36	100%	3.53	11.87
Retirement Community	255	Dwelling	1.41	100%	3.53	4.98
Hotel/Motel	310/320	Room	3.45	100%	4.92	16.96
COMMERCIAL						
Retail/Commercial	820	1000 sq. ft.	21.47	62%	2.17	28.86
Office	710	1000 sq. ft.	5.51	100%	4.00	22.01
Industrial	130	1000 sq. ft.	3.48	100%	4.00	13.91
Warehouse	150	1000 sq. ft.	2.48	100%	3.22	7.99
Mini-Warehousing	151	1000 sq. ft.	1.25	100%	3.22	4.03
INSTITUTIONAL						
Church/Synagogue	560	1000 sq. ft.	4.56	100%	2.44	11.10
Elementary/Secondary School	520/530	1000 sq. ft.	6.85	24%	2.46	4.04
College/Junior College	540	1000 sq. ft.	13.75	100%	3.22	44.28
Day Care	565	1000 sq. ft.	39.63	24%	3.22	30.63
Hospital	610	1000 sq. ft.	8.79	100%	4.00	35.12
Nursing Home/Group Quarters	620	1000 sq. ft.	3.05	100%	3.24	9.89
Cemetery	566	Acre	2.37	100%	3.22	7.63
Passenger Transportation Facility	150	1000 sq. ft.	2.48	100%	3.22	7.99
Emergency Service Facility	150	1000 sq. ft.	2.48	100%	3.22	7.99
RECREATIONAL						
Golf Course	430	Hole	17.87	100%	3.22	57.55
Public Park	411	Acre	0.80	100%	3.22	2.58
Stadium/Coliseum/Race Track	452	Seat	0.31	100%	3.22	1.00
General Recreation (all other)	414	Parking Space	0.84	100%	3.22	2.71

Source: "ADT" is 1/2 of daily trips from Institute of Transportation Engineers (ITE), *Trip Generation*, 7th ed., 2003; other institutional ADT based on office ADT rate; single-family detached trip rates from Table 29; primary trip percentages for retail/commercial uses from ITE, *Trip Generation Handbook*, March 2001 (additional 10% deducted from non-passby percentage for shopping centers to account for diverted-link trips); percentage for elementary/secondary school based on Preston Hitchens, "Trip Generation of Day Care Centers," 1990 *ITE Compendium*; local average trip lengths from Table 31.

While the travel demand schedule should be appropriate for most development in Raleigh, additional analysis was done to see if development in the downtown area has less impact on the thoroughfare system because it is better served by transit. For the purposes of this analysis, the downtown area was defined as the area covered by the Downtown Overlay District (DOD), which is shown in Figure 8.

Figure 8
DOWNTOWN OVERLAY DISTRICT



The demand for thoroughfare facilities is directly proportional to average trip length, which in turn is likely to be related to distance from the urban core. Whether average trip lengths actually correspond to this model was explored by examining census data on travel time to work for the DOD. The 2000 Census data on average travel time to work for workers over sixteen years of age using other modes than public transportation is summarized in Table 33. The data revealed a very small difference between the DOD area (20.7 minutes) and the city-wide average (20.8 minutes).

While DOD residents do not have significantly quicker travel routes to work when they use automobiles and other private forms of transportation, they are more likely to use alternative modes of travel. Only 64.7 percent of DOD residents take private motor vehicles to work, compared to 90.1 percent of residents city-wide. Taking into account the reduced tendency to use private motor vehicles, residential development in the DOD Core can be expected to generate only about 71.4 percent of the vehicular travel demand generated by residential development city-wide, as shown in Table 33.

Table 33
FEE REDUCTION FACTOR FOR DOWNTOWN RESIDENTIAL DEVELOPMENT

	Central Core	City-Wide	Ratio
Percent Driving Private Motor Vehicle to Work	64.7%	90.1%	0.718
Travel Time, Non-Public Transportation (minutes)	20.7	20.8	0.995
Reduction in Impact for Residential in Downtown			0.714

Source: 2000 U.S. Census, SF-3 sample data (1 in 6 sample) of workers 16 years or older; Downtown Overlay District area approximated by Wake County census tract 501.

The analysis so far has been based on data from the U.S. Census of Population and Housing, which deals only with residential development. Can the results be extrapolated to nonresidential development as well? Given that the core area in most cities is better served by public transportation than outlying suburbs, it is likely that workers living in the suburbs and commuting to the core are more likely to use public transportation than suburban workers traveling to other suburban locations. However, for those workers who do not use public transportation, trip lengths to nonresidential development in the DOD from suburban locations may well be longer than average. Without additional data, it is not possible to quantify a reduction factor for nonresidential development in the DOD area.

Maximum Fee Schedule

Using the formula and the inputs calculated in this section of the facility fee report, the maximum potential thoroughfare facility fees per unit of development for various land uses are shown in Table 34. The fee schedule provides the option of charging single-family detached development based on a flat rate per unit or on a variable schedule depending on the size of the dwelling unit.

Table 34
THOROUGHFARE NET COST SCHEDULE

Land Use Type	Unit	Daily VMT	Net Cost/ VMT	Net Cost/ Unit
Less than 1,000 sq. ft.*	Dwelling	11.32	$129.90	$1,470
1,000 - 1,999 sq. ft.*	Dwelling	15.79	$129.90	$2,051
2,000 - 2,999 sq. ft.*	Dwelling	17.85	$129.90	$2,319
3,000 - 3,999 sq. ft.*	Dwelling	19.23	$129.90	$2,498
4,000 sq. ft. or more*	Dwelling	20.24	$129.90	$2,629
Single-Family Detached, Avg.*	Dwelling	16.92	$129.90	$2,198
Multi-Family*	Dwelling	11.87	$129.90	$1,542
Retirement Community	Dwelling	4.98	$129.90	$647
Hotel/Motel	Room	16.96	$129.90	$2,203
COMMERCIAL				
Retail/Commercial	1000 sq. ft.	28.86	$129.90	$3,749
Office	1000 sq. ft.	22.01	$129.90	$2,859
Industrial	1000 sq. ft.	13.91	$129.90	$1,807
Warehouse	1000 sq. ft.	7.99	$129.90	$1,038
Mini-Warehousing	1000 sq. ft.	4.03	$129.90	$523
INSTITUTIONAL				
Church/Synagogue	1000 sq. ft.	11.10	$129.90	$1,442
Elementary/Sec. School	1000 sq. ft.	4.04	$129.90	$525
College/Junior College	1000 sq. ft.	44.28	$129.90	$5,752
Day Care	1000 sq. ft.	30.63	$129.90	$3,979
Hospital	1000 sq. ft.	35.12	$129.90	$4,562
Nursing Home/Group Quarters	1000 sq. ft.	9.89	$129.90	$1,285
Cemetery	Acre	7.63	$129.90	$991
Passenger Transportation Facility	1000 sq. ft.	7.99	$129.90	$1,038
Emergency Service Facility	1000 sq. ft.	7.99	$129.90	$1,038
RECREATIONAL				
Golf Course	Hole	57.55	$129.90	$7,476
Public Park	Acre	2.58	$129.90	$335
Stadium/Coliseum/Race Track	Seat	1.00	$129.90	$130
General Recreation (all other)	Parking Space	2.71	$129.90	$352

* fees reduced by a factor of 0.714 in the Downtown Overlay District (see Table 33)
Source: Net cost per VMT from Table 27; daily VMT from Table 32 .

The maximum thoroughfare facility fees calculated in this report are compared with current facility fees in Table 35. Facility fees could be adopted at less than 100 percent of the level shown in the net cost schedule, provided that the reduction is applied uniformly across all land use categories in order to retain the proportionality of the fees. As discussed in the background section of this report, the fees were adopted at about 39 percent of the maximum levels calculated in the 1987 study. The City's facility fee ordinance contains 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 thoroughfare facilities than indicated by the fee schedule.

Table 35
COMPARATIVE THOROUGHFARE FACILITY FEES

Land Use Type	Unit	Current Fee	Maximum Fee	% Change
Less than 1,000 sq. ft.	Dwelling	$307	$1,470	379%
1,000 - 1,999 sq. ft.	Dwelling	$307	$2,051	568%
2,000 - 2,999 sq. ft.	Dwelling	$307	$2,319	655%
3,000 - 3,999 sq. ft.	Dwelling	$307	$2,498	714%
4,000 sq. ft. or more	Dwelling	$307	$2,629	756%
Single-Family Detached, Avg.	Dwelling	$307	$2,198	616%
Multi-Family	Dwelling	$187	$1,542	725%
Retirement Community	Dwelling	$101	$647	540%
Hotel/Motel	Room	$313	$2,203	604%
COMMERCIAL				
Retail/Commercial (a)	1000 sq. ft.	$1,247	$3,749	201%
Office (a)	1000 sq. ft.	$438	$2,859	553%
Industrial	1000 sq. ft.	$181	$1,807	898%
Warehouse	1000 sq. ft.	$302	$1,038	244%
Mini-Warehousing	1000 sq. ft.	$80	$523	554%
INSTITUTIONAL				
Church/Synagogue	1000 sq. ft.	$135	$1,442	968%
Elementary/Sec. School (b)	1000 sq. ft.	$320	$525	64%
College/Junior College	1000 sq. ft.	$473	$5,752	1116%
Day Care (b)	1000 sq. ft.	$1,468	$3,979	171%
Hospital (c)	1000 sq. ft.	$438	$4,562	942%
Nursing Home (d)	1000 sq. ft.	$206	$1,285	524%
Cemetery	Acre	$127	$991	680%
Passenger Transportation Facility	1000 sq. ft.	$302	$1,038	244%
Emergency Service Facility	1000 sq. ft.	$302	$1,038	244%
RECREATIONAL				
Golf Course	Parking Space	$170	$7,476	4297%
Public Park	Acre	$110	$335	205%
Stadium/Coliseum/Race Track	Seat	$5	$130	2498%
General Recreation (all other)	Parking Space	$95	$352	271%

Notes: (a) based on 100,000 square foot building or shopping center; (b) based on ratio of students/1,000 sq. ft.; (c) based on 100,000 sq. ft. office (current category is "office, hospitals and medical care facilities"; (d) based on ratio of beds per 1,000 sq. ft.
Source: Current fees from City of Raleigh Municipal Code, Sec. 10-8003; maximum fees from Table 34.

OPEN SPACE FACILITIES

The City of Raleigh provides a variety of open space facilities, consisting of parks, greenways and trails, for the benefit of the public. The City's open space and park system is graphically illustrated in Figure 9. Continued population growth will require the City to acquire and develop additional park land and construct more recreational facilities in order to maintain the existing level of service. Open space facility fees are one method of ensuring that new residential development pays its proportionate share of these growth-related capital costs.

In 1985, the City of Raleigh sought and obtained authority from the North Carolina legislature to enact "open space project fees," which were originally limited to land acquisition. This legislation was amended in 1987 to expand the definition of "Open Space Project" to include the construction of recreation facilities. However, the City's ordinance provides conflicting signals about whether the fees, which were calculated in 1987 based on land costs only, can also be used to fund park improvements. Section 10-8005(b)(3) states that "All funds shall be used exclusively for capital improvements within the benefit area from which the funds were collected," and Section 10-8002 defines "open space capital costs" as "All monies expended for public parks and greenways, including land acquisition; site development; design, inspection and testing; construction of recreation facilities, including, but not limited to facilities for specialized and general recreation; parking, drives and other accessory facilities needed to serve public parks and greenways." On the other hand, Section 10-8005(b)(1) states that "Funds expended from facility fee trust accounts shall be made for no other purpose than capital costs for thoroughfares and collector streets or open space acquisition projects undertaken by the City or by the City in conjunction with other units of government." If the City decides to include improvement costs in the updated open space fees, this language would need to be clarified to clearly authorize the funds to be spent on park improvements.

The City's current open space facility fee was adopted in 1987. There have been no adjustments to the open space fee schedule since its adoption.

Methodology

A major change that the City should consider is the possibility of including park improvement costs. As noted above, the current open space facility fees are only designed to recover land costs. This report calculates maximum open space fees with and without improvements costs.

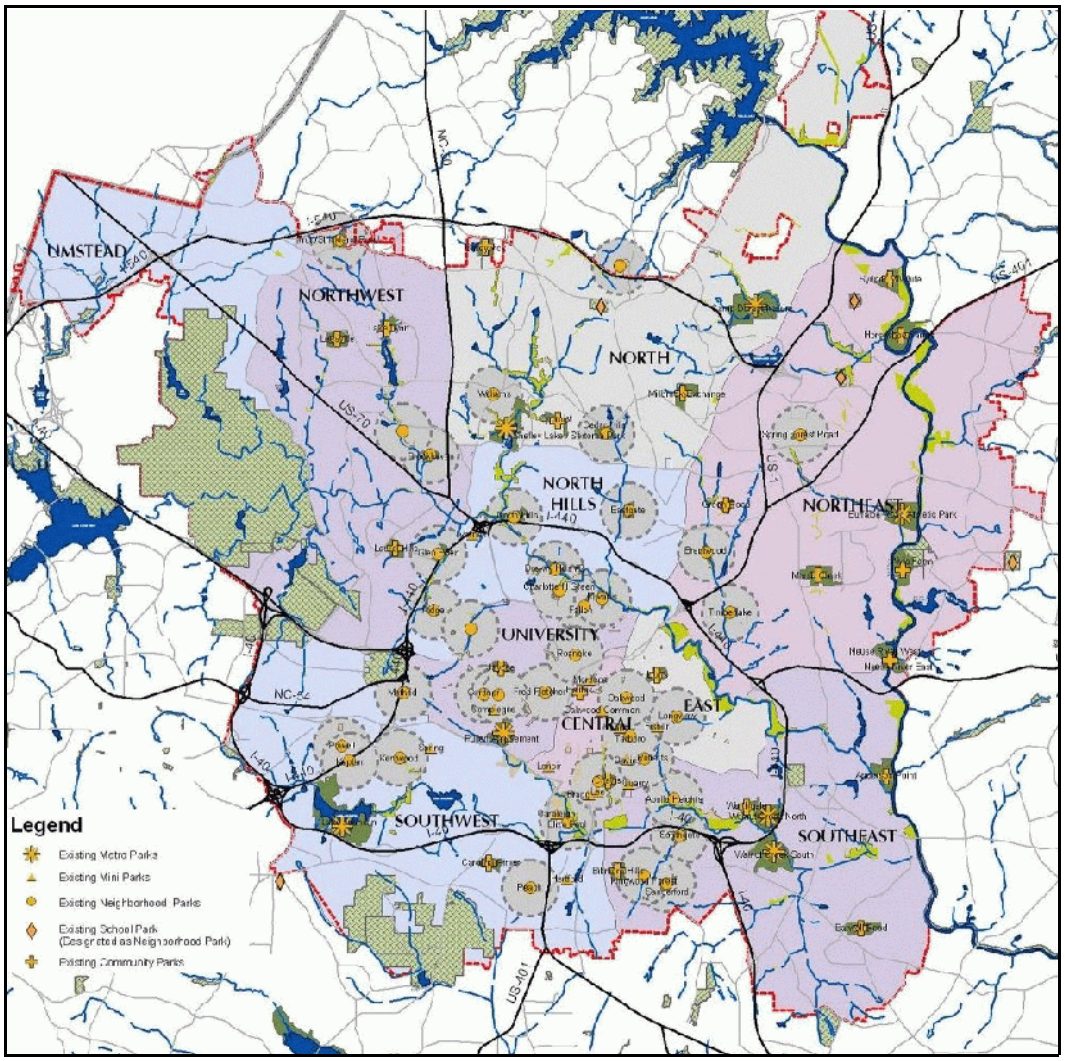
Similar to road facility fees, the major methodology for calculating open space facility fees are the "improvements-driven" and "consumption-based" approach. The merits and shortcomings of each approach are similar when applied to the calculation of open space facility fees.

The improvements-driven approach divides the cost of growth-related improvements required over a fixed planning horizon based on desired level of service (e.g., acres of parkland per person) by the number of new service units (e.g., population) projected to be generated by growth over the same planning horizon in order to determine a cost per service unit. The improvements-driven method must account

for existing deficiencies. If the system has excess capacity, the improvements-driven method does not charge for new development's consumption of the existing excess capacity.

As discussed in the introduction, the City's 1987 open space facility fees were based on the improvements- driven approach. The facility fee calculation were based on the adopted levels of service for parks and greenways contained in the City's comprehensive plan (5.7 acres per thousand residents for each, for a combined 11.4 acres per thousand persons). The cost to accommodate projected population growth over the ten-year period (1986-1996) in each zone was determined based on the acres needed to maintain the adopted level of service and average costs per acre. A reduction in the acres needed was made to account for greenways on State-owned property. Park land was assumed to cost $30,000 per acre in Zones 1 and 2, and $17,500 per acre in Zones 3 and 4. Greenway land was assumed to cost $3,415 per acre in all zones. The net cost in each zone (growth cost less growth revenue) was divided by anticipated population growth to determine the net cost per person.

Figure 9
EXISTING PARKS AND OPEN SPACE FACILITIES



Source: 2003 Update of the Parks Plan Element of the Comprehensive Plan

This study utilizes the consumption-based methodology for updating the City's open space and park facility fee. The consumption-based approach simply charges new development the cost of replacing the capacity that it consumes based on existing level of service, and measures that level of service in terms of the ratio of the replacement value of existing facilities to existing residential development expressed in equivalent dwelling units. As with the 1987 approach, a credit is provided to reflect outstanding debt on existing open space. An adjustment was not necessary to account for State-owned park land in the City's greenway system, since State land was not included in the open space inventory; however, a credit is provided to reflect State and Federal grant funding for parks and open space over the past few years. The recommended formula for calculating the updated open space facility fees is presented in Figure 10.

