PAVEMENT CONDITION ASSESSMENT

CITY OF KIRKWOOD, MISSOURI

FINAL REPORT

PREPARED BY

IN COOPERATION WITH

JULY 17, 2015

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1

Introduction

The City of Kirkwood faces the challenge of determining how it will provide for the long-term rehabilitation and maintenance of its streets. This report was produced at the direction of the Director of Public Services, Mr. Bill Bensing in response to concerns about the condition of the City's streets and the projected budget expenditures needed for their repair.

Executive Summary

The estimate of pavement related expenditures projected over the next five years under current fiscal conditions is $41.4 million as determined by MicroPAVER's work plan module. This calculation was based on the default maintenance policies contained within the software and can be refined as the City of Kirkwood develops and refines their own maintenance policies.

The team of Lochmueller Group and Payken Consulting inventoried and surveyed approximately one-hundred and fourteen (114) centerline miles of streets in the City of Kirkwood. The overall average surface condition index of the street network in the City of Kirkwood is 64, or the lower end of the good condition range, based on a scale from 1 to 100 with 100 being a new street. The deterioration of the City's streets will occur with increasing frequency as the overall condition of Kirkwood's streets fall below the critical Pavement Condition Index (PCI) of 55.

The structural distress in streets within the City is a function of a number of factors: 1) fatigue from repetitive stresses of wheel path traffic, as referenced in Figure 1; 2) temperature changes coupled with advanced oxidation of the asphalt cement (the tendency for asphalt to oxidize with age, making the pavement brittle, amplifies the stresses of both traffic and temperature); and 3) settlement of the road bed, due to water reaching the subgrade soil. Each of these processes leads to extensive cracking within the surface of the pavement.

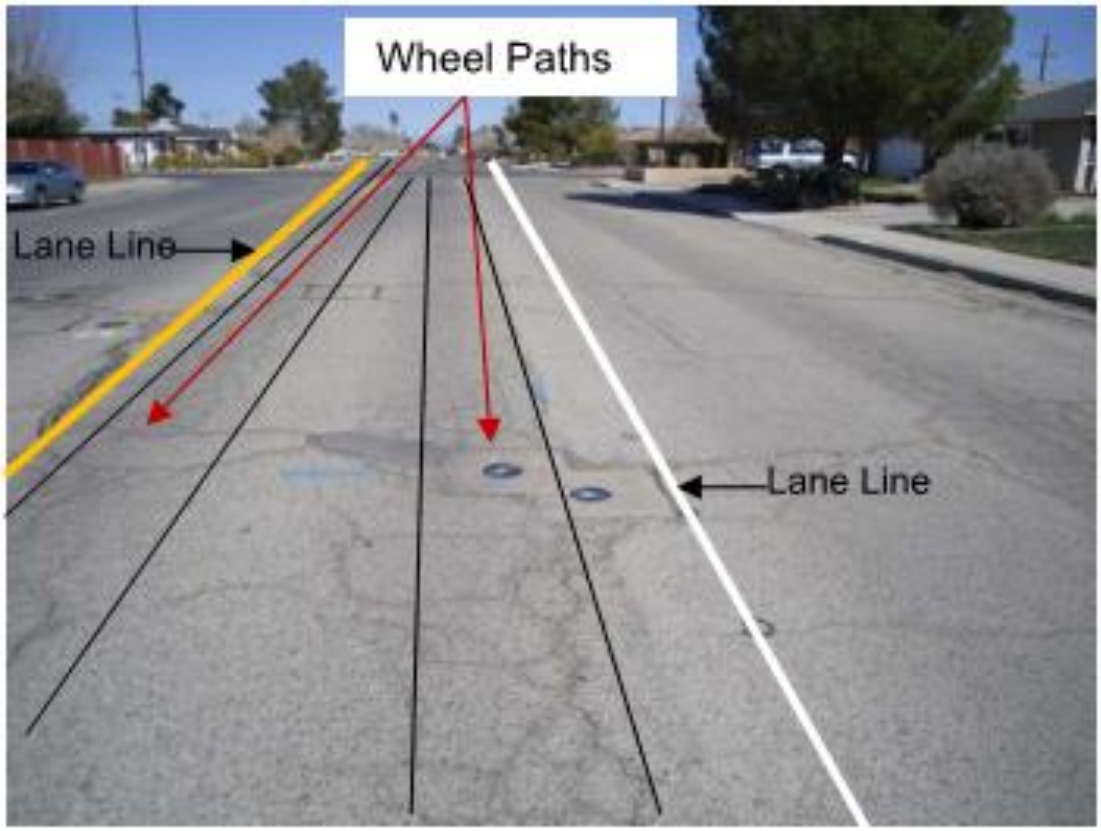


Figure 1: Example of Wheel Path Traffic Wear on Pavement

Once the pavement is cracked, water can move into the underlying soil causing loss of support to the pavement in surrounding areas. An acceleration of the spread of cracking usually results. Further deterioration of a different type follows, beginning at the originally cracked area. Water and traffic will cause a base failure, such that reconstruction is necessary. This secondary deterioration is also accelerative, in that the more base failure, the faster is the spread of base failure in surrounding areas.

The budget estimates cited in this study are only for pavement reconstruction. They do **not** include the following items:

- Grading
- Subgrade preparation needed due to unsuitable soil or wet conditions
- Utility relocations
- Storm or sanitary sewer reconstructions
- Roadway realignment
- Special provisions for residents
- Traffic control
- Sidewalks
- Street signage
- Street lighting

Further study by City Staff or hired consultants regarding specific projects is necessary to determine project scope, maintenance selected and reconstruction costs.

A goal the City could consider is increasing the slope of the overall PCI curve over time. By implementing this goal with possible funding mechanisms discussed later in the report, the City would improve the overall quality of their streets and minimizing deferred maintenance.

This study was limited to the assessment and analysis of the City's public roadways and does not contain condition assessments for the following:

- City-owned building and facilities
- Heavy equipment
- City bridges
- Private Roads within Kirkwood (see Appendix I for a complete listing)

2

Pavement Management

Pavement management is the practice of planning for pavement repairs and maintenance with the goal of maximizing the value and life of a pavement network.

To accomplish this, a community needs to have several repair techniques in its arsenal and the knowledge of when to apply them. This is where pavement management comes into play. With a comprehensive database of road conditions, pavement management software can model when to perform which repairs on a road network. Of course, engineering judgment is required to finalize any list of street repairs, as no computer model can take every variable analyzed in making a repair decision into account. Pavement management software is a great springboard to help a community start its repair program for each year and serves as an excellent method of storing the repair data. Lochmueller Group, working in conjunction with Payken Consulting, utilized a computerized Pavement Management System (PMS) developed by the U.S. Corps of Engineers Laboratory entitled MicroPAVER. A full description of this program and its capabilities is provided in Appendix B of this report.

The MicroPAVER System

The MicroPAVER System utilizes a numerical score to indicate the condition of each street. This score is called the Pavement Condition Index (PCI) and is based on the amount and type of surface defects, for example, longitudinal and transverse cracks, potholes, alligator cracking and others as illustrated in Figure 2. The PCI score can range from 0 to 100 with 100 representing new pavement. The computer program makes extensive use of pavement condition life cycle relationships. The pavement condition history is developed over a number of years and inspections. Eventually this information will be completely customized for Kirkwood's needs. The computer software does contain default life cycles for various pavement types (full-depth asphalt, concrete with asphalt overlay and concrete streets).

The scores are based on observation of cracks, potholes, ruts, patches and other surface distress. The severity and extent of pavement distress are both considered. The PCI rating can vary throughout a street. However, it is generally tied to a previous

maintenance action for a section of street, e.g., the PCI for a portion of a street with a recent overlay will be higher than the part which has not had recent maintenance. Conducting a full inventory of the street system which includes a full evaluation of pavement condition assists the expert reviewer in identifying necessary improvement strategies.

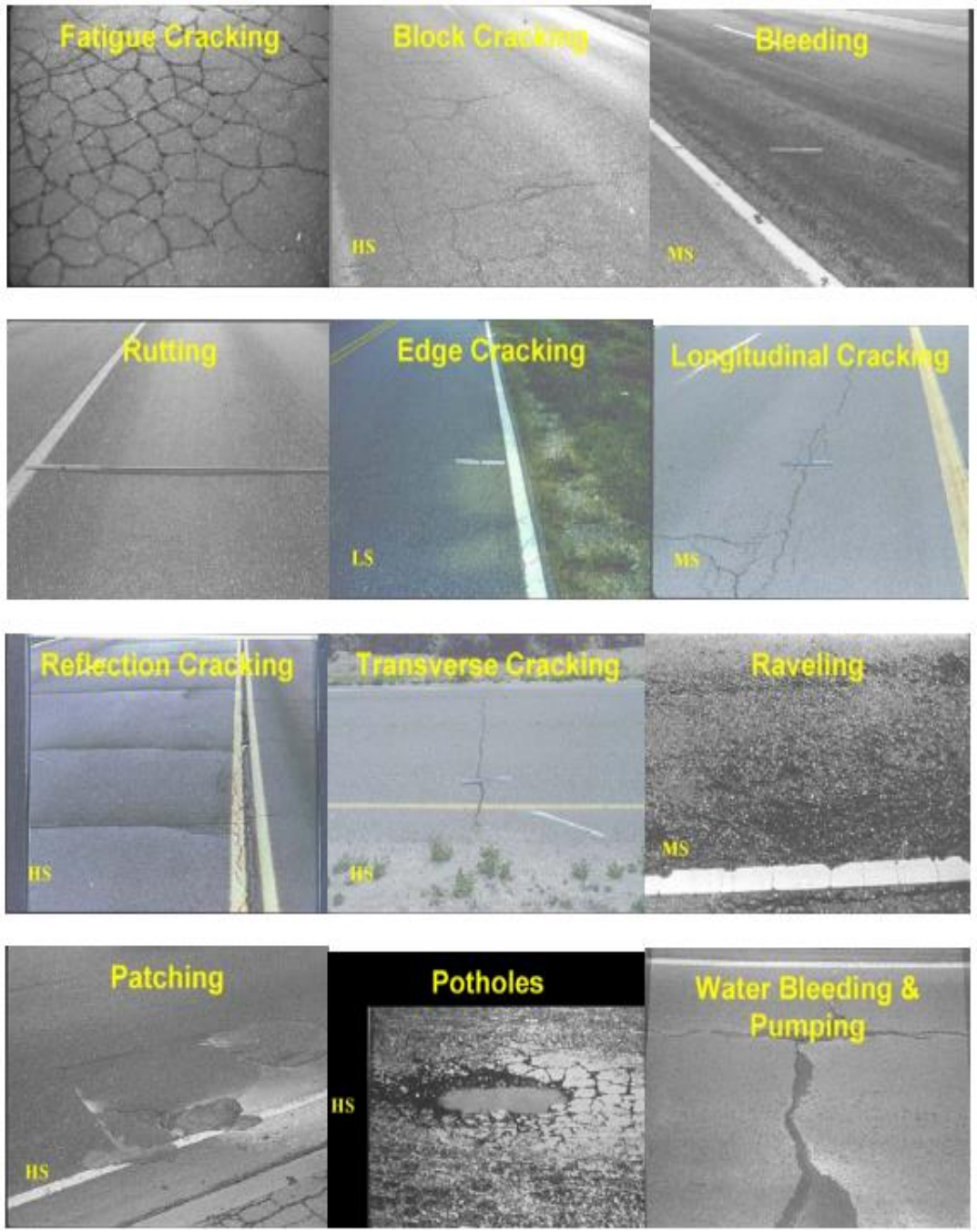


Figure 2: Examples of Pavement Surface Distress

Figure 3 illustrates the typical pavement condition life cycle. The focus of the data inventory process centered around the collection of the pavement area, pavement material composition and last known date of the roads to be tested. After obtaining this information, a system of separating the road into networks or "families" is performed followed by branches, sections and furthermore into sample units. Once inspection data is populated within the program then a family curve is used to project the future condition of the pavement. This capability provides the user a powerful tool for determining the capital expenditure needs with regard to street repair.

Upon inspecting the City's streets and loading incremental information into the MicroPAVER program, the results show that the City's average PCI is **64**. The Critical PCI is defined as the PCI value below which the pavement shows a significant increase in the rate of deterioration and preventive maintenance cost. The Critical PCI is usually between 55 and 70. A value of 55 is most likely to be selected unless otherwise indicated. By examining Figure 3 the significance of this score is visually apparent. The significance of this fact cannot be overstated. The implication is clear that the City's streets as a whole are at a point in their life cycle that will result in ever increasing deterioration and maintenance costs if measures are not enacted to reverse this trend.

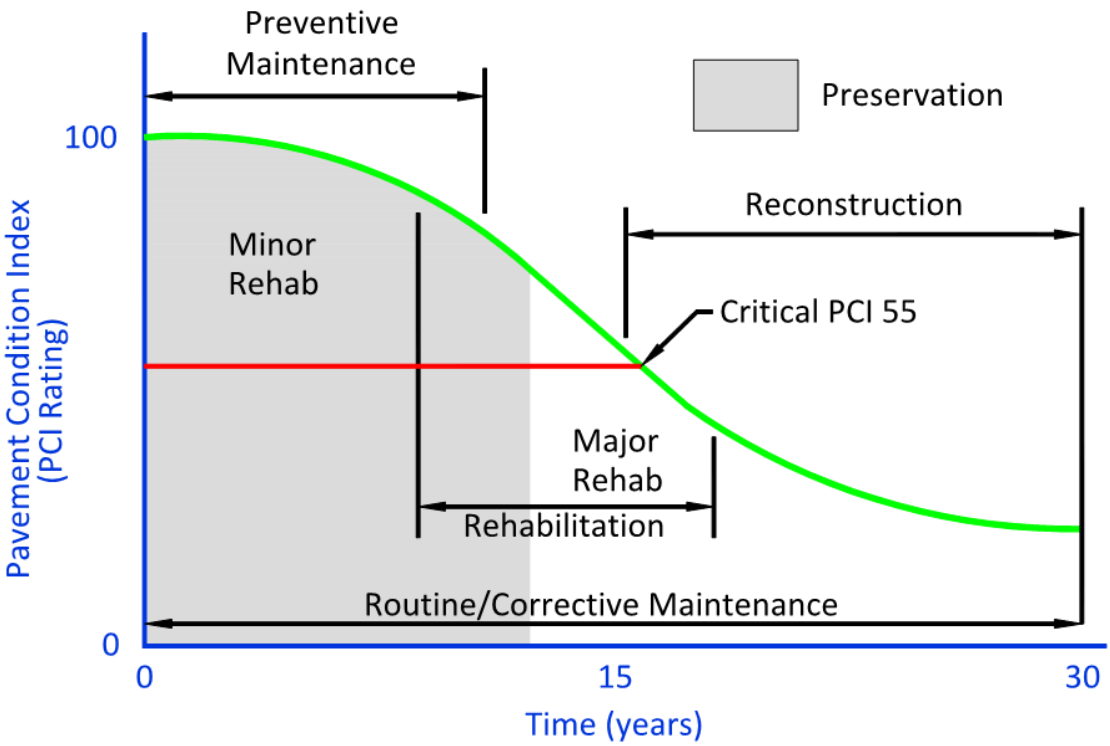


Figure 3: Pavement Condition Index Curve

In addition, the cost to restore this pavement will increase dramatically at the lower end of this life-cycle curve. Obviously, it is more cost effective to maintain Kirkwood's road network in the upper portion of this curve. It should be noted that an adequate amount

of money must be funded in order to maintain the roads at this level. If adequate revenue is not provided for this maintenance, then deferred maintenance occurs.

Pavement Analysis

As the data was reviewed, it became apparent that the City would have to spend approximately $2,000,000 for each 1 point increase in the City's overall street condition. However, when one considers that the streets deteriorate, on average, at a rate of 2-3 points per year (when no maintenance is applied), a total cost of approximately $1,200,000 annually is necessary for the City's streets to maintain their current condition (PCI). This figure may seem staggering, but when you consider the City of Kirkwood has over 600 streets, it takes a significant amount of improvements to increase the overall condition of the City's roadways. An average of three or four street reconstructions each year will not have an appreciable effect on the City's overall pavement condition.

As a way to illustrate this cost relationship, it may be helpful to consider that if the City did four street reconstructions each year, it would take over 150 years to rebuild all the City's streets. When you factor in a 30-year design life, the numbers really start to work against any meaningful overall improvement in the City's streets.

It should be noted that for a number of years the City and its residents enjoyed streets that were in consistently high condition. Examining Figure 3 again, one can see that it was not necessary for the City to perform extensive major maintenance and repair to maintain a fairly high level of service for the first 25% of the street's service life.

What has traditionally been Kirkwood's advantage is now turning into Kirkwood's liability. Many of Kirkwood's streets are approaching the end of their service lives simultaneously. There exist a number of repair alternatives that the City may wish to consider for addressing this situation. The amount of manpower and materials Kirkwood currently has available to address all of their various maintenance needs are inadequate at this time. Our analysis indicates that the City will realize a better return on its maintenance investment by applying the appropriate maintenance operation to Kirkwood's streets when they are within the preventative maintenance position of the pavement condition curve (PCI range 60-80). Therefore, it is recommended that the Department of Public Services adopt a policy of maintaining the condition of streets at the upper end of the pavement condition curve (PCI range 60-80) and consequently allowing the worse-conditioned streets to continue to deteriorate until they are replaced. The City will spend less money and realize a higher return on its maintenance investment using this type of prioritization scheme.

There are a number of factors that have contributed to the condition of Kirkwood's streets. They are, in no particular order, as follows:

- The discontinuation of the City's chip seal program
- The effect of in-fill housing
- Need for pavement standards
- Mill & overlay program history

Discontinuation of the Chip Seal Program

The City's Street Maintenance Division had for a number of years conducted an annual chip seal program. This program provided for the application of a chip seal surface treatment on every asphalt street in the City on a 5 year cycle basis. At one time it is estimated that 65% of Kirkwood's streets were maintained in this fashion. This low-cost surface treatment (because it was performed in-house with City employees) essentially maintained the City's streets in a good condition for many years. However, the decision was made in 2002 to discontinue the chip seal program and sell off the equipment used to apply the chip seal treatments. This decision resulted in the resumption of the majority of the City's streets continued deterioration. The average condition of Kirkwood's asphalt streets is now **60.3**, roughly 5 points difference from the critical PCI (The Critical PCI is 55). There presently exist a number of alternative surface treatment options (such as; micro surfacing, NOVACHIP, slurry seal and other similar products. Frequently, loose stone is cited as the principle objection with chip seal. If that objection was the basis for deciding to discontinue the chip seal program that would be understandable. However, there were other options that should have been implemented in place of the chip seal program. None of these alternate surface treatments cited above share chip seal's loose stone "problem." Unfortunately, this group of asphalt streets which have been previously chip sealed is now in a state of disrepair that makes surface treatments a poor choice for extending their service life.

Effect of In-Fill Housing

Over the last twenty years Kirkwood has experienced a significant number of single family in-fill housing demolitions and reconstructed houses. This typically involves a home builder purchasing an existing, smaller, older house; razing it and rebuilding a house that is typically significantly larger (and more expensive) than what was demolished. The effect of in-fill housing is experienced in a number of ways that are detrimental to Kirkwood's streets. First, each of these new homes must have their existing utilities disconnected prior to demolition. Typically, the water, gas, electric and sewer lines all must be taken out of service, capped or removed. These same services will then be reestablished later, constructed in compliance with current building codes. The survey team noted in the field that the typical utility cut for an in-fill house is 10 ft. x 10 ft. square. The first utility cut on a given street lowers the PCI by 15 points. The second utility cut lowers the street's PCI by another 10 points, for a total of 25 points. The third utility cut lowers the street's PCI by another 5 points, for a total of 30 points for each subsequent utility cut a diminishing number of points are deducted from the street's overall PCI rating. For example, on North Harrison Avenue between West Rose Hill Avenue and West Essex Avenue there have been at least twenty-four (24) in-fill houses constructed resulting in a PCI of 35. The larger the amount of utility cuts on a street the higher the impact they will have on degrading the pavement score within the MicroPAVER software program. In a somewhat counter intuitive manner it should be noted that the impact of utility cuts is greater for streets that have a higher PCI (between 75 and 100) than on a street that is already in bad shape prior to adjacent in-fill housing. An excellent example of this dynamic is seen on Glendover Drive (off of Dickson Street). Glendover Drive is an asphalt roadway with a chip seal maintenance application in which there are two sample units on the street. On one end of the street

the sample unit's PCI was 90, where the housing stock is original construction. However, at the other end of the street, where a couple of teardown homes have been rebuilt, the sample unit's PCI is 63. The second effect of in-fill housing is that of truck traffic. On each in-fill house upwards of 50 truck deliveries occur bringing all manner of construction materials to the site. Multiplying the 50 deliveries by the aforementioned twenty-four (24) in-fill houses on North Harrison Avenue will result in over 1,200 truck deliveries that this community and its streets would not have otherwise experienced. Many of Kirkwood's neighborhoods that have the greatest amount of interest for the in-fill housing market are located in the older parts of the City that contain a number of different pavement types and compositions that were built 75-100 years ago when large trucks did not exist.

Pavement Standards

Kirkwood's streets vary widely in width and pavement composition. Street width can be as narrow as 15 ft. with varying widths between 15 ft. and 45 ft. with no definitive standard. We recommend the City adopt a minimum standard of 26 ft. wide pavement with no parking posted on one side. We also observed instances where six inch vertical concrete curb and gutter were reconstructed when a better choice due to the sidewalk height and the surrounding terrain would have been a standard 3 inch concrete rolled curb and gutter system. Another issue confronting Kirkwood's streets is the almost complete lack of appropriate preventative and safety maintenance performed by the City's Street Maintenance Division. A disturbingly high number of streets have received no asphalt mat repair or crack sealing for what looks to be upwards of 20-30 years. Our team recommends the Department of Public Services engage in a thorough analysis of the Street Maintenance Division's priorities and makes appropriate organizational changes to bring about the desired service level. Appendix G shows recommended pavement restoration standards that the City should consider adopting. Still another factor effecting Kirkwood's streets is the prevalence of curb cuts and other ad hoc efforts to route downspouts and sump pumps.

We recognize that residents are attempting to install solutions they think is in their best interests. However, it appears that in too many instances what is best for the residents is not in the best interests of the City's streets. Frequently, builders and home owners merely cut a slot in the curb and gutter and discharge their storm water effluent directly into the street causing a greater degree of pavement deterioration than would not otherwise exist. Meaningful standards should be adopted and enforced to minimize this type of damage to the City's infrastructure. Finally, the other significant challenge Kirkwood faces is the prevalence of alligator cracking within the pavement network. Alligator cracking is defined as a base failure by the MicroPAVER program. As such, the pavement structure is insufficiently strong enough to carry the loads that it currently experiences. This fact places a special burden on the Department of Public Services due to the fact that in many areas there is not sufficient curb height to add extra material thus strengthening the pavement. Reconstruction is therefore the only option available for a failed pavement, thus increasing the budgetary demands of the Department.

Mill & Overlay Program History

Historical project information for previous year's mill and overlay were made available to the study team. The following tables breakdown each year's projects and based on each street's 2015 PCI rating as well as the given year's (2009, 2010, 2011, etc.) average PCI rating versus the PCI rating calculated by MicroPAVER (MicroPAVER calculates a default deterioration rate of 3 points per year).

2009	
STREET	**PCI RATING**
Lindeman (Des Peres city limits to Dougherty Ferry)	59
N. Clay (W. Essex to W. Adams)	45
N. Clay (Wilson to Barter)	60
S. Clay (W. Madison to W. Woodbine)	52
N. Taylor (E. Essex to E. Washington)	58
N. Taylor (E. Washington to E. Adams)	83
E. Argonne (S. Taylor to Holmes)	59 & 77
E. Washington (Kirkwood to N. Taylor)	72
W. Washington (Kirkwood to N. Clay)	64
Wilson (N. Clay to Kirkwood)	71
S. Harrison (W. Adams to RR Bridge)	40 & 63
2009 Average PCI =	**61.7**
MicroPAVER Predicted PCI =	**82**

Table 1: PCI Ratings for each Project in 2009

2010	
STREET	**PCI RATING**
Lemp	52 & 56
E. Rosehill	46
W. Monroe (N. Geyer to N. Harrison)	47
W. Monroe (N. Harrison to N. Clay)	72
S. Van Buren (W. Monroe to W. Woodbine)	79
S. Harrison (W. Monroe to W. Woodbine)	63
McCullough (S. Van Buren to S. Clay)	62
Heege	52
Hillcrest	53
Idlewild	47
W. Clinton (S. Clay to Kirkwood)	48
Silver	59
W. Jefferson (N. Clay to N. Harrison)	70
S. Geyer (Big Bend to City Limits)	72
Leffingwell (Scott to City Limits near Holmes)	42
N. Woodlawn (Manchester to City Limits)	60
S. Woodlawn (E. Adams to E. Argonne)	46
E. Bodley (Homewood to N. Woodlawn	61
S. Woodlawn (E. Argonne to Scott)	47
Nirk (Geyer to Couch)	67
S. Fillmore (E. Woodbine to E.Rosehill)	61
Forest (Big Bend to Marco)	73
E. Monroe (S. Woodlawn to Scott)	78
Nelda	68
Swan (Kirkwood to N. Taylor)	65
Duley	75
Frieda	72
Altus	83
Lockett	57
2010 Average PCI =	**61.1**
MicroPAVER Predicted PCI =	**85**

Table 2: PCI Ratings for each Project in 2010

2011	
STREET	**PCI RATING**
W. Woodbine (S. Geyer to S. Clay)	65
W. Woodbine (S. Clay to Kirkwood)	65
Goethe (W. Essex to Wilcox)	68
Wilcox (Goethe to Dead End)	62
Clemens (Knierim to W. Essex)	63
Central Ave (N. Geyer to Goethe)	58
Central Place (N. Van Buren to N. Geyer)	34
Dickens (Central to Knierim)	67
Longfellow (Central to Knierim)	77
Longfellow (Knierim to W. Washington)	82
Burns	72
Elm Tree	71
Edna	73
Bach	80
Janet	81
Thursby	76
Arminda (Virginia to Edna)	86
Arminda (Woodbine to Thursby)	91
Lavinia	85
Lockett Ln	55
Wilton (Forest to near Marco)	55
Virginia	82
2011 Average PCI =	**70.4**
MicroPAVER Predicted PCI =	**88**

Table 3: PCI Ratings for each Project in 2011

2012	
STREET	**PCI RATING**
Woodleaf Ct	63
Julian Pl	89
E. Essex Ave	80
Cranbrook Dr	88
Hawbrook Ln. (Triangle off Dickson)	96
Hawbrook Ct. (N. off Hawbrook Ave)	97
Parkwoods Ave (Adams to Hawbrook)	78
Parkwoods Ave (North off Hawbrook)	93
Parkwoods Ave (South off E. Essex)	62
Luther Ct	92
Norfolk	72
Longview Blvd	88
Claybrook	100
Ericson Place	93
Fairwood Ln	54
Churchill Ln	82
Seekamp Ave	99
Wood Ave	91
E. Essex (Kirkwood to N. Taylor)	87
Kneirim	74
Schubert	98
N. Harrison (Peeke to W. Essex)	85
2012 Average PCI =	84.6
MicroPAVER Predicted PCI =	91

Table 4: PCI Ratings for each Project in 2012

2013	
STREET	PCI RATING
Couch Ave (Big Bend to cul de sac)	95
Couch Ave (Big Bend to Rosehill)	85
Couch Ave (W. Rosehill to W. Adams)	78
Couch Ln (cul-de-sac below Big Bend)	64
Marjean Ct	100
Andrews Ave	83
Mclain Ln	96
Boxwood Ln	99
Forest Glen Ln	92
W. Rose Hill Ln (Couch to Craig)	98
Grandview	97
Robert Ave	100
Harvey St	100
W. Rose Hill Ln (S. Geyer to Couch)	86
2013 Average PCI =	90.9
MicroPAVER Predicted PCI =	94

Table 5: PCI Ratings for each Project in 2013

When major maintenance activities, such as mill & overlay or complete reconstruction, are entered into the Work History module of the MicroPAVER software the PCI is reset to 100. Even though the software considers a complete reconstruction (such is currently happening on North Clay Avenue) equivalent to a mill and overlay; in point of fact these two types of projects are not equivalent in long term performance. A complete street reconstruction has a longer service life and remains in better condition longer than a mill and overlay process. In other words, the deterioration rate for a milled and overlaid street is greater than that for a reconstructed street. That being said, the previously cited average PCI scores for each year's mill and overlay suggests that some of these streets were poor candidates for mill and overlay based on the low PCI scores. Those streets with low PCI ratings are attributed primarily to extensive alligator cracking which is an indication of base failure.

Over recent years City Staff has specified no joint fill material for all reconstructed concrete streets. Whether or not this practice is a good policy for the City, to continue this practice is beyond the scope of this study. It should be noted that the MicroPAVER software deducts 4 points from the PCI rating for non-crack sealed joints.

3

Budget Analysis

A generally accepted level of service for a community with the age of Kirkwood would be in the range of 75-80 PCI. A city can defer a great deal of expenditures in its initial growth years. However, as streets age they require more and more maintenance to keep them in an acceptable condition. The continued deterioration of Kirkwood's streets is inevitable, if unchecked.

Current PCI Condition

As stated previously, Kirkwood's current network PCI is 64 which is considered the low end of the good range. The PCI scale is defined below in Table 6:

PCI Scale	
Excellent	86 - 100
Very Good	71 - 85
Good	56 - 70
Fair	41 - 55
Poor	26 - 40
Very Poor	11 - 25
Failed	0 - 10

Table 6: Pavement Condition Index (PCI) Scale

Projected PCI Conditions

The following chart assumes that no additional revenues for street maintenance are available, which over the next 20 years is admittedly unlikely. However, it does provide tangible evidence of the inexorable deterioration of Kirkwood's streets. Table 7 illustrates the cumulative effect caused by deferred maintenance over the next 20 years.

PROJECTED NETWORK PCI (Safety Repairs Only)		
YEAR	PCI RATING	
2015	64	
2016	61	
2017	58	
2018	55	* critical PCI
2019	52	
2020	49	
2021	46	
2022	43	
2023	40	
2024	37	
2025	34	

Table 7: PCI Ratings as a Result of Deferred Maintenance

Budget Scenarios

OPTION #1

Unlimited funding (heavy first and second year needs)

Cost: $97,500,000.00

Result: PCI is raised from 64 to 82 in first year, 100 in the second year and levels out at 92 by the fifth year. There is no deferred maintenance after the second year.

OPTION #2

Safety repairs only

Cost: $250,000.00 annually

Result: Gradual decline from current PCI of 64 to a PCI of 52 by the fifth year.

OPTION #3

Cost: $1,000,000 annually

Result: PCI decreases from 64 to 60 in year 5. There will be deferred maintenance contingent upon future funding levels as shown in the below Figure 4.

Budget Consequence

$1,000,000 Budget

Year	Condition PCI	Funded	Unfunded
2015	64	$1,000,000.00	$31,200,000.00
2016	63	$1,000,000.00	$32,500,000.00
2017	62	$1,000,000.00	$33,800,000.00
2018	61	$1,000,000.00	$35,100,000.00
2019	60	$1,000,000.00	$36,400,000.00
	Total:	$5,000,000.00	

Total Cost: $41,400,000.00

Figure 4: PCI Ratings as a Result of $1,000,000.00 Annual Budgeted Maintenance

OPTION #4

Cost: $1,500,000 annually

Result: PCI increases from 64 to 67.1 by year 5. Option #4 will result in the satisfactory maintenance of all pavements above the critical PCI. However, limited funds will be available for pavements requiring major maintenance or repair. There will be greater levels of deferred maintenance as shown in Figure 5 on the next page.

Budget Consequence

$1,500,000 Budget

Year	Condition PCI	Funded	Unfunded
2015	64	$1,500,000.00	$28,600,000.00
2016	64.8	$1,500,000.00	$29,500,000.00
2017	65.9	$1,500,000.00	$30,200,000.00
2018	66.5	$1,500,000.00	$31,350,000.00
2019	67.1	$1,500,000.00	$32,200,000.00
	Total:	$7,500,000.00	

Total Cost: $39,700,000.00

Figure 5: PCI Ratings as a Result of $1,500,000.00 Annual Budgeted Maintenance

OPTION #5

Kirkwood Budget identified by Director of Public Services

Cost: $2,000,000 annually

Result: PCI increases from 64 to 70 by year 5. There will be a degree of deferred maintenance but less so than other budget scenarios. There will be even greater levels of deferred maintenance as shown in Figure 6 on the next page.

Budget Consequence

$2,000,000 Budget

Year	Condition PCI	Funded	Unfunded
2015	64	$2,000,000.00	$26,000,000.00
2016	65	$2,000,000.00	$26,500,000.00
2017	66	$2,000,000.00	$27,000,000.00
2018	68	$2,000,000.00	$27,600,000.00
2019	70	$2,000,000.00	$28,000,000.00
	Total:	$10,000,000.00	

Total Cost: $38,080,000.00

Figure 6: PCI Ratings as a Result of $2,000,000.00 Annual Budgeted Maintenance

All five above mentioned options are compiled in the below Figures 7 and 8 graphically illustrating the various budget scenarios with the required annual spending needed to meet these scenarios.