Figure 10
OPEN SPACE FACILITY FEE FORMULA

MAXIMUM FEE	=	**EDUs x NET COST/EDU**
EDUs	=	UNITS x EDU/UNIT
Where:		
UNITS	=	Number of dwelling units
EDUs/UNIT	=	Ratio of average household size of housing type to average household size of single-family detached unit
NET COST/EDU	=	COST/EDU - CREDIT/EDU
COST/EDU	=	Ratio of total replacement cost of existing parks and greenway land and improvements to total EDUs of existing development within the City and its ETJ
CREDIT/EDU	=	Revenue credit per EDU to account for outstanding debt and potential grant funding

Note: EDU stands for Equivalent Dwelling Unit (see discussion of Service Units)

Service Areas and Benefit Districts

The concept of service areas and benefit districts was described in the Thoroughfare Facilities section. Service areas are geographic areas subject to a single fee schedule. Service areas may be divided into multiple benefit districts, which are areas where fees collected are earmarked to be spent. The City of Raleigh currently has four open space facility fee zones (see Figure 11), which serve as both service areas and benefit districts. The fee per single-family unit ranges from a low of $307 to a high of $375. The highest fees are assessed in Zone 2, which is in the northeast quadrant of the City, and the lowest fees are assessed in Zone 3, which is in the southwest quadrant of the City.

As shown in Table 36, open space facility fee collections are highest in zones 2 and 4, and lowest in zone 3. This corresponds to the geographic size and location of the districts, with the larger zones located in areas experiencing rapid growth and new development, while zone 3 is the smallest zone and located in an area that has not experienced rapid population growth. Unlike the City's thoroughfare reimbursement accounts, the City's open space zones do not have significant outstanding reimbursements.

Table 36
OPEN SPACE FACILITY FEE REVENUES, FISCAL YEARS 2001-2005

Benefit Zone/Fund Type	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Average
Zone 1	$361,992	$231,000	$319,993	$408,388	$431,780	$350,631
Zone 2	$538,639	$463,500	$346,671	$446,042	$399,776	$438,926
Zone 3	$222,719	$144,473	$123,718	$135,511	$55,003	$136,285
Zone 4	$437,967	$440,055	$452,486	$406,846	$404,272	$428,325
Total Project Revenue	$1,561,317	$1,279,028	$1,242,868	$1,396,787	$1,290,831	$1,354,166
Zone 1	$93,544	$58,353	$80,259	$102,700	$108,383	$88,648
Zone 2	$143,408	$119,505	$90,219	$112,872	$100,544	$113,310
Zone 3	$55,864	$45,752	$31,113	$34,759	$15,150	$36,528
Zone 4	$110,837	$110,199	$113,678	$102,839	$101,793	$107,869
Total Reimbursement Rev.	$403,653	$333,809	$315,269	$353,170	$325,870	$346,354
Zone 1	$455,536	$289,353	$400,252	$511,088	$540,163	$439,278
Zone 2	$682,047	$583,005	$436,890	$558,914	$500,320	$552,235
Zone 3	$278,583	$190,225	$154,831	$170,270	$70,153	$172,812
Zone 4	$548,804	$550,254	$566,164	$509,685	$506,065	$536,194
Total Fee Revenue	$1,964,970	$1,612,837	$1,558,137	$1,749,957	$1,616,701	$1,700,520

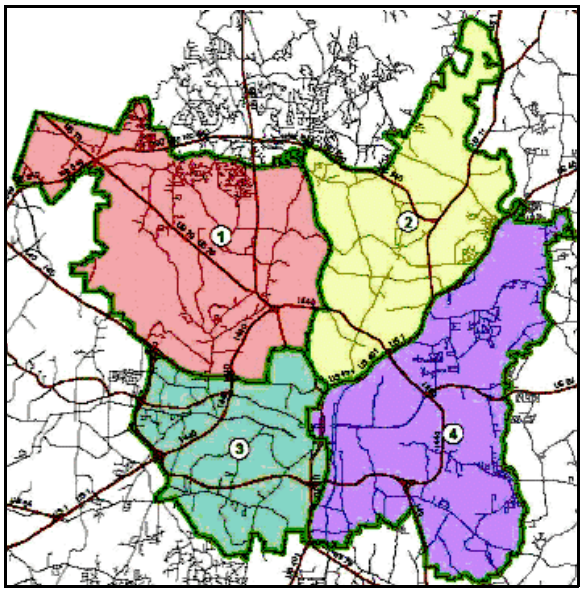
Source: City of Raleigh Finance Department.

The consultant recommends using a single city-wide service area for calculating open space facility fees. The primary rationale for continuing to utilize multiple service areas would be significant variation in land costs between different parts of the city. Since additional park land is likely to be purchased in newly-developing areas, it is the difference in land costs between such areas that is most relevant. Available parkland acquisition cost data (see Table 39) do not provide conclusive evidence that parkland acquisition costs in the existing districts justify the use of multiple service areas and different fees.

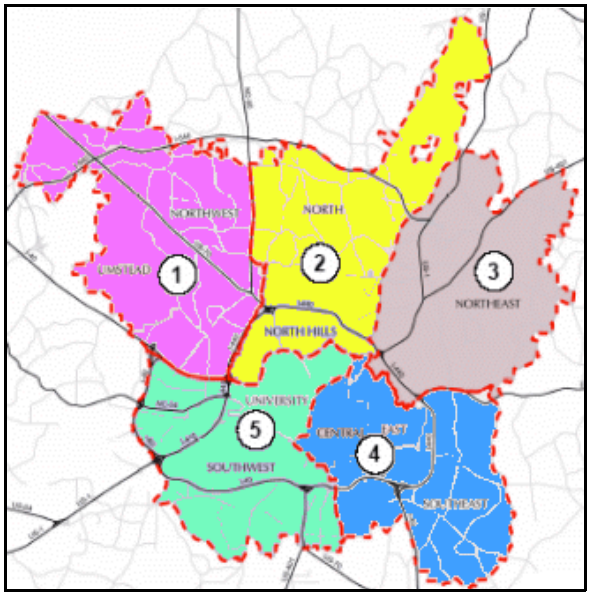
However, it is recommended that the City continue to utilize benefit districts for the collection and distribution of facility fees. The *Raleigh Parks Plan* recommends that the current four facility fee zones be re-structured to five zones to better represent population distribution. The proposed zone boundaries correspond with combinations of existing planning districts to facilitate planning and accountability. The current and proposed fee zones are illustrated in Figure 12. Generally, communities have more and smaller parks and open space benefit zones than roads, since park facilities most frequently serve a smaller geographic user base than a roadway system, which is designed to move traffic throughout the community. The addition of an open space benefit zone is consistent with the City's physical and population growth since the original study in 1987. However, amending the zonal boundaries would entail some additional administrative effort, since facility fees collected in the original zones would need to continue to be tracked and restricted to expenditure in the zone in which they were collected.

Figure 12
CURRENT AND PROPOSED OPEN SPACE BENEFIT ZONES

Current Benefit Zones



Raleigh Parks Plan Proposed Benefit Zones



Service Unit

The demand for open space land and facilities is generally attributed only to residential development, and Raleigh's current facility fee is consistent with this practice. This is a fairly standard approach, although some communities (such as Atlanta, Georgia) have experimented with charging park impact fees to non-residential development as well.

Different types of development must be translated into a common unit of measurement that reflects the impact of new development on the demand for open space land and facilities. This unit of measurement is called a "service unit." The most common service unit used in park impact fee analysis is population. Population estimates are based on three factors: the number of dwelling units, average household sizes for various types of units and occupancy rates. The number of dwelling units can be estimated with some degree of precision, and average household size has been declining somewhat predictably but has been stabilizing in recent years. Occupancy rates, on the other hand, tend to vary significantly over time, and not in predictable directions. Consequently, this report recommends the use of a service unit that avoids the need to make assumptions about occupancy rates. This service unit is the "equivalent dwelling unit" or EDU, which represents the impact of a typical single-family dwelling. By definition, a typical single-family unit represents, on average, one EDU. Other types of units each represent a fraction of an EDU, based on their relative average household sizes. The EDUs associated with each housing type and unit size category are shown in Table 37.

Table 37
EQUIVALENT DWELLING UNIT MULTIPLIERS

Land Use	Avg HH Size	EDUs/Unit
Less than 1,000 sq. ft.	1.98	0.75
1,000 - 1,999 sq. ft.	2.54	0.97
2,000 - 2,999 sq. ft.	2.79	1.06
3,000 - 3,999 sq. ft.	2.96	1.13
4,000 sq. ft or more	3.03	1.15
Single-Family Detached Average	2.63	1.00
Multi-Family	1.97	0.75
Mobile Home	2.86	1.09

Source: Average household size for all sizes of single-family and multi-family units and for mobile homes from Table 54 in Appendix B; average household sizes by size categories from Table 56 in Appendix B; EDUs/unit is ratio of average household size to single-family detached average household size.

In order to determine the existing level of service, it is necessary to estimate the total number of EDUs in Raleigh and its ETJ. This is accomplished by multiplying the number of existing residential units by the EDUs per unit calculated earlier based on relative average household sizes. As shown in Table 38, there are 144,857 open space service units (EDUs) in Raleigh.

Table 38
EXISTING OPEN SPACE SERVICE UNITS

Land Use	Existing Units	EDUs/ Unit	Total EDUs
Single-Family Detached	77,109	1.00	77,109
Multi-Family	87,407	0.75	65,555
Mobile Home	2,012	1.09	2,193
Total EDUs			144,857

Source: Existing units from Table 53 in Appendix B; EDUs per unit from Table 37.

Cost per Service Unit

As noted earlier, this study bases the open space facility fees on the existing level of service, and measures that level of service in terms of the ratio of the replacement value of existing facilities to existing residential development expressed in equivalent dwelling units. A full inventory of Raleigh's developed and undeveloped open space facilities is shown in Table 58 and Table 59, respectively, of Appendix C. As shown in Appendix C, Raleigh's existing open space sites total 7,630 acres, with 4,231 acres of developed parkland.

The City's open space inventory includes developed parkland, special use and historical sites, undeveloped parks and greenway corridors. Undeveloped parks and greenway corridors generally do not

include prior investment in recreational facilities or major site improvements. Developed parks and special use and historic sites include a range of recreational facilities depending on the type of park. Both developed and undeveloped parks are classified by type, with each type defined by a range of guidelines such as size, service area, character and recreational facilities.

In addition to the City's parks and open space, the City maintains a greenway trail system that includes 44.9 miles of paved and unpaved trails. The greenway trail system connects City parks and provides for activities such as jogging, hiking and observing nature in the City's greenway corridors. An inventory of the greenway trail system is shown in Table 60 of Appendix C.

Since 2000, the City has acquired greenway and park land parcels in each open space zone. Data on recent park land acquisition costs is shown in Table 39. Based on these data, it is reasonable to estimate an acquisition cost of $9,058 per acre for greenway easements and $36,077 per acre for park land.

Table 39

PARK LAND AND GREENWAY ACQUISITION COSTS, 2000 - 2004

Zone	Year	Acres	Land Cost	CPI Adj.	Adj. Cost	Adj. Cost per Acre
1		0.15	$1,580	na	$1,580	$10,533
1		0.25	$2,360	na	$2,360	$9,440
1	2000	1.14	$9,602	1.16	$11,138	$9,770
1		2.60	$19,300	na	$19,300	$7,423
Zone 1, Weighted Avg.		4.14			$34,378	$8,304
2		2.54	$6,700	na	$6,700	$2,638
2	2002	19.34	$190,791	1.10	$209,870	$10,852
Zone 2, Weighted Avg.		21.88			$216,570	$9,898
3		0.19	$834	na	$834	$4,389
Zone 3, Weighted Avg.		0.19			$834	$4,389
4		0.77	$6,000	na	$6,000	$7,792
4		1.82	$3,100	na	$3,100	$1,703
Zone 4, Weighted Avg.		2.59			$9,100	$3,514
Greenway Total		**28.80**			**$260,882**	**$9,058**
1		0.22	$10,000	na	$10,000	$45,455
1		1.20	$13,050	na	$13,050	$10,875
1	2002	4.52	$45,025	1.10	$49,528	$10,958
1	2003	20.03	$1,762,640	1.10	$1,938,904	$96,800
1	2003	17.20	$545,000	1.10	$599,500	$34,855
1	2003	48.70	$2,315,500	1.10	$2,547,050	$52,301
Zone 1, Weighted Avg.		91.87			$5,158,032	$56,145
2	2001	47.19	$1,662,000	1.13	$1,878,060	$39,798
2	2003	35.89	$956,000	1.08	$1,032,480	$28,768
2	2004	24.82	$421,940	1.06	$447,256	$18,020
Zone 2, Weighted Avg.		107.9			$3,357,796	$31,120

Zone	Year	Acres	Land Cost	CPI Adj.	Adj. Cost	Adj. Cost per Acre
3		3.92	$59,500	na	$59,500	$15,179
3	2000	0.46	$11,025	1.16	$12,789	$27,802
3	2001	77.79	$1,150,000	1.13	$1,299,500	$16,705
3	2002	6.84	$75,357	1.10	$82,893	$12,119
3	2003	6.01	$200,000	1.08	$81,386	$13,542
Zone 3, Weighted Avg.		95.02			$1,536,068	$16,166
4	2002	11.92	$1,900,000	1.10	$2,090,000	$175,336
4	2002	1.75	$16,500	1.10	$18,150	$10,371
4	2003	0.78	$33,500	1.08	$36,180	$46,385
4	2003	75.57	$1,561,730	1.08	$1,686,668	$22,319
Zone 4, Weighted Avg.		90.02			$3,830,998	$42,557
Park Land Total		**384.81**			**$13,882,894**	**$36,077**

Source: City of Raleigh Real Estate Acquisition department, March 10, 2005; weighted average calculated by dividing "Land Cost" by sum of "Total Acres" within each district, projects for which no cost is given are not included in the average cost calculation; CPI adjustment based on BLS Consumer Price Index change from year of acquisition to October 2005.

Multiplying the existing parkland acres by the estimated cost per acre for each type of park and summing the totals for each type yields the estimated land replacement cost of $201 million for the City's existing developed and undeveloped park land, as summarized in Table 40.

Table 40
OPEN SPACE LAND REPLACEMENT COSTS

Facility	Acres	Land Cost	Total Cost
Mini Park	5.6	$36,077	$202,031
Neighborhood	463.3	$36,077	$16,714,474
Community	690.4	$36,077	$24,907,561
Metro	2,268.5	$36,077	$81,840,675
Special	803.6	$36,077	$28,991,477
Subtotal, Developed Parks	4,231.4		$152,656,218
Neighborhood	102.1	$36,077	$3,683,462
Community	551.6	$36,077	$19,900,073
Open Space	115.7	$9,058	$1,048,011
Special	50.8	$36,077	$1,832,712
Subtotal, Undeveloped Parks	820.2		$24,631,546
Greenway Corridors	2,578.5	$9,058	$23,356,053
Total	7,630.1		$200,643,816

Source: Existing developed park acres from Table 58 of Appendix C; undeveloped and greenway park land acres from Table 59 of Appendix C; land costs from Table 39.

For the City's developed parks and trail system, the cost of site development must also be considered in determining the replacement costs. Development cost for park land includes the cost of site preparation such as clearing and grading, installation of security lighting, landscaping and utilities. Table 41 shows the estimated value of site improvements among Raleigh's existing developed parks.

Table 41
PARK SITE DEVELOPMENT COST

Facility Type	Acres	Pre-Dev't Cost	Total Cost
Mini Park	5.60	$3,400	$19,040
Neighborhood	463.30	$3,400	$1,575,220
Community	690.40	$4,800	$3,313,920
Metro	2,268.50	$1,600	$3,629,600
Special	803.60	$3,400	$2,732,240
Total	4,231.40		$11,270,020

Source: Existing developed park acres from Table 40; site development costs based on 2002 costs for site development for neighborhood, community and metro parks land in Appendix E, *Raleigh Parks Plan: Parks, Recreation and Greenways Element of the Comprehensive Plan*, May 2004; site development cost for mini park and special park assumed same as neighborhood park site cost; costS adjusted by *Engineering New-Record* (ENR) Construction Cost Index (CCI) (2002 to January 2006=1.172).

The City has invested in the construction of park and trail facilities, ranging from playgrounds and picnic pavilions to community centers. The sum of current replacement costs for existing City recreation facilities total about $177.1 million, as shown in Table 42.

Table 42
EXISTING PARK FACILITY REPLACEMENT COSTS

Facility Type	Units	Unit Cost	Total Cost
Adult Baseball Field	2	$387,500	$775,000
Youth Baseball Field	31	$299,600	$9,287,600
Softball Field	26	$367,400	$9,552,400
Multi-purpose Field	5	$56,300	$281,500
Informal Play Field	18	$56,300	$1,013,400
Football Field	1	$275,400	$275,400
Outdoor Basketball Court	42	$46,900	$1,969,800
Volleyball Court	20	$14,800	$296,000
Picnic Shelter	47	$47,700	$2,241,900
Playground	61	$154,700	$9,436,700
Staffed Community Center	24	$3,574,600	$85,790,400
Non-Staffed Community Center	12	$454,700	$5,456,400
Lighted Tennis Court	108	$107,800	$11,642,400
Unlit Tennis Court	4	$93,800	$375,200
Neighborhood Swim Pool	6	$2,344,000	$14,064,000
Comfort Station	31	$150,000	$4,650,000
Disc Golf	2	$14,800	$29,600
Handball	1	$46,900	$46,900
Track	2	NA	NA
Hiking Trails–Paved (miles)	26	$650,000	$16,770,000
Hiking Trails–Mixed (miles)	8	$348,600	$2,649,360
Hiking Trails–Unpaved (mi.)	12	$47,200	$542,800
Total Facility Costs			$177,146,760

Source: Units from Table 58 in Appendix C, except comfort stations and costs from City Parks and Recreation Department, January 31, 2006; unit costs based on 2002 costs in Appendix E, *Raleigh Parks Plan: Parks, Recreation and Greenways Element of the Comprehensive Plan*, May 2004, adjusted by ENR CCI (2002 to January 2006=1.172).

In addition to more standardized park facilities, the park system includes unique facilities such as cultural and historic structures, two large aquatic centers and two amphitheaters. The estimated total value of these facilities is $37.8 million, as shown in Table 43. While we believe that it would be reasonable to include these facilities in calculating the existing level of service, it could be argued that they should be excluded because it is unlikely that the City will be will be increasing the number of these types of facilities as the population grows. To be conservative, the fees will not include the costs of these specialized facilities.

Table 43
SPECIAL RECREATIONAL FACILITY REPLACEMENT COSTS

Facility	Total Cost
Optimist Aquatic Center	$6,470,000
Pullen Aquatic Center	$13,509,400
Pullen Carousel	$146,200
Chavis Carousel	$152,700
Raleigh Rose Garden Amphitheater	$346,100
Walnut Creek Amphitheater (Altell Pavilion)	$10,352,000
Berry O'Kelly Pioneer Building	$551,200
Tucker House	$901,900
Mordecai Buildings	$911,600
Borden Building	$1,115,400
Raleigh Little Theater Facilities	$3,368,900
Total Facility Costs	$37,825,400

Source: Facility costs based on data from the 1998 City of Raleigh *Insured Real Property Inventory*, provided by City of Raleigh Parks Department, January 13, 2006; 2002 improvement cost adjusted by ENR CCI (1998 to January 2006=1.294).

Dividing the total replacement cost of existing open space land and capital improvements by the number of existing service units (or EDUs) yields the cost per EDU to maintain the existing level of service, as summarized in Table 44. The cost per service unit to maintain the current level of service, based only on land costs, is $1,463 per EDU. If the fee is designed to include both land and park improvement costs, the cost per service unit to maintain the current level of service is $2,686 per EDU.

Table 44
OPEN SPACE COST PER SERVICE UNIT

	Land Cost Only	Total Costs
Total Park Land Cost	$200,643,816	$200,643,816
Total Site Development Cost	$11,270,020	$11,270,020
Total Park Facility Cost	n/a	$177,146,760
Total Open Space Costs	$211,913,836	$389,060,596
Equivalent Dwelling Units (EDUs)	144,857	144,857
Open Space Cost per EDU	$1,463	$2,686

Source: Park land cost from Table 40; total site development cost from Table 41; total facility cost from Table 42; EDUs from Table 38.

Net Cost Per Service Unit

In addition to paying open space facility fees, occupants of new residential development will also be paying taxes that will be used to retire outstanding debt on existing open space facilities. In addition, some of the capital costs to serve growth will be paid by outside funding sources, such as State and

Federal grants. Consequently, the cost per service unit is reduced to take account for these factors, and the result is referred to as the net cost.

Historically, the City's primary funding source for open space capital improvements has been general obligation bond issues. An analysis of past bond issues indicates that currently the City's outstanding debt related to open space is $30.4 million, as shown in Table 45.

Table 45
OUTSTANDING OPEN SPACE DEBT

Parks Series, 1996	$1,505,000
Public Improvement Refunding Series, 1997	$827,008
Public Improvement Series, 2002	$1,270,105
Public Improvement Series, 2002B	$4,715,116
Public Improvement Refunding Series, 2002C	$1,063,095
Public Improvement Series, 2004	$4,849,515
Public Improvement Refunding Series, 2004A	$10,177,784
Public Improvement Series, 2005B	$6,000,000
Total Outstanding Debt	$30,407,623

Source: City of Raleigh Finance Director, October 14, 2005.

A simple method that ensures that new development is not required to pay for existing facilities, through property tax or other funds used for debt retirement, as well as new facilities, through facility fees, is to subtract the outstanding debt from the replacement cost of existing open space facilities. Essentially, this defines the existing level of service that new development is required to maintain as the equity value of the existing open space system. The same result is obtained by calculating a credit by dividing the outstanding debt by existing service units. As shown in Table 46, the City's current open space-related debt results in a credit of $210 for every service unit in Raleigh.

Table 46
OPEN SPACE DEBT CREDIT PER SERVICE UNIT

Total Outstanding Debt Principal	$30,407,623
Equivalent Dwelling Units, 2005	144,857
Debt Credit per EDU	$210

Source: Total outstanding debt from Table 45; total EDUs from Table 38.

Another factor that is often considered in determining open space facility fees is the degree to which outside funding has been used to cover a portion of the recreational facility costs. While there is no guarantee that the past level of funding will be indicative of future outside funding support, to be conservative, the cost per service unit will be reduced to account for the likelihood that some growth-related open space costs can be paid for with Federal and State grants. Over the last five years, the City

has received an average of $513,000 annually in grants for open space land and improvements, as summarized in Table 47.

Table 47
OPEN SPACE GRANT FUNDING, 2000 to 2004

Grant	Year	Description	Amount
Wake Co. Open Space	2000	Honeycutt Creek Greenway	$200,000
Wake Co. Grant-in-Aid	2000	Mobile Recreation Trailer	$2,600
Wake Co. Open Space	2000	Lake Wheeler Park Acquisition	$350,000
PARTF	2003	Buffaloe Rd. Trails and Running Track	$241,000
PARTF	2004	Honeycutt Park Phase 1	$250,000
PARTF	2004	Lake Johnson Land Acquisition	$200,000
LWCF	2004	Honeycutt Park	$171,483
Wake County	2004	Brier Creek Land Acquisition	$200,000
Wake County	2004	Development of Brier Creek	$250,000
TEA-21	2004	Meredith College to Crabtree Trail	$200,000
Federal Highway Admin.	2004	Neuse River Greenway	$500,000
Total Grant Funding 2000-2004			$2,565,083
Average Annual Grant Funding			$513,000

Source: City of Raleigh Parks and Recreation Department.

It may be reasonable to assume that the grant funding received per open space service unit in the past will continue in the future. Dividing the average annual grant funding by existing service units yields annual funding per service unit. Multiplying that by the present value factor results in the current lump sum amount that is the equivalent of the future stream of outside funding that the City may receive over the next 20 years to help fund open space improvements. Based on these assumptions, the appropriate credit for potential grant funding is $47 for each new single-family home, or open space service unit equivalent, as shown in Table 48.

Table 48
OPEN SPACE GRANT FUNDING CREDIT

Average Annual Grant Funding	$513,000
Existing EDUs, 2005	144,857
Annual Funding per EDU	$3.54
Present Value Factor (20 years @ 4.25%)	13.29
Grant Funding Credit per EDU	$47

Source: Average annual grant funding from Table 47; existing EDUs from Table 37; discount rate for present value factor from Table 24.

As shown in Table 49, reducing the cost per service unit by the debt credit and anticipated grant funding per service unit leaves a net cost of $1,206 per EDU to maintain the existing level of service for open

space land acquisition. If the cost of park improvements are included, maintaining the current level of service has a net cost of $2,429 per EDU.

Table 49

OPEN SPACE NET COST PER SERVICE UNIT

	Land Only	Total Costs
Total Replacement Cost per EDU	$1,463	$2,686
Debt Credit per EDU	$210	$210
Grant Funding Credit per EDU	$47	$47
Net Open Space Cost per EDU	$1,206	$2,429

Source: Total replacement cost per EDU from Table 44; debt credit per EDU from Table 46; grant funding credit per EDU from Table 48.

Maximum Fee Schedule

Given the data, methodology and assumptions in this analysis, the maximum fees that can be adopted by Raleigh are derived by multiplying the number of equivalent dwelling units (EDUs) represented by each dwelling unit by the net cost per EDU, as shown in Table 50. The potential fees have been calculated for land costs only, and for land plus improvement costs. The City has the option of charging single-family homes a flat rate per unit or a variable rate based on dwelling unit size.

Table 50

POTENTIAL OPEN SPACE FACILITY FEES

	Land Costs Only			Land & Improvement Costs		
Land Use	EDUs/ Unit	Cost/ EDU	Net Cost/ Unit	EDUs/ Unit	Cost/ EDU	Net Cost/ Unit
Less than 1,000 sq. ft.	0.75	$1,206	$905	0.75	$2,429	$1,822
1,000 - 1,999 sq. ft.	0.97	$1,206	$1,170	0.97	$2,429	$2,356
2,000 - 2,999 sq. ft.	1.06	$1,206	$1,278	1.06	$2,429	$2,575
3,000 - 3,999 sq. ft.	1.13	$1,206	$1,363	1.13	$2,429	$2,745
4,000 sq. ft or more	1.15	$1,206	$1,387	1.15	$2,429	$2,793
Avg. Single-Family Detached*	1.00	$1,206	$1,206	1.00	$2,429	$2,429
Multi-Family	0.75	$1,206	$905	0.75	$2,429	$1,822

* includes manufactured homes/mobile homes

Source: EDUs per unit from Table 37; net cost per EDU from Table 49.

In the event that the City decides to charge single-family fees based on the size of the dwelling unit, the amount of the potential increase would depend on the square footage of the new unit. However, on average, open space facility fees could be more than tripled if the fees are based only on land costs, and could be increase to more than seven times current levels if improvement costs are included, as shown in Table 51.

Table 51
POTENTIAL OPEN SPACE FACILITY FEES

	Current Fees			Maximum Fees			
Land Use	Low (Zone 3)	High (Zone 2)	Average	Land Only	% Change	Land + Imprvmts	% Change
Less than 1,000 sq. ft.	$307	$375	$339	$905	167%	$1,822	437%
1,000 - 1,999 sq. ft.	$307	$375	$339	$1,170	245%	$2,356	595%
2,000 - 2,999 sq. ft.	$307	$375	$339	$1,278	277%	$2,575	660%
3,000 - 3,999 sq. ft.	$307	$375	$339	$1,363	302%	$2,745	710%
4,000 sq. ft or more	$307	$375	$339	$1,387	309%	$2,793	724%
Avg. Single-Family Detached*	$307	$375	$339	$1,206	256%	$2,429	617%
Multi-Family	$223	$272	$247	$905	267%	$1,822	638%

* includes manufactured homes/mobile homes

Source: Current fees from City of Raleigh Municipal Code, Sec. 10-8003; maximum fees from Table 50.

APPENDIX A: ROAD INVENTORY

Table 52
EXISTING MAJOR ROAD INVENTORY

Street Name	From	To	Ln	Mi.	AADT	Capacity	VMT	VMC
Capital Blvd	Spring Forest Rd	Millbrook Rd	6	0.36	51,000	51,800	18,360	18,648
Capital Blvd	Millbrook Rd	US 401	6	0.65	48,000	51,800	31,200	33,670
Capital Blvd	US 401	Buffaloe Rd	8	0.38	70,000	63,800	26,600	24,244
Capital Blvd	Buffaloe Rd	Trawick Rd	8	1.14	64,000	63,800	72,960	72,732
Capital Blvd	Trawick Rd	Highwoods Blvd	8	0.57	62,000	63,800	35,340	36,366
Capital Blvd	Highwoods Blvd	I-440	8	0.28	72,000	63,800	20,160	17,864
Capital Blvd	I-440	Wake Forest Rd	6	1.60	35,000	51,800	56,000	82,880
Capital Blvd	New Falls of Neuse	Durant Rd	4	4.00	44,000	34,500	176,000	138,000
Capital Blvd	Durant Rd	Greshams Lake Rd	6	1.17	57,000	51,800	66,690	60,606
Capital Blvd	Greshams Lake Rd	I-540	8	0.38	47,000	63,800	17,860	24,244
Capital Blvd	I-540	Old Wake Forest Rd	6	0.38	44,000	51,800	16,720	19,684
Capital Blvd	Old Wake Forest Rd	Spring Forest Rd	6	1.11	52,000	51,800	57,720	57,498
Capital Blvd.	Dawson	Peace St	6	0.24	43,000	51,800	10,320	12,432
Capital Blvd.	Peace St	Fairview Rd	6	0.72	55,000	51,800	39,600	37,296
Capital Blvd.	Fairview Rd	Wake Forest	6	0.86	51,000	51,800	43,860	44,548
Dawson St	South St	Davie St	3	0.24	20,000	10,300	4,800	2,472
Dawson St	Davie St	Hargett St	3	0.18	26,000	10,300	4,680	1,854
Dawson St	Hargett St	Edenton St	3	0.20	24,000	10,300	4,800	2,060
Dawson St	Edenton St	Capital Blvd	3	0.18	22,000	10,300	3,960	1,854
Dawson/McDowell	S. Saunders St	South St	6	0.58	22,000	51,800	12,760	30,044
Glenwood Ave	City Limit	I-540	4	1.99	35,000	34,500	69,650	68,655
Glenwood Ave	I-540	Ebenezer Church Rd	4	2.24	33,000	34,500	73,920	77,280
Glenwood Ave	Ebenezer Church Rd	Lynn Rd	4	1.33	36,000	34,500	47,880	45,885
Glenwood Ave	Lynn Rd	Millbrook Rd	6	0.85	41,000	51,800	34,850	44,030
Glenwood Ave	Millbrook Rd	Creedmoor Rd	6	2.21	38,000	51,800	83,980	114,478
Glenwood Ave	Creedmoor Rd	Lead Mine Rd	8	0.50	49,000	63,800	24,500	31,900
Glenwood Ave	Lead Mine Rd	I-440	8	0.32	75,000	63,800	24,000	20,416
Louisburg Rd	Forestville Rd	Mitchell Mill Rd	2	1.30	*11,600*	13,000	15,080	16,900
Louisburg Rd	Mitchell Mill Rd	Perry Creek Rd	6	1.10	34,000	38,900	37,400	42,790
Louisburg Rd	Perry Creek Rd	Spring Forest Rd	6	1.62	27,000	38,900	43,740	63,018
Louisburg Rd	Spring Forest Rd	N New Hope Rd	6	1.39	28,000	38,900	38,920	54,071
Louisburg Rd	N New Hope Rd	Capital Blvd	6	0.39	21,000	38,900	8,190	15,171
McDowell St	South St	Cabarrus St	3	0.15	19,000	10,300	2,850	1,545
McDowell St	Cabarrus St	Hargett St	3	0.28	21,000	10,300	5,880	2,884
McDowell St	Hargett St	Edenton St	3	0.21	20,000	10,300	4,200	2,163
McDowell St	Edenton St	Lane St	3	0.18	*17,400*	10,300	3,132	1,854
New Bern Ave	I-440	Trawick Rd	6	0.35	66,000	38,900	23,100	13,615
New Bern Ave	Trawick Rd	Corporation Pkwy.	7	0.53	62,000	49,200	32,860	26,076
New Bern Ave	Corporation Pkwy.	New Hope Rd	7	0.32	52,000	49,200	16,640	15,744
New Bern Ave	New Hope Rd	Freedom Dr.	6	0.35	*34,800*	38,900	12,180	13,615
New Bern Ave	Freedom Dr.	City Limits	4	0.33	*23,200*	25,900	7,656	8,547