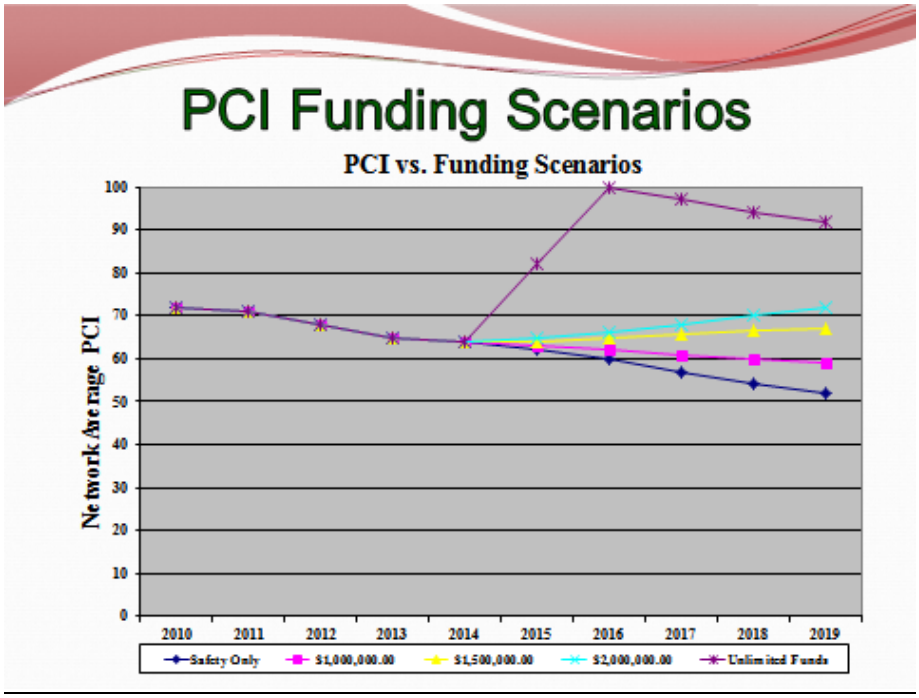


Figure 7: PCI Funding Scenarios

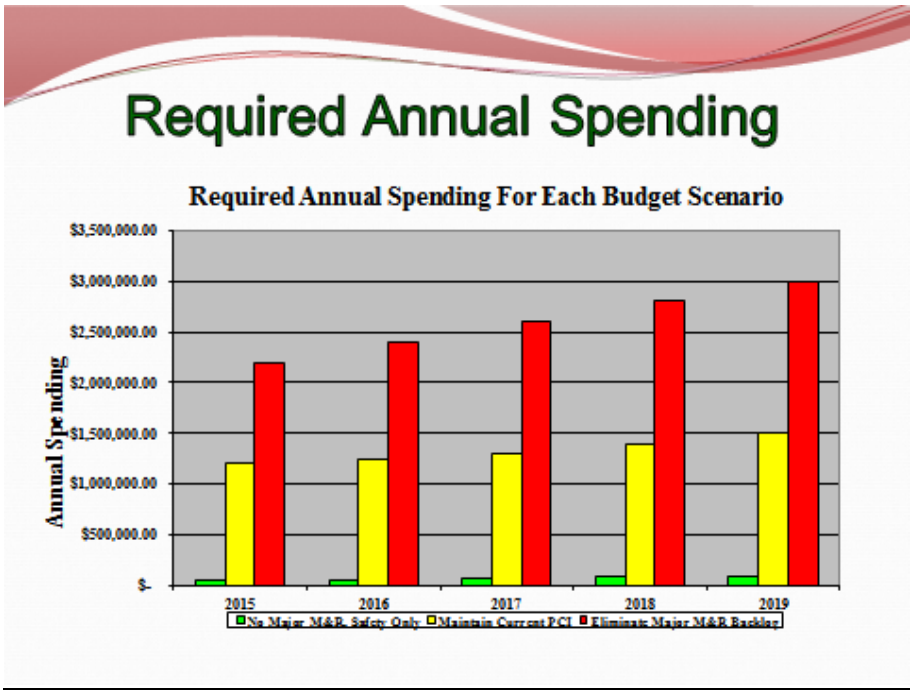


Figure 8: Required Annual Spending for Each Budget Scenario

4

Conclusion

The City should begin to consider identifying potential revenue sources to address the long-term major maintenance and repair needs of their streets. Current funding levels, manpower and materials are insufficient to adequately address the City's maintenance needs well above the critical PCI of 55.

Deferred maintenance has increased significantly over the last 10 years while street reconstruction funding has declined each year. The amount of deferred maintenance will continue to increase as well as the total cost necessary to restore an adequate PCI level to the City's streets should the City decide to defer street maintenance.

The three (3) year Capital Improvement Plan (CIP) has not been developed at this time for the following reasons:

- Future budgets are unknown.
- The maintenance policies unique to Kirkwood have not been developed yet in order to be entered into the PMS software for use in developing a future Work Plan.
- It has not been determined yet what the future role and responsibilities of the Street Maintenance Division shall be and what impact that may have on resource allocation.
- An extensive pavement coring program needs to be developed, implemented and completed prior to the development of maintenance policies which will help guide the Department's future decision making process.

Recommendations

The following funding options exist to enhance street maintenance and capital improvement budgetary support:

Transportation Development District (TDD)

General Obligation Bonds

Neighborhood Improvement Districts (NID)

Community Improvement District (CID)

Transportation Sales Tax

Enhance participation in East West Gateway STP and CMAQ funding

Property Tax Increase

Appendix H contains further information prepared by Mr. James Mello with Armstrong, Teasdale Law Firm describing the use of TDDs, NIDs and CIDs.

APPENDIX A

Definitions

Service level:	the overall condition of a community's streets and the associated expectation regarding the condition of those streets.
PCI	(Pavement Condition Index) – A numerical score representing a particular street's condition
PMS	Pavement Management System
AAC	Full Depth Asphalt Street Construction
APC	Concrete with Asphalt Overlay Street Construction
PCC	Concrete Street Construction
Network	A community (i.e. Kirkwood)
Branch	A roadway (i.e. North Harrison Avenue)
Section	A piece of a roadway broken up for the purpose of maintaining like characteristics (i.e. road width, pavement construction, traffic volume, traffic characteristics, etc.) Based on this definition, North Taylor Avenue has been broken up into eight sections to facilitate MicroPAVER analysis.

APPENDIX B

Explanation of the MICROPAVER System

INTRODUCTION

In order to effectively manage a City's streets, a systematic, objective method of determining maintenance and rehabilitation (M&R) needs and priorities must be used to ensure efficient allocation of resources. Both engineering and economic factors must be taken into consideration in determining cost-effective M&R strategies. In 1968, the U.S. Army Construction Engineering Research Laboratory (USACERL) began developing the Pavement Maintenance Management System, now known as PAVER, to assist as a tool in making standard, practical decisions.

PAVER was developed under the auspices of Headquarters, U.S. Army Corps of Engineers through funding from the Army and Air Force. It was originally designed to be operated on a mainframe computer at military installations, but also has far reaching application among municipalities, airports and counties. PAVER was field tested and validated at Fort Eustis, VA through full scale demonstration monitored by 21 pavement engineers.

One of the primary functions of a PMS is predicting pavement condition into the future. To make this projection, there must be an objective repeatable scale for determining the present pavement condition. PAVER uses the Pavement Condition Index (PCI); a numerical index from 0 to 100 that gives an indication of a pavement's structural integrity and operational condition. The PCI is based on the types, severity, and quantity of pavement distress identified during a condition survey.

In 1984, USACERL began developing a microcomputer version of PAVER called MICROPAVER. This project was initially sponsored by the FAA, with additional capabilities funded by the Army and Air Force. MICROPAVER maintains most of the capabilities of mainframe PAVER, while taking advantage of the more user friendly features of a microcomputer. MICROPAVER offers an economical solution to small database users seeking the advantages provided by a PMS. The American Public Works Association (APWA) has adopted MICROPAVER as the best available Pavement Management System (PMS) and has assisted in implementation at more than 90 military installations and 400 civilian facilities.

PAVEMENT MAINTENANCE MANAGEMENT CONCEPTS AND COMPONENTS

Overview

In past years, when maintenance funds were easier to obtain, pavement maintenance was typically performed as the need was brought to the engineer's attention. Past experience tended to dictate the selection of short-term repair techniques with little regard given to the long-term effects of the selected remedy. In today's economic environment, as pavement deterioration rates exceed the availability of M&R funds, a more systematic approach to determining M&R needs and priorities is required. Pavement networks must now be managed, not simply maintained.

The recent emergence of Pavement Management System (PMS) products has provided engineers with the tools needed to manage their pavements economically. A PMS provides a systematic, consistent method for selecting M&R needs and priorities and determining the optimal time of repair by predicting future pavement condition. The importance of early detection and repair of pavement distress cannot be overstated; the consequences of neglect and deferred maintenance are plotted in Figure 3. If repairs are performed during the early stages of deterioration before the sharp decline in pavement condition, repair costs of 80 percent can be realized. In addition to money savings, less shutdown time would be required, making neglect a costly alternative. A PMS can be used to alert the manager to this point in a pavement's life cycle.

Pavement management consists of two levels of analysis (1) the network level, in which the agency's entire pavement network is considered for budgeting, planning, scheduling, and selection of potential M&R projects and (2) the project level, in which potential projects are evaluated in more detail to identify feasible alternatives that address the site-specific conditions. The final step in project-level analysis is to perform life-cycle costing for selection of the most cost-effective M&R alternative. The scope of this report will be confined to network level analysis. Should the City give conceptual approval of the recommendations contained in this report, it will be necessary for City Staff to complete project-level analysis in order to "nail down" each street's M&R costs.

Approaches to Determining M&R Needs

Various organizations in the United States use different approaches to determine the necessary maintenance and rehabilitation for a given pavement section. Brief descriptions of the three most common approaches follow:

Ad Hoc Approach

Many agencies use the "habitual" or ad hoc approach, in which the staff applies the M&R alternatives that experience indicates is the best solution. Evaluation suggests that this approach results in the seemingly habitual application of a selected few

alternatives. A major drawback to this approach is that because of the limited set of alternatives, the best or more economical option for the pavement being considered may not be selected.

Present Condition Approach

In the "present condition" approach, the pavement is first evaluated using various condition indicators. Based on an analysis of these indicators, an M&R alternative is selected to correct the condition; however, no life-cycle cost comparisons of the alternatives are considered. A major advantage of this approach is that the prescribed M&R alternative addresses the deficiencies found in the pavement. The disadvantage is that the choice may not be the most cost-effective method.

Life Cycle Approach

The "Life Cycle" approach requires not only an in-depth evaluation of the pavement under consideration, but also prediction of its future condition. This process ensures selection of the most economical M&R strategy, as determined on a life-cycle cost basis. Projection of future condition requires the ability to measure condition on an objective, repeatable scale. By projecting rate of change on an objective condition scale, a meaningful life-cycle cost analysis can be performed to compare the various M&R alternatives and the future maintenance costs associated with each. Not only is the best M&R alternative selected, but the optimal time of application is also determined. As discussed earlier, such a decision is critical in order to avoid the higher M&R costs caused by excessive deterioration.

Project- vs. Network-Level Management

The individual selection of the best M&R alternative for each project being considered is known as "project-level management." Each project is analyzed in detail and the most feasible alternative is selected on a case-by-case basis. Little or no consideration is given to the resource requirements of the other projects being evaluated. Engineers have traditionally been trained to work at the project level, which may be acceptable as long as money is abundant.

However, this approach is no longer feasible due to the ever increasing budget constraints. Top management is now demanding budget projections for each fiscal year. This process is not possible within current resources if there must be an in-depth evaluation for each project to arrive at required budgets. Instead, the pavement network must be inspected in less detail and at a faster rate to identify a list of potential projects. When the needs of the entire network are considered, the process is referred to as "network-level management." When a pavement section is selected as a potential project, only then is it scheduled for in-depth evaluation and selection of a specific M&R strategy at the project level.

In general, network-level management considers the agency's short- and long-range budget needs, present and future overall network condition, and the identification and prioritization of potential projects to be considered at the project level. At the project level, the primary objective is to select the most cost-effective M&R strategies within existing management constraints.

Network-Level Management in a PMS

In network-level management, current and future M&R requirements are determined by considering the needs of the entire pavement network. The most important step in analyzing network needs accurately is to project the future condition of each section. This projection provides the input needed to perform two tasks: (1) scheduling future condition inspections and (2) identifying sections that will require major M&R in future years for budget estimating.

Pavement sections are flagged for inspection when their projected condition falls below a user-specified minimum allowable condition level. Ordinarily, this will be the point at which the pavement begins the sharp decline in condition and at which M&R should be performed. Also, based on the section's rate of deterioration, or loss of PCI points per year, re-inspections are scheduled, allowing pavements with a high rate of deterioration to be inspected more often than those with a lower rate.

Some examples of MicroPAVER financial capabilities include:

Five-Year Budget Forecasts: Based on local maintenance costs, the deterioration rates of individual local pavements and other factors, MICROPAVER will estimate annual maintenance budget needs.

Budget Scenarios: MICROPAVER can develop "what if" maintenance budget scenarios that relate budget packages to expected street conditions and future budgets.

Forecasts of Pavement Condition: Forecasts of future pavement conditions can be developed reflecting the consequences of deferred maintenance.

Project Prioritization: MICROPAVER will target pavements that should receive immediate attention by using a variety of criteria selected by Kirkwood staff.

Life-Cycle Costing: There are several programs to help select the maintenance strategy with the lowest long-term (life-cycle) cost and longest life expectancy.

Budget Optimization: MICROPAVER will identify those maintenance alternatives and those projects under consideration that will optimize a given budget.

The forecasted budget requirements calculated by the PMS should be compared with the actual amount of money allocated for M&R in the program year. When the

forecasted budget requirements exceed the actual amount of dollars available, as is usually the case, a prioritization scheme should be developed to provide a method of determining which pavement sections will be repaired first. By comparing the prioritized projects with the actual budget, a list of potential projects which are candidates for M&R in the current program year is produced. This potential project list provides the basis for project-level management.

Typically most cities utilize a worst-first priority scheme as shown below.

"WORST-FIRST"

PCI Range	Arterial	Collector	Residential
56-100	7	8	9
41-55	4	5	6
0-41	1	2	3

However, extensive PMS research has shown the reverse priority scheme is most cost effective. That is, over the life of the pavement you realize higher service levels for less money when this type of priority scheme is used.

"COST-EFFECTIVE"

PCI Range	Arterial	Collector	Residential
56-100	1	3	6
41-55	2	5	8
0-41	4	7	9

Project-Level Management in a PMS

In project-level management, each section identified in the network analysis as a candidate for M&R in the current year should be subjected to a detailed condition survey. The results of these detailed surveys are then used to identify feasible alternatives that can correct existing deficiencies and prevent their recurrence. The various alternatives identified, including "no action," should be compared on a life-cycle cost basis. In addition, the economic feasibility of combining adjacent sections into one large project should be investigated. The results, combined with any budget and/or management constraints, produce the final M&R project list for the current program year. A more sophisticated analysis for the current year's projects would include consideration of the benefits associated with each feasible alternative for each section. An analysis of both benefits and life-cycle costs produce M&R alternatives that ensure maximum return on investment for the agency.

Benefits of a PMS

Implementation of a PMS benefits the user in several ways. With an objective, consistent method of evaluating pavement condition, M&R needs and priorities can be determined on a systematic, documented engineering basis. Necessary budget requirements can be identified for maintaining pavements at various levels of serviceability, and the effects on the pavement network of delaying the necessary repairs can be shown. Finally, a PMS can be used to ensure selection of the most cost-effective M&R strategy by performing a life-cycle analysis on all feasible M&R alternatives. It is important to remember that a PMS does not replace good engineering judgment. It serves only as a tool to assist the engineer in the decision-making process.

PAVEMENT CONDITION SURVEY AND RATING PROCEDURE

Overview

The most useful feature of an effective PMS is the ability to both determine the current condition of a pavement network and predict pavement condition some time into the future. To predict condition reliably, an objective, repeatable rating system for identifying the pavement's present condition must be used. The MICROPAVER System uses the PCI, a numerical index ranging from 0 for a failed pavement to 100 for a pavement in perfect condition, as its pavement condition rating.

The PCI is calculated based on the results of a visual condition survey in which distress type, severity, and quantity are identified. Field verification of the PCI inspection method has shown that the index gives a good indication of a pavement's structural integrity and operational condition. It has also been shown that, at the network level, the observation of existing distress in the pavement provides a useful index of both the current condition and an indication of future performance under existing traffic conditions, without requiring comprehensive testing programs such as roughness, skid resistance, and structural capacity. As a result, large savings can be realized in terms of both time and money.

The degree of pavement deterioration is a function of the type of surface distress, distress severity, and amount of distress. Because of the large number of possible combinations, producing one index that would take into account all three factors was one of the major problems in developing the PCI. To overcome this problem, "deduct values" were introduced as a type of weighing factor to indicate the size of the effect that each particular distress type, severity level, and distress density combination has on pavement condition. Based on input from field-testing and evaluating the procedure, accurate descriptions of distress types and severity levels, and the corresponding deduct values, were developed so that the PCI could be calculated.

Pavement Inspection Sampling Techniques

The inspection of every sample unit in a pavement section may require considerable effort, especially if the section is large. In an effort to limit the amount of resources required, a sampling plan was developed so that a reasonable estimate of the PCI could be determined by inspecting only a portion of the sample units in the pavement section. The degree of sampling depends on the current and projected use of the pavement as well as the objective of the survey. For streets and parking lots it is difficult to justify a high degree of sampling unless a project level evaluation is being performed.

DEVELOPMENT OF ANNUAL AND LONG-RANGE WORK PLANS USING MICROPAVER

Introduction

Several engineering studies have shown that the most economical way to preserve pavements is through preventive and timely application of the correct maintenance alternative. Figure 3 is a schematic diagram of a typical pavement condition life cycle showing the significant increase in maintenance cost if the pavement is allowed to deteriorate below a certain condition.

The MICROPAVER system provides personnel with an easy to use decision-making tool for pavement maintenance management. A step-by-step method for annual and long-range planning will help personnel prioritize the pavement system and allocate the budget at the network level. At the project level the MICROPAVER system can help choose the best maintenance and rehabilitation alternative. The goal of this technology is to maximize the pavement condition with the available funds.

ANNUAL WORK PLAN

An Annual Work Plan (AWP) consists of two parts. Annual Recurring Requirements (ARR) and Programmed Year Projects (PYP). Following is a description of each, as well as guidelines for their development using the MICROPAVER system.

Preventive Maintenance

Preventive maintenance consists of activities intended to show the deterioration of street pavement in order to preserve the pavement investment. There are two types of preventive maintenance: localized and global. Localized preventive maintenance includes crack sealing and various patching techniques. Global preventive maintenance includes various methods of surface sealing for asphalt pavements and joint sealing for concrete payments.

The Critical PCI is defined as the PCI value below which the pavement shows a significant increase in the rate of deterioration and preventive maintenance cost. The

Critical PCI is usually between 55 and 70. A value of 55 is most likely to be selected unless otherwise indicated.

As you can see in Figure 3, the City is currently at an overall PCI of 64 which is slightly above the critical PCI of 55. The significance of this fact cannot be overstated. The implication is clear that the City's streets as a whole are at a point in their life cycle that will result in ever increasing deterioration and maintenance costs if something is not done to reverse this trend.

Global preventive maintenance is recommended for those asphalt pavement sections having a PCI above the Critical value and showing minor or no structural distress. The specific type of maintenance depends on the age of the pavement, usage, and existing distresses. For example, a pavement with weathering and raveling will benefit from a fog seal or a rejuvenator. A pavement with a smooth surface or skid problem should not be treated with a rejuvenator but instead should be considered for a chip or slurry seal or programmed for a thin overlay. Global preventive maintenance for PCC pavements usually consists of joint sealing.

Programmed Year Projects (PYP)

PYP includes all pavement sections at or below the Critical PCI as well as sections above the Critical PCI that are beginning to show structural distress. If the budget permitted, performing the most cost-effective M&R on all the PYP sections would be desirable. However, this is usually not the situation. Therefore, it is important to prioritize these sections to ensure the highest return on investment and to meet managerial constraint sand references

APPENDIX C

MICROPAVER Summary Reports

PCI Ratings (by maintenance zones)

PCI Ratings Citywide (Sorted by Maintenance Zone)

Name		To	Width	Length	PID	Section Area (SF)	Pavement Type	Zone	PCI	Number of Sections
Alice Ave.	Scott	dead end	23.	825.	KirkwoodMO::Alice::001	18,975.00	AC	E	**51**	
Angenette Ave.	E. Rosehill north	Thomas	27.	680.	KirkwoodMO::Angenette::002	18,360.00	AC	E	**43**	
Angenette Ave.	E. Woodbine south	island at Thomas	22.	754.	KirkwoodMO::Angenette::001	16,588.00	PCC	E	**54**	
Ashwood Ln.	S. Geyer	Boxelder	27.	675.	KirkwoodMO::AshwoodLn::001	18,225.00	PCC	E	**62**	
Bouyer Ln.	S. Fillmore	dead end	14.	315.	KirkwoodMO::Bouyer::001	4,410.00	AAC	E	**4**	
Boxelder Dr.	Ashwood	401/404 Ashwood	27.	1,000.	KirkwoodMO::BoxelderDr::001	27,000.00	PCC	E	**60**	
Chester Ave.	Kirkwood Rd.	S. Taylor	26.	520.	KirkwoodMO::Chester::001	13,520.00	AC	E	**47**	
Clark Ave.	Leffngwell	dead end at E. Eliott	26.	822.	KirkwoodMO::ClarkAve::001	21,372.00	PCC	E	**41**	
Clark Ave.	E. Argonne	dead end	22.	1,855.	KirkwoodMO::Clark::001	40,810.00	AC	E	**46**	
College Ave.	S. Clay	dead end	16.	260.	KirkwoodMO::College::001	4,160.00	AC	E	**100**	
Commerce Ave.	S. Taylor	S. Fillmore	25.	800.	KirkwoodMO::Commerce::001	20,000.00	AC	E	**45**	
Creekside Place	E. Clinton	cul de sac	26.	400.	KirkwoodMO::Creekside::001	10,400.00	PCC	E	**87**	
Dickson St.	E. Adams	E. Essex	24.	2,025.	KirkwoodMO::DicksonSt::002	48,600.00	AC	E	**46**	
Dickson St.	E. Argonne	E. Adams	25.	795.	KirkwoodMO::DicksonSt::001	19,875.00	AC	E	**100**	
Dickson St.	E. Argonne	E. Adams	25.	795.	KirkwoodMO::DicksonSt::000	19,875.00	AC	E	**66**	
E Woodbine Ave	Fillmore	E. side of S Taylor	24.	595.	KirkwoodMO::EWoodbine::002	13,560.00	PCC	E	**41**	
E Woodbine Ave	Kirkwood Rd	east curbline of Taylor	25.	924.	KirkwoodMO::EWoodbine::001	23,100.00	PCC	E	**52**	
E. Argonne Dr.	Kirkwood Rd east	west curbline N. Taylor	84.	625.	KirkwoodMO::EArgonn::001	52,500.00	AC	E	**48**	
E. Argonne Dr.	N. Taylor east curbline	Woodlawn	30.	1,925.	KirkwoodMO::EArgonn::002	57,750.00	AC	E	**59**	
E. Argonne Dr.	Woodlawn east curbline	Holmes	30.	1,665.	KirkwoodMO::EArgonn::003	49,950.00	AC	E	**77**	
E. Clinton Place	Kirkwood Rd	S. Taylor	24.	615.	KirkwoodMO::EClinton::001	14,760.00	PCC	E	**71**	
E. Clinton Place	S. Taylor	S. Fillmore	24.	591.	KirkwoodMO::EClinton::002	14,184.00	PCC	E	**56**	
E. Clinton Place	Leffingwell	dead nd	19.	760.	KirkwoodMO::EClinton::004	14,440.00	AC	E	**54**	
E. Clinton Place	S. Fillmore	Leffingwell	30.	860.	KirkwoodMO::EClinton::003	25,800.00	AC	E	**67**	
E. Elliot Ave.	Leffingwell	Clark	20.	975.	KirkwoodMO::EElliot::001	19,500.00	AC	E	**52**	
E. Elliott Ave.	Holmes	dead end	24.	563.	KirkwoodMO::EEliott::001	13,512.00	PCC	E	**46**	
E. Jefferson Ave.	Holmes	Dickson	24.	560.	KirkwoodMO::EJefferson::004	13,440.00	PCC	E	**52**	
E. Jefferson Ave.	Woodlawn	Dickson	25.	750.	KirkwoodMO::EJefferson::003	18,750.00	AAC	E	**54**	
E. Jefferson Ave.	N. Taylor	Woodlawn	25.	1,900.	KirkwoodMO::EJefferson::002	47,500.00	AC	E	**45**	
E. Madison Ave	Woodlawn	E. to Smith	24.	608.	KirkwoodMO::EMadison::003	14,592.00	PCC	E	**100**	
E. Madison Ave	Clark	Holmes	20.	680.	KirkwoodMO::EMadison::001	13,600.00	AC	E	**48**	
E. Madison Ave	Woodlawn	w. curbline Clark	25.	640.	KirkwoodMO::EMadison::002	16,000.00	AC	E	**45**	
E. Madison Ave	S. Fillmore	Smith	25.	630.	KirkwoodMO::EMadison::004	15,750.00	AC	E	**61**	
E. Madison Ave	S. Fillmore	S. Taylor	29.	680.	KirkwoodMO::EMadison::005	19,720.00	AC	E	**57**	
E. Monroe Ave.	Holmes	Woodlawn	25.	1,675.	KirkwoodMO::EMonroe::001	41,875.00	AC	E	**52**	
E. Monroe Ave.	Woodlawn	Gilbert/Scott	21.	940.	KirkwoodMO::EMonroe::002	19,740.00	AC	E	**78**	
E. Monroe Ave.	S. Taylor	S. Fillmore	36.	600.	KirkwoodMO::EMonroe::003	21,600.00	AC	E	**58**	
E. Monroe Ave.	Kirkwood Rd.	N.Taylor	36.	620.	KirkwoodMO::EMonroe::004	22,320.00	AC	E	**58**	
E. Rosehill Ave.	Kirwood Rd.	Fillmore	32.	1,350.	KirkwoodMO::ERosehill::001	43,200.00	AC	E	**48**	
Edgewood Ln.	E. Rosehill	Nipher parking lot	25.	225.	KirkwoodMO::Edgewood::001	5,625.00	AC	E	**100**	
Gilbert St.	E. Argonne	E. Madison	26.	355.	KirkwoodMO::Gilbert::001	9,230.00	AC	E	**42**	
Gilbert St.	E. Madison	E. Monroe	18.	435.	KirkwoodMO::Gilbert::002	7,830.00	AC	E	**35**	
Gordon Place	Big Bend	228 ft. N	26.5	228.	KirkwoodMO::GordonPl::001	6,042.00	PCC	E	**81**	
Grand Ave.	S. Harrison	Minnie	25.	890.	KirkwoodMO::Grand::002	22,250.00	AC	E	**49**	
Grand Ave.	Kirkwood Rd	Minnie	24.	477.	KirkwoodMO::Grand::001	11,448.00	PCC	E	**44**	
Handlan Ct.	E. Argonne	dead end	21.	160.	KirkwoodMO::Handlan::001	3,360.00	AC	E	**100**	
Heege Ave.	S. Harrison	S. Van Buren	21.	635.	KirkwoodMO::Heege::001	13,335.00	AC	E	**52**	
Hillcrest Place	W. Woodbine	dead end	26.	370.	KirkwoodMO::Hillcrest::001	9,620.00	AC	E	**53**	

Idlewild Place	S. Clay	Kirkwood Rd.	27.	630.	KirkwoodMO::Idlewild::001	17,010.00	AC	E	**100**
Kirkwood Rd.	RR Tracks north	MoDOT RW near Swan	44.	4,475.	KirkwoodMO::KirkwoodRd::002	196,900.00	AC	E	**65**
Kirkwood Rd.	RR tracks south	MoDOT ROW	44.	4,410.	KirkwoodMO::KirkwoodRd::001	194,040.00	AC	E	**52**
Lee Ave.	S. Harrison	S. Geyer	25.	1,290.	KirkwoodMO::Lee::001	32,250.00	AC	E	**67**
Leffingwell Ave.	Holmes	section 001 (APC)	24.	754.	KirkwoodMO::Leffngwell::002	18,096.00	PCC	E	**42**
Leffingwell Ave.	rr tracks south	section 002 (PCC)	23.	3,385.	KirkwoodMO::Leffingwel::001	77,855.00	AC	E	**68**
McCullough Ave.	S. Clay	S. Van Buren	26.	1,250.	KirkwoodMO::McCullough::001	32,500.00	AC	E	**62**
Midway Ave.	S. Harrison	dead end	19.	475.	KirkwoodMO::Midway::002	9,025.00	AC	E	**49**
Minnie Ave.	dead end	Grand	24.	477.	KirkwoodMO::MinnieAve::001	11,448.00	PCC	E	**45**
Miriam Ave.	Scott	dead end	22.	780.	KirkwoodMO::Miriam::001	17,160.00	AC	E	**69**
Mitchell Place	E. Argonne	E. Jefferson	25.	480.	KirkwoodMO::Mitchell::001	12,000.00	AC	E	**55**
Monroe Place	S. Geyer	S. Van Buren	21.	725.	KirkwoodMO::MonroePl::001	15,225.00	AC	E	**60**
N. Clay Ave	W. Argonne (south curbline)	W. Adams (south curbline)	37.	765.	KirkwoodMO::NClay::000	28,305.00	AC	E	**51**
N. Harrison Ave.	W. Argonne north	W. Adams (south curbline)	31.	730.	KirkwoodMO::NHarrison::001	22,630.00	AC	E	**40**
N. Taylor Ave.	E. Adams south	E. Argonne	36.	710.	KirkwoodMO::NTaylor::001	25,560.00	AC	E	**44**
N. Van Buren Ave.	W. Adams	W. Argonne	31.	730.	KirkwoodMO::NVanBuren::003	22,630.00	PCC	E	**100**
N. Woodlawn Ave.	E. Adams	E. Argonne	35.	1,600.	KirkwoodMO::NWoodlawn::004	52,675.00	AC	E	**46**
Norton Ave.	Lillian	dead end	24.	765.	KirkwoodMO::Norton::001	18,360.00	AC	E	**71**
Ohlman Ave.	Commerce	Gordon Place	27.	835.	KirkwoodMO::Ohlman::001	22,545.00	AC	E	**80**
Prospect Ave.	Kirkwood Rd.	dead end	24.	700.	KirkwoodMO::Prospect::001	16,800.00	AC	E	**50**
Reardon Dr	S. Fillmore	cul de sac	27.	630.	KirkwoodMO::Reardon::001	17,010.00	PCC	E	**47**
Rollingwood Ln	S Geyer	cul de sac	27.	620.	KirkwoodMO::Rollwood::001	16,740.00	PCC	E	**38**
Rose Ln.	S. Harrison	cul de sac	23.	1,140.	KirkwoodMO::Rose::001	29,250.00	PCC	E	**90**
S Fillmore Ave	Big Bend	555 ft N.	28.	555.	KirkwoodMO::SFillmore::001	15,540.00	PCC	E	**68**
S Fillmore Ave	Scott Ave. south	E. Clinton (south curbline)	36.	1,645.	KirkwoodMO::SFillmore::002	59,220.00	AC	E	**65**
S Fillmore Ave	Rosehill north	E. Clinton (south curbline)	37.	1,550.	KirkwoodMO::SFillmore::003	57,350.00	AC	E	**62**
S. Clay Ave.	W. Rose Hill	north curbline of W. Woodbine	24.	1,375.	KirkwoodMO::SClay::001	33,000.00	PCC	E	**84**
S. Clay Ave.	south curbline W. Argonne	north bridge approach @ RR tracks	25.	150.	KirkwoodMO::SClay::003	3,750.00	PCC	E	**61**
S. Clay Ave.	W. Woodbine (north curbline)	RR Bridge (south bent)	37.	2,055.	KirkwoodMO::SClay::002	76,035.00	AC	E	**52**
S. Elliot Ave.	Leffingwell	dead end	25.	1,125.	KirkwoodMO::SElliot::001	28,125.00	AC	E	**81**
S. Fillmore Ave	E. Argonne south	RR Tracks/Scott	26.	725.	KirkwoodMO::SFillmore::004	18,850.00	AC	E	**61**
S. Fillmore Ave	Section 001 (PCC)	dead end @ RRTracks	28.	465.	KirkwoodMO::SFillmore::005	13,020.00	AC	E	**41**
S. Geyer Rd. (NBL only)	W. Argonne	W. Madison	18.	480.	KirkwoodMO::SGeyer::007	8,640.00	AC	E	**45**
S. Harrison Ave.	W. Rose Hill	Lee	24.	359.	KirkwoodMO::SHarrison::002	8,616.00	PCC	E	**82**
S. Harrison Ave.	W. Woodbine	RR tracks	26.	1,865.	KirkwoodMO::SHarrison::004	48,490.00	AC	E	**63**
S. Harrison Ave.	W. Rosehill	Grand	22.	665.	KirkwoodMO::SHarrison::001	14,630.00	AC	E	**62**
S. Harrison Ave.	W. Woodbine	Lee (south curbline)	25.	975.	KirkwoodMO::SHarrison::003	24,375.00	AC	E	**67**
S. Harrison Ave.	W. Monroe (north curbline	RR Bridge (south bent)	32.	125.	KirkwoodMO::SHarrison::005	4,000.00	AC	E	**51**
S. Harrison Ave.	W. Argonne	RR Bridge (north bent)	31.	540.	KirkwoodMO::SHarrison::006	16,740.00	AC	E	**63**
S. Taylor Ave.	E. Woodbine north	E. Monroe	37.	1,640.	KirkwoodMO::STaylor::002	60,680.00	AC	E	**57**
S. Taylor Ave.	dead end @ RR Tracks	cul de sac	23.	975.	KirkwoodMO::STaylor::001	22,425.00	AC	E	**47**
S. Taylor Ave.	E. Argonne	E. Monroe	37.	708.	KirkwoodMO::STaylor::003	26,196.00	AC	E	**50**
S. Van Buren Ave.	W. Woodbine north	RR tracks	30.	1,380.	KirkwoodMO::SVanBuren::001	41,400.00	AC	E	**79**
S. Woodlawn Ave.	E. Adams south	Scott	24.	1,400.	KirkwoodMO::SWoodlawn::001	54,360.00	AC	E	**47**
Sante Ave.	S. Fillmore	dead end	24.	365.	KirkwoodMO::Sante::001	8,760.00	AC	E	**28**
Scott Ave.	S. Woodlawn @ eyebrow	S. Fillmore	22.	1,400.	KirkwoodMO::Scott::002	30,800.00	AC	E	**51**
Scott Ave.	Holmes	Woodlawn	24.	1,690.	KirkwoodMO::Scott::001	40,560.00	AC	E	**45**
Silver Ln.	McCullough (west leg)	McCullough (east leg)	25.	665.	KirkwoodMO::Silver::001	16,625.00	AC	E	**59**
Smith St.	E. Argonne	E. Monroe	25.	820.	KirkwoodMO::Smith::001	20,500.00	AC	E	**72**
Smith St.	E. Monroe	Scott	22.	200.	KirkwoodMO::Smith::002	4,400.00	AC	E	**57**
Thomas Ave.	S. Fillmore	dead end @ Nipher service road	19.	600.	KirkwoodMO::Thomas::001	11,400.00	AC	E	**63**
W. Argonne Dr.	N Harrison	N. geyer	30.	1,295.	KirkwoodMO::WArgonne::003	38,850.00	AAC	E	**71**