Street Name	From	To	Ln	Mi.	AADT	Capacity	VMT	VMC
Saunders St	Dawson/McDowell	I-40	6	0.82	42,000	38,900	34,440	31,898
Saunders St	I-40	Wilmington St	6	0.85	51,000	38,900	43,350	33,065
US 64 Bypass	I-440	New Hope Rd	6	0.75	*34,800*	51,800	26,100	38,850
US 64 Bypass	New Hope Rd	Neuse R. Bridge	6	1.15	*34,800*	51,800	40,020	59,570
Wade Ave	I-40	Edwards Mill Rd	6	1.42	53,000	51,800	75,260	73,556
Wade Ave	Edwards Mill Rd	Blue Ridge Rd	6	0.94	59,000	51,800	55,460	48,692
Wade Ave	Blue Ridge Rd	I-440	6	0.75	56,000	51,800	42,000	38,850
Wilmington St	S. Saunders St	Tryon Rd	8	0.70	58,000	67,000	40,600	46,900
Wilmington St	Tryon Rd	Mechanical Blvd.	4	0.45	42,000	34,500	18,900	15,525
Subtotal, Primary Arterial				40.99			1,707,128	1,786,539
Aviation Pkwy	Brier Creek Pkwy	I-540	4	0.67	6,200	34,500	4,154	23,115
Blount St	Delway St	Pace St	2	0.15	7,200	7,800	1,080	1,170
Blount St	Pace St	Polk St	2	0.21	9,100	7,800	1,911	1,638
Blount St	Polk St	Jones St	3	0.25	9,900	10,300	2,475	2,575
Blount St	Jones St	Edenton	2	0.09	9,700	7,800	873	702
Blount St	Edenton	South St	3	0.63	*11,400*	10,300	7,182	6,489
Blount St	South St	MLK Jr. Blvd	3	0.18	*11,400*	10,300	2,052	1,854
Blount St	MLK Jr. Blvd.	Hoke St	2	0.41	9,900	7,800	4,059	3,198
Brier Creek Pkwy	Globe Road	Glenwood Ave	4	0.91	*15,200*	34,500	13,832	31,395
Brier Creek Pkwy	Glenwood Ave	ACC Blvd	4	1.17	*15,200*	34,500	17,784	40,365
Creedmoor Rd	Strickland Rd	Lynn Rd	4	2.01	33,000	34,500	66,330	69,345
Creedmoor Rd	Lynn Rd	Millbrook Rd	4	0.94	29,000	34,500	27,260	32,430
Creedmoor Rd	Millbrook Rd	Glenwood Ave	6	1.11	27,000	51,800	29,970	57,498
Duraleigh Rd	Edwards Mill Rd	Glenwood Ave	5	2.89	25,000	34,500	72,250	99,705
Edenton St	Dawson	East St	3	0.63	7,800	10,300	4,914	6,489
Edenton St	East St	Seawell Ave	3	0.28	9,000	10,300	2,520	2,884
Edenton St	Seawell Ave	Idlewild	3	0.09	9,600	10,300	864	927
Edenton St	Idlewild	Tarboro	3	0.20	13,000	10,300	2,600	2,060
Edenton St	Tarboro	New Bern	3	0.19	*11,400*	10,300	2,166	1,957
Edwards Mill Rd	Glenwood Ave	Duraleigh Rd	5	1.98	18,000	34,500	35,640	68,310
Edwards Mill Rd	Duraleigh Rd	Wade Ave	4	1.41	16,000	34,500	22,560	48,645
Edwards Mill Rd	Wade Ave	Trinity Rd	5	0.56	14,000	34,500	7,840	19,320
Falls of Neuse Rd	Fonville Rd	Dunn Rd	2	0.70	18,000	13,000	12,600	9,100
Falls of Neuse Rd	Dunn Rd	Raven Ridge Rd	2	0.80	*7,600*	13,000	6,080	10,400
Falls of Neuse Rd	Raven Ridge Rd	Durant Rd	5	0.71	20,000	34,500	14,200	24,495
Falls of Neuse Rd	Durant Rd	I-540	5	0.90	32,000	34,500	28,800	31,050
Falls of Neuse Rd	I-540	Strickland Rd	5	1.11	26,000	34,500	28,860	38,295
Falls of Neuse Rd	Strickland Rd	Newton Rd	5	0.84	32,000	34,500	26,880	28,980
Falls of Neuse Rd	Newton Rd	Spring Forest Rd	5	0.82	38,000	34,500	31,160	28,290
Falls of Neuse Rd	Spring Forest Rd	Millbrook Rd	5	1.29	36,000	34,500	46,440	44,505
Falls of Neuse Rd	Millbrook Rd	Old Wake Forest	7	1.00	38,000	49,200	38,000	49,200
Glenwood Ave	I-440	Glen Eden Dr	4	1.00	29,000	34,500	29,000	34,500
Glenwood Ave	Glen Eden Dr	Oberlin Rd	4	0.45	27,000	34,500	12,150	15,525
Glenwood Ave	Oberlin Rd	Anderson Dr	4	0.50	22,000	34,500	11,000	17,250
Glenwood Ave	Anderson Dr	Whitaker Mill Rd	4	0.60	22,000	34,500	13,200	20,700
Glenwood Ave	Whitaker Mill Rd	Wade Ave	4	0.43	25,000	34,500	10,750	14,835

Street Name	From	To	Ln	Mi.	AADT	Capacity	VMT	VMC
Globe Rd	Durham County Line	Aviation Pkwy	2	0.36	*7,600*	13,000	2,736	4,680
Globe Rd	Aviation Pkwy	Brier Creek Pkwy	4	0.21	*15,200*	34,500	3,192	7,245
Hammond Road	Hoke St	I-40	6	0.67	19,000	51,800	12,730	34,706
Hammond Road	I-40	Rush St	6	0.82	22,000	51,800	18,040	42,476
Hammond Road	Rush St	Tryon Rd	4	0.80	24,000	34,500	19,200	27,600
Hammond Road	Tryon Rd	Mechanical Blvd.	6	0.41	20,000	51,800	8,200	21,238
Jones Franklin Rd	I-40	I-440	2	0.92	19,000	13,000	17,480	11,960
Jones Franklin Rd	I-440	Buck Jones Rd	2	0.92	*7,600*	13,000	6,992	11,960
Jones Franklin Rd	Buck Jones Rd	Western Blvd	5	0.10	13,000	34,500	1,300	3,450
Jones Franklin Rd	Western Blvd	Hillsborough St	2	0.09	12,000	13,000	1,080	1,170
Jones Sausage Rd	Rock Quarry Rd	I-40	2	1.45	12,000	13,000	17,400	18,850
Lumley Rd	Brier Creek Pkwy	I-540	5	0.40	3,100	34,500	1,240	13,800
Lumley Rd	I-540	Glenwood Ave	5	1.15	5,700	34,500	6,555	39,675
MLK Jr Blvd	Dawson-McDowell	Rock Quarry Rd	5	1.57	19,000	34,500	29,830	54,165
MLK Jr Blvd	Rock Quarry Rd	Poole Rd	4	1.02	11,000	34,500	11,220	35,190
Millbrook Rd	Glenwood Ave	Leesville Rd	4	1.06	15,000	34,500	15,900	36,570
Millbrook Rd	Leesville Rd	Creedmoor Rd	4	0.85	20,000	34,500	17,000	29,325
Millbrook Rd	Creedmoor Rd	Lead Mine Rd	5	0.60	14,000	34,500	8,400	20,700
Millbrook Rd	Lead Mine Rd	North Hills Dr	5	0.91	14,000	34,500	12,740	31,395
Millbrook Rd	North Hills Dr	Six Forks Rd	5	0.88	16,000	34,500	14,080	30,360
Millbrook Rd	Six Forks Rd	Falls of Neuse Rd	5	1.60	18,000	34,500	28,800	55,200
Millbrook Rd	Falls of Neuse Rd	Old Wake Forest Rd	5	0.49	26,000	34,500	12,740	16,905
Millbrook Rd	Old Wake Forest Rd	Hargrove Rd	5	0.91	*19,000*	34,500	17,290	31,395
Millbrook Rd	Hargrove Rd	Capital Blvd	6	0.60	29,000	51,800	17,400	31,080
Morgan St	Dawson St	Person St	3	0.50	8,600	10,300	4,300	5,150
New Bern Ave	Person St	East St	4	0.14	*15,200*	20,700	2,128	2,898
New Bern Ave	East St	Seawell Ave	4	0.28	*15,200*	20,700	4,256	5,796
New Bern Ave	Seawell Ave	Idlewild	4	0.09	*15,200*	20,700	1,368	1,863
New Bern Ave	Idlewild	Tarboro	4	0.20	11,000	20,700	2,200	4,140
New Bern Ave	Tarboro	Edenton	4	0.17	14,000	20,700	2,380	3,519
New Bern Ave	Edenton	Raleigh Blvd.	6	0.33	21,000	49,300	6,930	16,269
New Bern Ave	Raleigh Blvd.	Hawkins St	6	0.05	20,000	49,300	1,000	2,465
New Bern Ave	Hawkins St	Albemarle Ave	4	1.11	21,000	32,800	23,310	36,408
New Bern Ave	Albemarle Ave	Sunnybrook	5	0.50	23,000	41,000	11,500	20,500
New Bern Ave	Sunnybrook	I-440	6	0.56	40,000	49,300	22,400	27,608
New Falls of Neuse	end	Capital Blvd	4	1.86	*15,200*	34,500	28,272	64,170
New Hope Rd	Capital Blvd	New Bern Ave	4	3.90	20,000	34,500	78,000	134,550
New Hope Rd	New Bern Ave	US 64 Bypass	2	1.50	17,000	13,000	25,500	19,500
New Hope Rd	US 64 Bypass	Poole Rd	4	0.84	16,000	34,500	13,440	28,980
New Hope Rd	Poole Rd	Old Poole Rd	5	0.23	7,400	34,500	1,702	7,935
New Hope Rd	Old Poole Rd	Rock Quarry Rd	2	1.66	8,700	13,000	14,442	21,580
Person St	Wake Forest Rd	Pace St	3	0.11	8,300	10,300	913	1,133
Person St	Pace St	Polk St	3	0.21	*11,400*	10,300	2,394	2,163
Person St	Polk St	Oakwood	3	0.09	10,000	10,300	900	927
Person St	Oakwood	Lane St	3	0.07	11,000	10,300	770	721
Person St	Lane St	Jones St	3	0.09	12,000	10,300	1,080	927
Person St	Jones St	Edenton	3	0.10	9,500	10,300	950	1,030

Street Name	From	To	Ln	Mi.	AADT	Capacity	VMT	VMC
Person St	Edenton	South St	2	0.62	*7,600*	7,800	4,712	4,836
Person St	South St	MLK Jr. Blvd	2	0.19	*7,600*	10,300	1,444	1,957
Person St	MLK Jr. Blvd.	Hoke St	2	0.42	*7,600*	10,300	3,192	4,326
Poole Rd	MLK Jr. Blvd	Sunnybrook Rd	4	0.94	15,000	25,900	14,100	24,346
Poole Rd	Sunnybrook Rd	I-440	5	0.57	22,000	34,500	12,540	19,665
Poole Rd	I-440	New Hope Rd	4	0.91	30,000	34,500	27,300	31,395
Poole Rd	New Hope Rd	Cannon Ridge	4	0.36	23,000	34,500	8,280	12,420
Poole Rd	Cannon Ridge	Barwell Rd	2	1.10	*7,600*	13,000	8,360	14,300
Six Forks Rd	I-540	Strickland Rd	6	0.75	34,000	38,900	25,500	29,175
Six Forks Rd	Strickland Rd	Newton Rd	4	1.55	30,000	25,900	46,500	40,145
Six Forks Rd	Newton Rd	Lynn Rd	4	1.10	35,000	25,900	38,500	28,490
Six Forks Rd	Lynn Rd	Millbrook Rd	4	0.70	42,000	25,900	29,400	18,130
Six Forks Rd	Millbrook Rd	I-440	6	1.58	43,000	38,900	67,940	61,462
Strickland Rd	Leesville Rd	Ray Rd	2	1.50	14,000	13,000	21,000	19,500
Strickland Rd	Ray Rd	Creedmoor Rd	2	1.34	9,700	13,000	12,998	17,420
Strickland Rd	Creedmoor Rd	Six Forks Rd	5	1.64	18,000	34,500	29,520	56,580
Strickland Rd	Six Forks Rd	Falls of Neuse Rd	5	1.61	15,000	34,500	24,150	55,545
T W Alexander Dr	Glenwood Ave	County Line	4	1.16	13,000	25,900	15,080	30,044
Wade Ave	I-440	Dixie Trl	4	1.00	30,000	25,900	30,000	25,900
Wade Ave	Dixie Trl	Canterbury Rd	4	0.37	27,000	25,900	9,990	9,583
Wade Ave	Canterbury Rd	Oberlin Rd	4	0.53	27,000	25,900	14,310	13,727
Wade Ave	Oberlin Rd	Saint Mary's St	4	0.52	24,000	25,900	12,480	13,468
Wade Ave	Saint Mary's St	Glenwood Ave	4	0.39	21,000	25,900	8,190	10,101
Wade Ave	Glenwood Ave	Capital Blvd	4	0.33	25,000	25,900	8,250	8,547
Wake Forest Rd	Old Wake Forest Rd	I-440	7	1.23	47,000	49,200	57,810	60,516
Wake Forest Rd	I-440	E Six Forks Rd	5	0.40	31,000	34,500	12,400	13,800
Wake Forest Rd	E Six Forks Rd	Whitaker Mill Rd	5	0.88	28,000	34,500	24,640	30,360
Wake Forest Rd	Whitaker Mill Rd	Capital Blvd	4	0.42	22,000	25,900	9,240	10,878
Wake Forest Rd	Capital Blvd	Delway St	4	0.84	13,000	25,900	10,920	21,756
Western Blvd	Hillsborough St	Blue Ridge Rd	6	1.35	17,000	49,300	22,950	66,555
Western Blvd	Blue Ridge Rd	I-440	6	0.17	27,000	49,300	4,590	8,381
Western Blvd	I-440	Gorman St	6	0.76	29,000	49,300	22,040	37,468
Western Blvd	Gorman St	Avent Ferry Rd	4	0.72	27,000	32,800	19,440	23,616
Western Blvd	Avent Ferry Rd	Pullen Rd	4	0.50	31,000	32,800	15,500	16,400
Western Blvd	Pullen Rd	Bilyeu St	4	0.30	26,000	32,800	7,800	9,840
Western Blvd	Bilyeu St	Cabarrus St	4	0.50	23,000	32,800	11,500	16,400
Western Blvd	Cabarrus St	Dawson-McDowell	4	0.76	*15,200*	32,800	11,552	24,928
Westgate Dr	Glenwood Ave	Fairbanks Dr	2	1.66	11,000	13,000	18,260	21,580
Subtotal, Secondary Arterial				93.16			1,913,494	2,824,063
Atlantic Ave	Spring Forest Rd	Dixie Forest Rd	5	0.23	26,000	34,500	5,980	7,935
Atlantic Ave	Millbrook Rd	Spring Forest Rd	5	0.89	28,000	34,500	24,920	30,705
Atlantic Ave	New Hope Ch Rd	Millbrook Rd	5	1.00	27,000	34,500	27,000	34,500
Atlantic Ave	New Hope Ch Rd	I-440	4	1.10	27,000	25,900	29,700	28,490
Atlantic Ave	I-440	Capital Blvd	4	1.59	23,000	25,900	36,570	41,181
Avent Ferry Rd	Gorman St	Western Blvd	5	1.39	25,000	34,500	34,750	47,955
Blue Ridge Rd	Western Blvd	Hillsborough St	5	0.57	10,000	34,500	5,700	19,665

Street Name	From	To	Ln	Mi.	AADT	Capacity	VMT	VMC
Blue Ridge Rd	Hillsborough St	Trinity Rd	5	0.25	20,000	34,500	5,000	8,625
Blue Ridge Rd	Trinity Rd	Reedy Creek Rd	5	0.71	25,000	34,500	17,750	24,495
Blue Ridge Rd	Reedy Creek Rd	Duraleigh Rd	4	0.67	25,000	34,500	16,750	23,115
Buffaloe Rd	Old Crews Rd	Forestville Rd	2	0.79	7,800	13,000	6,162	10,270
Buffaloe Rd	City Limit	Southall Rd	5	0.90	*16,500*	34,500	14,850	31,050
Buffaloe Rd	Southall Rd	New Hope	5	0.80	18,000	34,500	14,400	27,600
Buffaloe Rd	New Hope	Old Buffaloe Rd	5	0.50	13,000	34,500	6,500	17,250
Buffaloe Rd	Old Buffaloe Rd	Capital Blvd	4	0.40	*13,200*	25,900	5,280	10,360
Chapel Hill Rd	Corp. Center Dr	1/2 M W of Hilsb	2	0.83	11,500	13,000	9,545	10,790
Chapel Hill Rd	1/2 M W of Hilsb	Hillsborough St	4	0.50	11,500	25,900	5,750	12,950
Chapel Hill Rd	Hillsborough St	I-40	4	0.33	10,000	34,500	3,300	11,385
Clark Ave	Oberlin Rd	W. Johnson St	3	1.10	*9,900*	17,100	10,890	18,810
Duraleigh Rd	Blue Ridge Rd	Edwards Mill Rd	5	0.24	*16,500*	34,500	3,960	8,280
Durant Rd	Falls of Neuse Rd	Capital Blvd	5	2.55	16,000	34,500	40,800	87,975
Edenton St	Hillsborough	Dawson	3	0.23	*9,900*	10,300	2,277	2,369
Falls of Neuse Rd	Old NC 98	Wakefield Pines Dr	2	1.50	*6,600*	13,000	9,900	19,500
Falls of Neuse Rd	Wakefield Pines Dr	Fonville Rd	2	1.50	18,000	13,000	27,000	19,500
Forestville Rd	Louisburg Rd	Buffaloe Rd	2	3.76	5,300	13,000	19,928	48,880
Forestville Rd	Buffaloe Rd	Old Milburnie Rd	2	1.28	3,600	13,000	4,608	16,640
Forestville Rd	Old Milburnie Rd	City Limit	2	0.20	3,200	13,000	640	2,600
Fox Rd	Old Wake Forest Rd	US 401	2	1.14	*6,600*	13,000	7,524	14,820
Garner Rd	MLK Jr Blvd	I-40	3	1.05	10,000	17,100	10,500	17,955
Garner Rd	I-40	Tryon Rd	3	1.52	7,800	17,100	11,856	25,992
Glenwood Ave	Wade Ave	Peace St	4	0.63	17,000	34,500	10,710	21,735
Glenwood Ave	Peace St	North St	2	0.26	12,000	13,000	3,120	3,380
Glenwood Ave	North St	Hillsborough St	2	0.29	10,000	13,000	2,900	3,770
Glenwood Ave	Hillsborough St	Morgan St	4	0.06	*13,200*	25,900	792	1,554
Gorman St	Tryon Rd	I-40	4	0.20	*13,200*	34,500	2,640	6,900
Gorman St	I-40	Avent Ferry Rd	4	1.24	19,000	25,900	23,560	32,116
Hillsborough St	I-40	Burton Ave	3	1.17	16,000	17,100	18,720	20,007
Hillsborough St	Burton Ave	Jones Franklin Rd	2	0.35	*6,600*	7,800	2,310	2,730
Hillsborough St	Jones Franklin Rd	Western Blvd	2	0.12	*6,600*	7,800	792	936
Hillsborough St	Western Blvd	Chapel Hill Rd	2	0.33	12,000	13,000	3,960	4,290
Hillsborough St	Chapel Hill Rd	Blue Ridge Rd	3	0.56	16,000	17,100	8,960	9,576
Hillsborough St	Blue Ridge Rd	I-440	5	0.65	18,000	34,500	11,700	22,425
Hillsborough St	I-440	Royal St	4	0.42	25,000	25,900	10,500	10,878
Hillsborough St	Royal St	Faircloth St	4	0.20	26,000	25,900	5,200	5,180
Hillsborough St	Faircloth St	Montgomery	2	0.05	28,000	13,000	1,400	650
Hillsborough St	Montgomery	Dixie Trl	2	0.55	25,000	13,000	13,750	7,150
Hillsborough St	Dixie Tr	Brooks Ave	2	0.16	26,000	13,000	4,160	2,080
Hillsborough St	Brooks Ave	Oberlin Rd	4	0.70	22,000	25,900	15,400	18,130
Hillsborough St	Oberlin Rd	Forest Rd	5	0.18	19,000	34,500	3,420	6,210
Hillsborough St	Forest Rd	Morgan St	5	0.19	18,000	34,500	3,420	6,555
Hillsborough St	Morgan St	Glenwood Ave	4	0.50	9,100	25,900	4,550	12,950
Lake Wheeler Rd	City Limit	Tryon Rd	2	0.31	13,000	13,000	4,030	4,030
Lake Wheeler Rd	Tryon Rd	I-40	2	1.31	13,000	13,000	17,030	17,030
Lake Wheeler Rd	I-40	Centennial Pkwy	2	1.12	18,000	13,000	20,160	14,560

Street Name	From	To	Ln	Mi.	AADT	Capacity	VMT	VMC
Lake Wheeler Rd	Centennial Pkwy	Hammell Dr	4	0.78	13,200	34,500	10,296	26,910
Lake Wheeler Rd	Hammell Dr	Saunders St	2	0.16	5,400	13,000	864	2,080
Lead Mine Rd	Glenwood Ave	North Hills Dr	7	0.07	29,000	49,200	2,030	3,444
Lead Mine Rd	North Hills Dr	Town & County Rd	5	0.66	18,000	34,500	11,880	22,770
Lead Mine Rd	Town & County Rd	Millbrook Rd	3	0.54	*9,900*	17,100	5,346	9,234
Lead Mine Rd	Millbrook Rd	Lynn Rd	2	0.97	12,000	13,000	11,640	12,610
Lead Mine Rd	Lynn Rd	Sawmill Rd	2	1.00	14,000	13,000	14,000	13,000
Lead Mine Rd	Sawmill Rd	Strickland Rd	5	1.35	7,800	34,500	10,530	46,575
Leesville Rd	Millbrook Rd	Lynn Rd	2	0.80	*6,600*	13,000	5,280	10,400
Leesville Rd	Lynn Rd	Tylerton Dr.	2	1.09	9,700	13,000	10,573	14,170
Leesville Rd	Tylerton Dr.	Fairbanks Dr	2	1.22	10,000	13,000	12,200	15,860
Leesville Rd	Fairbanks Dr	Westgate Rd	2	0.42	*6,600*	13,000	2,772	5,460
Leesville Rd	Westgate Rd	Strickland Rd	5	0.20	*16,500*	34,500	3,300	6,900
Leesville Rd	Strickland Rd	I-540	5	0.36	14,000	34,500	5,040	12,420
Leesville Rd	I-540	Norwood Rd	2	0.44	*6,600*	16,300	2,904	7,172
Leesville Rd	Norwood Rd	Hickory Grv Ch Rd	2	0.73	16,000	13,000	11,680	9,490
Litchford Rd	Falls of Neuse Rd	I-540	3	0.73	11,000	17,100	8,030	12,483
Litchford Rd	I-540	Gresham Lake Rd	3	0.57	14,000	17,100	7,980	9,747
Litchford Rd	Gresham Lake Rd	Old Wake Forest Rd	3	1.64	19,000	17,100	31,160	28,044
Lynn Rd	Glenwood Ave	Leesville Rd	4	1.31	11,000	25,900	14,410	33,929
Lynn Rd	Leesville Rd	Ray Rd	5	0.56	16,000	34,500	8,960	19,320
Lynn Rd	Ray Rd	Creedmoor Rd	5	0.66	21,000	34,500	13,860	22,770
Lynn Rd	Creedmoor Rd	Lead Mine Rd	5	0.91	18,000	34,500	16,380	31,395
Lynn Rd	Lead Mine Rd	Six Forks Rd	5	1.70	17,000	34,500	28,900	58,650
Mitchell Mill Rd	City Limit	Louisburg Rd	2	1.84	15,000	13,000	27,600	23,920
Morgan St	Hillsborough St	St Marys	2	0.50	9,500	7,800	4,750	3,900
Morgan St	St Marys St	Dawson	2	0.41	11,500	13,000	4,715	5,330
New Leesville Blvd	Leesville Rd	Harrington Grove Dr	4	0.80	*13,200*	34,500	10,560	27,600
Oberlin Rd	Glenwood Ave	Wade Ave	2	1.20	15,000	13,000	18,000	15,600
Oberlin Rd	Wade Ave	Hllsborough/SH 54	4	1.06	14,000	25,900	14,840	27,454
Old Wake Forest Rd	Dixie Forest Rd	Capital Blvd	2	1.15	16,000	13,000	18,400	14,950
Old Wake Forest Rd	Capital Blvd	Fox Rd	5	2.20	*16,500*	34,500	36,300	75,900
Peace St	W. Johnson St	Glenwood Ave	3	0.45	23,000	17,100	10,350	7,695
Peace St	Glenwood Ave	Person St	4	1.16	*13,200*	25,900	15,312	30,044
Perry Creek Rd	US 1 / Capital Blvd	Louisburg Rd	2	1.61	15,000	13,000	24,150	20,930
Raleigh Blvd	Rock Quarry Rd	MLK Jr. Blvd	5	0.29	16,000	34,500	4,640	10,005
Raleigh Blvd	MLK Jr. Blvd	Poole Rd	5	0.57	16,000	34,500	9,120	19,665
Raleigh Blvd	Poole Rd	New Bern Ave	5	0.15	*16,500*	34,500	2,475	5,175
Raleigh Blvd	New Bern Ave	Milburnie Rd	5	0.54	15,000	34,500	8,100	18,630
Raleigh Blvd	Milburnie Rd	Glascock St	5	0.36	17,000	34,500	6,120	12,420
Raleigh Blvd	Glascock St	Crabtree Blvd	5	0.83	14,000	34,500	11,620	28,635
Raleigh Blvd	Crabtree Blvd	I-440	5	0.61	14,000	34,500	8,540	21,045
Raleigh Blvd	I-440	Brentwood Rd	5	0.45	15,000	34,500	6,750	15,525
Rock Quarry Rd	Whitfield Rd	Battle Bridge Rd	2	1.15	4,900	13,000	5,635	14,950
Rock Quarry Rd	Battle Bridge Rd	Barwell Rd	2	0.44	*6,600*	13,000	2,904	5,720
Rock Quarry Rd	Barwell Rd	New Hope Rd	2	0.96	12,000	13,000	11,520	12,480
Rock Quarry Rd	New Hope Rd	I-40	2	1.54	12,000	13,000	18,480	20,020

Street Name	From	To	Ln	Mi.	AADT	Capacity	VMT	VMC
Rock Quarry Rd	I-40	Sanderford Rd	4	1.08	*13,200*	25,900	14,256	27,972
Rock Quarry Rd	Sanderford Rd	I-40	5	0.50	22,000	34,500	11,000	17,250
Rock Quarry Rd	I-40	Raleigh Blvd	5	0.55	28,000	34,500	15,400	18,975
Saunders St	Cabarrus St	Lake Wheeler Rd	2	0.36	10,000	13,000	3,600	4,680
Saunders St	Lake Wheeler Rd	Hammell Dr	2	0.22	3,800	13,000	836	2,860
Six Forks Rd	I-440	Wake Forest Rd	5	1.39	27,000	34,500	37,530	47,955
Six Forks Rd	Wake Forest Rd	end	5	0.55	*16,500*	34,500	9,075	18,975
Skycrest Dr	Brentwood Rd	New Hope Rd	2	1.59	11,000	13,000	17,490	20,670
Southall Rd	Buffaloe Rd	Skycrest Dr	2	1.82	*6,600*	13,000	12,012	23,660
Southall Rd	Skycrest Dr	Hedingham Dr	4	1.20	*13,200*	25,900	15,840	31,080
Southall Rd	Groundwater Pl	New Bern Ave	5	1.00	*16,500*	34,500	16,500	34,500
Spring Forest Rd	Six Forks Rd	Falls of Neuse Rd	5	1.25	19,000	34,500	23,750	43,125
Spring Forest Rd	Falls of Neuse Rd	Atlantic Ave	5	1.35	24,000	34,500	32,400	46,575
Spring Forest Rd	Atlantic Ave	Capital Blvd	5	1.24	23,000	34,500	28,520	42,780
Spring Forest Rd	Capital Blvd	Fox Rd	5	0.80	21,000	34,500	16,800	27,600
Spring Forest Rd	Fox Rd	US 401	2	0.66	10,000	13,000	6,600	8,580
Sunnybrook Rd	New Bern Ave	Falstaff Rd	4	1.26	12,000	34,500	15,120	43,470
Sunnybrook Rd	Falstaff Rd	Poole Rd	2	0.77	*6,600*	13,000	5,082	10,010
Sunnybrook Rd	Poole Rd	I-440	3	1.20	5,900	17,100	7,080	20,520
Tryon Rd	Walnut St	Yates Mill Pond Rd	3	0.44	23,000	17,100	10,120	7,524
Tryon Rd	Yates Mill Pond Rd	Dillard Drive	2	0.70	*6,600*	13,000	4,620	9,100
Tryon Rd	Dillard Drive	Gorman St	4	1.10	19,000	32,800	20,900	36,080
Tryon Rd	Gorman St	Lake Wheeler Rd	5	1.30	17,000	34,500	22,100	44,850
Tryon Rd	Lake Wheeler Rd	Wilmington St	2	0.50	10,400	13,000	5,200	6,500
Tryon Rd	Wilmington St	Hammond Rd	5	0.44	10,000	34,500	4,400	15,180
Tryon Rd	Hammond Rd	Garner Rd	5	0.90	8,200	34,500	7,380	31,050
Wilmington St	MLK Jr Blvd	I-40	4	1.05	*13,200*	34,500	13,860	36,225
Wilmington St	I-40	S. Saunders St	4	1.00	11,000	34,500	11,000	34,500
Subtotal, Major Thoroughfare				106.43			1,532,341	2,501,136
ACC Blvd	Brier Creek Pkwy	Mt. Herman Ch. Rd	5	0.85	*11,500*	34,500	9,775	29,325
ACC Blvd	Mt. Herman Ch. Rd	end	2	0.79	*4,600*	13,000	3,634	10,270
Avent Ferry Rd	Athens Dr	Gorman St	5	0.72	*11,500*	34,500	8,280	24,840
Avent Ferry Rd	I-40	Athens Dr	2	1.13	7,900	13,000	8,927	14,690
Avent Ferry Rd	Tryon Rd	I-40	2	0.50	6,800	13,000	3,400	6,500
Baileywick Rd	Creedmoor Rd	Lead Mine Rd	2	1.89	7,600	13,000	14,364	24,570
Barwell Rd	Poole Rd	Rock Quarry Rd	2	2.32	5,900	13,000	13,688	30,160
Battle Bridge Rd	Whitfield Rd	Rock Quarry Rd	2	0.90	3,800	13,000	3,420	11,700
Bloodworth St	Lane St	Lenoir St	2	0.75	*4,600*	13,000	3,450	9,750
Bloodworth St	Lenoir St	MLK Jr. Blvd	2	0.25	1,800	13,000	450	3,250
Blue Ridge Rd	Duraleigh Rd	Glen Eden Dr	3	0.97	*6,900*	17,100	6,693	16,587
Blue Ridge Rd	Glen Eden Dr	Crabtree Valley Ave	2	1.00	6,800	13,000	6,800	13,000
Blue Ridge Rd	Crabtree Valley Ave	Glenwood Ave	4	0.19	11,000	25,900	2,090	4,921
Buck Jones Rd	I-40	Farmgate Rd	4	0.23	9,300	25,900	2,139	5,957
Buck Jones Rd	Farmgate Rd	Jones Franklin Rd	2	1.12	*4,600*	13,000	5,152	14,560
Centennial Pkwy	Avent Ferry Rd	Lake Wheeler Rd	4	1.85	*9,200*	34,500	17,020	63,825
Dixie Trl	Lake Boone Trl	Wade Ave	3	0.82	6,100	17,100	5,002	14,022

Street Name	From	To	Ln	Mi.	AADT	Capacity	VMT	VMC
Dixie Trl	Wade Ave	Hillsborough St	2	0.80	5,300	13,000	4,240	10,400
East St	Lane St	Edenton	2	0.19	*4,600*	13,000	874	2,470
East St	Edenton	New Bern	2	0.06	1,700	13,000	102	780
East St	New Bern	Hargett	2	0.15	2,200	13,000	330	1,950
East St	Hargett	Martin	2	0.09	2,900	13,000	261	1,170
East St	Martin	Lenoir St	2	0.28	3,600	13,000	1,008	3,640
East St	Lenoir St	South St	2	0.05	5,000	13,000	250	650
East St	South St	MLK Jr. Blvd	2	0.22	4,300	13,000	946	2,860
Ebenezer Church Rd	Westgate Rd	Marvino Ln	2	1.00	7,300	13,000	7,300	13,000
Ebenezer Church Rd	Marvino Ln	Glenwood Ave	5	0.21	*11,500*	34,500	2,415	7,245
Ebenezer Church Rd	Glenwood Ave	Duraleigh Rd	2	4.77	4,500	13,000	21,465	62,010
Fairbanks Dr	Westgate Rd	Pinecrest	2	0.18	5,300	13,000	954	2,340
Fairbanks Dr	Pinecrest	Leesville Rd	4	0.31	4,800	25,900	1,488	8,029
Faircloth St	Hillsborough St	Wade Ave	3	0.51	9,700	17,100	4,947	8,721
Fox Rd	Old Wake Forest Rd	Louisburg Rd	2	1.43	*4,600*	13,000	6,578	18,590
Glascock St	Wake Forest Rd	Raleigh Blvd	2	1.06	*4,600*	13,000	4,876	13,780
Glen Eden Dr	Edwards Mill Rd	Blue Ridge Rd	2	0.54	5,000	13,000	2,700	7,020
Glen Eden Dr	Blue Ridge Rd	I-440	2	0.40	6,300	13,000	2,520	5,200
Glen Eden Dr	I-440	Ridge Rd	2	0.40	6,000	13,000	2,400	5,200
Glen Eden Dr	Ridge Rd	Glenwood Ave	2	0.77	4,600	13,000	3,542	10,010
Globe Rd	Brier Creek Pkwy	Kitty Hawk	5	0.65	*11,500*	34,500	7,475	22,425
Gorman St	Avent Ferry Rd	Hillsborough St	2	1.95	14,000	13,000	27,300	25,350
Greshams Lake Rd	Litchford Rd	I-540	2	0.56	*4,600*	13,000	2,576	7,280
Greshams Lake Rd	I-540	Capital Blvd	2	1.17	8,900	13,000	10,413	15,210
Hargett St	East St	St Marys	2	1.02	1,600	13,000	1,632	13,260
Harrington St	W. Lane St	W. North St	2	0.08	*4,600*	13,000	368	1,040
Highwoods Blvd	Atlantic Ave	Capital Blvd	4	0.68	*9,200*	34,500	6,256	23,460
Lake Boone Trl	Blue Ridge Rd	I-440	5	0.71	23,000	34,500	16,330	24,495
Lake Boone Trl	I-440	Ridge Rd	4	0.43	10,000	25,900	4,300	11,137
Lane St	Harrington St	East St	2	0.71	*4,600*	7,800	3,266	5,538
Lassiter Mill Rd	Six Forks Rd	I-440	5	0.38	15,000	34,500	5,700	13,110
Lassiter Mill Rd	I-440	White Oak Rd	3	1.00	9,300	17,100	9,300	17,100
Lenoir St	S. Saunders	S. Dawson	2	0.33	2,300	7,800	759	2,574
Lenoir St	S. Dawson	McDowell	2	0.11	2,000	7,800	220	858
Lenoir St	McDowell	S. Salisbury	2	0.09	2,600	7,800	234	702
Lenoir St	S. Salisbury	S. Wilmington	2	0.11	2,200	7,800	242	858
Lenoir St	S. Wilmington	Blount St	2	0.09	2,100	7,800	189	702
Lenoir St	Blount St	S. Person St	2	0.09	2,200	7,800	198	702
Lenoir St	S. Person St	East St	2	0.16	1,700	7,800	272	1,248
Lenoir St	East St	S. Tarboro St	2	0.62	4,000	7,800	2,480	4,836
Marsh Creek	Trawick Rd	New Hope Rd	2	0.68	9,200	13,000	6,256	8,840
Martin St	East St	S. Dawson	2	0.63	1,400	13,000	882	8,190
New Hope Ch Rd	Wake Forest Rd	Atlantic Ave	5	0.66	24,000	34,500	15,840	22,770
New Hope Ch Rd	Atlantic Ave	Capital Blvd	5	1.16	*10,000*	34,500	11,600	40,020
Newton Rd	Six Forks Rd	Falls of Neuse Rd	3	1.19	*6,900*	17,100	8,211	20,349
North Hills Dr	Lynn Rd	Millbrook Rd	2	1.00	7,400	13,000	7,400	13,000
North Hills Dr	Millbrook Rd	Northbrook Dr	2	0.95	6,100	13,000	5,795	12,350