W. Argonne Dr.	N. Harrison	N. Clay	40.	615.	KirkwoodMO::WArgonne::002	24,600.00	AAC	E	**58**	
W. Argonne Dr.	N. Clay	N. Harrison	84.	625.	KirkwoodMO::WArgonne::001	52,500.00	AAC	E	**63**	
W. Clinton Place	Kirkwood Rd.	S. Clay	28.	635.	KirkwoodMO::WClinton::001	17,780.00	AC	E	**48**	
W. Jefferson Avenue	N. Clay	Kirkwood Rd	43.	625.	KirkwoodMO::WJefferson::004	26,875.00	AC	E	**43**	
W. Jefferson Avenue	N. geyer	w. curbline of Van Buren	25.	635.	KirkwoodMO::WJefferson::001	15,875.00	AC	E	**49**	
W. Jefferson Avenue	N Harrison	N Clay	35.	615.	KirkwoodMO::WJefferson::003	21,525.00	AC	E	**70**	
W. Jefferson Avenue	S. Van Buren	N. Harrison	25.	600.	KirkwoodMO::WJefferson::002	15,000.00	PCC	E	**40**	
W. Madison Ave.	Kirkwood Rd	S. Clay	33.	625.	KirkwoodMO::WMadison::003	20,625.00	PCC	E	**100**	
W. Madison Ave.	S. Van Buren	S. Harrison	25.	625.	KirkwoodMO::WMadison::002	15,625.00	AC	E	**55**	
W. Madison Ave.	S. Geyer	S. Van Buren	25.	655.	KirkwoodMO::WMadison::001	16,375.00	AC	E	**53**	
W. Monroe Ave.	Kirkwood Rd.	N. Clay (east curbline)	32.	625.	KirkwoodMO::WMonroe::001	20,000.00	AC	E	**61**	
W. Monroe Ave.	S. Clay (west curbline)	Bend next to RR Tracks	28.	825.	KirkwoodMO::WMonroe::002	23,100.00	AC	E	**72**	
W. Monroe Ave.	S. Van Buren (east curbline)	section 002 (bend at RR tracks)	24.	540.	KirkwoodMO::WMonroe::003	12,960.00	AC	E	**58**	
W. Monroe Ave.	S. Van Buren	S. Geyer	21.	645.	KirkwoodMO::WMonroe::004	13,545.00	AC	E	**67**	
W. Woodbine Ave.	Kirkwood Rd.	S. Geyer	34.	2,525.	KirkwoodMO::WWoodbine::001	85,850.00	AC	E	**65**	
Whitson Ave.	E. Clinton	dead end	20.	355.	KirkwoodMO::Whitson::001	7,100.00	AC	E	**52**	
Willow Ct.	W Woodbine	cul de sac	27.	280.	KirkwoodMO::Willow::001	7,560.00	AC	E	**44**	
						22.64			**58.3**	**118**
Adams Ln.	E. Adams	dead end	20.	370.	KirkwoodMO::Adams::001	7,400.00	AC	NE	**76**	
Alexandra Dr.	Belson Ct	cul de sac	27.	800.	KirkwoodMO::Alexandra::001	21,600.00	PCC	NE	**45**	
Alfred Ave.	Wood	dead end	25.	550.	KirkwoodMO::Alfred::001	13,750.00	AC	NE	**74**	
Ascot Ln.	Mariedale	cul de sac	27.	395.	KirkwoodMO::Ascot::001	10,665.00	PCC	NE	**98**	
Avery Ct.	Avery Dr.	Avery Ct.	27.	1,480.	KirkwoodMO::AveryCt::001	39,960.00	AC	NE	**77**	
Avery Dr.	N. Harrison	N. Clay	23.	680.	KirkwoodMO::AveryDr::001	15,640.00	AC	NE	**66**	
Bambury Way	Woodlawn	cul de sac	24.	1,362.	KirkwoodMO::Bambury::001	32,688.00	PCC	NE	**46**	
Barry Ct.	Wilson	cul de sac	27.	585.	KirkwoodMO::BarryCt::001	15,795.00	PCC	NE	**96**	
Barter Ave.	N. Geyer	Evans Ave.	19.	930.	KirkwoodMO::Barter::001	17,670.00	AC	NE	**34**	
Barter Ave.	Evans	N. Harrison	25.	370.	KirkwoodMO::Barter::002	9,250.00	AC	NE	**50**	
Barter Ave.	N. Harrison	Kirkwood Rd.	25.	695.	KirkwoodMO::Barter::003	17,375.00	AC	NE	**44**	
Belson Ct	Dickson St	cul de sac	27.	750.	KirkwoodMO::BelsonCt::001	20,250.00	PCC	NE	**54**	
Belva Ave.	Simmons	Evans	20.	506.	KirkwoodMO::Belva::001	10,120.00	AC	NE	**49**	
Bernice Ave.	Manchester Rd	Quan	21.	1,570.	KirkwoodMO::Bernice::001	32,970.00	AC	NE	**59**	
Bogey Ln.	N. Woodlawn	Club	24.	1,195.	KirkwoodMO::Bogey::001	28,680.00	AC	NE	**75**	
Brookhaven Ct	Dickson (west)	Southbrook Dr	27.	565.	KirkwoodMO::Brookhaven::002	15,255.00	APC	NE	**63**	
Brookhaven Ct	Dickson (east)	cul de sac	24.	840.	KirkwoodMO::Brookhaven::001	20,160.00	AAC	NE	**46**	
Brownell Ave.	Dickson	City Limits (Glendale)	27.	1,125.	KirkwoodMO::Brownell::001	30,375.00	AC	NE	**72**	
Central Place	N. Harrison	east side of Van Buren	30.	617.	KirkwoodMO::Central::001	18,510.00	PCC	NE	**35**	
Central Place	N. Geyer	Van Buren (west curbline)	31.	650.	KirkwoodMO::Central::002	20,150.00	AC	NE	**34**	
Charlene Dr.	Evans	N. Harrison	20.	260.	KirkwoodMO::Charlene::001	5,200.00	AC	NE	**43**	
Charlene Dr.	Simmons	Folger	22.	260.	KirkwoodMO::Charlene::002	5,720.00	AC	NE	**64**	
Chelsea Ave.	Dickson	Brownell	27.	880.	KirkwoodMO::ChelseaAve::001	23,760.00	AC	NE	**63**	
Chelsea Ct.	Chelsea Ave.	cul de sac	27.	200.	KirkwoodMO::ChelseaCt::001	5,400.00	AC	NE	**69**	
Churchill Ln.	N. Taylor	cul de sac	26.	575.	KirkwoodMO::Churchill::001	14,950.00	AC	NE	**82**	
Claybrook Ln.	Longview	cul de sac	24.	380.	KirkwoodMO::Claybrook::001	9,120.00	AC	NE	**100**	
Cleveland Ave.	W. Essex	Peeke	24.	1,367.	KirkwoodMO::Cleveland::001	32,808.00	PCC	NE	**93**	
Cleveland Ave.	Wilson	Peeke	20.	1,595.	KirkwoodMO::Cleveland::002	31,900.00	AC	NE	**59**	
Club Ln.	Longview	Par	24.	795.	KirkwoodMO::Club::001	19,080.00	AC	NE	**60**	
Cranbrook Dr.	Dickson (north leg)	Dickson (south leg)	27.	1,375.	KirkwoodMO::Cranbrook::001	37,125.00	AC	NE	**88**	
Crescent Dr.	Dickson	N/S Cresent (west curbline)	17.	280.	KirkwoodMO::Crescent::001	4,760.00	AC	NE	**64**	
Curran Ave.	Manchester Rd.	Quan	21.	1,540.	KirkwoodMO::Curran::001	32,340.00	AC	NE	**47**	
Delshire Ct.	E. Gill	cul de sac	22.	225.	KirkwoodMO::Delshire::001	4,950.00	AC	NE	**76**	

Dewberry Ct.	Quan	cul de sac	28.	300.	KirkwoodMO::Dewberry::001	8,400.00	PCC	NE	**82**
Dickson St.	E. Essex north	Greenridge Manor	20.	1,970.	KirkwoodMO::DicksonSt::003	39,400.00	AC	NE	**75**
Dickson St.	Manchester Rd. south	Greenridge Manor	22.	2,500.	KirkwoodMO::DicksonSt::004	55,000.00	AC	NE	**37**
Doerwood Ct.	N. Woodlawn	cul de sac	27.	885.	KirkwoodMO::DoerwoodCt::001	23,895.00	PCC	NE	**47**
Doorack Ln.	N. Clay	cul de sac	27.	600.	KirkwoodMO::Doorack::001	16,200.00	AC	NE	**48**
Douglas Ln.	E. Adams	dead end	18.	235.	KirkwoodMO::Douglas::001	4,230.00	AC	NE	**23**
Douglas Ln.	E. Adams	Douglas	19.	456.	KirkwoodMO::Douglas::002	8,664.00	AC	NE	**35**
Drury Ln.	Dickson	cul de sac	27.	415.	KirkwoodMO::Drury::001	11,205.00	APC	NE	**72**
E. Bodley	Kirkwood Rd.	N. Taylor	22.	638.	KirkwoodMO::EBodley::001	14,036.00	AC	NE	**31**
E. Bodley	N. Taylor	N. Woodlawn	22.	2,210.	KirkwoodMO::EBodley::002	48,620.00	AC	NE	**61**
E. Essex Ave.	Kirkwood Rd	N. Taylor	25.	645.	KirkwoodMO::EEssex::001	16,125.00	AC	NE	**87**
E. Essex Ave.	N. Woodlawn	City Limits Glendale	21.	1,700.	KirkwoodMO::EEssex::003	35,700.00	AC	NE	**81**
E. Essex Ave.	Longview	N. Woodlawn	27.	365.	KirkwoodMO::EEssex::002	9,855.00	AC	NE	**80**
E. Gill Ln.	N. Woodlawn	N. Fillmore	22.	1,285.	KirkwoodMO::EGill::001	28,270.00	AC	NE	**40**
E. Jefferson Ave.	N. Taylor	Kirkwood Rd	43.	625.	KirkwoodMO::EJefferson::001	26,875.00	AC	NE	**64**
E. Jewel Ave.	Kirkwood Rd	N. Taylor	24.	629.	KirkwoodMO::EJewel::001	15,096.00	PCC	NE	**55**
E. Maple Ave.	N. Taylor	dead end	20.	410.	KirkwoodMO::EMaple::002	8,200.00	AC	NE	**41**
E. Maple Ave.	Kirkwood Rd.	dead end	20.	185.	KirkwoodMO::EMaple::001	3,700.00	AC	NE	**65**
E. Mermod Ave.	Kirkwood Rd.	dead end	21.	385.	KirkwoodMO::Emermod::001	8,085.00	AC	NE	**46**
E. Sarah Ave.	Bernice	Kirkwood Rd	18.	1,150.	KirkwoodMO::ESarah::001	20,700.00	AC	NE	**55**
E. Washington Ave.	Kirkwood Rd	N. Taylor	33.	635.	KirkwoodMO::EWashingtn::001	20,955.00	AC	NE	**72**
E. Washington Ave.	N. Taylor	N. Fillmore	33.	605.	KirkwoodMO::EWashingtn::002	19,965.00	AC	NE	**64**
Earl Ave.	Manchester Rd.	dead end	20.	300.	KirkwoodMO::Earl::001	6,000.00	AC	NE	**61**
Eastwood Dr.	Dickson	Meadowridge	27.	1,025.	KirkwoodMO::EastwoodDr::001	27,675.00	PCC	NE	**93**
Erichson Place	Longview	cul de sac	26.	330.	KirkwoodMO::Erichson::001	8,580.00	AC	NE	**93**
Evans Ave	Wilson	Peeke	24.	1,575.	KirkwoodMO::Evans::002	37,800.00	PCC	NE	**91**
Evans Ave	Essex	Peeke	24.	1,350.	KirkwoodMO::Evans::001	32,400.00	PCC	NE	**45**
Evans Ave	Manchester Rd	Belva	22.	1,213.	KirkwoodMO::Evans::003	26,686.00	AC	NE	**76**
Fairway	N. Woodlawn	Club	24.	1,195.	KirkwoodMO::Fairway::001	28,680.00	AC	NE	**79**
Fairwood Ln.	Longview	cul de sac	24.	515.	KirkwoodMO::Fairwood::001	12,360.00	AC	NE	**54**
Fillmore Ln.	N. Fillmore	cul de sac	18.	731.	KirkwoodMO::Fillmore::001	13,158.00	AC	NE	**56**
Florist Ave,	Dickson	dead end	20.	442.	KirkwoodMO::Florist::001	8,840.00	AC	NE	**97**
Folger Ave.	Manchester	Belva	28.	1,240.	KirkwoodMO::Folger::001	34,720.00	AC	NE	**57**
Garden Ln.	Kirkwood Rd.	cul de sac	23.	838.	KirkwoodMO::Garden::001	19,274.00	AC	NE	**32**
Gaslite Ln.	Dickson	cul de sac	25.	775.	KirkwoodMO::Gaslite::001	19,375.00	AC	NE	**64**
Girard Place	N. Clay	cul de sac	31.	445.	KirkwoodMO::Girard::001	13,795.00	AC	NE	**41**
Glendover Dr.	Brownell	Chelsea Ave.	27.	645.	KirkwoodMO::Glendover::001	17,415.00	AC	NE	**76**
Greenleaf Dr.	N. Woodlawn	Longview	27.	1,120.	KirkwoodMO::Greenleaf::001	30,240.00	AC	NE	**63**
Greenridge Manor Ln.	Dickson	cul de sac	28.	490.	KirkwoodMO::GrnrdgMan::001	13,720.00	PCC	NE	**57**
Hartmann Ct.	Dickson	cul de sac	26.	358.	KirkwoodMO::Hartmann::001	9,308.00	PCC	NE	**100**
Hawbrook Ave.	Dickson	Parkwoods	20.	407.	KirkwoodMO::Hawbrook::002	8,140.00	PCC	NE	**63**
Hawbrook Ave.	Glendale City Limits	Parkwoods	20.	608.	KirkwoodMO::Hawbrook::003	12,160.00	PCC	NE	**60**
Hawbrook Ave.	Hawbrook	E. Adams/Lockwood	24.	780.	KirkwoodMO::Parkwood::001	18,720.00	AC	NE	**78**
Hawbrook Ave.	Hawbrook north	cul de sac	23.	890.	KirkwoodMO::Parkwood::002	20,470.00	AC	NE	**91**
Hawbrook Ave.	E. Essex	cul de sac	26.	495.	KirkwoodMO::Parkwood::003	12,870.00	AC	NE	**62**
Hawbrook Ct.	Hawbrrok Ave.	cul de sac	36.	180.	KirkwoodMO::HawbrookCt::001	6,480.00	AC	NE	**97**
Hawbrook Ln.	Dickson (south)	Dickson (north)	24.	465.	KirkwoodMO::HawbrookLn::001	11,160.00	AAC	NE	**96**
Hill Dr.	#28/30 Hill	#53 Hill	24.	720.	KirkwoodMO::HillDr::001	17,280.00	AC	NE	**60**
Hollywood Ln.	N. Taylor	Kirkwood Rd.	20.	650.	KirkwoodMO::Hollywood::001	13,000.00	APC	NE	**96**
Homewood Ln.	E. Bodley	cul de sac	25.	1,250.	KirkwoodMO::Homewood::001	31,250.00	AC	NE	**45**
Huntleigh Dr.	Lindbergh	Lynchester	31.	1,210.	KirkwoodMO::HunteigDr::001	37,510.00	APC	NE	**72**
Huntleigh Forest Dr.	Lindbergh	cul de sac	27.	745.	KirkwoodMO::Huntleigh::001	20,115.00	PCC	NE	**47**

Hyacinth Ct.	N. Clay	cul de sac	22.	480.	KirkwoodMO::Hyacinth::001	10,560.00	APC	NE	**43**
Julia Place	Wood	Woodlawn	23.	900.	KirkwoodMO::Julia::001	20,700.00	AC	NE	**89**
Lawn Ct.	Quan	cul de sac	27.	285.	KirkwoodMO::Lawn::001	7,695.00	APC	NE	**48**
Lewiston Dr.	Dickson	cul de sac	23.	1,240.	KirkwoodMO::Lewiston::001	28,520.00	AC	NE	**69**
Longview Blvd.	N. Taylor	Woodlawn	40.	2,350.	KirkwoodMO::Longview::001	94,000.00	AC	NE	**88**
Luther Ln.	Hawbrook south	City Limits	24.	400.	KirkwoodMO::Luther::001	9,600.00	AC	NE	**92**
Lynchester Ln.	Manchester Rd north	1262 Lynchester	31.	900.	KirkwoodMO::Lynchester::001	27,900.00	APC	NE	**72**
Manlyn Dr.	N. Talor	Kirkwood Rd.	32.	660.	KirkwoodMO::Manlyn::001	21,120.00	AC	NE	**54**
Mariedale Ct.	Manchester Rd	section 002 (AAC)	27.	200.	KirkwoodMO::Mariedale::001	5,400.00	PCC	NE	**44**
Mariedale Ct.	section 001	cul de sac	21.	545.	KirkwoodMO::Mariedale::002	11,445.00	AC	NE	**80**
Mariedale Dr.	Mariedale Ct.	Ascot	27.	534.	KirkwoodMO::MariedaleD::001	14,418.00	PCC	NE	**64**
Meadowridge Dr.	Dickson west	section 002 (PCC)	27.	670.	KirkwoodMO::MeadowgDr::001	18,090.00	AC	NE	**48**
Meadowridge Dr.	section 001 (AC)	Eastwood	27.	500.	KirkwoodMO::MeadowgDr::002	13,500.00	PCC	NE	**100**
Meadowridge Ln.	Dickson east to	cul de sac	27.	483.	KirkwoodMO::Meadowrdg::001	13,041.00	PCC	NE	**46**
Morningside Dr.	N. taylor	Kirkwood Rd.	24.	650.	KirkwoodMO::Morningsid::001	15,600.00	AC	NE	**53**
N. Clay Ave	Manchester	Wilson	26.	886.	KirkwoodMO::NClay::005	23,036.00	PCC	NE	**69**
N. Clay Ave	W. Adams	Peeke	28.	1,380.	KirkwoodMO::NClay::002	38,640.00	PCC	NE	**100**
N. Clay Ave	W. Adams	W. Essex	33.	2,000.	KirkwoodMO::NClay::001	66,000.00	AC	NE	**45**
N. Clay Ave	Wilson (south curbline)	Barter	24.	1,080.	KirkwoodMO::NClay::004	25,920.00	AC	NE	**60**
N. Clay Ave	Peeke (north curbline)	Barter (north curbline)	24.	560.	KirkwoodMO::NClay::003	13,440.00	APC	NE	**72**
N. Clay Ave	Manchester Rd north	Maple Hill (PCC)	20.	485.	KirkwoodMO::NClay::006	9,700.00	AC	NE	**80**
N. Crescent Dr.	Woodlawn	Cresent	17.	470.	KirkwoodMO::NCrescent::001	7,990.00	AC	NE	**65**
N. Dickson St.	Mariedale	cul de sac	27.	405.	KirkwoodMO::NDicksonSt::001	10,935.00	PCC	NE	**73**
N. Fillmore Ave.	E. Adams	E. Gill	33.	695.	KirkwoodMO::NFillmore::002	22,935.00	AC	NE	**49**
N. Harrison Ave.	Manchester south	Peek	24.	2,400.	KirkwoodMO::NHarrison::004	57,600.00	PCC	NE	**94**
N. Harrison Ave.	W. Adams	W. Essex	25.	1,990.	KirkwoodMO::NHarrison::002	49,750.00	AC	NE	**35**
N. Harrison Ave.	W. Essex	Peeke	31.	1,355.	KirkwoodMO::NHarrison::003	42,005.00	AC	NE	**85**
N. Harrison Ave.	Manchester Rd	dead end	23.	1,140.	KirkwoodMO::NHarrison::005	26,220.00	AC	NE	**64**
N. Holmes Ave.	E. Essex	dead end	24.	285.	KirkwoodMO::NHolmes::001	6,840.00	AC	NE	**100**
N. Taylor Ave.	Manlyn	Hollywood	24.	271.	KirkwoodMO::NTaylor::006	6,504.00	PCC	NE	**100**
N. Taylor Ave.	Manchester Rd. south	1384 ft. south	24.	1,384.	KirkwoodMO::NTaylor::007	33,216.00	PCC	NE	**91**
N. Taylor Ave.	Hollywood south	Swan	24.	964.	KirkwoodMO::NTaylor::005	23,136.00	PCC	NE	**93**
N. Taylor Ave.	620 N. Taylor	Swan	25.	1,315.	KirkwoodMO::NTaylor::004	32,875.00	AC	NE	**59**
N. Taylor Ave.	E. Adams	E. Washington	37.	345.	KirkwoodMO::NTaylor::002	12,765.00	AC	NE	**83**
N. Taylor Ave.	E. Washington (north curbline)	620 N. Taylor	26.	1,940.	KirkwoodMO::NTaylor::003	50,440.00	AC	NE	**58**
N. Van Buren Ave.	Adams	S. side of Way	24.	1,167.	KirkwoodMO::NVanBuren::002	28,008.00	PCC	NE	**38**
N. Van Buren Ave.	Essex	N. side of Way	24.	706.	KirkwoodMO::NVanBuren::001	16,944.00	PCC	NE	**53**
N. Woodlawn Ave.	E. Adams north	E. Essex (south curbline)	34.	2,035.	KirkwoodMO::NWoodlawn::001	69,190.00	AC	NE	**65**
N. Woodlawn Ave.	Manchester Rd. south	E. Essex	26.	4,805.	KirkwoodMO::NWoodlawn::002	124,930.00	AC	NE	**59**
N. Woodlawn Ave.	Manchester Rd north	City Limits	26.	1,126.	KirkwoodMO::NWoodlawn::003	29,276.00	AC	NE	**60**
Norfolk Dr.	Dickson	E. Essex	23.	1,025.	KirkwoodMO::Norfolk::001	23,575.00	AC	NE	**72**
Oak Glen Manor Ct.	Quan	cul de sac	24.	375.	KirkwoodMO::OakGlenMnr::001	9,000.00	PCC	NE	**68**
Oakcraft Dr.	Greenleaf	Longview	27.	455.	KirkwoodMO::Oakcraft::001	12,285.00	AC	NE	**43**
Oakley Ln.	Wood	Bernice	26.	445.	KirkwoodMO::Oakley::001	11,570.00	AC	NE	**81**
Oakside Ln.	Willow View Ln.	Huntleigh Forest	27.	621.	KirkwoodMO::Oakside::001	16,767.00	PCC	NE	**38**
Orrick Ln.	N. Taylor	E. Gill	20.	650.	KirkwoodMO::Orrick::001	13,000.00	AC	NE	**57**
Par Ln.	N. Woodlawn	cul de sac	24.	1,245.	KirkwoodMO::Par::001	29,880.00	AC	NE	**62**
Par Ln.	Woodlawn	cul de sac	24.	600.	KirkwoodMO::ParLn::001	14,400.00	AC	NE	**52**
Parkwoods Ave.	Hawbrook south	E. Adams/Lockwood	24.	780.	KirkwoodMO::Parkwoods::001	18,720.00	AC	NE	**78**
Parkwoods Ave.	Hawbrook north	cul de sac	23.	890.	KirkwoodMO::Parkwoods::002	20,470.00	AC	NE	**93**
Parkwoods Ave.	E. Essex south	cul de sac	26.	495.	KirkwoodMO::Parkwoods::003	12,870.00	AC	NE	**62**
Pearl Ave.	W. Essex	W. Jewel	25.	995.	KirkwoodMO::Pearl::001	24,875.00	AC	NE	**44**

Peeke Ave.	N. Harrison	Kirkwood Rd.	36.	1,330.	KirkwoodMO::Peeke::002	47,880.00	AC	NE	**45**
Peeke Ave.	N. geyer	N. Harrison (east curbline)	26.	1,365.	KirkwoodMO::Peeke::001	35,490.00	AC	NE	**72**
Pleasant Ct.	W. Washington	cul de sac	25.	300.	KirkwoodMO::Pleasant::001	7,500.00	AC	NE	**58**
Quan Ave	Woodlawn	Lawn	27.	204.	KirkwoodMO::Quan::002	5,508.00	PCC	NE	**19**
Quan Ave	N. Taylor	002 (PCC)	24.	1,755.	KirkwoodMO::Quan::001	42,120.00	AC	NE	**48**
Quanal Dr	Alfred Ave	cul de sac	27.	505.	KirkwoodMO::Quanal::001	13,635.00	PCC	NE	**100**
S. Crescent Dr.	Woodlawn	Cresent	17.	570.	KirkwoodMO::SCrescent::001	9,690.00	AC	NE	**46**
Seekamp Ave.	Woodlawn	Wood	17.	920.	KirkwoodMO::Seekamp::001	15,640.00	AC	NE	**99**
Simmons Ave.	W. Essex	Peeke	25.	1,365.	KirkwoodMO::Simmons::001	34,125.00	PCC	NE	**93**
Simmons Ave.	Manchester	Wilson	26.	557.	KirkwoodMO::Simmons::003	14,482.00	AC	NE	**65**
Simmons Ave.	Wilson	Peeke	24.	1,595.	KirkwoodMO::Simmons::001	38,280.00	AC	NE	**66**
Simmons Ave.	Manchester	dead end	26.	1,680.	KirkwoodMO::Simmons::004	43,680.00	AC	NE	**55**
Southbrook Dr.	Dickson (west)	Brookhaven Ct (002)	27.	615.	KirkwoodMO::Southbrook::001	16,605.00	APC	NE	**57**
Sturgis Dr.	Manchester	dead end	27.	520.	KirkwoodMO::Sturgis::001	14,040.00	AC	NE	**57**
Sunset Ln.	N. Taylor	cul de sac	23.	320.	KirkwoodMO::Sunset::001	7,360.00	AC	NE	**64**
Swan Ave.	N. Taylor	Kirkwood Rd.	30.	645.	KirkwoodMO::Swan::001	19,350.00	AC	NE	**65**
Sylvan Place	Manchester Rd	dead end	26.	510.	KirkwoodMO::Sylvan::001	13,260.00	AC	NE	**81**
Tarrymore Ln.	Kenmore	cul de sac	27.	480.	KirkwoodMO::Tarrymore::001	12,960.00	AC	NE	**67**
Taylor Estates	N. Taylor	cul de sac	27.	540.	KirkwoodMO::TaylorEst::001	14,580.00	AC	NE	**43**
Taylor Woods Dr.	N. Taylor (south leg)	N. Taylor (north leg)	28.	1,750.	KirkwoodMO::TaylorWood::001	49,000.00	AC	NE	**44**
Timbercrest Rd.	Huntleigh	237/1262 Lynchester	31.	1,330.	KirkwoodMO::Timbercres::001	41,230.00	APC	NE	**80**
W. Bodley Ave.	N. Clay	Kirkwood Rd.	24.	610.	KirkwoodMO::WBodley::001	14,640.00	AC	NE	**63**
W. Essex Ave.	207 ft west of N. Geyer	1277 ft west of N. Geyer	24.	1,070.	KirkwoodMO::WEssex::002	25,680.00	PCC	NE	**64**
W. Jewel Ave.	Kirkwood Rd	N. Clay	24.	645.	KirkwoodMO::WJewel::001	15,480.00	PCC	NE	**100**
W. Jewel Ave.	N. Clay	N. Harrison	25.	710.	KirkwoodMO::WJewel::002	17,750.00	AC	NE	**41**
W. Jewel Ave.	N. Harrison	N. Geyer	16.	1,170.	KirkwoodMO::WJewel::003	18,720.00	AC	NE	**43**
W. Maple Ave.	Kirkwood Rd.	N. Clay	25.	710.	KirkwoodMO::WMaple::001	17,750.00	AC	NE	**57**
W. Mermod Place	Kirkwood Rd	N. Clay	24.	710.	KirkwoodMO::WMermod::001	17,040.00	PCC	NE	**100**
W. Sarah Ave.	Kirkwood Rd	N. Clay	23.	715.	KirkwoodMO::WSarah::001	16,445.00	AC	NE	**62**
W. Washington Ave.	Van Buren	N. Harrison	24.	586.	KirkwoodMO::WWashingtn::003	14,064.00	PCC	NE	**57**
W. Washington Ave.	N. Geyer west	Sugar Creek Trail	24.	1,297.	KirkwoodMO::WWashingtn::005	31,128.00	PCC	NE	**33**
W. Washington Ave.	Kirkwood Rd.	N. Clay	34.	620.	KirkwoodMO::WWashingtn::001	21,080.00	AC	NE	**64**
W. Washington Ave.	N. Clay	N. Harrison	31.	620.	KirkwoodMO::WWashingtn::002	19,220.00	AC	NE	**57**
W. Washington Ave.	Van Buren	N. Geyer	25.	640.	KirkwoodMO::WWashingtn::004	16,000.00	APC	NE	**70**
Warrenton Dr.	Lewiston (south leg)	Lewiston (north leg)	23.	645.	KirkwoodMO::Warrenton::001	14,835.00	AC	NE	**74**
Way Ave.	Geyer	east cubline of Van Buren	27.	666.	KirkwoodMO::Way::002	17,982.00	PCC	NE	**71**
Way Ave.	N. Clay	Van Buren	25.	1,230.	KirkwoodMO::Way::001	30,750.00	AC	NE	**79**
Weatherfield Ct.	Dickson	cul de sac	27.	670.	KirkwoodMO::Wethrfield::001	18,090.00	AC	NE	**61**
Weston Oaks Ct.	Wood	cul de sac	26.	595.	KirkwoodMO::WestonOaks::001	15,470.00	PCC	NE	**95**
Westrick Ct.	E. Gill	cul de sac	21.	225.	KirkwoodMO::Westrick::001	4,725.00	AC	NE	**54**
Willow View Ln	Huntleigh Forest	1215 Willow View	27.	745.	KirkwoodMO::WillowView::001	20,115.00	PCC	NE	**49**
Wilson Ave.	N. Geyer	N. Clay	22.	1,915.	KirkwoodMO::Wilson::001	42,130.00	AC	NE	**59**
Wilson Ave.	N. Clay	Kirkwood Rd	22.	715.	KirkwoodMO::Wilson::002	15,730.00	AC	NE	**71**
Windrush Dr.	Dickson	cul de sac	25.	750.	KirkwoodMO::Windrush::001	18,750.00	AC	NE	**62**
Wood Ave.	Quan	Seekamp	24.	1,200.	KirkwoodMO::Wood::002	28,800.00	AC	NE	**91**
Wood Ave.	Manchester Rd	Quan	25.	1,585.	KirkwoodMO::Wood::001	39,625.00	AC	NE	**65**
Woodlawn Estates Dr.	Woodlawn	cul de sac	27.	410.	KirkwoodMO::WoodlawnEs::001	11,070.00	APC	NE	**52**
Woodlawn Grove Ln	Woodlawn	cul de sac	26.	365.	KirkwoodMO::WoodGrove::001	9,490.00	PCC	NE	**75**
Woodleaf Ct.	Woodlawn	cul de sac	27.	430.	KirkwoodMO::Woodleaf::001	11,610.00	APC	NE	**63**
Woodridge Rd.	Lynchester	Huntleigh	31.	1,100.	KirkwoodMO::Woodridge::001	34,100.00	APC	NE	**76**
Woodside Dr.	Bernice	Wood	26.	450.	KirkwoodMO::Woodside::001	11,700.00	AC	NE	**55**
Woodview Manor Ln	Woodlawn	cul de sac	26.	655.	KirkwoodMO::WodviewMnr::001	17,030.00	PCC	NE	**69**