Street Name	From	To	Ln	Mi.	AADT	Capacity	VMT	VMC
North Hills Dr	Northbrook Dr	Lead Mine Rd	2	0.82	8,200	13,000	6,724	10,660
North St	St Marys St	Harrington St	2	0.33	*4,600*	13,000	1,518	4,290
Pearl Rd	Rock Quarry Rd	NA	2	0.74	1,600	13,000	1,184	9,620
Pinecrest Rd	Fairbanks Dr	Glenwood Ave	2	1.80	*4,600*	13,000	8,280	23,400
Poole Rd	New Bern Ave	Raleigh Blvd	2	0.33	6,500	13,000	2,145	4,290
Poole Rd	Raleigh Blvd	MLKJr.	4	0.87	7,800	25,900	6,786	22,533
Ray Rd	Strickland Rd	Lynn Rd	2	2.62	6,200	13,000	16,244	34,060
Ray Rd	Lynn Rd	Leesville Rd	2	0.58	4,800	13,000	2,784	7,540
Saint Mary's St	White Oak Rd	Glenwood Ave	2	0.67	*4,600*	13,000	3,082	8,710
Saint Mary's St	Glenwood Ave	Hillsborough St	2	2.25	*4,600*	13,000	10,350	29,250
Saint Mary's St	Hillsborough St	E. Hargett St	4	0.16	*9,200*	25,900	1,472	4,144
Salisbury St	Peace St	Edenton St	2	0.50	5,800	7,800	2,900	3,900
Salisbury St	Edenton St	South St	2	0.62	6,100	7,800	3,782	4,836
Salisbury St	South St	MLK Jr Blvd	2	0.27	5,300	7,800	1,431	2,106
South St	S. Saunders	S. Dawson	2	0.33	*4,600*	7,800	1,518	2,574
South St	S. Dawson	McDowell	2	0.11	4,300	7,800	473	858
South St	McDowell	S. Salisbury	2	0.09	2,900	7,800	261	702
South St	S. Salisbury	S. Wilmington	2	0.11	3,600	7,800	396	858
South St	S. Wilmington	Blount St	2	0.09	2,300	7,800	207	702
South St	Blount St	S. Person St	2	0.09	3,100	7,800	279	702
South St	S. Person St	East St	2	0.16	2,000	7,800	320	1,248
Sumner Blvd	Capital Blvd	Triangle Town Blvd	5	0.68	*11,500*	34,500	7,820	23,460
Sumner Blvd	Old Wake Forest Rd	end	4	0.61	*9,200*	25,900	5,612	15,799
Tarboro Rd	Edenton	Davie St	4	0.40	9,200	25,900	3,680	10,360
Tarboro Rd	Davie St	Lenoir St	4	0.19	11,000	25,900	2,090	4,921
Trawick Rd	Capital Blvd	Marsh Creek	2	0.73	11,000	13,000	8,030	9,490
Trawick Rd	Marsh Creek	Skycrest Dr	2	0.53	9,900	13,000	5,247	6,890
Trawick Rd	Skycrest Dr	New Bern Ave	2	0.91	17,000	13,000	15,470	11,830
Triangle Town Blvd	Sumner Blvd	I-540	5	0.75	*11,500*	34,500	8,625	25,875
Trinity Rd	I-40	Edwards Mill Rd	2	0.82	*4,600*	13,000	3,772	10,660
Trinity Rd	Edwards Mill Rd	Blue Ridge Rd	5	1.10	6,400	34,500	7,040	37,950
Whitaker Mill Rd	Glenwood Dr	Reaves Dr	2	0.22	*4,600*	13,000	1,012	2,860
Whitaker Mill Rd	Reaves Dr	Atlantic Ave	4	1.00	*9,200*	25,900	9,200	25,900
Wilmington St	Peace St	Edenton St	2	0.50	*4,600*	7,800	2,300	3,900
Wilmington St	Edenton St	South St	2	0.62	*4,600*	7,800	2,852	4,836
Wilmington St	South St	MLK Jr. Blvd.	2	0.20	6,100	7,800	1,220	1,560
Subtotal, Minor Thoroughfare				69.71			495,080	1,173,670
Alamance Dr	I-440	Glenwood Ave	2	0.72	990	13,000	713	9,360
Anderson Dr	Glenwood Ave	Six Forks Rd	2	1.30	*3,800*	13,000	4,940	16,900
Athens Dr	Jones Franklin Rd	I-440	2	0.49	7,600	13,000	3,724	6,370
Athens Dr	I-440	Avent Ferry Rd	2	0.71	7,200	13,000	5,112	9,230
Bashford Rd	Strother Rd	Buck Jones	2	0.93	*3,800*	13,000	3,534	12,090
Bennett St	Dennis Ave	Glascock St	2	0.42	*3,800*	13,000	1,596	5,460
Boundary St	N East St	Brookside Dr	2	0.19	1,200	13,000	228	2,470
Brentwood Rd	New Hope Ch Rd	Capital Blvd	2	1.21	6,900	13,000	8,349	15,730
Brentwood Rd	Capital Blvd	I-401	5	0.98	16,000	34,500	15,680	33,810

Street Name	From	To	Ln	Mi.	AADT	Capacity	VMT	VMC
Bridgeport Dr	Creedmoor Rd	Lead Mine Rd	2	1.08	*3,800*	13,000	4,104	14,040
Brooks Ave	Lake Boone Trl	Wade Ave	2	1.14	1,900	13,000	2,166	14,820
Brooks Ave	Wade Ave	Hillsborough St	2	0.83	4,800	13,000	3,984	10,790
Brookside Dr	Wake Forest Rd	Watauga St	2	0.96	*3,800*	13,000	3,648	12,480
Calvary Dr	Hargrove Rd	Capital Blvd	4	0.60	5,800	34,500	3,480	20,700
Calvary Dr	Capital Blvd	Louisburg Rd	3	0.31	*5,700*	17,100	1,767	5,301
Canterbury Rd	Wade Ave	Glenwood Ave	2	1.42	*3,800*	13,000	5,396	18,460
Castlebrook Dr	Southall Rd	Buffaloe Rd	2	1.60	*3,800*	13,000	6,080	20,800
Clark Ave	Brooks Ave	Oberlin Rd	2	0.60	*3,800*	17,100	2,280	10,260
Country Trl	Pinecrest Rd	Leesville	2	1.00	*3,800*	13,000	3,800	13,000
Crabtree Blvd	Capital Blvd / 401	Timber Dr	3	0.24	*5,700*	17,100	1,368	4,104
Crabtree Blvd	Timber Dr.	Raleigh Blvd	4	0.24	10,000	25,900	2,400	6,216
Creech Rd	Rock Quarry Rd	Sanderford Rd	2	0.86	*3,800*	13,000	3,268	11,180
Dennis Ave	Bennett St	Timber Dr	2	0.23	740	13,000	170	2,990
Departure Dr	Millbrook Rd	Oak Forest Dr	2	1.16	*3,800*	13,000	4,408	15,080
Dixie Forest Rd	Spring Forest Rd	Litchford Rd	2	0.24	6,400	13,000	1,536	3,120
Drewry Ln	Landor Rd	Anderson Dr	2	0.59	*3,800*	13,000	2,242	7,670
Fairview Rd	Canterbury Rd	US 401	2	1.90	1,900	13,000	3,610	24,700
Favetteville St	Prospect Ave	Wilmington St	2	0.45	1,100	13,000	495	5,850
Fayetteville St	MLK Jr Blvd	Prospect Ave	2	0.45	1,500	13,000	675	5,850
Glascock St	Raleigh Blvd	end of street	2	1.06	*3,800*	13,000	4,028	13,780
Green Rd	Spring Forest Rd	Kilcullen	4	0.96	*7,600*	34,500	7,296	33,120
Green Rd	Kilcullen	New Hope Ch Rd	4	0.48	*7,600*	25,900	3,648	12,432
Greshams Lake Rd	Rainwater Rd	Litchford Rd	2	0.23	*3,800*	13,000	874	2,990
Hardimont Rd	Saint Albans Dr	Wake Forest Rd	2	0.94	6,800	13,000	6,392	12,220
Hargrove Rd	Green Rd	Millbrook Rd	4	0.39	*7,600*	34,500	2,964	13,455
Harps Mill Rd	Newton Rd	Litchford Rd	2	2.00	*3,800*	13,000	7,600	26,000
Harvey St	Saint Mary's St	Aycock St	2	0.71	*3,800*	13,000	2,698	9,230
Hodges St	Wake Forest Rd	Capital Blvd	2	0.89	*3,800*	13,000	3,382	11,570
Hollenden Dr	New Hope Rd	Spring Forest Rd	2	0.42	*3,800*	13,000	1,596	5,460
Horton St	Ridge Rd	Lake Boone Trl	2	0.68	*3,800*	13,000	2,584	8,840
Howard Ln	Ray Rd	Creedmoor Rd	2	0.67	*3,800*	13,000	2,546	8,710
Hunting Ridge Rd	Falls of Neuse Rd	Litchford Rd	2	1.80	*3,800*	13,000	6,840	23,400
Huntleigh Dr	New Hope Ch Rd	Capital Blvd	2	1.13	*3,800*	13,000	4,294	14,690
Industrial Dr	Creekside Dr	Six Forks Rd	2	0.20	*3,800*	13,000	760	2,600
Jones St	East St	Hill St	2	0.82	*3,800*	13,000	3,116	10,660
Kyle Rd	Spring Forest Rd	US 401	2	1.37	*3,800*	13,000	5,206	17,810
Lake Boone Trl	Dixie Tr	Cambridge	2	0.80	8,100	13,000	6,480	10,400
Lane St	East St	Hill St	2	0.82	*3,800*	13,000	3,116	10,660
Laurel Hills Rd	Edwards Mill Rd	Edwards Mill Rd	2	1.34	*3,800*	13,000	5,092	17,420
Leonard St	Ridge Rd	Brooks Ave	2	0.87	*3,800*	13,000	3,306	11,310
Lewis Farm Rd	Ridge Rd	Brooks Ave	2	0.80	*3,800*	13,000	3,040	10,400
Marlowe Rd	Yadkin Rd	Landor Rd	2	1.40	*3,800*	13,000	5,320	18,200
Maybrook Dr	New Hope Rd	Poole Rd	2	1.06	*3,800*	13,000	4,028	13,780
Milburnie Rd	Hill St	New Bern Ave	2	1.86	*3,800*	13,000	7,068	24,180
Noble Rd	Whitaker Mill Rd	Wake Forest Rd	2	0.84	2,900	13,000	2,436	10,920
Oak Forest Dr	Old Wake Forest Rd	US 1 / Capital Blvd	2	0.74	*3,800*	13,000	2,812	9,620

Street Name	From	To	Ln	Mi.	AADT	Capacity	VMT	VMC
Oakwood Ave	Person St	Raleigh Blvd	2	1.19	3,700	13,000	4,403	15,470
Old Lead Mine Rd	Sawmill Rd	Six Forks Rd	2	0.99	9,100	13,000	9,009	12,870
Old Wake Forest Rd	Wake Forest Rd	Millbrook Rd	3	0.71	10,000	17,100	7,100	12,141
Old Wake Forest Rd	Millbrook Rd	Spring Forest Rd	2	0.82	8,500	13,000	6,970	10,660
Pasquotank Dr	Glenwood Ave	Beaufort St	2	0.75	1,000	13,000	750	9,750
Quail Hollow Dr	Hardimont Rd	Millbrook Rd	2	1.09	3,900	13,000	4,251	14,170
Rainwater Rd	Spring Forest Rd	Harps Mill Rd	2	1.81	*3,800*	13,000	6,878	23,530
Ridge Rd	Wade Ave	I-440	2	2.38	*3,800*	13,000	9,044	30,940
Rowland Rd	Litchford Rd	Greshams Lake Rd	2	0.80	*3,800*	13,000	3,040	10,400
Saint Albans Dr	Wake Forest Rd	New Hope Ch. Rd	2	1.92	6,500	13,000	12,480	24,960
Sandy Forks Rd	Six Forks Rd	Spring Forest Rd	2	0.24	9,400	13,000	2,256	3,120
Sandy Forks Rd	Spring Forest Rd	Falls of Neuse Rd	2	1.04	11,000	13,000	11,440	13,520
Sawmill Rd	Creedmoor Rd	Lead Mine Rd	2	1.20	7,600	13,000	9,120	15,600
Sawmill Rd	Lead Mine Rd	Six Forks Rd	2	0.85	12,000	13,000	10,200	11,050
State St	Glascock St	Jones St	2	0.81	2,600	13,000	2,106	10,530
Sumner Blvd	Triangle Town Blvd	Fox Rd	3	0.27	*5,700*	17,100	1,539	4,617
Timber Dr	Crabtree Blvd	Dennis Ave	2	0.45	790	13,000	356	5,850
Town and Ctry Rd	Lead Mine Rd	Millbrook Rd	2	0.52	4,600	13,000	2,392	6,760
Valley Stream Dr	US 401	Buffaloe Rd	2	1.03	*3,800*	13,000	3,914	13,390
Watauga St	Brookside Dr	Oakwood Ave	2	0.24	*3,800*	13,000	912	3,120
White Oak Rd	Beaufort St	Webb St	2	0.82	2,100	13,000	1,722	10,660
White Oak Rd	Webb St	Glenwood Ave	2	1.08	1,600	13,000	1,728	14,040
Subtotal, Collector Roads				69.14			320,885	979,836
Total Major Roadway System				379.43			5,968,928	9,265,244

Source: Major road classification and segments from *City of Raleigh Thoroughfare Plan*, 2005; segment miles scaled by Duncan Associates, road segment lane information provided by City of Raleigh Public Works Department, Transportation Services Division; annual average daily traffic counts (AADT) from North Carolina Department of Transportation, Division of Highways Traffic Survey Unit, 2003 counts; capacity from Table 19; AADT in *italics* are assumed based on 75 percent of the average AADT per lane-mile of the respective road classification.

APPENDIX B: DEMOGRAPHIC DATA

For the impact fee analysis, it is important to know both the existing amount of residential development and the number of residents associated with each dwelling unit. The first step is to compile an estimate of existing dwelling units by type in Raleigh. This is done by combining 2000 Census counts of housing units with building permit data on the number of dwelling units constructed since the census enumeration, as shown in Table 53.

Table 53
DWELLING UNITS BY TYPE, 2005

Housing Type	2000 Census	2000-05* Permits	Estimated Units
Single-Family Detached	61,480	15,629	77,109
Multi-Family	67,772	19,635	87,407
Mobile Home	1,835	177	2,012
Total	131,087	35,441	166,528

* 2005 Permit data through August 31, 2005

** includes mobile home

Source: City of Raleigh Planning Department October 26, 2005 and January 18, 2006.

An important input into the impact fee calculations is the number of persons associated with dwelling units of various housing types. These residential multipliers will be used in developing the facility fees for open space facilities, which are assessed solely on residential development. The best available data source on average household size in Raleigh is the 2000 U.S. Census. As shown in Table 54 below, average household size varies significantly by housing type, ranging from 1.97 persons per multi-family unit to 2.63 persons per single-family detached unit.

Table 54
AVERAGE HOUSEHOLD SIZE BY HOUSING TYPE, 2000

Housing Type	Population	Households	Avg. HH Size
Single-Family Detached	143,345	54,469	2.63
Multi-Family	111,615	56,586	1.97
Mobile Home	4,289	1,502	2.86
All Housing Types	259,249	112,557	2.30

Source: U.S. Census Bureau, 2000 Census SF-3 (1-in-6 weighted sample data) for Raleigh.

In addition, data on the average household size of single-family detached units by number of bedrooms is available from 2000 Census five-percent sample data for geographic areas containing at least 100,000 residents. As can be seen in Table 55, single-family average household size in Raleigh is strongly related to the number of bedrooms in the dwelling unit. As shown in Table 55, the average number of residents in an occupied single-family detached dwelling unit increases from 2.14 for a two-bedroom

home to 3.27 for a home with five or more bedrooms. The overall average single-family household size derived from the 5-percent sample (2.59) is slightly lower than the figure derived from the 1-in-6 sample data for Raleigh (2.63).