						29.78			**64.8**	**186**
Applewood Dr.	Daugherty Ferry	bedford Oaks	27.	2,025.	KirkwoodMO::Applewood::001	54,675.00	AC	NW	**64**	
Bedford Oaks Dr.	Applewood	Bedford Oaks (002)	27.	645.	KirkwoodMO::BedfordOak::001	17,415.00	AC	NW	**65**	
Bedford Oaks Dr.	Daugherty Ferry	cul de sac	27.	1,090.	KirkwoodMO::BedfordOak::002	29,430.00	AC	NW	**56**	
Beethoven Dr.	W. Essex	Mozart	27.	825.	KirkwoodMO::Beethoven::001	22,275.00	PCC	NW	**93**	
Ben Davis Ln.	Lindemann	Twin Pine	27.	795.	KirkwoodMO::BenDavis::001	21,465.00	PCC	NW	**90**	
Black Twig Ln.	Lindemann	Ben Davis	37.	775.	KirkwoodMO::BlackTwig::001	28,675.00	PCC	NW	**95**	
Bluebonnet Ct.	Mistletoe (south)	311 ft. south	27.	311.	KirkwoodMO::Bluebonnet::001	8,397.00	PCC	NW	**97**	
Briar Meadow Ct.	Brookcreek Ln	cul de sac	27.	320.	KirkwoodMO::BriarMdwCt::001	8,640.00	PCC	NW	**64**	
Briarfarm Ln.	Lynkirk	cul de sac	27.	645.	KirkwoodMO::Briarfarm::001	17,415.00	PCC	NW	**71**	
Briarfarm Ln.	Lynkirk south	cul de sac	27.	645.	KirkwoodMO::Briarfarm::002	17,415.00	PCC	NW	**77**	
Bridelbrook Ln.	Lynkirk	Brookcreek	27.	1,226.	KirkwoodMO::Bridlebrok::001	33,102.00	PCC	NW	**62**	
Brookcreek Ln (Court)	Brrokcreek Ln	cul de sac	27.	300.	KirkwoodMO::BrookcrkCt::001	8,100.00	PCC	NW	**84**	
Brookcreek Ln.	Lynkirk	2039 2040 Ballas	27.	1,925.	KirkwoodMO::Brookcreek::001	51,975.00	PCC	NW	**67**	
Bryan Ave.	W. Essex	dead end	23.	1,025.	KirkwoodMO::Bryan::001	23,575.00	AC	NW	**55**	
Bryan Meadows Ct	Bryan Ave W. to	dead end	27.	445.	KirkwoodMO::BryanMdws::001	12,015.00	PCC	NW	**94**	
Burns Ave.	Central	Knierim	25.	905.	KirkwoodMO::Burns::001	22,625.00	AC	NW	**72**	
Central Ave.	S. Geyer	Goethe	26.	845.	KirkwoodMO::CentralAve::001	21,970.00	AC	NW	**58**	
Cherry St.	Woodgate Dr.	Ruth Dr.	27.	840.	KirkwoodMO::Cherry::001	22,680.00	APC	NW	**67**	
Cheswick Place	Lynkirk west curbline	cul de sac	27.	430.	KirkwoodMO::Cheswick::001	11,610.00	PCC	NW	**91**	
Chopin Dr.	Dougherty Ferry	W. Essex	27.	1,300.	KirkwoodMO::Chopin::001	35,100.00	PCC	NW	**49**	
Clemens Ave.	W. Essex	Goethe	24.	375.	KirkwoodMO::Clemens::001	9,000.00	AC	NW	**68**	
Clemens Ave.	Goethe	Knierim	20.	885.	KirkwoodMO::Clemens::002	17,700.00	AC	NW	**63**	
Clemens Ct.	Essex	cul-de-sac	28.	610.	KirkwoodMO::ClemensCt::001	17,080.00	PCC	NW	**91**	
Colonial Oak Ln.	Frances	cul de sac	27.	590.	KirkwoodMO::ColonialOa::001	15,930.00	AC	NW	**45**	
Cornhill Ln.	Lindeman	cul de sac	27.	725.	KirkwoodMO::Cornhill::001	19,575.00	AC	NW	**59**	
Creekbriar Ln.	Lynkirk	cul de sac	27.	475.	KirkwoodMO::Creekbriar::001	12,825.00	PCC	NW	**88**	
Daugherty Ferry Rd.	N. Geyer	Chopin (west curbline)	37.	3,240.	KirkwoodMO::DaughertyF::001	119,880.00	AC	NW	**54**	
Daugherty Ferry Rd.	Chopin (west curbline)	City Limits (Des Peres)	36.	5,980.	KirkwoodMO::DaughertyF::002	215,280.00	AC	NW	**64**	
Daughtery Place	Daugherty Ferry	cul de sac	26.	1,415.	KirkwoodMO::DaughertyP::001	36,790.00	AC	NW	**48**	
Delchester Ln.	Woodgate	Ruth	27.	885.	KirkwoodMO::Delchester::001	23,895.00	PCC	NW	**56**	
Dickens Ave.	Central ave.	Clements	23.	980.	KirkwoodMO::Dickens::001	22,540.00	AC	NW	**67**	
Dorchester Ave.	Linwood	Kirkshire	27.	546.	KirkwoodMO::Dorchester::001	14,742.00	PCC	NW	**81**	
Dovergate Dr.	Lockett	Woodgate	28.	1,127.	KirkwoodMO::Dovergate::001	31,556.00	PCC	NW	**53**	
Edgeworth Ave.	Linwood	Kirkshire	27.	505.	KirkwoodMO::Edgeworth::001	13,635.00	PCC	NW	**72**	
Elm Tree Ln.	Gabriel	cul de sac	26.	1,525.	KirkwoodMO::ElmTree::001	39,650.00	AC	NW	**71**	
Essex Ct.	W. Essex	cul de sac	26.	435.	KirkwoodMO::EssexCt::001	11,310.00	PCC	NW	**98**	
Frances Rd.	Lindeman	Daughtery Ferry	25.	1,330.	KirkwoodMO::Francis::001	33,250.00	AC	NW	**59**	
Gabriel Ct.	south leg of Gabriel Ct	Gabriel Dr.	27.	1,010.	KirkwoodMO::GabrielCt::001	27,270.00	PCC	NW	**57**	
Gabriel Dr.	W. Essex	section 002 (PCC)	27.	400.	KirkwoodMO::Gabriel Dr::001	10,800.00	AC	NW	**47**	
Gabriel Dr.	504 Gabriel Dr.	cul de sac	27.	1,775.	KirkwoodMO::Gabriel Dr::002	47,925.00	PCC	NW	**57**	
Goethe Ave.	W. Essex	Wilcox	24.	1,635.	KirkwoodMO::Goethe::001	39,240.00	AC	NW	**68**	
Grassy Ridge Rd.	west cul de sac	east cul de sac	21.	1,825.	KirkwoodMO::GrassyRidg::001	38,325.00	AC	NW	**60**	
Greening Ln.	Lindemann east	1406 Lynkirk	27.	990.	KirkwoodMO::Greening::001	26,730.00	PCC	NW	**68**	
Greening Ln.	Lindemann west	dead end	27.	630.	KirkwoodMO::Greening::002	17,010.00	PCC	NW	**83**	
Iris Ln.	W. Essex	cul de sac	24.	1,190.	KirkwoodMO::Iris::001	28,560.00	AC	NW	**60**	
Jasmine Ln.	Poinsetta	Bluebonnet	27.	635.	KirkwoodMO::Jasmine::001	17,145.00	APC	NW	**59**	
Jill Ct.	Dougherty Ferry	cul de sac	27.	315.	KirkwoodMO::Jill::001	8,505.00	PCC	NW	**96**	
Kimkirk Ct.	Lynkirk east curbline	cul de sac	27.	600.	KirkwoodMO::Kimkirk::001	16,200.00	PCC	NW	**89**	
Kings Cliff Rd.	Sunny	Twin Pine	27.	1,000.	KirkwoodMO::KingsCliff::001	27,000.00	PCC	NW	**95**	
Kirkshire Dr.	east curbline Ormond	Claridge Place	26.	1,473.	KirkwoodMO::Kirkshire::002	38,298.00	PCC	NW	**76**	

Knierim Place	N. Geyer	Clements	19.	1,135.	KirkwoodMO::Knierim::001	21,565.00	AC	NW	**74**
Lanyard Ln.	Dougherty Ferry	cul de sac	27.	785.	KirkwoodMO::Lanyard::001	21,195.00	PCC	NW	**73**
Laven-Del Ln	Mid-Meadows north	cul de sac	27.	1,465.	KirkwoodMO::LavenDel::001	39,555.00	PCC	NW	**35**
Laven-Del Ln	Mid-Meadows south	cul de sac	27.	685.	KirkwoodMO::LavenDel::002	18,495.00	PCC	NW	**42**
Lin Manor Dr.	Lockett	Sherilin	27.	435.	KirkwoodMO::LinManor::001	11,745.00	AC	NW	**35**
Lindeman Rd.	Daugherty Ferry	City Limits (Des Peres)	37.	3,320.	KirkwoodMO::Lindeman::001	122,840.00	AC	NW	**59**
Lindeman Rd.	Dougherty Ferry	W. Adams Ave.	27.	1,871.	KirkwoodMO::Lindeman::002	50,517.00	PCC	NW	**68**
Lindgate Dr.	Lindeman	Lockett	27.	2,060.	KirkwoodMO::Lindgate::001	55,620.00	AC	NW	**31**
Linwood Blvd.	N. Geyer	Claridge Place	27.	1,947.	KirkwoodMO::Linwood::001	52,569.00	PCC	NW	**72**
Lisa Ln.	Lindgate	cul de sac	27.	315.	KirkwoodMO::Lisa::001	8,505.00	AC	NW	**48**
Lockett Ln.	Locket Rd.	cul de sac @ Sherilin	19.	1,630.	KirkwoodMO::LockettLn::001	30,970.00	AC	NW	**55**
Lockett Rd.	Daugherty Ferry	Linmanor	36.	935.	KirkwoodMO::Lockett::001	33,660.00	AC	NW	**57**
Lockett Rd.	City Limits (Des Peres)	Linmanor	30.	905.	KirkwoodMO::Lockett::002	27,150.00	AC	NW	**51**
Longfellow Ave.	Central	Knierim	25.	940.	KirkwoodMO::Longfellow::001	23,500.00	AC	NW	**77**
Longfellow Ave.	Knierim	W. Washington	16.	345.	KirkwoodMO::Longfellow::002	5,520.00	AC	NW	**82**
Lynkirk Ln.	Lindemann east	1406 Lynkirk	27.	740.	KirkwoodMO::Lynkirk::001	19,980.00	PCC	NW	**64**
Lynkirk Ln.	Lindemann west	Cheswick Place	27.	1,960.	KirkwoodMO::Lynkirk::002	52,920.00	PCC	NW	**65**
Mendelssohn Dr.	Dougherty Ferry	Mozart	27.	640.	KirkwoodMO::Mendelsohn::001	17,280.00	PCC	NW	**53**
Mid-Meadows Ln.	N. Geyer	KW North Middle School	27.	311.	KirkwoodMO::MidMeadows::001	8,397.00	PCC	NW	**46**
Mindy Ln.	Lindgate	cul de sac	27.	280.	KirkwoodMO::Mindy::001	7,560.00	AC	NW	**51**
Missouri Ave.	N. side of Cherry	dead end	27.	367.	KirkwoodMO::Missouri::002	9,909.00	PCC	NW	**40**
Missouri Ave.	Manchester Rd	Cherry	26.	1,265.	KirkwoodMO::Missouri::001	32,890.00	AC	NW	**42**
Mistletoe Ln.	N. Geyer	Bluebonnet	27.	1,080.	KirkwoodMO::Mistletoe::001	29,160.00	PCC	NW	**95**
Mozart Dr.	Chopin	cul de sac	27.	930.	KirkwoodMO::Mozart::001	25,110.00	PCC	NW	**94**
N. Geyer Rd.	Manchester Rd.	City Limits (Frontenac)	23.	2,755.	KirkwoodMO::NGeyer::001	63,365.00	AC	NW	**75**
N. Geyer Rd.	Manchester Rd south	W. Essex	36.	3,570.	KirkwoodMO::NGeyer::002	128,520.00	AC	NW	**36**
N. Geyer Rd.	W. Adams (north curbline)	W. Essex (north curbline)	36.	1,990.	KirkwoodMO::NGeyer::003	71,640.00	AC	NW	**44**
Northlin Dr.	Lindgate (west leg)	Southlin	27.	670.	KirkwoodMO::Northlin::001	18,090.00	AC	NW	**45**
Oak Bluff Ln.	Frances	cul de sac (Colonial Oak)	27.	695.	KirkwoodMO::OakBluff::001	18,765.00	AC	NW	**48**
Ormond Dr.	Manchester south	Kirkshire	27.	236.	KirkwoodMO::Ormond::002	6,372.00	PCC	NW	**64**
Ormond Dr.	Linwood	Kirkshire	27.	460.	KirkwoodMO::Ormond::001	12,420.00	PCC	NW	**80**
Pamela Ln.	N. Geyer	cul de sac	27.	1,275.	KirkwoodMO::Pamela::001	34,425.00	PCC	NW	**45**
Plaza Terrace	Linwood	Kirkshire	27.	565.	KirkwoodMO::PlazaTerr::001	15,255.00	PCC	NW	**75**
Poinsetta Ln.	Daugherty Ferry	Mistletoe	25.	870.	KirkwoodMO::Poinsetta::001	21,750.00	APC	NW	**72**
Point Essex Ct.	W. Essex	cul de sac	27.	1,095.	KirkwoodMO::PointEssex::001	29,565.00	PCC	NW	**76**
Rieth Terrace	Daugherty Ferry north	cul de sac	20.	500.	KirkwoodMO::RiethTerr::001	10,000.00	AC	NW	**43**
Rieth Terrace	Daugherty Ferry south	Grassy Ridge	22.	1,150.	KirkwoodMO::RiethTerr::002	25,300.00	AC	NW	**62**
Romine Dr.	Manchester Rd	129 ft south	26.	129.	KirkwoodMO::Romine::002	3,354.00	PCC	NW	**51**
Ruth Dr.	Cherry St	Delchester	27.	1,174.	KirkwoodMO::Ruth::002	31,698.00	PCC	NW	**53**
Ruth Dr.	Manchester	Ruth (002)	25.	1,310.	KirkwoodMO::Ruth::001	32,750.00	AC	NW	**46**
Schubert Dr.	W. Essex	Elm Tree	26.	245.	KirkwoodMO::Schubert::001	6,370.00	AC	NW	**98**
Scottsdale Rd.	N. Geyer	cul de sac	25.	1,320.	KirkwoodMO::Scottsdale::001	33,000.00	AC	NW	**91**
Sherilin Dr.	Lockett Ln. (south)	Lockett Ln. (north)	27.	1,290.	KirkwoodMO::Sherilin::001	34,830.00	AC	NW	**48**
Southlin Dr.	Northlin (west leg)	Lindgate	27.	1,250.	KirkwoodMO::Southlin::001	33,750.00	AC	NW	**37**
Spring House Dr.	Reith Terrace (west curbline)	cul de sac	20.	1,490.	KirkwoodMO::SpringHous::001	29,800.00	AC	NW	**46**
St. Croix Ct.	Lockett east	cul de sac	25.	420.	KirkwoodMO::StCroix::001	10,500.00	AC	NW	**63**
St. Croix Ct.	Lockett west	cul de sac	25.	250.	KirkwoodMO::StCroix::002	6,250.00	AC	NW	**75**
Stable Ridge Dr.	Sunny (south curbline)	2nd cul de sac at Sunny	26.	1,030.	KirkwoodMO::Stablridge::001	26,780.00	PCC	NW	**95**
Sugar Creek Rd.	W. Adams	W. Washington	15.	380.	KirkwoodMO::SugarCrkRd::001	5,700.00	AC	NW	**28**
Sunny Dr.	Twin Pine	Stable Ridge	27.	1,834.	KirkwoodMO::Sunny::001	49,518.00	PCC	NW	**95**
Thornberry Ln	Daughtery Ferry	cul de sac	27.	690.	KirkwoodMO::Thornbry::001	18,630.00	PCC	NW	**47**
Trailcrest Ln.	Bridlebrook	Ballas	27.	1,000.	KirkwoodMO::Trailcrest::001	27,000.00	PCC	NW	**82**

Twin Pine Dr.	City Limits south	Kings Cliff	27.	800.	KirkwoodMO::TwinPine::001	21,600.00	PCC	NW	**95**	
View Woods Dr.	Lindemann east	cul de sac	21.	475.	KirkwoodMO::ViewWoods::001	9,975.00	PCC	NW	**95**	
View Woods Dr.	Lindemann west	cul de sac	21.	700.	KirkwoodMO::ViewWoods::002	14,700.00	PCC	NW	**95**	
Villa Gardens Dr.	N. Geyer	cul de sac	27.	730.	KirkwoodMO::VillaGardn::001	19,710.00	PCC	NW	**64**	
W. Essex Ave.	N. Geyer	section 003	24.	1,280.	KirkwoodMO::WEssex::002	25,680.00	PCC	NW	**64**	
W. Essex Ave.	Kirkwood Rd	N. Geyer	32.	2,580.	KirkwoodMO::WEssex::001	82,560.00	AC	NW	**39**	
W. Jewel Ave.	N. Geyer	cul de sac	24.	1,885.	KirkwoodMO::WJewel::004	45,240.00	AC	NW	**43**	
Wessel Farm Ct.	Hunters Field	cul de sac	26.	375.	KirkwoodMO::WesselFarm::001	9,750.00	PCC	NW	**87**	
Westchester Ct.	Ruth	east cul de sac	27.	400.	KirkwoodMO::Westchster::001	10,800.00	PCC	NW	**96**	
Westchester Ct.	Ruth	west cul de sac	27.	325.	KirkwoodMO::Westchster::002	8,775.00	PCC	NW	**26**	
Whitecliff Dr.	Lockett	Dovergate	26.	1,150.	KirkwoodMO::Whitecliff::001	29,900.00	PCC	NW	**98**	
Wilcox Ave.	W. Essex	dead end	24.	320.	KirkwoodMO::Wilcox::001	7,680.00	AC	NW	**80**	
Wilcox Ave.	Goethe	dead end	22.	1,135.	KirkwoodMO::Wilcox::002	24,970.00	AC	NW	**62**	
Winesap Ln.	Lindemann	Greening	27.	765.	KirkwoodMO::Winesap::001	20,655.00	PCC	NW	**43**	
Woodfield Manor Ct	Bryan Ave	cul de sac	27.	429.	KirkwoodMO::WoodfldMan::001	11,583.00	PCC	NW	**96**	
Woodfin Ct.	Grassy Ridge	cul de sac	22.	390.	KirkwoodMO::Woodfin::001	8,580.00	AC	NW	**59**	
Woodgate Dr.	Manchester Rd south	north curbline of Rochdale	27.	970.	KirkwoodMO::Woodgate::002	26,190.00	PCC	NW	**56**	
Woodgate Dr.	Manchester Rd. north	dead end	27.	2,554.	KirkwoodMO::Woodgate::001	68,958.00	PCC	NW	**49**	
						25.10			**61.8**	**121**
Aldridge St.	Milwaukee	cul de sac	26.	515.	KirkwoodMO::Aldridge::001	13,390.00	AC	S	**49**	
Alsobrook St.	Milwaukee east	Tolstoi	26.	1,220.	KirkwoodMO::Alsobrook::001	31,720.00	AC	S	**62**	
Attucks St	Milwaukee east	cul de sac	26.	1,315.	KirkwoodMO::Attucks::001	34,190.00	AC	S	**61**	
Attucks St	Milwaukee west	dead end	26.	360.	KirkwoodMO::Attucks::002	9,360.00	AC	S	**85**	
Boxwood Ln.	S. Geyer	cul de sac	20.	555.	KirkwoodMO::Boxwood::001	11,100.00	AC	S	**99**	
Charmwood Ct.	Charmwood Dr	cul de sac	20.	605.	KirkwoodMO::CharmwdCt::001	12,100.00	PCC	S	**80**	
Charmwood Dr.	Marshall	dead end	20.	1,411.	KirkwoodMO::CharmwdDr::001	28,220.00	PCC	S	**78**	
Chicago St.	Milwaukee	Orleans	26.	625.	KirkwoodMO::Chicago::001	16,250.00	AC	S	**71**	
Couch Ave.	Big Bend south	dead end	21.	830.	KirkwoodMO::CouchAve::003	17,430.00	AC	S	**95**	
Couch Ln.	Couch Ave	cul de sac	19.	300.	KirkwoodMO::CouchLn::001	5,700.00	AC	S	**64**	
Danworth Ct.	Danworth Ct	cul de sac	27.	525.	KirkwoodMO::DanwrthCt::002	14,175.00	PCC	S	**47**	
Danworth Ct.	Big Bend	cul de sac	27.	420.	KirkwoodMO::DanwrthCt::001	11,340.00	PCC	S	**49**	
Eastview Dr.	Big Bend	dead end	19.	275.	KirkwoodMO::Eastview::001	5,225.00	AC	S	**80**	
Electric St.	Milwaukee	Orleans	26.	620.	KirkwoodMO::Electric::001	16,120.00	AC	S	**62**	
Forest Ave.	section 001 (APC)	cul de sac	21.	1,235.	KirkwoodMO::Forest::002	25,935.00	PCC	S	**43**	
Forest Ave.	Big Bend	section 002 (PCC)	21.	2,640.	KirkwoodMO::Forest::001	55,440.00	AC	S	**73**	
Forest Glen Ln.	S. Geyer	dead end	21.	1,190.	KirkwoodMO::Forest Gle::001	24,990.00	AC	S	**92**	
Geyer Forest Dr.	S. Geyer	cul de sac	27.	1,695.	KirkwoodMO::GeyerFrst::001	45,765.00	PCC	S	**49**	
Glenford Ct.	Big Bend	cul de sac	27.	755.	KirkwoodMO::GlenfordCt::001	20,385.00	PCC	S	**95**	
Huthmaker Ave.	Big Bend	cul de sac	26.	985.	KirkwoodMO::Huthmaker::001	25,610.00	PCC	S	**59**	
Ivanhoe Woods St.	S. Geyer	cul de sac	27.	440.	KirkwoodMO::IvanhoWood::001	11,880.00	PCC	S	**54**	
Laurel Bend Ct.	Station Bend	cul de sac	26.	320.	KirkwoodMO::LaurelBend::001	8,320.00	PCC	S	**94**	
Lemp Rd.	Forest	Finlay Rd.	21.	4,380.	KirkwoodMO::Lemp::001	91,980.00	AC	S	**52**	
Lemp Rd.	Lemp Rd	cul de sac	19.	1,545.	KirkwoodMO::Lemp::002	29,355.00	AC	S	**56**	
Lillian Ave.	S. Fillmore	Elliott	18.	635.	KirkwoodMO::LillianAve::001	11,430.00	PCC	S	**45**	
Maeville Ct.	Big Bend	cul de sac	27.	300.	KirkwoodMO::Maeville::001	8,100.00	PCC	S	**68**	
Marbendale Ct.	Marshall	cul de sac	27.	525.	KirkwoodMO::Marbendale::001	14,175.00	PCC	S	**42**	
Marco Dr.	Forest	Wilton	22.	732.	KirkwoodMO::MarcoDr::001	16,104.00	PCC	S	**56**	
Meachum St.	Milwaukee east	dead end	26.	1,255.	KirkwoodMO::Meachum::001	32,630.00	AC	S	**72**	
Meachum St.	Milwaukee west	dead end	26.	385.	KirkwoodMO::Meachum::002	10,010.00	AC	S	**56**	
Memphis St.	Milwaukee	Orleans	26.	620.	KirkwoodMO::Memphis::001	16,120.00	AC	S	**56**	
Midway Ave.	S. Harrison	Minnie	24.	843.	KirkwoodMO::Midway::001	20,232.00	PCC	S	**42**	

Milwaukee Ave.	Big Bend	dead end at Lowe's	26.	2,235.	KirkwoodMO::Milwaukee::001	58,110.00	AC	S	**75**	
MoDoc Trail	S. Glenwood	dead end	15.	385.	KirkwoodMO::MoDoc::001	5,775.00	AC	S	**29**	
N. Signal Hills Dr.	Marshall Rd	cul de sac	19.	1,800.	KirkwoodMO::NSignalHil::001	34,200.00	AC	S	**39**	
Neffwold Ct.	Neffwold Ln	cul de sac	27.	390.	KirkwoodMO::NeffwoldCt::001	10,530.00	PCC	S	**74**	
Neffwold Ln.	Lemp Rd	cul de sac	27.	1,733.	KirkwoodMO::NeffwoldLn::001	46,791.00	PCC	S	**77**	
New York St.	Milwaukee east	cul de sac	26.	1,350.	KirkwoodMO::NewYork::001	35,100.00	AC	S	**70**	
New York St.	Milwaukee west	dead end	26.	390.	KirkwoodMO::NewYork::002	10,140.00	AC	S	**80**	
Oakshire Ct.	Oakshire Ln	cul de sac	26.	230.	KirkwoodMO::OakshireCt::001	5,980.00	PCC	S	**97**	
Oakshire Ln.	S. Geyer	dead end	24.	1,900.	KirkwoodMO::Oakshire::001	45,600.00	AC	S	**70**	
Orchard Ln.	Windsor (south curbline)	dead end	23.	2,640.	KirkwoodMO::Orchard::001	60,720.00	AC	S	**63**	
Orchard Ln.	Windsor (north curbline)	dead end	23.	725.	KirkwoodMO::Orchard::002	16,675.00	AC	S	**58**	
Orchard Way	Orchard	cul de sac	16.	765.	KirkwoodMO::Orchard Wa::001	12,240.00	AC	S	**42**	
Orleans St.	Attucks (south curbline)	Memphis	26.	1,935.	KirkwoodMO::Orleans ::001	50,310.00	AC	S	**52**	
Ponca Trail	Big Bend	Barberry	17.	1,935.	KirkwoodMO::PoncaTrail::001	32,895.00	AC	S	**71**	
S. Geyer Rd.	Big Bend	City Limits (Sunset Hills)	24.	2,585.	KirkwoodMO::SGeyer::001	62,040.00	AC	S	**72**	
S. Glenwood Ln.	RR Bridge (south bent)	dead end	20.	1,700.	KirkwoodMO::SGlenwood::002	34,000.00	AC	S	**58**	
S. Glenwood Ln.	RR Bridge (north bent)	Big Bend	29.	185.	KirkwoodMO::SGlenwood::001	5,365.00	AC	S	**59**	
S. Signal Hills dr.	Marshall Rd.	cul de sac	19.	1,525.	KirkwoodMO::SSignalHil::001	28,975.00	AC	S	**27**	
Saratoga St.	Milwaukee east	dead end	26.	1,220.	KirkwoodMO::Saratoga::001	31,720.00	AC	S	**72**	
Scarlet Bend Ct.	Staion Bend	cul de sac	26.	260.	KirkwoodMO::ScarletBen::001	6,760.00	PCC	S	**89**	
Station Bend Ln.	Big Bend	cul de sac	26.	900.	KirkwoodMO::StationBen::001	23,400.00	PCC	S	**89**	
Timberbrook Dr.	S. Glenwood	Marshall Rd.	27.	2,250.	KirkwoodMO::Timberbrok::001	60,750.00	AC	S	**47**	
Timberview Dr.	Timberbrook	cul de sac	26.	1,200.	KirkwoodMO::Timberview::001	31,200.00	AC	S	**48**	
Wilton Ln.	section 001 (APC)	CUL DE SAC	21.	1,400.	KirkwoodMO::WiltonLn::002	29,400.00	PCC	S	**95**	
Wilton Ln.	Forest	section 002 (PCC)	20.	1,930.	KirkwoodMO::WiltonLn::001	38,600.00	AC	S	**55**	
Windsor Ln.	Orchard (west curbline)	S. Geyer	21.	1,015.	KirkwoodMO::Windsor::001	21,315.00	AC	S	**49**	
Windsor Spring Ct.	Windsor Spring Rd.	cul de sac	27.	350.	KirkwoodMO::WindsrSprg::001	9,450.00	PCC	S	**96**	
						10.95			**63.6**	**58**
Alphonse Dr.	S Geyer	Heman	26.	345.	KirkwoodMO::AlphonseDr::001	8,970.00	PCC	W	**59**	
Altus Place	Ann	dead end	25.	1,435.	KirkwoodMO::Altus::001	35,875.00	AC	W	**73**	
Altus Place	Ann south	dead end	24.	115.	KirkwoodMO::Altus::002	2,760.00	AC	W	**83**	
Andrews Ave.	W. Woodbine	Rosehill	26.	1,320.	KirkwoodMO::Andrews::001	34,320.00	AC	W	**83**	
Ann Ave.	Couch	Ballas	22.	2,713.	KirkwoodMO::Ann::001	59,686.00	PCC	W	**95**	
Arminda Ave.	W. Woodbine south	Thursby	21.	790.	KirkwoodMO::Arminda::001	16,590.00	AC	W	**91**	
Arminda Ave.	Virginia	Edna	21.	790.	KirkwoodMO::Arminda::002	16,590.00	AC	W	**86**	
Art Ln.	W Woodbine	cul de sac	27.	280.	KirkwoodMO::Art::001	7,560.00	AC	W	**50**	
Bach Ave.	Ballas	Hoffman	24.	1,325.	KirkwoodMO::Bach::001	31,800.00	AC	W	**42**	
Bach Ave.	Bach (001) south	Boaz	26.	735.	KirkwoodMO::Bach::002	19,110.00	AC	W	**58**	
Bach Ave.	W. Woodbine north	dead end	24.	510.	KirkwoodMO::Bach::003	12,240.00	AC	W	**80**	
Barberry Ln	Big Bend N.	Briargate	24.	197.	KirkwoodMO::Barberry::001	4,728.00	PCC	W	**83**	
Barberry Ln	Briargate	dead end	14.	118.	KirkwoodMO::Barberry::002	1,652.00	PCC	W	**39**	
Barberry Ln	Sweetbriar	E. Glenwood	18.	520.	KirkwoodMO::Barberry::003	9,360.00	PCC	W	**64**	
Barberry Ln	Big Bend south 218 ft.	cul de sac	27.	1,420.	KirkwoodMO::Barberry::004	38,340.00	PCC	W	**81**	
Barby Ln.	Old Big Bend	cul de sac	27.	700.	KirkwoodMO::Barby::0001	18,900.00	AC	W	**65**	
Boaz Ave.	Ballas	Emmerson	21.	2,200.	KirkwoodMO::Boaz::001	46,200.00	AC	W	**36**	
Briar Green Ct.	Big Bend	cul de sac	27.	647.	KirkwoodMO::BriarGreen::001	17,469.00	PCC	W	**82**	
Briarcreek Dr.	Nelda	cul de sac	27.	970.	KirkwoodMO::Briarcreek::001	26,190.00	PCC	W	**56**	
Briargate Ln.	E. Glenwood	W. Glenwood	24.	1,440.	KirkwoodMO::Briargate::001	21,600.00	PCC	W	**78**	
Briargate Ln.	E. glenwood	Cedarbrook (by I-270)	24.	343.	KirkwoodMO::Briargate::002	8,232.00	PCC	W	**91**	
Caroline Ave.	W. Woodbine	Nirk	24.	780.	KirkwoodMO::Caroline::002	18,720.00	PCC	W	**96**	
Caroline Ave.	Nirk	cul de sac	26.	800.	KirkwoodMO::Caroline::001	20,800.00	PCC	W	**57**	

Cedarbrook Ln.	Briargate north to	Briargate (by I-270)	24.	885.	KirkwoodMO::Cedarbrook::001	21,240.00	PCC	W	**61**
Cheviot Ct.	Culloden	Cheviot	25.	1,300.	KirkwoodMO::Cheviot::001	32,500.00	PCC	W	**96**
Chippendale Ct	Rosehill	cul de sac	27.	435.	KirkwoodMO::Chipendale::001	11,745.00	PCC	W	**47**
Claridge Place	Linwood	Kirkshire	27.	569.	KirkwoodMO::ClaridgePl::001	15,363.00	PCC	W	**59**
Couch Ave.	W. Adams	W. Rosehill	26.	4,500.	KirkwoodMO::CouchAve::001	117,000.00	AC	W	**78**
Couch Ave.	Big Bend	W. Rosehill	45.	1,275.	KirkwoodMO::CouchAve::002	57,375.00	AC	W	**85**
Coulter Ave.	W. Woodbine	dead end	21.	1,300.	KirkwoodMO::Coulter::001	27,300.00	AC	W	**47**
Coulter Forest	Coulter	cul de sac	26.	825.	KirkwoodMO::CoulterFrs::001	21,450.00	PCC	W	**78**
Coverdale Ln.	W. Woodbine	cul de sac	26.	320.	KirkwoodMO::Coverdale::001	8,320.00	PCC	W	**88**
Craig Forest Ln	Craig Rd	cu de sac	26.5	1,375.	KirkwoodMO::CraigForst::001	36,437.50	PCC	W	**88**
Craig Rd.	Woodbine/Craig split	Old Big Bend/Ballas	30.	4,250.	KirkwoodMO::Craig::001	127,500.00	AC	W	**65**
Craigvale Ct.	Craigwoods Dr.	cul-de-sc	24.	851.	KirkwoodMO::Craigvale::001	20,424.00	PCC	W	**81**
Craigwoods Dr.	Craig Rd.	cul-de-sac	24.	1,351.	KirkwoodMO::Craigwoods::001	32,424.00	PCC	W	**87**
Crest Ave.	Nirk south	W. Woodbine	25.	775.	KirkwoodMO::CrestAve::002	19,375.00	AC	W	**59**
Crest Ave.	Nirk	cul de sac	27.	900.	KirkwoodMO::CrestAve::001	24,300.00	PCC	W	**66**
Crest Ct.	W. Woodbine	cul de sac	27.	660.	KirkwoodMO::CrestCt::001	17,820.00	PCC	W	**45**
Culloden Rd.	Trossock	St. Giles	25.	1,308.	KirkwoodMO::Culloden::001	32,700.00	PCC	W	**96**
DuBois Ct	Craigwoods Dr	cul-de-sac	24.	565.	KirkwoodMO::DuBoisCt::001	13,560.00	PCC	W	**88**
DuBray Ct.	Craigwoods Dr.	cul-de-sac	24.	576.	KirkwoodMO::DuBray::001	13,824.00	PCC	W	**69**
Duley Ave.	Couch	Freida	25.	685.	KirkwoodMO::Duley::001	17,125.00	AC	W	**75**
E. Glenwood Ln.	Big Bend	west curbline W. Glenwood	23.	2,520.	KirkwoodMO::EGlenwood::001	57,960.00	PCC	W	**63**
Edna Ave.	W. Woodbine south	Old Big Bend	26.	2,765.	KirkwoodMO::Edna::001	71,890.00	AC	W	**73**
Embassy Ct.	Lark	cul de sac	27.	687.	KirkwoodMO::Embassy::001	18,549.00	PCC	W	**36**
Emmerson Ave.	Westview	dead end	20.	1,235.	KirkwoodMO::Emmerson::001	24,700.00	AC	W	**30**
Enola Ave.	Bach	Windy Hill	28.	275.	KirkwoodMO::Enola::001	7,700.00	AC	W	**51**
Enola Ct.	Enola Ave	cul de sac	27.	504.	KirkwoodMO::EnolaCt::001	13,608.00	PCC	W	**97**
Erber Dr.	W. Woodbine	Alphonse	24.	445.	KirkwoodMO::Erber::001	10,680.00	PCC	W	**71**
Ferncliff Ln.	W. Glenwood	dead end	24.	661.	KirkwoodMO::Ferncliff::001	15,864.00	PCC	W	**93**
Friar Ln.	Coulter	Robin Hood	24.	810.	KirkwoodMO::FriarLn::001	19,440.00	PCC	W	**94**
Frieda Ave.	Ann	dead end	21.	1,375.	KirkwoodMO::Frieda::001	28,875.00	AC	W	**72**
Frieda Ave.	Ann south	dead end	18.	295.	KirkwoodMO::Frieda::002	5,310.00	AC	W	**78**
George Ave.	Nirk	dead end	26.	500.	KirkwoodMO::George::001	13,000.00	AC	W	**66**
George Ave.	Nirk south	W. Woodbine	25.	775.	KirkwoodMO::George::002	19,375.00	AC	W	**57**
Grandview Dr.	Couch	Old Big Bend	24.	1,675.	KirkwoodMO::Grandview::001	40,200.00	AC	W	**97**
Harvey St.	Granview	Big Bend	24.	445.	KirkwoodMO::Harvey::001	10,680.00	AC	W	**100**
Heatherbrook Ln.	W. Glenwood (north leg)	W. Glenwood (south leg)	24.	1,565.	KirkwoodMO::Hethrbrook::001	37,560.00	PCC	W	**84**
Heman Dr.	W. Woodbine	Alphonse	26.	465.	KirkwoodMO::HemanDr::001	12,090.00	PCC	W	**52**
Hickory Hollow Ln.	W. Woodbine	cul de sac	27.	645.	KirkwoodMO::HickHollow::001	17,415.00	PCC	W	**96**
Horseshoe Dr.	Lark (west leg)	Lark (east leg)	22.	2,660.	KirkwoodMO::Horseshoe::001	58,520.00	AC	W	**54**
Hunters Field Rd.	Ballas	cul de sac	26.	975.	KirkwoodMO::HuntersFld::001	25,350.00	PCC	W	**72**
Huntwood Ln.	W. Rose Hill Ave.	cul de sac	27.	575.	KirkwoodMO::Huntwood::001	15,525.00	PCC	W	**32**
Janet Place	Ballas west	Edna	20.	1,155.	KirkwoodMO::Janet::001	23,100.00	AC	W	**81**
Janis Lynn Ct.	Couch	cul de sac	27.	325.	KirkwoodMO::JanisLynn::001	8,775.00	PCC	W	**96**
Joe Ave.	Ann	dead end	24.	400.	KirkwoodMO::Joe::001	9,600.00	AC	W	**69**
Kinyon Ct.	Craig Dr.	cul de sac	24.	650.	KirkwoodMO::KinyonCt::001	15,600.00	PCC	W	**94**
Lark Ave.	Couch	cul de sac	23.	2,675.	KirkwoodMO::Lark::001	61,525.00	AC	W	**55**
Lavina Place	Thusby	Virginia	20.	425.	KirkwoodMO::Lavina::001	8,500.00	AC	W	**85**
Lily Ave.	Emmerson	dead end	18.	170.	KirkwoodMO::Lily::001	3,060.00	AC	W	**38**
Lynda Ct.	Craig Dr.	cul de sac	27.	450.	KirkwoodMO::LyndaCt::001	12,150.00	PCC	W	**68**
Magnolia Ave.	W. Woodbine	Nirk	28.	766.	KirkwoodMO::Magnolia::001	21,448.00	AC	W	**44**
Maple Hill Ln.	Willow View	N. Clay	27.	870.	KirkwoodMO::MapleHill::001	23,490.00	PCC	W	**94**
Marjean Ct.	Big Bend (east leg)	Big Bend (west leg)	25.	400.	KirkwoodMO::Marjean::001	10,000.00	AC	W	**100**

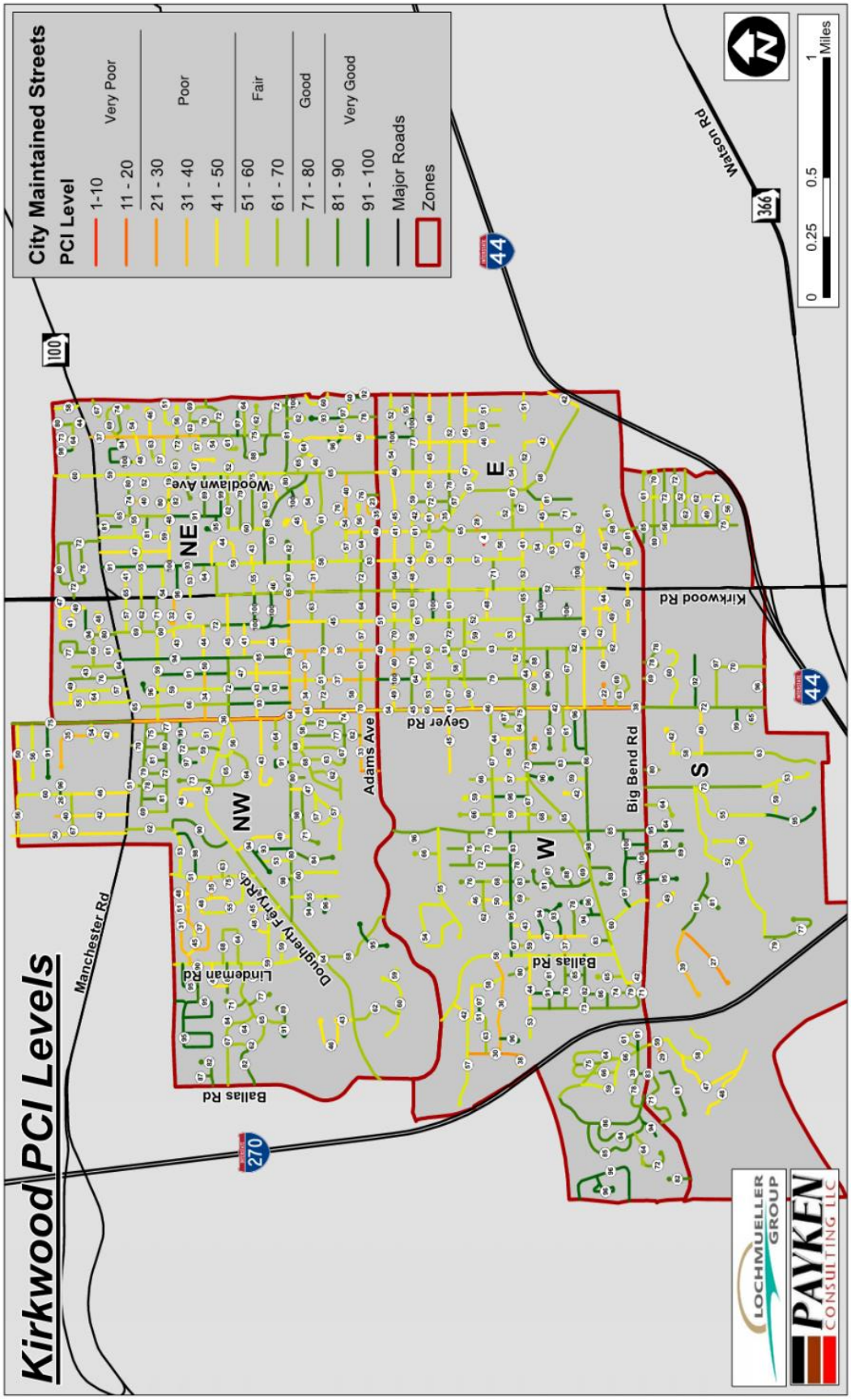
Maybrook Ln.	1st cul de sac @ Maybrook	2nd cul de sac	26.	1,042.	KirkwoodMO::Maybrook::002	27,092.00	PCC	W	**72**
Maybrook Ln.	Heatherbrook	cul de sac	27.	865.	KirkwoodMO::Maybrook::001	23,355.00	AC	W	**64**
McClain Ln.	W. Rosehill (west leg)	S. Geyer	18.	1,065.	KirkwoodMO::McClainLn::001	19,170.00	AC	W	**96**
McKinley Ave.	Magnolia	dead end	25.	610.	KirkwoodMO::McKinley::001	15,250.00	AC	W	**58**
Meyer Ave.	Ann south	W. Woodbine	23.	400.	KirkwoodMO::Meyer::001	9,200.00	AC	W	**43**
Millbrook Ln	Thorncliff Ln	E. Glenwood Ln	24.	530.	KirkwoodMO::Millbrook::001	12,720.00	PCC	W	**75**
N. Geyer Rd.	W. Adams (north curbline)	W. Argonne (south curbline)	36.	770.	KirkwoodMO::NGeyer::004	27,720.00	AC	W	**54**
Nelda Ave.	Ann south	dead end	23.	400.	KirkwoodMO::Nelda::001	9,200.00	AC	W	**83**
Nelda Ave.	Ann north	section 003 (PCC)	20.	645.	KirkwoodMO::Nelda::002	12,900.00	AC	W	**68**
Nelda Ave.	645 ft. north of Ann	cul de sac	24.	580.	KirkwoodMO::Nelda::003	13,920.00	PCC	W	**73**
Nirk Ave.	S. Geyer	Couch	21.	2,645.	KirkwoodMO::Nirk::001	55,545.00	AC	W	**67**
Old Big Bend Rd.	Big Bend	section 001 (PCC) Tamar	32.	2,450.	KirkwoodMO::OldBigBend::002	78,400.00	AC	W	**66**
Old Big Bend Rd.	Big Bend	Taman Ct	36.	352.	KirkwoodMO::OldBigBend::001	12,672.00	PCC	W	**51**
Porter Ave.	W. Woodbine	Ann	18.	380.	KirkwoodMO::Porter::001	6,840.00	PCC	W	**66**
Regent Terrace	Linwood	Kirkshire	27.	482.	KirkwoodMO::RegentTerr::001	13,014.00	PCC	W	**78**
Repetto Ln.	Old Big Bend	cul de sac	26.	120.	KirkwoodMO::RepettoLn::001	3,120.00	PCC	W	**51**
Repetto Ln.	section 001 (PCC)	cul de sac	27.	375.	KirkwoodMO::RepettoLn::002	10,125.00	AC	W	**74**
Robert Place	Grandvie	Big Bend	24.	400.	KirkwoodMO::Robert::001	9,600.00	AC	W	**100**
Robin Hood Ct.	Coulter	cul de sac	24.	975.	KirkwoodMO::RobinHood::001	23,400.00	PCC	W	**93**
Rochdale Dr.	Dougherty Ferry	Dovergate	27.	1,775.	KirkwoodMO::Rochdale::001	47,925.00	PCC	W	**89**
Romine Dr.	Linwood	Kirkshire	27.	525.	KirkwoodMO::Romine::001	14,175.00	PCC	W	**70**
Rosewood Ln.	S. Geyer	cul de sac	26.	1,006.	KirkwoodMO::Rosewood::001	26,156.00	PCC	W	**85**
S. Ballas Rd.	Ballas/Adams (Sugar Creek)	Old Big Bend	25.	4,750.	KirkwoodMO::SBallas::001	118,750.00	AC	W	**58**
S. Geyer Rd (SBL only)	W. Argonne south	Madison	28.	480.	KirkwoodMO::SGeyer::006	13,440.00	PCC	W	**65**
S. Geyer Rd.	Big Bend	W. Rosehill (north curbline)	45.	1,215.	KirkwoodMO::SGeyer::002	54,675.00	AC	W	**38**
S. Geyer Rd.	W. Woodbine (south curbline)	W. Rosehill (north curbline)	36.	1,318.	KirkwoodMO::SGeyer::003	47,448.00	AC	W	**42**
S. Geyer Rd.	W. Woodbine (north curbline)	RR Tracks	36.	1,200.	KirkwoodMO::SGeyer::004	43,200.00	AC	W	**46**
S. Geyer Rd.	RR Tracks north	W. Madison (south curbline)	36.	863.	KirkwoodMO::SGeyer::005	31,068.00	AC	W	**41**
S. Van Buren Ave.	W. Argonne	dead at RR tracks	24.	1,005.	KirkwoodMO::SVanBuren::002	24,120.00	AC	W	**64**
Shands Ct.	Kinyon Ct	cul de sac	20.	600.	KirkwoodMO::ShandsCt::001	12,000.00	PCC	W	**96**
St. Giles Rd.	1338 ft E of Trossock	Culloden	25.	620.	KirkwoodMO::StGiles::001	15,500.00	PCC	W	**96**
Sweetbriar Ln.	E. Glenwood (south leg)	E. Glenwood (north leg)	18.	1,370.	KirkwoodMO::Sweetbriar::001	24,660.00	PCC	W	**59**
Symphony Hill Ct.	Boaz	cul de sac	26.	545.	KirkwoodMO::SymphnyHil::001	14,170.00	PCC	W	**96**
Taman Ct.	Old Big Bend	cul de sac	27.	360.	KirkwoodMO::Taman::001	9,720.00	PCC	W	**36**
Thorncliff Ln.	E. Glenwood (north leg)	E. Glenwood (south leg)	24.	1,737.	KirkwoodMO::Thorncliff::001	41,688.00	PCC	W	**62**
Thursby Ave.	Ballas east	Coulter	19.	400.	KirkwoodMO::Thursby::002	7,600.00	AC	W	**37**
Thursby Ave.	Ballas west	Edna	21.	1,150.	KirkwoodMO::Thursby::001	24,150.00	AC	W	**76**
Trossock Ln.	1275 ft. E of Barrett Station	Culloden	25.	300.	KirkwoodMO::Trossock::001	7,500.00	PCC	W	**96**
Virginia Ln.	Ballas west	Edna	21.	1,160.	KirkwoodMO::Virginia::001	24,360.00	AC	W	**82**
W. Glenwood Ln	Big Bend Rd	N. to Highland	24.	2,310.	KirkwoodMO::WGlenwood::001	55,440.00	PCC	W	**83**
W. Monroe Ave.	S. Geyer	park entrance (low water crossing)	25.	1,365.	KirkwoodMO::WMonroe::005	34,125.00	AC	W	**45**
W. Rosehill Ave.	Couch	Craig	32.	530.	KirkwoodMO::WRosehill::001	16,960.00	AAC	W	**98**
W. Rosehill Ave.	Couch	S. Geyer	41.	2,690.	KirkwoodMO::WRosehill::002	110,290.00	AC	W	**86**
W. Rosehill Ave.	S. Geyer east	Kirkwood Rd.	28.	2,590.	KirkwoodMO::WRosehill::003	72,520.00	AC	W	**46**
W. Woodbine Ave.	Porter	Meyer (dead end)	21.	475.	KirkwoodMO::WWoodbine::006	9,975.00	AC	W	**53**
W. Woodbine Ave.	Ballas east	east curbline of Coulter	21.	180.	KirkwoodMO::WWoodbine::004	3,780.00	PCC	W	**59**
W. Woodbine Ave.	Ballas west	1090 ft.	25.	1,090.	KirkwoodMO::WWoodbine::005	27,250.00	PCC	W	**44**
W. Woodbine Ave.	Couch	Craig	36.	1,160.	KirkwoodMO::WWoodbine::003	41,760.00	AAC	W	**67**
W. Woodbine Ave.	S. Geyer (west curbline)	Craig Rd split	54.	1,545.	KirkwoodMO::WWoodbine::002	83,430.00	AC	W	**73**
Westview Ave.	Bach	cul de sac	23.	2,000.	KirkwoodMO::Westview::001	46,000.00	AC	W	**57**
Wildwood Ln.	W. Glenwood	Heatherbrook	22.	1,747.	KirkwoodMO::Wildwood::001	38,434.00	PCC	W	**85**
Windgrove Rd.	Ann	Briarcreek	27.	615.	KirkwoodMO::Windgrove::001	16,605.00	PCC	W	**41**

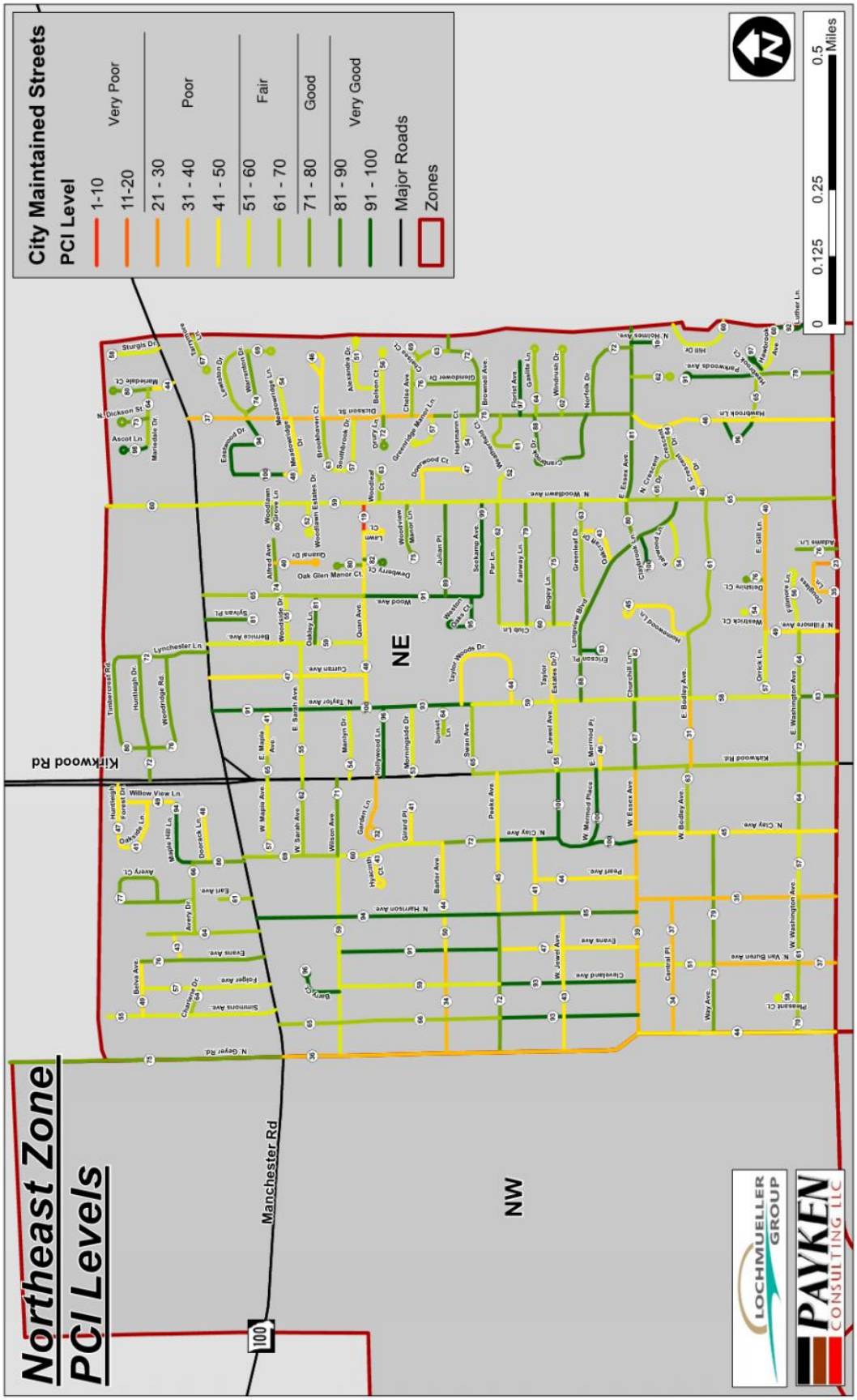
Windgrove Rd.	Briarcreek	cul de sac	27.	480.	KirkwoodMO::Windgrove::002	12,960.00	PCC	W	**30**	
Windy Hill Rd.	Emmerson	Enola	23.	810.	KirkwoodMO::WindyHill::001	18,630.00	AC	W	**63**	
Woodard Dr.	S. Geyer	cul de sac	25.	1,020.	KirkwoodMO::Woodard::001	25,500.00	AC	W	**61**	
Wooddell Ct	W. Woodbine	cul de sac	27.	544.	KirkwoodMO::Wooddell::001	13,056.00	PCC	W	**39**	
						25.34			**68.9**	**133**
						113.81	Total centerline miles			
						Average Concrete PCI =			***71.4***	
						Average Asphalt PCI =			***60.4***	
						Overall PCI =			***63.6***	

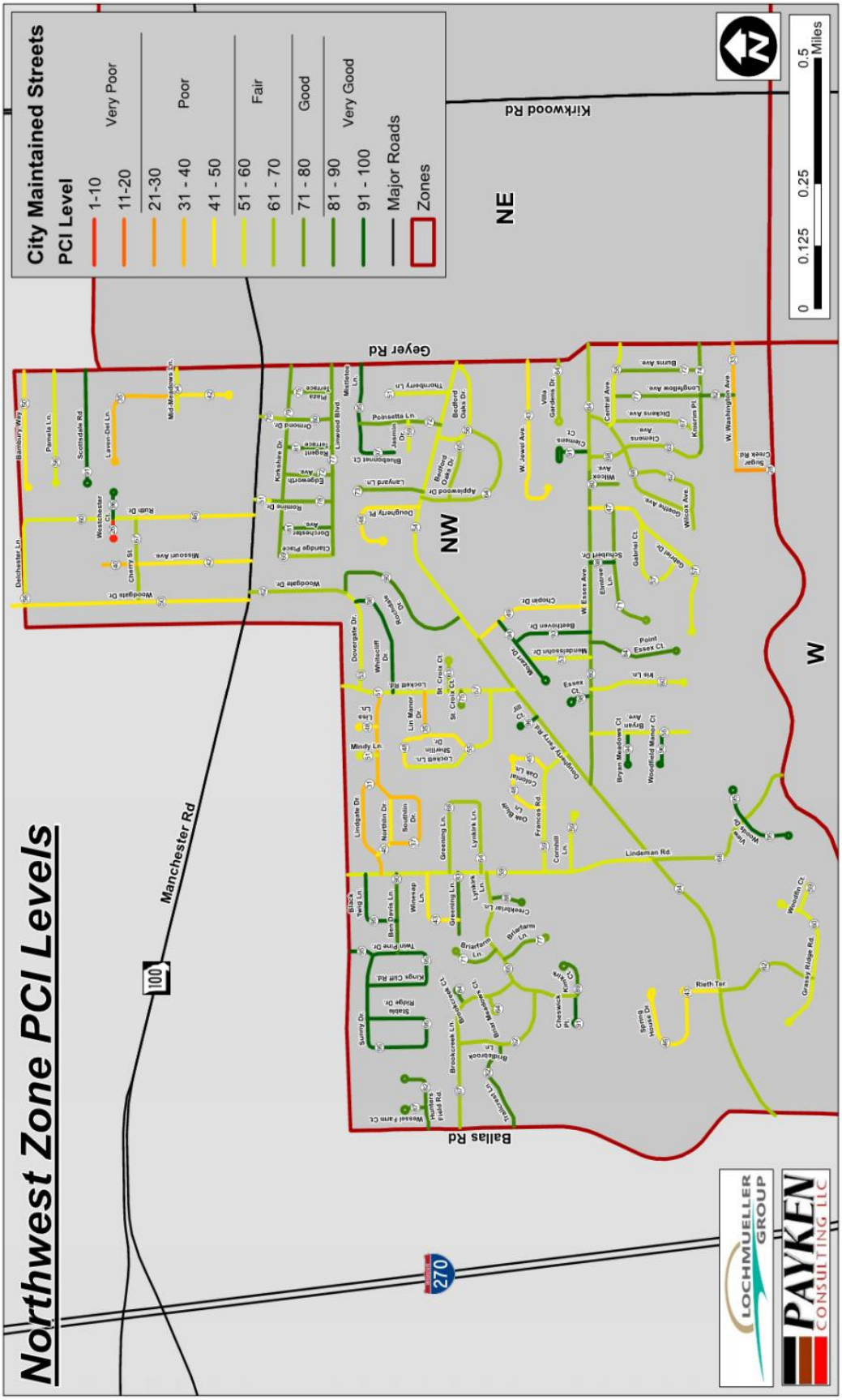
APPENDIX D

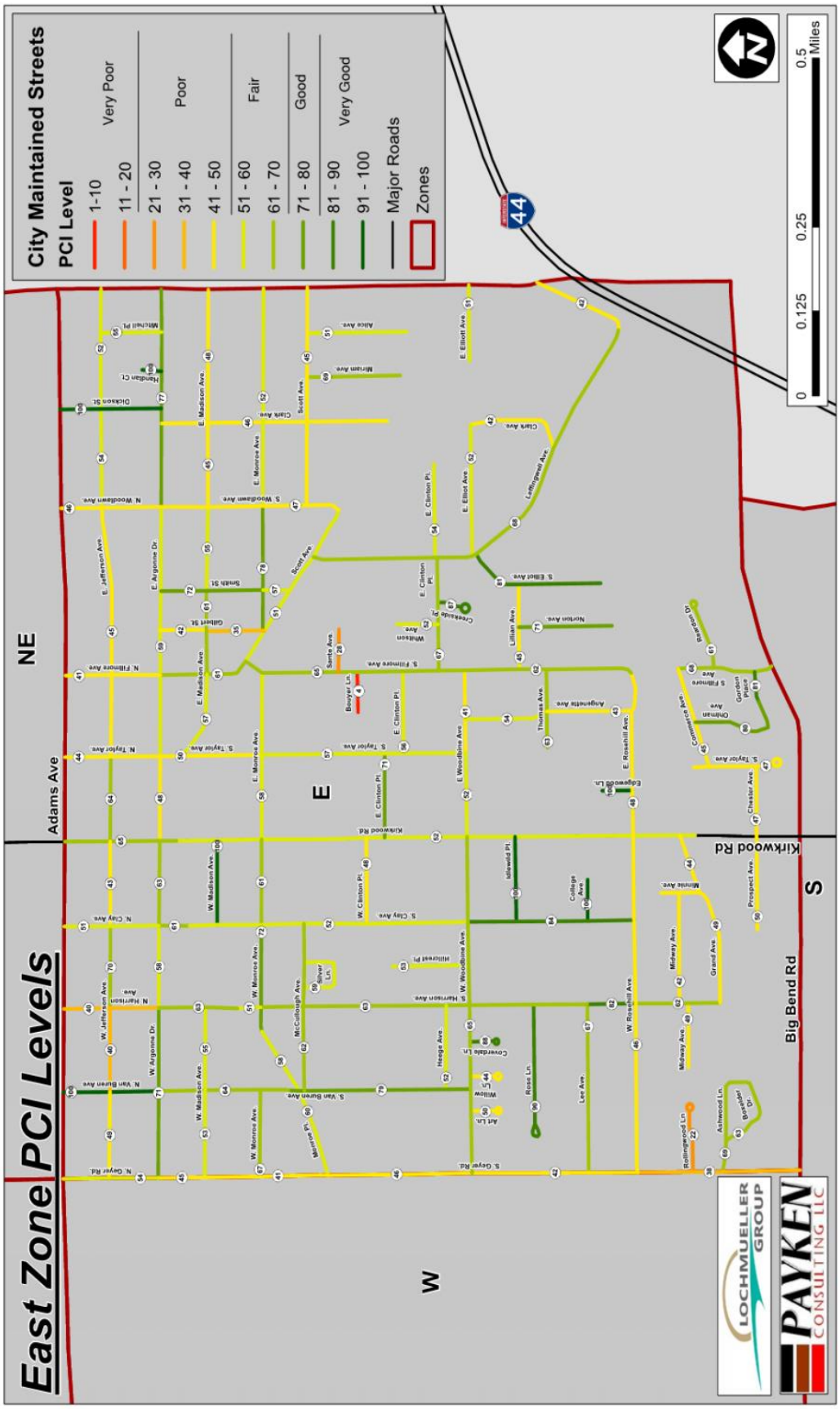
MICROPAVER Summary Maps

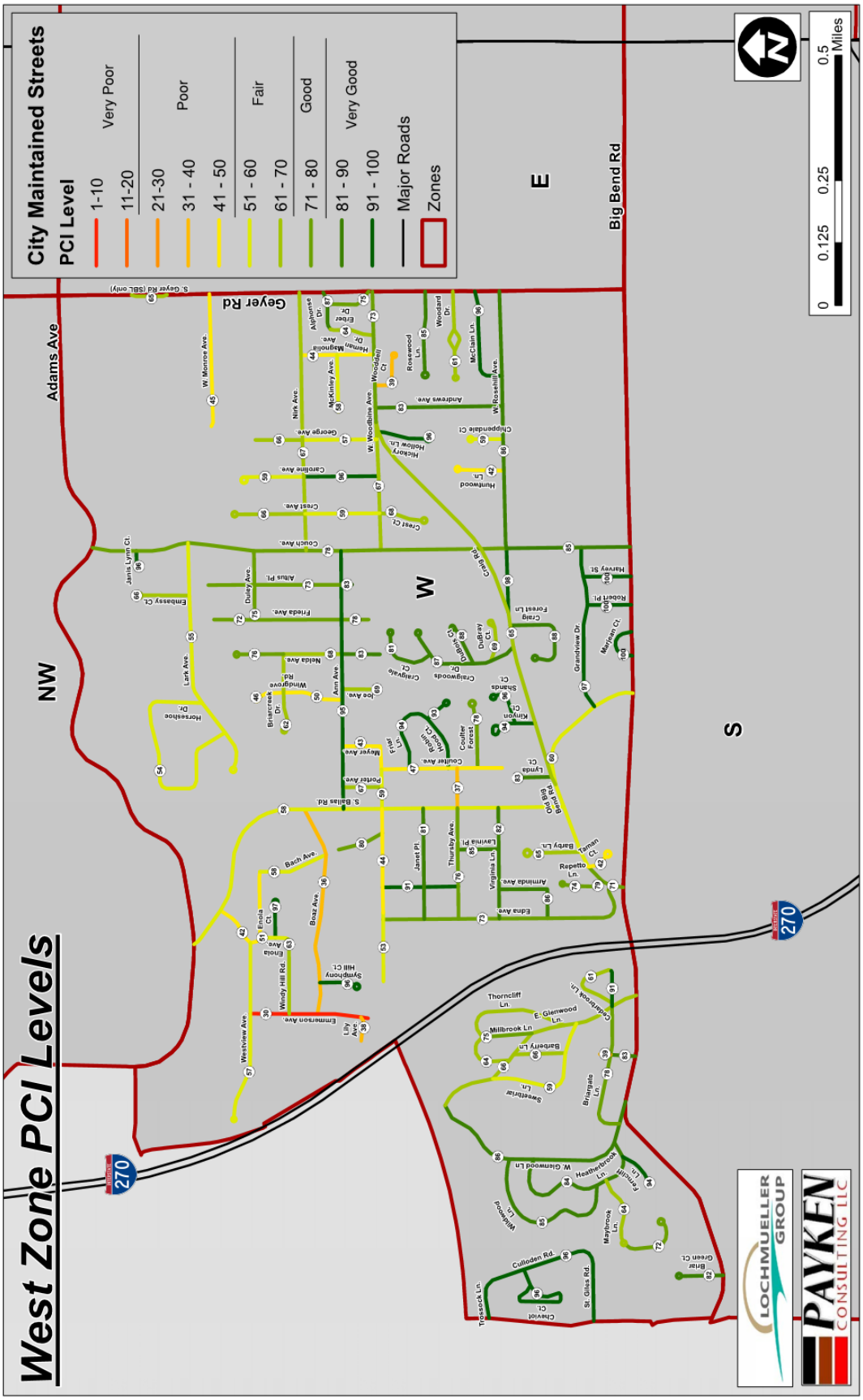
PCI Ratings (by maintenance zones)

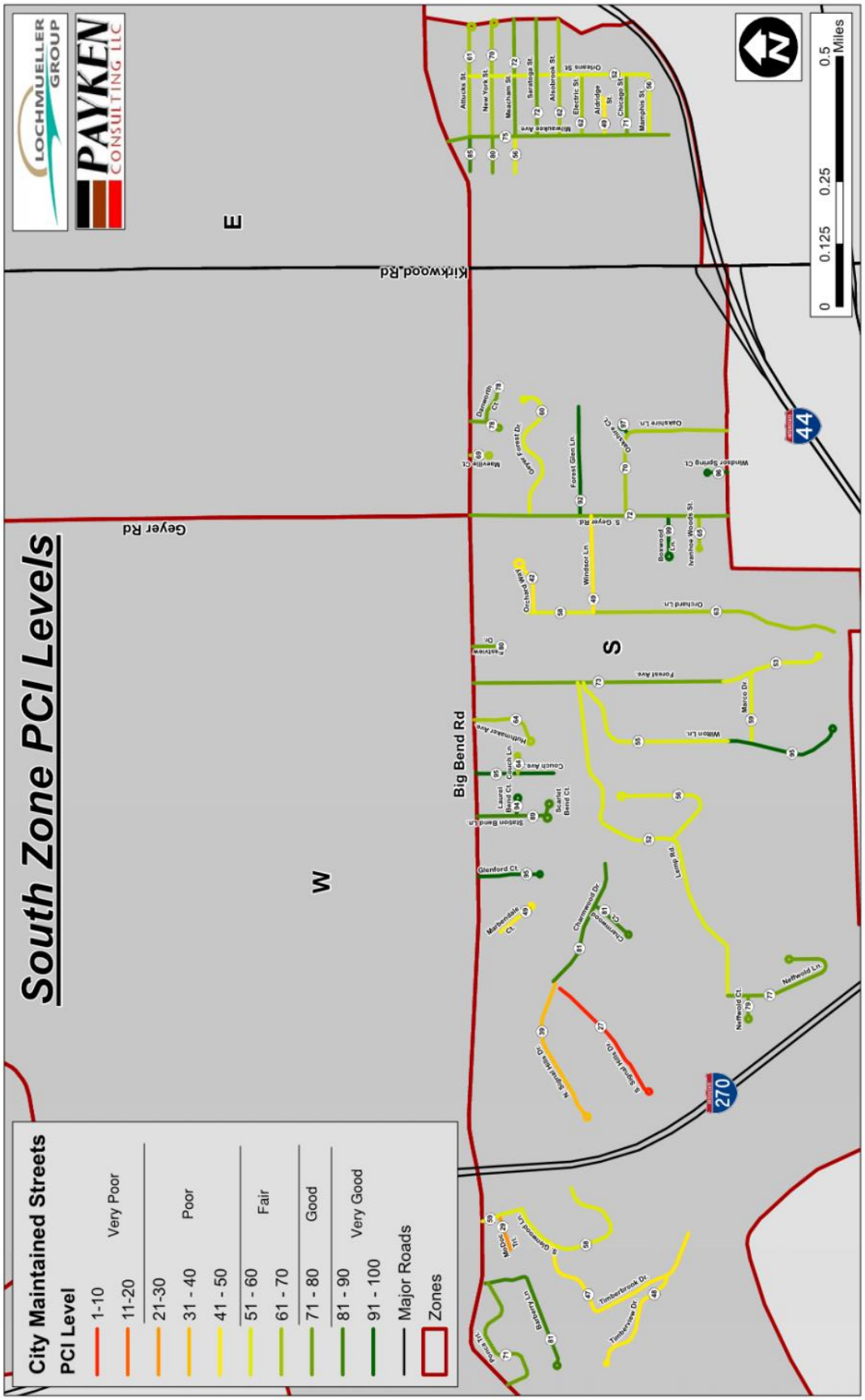

Kirkwood PCI Levels
City Maintained Streets
PCI Level
1-10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Very Poor
Poor
Fair
Good
Very Good
Major Roads
Zones
0 0.25 0.5 1 Miles
NE
NW
E
W
S
Woodlawn Ave
Adams Ave
Geyer Rd
Big Bend Rd
Kirkwood Rd
Watson Rd
Manchester Rd
Dougherty Ferry Rd
Lindeman Rd
Ballas Rd
100
270
44
366
LOCHMUELLER GROUP
PAYKEN CONSULTING LLC