Table 55
HOUSEHOLD SIZE BY BEDROOMS

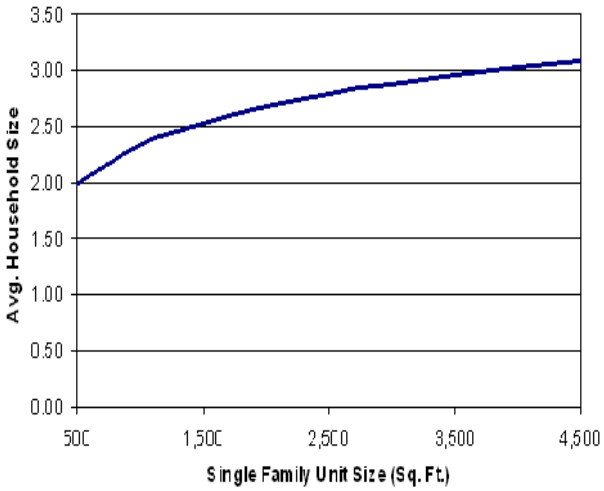
Bedrooms	Sample Households	Persons	Occupied Units	Avg. HH Size
Up to Two	329	15,613	7,293	2.14
Three	1,255	72,950	29,787	2.45
Four	618	44,609	14,845	3.01
Five or more	97	7,192	2,198	3.27
All Single-Family	2,299	140,364	54,123	2.59

Source: 2000 U.S. Census Public Use Microdata Sample (PUMS) 5% sample data for Raleigh, North Carolina PUMA 2600 and 2603.

While the only measure of dwelling unit size recorded by the Census Bureau is bedrooms, it is recommended that the fees be based on square footage rather than number of bedrooms. Although some municipalities charge impact fees on the basis of bedrooms, it can be an administrative challenge to determine the number of bedrooms when there is a financial incentive to disguise bedrooms as something else (a den or storage room, for example). An alternative is to translate bedrooms into size categories.

To determine a relationship between the unit square footage, bedrooms and household population, the consultant compiled data on a sample with 1,098 of the 2,237 single-family homes listed for sale in Raleigh from the National Association of Realtors website (www.realtor.com) on November 22, 2005. These on-line listings give square footage and the number of bedrooms for each home offered for sale. A variable for average household size was added, consisting of the average household size multipliers by housing type and number of bedrooms derived from 2000 U.S. Census sample data in the preceding table. Regression analysis was then performed to determine the relationship between unit size in square feet and the number of persons residing in the unit. Linear, semi-logarithmic and logarithmic regressions were performed. The semi-logarithmic

Figure 13
HOUSEHOLD SIZE BY UNIT SIZE



regression was statistically significant, and accounted for 46 percent of the variation.[7] The curve described by the equation is shown in Figure 13.

The average household size for each size category is calculated by applying the equation derived above to the midpoint of the square footage range, as shown in Table 56.

Table 56
SINGLE-FAMILY HOUSEHOLD SIZE BY UNIT SIZE

Dwelling Size Category	Approximate midpoint (sq. ft.)	Average Household Size
Less than 1,000 sq. ft.	500	1.98
1,000 - 1,999 sq. ft.	1,500	2.54
2,000 - 2,999 sq. ft.	2,500	2.79
3,000 - 3,999 sq. ft.	3,500	2.96
4,000 sq. ft or more	4,500	3.03

Source: Average household size is derived by substituting the midpoint for x and solving for y in the equation described in the preceding text.

Existing nonresidential building floor area in Raleigh and its ETJ was provided by the City of Raleigh Planning Department. As shown in Table 57, it is estimated that there is approximately 157.6 million square feet of nonresidential development in Raleigh.

Table 57
EXISTING NONRESIDENTIAL FLOOR AREA

Land Use	Sq. Feet
Industrial	11,437,148
Mini Warehouse	2,288,175
Warehouse	28,637,785
Retail/Commercial	40,080,517
Hotel/Motel	4,687,998
Office	39,143,457
Nursing Home	1,160,745
Hospital	2,896,814
Day Care	533,553
Church/Religious Institution	4,164,676
Elementary/Secondary School	13,042,375
Other Institutional	9,499,744
Total	157,572,987

Source: City of Raleigh Planning Department, March 10, 2005

[7] The semi-logarithmic equation is y = .502329 *log x - 1.13826 (r-square = 0.4644), where x is square feet of living area and y is household size.

APPENDIX C: EXISTING OPEN SPACE INVENTORY

Table 58
EXISTING DEVELOPED OPEN SPACE INVENTORY

Park Name	Acres	Adult Baseball Field	Youth Baseball Field	Softball Field	Multi-purpose Field	Informal Play Field	Football Field	Outdoor Basket-ball	Volley-ball	Picnic Shelters	Play ground	Historic & Cultural	Staffed Centers	Non-Staffed Centers	Lit Tennis Courts	Unlit Tennis Courts	Pool	Disc Golf	Amphi-theater	Handball	Track
Bragg	0.3										1										
Caraleigh	0.6							2			1										
Compiegne	0.5																				
Davie	0.9									1	1										
Fisher	0.3										1										
Hertford	0.3										1										
Lane	0.3										1										
Lee	0.3										1										
Lenoir	0.3										1										
Mordecai	0.5										1										
Oakwood Common	0.1										1										
Quarry	0.4										1										
Spring	0.4							1		1	1										
Varnell	0.4																				
Subtotal, Mini Park	5.6	0	0	0	0	0	0	3	0	2	12	0	0	0	0	0	0	0	0	0	0
Apollo Heights	4.3							2		1	1		1								
Brentwood	16.1		1	1				2		1	1			1	2						
Brookhaven	25.9																				
Cedar Hills	38.5				1			1		1	1				4			1			
Chamberlain	1.4							2			1										
Drewry Hills #2	18.5																				
Eastgate	25.3					1		1		1	1			1	3						
Eliza Pool	6.2										1										
Fallon	10.3									1											
Fred Fletcher	21.4			1	1					1	1	1		1		2			1		
Gardner	3.5				1	1					1										
Glen Eden	20.4					1		2		1	1			1	4						
Honeycutt	28.5																				
John P Top Green	1.3													1							
Kaplan	5.2																				
Kentwood	14.6		1								1				4			1			
Kingwood Forest	4.2							1		1	1										
Kiwanis	24.1		1			2		2	2	1	1			1							

Park Name	Acres	Adult Baseball Field	Youth Baseball Field	Softball Field	Multi-purpose Field	Informal Play Field	Football Field	Outdoor Basket-ball	Volley-ball	Picnic Shelters	Play ground	Historic & Cultural	Staffed Centers	Non-Staffed Centers	Lit Tennis Courts	Unlit Tennis Courts	Pool	Disc Golf	Amphi-theater	Handball	Track
Longview	6.9																1				
Method	8.3		1					1		1	1		1	1	2						
North Hills	31.5		1							1	1				2						
Oakwood	12.7		1	1						1	1										
Peach	7.0					1		2		1	1		1							1	
Powell	8.6					1		1			1			1	2						
Ridge	6.8																1				
Roanoke	1.6					1		1			1										
Roberts	7.2		1					1		2	1		1		2						
Sanderford	25.4		1	1				2		1	1			1	3						
Southgate	8.8		1					2	1	1	1		1								
Spring Forest	21.8		1							1	1				4						
Tarboro	3.2									1	1		1		2						
Williams	8.7		1						1	1	1					2					
Wind./Beaver Dam	14.6										1										
Wooten Meadow	20.5					2					1										
Subtotal, Nhood Park	463.3	0	11	4	3	10	0	23	4	20	26	1	6	9	34	4	2	2	1	1	0
Anderson Point	89.1					2				2	1			1							
Baileywick	50.0			1	1					2	1										
Biltmore Hills	39		1	1				2		2	1		1		8		1				
Carolina Pines	38.7		1	2					1	1	1		1		3						
Chavis	28.9		1			1				2	1	1	1		2		1				1
Green Road	26.7		1	1				2	6	1	1		1		4						
Halifax	4.6					1		2			1		1								
Jaycee	24.9		1	2					8	1	1		1		2						
Lake Lynn	52.0		1								1		1		4						
Laurel Hills	48.3		2			2		2			1		1								
Lions	41.4	1	1	2				2		1	1		1		8						
Marsh Creek	110.6		1		1	1				1	1										
Millbrook-Exchange	69.4		2	1				2		3	2		1		23		1				
Optimist	30.7		2	1							1		1		8		1				
Worthdale	36.1		1	1				1			1		1		6						
Subtotal, Comm. Park	690.4	1	15	12	2	7	0	13	15	16	16	1	12	1	68	0	4	0	0	0	1
Buffaloe Rd Athletic	166.9	1	4				1				1										1
Durant Nature	241.2					1		1		2	2			2							
Lake Johnson	472											1	1				1				
Lake Wheeler	865.6								1	6	1	1	1								

Park Name	Acres	Adult Baseball Field	Youth Baseball Field	Softball Field	Multi-purpose Field	Informal Play Field	Football Field	Outdoor Basket-ball	Volley-ball	Picnic Shelters	Play ground	Historic & Cultural	Staffed Centers	Non-Staffed Centers	Lit Tennis Courts	Unlit Tennis Courts	Pool	Disc Golf	Amphi-theater	Handball	Track
Pullen	68.5		1	1							1	1	2		6		1				
Shelley Lk - Sertoma	144.8							2			1		1								
Walnut Creek North	104.8			9																	
Walnut Creek South	204.7																				
Subtotal, Metro Park	2,268.5	1	5	10	0	1	1	3	1	8	6	2	5	2	6	0	2	0	0	0	1
301 Building	0.8																				
Canoe Launch Falls Lk	9.4																				
City Cemetery	7.5																				
Civic Center	7.4																				
Dorothea Dix Soccer	55.4																				
Edna Metz Wells	2.9																				
Fayetteville St Mall	4.4																				
Hymettus Woods	4.5																				
Lake Benson	646.9																				
M. L K. Jr Memorial	2.4																				
Memorial Auditorium	9.7																				
Moore Square	4.1																				
Mordecai Square	2.7											1									
Mt Hope Cemetery	28.4																				
Municipal Building	4.1																				
Nash Square	4.1																				
New Bern Place	0.1																				
ORourke Cemetery	1.0																				
Rose Gdn & Thtre	6.8									1		3							1		
Tucker House	0.7											1									
Vallie Henderson	0.1																				
Walnut Terrace	0.2												1								
Subtotal, Special	803.6	0	0	0	0	0	0	0	0	1	0	5	1	0	0	0	0	0	1	0	0
Total, Developed	4,231.4	2	31	26	5	18	1	42	20	47	61	9	24	12	108	4	8	2	2	1	2

Source: City of Raleigh Parks and Recreation Department, February 2005; park land acres from Smith Group JJR, *Raleigh Parks Plan: Parks, Recreation and Greenways Element of the Comprehensive Plan*, May 2004.

Table 59
EXISTING UNDEVELOPED OPEN SPACE INVENTORY

Name	Park Type	Acres
Charlotte H Green	Neighborhood	1.0
NPS-16	Neighborhood	24.9
NPS-28	Neighborhood	16.8
NPS-33	Neighborhood	6.0
Timberlake	Neighborhood	16.5
Trott-Strickland	Neighborhood	36.9
Subtotal, Neighborhood		102.1
Alvis Farm	Community	81.6
Barwell Road	Community	77.6
CPS-1	Community	NA
Horseshoe Farms	Community	146.3
Leesville	Community	55.2
Milburnie Park	Community	88.4
Sydnor M White	Community	64.5
Watkins Road	Community	38.0
Subtotal, Community		551.6
Alexander	Open Space	0.1
Atkins Circle	Open Space	0.1
Barmettler	Open Space	1.2
Beckana	Open Space	1.0
Bland	Open Space	0.1
Boundary	Open Space	0.1
Buck Jones	Open Space	2.3
Carver	Open Space	0.1
Chatham & Stevens	Open Space	0.2
Chester & Oberlin	Open Space	0.5
Claremont	Open Space	11.5
Clark & Merrimon	Open Space	0.7
Colby & Hardimont	Open Space	0.1
Cowper Drive Median	Open Space	3.9
Culpepper Circle	Open Space	0.8
Dogwood	Open Space	0.2
Drewry Hills	Open Space	11.0
Dupont Circle	Open Space	0.1
East & West Gardner	Open Space	0.9
Faircloth & Hillsborough	Open Space	0.1
Fairway & Suffolk	Open Space	0.1
FEMA HMGP Phase 1	Open Space	11.4
FEMA HMGP Phase 3	Open Space	1.3
Fenton	Open Space	0.4
Forest	Open Space	1.9
Furches	Open Space	0.5
Glascock	Open Space	0.2
Glendower	Open Space	0.3
Glenwood & Wake	Open Space	0.5
Harvey & Carr	Open Space	0.1
Harvey & Jarvis	Open Space	0.1
Hawkins Circle	Open Space	0.2

Name	Park Type	Acres
Idolbrook	Open Space	3.2
Jackson	Open Space	4.9
Kimbrough	Open Space	1.3
King Charles & Bertie	Open Space	0.2
King Charles & Marlborough	Open Space	0.3
King William	Open Space	1.5
Long Acres	Open Space	3.0
Longview Lake	Open Space	0.9
Marshall	Open Space	0.9
Mayview	Open Space	0.5
Meadowbrook	Open Space	1.2
Old Forge Circle	Open Space	0.0
Oxford	Open Space	0.2
Parnell	Open Space	5.6
Pasquotank & Granville	Open Space	0.5
Person	Open Space	0.1
Plainview & Rankin	Open Space	0.0
Plainview & Vale	Open Space	0.0
Pollock	Open Space	0.6
Poplar	Open Space	1.0
Quail Hollow	Open Space	0.4
Rothgeb	Open Space	6.7
Sherwood Forest	Open Space	18.8
Smallwood	Open Space	2.1
Suburban Drive	Open Space	0.3
W Millbrook	Open Space	0.5
Waldrop	Open Space	1.8
Waterbury	Open Space	0.0
West & Peace	Open Space	0.0
West Lake	Open Space	3.0
West Park	Open Space	3.4
Westbrook & Ashworth	Open Space	0.1
White Oak & Anderson	Open Space	0.1
White Oak & St Marys	Open Space	0.1
Williamson & Iredell	Open Space	0.1
Wingate Circle	Open Space	0.1
Yadkin Circle	Open Space	0.3
Subtotal, Open Space		115.7
Montgomery Green	Special	1.4
Mordecai Annex	Special	0.7
Mt. Herman Rd Operation Fac	Special	48.7
Subtotal, Special Parks		50.8
Greenways		2,578.5
Total, Undeveloped Open Space		3,398.7

Source: City of Raleigh Parks and Recreation Department, February 2005; acres from *City of Raleigh Parks Plan*, May 2004.

Table 60
EXISTING GREENWAY TRAILS

Name	Surface	Miles
Lake Park	Earth	0.6
Loblolly	Earth	6.0
Neuse River	Earth	4.0
Sawmill	Earth	0.9
Subtotal, Earth Surface		11.5
Beaver Dam	Mixed	1.4
Gardner	Mixed	0.7
Lake Johnson	Mixed	5.5
Subtotal, Mixed Surface		7.6
Alleghany Trail	Paved	2.4
Bent Creek	Paved	1.4
Brentwood	Paved	0.8
Buckeye	Paved	2.5
Crabtree - Oak Park	Paved	1.6
Crabtree Valley	Paved	1.0
Durant	Paved	1.1
Fallon Creek	Paved	0.5
Falls River	Paved	1.1
Ironwood	Paved	1.3
Lake Lynn	Paved	2.2
Little Rock	Paved	0.9
Lower Walnut Creek	Paved	2.1
North Hills	Paved	1.0
Rocky Branch	Paved	1.5
Shelley Lake	Paved	3.0
Upper Walnut	Paved	1.1
West Millbrook	Paved	0.3
Subtotal, Paved Surface		25.8
Total		44.9

Source: City of Raleigh Parks and Recreation Department.

APPENDIX D: THOROUGHFARE REIMBURSEMENTS

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Kimley-Horn
and Associates, Inc.

Memorandum

§
P.O. Box 33068
Raleigh, North Carolina
27636-3068

To: Clancy Mullen
Duncan Associates

From: Richard Adams, P.E.
Matt Noonkester, AICP

Date: December 19, 2005

Subject: Reimbursement and Design Standards for Subdivisions and Site Plans – Update to Schedule of Improvement Costs for Streets
Section 10-3024, Raleigh City Code

Kimley-Horn and Associates, Inc. has completed an evaluation of the current *Schedule for Improvement Costs* included in Section 10-3024 of the City of Raleigh Code. The purpose of this memorandum is to update construction cost estimates for current items included in the schedule and determine whether additional items should be given consideration for future reimbursements. A summary of the assumptions incorporated into this evaluation and our recommendations towards updating the current schedule are presented below.

Project Background

Section 10-3024 of the Raleigh City Code allows developers the opportunity to seek refund of monies spent for development related improvements over and beyond the unit costs to meet applicable standard commercial, residential, and minor residential street design standards. Once construction is complete, the City of Raleigh certifies all work and at such time the developer is eligible to apply for reimbursement of certain improvement items. The total amount eligible for reimbursement is based on several variables, including:

- Length
- Right of way
- Cross section
- Excavation depth
- New and old pavement depth
- Width of clearing and grubbing
- Asphalt depth
- Pavement stone depth

In some instances, the variables listed above do not accurately reflect the necessary reimbursement, and a review of the project construction plans is necessary to determine the actual quantities used in construction.