Northeast Zone
PCI Levels
City Maintained Streets
PCI Level
1-10
11-20
Very Poor
21 - 30
31 - 40
41 - 50
Poor
51 - 60
61 - 70
Fair
71 - 80
Good
81 - 90
91 - 100
Very Good
Major Roads
Zones
0
0.125
0.25
0.5
Miles
NE
NW
Manchester Rd
Kirkwood Rd
100
LOCHMUELLER GROUP
PAYKEN
CONSULTING LLC


Northwest Zone PCI Levels
City Maintained Streets
PCI Level
1-10
11-20
21-30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Very Poor
Poor
Fair
Good
Very Good
Major Roads
Zones
NE
NW
W
Kirkwood Rd
Geyer Rd
Ballas Rd
Manchester Rd
Lindeman Rd
0
0.125
0.25
0.5
Miles
LOCHMUELLER GROUP
PAYKEN CONSULTING LLC


East Zone PCI Levels
City Maintained Streets
PCI Level
1-10
11 - 20
Very Poor
21 - 30
31 - 40
Poor
41 - 50
51 - 60
Fair
61 - 70
71 - 80
Good
81 - 90
91 - 100
Very Good
Major Roads
Zones
0
0.125
0.25
0.5
Miles
NE
Adams Ave
E
W
S
Big Bend Rd
Kirkwood Rd
44
LOCHMUELLER GROUP
PAYKEN CONSULTING LLC


West Zone PCI Levels
City Maintained Streets
PCI Level
1-10
11-20
21-30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Very Poor
Poor
Fair
Good
Very Good
Major Roads
Zones
NW
W
E
S
Adams Ave
Geyer Rd
Big Bend Rd
270
0
0.125
0.25
0.5
Miles
LOCHMUELLER GROUP
PAYKEN CONSULTING LLC


South Zone PCI Levels
City Maintained Streets
PCI Level
1-10
11-20
Very Poor
21-30
31 - 40
Poor
41 - 50
51 - 60
Fair
61 - 70
71 - 80
Good
81 - 90
Very Good
91 - 100
Major Roads
Zones
W
E
S
Geyer Rd
Kirkwood Rd
Big Bend Rd
0 0.125 0.25 0.5 Miles

APPENDIX E

Photos of Street Structural Distresses

NORTH WOODLAWN AVENUE

PATCH IN GOOD CONDITION, LOW LONGITUDINAL AND TRANSVERSE CRACKING AS WELL AS HIGH ALLIGATOR CRACKING

NORTH WOODLAWN AVENUE

PATCHING IN FAIR TO GOOD CONDITION WITH LOW LONGITUDINAL AND TRANSVERSE CRACKING WHICH HAS BEEN CRACK SEALED

WEST ARGONNE AVENUE

SEALED AND UNSEALED LONGITUDINAL AND TRANSVERSE CRACKING

WEST ARGONNE AVENUE

ALLIGATOR CRACKING WITH LONGITUDINAL AND TRANSVERSE CRACKING AS WELL AS WEATHERING

BARTER AVENUE

WORN MICROSURFACE WITH LONGITUDINAL AND TRANSVERSE CRACKING

BARTER AVENUE

WORN MICROSURFACE SHOWING SIGNS OF DELAMINATION AND POT HOLE FORMATION

BARTER AVENUE

WORN MICROSURFACE WITH LONGITUDINAL AND TRANSVERSE CRACKING

BARTER AVENUE

SEVERELY DETERIORATED MICROSURFACE WITH HIGH LONGITUDINAL AND TRANSVERSE CRACKING

BOUYER LANE

SEVERE PAVEMENT DETERIORATION WITH LONGITUDINAL, TRANSVERSE AND ALLIGATOR CRACKING WITH RAVELING AND POTHOLES

DOUGLASS LANE

MODERATE LONGITUDINAL, TRANSVERSE AND ALLIGATOR CRACKING

BOUYER LANE

SEVERE PAVEMENT DETERIORATION WITH LONGITUDINAL, TRANSVERSE AND ALLIGATOR CRACKING WITH RAVELING AND POTHOLES

GEYER ROAD

DETERIORATED PATCHING WITH MODERATE LONGITUDINAL AND TRANSVERSE CRACKING AS WELL AS MODERATE WEATHERING

QUAN AVENUE

TWO APPLICATIONS OF MICROSURFACING IN VERY POOR CONDITION WITH SEVERE LONGITUDINAL, TRANSVERSE AND HIGH ALLIGATOR CRACKING AS WELL AS RAVELING AND POTHOLES

QUAN AVENUE

UTILITY PATCH IN FAIR CONDITION WITH SEVERE LONGITUDINAL, TRANSVERSE AND HIGH ALLIGATOR CRACKING

WEST WASHINGTON AVENUE

PATCHING IN GOOD CONDITION WITH LONGITUDINAL AND TRANSVERSE CRACKING AS WELL AS MODERATE WEATHERING

WEST WASHINGTON AVENUE

SEVERE LONGITUDINAL, TRANSVERSE AND ALLIGATOR CRACKING WITH MODERATE WEATHERING

VAN BUREN AVENUE

PATCHING IN POOR CONDITION WITH JOINT DETERIORATION AND CORNER SPALLS AS WELL AS TRANSVERSE CRACKING

BOX ELDER DRIVE

PATCHING IN POOR CONDITION WITH DIVIDED SLABS, TRANSVERSE CRACKING, JOINT DETERIORATION AND CORNER SPALLS

BOX ELDER DRIVE

PATCHING IN POOR CONDITION WITH DIVIDED SLABS, TRANSVERSE CRACKING, JOINT DETERIORATION AND CORNER SPALLS

SOUTH FILLMORE AVENUE

WIDESPREAD UNSEALED LONGITUDINAL AND TRANSVERSE CRACKING WITH JOINT AND CORNER SPALLS AS WELL AS CORNER BREAKS, AND DIVIDED SLABS

ROLLINGWOOD LANE

PATCHING IN POOR CONDITION WITH DETERIORATED JOINT SEAL, CORNER SPALLS TRANSVERSE CRACKING

ROLLINGWOOD LANE

UTILITY PATCHING IN POOR CONDITION WITH DIVIDED SLABS, TRANSVERSE CRACKING, JOINT SEAL DETERIORATION AND CORNER SPALLS

ROLLINGWOOD LANE

PATCHING IN POOR CONDITION WITH DIVIDED SLABS, TRANSVERSE CRACKING AS WELL AS SEVERE JOINT AND CORNER SPALLS

WESTCHESTER COURT

PATCHING IN POOR CONDITION WITH DETERIORATED JOINT SEAL, CORNER SPALLS AS WELL AS TRANSVERSE CRACKS, CORNER BREAKS, AND DIVIDED SLABS

APPENDIX F

Strategies for Fiscally Sustainable Infill Housing Study

Prepared by: Chris Schildt, with the Center for Community Innovation

Strategies for Fiscally Sustainable Infill Housing

GREENBELT ALLIANCE
Open Spaces & Vibrant Places

CENTER FOR COMMUNITY INNOVATION

Author
Chris Schildt, Center for Community Innovation

Cover Photo
Little Italy, San Diego, from Greenbelt Alliance

Key Support
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The Center for Community Innovation (CCI) at UC Berkeley nurtures effective solutions that expand economic opportunity, diversify housing options, and strengthen connection to place. The Center builds the capacity of nonprofits and government by convening practitioner leaders, providing technical assistance and student interns, interpreting academic research, and developing new research out of practitioner needs.

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September 2011

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Introduction

Passed in 2008, new state legislation (Senate Bill 375) now requires every major region within California to reduce statewide greenhouse gas emissions by accommodating new growth through infill urban development. A growing number of California cities want to comply with this new bill and promote thriving, infill development with multi-family housing affordable to families at a range of incomes.

The benefits of walkable, infill communities are many and well-documented – from greenhouse gas reduction to resource conservation to improved community health. However, in order to achieve the goal of more infill homes, a city's costs and revenues need to match up. Cities today are faced with a crippling economic recession that is forcing municipalities to drastically cut back on the public services – such as parks, libraries, police, and fire – that make these communities such great places to live. Since property tax rates were capped with the passage of Proposition 13 in 1978, revenues from residential land uses have not increased at pace with the rising costs of both infrastructure needs and public services in California. Cities are reticent to accommodate California's growing population within their borders without new revenue sources. Simply put, cities need a model for new housing development that is both environmentally sustainable and fiscally sustainable.

This report attempts to help infill housing advocates and city staff better understand the relationship between a city's fiscal health and infill housing development. It is divided into three parts. Part I provides an introduction to city general revenues and expenses associated with infill housing development. Part II describes strategies that California cities can use to raise additional revenues from housing development. Finally, Part III looks specifically at the City of San Jose as a case study of how a city may promote fiscally sustainable infill housing development.

The primary focus of this report is on strategies that cities can implement to generate net new revenues out of new multifamily infill housing development. Because of this narrow focus, many other important areas of investigation are left out of this report, including: state-level strategies to generate new revenues for cities (such as amending or repealing Proposition 13); cost reduction strategies (such as reducing the health care costs for municipal workers); revenue reallocation strategies (such as tax-increment financing); or new revenue sources from non-residential development (such as business license fees). All of these topics certainly play an important role in the overall fiscal health of a city, but they are beyond the scope of this report.

Infill homes.
Photo credit: Greenbelt Alliance

Part I: A Primer on Fiscally Sustainable Infill

This section is designed to help infill housing advocates understand the basic mechanics of how cities pay for infrastructure and public services – two essential parts of building a livable community. It's important to remember that this sort of fiscal analysis of housing only focuses on one aspect of the development. Obviously, other factors such as safety, affordability, and environmental sustainability ought to be considered when determining what sort of housing development is right for a community.

What you should take away from reading this primer is:

Infill homes usually costs less per unit than low-density greenfield housing for both infrastructure and most public services. Most of the recent research shows that on a per unit basis, infill costs less than sprawl.

However, revenues from infill homes do not always cover all the costs. Property taxes are one of the primary revenues that cities receive from housing, but because of California's highly restrictive property tax laws, residential development generally does not generate enough revenues to offset their costs. So even though infill costs less per unit than sprawl, it generates less property tax revenues per unit, as well.

Oftentimes, planners and advocates do not fully understand what the costs and revenues are for infill housing development. The common perception in many

A Note on the Research

Academic research on the relationship between compact development and cities' costs for infrastructure and public services ranges widely in both their methodology and results. Most of the studies use aggregate data at the county level, which masks many of the cost efficiencies specific to infill compact development discussed in this report. Studies that use site-specific analysis in general do find compact development to have lower costs. Some of the most commonly cited studies are discussed below.

Studies by Helen F. Ladd and John Yinger in the early 1990s show that at the county level, the cost of infrastructure goes down with density, but public services cost per capita increase with increased density and city size. This finding was supported by a 2008 study by Randall G. Holcombe and DeEdgra W. Williams that shows that infrastructure costs decrease as density increases, but public service per capita costs increase as density increases in cities of more than 500,000 people. However, both of these studies used average density across entire counties, which masks many of the location-based cost efficiencies of compact development.

John I. Carruthers and Godmunder F. Ulfarsson also used county-level data in their studies, but segregated urbanized and rural land within the county to create a finer grain analysis. Their research shows that all public services except sewage go down in per capita costs as density increases. They note that the lower cost for sewage in rural areas is likely due to the use of septic tanks, which is not feasible in urbanized areas. Robert Burchell et al. have also recently conducted a nation-wide study showing that while both sprawl and compact residential development will incur deficits under the status quo revenue generating policies, compact development's deficit is on average 10 percent less than sprawl, though in California they found no difference in cost between compact and sprawl development.

Learn More:

Burchall, Robert W., Anthony Downs, Barbara McCann, and Sahan Mukherji. 2005. *Sprawl Costs: Economic Impact of Unchecked Development*. Washington: Earth Island Press.

Carruthers, John I. and Gudmunder F. Ulfarsson. "Urban Sprawl and the Cost of Public Services." *Environment and Planning: Planning and Design*. 2003 30:503-522.

Holcombe, Randall G. and DeEdgra W. Williams. "The Impact of Population Density on Municipal Government Expenditures." *Public Finance Review*. 2008 36:359.

Ladd, Helen F. and John Yinger. 1991. *America's Ailing Cities: Fiscal Health and the Design of Urban Policy*. John Hopkins University Press.

California cities is that housing will always be a fiscal loss for cities, and doing a full fiscal analysis will only increase opposition. However, it is important that infill housing advocates understand these fiscal issues so that acceptable solutions can be worked out beforehand.

In general, cities have two costs associated with housing: (1) one-time infrastructure and capital costs; and (2) ongoing public services (ie. police, fire, parks, and libraries) and infrastructure maintenance. This report will discuss both, but mostly focuses on a city's ongoing costs.

Cities also have a range of revenue sources, which can be roughly divided into two groups: (1) unrestricted, or general, revenues, and (2) restricted revenues. Unrestricted revenues go into a city's general fund and can be spent at the discretion of the city council. Restricted revenues can only be used to pay for specific things.

Not all cities provide the same services, or collect the same revenues. In California, roughly one quarter of cities are full-service cities, meaning that they provide all the common public services to their residents (police, fire, libraries, and parks). Many cities are partial-service cities, with some services such as fire provided through special districts and not by the city itself.[1] Revenues can also vary widely. For example, if a housing development is in a Redevelopment Area, then a significant portion of property tax revenues get diverted to the Redevelopment Agency. While this grants the Redevelopment Agency the ability to use this money on important things like affordable housing and new infrastructure, it can also mean less money for public services.

To complicate issues further, the costs of most services are usually calculated per capita, while the revenues are generated on a per unit basis. For example, many cities establish a parks requirement based on a number of acres per 1,000 residents. However, property taxes are collected based on the assessed value of the property, regardless of the number of residents.

Finally, there is ongoing disagreement about how to divide costs and revenues by land use. For example, sales taxes are an important revenue source for cities, which comes almost exclusively from commercial land uses like stores and shopping malls. However, stores need people living nearby who shop there in order to sell anything – which suggests that at least a portion of sales tax revenues should be attributed to residential uses. Cities will oftentimes hire consultants to determine how much their residents are spending on taxable goods in their city and develop a formula for allocating revenues accordingly.

Even with all this variation between and within cities, it is helpful to understand a city's basic balance sheet when it comes to housing. Below is a more detailed discussion of both the costs and revenues from infill development.

Tip: Reducing Infrastructure Costs

Transportation Many cities use an out-dated Level of Service traffic modeling analysis during the environmental review process of development that unfairly requires new development to look at local automobile traffic impacts, but not other modes of transportation or regional impacts. This oftentimes means that cities or developers must pay for costly road widenings in dense urban areas. Cities can go a long way in reducing this infrastructure cost by updating their model for analyzing traffic impacts to take into account pedestrians, bicycles, and public transit options, as well as regional traffic impacts.

Sewage and Water Many cities create agreements with developers in which the developer build sewage and water lines for a development, while the city is responsible for operating and maintaining them. While this can lead to cost savings because of timing efficiencies, the developer may choose to install a system that has the cheapest capital costs, but may be expensive to operate and maintain over time. If developers opt to build the infrastructure themselves, then it is important for the city to have stringent requirements that ensure operations and maintenance costs are manageable over time.

Parks City park requirements can be costly for an infill developer to fulfill because of the high cost of land in infill areas. City zoning regulations allowing rooftop open spaces or joint use agreements with nearby schools can help reduce the cost of building and operating parks while still providing recreational facilities for residents.

Costs of Infill Housing

A city's costs associated with building more housing are twofold. First, there are the initial costs of building or upgrading the infrastructure to serve the new housing; this may include building new roads, upgrading sewage and water capacity in the area, and building new facilities. Second, cities pay for many of the ongoing public services for the residents in the area, including police, fire, parks, and libraries. These ongoing costs also include operations and maintenance for the roads, sewage, and other infrastructure.

Infill housing can take advantage of both excess capacity in existing infrastructure and locational efficiencies to lower both initial and ongoing costs to cities. Below is an itemized description of infrastructure and service costs for a full service city and how infill can save money for cities, compared to single-family greenfield development.

Infrastructure costs

Transportation Road infrastructure per unit is on average much cheaper for infill compared to greenfield; there are simply less roads to be built per unit. Infill can incur significant transportation infrastructure costs if the city requires excessive traffic mitigation measures. See sidebar on "Reducing Infrastructure Costs" for more information.

Sewage and Water Sewage and water infrastructure per unit are usually cheaper in infill development because the infrastructure in place has excess capacity.[2] The costs of sewage and water both increase rapidly in sprawl development, and particularly where new development leap-frogs over existing agricultural or undeveloped land. Sewage pipes need either a constant downhill slope to the treatment facility or pumps to move the sewage. A constant slope becomes harder and possibly impossible to achieve over long distances, and pumps can be costly to maintain over time. Providing water over long distances also becomes costly, as pumps are needed to maintain adequate water pressure.[3]

Utilities Where electrical, phone, and internet lines have excess capacity in urban neighborhoods, the cost of utilities infrastructure for infill development is minimal. For new greenfield development, the cost increases with distance from existing trunk lines, particularly if the cables must be undergrounded.[4]

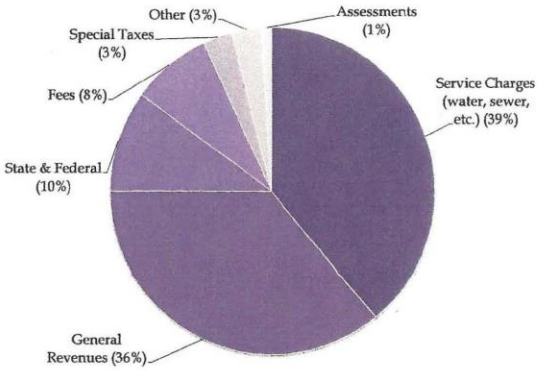
Capital Costs for Services The public services listed below often have up-front capital costs associated with them. Police and fire need stations and equipment; Parks and libraries require physical space or structures before operations can begin. These costs can vary significantly based on the capacity of existing facilities and how far they are from the new development.

Cost of public services

Police Services As new development is built, police departments must hire additional police officers and patrol cars for new beats. When density increases, hard costs such as patrol cars and gasoline decrease on a per capita level. While some argue that more police officers will be needed because crime rates go up in denser areas, there is more credible evidence that police costs per capita actually decrease with density because a police officer is able to cover more residents in a single beat.[5]

Fire Protection Services With fire protection services, response time is a key factor. Thus, if a sprawl development is built far from existing services, a new station may be required, adding significant costs. By the same logic, if infill developments are particularly tall, firemen may need special equipment to safely and quickly access them in the event of a fire. However, once that equipment has been purchased to service one building in a neighborhood, additional buildings at that height can be built nearby with minimal additional costs.

Figure 1. Typical City Revenue Sources



Source: Michael Coleman. *A Primer on California City Finance*. League of California Cities, 2005.

Figure 2. Breakdown of General Revenues Soureces

Source: Michael Coleman. *A Primer on California City Finance*. League of California Cities, 2005.

Parks and Libraries Operations and maintenance of parks and libraries can be a relatively small but significant cost that the city must pay for with scarce general revenues. Maintenance costs for parks are often lower when they are located near the service center, which is often near the city center. Most libraries have excess capacity and benefit from maximizing the number of residents nearby.

General Government and Planning These costs include everything needed to make a city run administratively, from planning and permitting to the City Manager's office.

Infrastructure Operations and Maintenance The cost of operating and maintaining infrastructure over time varies considerably by neighborhood and by project site.

These costs are often lower for infill development simply because as densities increase, the cost of operations and maintenance per linear foot of infrastructure is spread over more residents.

Revenues from Infill Housing

Cities have two primary sources to pay for new infrastructure and increased demand for public services. First, cities can pay with general (or unrestricted) revenues. These revenue sources include automatic revenues such as property taxes and sales taxes, as well as additional taxes cities can choose to levy, such as Transit Occupancy Taxes (TOTs). For the average California city, general revenues make up 36 percent of a city's overall revenues.

In addition, cities can pay using targeted revenue sources, such as a traffic mitigation fee to pay for widening roads or a special assessment district to pay for parks maintenance. These additional revenue sources will be discussed in Part II of this report. Finally, it's important to note that the ongoing costs of many utilities are paid for through service charges, such as water, sewage, waste removal, etc., which will not be discussed here.

This section will discuss the general revenue sources cities can use to pay for infrastructure and public services, and how infill development affects these revenues. For a more general discussion on city revenues, an essential resource is "A Primer on California City Finance" available through the League of California Cities on their website.

Automatic general revenue sources

The first three general revenue sources discussed here – property taxes, sales taxes, and vehicle license fee – generate revenues for cities automatically. This means that a certain portion of these state-collected revenues are automatically returned to the city through a pre-established formula.

Property Tax Of all the basic general revenue sources, property taxes are the only ones directly generated by residential development. After Proposition 13 was passed in 1978, property tax was locked in at 1 percent of property value, with a maximum increase of 2 percent a year. Property tax gets reassessed whenever a property changes ownership or when major improvements are done on the land.[6] While infill, compact development creates more property tax revenue per acre than low-density housing, it oftentimes generates less property tax revenue per unit or per capita due to the lower assessed value of each individual unit.[7] Property taxes go first to the state, which uses a formula to determine how much of it goes to school districts, the county, and city general revenues. On average, cities receive 21 percent of property tax revenues in non-redevelopment areas. Property tax makes up 11 percent of a city's general revenues. Even though property taxes are levied on all properties, many commercial and office building owners have found ways to minimize property tax increases on their properties by avoiding changes in ownership. Because of this, the residential share of property tax revenues increased from 50 percent to 64 percent in the last 30 years as the share from commercial properties has declined.[8]

Sales Tax Since Proposition 13, sales tax has increasingly become the most important source of revenue for many cities. On average, sales tax revenues are 10 percent of all revenues for cities. This has led to a fiscalization of land use as commercial developments have become a vital source of sales tax revenues for cities. Cities have a financial incentive to prioritize retail or commercial uses over residential or other uses that generate less sales tax revenue.[9] Infill development can have two positive impacts on sales tax revenues: first, infill is often mixed-use, with sales-tax generating ground floor retail. Second, higher density means more residents who are likely to shop at stores in the city, boosting sales. Economic consultants can analyze a city's demographics and retail profile to determine how much new residents would contribute to this tax base.

Vehicle License Fee Cities receive the revenues from license fees of vehicles registered in their boundaries. In 2004, the state reduced the rate of the Vehicle License Fee (VLF) from 2 percent to 0.65 percent, and made up for the revenue loss to cities by backfilling it with additional property tax revenues to cities.[10] Because of this, VLFs are now a small sliver of a city's revenues.

Additional general revenue sources

Below are some of the most common additional general revenue sources for cities. These revenues require additional action before they can be collected.

Utility Users Tax Cities are allowed to levy a Utility Users Tax (UUT) on a number of utilities, including gas, electric, water, and more. The tax can be approved by a city as either a special tax or a general tax to pay for city services. The tax is on average about 5 percent of a household's utility costs, and is included in the utilities bill. Nearly half of all households in California pay a UUT. Infill units often use less resources, and therefore pay less of the UUT than other units that consume a greater amount of resources.

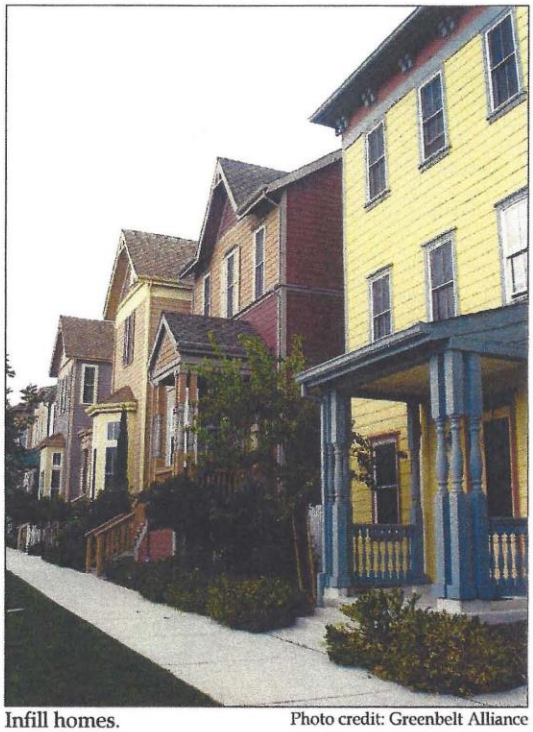
Other Taxes and Fees Over three quarters of California cities levy a Transit Occupancy Tax on visitors who stay in the city. Because this is a revenue source tied to a specific land use (hotels and other lodging facilities), it has also led to a fiscalization of land use.[11] When infill developments include hotels, significant new revenues for the city may be generated. Business License Taxes are levied by most of California's major cities and provide an important source of general revenues, but infill housing development has a minimal impact on this revenue source unless the development also includes office space.

Conclusion – Adding it all up

So how well do these costs and revenues add up in an average Californian city? The table below is an example that shows a cost/revenue analysis for single family greenfield development and higher-density infill housing in a hypothetical city. The numbers are loosely based on similar analyses done by Michael Coleman. This is for illustrative purposes only to show how a cost/revenue analysis of housing development might look, and is not meant to apply to any particular city.

Though both the single family and multi-family development scenarios show a negative net impact, it's important to note that the single family scenario costs the city more per unit than the higher-density development. This is generally true, and can explained in part by all the reasons discussed above: higher density infill housing can take advantage of locational efficiencies that lower costs for cities.

This example does not mean that infill development will never be able to pay for itself; it does mean that in some circumstances, additional revenues are needed in order to make infill housing fiscally sustainable for cities. In Part II, we'll talk about what these additional revenues might be. For a more specific analysis, see the case study on San Jose in Part III of this report.



Infill homes. Photo credit: Greenbelt Alliance

Table 1. Example of Cost and Revenue Analysis for a City

	Single Family	Multi Family
ASSUMPTIONS		
Density (Gross)	4	20
Acres	5	5
Total Residential Units	20	100
Median Cost per Unit	$500,000	$250,000
Property Value	$10,000,000	$25,000,000
Average Property Tax Revenue to Cities	0.21%	0.21%
CITY SERVICES COSTS		
Police	$15,000	$52,000
Fire	$8,000	$26,800
Parks	$4,000	$13,350
Libraries	$2,250	$7,350
Planning and General Government	$5,250	$17,500
Infrastructure Operations and Maintenance	$3,200	$10,700
Total City Costs	**$37,700**	**$127,700**
Total City Costs per unit	**$1,885**	**$1,277**
CITY SERVICES REVENUES		
Property Tax Revenue	$21,000	$52,500
Sales Tax Revenue	$4,600	$23,000
Utility Tax Revenue	$2,000	$11,200
Other Taxes and Revenues	$4,100	$21,000
Total City Revenues	**$31,700**	**$107,700**
Total City Revenues per unit	**$1,585**	**$1,077**
Net Difference	**-$6,000**	**-$20,000**
Net Difference per unit	**-$300**	**-$200**

Part II: Filling the Financial Gap

This section outlines what actions infill housing advocates can push their cities to take in order to pay for the infrastructure and public services that new residents of infill housing require. The strategies listed here generate additional revenue directly from the new development. These targeted revenue sources are the basic toolbox that each city has in order to fill the financial gap of infill housing. They fall into three basic categories:

Impact Fees are charged to a developer in exchange for approval of a development project. Fees can be levied with a simple majority approval of the city council, but they must meet more stringent legal requirements than other forms of targeted revenues. Parks or Traffic Mitigation Fees are examples of Developer Impact Fees.[12]

Special Assessment Districts are levied on both new and existing residents in an area to pay for specific improvements. The revenues must be used to pay for a unique benefit to the affected property owners. They are established through a weighted simple majority vote of the affected property owners. Business Improvement Districts and Maintenance Assessment Districts are examples of this.[13]

Mello-Roos Districts require a two thirds majority vote to pass, but there is far more flexibility in how the revenue can be spent. Community Facilities Maintenance Districts are an example of this.[14]

The chart below summarizes some of the important differences between these three revenue sources.

Finally, *Value Capture from Upzoning* is an important concept when considering these three strategies for infill development. Although value capture is not a specific, revenue-generating strategy, it can provide a useful framework.

Table 2. Targeted Revenue Sources

	Impact Fees	*Special Assessments*	*Mello Roos Districts*
Who is charged	Developers applying for building permits	All property owners in the district	All property owners in the districts, except public buildings and other uses specifically exempted
How it is enacted	Simple majority of the city council, with findings	Simple majority of affected property owners, weighted by benefit accrued	Two-thirds majority of affected property owners/residents
Impacts on low-income communities	Potentially significant -- Only applies to new construction and affordable housing is usually (though not always) exempted. Can raise cost of all housing in a tight market.	Potentially significant -- No exemptions allowed, and voting system often disenfranchises low-income property owners	Varies -- Cities have significant flexibility in how tax is calculated, and who has to pay
What it can pay for	Most limited - the fee can only pay for additional infrastructure or services for new development. Must prove nexus and rough proportionality to service provided.	Can only pay for a "unique benefit" for affected properties. Best used to pay for additional services; can't be bonded.	Most flexible – can pay for infrastructure and most services, and can be bonded.
What it's good at paying for	New infrastructure that will obviously benefit the new development (ie. new roads, parks, sewers, etc.)	Small things that make a place special (ie. street festivals, special garbage cans or banners, special landscaping etc.)	Just about anything. Can be bonded for capital improvements, or used for services.
What it's bad at paying for	Cannot be used to correct existing deficits. Also, while technically it can be used to fund services, it can be very hard to prove nexus and rough proportionality.	Cannot be used to replace any service already provided by the city. Cannot be bonded in order to pay for big infrastructure projects.	Cannot pay for transit service, unless the city is a charter city and chooses to write special formation papers.
Examples	Traffic Impact Fees, Parks Impact Fees	Business Improvement Districts	Community Facilities Maintenance Districts

Value Capture from Upzoning

What is value capture?

Cities and government agencies create value all the time: from a new public transit line to sewer upgrades to changes in the zoning code that increase the value of the land. All of these public sector actions make the properties around them more valuable, yet for the most part, the individual landowners get to keep all or most of that increased value in the form of higher profits when they eventual sell or develop their land. This unearned windfall may be great for land speculators, but ultimately it comes at the expense of taxpayers who paid for that public amenity in the first place.

Value capture is a broad term that covers any policy or agreement in which a government agency captures some of this unearned windfall in the private sector that arises from public sector activity. Value capture is based on the principle that the public should receive some of the economic benefits of its actions. Value capture is already widely used in California today. Tax increment financing, used by Redevelopment Agencies, uses anticipated increases in land value, and therefore in property tax revenues, to pay for new investments in infrastructure. California's 25 percent density bonus for developments that include affordable housing is another form of value capture; the city captures the economic value of increased density by requiring the developer to create additional affordable housing units.[15]

How can value capture help infill pay for itself?

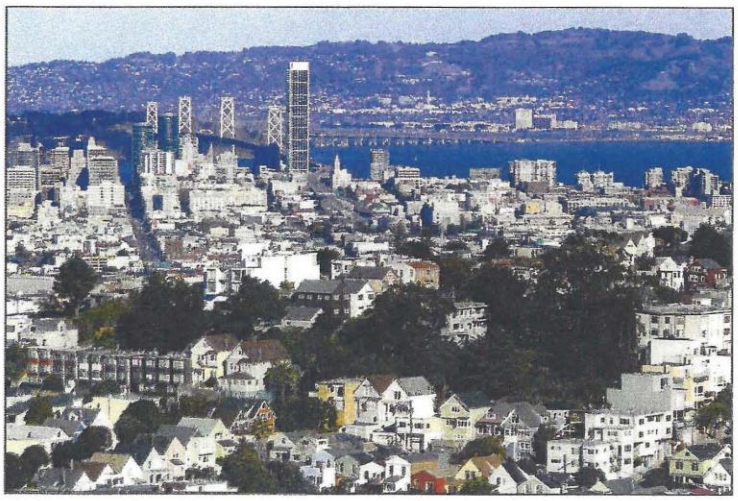
Value capture can be a powerful tool to help cities recoup the full cost of infill housing development. In order for it to work, it needs three things: (1) A government action that increases land value in a given area (such as new infrastructure investments or zoning changes); (2) A mechanism to capture that increased value (such as an agreement with the land owner, or a special tax, assessment, or fee); (3) A plan for how the money generated will be spent (such as to pay for the infrastructure investment, or to pay for other public amenities).

While value capture is frequently used when cities invest in new infrastructure, it is less widely used when cities create new land value through zoning changes. A 1-acre parcel zoned for 100 units is far more valuable than a parcel zoned for only 5 units. Yet when cities upzone an area, they rarely attempt to capture that increased value.

Today, this issue is more important than ever, as cities throughout California are increasing densities in their urban cores and around transit stations while at the same time running huge budget deficits. Cities can and have used a variety of mechanisms to capture some of the private windfall from these zoning changes to fund public amenities, including Developer Agreements, Density Bonuses, Developer Impact Fees, Special Assessments , Special Taxes, and Tax Increment Financing.

What are the equity impacts?

Value capture minimizes unearned windfalls to the private sector from public sector activities, and allows these windfalls to be used for public benefit. Of course, there is



San Francisco Eastern Neighborhoods.
Photo credit: J.G. in S.F.

no guarantee that the money generated through value capture will be used to further social equity goals. That is why advocates should ensure that there is a spending plan, and that social equity goals are articulated and incorporated into that plan from the beginning.

Case Study: San Francisco Impact Fee

In the mid-2000s, San Francisco initiated a Public Benefits Program for the Eastern Neighborhoods. As a part of the program, the city and community partners developed an Improvements Program that outlined community needs such as more parks, transit improvements, more library facilities, and more affordable housing. The city proposed establishing a Developer Impact Fee to cover some of the costs from the Improvements Program.

Significant changes in the zoning code were also being proposed as a part of this planning process. So, in order to establish the rates for the Impact Fee, the city conducted an analysis of the value created by the zoning changes for current landowners. They determined that, depending on the specific zoning change, the residual land values would increase anywhere from 8.5 percent to upwards of 20 percent on some parcels. The city established fees ranging from $6 to $16 per square foot based on the type of land use and number of additional stories allowed by the upzoning. Thus, as land became more valuable due to the city's upzoning, the city was able to capture some of that increased value and use it to pay for amenities outlined in the Improvements Program. According to city staff, the goal was to structure the impact fees to maximize what the city could exact while ensuring that the fees were reasonable enough that development would still move forward.[16]

The new plan and impact fees were adopted in early 2009. There have been no projects completed yet, and therefore no revenues generated. Under the approved fee structure, the city anticipates that nearly $25 million in new revenues will be created in the next 5 years, which will cover 30 percent of the projected capital needs of the area.