§
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Reimbursement rates included in the schedule have not been updated since 1997, and there is a strong need to adjust these rates to account for escalation of construction costs over the eight-year period. In addition, application of Section 10-3024 within the development community has generated requests from developers to add several new improvement items to the schedule for potential reimbursement by the City. A list of these items was developed by the City Transportation Services Division for inclusion in this evaluation.

Methodology

The foundation for our evaluation of existing reimbursement items included in the *Schedule for Improvement Costs*, and those proposed for consideration as additional items, was a set of several bid tabulations provided by the City of Raleigh Public Works Department for eight local roadway projects. These projects encompass widening and rehabilitation improvements that were all released for bid by the City of Raleigh since 2001. Specific plans incorporated into this evaluation include:

- Garner Road Widening Phase II, from Walnut Creek to Martin Luther King, Jr. Boulevard; approximate length is 3,907 linear feet; bid awarded June 2003.
- Highwoods Boulevard/Capital Boulevard Improvements; approximate length is 2,218 linear feet; bid awarded March 2004
- Wilmington Street Rehabilitation Project, from Rush Street to Bridge over Norfolk-Southern Railway; approximate length is 8,350 linear feet; bid awarded November 2004.
- Tryon Road Widening Part A from Dillard Road to Gorman Street; approximate length is 6,100 linear feet; bid awarded August 2002.
- Tryon Road Widening Part B, from Gorman Street to East of Lake Wheeler Road; approximate length is 7,200 linear feet; bid awarded December 2004
- Newton Road Widening; approximate length is 5,970 linear feet; bid awarded March 2005.
- Falls of Neuse Road Widening Part A, from Strickland Road to East of Rainwood Lane; approximate length is 3,884 linear feet; bid awarded April 2001.
- Falls of Neuse Road Widening Part B, from Litchford road to East of Ravenridge Road; approximate length is 6,460 linear feet; bid awarded April 2001.

Bid tabulations from all bidders for each project were summarized in an electronic database for the appropriate line items. For each item, the average low bid and an overall averages based on bids by all contractors were calculated. We then calculated an average low bid and an overall average for each item in the analysis. The average low bid is based on the lowest bids for each project, and the overall

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average is based on all bids. Items considered for this evaluation are provided in **Table 1**.

Table 1 – Construction Items Considered For This Analysis

Existing (To Be Revised)	Proposed (To Be Added)
Catch Basins	Rock Excavation
Sidewalk	Guardrail
Curb and Gutter	Keystone Brick Retaining Wall Installation
Storm Drainage Perpendicular to Right-of-Way	Cast-in-Place Retaining Wall Installation
Storm Drainage Parallel to Right-of-Way	Wood Pole to Metal Pole Traffic Signal Upgrade
Common Excavation	Traffic Signal Relocation
Stripping (Top Soil) Excavation	Multi-Purpose Path Installation
Clearing and Grubbing	Relocate Fire Hydrants
Erosion Control	Relocate Water Meters
Traffic Control	Relocate Utility Poles
Seeding and Mulching	Relocate Backflow and Vault
Paving-Asphalt	18" Median Curb and Gutter
Paving-Aggregate Base Course	
Mobilization	
Paint Striping	
Design and Inspection	

Comparable line items were found in the bid averages for all items except stripping excavation and design and inspection. Some quantities in the bid tabulations were converted to reflect the unit costs presented in Section 10-3024 of the Raleigh City Code.

Draft findings were presented to the City of Raleigh Transportation Services Division on November 29, 2005 for review and comment. Based on discussions with City staff, the methodology for calculating the reimbursement values for each of the existing items was verified and several items were added to the analysis for possible inclusion in the city code. These additional items were based on requests made by developers during previous reimbursement applications. The list of potential additions was based on feasibility of assessment within the cities codes. Below is a summary of how all of the (current items and proposed items) comparable construction cost estimates were developed for each additional item.

Catch Basins – line items considered include: frame with grate and hood types E, F, and G, curb inlets, and masonry drainage structures; Average cost per linear foot was found by summing the total cost of each type and dividing by the length of the project (Recommend changing item name to "Drainage Structures").

Sidewalk – line item considered was 4" depth concrete sidewalk; Converted cost per square yard of sidewalk to cost per linear foot; factor is 1 square yard = 9/5 linear feet (1 SY = 9 ft^2, assumes sidewalk is 5' wide).

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Curb and Gutter – line item considered was 2'-6" curb and gutter; cost per linear foot from bid tabulations doubled to develop cost per linear foot, both sides (Recommend changing item name to "Curb and Gutter (Both Sides)").

Storm Drain Perpendicular to Right-of-Way – line items considered include: 15", 18", 24", 30", 36", 42", and 48" storm drain pipe; adjusted by the equation below; average of all sizes is average cost. Recommend changing units calculated from FT-IN to LF of pipe as follows

$$\text{Rate per LF} = \frac{\left(\frac{\text{Amount of Perpendicular Pipe}}{\text{Total Amount of Pipe}}\right) \text{x Bid Estimate}}{\text{Length of Project}}$$

Storm Drain Parallel – line items considered include: 12", 15", 18", 24", 30", 36", 42", and 48" storm drain pipe; adjusted by the equation below; average of all sizes is average cost.

$$\text{Rate per LF} = \frac{\left(\frac{\text{Amount of Parallel Pipe}}{\text{Total Amount of Pipe}}\right) \text{x Bid Estimate}}{\text{Length of project}}$$

Common Excavation – line item considered was unclassified excavation; unit cost from bid tabulations, no conversions (weighted average) (Recommend changing item name to "Unclassified Excavation").

Top-Soil Stripping – no comparable line item included in any bids; generally considered incidental to clearing and grubbing (Recommend removing this item from reimbursement schedule).

Clearing and Grubbing – unit cost from bid tabulation, adjusted to reflect the cost per acre (weighted average).

Erosion Control – line items considered include: temporary silt fence, stone for erosion control, sediment control stone, silt excavation, temporary mulching, matting for erosion control, fertilizer topdressing, ¼" hardware cloth, check dams; Cost per linear foot of project; combined costs for all erosion control items and divided by the length of project.

Traffic Control – line items considered include: work zone signs (stationary and portable), flashing arrow panels, changeable message signs, drums, cones, barricades (Type III), Flagger, warning lights, temporary crash cushion (with reset), portable concrete barrier (with reset), truck mounted impact attenuators; Cost per linear foot of project; combined costs of all traffic control items and divided by length of project.

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Seeding and Mulching – unit cost from bid tabulations, no conversions (weighted average).

Paving-Asphalt – This item is currently only applicable to overall paving asphalt; we recommend that this item by split into surface course, intermediate binder, and base course; line item considered was Asphalt Surface Course and Asphalt Binder Course; converted tons of asphalt to SY-IN of asphalt; conversion is 1 Ton = 17.86 SY-IN for Surface Course and 1 Ton = 16.21 SY-IN for Binder Course and Base Course; use this factor to convert cost per ton to cost per SY-IN; special care must be given when calculating reimbursement for asphalt base, as to not reimburse twice for asphalt and aggregate base courses.

Paving-Stone – line item considered was Aggregate Base Course (ABC); converted tons ABC to SY-IN; conversion is 1 Ton = 26.67 SY-IN; used this factor to convert cost per ton to cost per SY-IN; special care must be given when calculating reimbursement for aggregate base, as to not reimburse twice for asphalt and aggregate base courses.

Mobilization – Calculated by estimated mobilization cost divided by total estimated cost; expressed as a percentage of the projects total cost.

Paint Striping – line items considered include: 4" (90 and 120 mils), 8" (90 and 120 mils), and 24" (20 mils) thermoplastic pavement markings, 4" and 24" paint markings and pavement marking characters; Cost per linear foot of project; combined costs of all paint striping items and divided by length of project.

Rock Excavation - unit cost from bid tabulations, no conversions.

Guardrail – line items considered include: steel beam guardrail (straight and shop-curved), guardrail anchor units (types Cat-1, 350, AT-1, XI, and GRAU-350), and additional guardrail posts; Average cost per linear foot of guardrail.

Retaining Wall Installation (Keystone Brick) – bid tabulations did not provide adequate information for this line item; average pricing based on local developer averages and Kimley-Horn experience with retaining wall construction costs within the past year; unit is square foot of face of wall.

Retaining Wall Installation (Cast-in-Place) – based on unit cost per cubic yard of concrete cast-in-place retaining wall.

Traffic Signal Upgrade (Wood Pole to Metal Pole) – line items considered include: removal of wood poles, new metal strain poles, metal strain pole foundations, signal cable, and relocation of signal heads; average cost per pole was calculated by projecting individual bid tabulations onto a base scenario (upgrade

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one pole at a two lane approach); It is recommended that special consideration be given to upgrades from wood poles to metal poles with mast arms.

Traffic Signal Relocation – line items considered include: inductive loop saw cuts, lead-in cable, signal cable, new three section signal heads, and junction boxes; average cost per corner of intersection to be modified was calculated by projecting individual bid tabulations onto a base scenario (relocate one corner of intersection due to 12' lane shift); It is recommended that special consideration be given if the signal control cabinet is relocated.

Multi-Use Path Installation – line items considered include asphalt surface course and aggregate base course; average cost per linear foot was calculated by projecting individual bid tabulations onto a base scenario (8 foot wide path with 2 inches of surface course and 6 inches of base course).

Relocate Fire Hydrant - unit cost from bid tabulations, no conversions; cost per each relocation.

Relocate Water Meter - unit cost from bid tabulations, no conversions; cost per each relocation.

Relocate Utility Pole – based on average cost to relocate pole provided by representatives at Progress Energy; cost per each relocation.

Relocate Backflow and Vault - unit cost from bid tabulations, no conversions; cost per each relocation.

18" Median Curb and Gutter (Both Sides of Median)- line item considered was 1'-6" curb and gutter; cost per linear foot from bid tabulations doubled to develop cost per linear foot, both sides

In addition to these procedures, a small number of bid prices for **Common Excavation** and **Clearing and Grubbing** were excluded from the averages. These bid prices were exceedingly high (well over 100% higher than the average) and were deemed unrepresentative of typical bid prices for the local area.

Current Reimbursement Items

We found two different types of averages for each project, the average low bid and the overall average. The average low bid is simply the average of all the lowest bids for each item. The overall average is the average of all the bids for each project. The attached **Table 2** provides the overall average bid tabulations as well as the 'average low bid', which represents the average of the lowest bid tab item from each project studied. These values are compared against the current City of Raleigh unit price (reimbursement value) to illustrate the increases since the previous update.

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Potential New Reimbursement Items

The attached **Table 3** provides the overall average bid as well as the average low bid for the proposed additions to the facility fee reimbursement values.

Recommendations

As expected, the overall averages for all reimbursement items included in this evaluation were higher than those currently reported in Section 10-3024 of the City ofRaleigh Code. Although most items evaluated show a steady growth consistent with the rise in construction costs, some items such as common excavation, clearing and grubbing, erosion control, and traffic control are significantly higher and may warrant further investigation.

In addition to updated values for existing items, several new items included in this evaluation should be considered for inclusion in the *Schedule for Improvement Costs* to provide staff with a more comprehensive toolbox for evaluating potential reimbursable items. Addition of these reimbursement items to the schedule would reduce the need for special investigations concerning reoccurring requests from the development community for items typical to the construction of improvements above and beyond those required to meet applicable standard commercial, residential, and minor residential street design standards.

Overall, we recommend utilization of the low bid averages developed for existing and recommended reimbursement items to update the *Schedule of Improvement Costs* in Section 10-3024 of the City of Raleigh Code. While we recommend this method for establishing updated reimbursement values based on the representative plan sets reviewed, ultimate values to be included in the *Schedule for Improvement Costs* should be reviewed and agreed upon by representatives of the City of Raleigh. Furthermore, we recommend consideration be given to updating and simplifying the methodology for calculating the current reimbursement items, and better clarifying the methodology for applying them within the Raleigh City Code. Several of the current items in the code require complex steps to calculate reimbursement values based on plan sets and construction quantities and may warrant further investigation.

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Table 2 - City of Raleigh Impact Fee Study Update
Update to Existing Items in Construction Fee Reimbursement Schedule
Bid Tabulation Averages

Reimbursement Item Description	Units	City of Raleigh Current Unit Price	City of Raleigh Average Low Bid [A]	City of Raleigh Overall Average Bid [B]
Mobilization [C]	LS	5%	4%	5%
Clear and Grub	AC	$4,888.00	$7,839.23	$22,023.39
Common Excavation	CY	$4.75	$9.59	$13.54
Strom Drain Parallel to ROW (per side) [D]	LF	$5.00	$6.15	$9.83
Storm Drain Perpendicular to ROW [E]	IN-FT	$2.00	$1.55	$2.70
Catch Basins (per side) [F]	LF	$3.25	$13.19	$16.50
Curb and Gutter (per side) [G]	LF	$9.73	$9.59	$11.15
Paving Asphalt (Surface Course)	SY-IN	$1.89	$1.73	$2.08
Paving Asphalt (Binder Layer)	SY-IN	$1.89	$1.78	$2.06
Paving Asphalt (Base Layer)	SY-IN	$1.89	$1.86	$2.20
Paving Stone (ABC)	SY-IN	$0.67	$0.43	$0.53
Sidewalk (per side)	LF	$5.59	$10.98	$12.35
Seed and Mulch	AC	$2,700.00	$1,329.63	$1,936.05
Traffic Control [H]	LF	$1.04	$11.34	$15.64
Erosion Control [I]	LF	$1.37	$4.95	$6.19
Paint Striping [J]	LF	$2.75	$2.82	$3.11

Notes:

A = "Average Low Bid" represents the average of the lowest bid tab item from each bid tab set.

B = "Overall Average Bid" represents the average bid tab item for all similar improvements included in a bid tab set.

C = Mobilization costs are presented as a percentage of total cost.

D = Storm drain parallel to the right of way costs were calculated by dividing the total cost of pipe by the total length of project.

E = Storm drain perpendicular to the right of way costs were calculated by dividing the total cost of pipe by the total length of

F = Catch basin costs were found by dividing the total cost of all catch basins by the length of project.

G = Curb and Gutter costs were calculated for linear footage of project and doubled to estimate the cost for both sides.

H = Average costs for traffic control were developed by summing the total cost for all components of traffic control, including work zone signs (stationary and portable), flashing arrow panels, changeable message signs, drums, cones, barricades (Type III), Flagger, warning lights, temporary crash cushion (with reset), portable concrete barrier (with reset), and truck mounted

I = Average costs for erosion control were developed by summing the total cost for all components of erosion control, including temporary silt fence, stone for erosion control, sediment control stone, silt excavation, temporary mulching, matting for erosion control, fertilizer topdressing, ¼" hardware cloth, and check dams.

J = Average costs for paint striping were developed by summing the total cost for all components of paint striping, including 4"

Last Revised 12/19/2005

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Table 3 - City of Raleigh Impact Fee Study Update
Potential Additions to Construction Fee Reimbursement Schedule
Bid Tabulation Averages [A]

Reimbursement Item Description	Units	City of Raleigh Average Low Bid [B]	City of Raleigh Overall Average Bid [C]
Rock Excavation	CY	$47.00	$77.02
Guardrail [D]	LF	$21.06	$24.27
Retaining Wall Installation - Keystone Brick [E]	SF	$15.00	$20.00
Retaining Wall Installation - Pour-In-Place	CY	$449.85	$508.28
Traffic Signal Upgrade - Wood Pole to Metal Pole [F]	POLE	$11,866.65	$14,689.68
Traffic Signal Relocation [G]	CORNER	$3,636.60	$3,982.30
Multi-Purpose Path Installation [H]	LF	$7.61	$9.22
Relocate Fire Hydrant	EA	$1,382.50	$2,152.46
Relocate Water Meter	EA	$417.25	$699.17
Relocate Utility Pole [I]	EA	$5,000.00	$6,000.00
Relocate Backflow and Vault	EA	$4,000.00	$8,521.50
18" Median Curb and Gutter	LF	$7.25	$9.11

Notes:

A = List of potential reimbursement items generated through e-mail request from the City of Raleigh Transportation Services Division (September 15, 2005).

B = "Average Low Bid" represents the average of the lowest bid tab item from each bid tab set.

C = "Overall Average Bid" represents the average bid tab item for all similar improvements included in a bid tab set.

D = Average costs for guardrail were developed by summing the total cost for all components of guardrail installation, such as steel beam guardrail (curved and uncurved), anchor units, and additional guardrail posts.

E = Due to insufficient data in the reviewed bid tabulations, Keystone Retaining Wall Installation is an average range of cost per SF of face of retaining wall based on Kimley-Horn experience with retaining wall construction cost in the past year.

F = Average costs for wood pole to metal pole traffic signal upgrades were developed by summing the total cost for all components of wood pole to metal pole traffic signal upgrade, including removal of wood poles, new metal strain poles, metal strain pole foundations, signal cable, and relocation of signal heads. Special consideration should be given to upgrades from wood pole to metal poles with mastarms.

G = Average costs for traffic signal relocations were developed by summing the total cost for all components of relocations, including inductive loop sawcuts, lead-in cable, signal cable, new three section signal heads, and new junction boxes. Special consideration should be given if the signal control cabinet is relocated, as this will cause the cost to vary greatly.

H = Cost estimate for multi-purpose path assumes an 8-foot wide asphalt path composed of 2 inches of asphalt concrete surface course over 6 inches of aggregate base course.

I = Relocation of utility poles is based on an average range of cost to relocate one pole as provided by a representative of Progress Energy.

Last Revised 12/19/2005