Learn More:

Gihring, Thomas A. "The Value Capture Approach to Stimulating Transit-Oriented Development and Financing Transit Station Area Improvements." *Victoria Transit Policy Institute*. 2009.

San Francisco's Eastern Neighborhoods Public Benefits Program: http://www.sf-planning.org/index.aspx?page=1673

Developer Impact Fees

What are Developer Impact Fees?

Assembly Bill 1600 (Mitigation Fee Act, Government Code Section 66000 et. Seq.) allows cities to charge fees on new developments in order to cover the costs of infrastructure improvements and public services. Legislatively enacted fees can be approved by a simple majority of a city council, as long as the city provides sufficient findings that the fee bears a reasonable relationship to the community's needs in terms of the benefits provided and cost. In legal terms, this is known as *nexus* and *rough proportionality*. Cities can also levy ad hoc fees on individual developments, though such fees will be more heavily scrutinized by the courts. Fees can be levied on all types of developments, including housing, commercial, and office.

How can fees help infill pay for itself?

Many cities have historically adopted fees that simply averaged anticipated costs across all new housing developments at a fixed amount per unit. However, this does not take into account the impacts of density and distance to the city center on the cost of providing residential services. When fees are calculated more accurately, the city has more confidence that the costs of residential development will be covered by revenues from the development. Some cities, such as Lancaster, have corrected this oversight by calculating the exact cost of a development based on housing type, density, geographic location, and related factors.

Many for-profit infill developers can find these one-time, up-front fees difficult to finance. To respond to this concern, cities can set up payments to be pro rata as units actually become occupied, or go into a contract agreement with the developer to have the fees paid over time. For example, in 2009 the City of San Jose approved delaying final payment of parkland fees to five developments because of economic hardship due to the recession. Instead, the developers agreed to pay a monthly late fee and interest, and to pay the fee in full at a later date.

Effective January 1, 2011, cities can choose to exempt new development near public transit (ie. transit-oriented development) from paying traffic impact fees. Studies show that residents living near transit contribute less to traffic congestion than other residents; therefore, it makes sense that these residents should be exempted from a traffic impact fee.

What are the equity impacts?

Fees can have a range of impacts on local housing affordability, depending on market conditions and how the fees

are structured. In tight housing markets where residents lack housing options, the cost of the fee is often pushed on to the residents in the form of higher housing prices or higher rents. However, in more competitive markets, the cost of the fee is often absorbed by the land owner in the form of lower land value.[17]

Developments that have at least 50 percent affordable units can be exempted from fees, but that loss of revenue must be absorbed by the city and cannot be paid for by increasing the fee on other developments in the area. Because of this exemption, affordable housing developers often prefer impact fees compared to other policies to pay for new infrastructure and public services. Also, establishing impact fees to be based on square footage, and not as a simple per unit cost, can make the fee more equitable for lower-income families who often live in smaller homes.

Case Study: Lancaster Urban Structure Program

In the late 1980s, the City of Lancaster in southern California began to experience rapid residential growth. In 1992, the city created an Urban Structure Program to determine developer impact fees that would cover the infrastructure, facilties, and operations costs of new development.

Using sophisticated computer software, the city quantified what the projected 20 year shortfall for public services such as police and park maintenance would be, and added this shortfall to the impact fee. In addition, the city took into account the distance between the development and the service base station when calculating the cost of providing these services.

The city, developers, and residents realized two positive outcomes by calculating the fees this way. First, infill homes that were located near existing services were charged a lower fee that took into account the cost savings the city would realize from locational efficiencies. And second, according to city staff, the fees were effective at staving off most service cuts during the current recession.[18] Thus, even as property tax revenues have fallen by more than 20 percent since the 2008-2009 fiscal year, the city has managed to prevent lay offs in the latest fiscal year.[19] However, housing production, and therefore impact fee revenues, has dried up in the current economic reccession, and the city has decided to discontinue the Urban Structure Program to focus instead on using zoning regulations to encourage infill development, rather than fee structures alone.

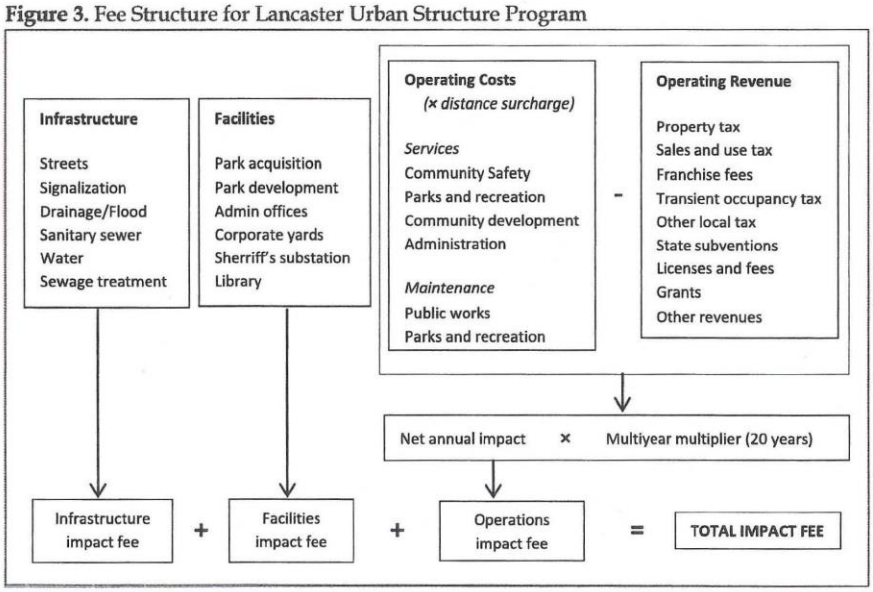
Learn More:

Peter N. Brown and Graham Lyons. "A Short Overview of Development Impact Fees." League of California Cities. 2003.

Gary G. Hill. "Paying for New Development: The Urban Structure Program of the City of Lancaster." *Government Finance Review*, Vol. 13:3. June 1997.

Arthur C. Nelson, et al. 2008. *A Guide to Impact Fees and Housing Affordability*. Island Press: Washington.

Figure 3. Fee Structure for Lancaster Urban Structure Program



Source: Adapted from Hill (1997)

Special Assessment Districts

What is a Special Assessment District?

Though often indistinguishable from traditional property taxes in how they are collected and paid, special assessment districts (SADs) are legally distinct from property tax, special taxes, and developer impact fees. In order to establish a SAD, it must be approved by a simple majority vote of the landowners within the district boundaries, weighted by the amount of benefit each landowner will receive from the district (and therefore how large of an assessment they will have to pay). SADs can be used to pay for operations and maintenance of public improvements, including landscaping, parks, street lighting, storm drains, streets, and similar such things, provided that the city can prove that the benefits are limited to the district boundaries and go beyond the basic services the city provides. There are over 20 statutes in the State Government and Streets and Highways Code that fall under the category of a Special Assessment District; the first one dates back to 1911.

How can Special Assessment Districts help infill pay for itself?

SADs cannot be bonded against, so they are not a good tool for financing major projects. However, they can still generate significant revenues for services and small projects such as street banners, landscaping, or pocket park maintenance. One of the most commonly used SADs in infill areas is a Business Improvement District (BID), in which businesses will pay a small assessment in order to improve neighborhood identity and attract more customers. Maintenance Assessment Districts (MADs) are similar and can apply to both residential and commercial areas.

Oftentimes, infill developers strive to carve out a unique and desirable community identity in the midst of the surrounding urban landscape. SADs generate new revenues to pay for the maintenance of special parks, landscaping, or bicycle and pedestrian facilities that help an infill neighborhood become more livable, safe, and attractive.

What are the equity impacts?

SADs came under much more stringent regulation after voters passed Proposition 218 in 1996. Prior to 1996, SADs could be established by a simple majority vote of the legislative body. Now, they must be approved by a simple majority vote of the landowners within the district boundaries, weighted by the amount of benefit each landowner will receive from the district. While some have suggested that this was a victory for democracy and resident control over taxation, others are critical that it is still not a truly democratic procedure of "1 person, 1 vote."[20] Large, usually richer, landowners cast a larger vote in establishing the SAD, and therefore in what it will fund, as well.

All properties that will receive a benefit from the SAD must be included in the district and must pay the assessment, including public properties and non-profits. While there is some flexibility in determining how to structure the assessment, it can only take into account various measures of the benefit accrued to the property, and not other considerations such as non-profit status or income level. So the burden of a SAD can fall particularly hard on older neighborhoods where homeowners may own their homes but have little cash on hand. Social justice advocates in some cities like San Diego, which has used MADs extensively, see these districts as a way to privatize city services.

Case Study: San Diego Maintenance Assessment Districts

In the 1980s, San Diego faced rapid population growth which, by the 1990s, led to a city-wide fiscal crisis.[21] The city, unable to maintain the high level of city services that its residents desired, worked with developers and homeowners to establish Maintenance Assessment Districts throughout the city.

Today, the city has 56 MADs that, combined, raise over $12 million annually in new revenues for services ranging from public events to increased security services to landscaping and parks maintenance. Roughly half of the MADs were formed by developers to ensure new developments would have a higher quality of service; the remaining were created through community outreach in existing neighborhoods in order to meet residents' demands for increased services that the city could not afford, such as special landscaping. The below map shows the spread of where MADs were created throughout the city, with many of them established either where new development occurred on the urban fringe or in the central downtown area. The amount levied on each parcel is determined by parcel area, land use, number of dwelling units, parcel frontage, and building area. All but eight of the MADs are operated out of the Parks and Recreation department, and most have some form of community advisory board to establish priorities on budgets and spending.[22]

The city continues to actively encourage new MADs to be formed. In 1998, the city passed a resolution in support of community efforts to establish MADs, and in 2004 it established a MAD formation fund to help communities with the initial start-up costs of creating a new district.

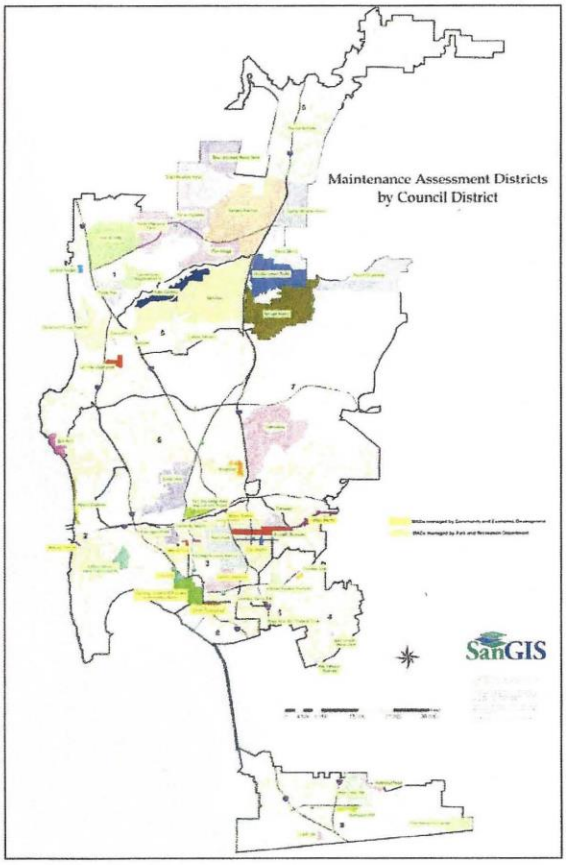
Learn More:

A Planner's Guide to Financing Public Improvements. 1997. Governor's Office of Planning and Research. http://ceres.ca.gov/planning/financing/

Kogan, Vladimir, and Mathew D. McCubbins. "The Problem with Being Special: Democratic Values and Special Assessments. " *Public Works Management Policy*. 2009 14: 4

Erie, Steven, Vladimir Kogan, and Scott A. MacKenzie. 2011. *Paradise Plundered: Fiscal Crisis and Governance Failures in San Diego*. Stanford: Stanford University Press.

Figure 4: Maintenance Assessment Districts in San Diego



Source: City of San Diego

Mello Roos Community Facilities District

What is a Community Facilities District?

The Community Facilities District Act of 1982 (Government Code Section 53311 et. Seq.) allows jurisdictions to generate new revenues by levying a special annual tax on properties within an established district, known as a Community Facilities District (CFD) or a Mello Roos district after the authors of the legislation. Because it is a special tax, it requires a 2/3 majority vote by voters who reside within the district boundaries; unique to CFDs, a district can also be established by a 2/3 majority vote of the landowners if there are less than 12 residents in the district. The tax provides an important annual revenue source that cities can either bond against to finance up-front infrastructure improvements or use to pay for ongoing maintenance and services. CFDs can be used to fund police services, fire services, ambulance and paramedic services, parks maintenance and recreation programs, library services, and flood and storm protection services. CFDs cannot be used to fund transit service unless explicitly allowed in the CFD formation papers written by a charter city.[23]

How can Community Facilities Districts help infill pay for itself?

CFDS have become popular over the years as a tool to finance infrastructure needs, particularly for new, greenfield development. Publicly-owned properties are exempted from it, as well as any other type of property explicitly stated in the formation papers. In general, developers prefer assessments like these that can be bonded against and paid back over time rather than one-time impact fees, which are much harder to finance.[24]

Because of the onerous approval process to create CFDs in already populated areas, they are most oftentimes established in greenfield areas where there are very few residents and parcel sizes are large. Landowners will approve CFDs in order to pay for new roads and infrastructure in areas that lack these improvements. Large infill sites that do not currently have residents, such as underused parking lots or formerly industrial land, are also potentially viable places to establish a CFD.

What are the equity impacts?

Because it is an annual tax levied on property, CFDs usually pass on the costs of infrastructure and services to the homebuyer or renter. Historically, homebuyers didn't necessarily realize they were moving into a CFD until they got their first property tax bill and saw the extra charge. CFDs can cost a homeowner thousands of dollars a year, which can be a significant burden for struggling homeowners.

Today, there are full disclosure laws that require proper notification of CFD fees to homebuyers before purchase.

The amount for the special tax is determined using a special formula established by the city that takes into account land use, lot size, and square footage. Unlike impact fees, the revenues generated from CFDs don't have to meet the legal requirements of nexus and proportionality, which means that properties don't have to be assessed based on how much they cost the city. For example, larger units could be assessed at a much higher rate than smaller, more affordable units. In addition, cities do have the ability to exempt certain land uses or property types from paying the special tax. In theory, below-market rate housing units could be exempted from a CFD fee altogether.

Case Study: Contra Costa Centre Transit Village

The Contra Costa Centre Transit Village is a 125-acre area surrounding the Pleasant Hill BART station in Central Contra Costa County. Planning began in the early 1980s to convert the underutilized land into a walkable, liveable community. Nearly completed, the project today has over 2,700 homes, 2 million square feet of office space, and over 400 hotel rooms.

Contra Costa County created several CFDs to help finance this project over the last 20 years. In 1991, the county established a district in order to help pay for a parking structure to serve the BART station and an upgrade for an offsite sanitary district facility. This first CFD was bonded for $4.5 million. The county created a second, much smaller CFD in 1992 for $125,000 that was designed to help some of the landowners in the area finance a new impact fee to pay for a child care facility on site. Finally, in 2008, they created a third CFD to fund ongoing maintenance of a bicycle/pedestrian bridge that connects two legs of a popular regional trail network over a wide and busy road.[25] All three of the district boundaries are small, encompassing only one to four property owners in the area. The bonds from the first two districts are expected to retire in 2018.

Learn More:

Daniel C. Bort. 2006. *An Introduction to California Mello-Roos Community Facilities Districts*. Orrick, Herrington & Sutcliffe LLP.

"Community Facilities Districts: Potential Use for Supporting Transit-Oriented Development." 2009. Prepared for North County Transit District of San Diego by KTU+A et. al.

Contra Costa Centre website: http://centrepoints.org

New infill housing at the Contra Costa Centre Transit Village.

Photo credit: Uncredited

Part III: Case Study on San Jose

San Jose, California, is a city of nearly 1 million people at the southern end of the Bay Area. It is the third largest city in California, behind Los Angeles and San Diego, and the 10th largest in the country.

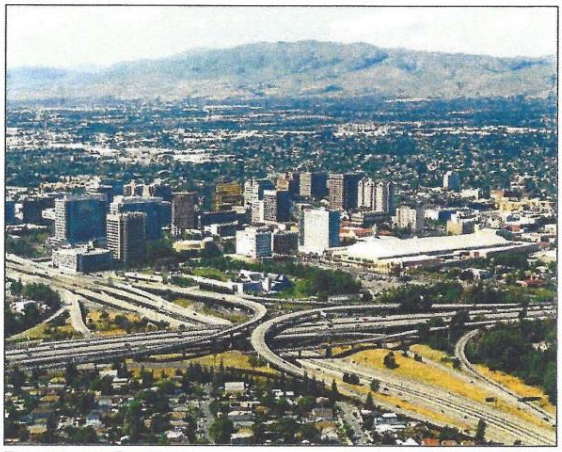
San Jose is in the midst of creating a new vision for its future. Under new state legislation, the Bay Area region must address ways to reduce greenhouse gas emissions through its transportation and housing planning processes. San Jose is moving forward with a new General Plan which seeks to meet this new environmental mandate through an urban villages vision of development that will reduce the amount residents will need to drive to get between home, work, school, and shopping. With an additional 500,000 people projected to live in San Jose by 2040, this is an ambitious plan to accommodate growth through targeted infill development.[26] The city is also in the process of creating a Station Area Plan for the 500 acres surrounding the Diridon transit station area. Diridon is a major regional transit hub near downtown that will include connections to local, regional, and state-wide mass transit by 2050.

However, these visions for a stronger, more sustainable future are under threat by today's economic conditions. San Jose today is slowly recovering from both the 2001 dot-com crash and the 2008 Great Recession. Unemployment in the city is over 10 percent, with the computer and technology industry taking a substantial hit. EBay, the third largest employer in San Jose, laid off 1,500 workers in 2008, 10 percent of its workforce. The city itself is also in the midst of a budget crisis. Home values in the area were hit hard in the recent recession, lowering property tax revenues significantly, and sales tax revenues have declined by 17 percent since 2008.[28] Meanwhile, costs for public services continue to rise.

San Jose's vision of a more sustainable future can be reached, but only with thoughtful consideration of how to ensure infill housing development is fiscally sustainable for the city. This case study will look at the current fiscal condition of the city, analyze how these costs and revenues play out with respect to infill housing development, and provide recommendations on how the city can make infill housing development pay its way.

History of Housing Development in San Jose

San Jose was established in 1777 as a Spanish colonial city. Through the 19th and first half of the 20th centuries, it grew to become an agricultural center for the country, producing nuts and fruit. Starting in the 1970s, the technology industry began to grow in the Santa Clara Valley and the lower Peninsula. As the largest city in the area, San Jose became the de facto capital of Silicon Valley. While the city population grew dramatically through the 1970s, 80s and 90s, most of the job growth happened in other nearby cities. San Jose developed a jobs/housing imbalance, with only 0.8 jobs for every worker who lived in the city.[28]



Downtown San Jose. Photo credit: City of San Jose

Today, San Jose's population is incredibly diverse, with a high level of income and educational attainment. One third of the population is Hispanic, and nearly another third is Asian. Forty percent of all residents were born outside of the United States, and over half of the population speaks a language other than English at home. The median annual household income is roughly $76,500, and over 80 percent of adults have a high school degree or higher level of educational attainment.[29]

San Jose's History of Planned Growth

Starting in the 1970s, the city attempted to control its rapid growth through planning. Concerned with an explosion of growth that started in the 1950s, the city developed an urban development policy in 1970 that permitted urban development only within the Urban Service Area of the city. This policy is still in force today. San Jose adopted its first modern general plan in 1976, which included protection of hillsides and agricultural lands in some parts of the city and encouraged infill development.[30]

Through the 1970s, most housing development occurred in the southern part of the city, while industrial and office uses were concentrated in the north. To try to correct this, the city began a concerted effort in the 1980s to revitalize the downtown and promote more jobs in the south and

downtown area. In 1987, the Santa Clara Valley Transportation Authority opened its first light rail line, connecting the southern residential areas to the downtown and employment centers in the north. Starting as early as the mid 1990s, the city began increasing densities along transit corridors in order to encourage multifamily infill development. Today, the system consists of over 40 miles of track and 62 stations. These light rail stations, in conjunction with major bus route lines, Amtrak, and Caltrain station, serve as the backbone of San Jose's urban villages vision.

Though only one third of San Jose's 300,000 homes today are multifamily, the city has pursued a policy of encouraging multifamily, infill housing development for over a decade. Nearly 80 percent of all new housing construction since 2000 has been multifamily, infill housing.

Fiscal Impact Studies of Housing Development

In the early 2000s, Silicon Valley was hit hard by an economic crash in the dot-com industry. Suddenly, the land that San Jose had slated for industrial and office use in the northern part of the city no longer had the same level of market demand. Developers were pressuring the city to convert the land to residential and build more housing. The city was concerned this land conversion might exacerbate the jobs/housing imbalance that already existed, and decided to study the issue further.

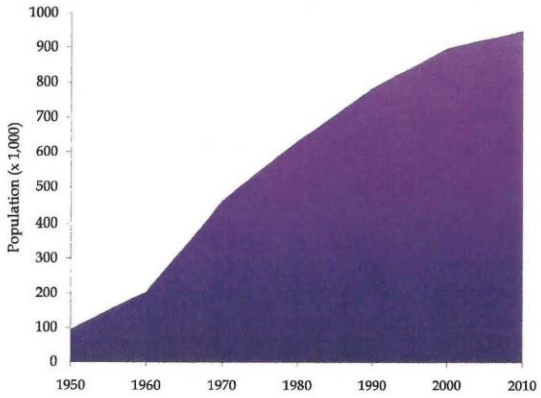
In 2004, the city commissioned Strategic Economics to do a fiscal impact analysis of residential, office, and commercial land uses in several sites throughout San Jose. While the report did ultimately find that the city could accommodate a significant amount of infill multifamily housing development in several areas, it noted that the financial burden of providing services for these new homes – particularly police, fire, parks, and libraries – made housing a potential net financial loss for the city without office or commercial development to support it.

The analysis here takes the Strategic Economic report as a starting point, updates the numbers to reflect current economic conditions, and analyzes the costs and revenues from both single family and multi-family housing.

Current Fiscal Conditions

Today, in 2011, the economy is in a major recession. San Jose has reduced both its budget and staffing considerably as revenues continue to fall. San Jose's budget is nearly $3 billion total, though the 2011-12 budget would decrease it to $2.5 billion. Roughly 30 percent of revenues are from the general fund. Another 35 percent are capital improvements (mostly bonds and fees), 20 percent are from special revenues (such as the low income housing fund and waste management), and 15 percent are from enterprises (primarily the airport and sewage management). For the last several years, the city has been balancing its budget by drawing down its reserves. In 2007-2008, reserves were 24

Figure 5: San Jose Population Growth, 1950 - 2010



Source: City of San Jose, 2011

percent of the budget; in 2011-12, they make up barely 10 percent. The city employed 5,840 FTEs (full-time equivalents) last year, and is proposing reducing this number to 5,200 for the 2011-2012 fiscal year.

In order to build a model of fiscally sustainable development, it is important to understand the city's current fiscal conditions. Below is an overview of both the costs and revenues associated with residential development.

Public Services Costs

Public Safety The city has about 1,620 police officers and 770 fire fighters. Combined, police and fire make up about 40 percent of the city's operating staff and over 50 percent of general fund uses. Police cost the city roughly $300 million annually, while fire costs an additional $150 annually. Performance objectives for both police and fire are based on response time to emergency situations. Budget cuts, population growth, county land annexation and infill development have all negatively impacted emergency response times, according to departmental information.[31] There are 33 fire stations throughout the city, but the proposed budget plans to have temporary, rolling closures of two stations each day to reduce operating expenses.

Parks and Recreation The city of San Jose has nearly 200 trails, regional parks, and neighborhood parks. Park maintenance and operations, as well as recreation and community services, totaled $55 million in 2009-2010. The city has proposed reducing it to $45 million for the upcoming fiscal year. Under the Capital Improvement Program, there are sufficient funds to build several new parks; however, the city lacks enough revenues to operate and maintain the parks, and has therefore halted some of the planned park construction until more funding is available.[33]

Libraries The city currently has 19 libraries, with four more planned (though construction has been indefinitely de-

ferred). Libraries employed 300 FTEs last year; this year they are proposing reducing FTEs to 230, with partial closure of some libraries. Operations and maintenance was $30 million for 2009-2010.

Public Works Public works includes facilities maintenance, fleet and equipment services, and infrastructure planning and building. The budget for these services has declined from $60 million to a proposal of $50 million for 2011-2012.

Planning and Community Development There are roughly 210 FTEs in the planning, building, and code enforcement, down from a high of nearly 370 in 2008. The cost was roughly $25 million for 2009-2010.

General Government General government includes the City Manager's office, City Council, City Attorney, human resources, information technology services, and more. There were nearly 600 FTEs in 2010-2011; the proposed budget would reduce that to just over 500 FTE. The budget was $76 million in 2009-2010, with a proposed reduction to $69 million in the upcoming fiscal year.

Waste management, sewage, and water are managed via fee for service and so are not included in the analysis here.

General Revenues

Property Tax Property taxes have declined by five percent from a high of over $200 million in 2008. Because this analysis is city-wide, it does not take into consideration the impact of geographically-specific programs, like Redevelopment Areas, on city property taxes.

Sales Tax The sales tax rate in Santa Clara County is 9.25 percent. San Jose sales tax revenues are strong overall, compared regionally. Sales tax data from 2008 shows that San Jose has a net positive sales tax flow, meaning the city is attracting consumers from other jurisdictions.[33] However, the economic recession has decreased sales tax revenues for the city by 17 percent.

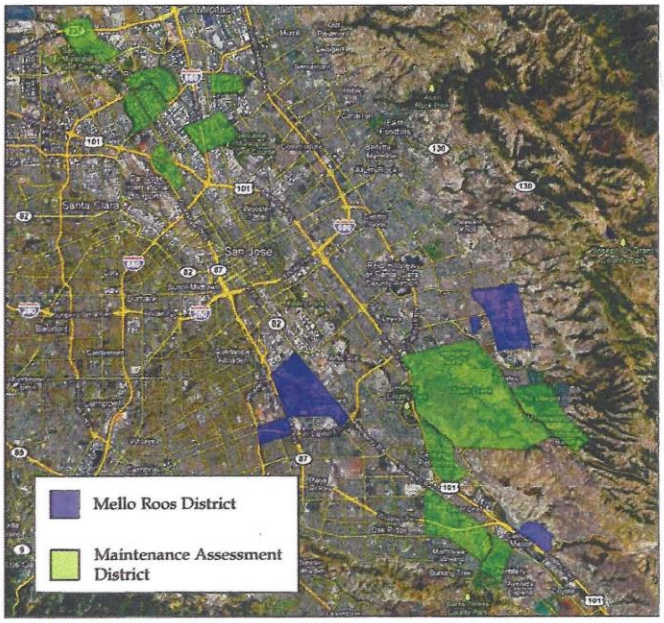
Franchise Fees, Licenses and Permits, and Fines These revenue sources come from both residential and non-residential land uses. Combined, they add up to $85 million a year in revenues. Franchise Fees are charged to third-party companies such as PG&E for the use of public right-of-ways (primarily streets) to provide their services. Licenses and permits include building permits, business licenses, and more. Fines include traffic violations, judge sentences, and other such fines.

Utilities User Tax The city charges a five percent general tax on all utility bills, including gas, water, electricity, and telephone.

Revenue from Local Agencies The city receives reimbursement from other agencies for providing services to residents who live in Special Districts, such as the Central Fire District.

Telephone Tax The telephone tax was voter-approved in 2009, and is generating $20 million per year of new general revenues.

Figure 6. Map of Mello Roos and Maintenance Assessment Districts



Source: Based on data from City of San Jose, 2011

Special revenues

In addition to the general revenue sources listed above, the city also has several other special revenues to help pay for housing development. These are divided up into revenue sources for operations and maintenance, and revenue sources for capital improvements.

Revenue Sources for Operations and Maintenance

Library Parcel Tax This parcel tax provides funding for development, operations, and maintenance for specific services within the city from development. The tax ranges from $25 per unit for single family to under $10 per unit for large multi-family projects, with Consumer Price Index-based increases annually.

Maintenance Assessment Districts There are 13 Maintenance Districts throughout the city, which provide roughly $11 million a year for maintenance of street islands, street frontages, and other, mostly landscaping-related, elements.

Mello Roos Districts San Jose has 6 Maintenance districts, and 4 bonded districts. Together, bonds are for $42 million, primarily for street construction and maintenance. Revenue from non-bonded districts is roughly $7.5 million annually and is primarily for maintenance of roads, waterways, and landscaping in the district.

Revenue Sources for Capital Improvements

Park Impact Fee The city's Park Dedication Ordinance and Park Impact Ordinance (PDO-PIO) were passed in 1988 and 1992, respectively, to ensure new development maintains a ratio of 3 acres of parkland for every 1,000 residents. Fees range from $10,000 to $34,000 per unit, depending on the city zone, project density, and estimated number of residents per unit. Under this formula, higher density projects pay roughly 1/3 less in fees per unit because the city assumes they have fewer residents per unit. These fees can only be used for the development or renovation of parks.

Traffic Impact Fee In 2005, San Jose established a Traffic Impact fee for North San Jose in order to pay for the major traffic improvements necessitated by the newly adopted North San Jose Area Development Policy, which includes up to 32,000 new housing units, as well as significant office and commercial development. The fee is $6,994 for single family units, and $5,596 for multi-family units. It can only be used for capital expenditures.

Residential Construction-related Tax, and Other Special Taxes Four separate taxes related to residential construction add up to 4.5 percent of the total project costs for new development. These taxes are established flat rate for all development; however, in 2000 the city approved a policy that exempts multifamily residential development in the downtown area from all of these taxes.

Infill Housing Costs and Revenues Analysis

Below is a table showing the analysis of how the costs and revenues for city services add up for both single family and multi-family homes in San Jose. Infrastructure costs and revenues (such as impact fees) are not included in this analysis, neither are place-specific costs and revenues (such as the Maintenance Assessment Districts). Costs are calculated on a per capita basis, based on the city's average residents per unit. Revenues are calculated on a per unit basis or according to pre-established city formulas where they exist. The numbers are mostly provided by actuals from the 2009-2010 fiscal year. For a full discussion of the numbers and calculations, see Appendix A.

This analysis is static, which means it is meant to give a "snapshot" of the fiscal impact of housing development on the city under current conditions. It does not attempt to project how the costs and revenues might change over time.

While the specific dollar amounts presented here may vary depending on neighborhood-specific conditions, this analysis reveals three important things overall:

1. Multi-family housing development generally costs the city less than single family on a per unit basis;

2. Both single family and multi-family housing development generally come at a net fiscal loss for the city of thousands of dollars annually; and

3. Multi-family housing development has a lower net fiscal loss per unit than single family development.

This analysis provides some support to the city's efforts to redirect housing development towards lower-cost infill housing with the urban villages vision. It also points to the need for the city to implement additional revenue generating strategies with new housing development. Below are three recommendations for ways the city can raise more revenues from new housing development.

Recommendations

1. Value capture from upzoning

San Jose is adopting a new vision for growth centered around urban villages. Not only will these urban villages create more transportation and lifestyle options for San Jose residents, but they could also dramatically increase land values in these areas due to new infrastructure investments and zoning changes that allow for denser, higher value development. According to a 2009 study by Shishir Mathur and Christopher E. Ferrell, home values increase by 1.5 percent for every 1000 feet closer a home is to a transit station in the San Jose area.[34] As the city moves forward in planning out each new urban village, it has a unique opportunity to capture some of this newly created value and use it to cover the costs of new, infill homes.

Table 3: San Jose Infill Housing Costs and Revenues Analysis

	Single Family	Multi Family
ASSUMPTIONS		
Density (Gross)	4	20
Acres	5	5
Total Residential Units	20	100
Avg. Person per Household	3.5	2.3
Median Cost per Unit	$480,000	$245,000
Property Value	$9,600,000	$24,500,000
Avg. Property Tax Revenue to City	0.21%	0.21%
CITY SERVICES ANNUAL COSTS		
Police	$15,586	$51,210
Fire	$8,208	$26,970
Parks & Community Service	$4,060	$13,340
Library	$2,240	$7,360
Public Works	$3,270	$10,743
Planning & Community Development	$1,268	$4,167
General Government	$5,670	$18,630
Total City Services Annual Costs	**$40,302**	**$132,421**
Total City Services Annual Costs per unit	**$2,015**	**$1,342**
CITY SERVICES ANNUAL REVENUES		
Property Tax	$20,160	$51,450
Sales Tax	$4,560	$22,800
Utility Tax	$2,240	$11,200
Franchise Fees	$2,066	$6,789
Fines, etc.	$861	$2,828
Licenses and Permits	$1,497	$7,486
Revenue from Local Agencies	$2,319	$11,595
Telephone Tax	$989	$4,945
Library Parcel Tax	$500	$920
Total Annual Revenues	**$35,192**	**$120,014**
Total Annual Revenues per unit	**$1,760**	**$1,200**
Annual Net Difference	**-$5,110**	**-$12,407**
Annual Net Difference per unit	**-$255**	**-$124**

There are several mechanisms a city can use to capture this value increase. First, the city could create a new Developer Impact Fee, like San Francisco did in the Eastern Neighborhoods area. The fee rate could be set in direct proportion to the amount of additional value the parcel would accrue through the upzoning process.

Another approach could be to create new Mello Roos Maintenance Districts. Mello Roos can be an incredibly flexible revenue-generating tool for cities; its primary constraint is the high voter approval needed in order to establish a district. A district is easiest to establish in areas that do not have a large number of residents already living there, and where there are few land owners. Several of San Jose's urban villages, such as the Diridon Station Area, have these characteristics and would be well positioned to succeed in establishing a Mello Roos district. The Contra Costa Centre is a successful example of how Mello Roos was used on an infill project near transit to raise revenues for both capital costs and ongoing maintenance expenditures.

Wherever the city is planning to upzone to higher densities of infill housing development, the city should conduct an economic impact analysis to determine how much additional value is being created for landowners from the upzoning, and which strategy would be most appropriate to capture part of that windfall value.

Finally, and most importantly, a spending plan must be in place so that all stakeholders have a shared understanding of how the new revenue will be spent. The spending plan gives residents and infill housing advocates an important space to voice concerns and priorities.

2. Raise specific revenues for specific shortfalls

As was noted in the Strategic Economic report, San Jose has a specific funding shortfall for city parks maintenance

that can be corrected by modifying the park impact fee. The city has addressed this cost to some degree in its draft General Plan by allowing and encouraging the use of Joint Use Agreements with schools. Joint Use Agreements make school recreational facilities available to residents and thus create new neighborhood park spaces. However, the city still lacks adequate funding to pay for ongoing park maintenance.

One potential solution to this particular problem would be to include ongoing maintenance costs in the park impact fee. The City of Lancaster developed a Developer Impact Fee structure that calculated the anticipated costs for 20 years of maintenance and operations (see Part II of this report for more information on this case study). San Jose could adopt a similar fee structure for calculating the park impact fee.

One important caveat to note is that impact fees cannot be used to make up pre-existing deficits. So while this new impact fee would ensure that there will be sufficient funding for operations and maintenance of parks near new development in the future, it could not be used to resolve the current funding gap for existing park maintenance needs.

3. *Enable Special Assessment Districts*

As San Jose's continuing budget crisis forces more cuts and declining levels of service, the city could explore making it easier for neighborhoods to create Special Assessment Districts (SADs). SADs can be used to provide additional services by charging a small annual fee to property owners in the area, based on the amount of benefit the owner receives from the district. The city can facilitate community processes to create SADs by providing seed funding for educational materials or running the voting process to establish a SAD.

SADs should never be used to backfill services the city ought to be providing, such as basic parks maintenance or street repair. However, as the city's budget continues to tighten, residents will find it much more difficult to get the city to pay for small improvements that make neighborhoods unique and interesting, such as special street lighting, banners, or garbage receptacles. This is particularly true for the new urban villages the city envisions. Thus, SADs are one strategy the city could use to pay for these types of special improvements.

Finally, with every discussion of strategies to raise more money for city governments, there must be an honest consideration of who will ultimately pay for it. San Jose has a tight housing market, and any new costs the city imposes on development will likely be passed on to the new residents themselves. For infill housing advocates concerned about making new housing affordable to residents at a range of incomes, this fact is particularly troubling. There are no perfect strategies here, though there are some potentially promising ones. When determining which strategy to pursue, it's important to have an honest discussion with all stakeholders about the strengths and constraints for each one. However, through an open and transparent decision-making process, San Jose can create a model for new infill homes that are both environmentally and fiscally sustainable.

Infill homes in San Jose.
Photo credit: Greenbelt Alliance

Appendix A: Methodology for San Jose Analysis

For this fiscal analysis, I relied on two sources in particular: the 2011-12 San Jose draft budget for data on actual costs and revenues from 2009-2010; and Strategic Economics' fiscal impact analysis from 2005. The former was used primarily for the raw data for the calculations, while the later was used to develop the methodology used here. I also referred to calculations by Michael Coleman of costs and revenues of single family versus multi-family development.

A few things to note: I chose to calculate the city costs on a per capita basis, and then multiplied it out based on the Average Persons per Household used by the city. This is because most level of service standards the city has for services, such as parks, is calculated on a per capita basis. City Revenues, on the other hand, are calculated on a per unit basis because most revenues (property tax, utility user tax, etc.) are collected on a per unit basis.

Calculations of city costs can be done either by looking at the increment of cost by new housing, or by averaging costs across all residents. Incremental cost factors in excess capacities in existing facilities, while simply averaging costs does not. Since this analysis is meant to generically apply across the entire city, it was not feasible to calculate excess capacity of place-based facilities such as police stations, fire stations, parks, and libraries. Instead, I used average costs across all city services.

Assumptions:

The data sources for the assumptions are as follows:

1. Density – Given.
2. Acres – Given.
3. Total Residential Units – Given.
4. Average Persons per Household – City of San Jose's PPH used in calculating Parks Impact Fees. Last updated 2009.
5. Median Cost per Unit – Santa Clara County Association of Realtors, March 2011.
6. Property Value – Calculated.
7. Property Tax Rate – Michael Coleman. A Primer on California Finance. League of California Cities. 2005.

Ongoing City Costs:

The costs include police, fire, parks, libraries, public works, planning & community development, and general government. The first four of these costs are considered standard resident services, and San Jose provides all of them to its residents as a full service city. These costs mainly cover operations and maintenance, and do not include any capital investments that would be necessary as the population grows. Public works includes operations and maintenance of public works facilities. Planning & community development include all planning services, including long range planning. General government covers the costs of basic government administration. These last three costs are considered "fixed" when looking at the incremental cost of individual housing developments; they are included in this analysis because it is assumed that they will need to grow to keep pace with population growth, which is projected to increase by 50 percent by 2040.

The calculation of costs assumes that both workers and residents benefit from police, fire, public works, and planning & community development, while only residents benefit from parks, libraries, and general government. Thus, for the first category, the cost is spread out over both residents and workers.

For example, costs for police are calculated as:

Cost of police per dwelling unit = (2009-2010 Police Actuals/(2010 population + 2009 jobs))*Average Persons per Household

These numbers are explained as follows:

1. 2009-2010 Police Actuals is the total cost of providing police services during the 2009-2010 fiscal year, according to City of San Jose budget data.
2. 2010 population is the total population based on the 2010 US Census (total pop: 945,942).
3. 2009 jobs is the total number of jobs in San Jose. It is based on 2009 numbers from the US Census' Longitudinal Employer-Household Dynamics, the most recent year that city-level data is available (total jobs: 355,234).

This analysis is repeated for fire, public works, and planning & community development.

For parks, libraries, and general government the cost per dwelling unit was calculated as follows:

Cost of parks per dwelling unit = (2009-2010 Parks Actuals/2010 population)*Average Persons per Household

In this case, because these services are used almost exclusively by residents, their entire cost is charged to the residents.

Ongoing City Revenues:

City revenues included in this analysis are: Property tax, sales tax, utility tax, franchise fees, fines, licenses and permits, revenue from local agencies, telephone tax, and library parcel tax. Each of these will be explained in more depth below. General revenues that were not included in this analysis are: transient occupancy tax, business taxes, transfers and reimbursements from non-local agencies, and other revenues. These were excluded because they are generally not generated from residential uses.

In addition, there are four construction taxes imposed by the city that were not included in these calculations: Construction and Conveyance Tax; Construction Excise Tax (also called the Commercial-Residential-Mobile Home Park Building Tax); Building and Structure Construction Tax; and Residential Construction Tax. These taxes are used overwhelmingly to pay for capital improvements on streets or parks, and so are not included in this analysis of revenue sources for ongoing services. Likewise, the Parks Impact Ordinance and the Traffic Impact Fee are not included in this analysis for the same reason. Special Assessment Districts and Mello Roos districts are also not included in these calculations because they are geographically constrained revenue sources.

Property tax, sales tax, utility users tax, and library parcel tax are calculated using their own formulas, as described below. All other revenues are calculated based on contributes from both households and employers. Because employer size (and therefore contribution) varies dramatically, I developed a proxy by converting the number of jobs in the city into households based on the city-wide average number of residents per household, which was 3.14 in 2010. Thus, I assume that every 3.14 employees in San Jose contribute roughly as much revenue as one household for these particular revenue sources.

All revenue data is calculated using 2009-2010 budget actuals from the 2011-2012 Draft Budget, except where noted otherwise. Explanation of individual revenues:

1. Property tax – Calculated as 0.21 percent of property value. See Assumptions calculations, above, for more information.
2. Sales tax – Data is taken from an analysis of household sales tax revenues by CBRE Consulting, Inc. conducted in December 2008. The number was reduced by 17 percent to account for decline in sales tax revenue from 2008 to 2010, as reported in the 5-year Comparison of General Fund Sources provided by the city.
3. Utility users tax – Amount is calculated based on pay rate scale and average utility usage for single family and multi-family homes in San Jose. The calculated rate for single family homes is $120/yr. the rate for multi-family homes is $86/yr. Data is from City of San Jose and PG&E. The utility users tax rate is 5 percent.
4. Franchise fees –These are calculated on a per capita basis as a proxy for amount of service consumed per household. Revenues are adjusted to account for both households and businesses.
5. Fines –These are calculated on a per capita basis because they are collected per capita. Revenues are adjusted to account for both households and businesses.
6. Licenses and permits –Revenues are adjusted to account for both households and businesses.
7. Revenue from local agencies – These revenues are primarily transfers for city services provided to residents in special districts. For example, the city receives payments from the Central Fire District for services provided by the San Jose Fire Department. Because businesses may also reside in special districts, revenues are adjusted to account for both households and businesses.
8. Telephone tax – This telephone tax was voter approved in 2008 (Measure J). Without more specific information about trunk lines in specific developments, I used city averages adjusted for both households and businesses.
9. Library parcel tax – Data is based on rates for single family and multi-family homes, as outlined in City of San Jose Municipal Code 4.79. This parcel tax was voter approved in 2004 (Measure S).

Finally, it's important to note that both revenues and costs have fluctuated dramatically in the last several years. The numbers used in this analysis should be used for illustrative purposes only, and do not necessarily reflect the actual costs and revenues of housing development in the city.

Notes

1. See Michael Coleman. *A Primer on California City Finance*. League of California Cities, 2005.
2. See Sarah Lynn Cunningham. "Do You Want Utilities With That? Avoiding the Unintended Economic Consequences of Poorly Planned Growth on the Provision of Water and Sewer Service." Practice Guide #14; and Cameron Speir and Kurt Stephenson. "Does Sprawl Cost Us All? Isolating the Effects of Housing Patterns on Public Water and Sewer Costs." *Journal of the American Planning Association*, 68: 1, 2002.
3. Cunningham (undated).
4. John I. Carruthers and Gudmunder F. Ulfarsson. "Urban Sprawl and the Cost of Public Services." *Environment and Planning B: Planning and Design*. Vol. 30, 2003.
5. See John I. Carruthers and Gudmunder F. Ulfarsson. "Does 'Smart Growth' Matter to Public Financing?" *Urban Studies*. 2008.
6. Coleman 2005.
7. Ibid.
8. Lenny Goldberg and David Kersten. "System Failure: California's Loophole-Ridden Commercial Property Tax." California Tax Reform Association. May 2010.
9. Though commercial land uses are the location where sales happen, it's important to recognize that residential land uses are necessary in order to have people that shop at these stores. For more on the fiscalization of land use, see John V. Thomas. "Dividing Lines and Bottom Lines: The Forces Shaping Local Development Patterns." *Journal of Planning Education and Research* 25: 275-293.
10. See Coleman 2005.
11. Ibid.
12. Wiliam W. Abbott, Peter M. Detwiler, M. Thomas Jacobson, Margaret Sohagi, and Harriet A. Steiner. 2001. *Exactions and Impact Fees in California: A Comprehensive Guide to Policy, Practice, and the Law*. California: Solano Press Books.
13. Ibid. Also see Vladimir Kogen, and Mathew D. McCubbins. "The Problem with Being Special: Democratic Values and Special Assessments." *Public Works Management Policy*, 2009 14: 4.
14. D.C. Bort. 2006. *An Introduction to California Mello-Roos Community Facilities Districts*. San Francisco: Orrick, Herrington & Sutcliffe LLP.
15. See Nico Calavita and Alan Mallach. 2010. *Inclusionary Housing in International Perspective: Affordable Housing, Social Inclusion, and Land Value Recapture*. Cambridge, Mass.: Lincoln Institute of Land Policy.
16. Author email correspondence with Sarah Dennis Phillips, Senior Planner with the City of San Francisco, July 2011.
17. See Jennifer S. Evans-Cowley and Larry L. Lawhon. "The Effects of Impact Fees on the Price of Housing and Land: a Literature Review." *Journal of Planning Literature*. 2003.
18. Author interview, Chuen Ng, City of Lancaster Associate Planner, June 14 2011.
19. City of Lancaster Program and Fiscal Plan 2010-2011 and 2011-2012.
20. Kogan and McCubbins 2009.
21. Steven Erie, Vladimir Kogan, and Scott A. MacKenzie. 2011. *Paradise Plundered: Fiscal Crisis and Governance Failures in San Diego*. Stanford: Stanford University Press.
22. Author interview, Andrew Field, Assistant Deputy Director, Park and Recreation Department, City of San Diego, August 30, 2011.
23. *Community Facilities Districts: Potential Use for Supporting Transit-Oriented Development*. 2009. See Sacramento for an example of a CFD that allows funding for transit services and bike and pedestrian facilities.
24. Author interview, Kate White, Urban Land Institute San Francisco Executive Director, April 7 2011.
25. Author interview, Jim Kennedy, Contra Costa County, July 21, 2011.
26. Draft of *Envision San Jose 2040 General Plan*. Projections are from ABAG.
27. City of San Jose 2011-12 Proposed Operating Budget.

28. Draft of *Envision San Jose 2040 General Plan*.

29. US Census, 2010.

30. Draft of *Envision San Jose 2040 General Plan*.

31. City of San Jose 2011-12 Proposed Operating Budget.

32. Author interview, Kristen Clements, Director of Policy, San Jose Housing Department, July 12, 2011.

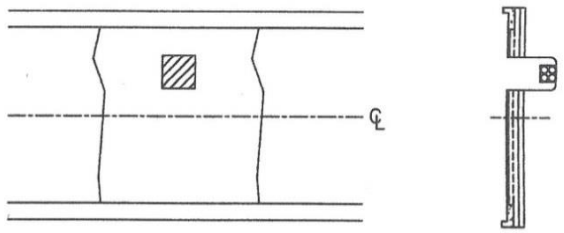
33. CBRE Consulting Inc. Memo entitled: "Mountain View Retail Leakage Study." Dated December 12, 2008.

34. Shishir Mathur and Christopher E. Ferrell. "Effect of Suburban transit Oriented Developments on Residential Propoerty Values," *Mineta Transportation Institute. 2009.*

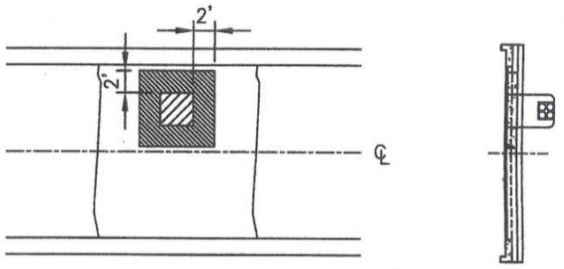
APPENDIX G

Recommended Pavement Restoration Standards

TYPICAL HOLE EXCAVATION



TYPICAL FULL PANEL RESTORATION



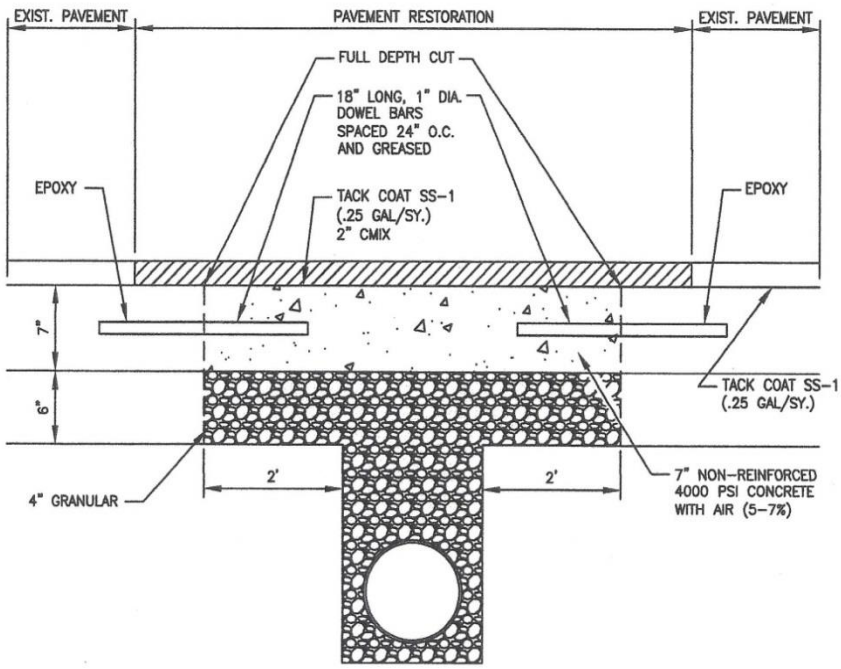
1. CONCRETE PAVEMENT: WHERE PARTIAL PANEL REPLACEMENT IS ALLOWED. ADDITIONAL PAVEMENT REPLACEMENT BEYOND THE CUT OR TRENCH LINE WILL BE REQUIRED UNDER THE FOLLOWING CONDITIONS:

   A. CUTS LESS THAN 18 SQUARE FEET AND WHERE THE DEPTH OF EXCAVATION IS 6 FEET OR LESS BELOW GRADE AND NOT WITHIN IT'S INITIAL SIZE.
   B. MINIMUM RESTORATION SLAB SHALL BE 3 FEET WIDE IN THE LONGITUDINAL DIRECTION AND 5 FEET LONG IN THE TRANSVERSE DIRECTION.
   C. IF CUT IS LESS THAN 3 FEET FROM THE LONGITUDINAL OR 5 FEET FROM THE TRANSVERSE JOINT OR OTHER PATCHES OR CRACKS, THE INTERVENING PORTION OF THE SLAB MUST BE REMOVED.

2. ASPHALT PAVEMENT:
   A. MINIMUM WIDTH OF REPLACEMENT OVERLAY SHALL BE THE FULL LANE WIDTH ON MULTIPLE LANE ROADWAYS AND TO THE CENTERLINE ON TWO LANE ROADS.
   B. THE LENGTH OF REPLACEMENT SHALL BE THE LONGITUDINAL LENGTH OF THE CUT PLUS 24 INCHES AT BOTH ENDS. IN ALL CASES THE TOP OF BASE PAVEMENT MUST BE EXPOSED A MINIMUM OF 24 INCHES FROM ALL EDGES OF THE CUT.

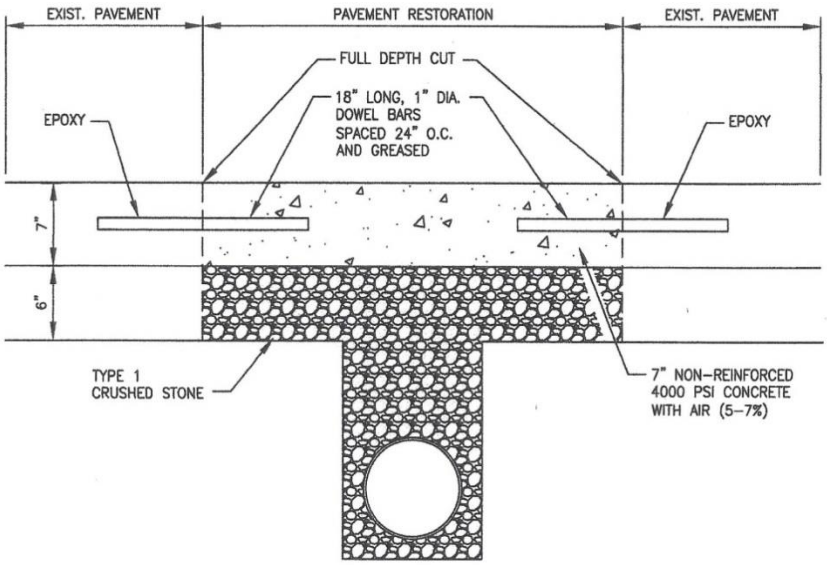
PAVEMENT RESTORATION DETAIL - ATTACHMENT H
PARTIAL PANEL REPLACEMENT

REV.	DATE	DESCRIPTION	APPROVED	SCALE NONE	DRAWN BY TJM
				DATE 2.22.06	CHECKED BY TJM



PAVEMENT RESTORATION DETAIL - ATTACHMENT B
CONCRETE PAVEMENT WITH ASPHALT OVERLAY

REV.	DATE	DESCRIPTION	APPROVED	SCALE NONE	DRAWN BY TJM
				DATE 2.22.06	CHECKED BY TJM



NOTES:

1. FULL PANEL REPLACEMENT IS REQUIRED UNLESS OTHERWISE SPECIFIED BY DEPARTMENT OF PUBLIC WORKS.

PAVEMENT RESTORATION DETAIL - ATTACHMENT A
PARTIAL PANEL REPLACEMENT

REV.	DATE	DESCRIPTION	APPROVED	SCALE NONE	DRAWN BY TJM
				DATE 2.22.06	CHECKED BY TJM

APPENDIX H

Summary of the Neighborhood Improvement District Act

Describing various options for the use of NID, CID and TDD Taxing Districts

(Prepared by Mr. James Mellon, with Armstrong Teasdale)

Armstrong Teasdale

SUMMARY OF THE

NEIGHBORHOOD IMPROVEMENT DISTRICT ACT

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EXECUTIVE SUMMARY

Missouri statutes provide a number of financing tools to spur economic development throughout the state. One such tool that has recently received increasing attention is the creation of a neighborhood improvement district, or "NID" as it is commonly called, which may be established pursuant to the Neighborhood Improvement District Act (the "NID Act").

Simply defined, a NID is a geographically bounded area within which certain public improvements are financed by a city through the issuance of notes or bonds, which are in turn repaid by levying assessments against the property within the NID. Under the NID Act, notes or bonds may be issued to pay for any one or more public facilities or improvements which confer a benefit on property within the NID, including streets, street lighting, parks and recreational facilities, sidewalks, utility service connections, sewer and storm water systems, flood control works, off-street parking structures, bridges, overpasses, tunnels, and any other public facilities or improvements deemed necessary by the governing body of the city. The NID Act also allows certain incidental costs to be financed, such as land acquisition and engineering, legal, and financing fees and costs.

A NID may be established in one of two ways: (1) by a petition of at least two-thirds of the owners of record of all of the real property located within the proposed NID requesting that the city approve the NID; or (2) by the city's submission of a question to all qualified voters residing within the proposed NID at a general or special election called for that purpose, which question must be approved by the requisite percentage of votes required for the city to issue any other general obligation debt.

Unlike other development vehicles, such as tax increment financing ("TIF"), a NID is financed by the issuance of general, rather than limited, obligation bonds. Since general obligation bonds are secured by the general revenue of the city rather than by a special, limited revenue source, such bonds are often perceived by the bond market as being more secure than limited obligations, and thus can frequently be sold at a lower interest rate. Further, a NID can be established anywhere; there is no requirement that a NID suffer from any conditions of blight.

To pay for the public improvements, the city levies assessments that are over and above any property or sales taxes already being imposed. While the property owners are primarily responsible for payment of the costs of the public improvements, the city carries its share of the burden as well. If the property owners fail to pay their assessments, the city that is ultimately responsible to the bondholders, although the delinquent assessments constitute liens on the property and, as such, the city has some recourse against the property owners. Unlike TIF, however, school districts and fire districts bear none of the burden, even though they may receive some benefit from any increase in tax revenues attributable to the public improvements.

The NID Act contains several unique features that enhance its utility. First, a NID can be established and an assessment imposed without a city-wide election. Also, since the city issues general obligation bonds, the public improvements can be financed at lower interest rates. Third, the city oversees the formation of each NID and approves the plans and specifications of each project and, as such, may group two or more NID projects together into one bond issue to further

reduce the costs. Fourth, the NID Act allows for a broad range of public improvements to be financed without a requirement that the area to be improved suffer from any conditions of blight.

I. INTRODUCTION

Missouri statutes provide a number of financing tools to spur economic development throughout the state. One such tool that has recently received increasing attention in public finance law practices is neighborhood improvement districts, or *"NIDS"* as they are commonly called.

Simply defined, a neighborhood improvement district is a geographically bounded area within which certain public improvements are financed by the local government through the issuance of notes or general obligation bonds, which are in turn retired by assessing the property owners in the district on some equitable basis. *See* § 67.453(6), RSMo. Used alone or in conjunction with tax increment financing, NIDs can provide the flexibility necessary to meet some of the difficult political, legal and financial challenges that accompany the transformation of property from under-utilized to economically prosperous.

Because of the flexibility of NIDs as a financing/development tool, their true potential and applicability can only be realized when the concept is applied to a particular set of circumstances. Accordingly, this Summary is intended only as a general introduction to NIDS.

II. GENERAL PROVISIONS OF THE NID ACT

Legal Authority. Under the authority of Article III, Section 38(c) of the Missouri Constitution, the General Assembly enacted the Neighborhood Improvement District Act (the *"NID Act"*), effective August 1991. *See* §§ 67.453-67.475, RSMo.

Purpose. Although not expressly stated, the general purpose of the NID Act can be inferred from the overall effect of the statute. The NID Act's purpose is to stimulate the development of public improvements by providing an equitable and politically expeditious method of financing those improvements. The Act achieves this purpose by offering a financing methodology unique among statutory development vehicles.

Unlike other development vehicles, such as tax increment financing (*"TIF"*), NIDs are financed by the issuance of general, rather than limited, obligation bonds. § 67.471, RSMo. Because general obligation bonds are secured by the general revenue of the issuing municipality rather than by monies of a limited fund, they are often perceived by the bond market as more secure than limited obligations, and thus can frequently be sold at a lower interest rate. Before NID, however, local governments could issue general obligation bonds for financing public improvements only upon the approval of a super majority of the general electorate. *See* Mo. CONST. Art. VI, § 26. In circumstances where the benefits of the improvements being financed accrued only to a limited number of voters, such propositions were likely to be rejected by the general electorate. The NID Act retains the same super majority requirement (two-thirds) for approving the establishment of the district (and thus any resulting debt issuance), but the NID Act limits the vote to the property owners within the neighborhood improvement district - the very people who will benefit from, and pay for, the improvements. *See* § 67.457.3, RSMo.

Establishing the District. A NID is established by a process, discussed in more detail below, requiring approval of two-thirds of the qualified voters within the proposed district. *See* § 67.457, RSMo. There are no particular limitations on district boundaries, except that the district fall within the municipal boundaries of the local government issuing the debt. Even single-owner and single-parcel districts are permissible. *See* § 67.457, RSMo; *see also Spradlin v. City of Fulton*, 924 S.W.2d 259, 263 (Mo. banc 1996) ('the constitution does not require either multiple parcels or multiple residents before a neighborhood improvement district can exist.").

Eligible Improvements and Costs. Under the NID Act, notes or bonds may be issued to pay for "any one or more public facilities or improvements which confer a benefit on property within" the district, including streets, lighting, parks and recreational facilities, sidewalks, utility service connections, sewer and storm water systems, flood control works, off-street parking structures, bridges, overpasses, tunnels, and "any other public facilities or improvements deemed necessary by the governing body of the city or county." § 67.453, RSMo. The NID Act also allows certain incidental costs to be financed, such as land acquisition and engineering, legal, and financing fees and costs. § 67.453(3), RSMo. Provisions for maintenance of the project during the term of the bonds or notes must also be enacted. § 67.456(2), RSMo.

Financing Methods. Once the NID is established, the local government may issue temporary notes to finance the proposed improvements, which may then be refunded by issuing general obligation bonds. *See* §§ 67.455, .471, RSMo. The principal and interest payments on the notes or bonds are passed on to property owners within the district through special assessments, which are made concurrently with property tax assessments. *See* § 67.463.4, RSMo. As previously mentioned, because the cost of financing is paid through special assessments, no vote by the general public is required for the issuance of the notes or bonds.

Special Assessment Methods. The NID Act requires that property owners within the district be assessed on some basis "which results in imposing substantially equal burdens or share of the cost upon property similarly benefited." § 67.459, RSMo. Typical means of apportioning the assessment are by lot, by square foot, or by front foot.

Security for the Issuer and Bond or Note Holders. The NID Act offers security for the issuing municipality by providing that the special assessment becomes a lien on the property to the same extent as a tax upon real property . § 67.469, RSMo. Such tax liens have priority over any mortgages, in the event of default. *See* § 67.469, RSMo. Holders of NID bonds or notes receive additional security, in that the bonds or notes are backed by the full faith and credit of the issuing municipality, subject to the limitations set out in the *Fulton* case, discussed below.

III. PROCEDURE FOR ESTABLISHING A NID

The NID Act sets out a detailed procedure for establishing a neighborhood improvement district. *See* §§ 67.457-67.463, RSMo 1994. This procedure, while not particularly burdensome, must be followed to the letter in order to insure the legal validity of the district and thereby the validity and marketability of the notes or bonds issued to pay for the improvements. The following is a step-by-step outline of the procedure in roughly chronological order:

Alternative Procedures for Initiating the Establishment of a NID. There are two alternative procedures for initiating the establishment of a neighborhood improvement district:

> **By submission to qualified voters within the proposed district.** The governing body of the city or county may by resolution submit the question of creating a district to all qualified voters residing within the proposed district at a general election or a special election called for that purpose. Section 67.457.2 of the NID Act details the specific procedures to be followed and the information to be contained in the ballot.
>
> **By petition of the property owners within the proposed district.** At least two-thirds of the owners of record of all of the real property located within the proposed district may petition the city or county to create the district. § 67.457.3, RSMo. The petition must be filed with the city or county clerk. Section 67.457.3 provides a detailed list of the information the petition must contain. Owners are limited to one signature on the petition to establish a neighborhood improvement district, regardless of how many parcels are owned in the proposed district. § 67.457, RSMo.

Municipal Approval. After receiving requisite voter approval or upon the filing of a proper petition, the governing body must consider the advisability of the improvements and may order by resolution or ordinance that the district be established and that preliminary plans and specifications for the improvements be made. Under Section 67.457.4, the resolution or ordinance must cover the same essential information as required in the petition.

Proposed Assessment Role. After enacting the ordinance or resolution establishing the NID and once the plans and specifications have been prepared, the governing body must by ordinance or resolution order that assessments be made against each property deemed to be benefited by the improvements based upon the revised estimated cost of the improvements or, if available, the final cost, and must order the preparation of a proposed assessment role. § 67.457.4, RSMo.

Public Inspection of Plans and Specifications and Proposed Assessment Role. The plans and specifications and the proposed assessment role must be filed with the city or county clerk and be open for public inspection. § 67.461.2, RSMo.

Public Hearing. A public hearing must be held, at which the governing body must hear and pass upon all objections, if any, to the proposed improvements and proposed assessments. § 67.463.1, RSMo. Notice of the hearing must be published and mailed to the affected property owners. § 67.461.2, RSMo. At the hearing, the governing body may amend the proposed improvements, the plans and specifications, or the proposed assessments. § 67.463.1, RSMo. Additional notice and public comment may be required when a county, city, town, or any entity created by these political subdivisions votes to implement a tax increase, to approve a redevelopment plan that pledges public funds, or with respect to a retail development project which utilizes the power of eminent domain. § 67.2725, RSMo.

Ordinance Authorizing Construction and Financing. If the governing body approves the project at the hearing, it then passes an ordinance authorizing the construction and financing of the improvements. § 67.463.1, RSMo.

Public Bid. For County-sponsored NIDS, the project must be bid publicly, and a contract is entered into with the bid winner. § 50.660, RSMo. The local ordinances of many municipalities also require public bidding.

Debt Obligations Issued. Temporary notes may be issued until construction is completed. § 67.471, RSMo. Upon completion, general obligation bonds are issued, for a term of up to twenty years. § 67.471, RSMo. The average maturity of bonds issued after August 28, 2004 cannot exceed 120% of the average economic life of the improvement for which the bonds are being issued. § 67.456(1), RSMo.

Establishment of Special Fund. The city or county must establish a separate fund in which the proceeds of the temporary notes or bonds are deposited and from which the project costs are paid. § 67.473, RSMo. Any balance after completion must be credited against the amount of the original assessment of each parcel on a pro-rata basis, and refunded. § 67.473, RSMo.

Assessing the Property Owners. Upon completion of the project, the governing body adopts an ordinance assessing each parcel with its proportionate share of the costs. § 67.463.2, RSMo. The city or county clerk then mails a notice to each property owner to inform them of the assessment, with a statement that they may pay the assessment in full or in the installments according to the bond financing. § 67.463.3-4, RSMo.

Assessments Paid. The first installment is due at the beginning of the first year after the completion of the project. § 67.463.4, RSMo.

IV. COMPARING NID AND TIF

Primary Distinctions and Similarities. Both NID and TIF are premised on the philosophy that an investment in public improvements spurs economic development, which in the long run will pay for the public improvements and more. These two economic development vehicles differ primarily in how the burden of financing the improvements is distributed among the property owners, the municipality and other taxing jurisdictions.

With NID, the property owners within the district pay for the public improvements through assessments over and above any property or sales taxes they already pay. *See* § 67.461, RSMo. The municipality carries its share of the burden as well; if the property owners fail to pay their assessments, it is the municipality who is ultimately responsible to the bondholders (although the fact that the assessments constitute liens on the property does provide the municipality with recourse). *See* § 67.469, RSMo. However, other taxing jurisdictions such as school and fire districts share none of the burden with a NID, but may benefit from any increase in tax revenues attributable to the improvements.

With TIF, the burdens are basically reversed. The property owner/developer pays nothing for the publicly financed improvements, but is ultimately responsible to the bondholders if the tax revenue

generated by the improvements is insufficient to make the payments. The municipality, on the other hand, has no financial responsibility to the bondholders, but along with the other affected taxing jurisdictions, "pays" for the improvements by foregoing a portion of the increased tax revenue until the bonds are paid off.

This difference in the distribution of burdens points to a more fundamental distinction between the two development vehicles, a distinction which can aid in determining which vehicle is more appropriate for a particular set of circumstances. Under TIF, the affected taxing jurisdictions can justify temporarily foregoing the increased tax revenue because the area being developed is declared by the municipality to be blighted, and a finding is made that but for financing the improvements, the development - and the resulting increase in tax revenues - would not occur. Thus, TIF is appropriate in circumstances where development is not likely to take place without the incentive that TIF offers, i.e., where it is not financially feasible for the property owner(s) to pay for the desired improvements.

In contrast, there is no requirement that a NID be declared blighted or that a finding be made that the improvements would not likely be constructed without the NID financing. NIDS, without any such limitation, have potentially broader application, at least where it is financially feasible for property owners to foot the bill. And NIDS, by lowering the cost of making improvements through public financing, will make more development projects financially feasible.

Using TIF and NIDs Together. The distinctions between TIF and NIDs do not preclude their use together on the same project. In fact, on the right project, the distinctions between TIF and NIDs actually complement each other. Because TIF bonds are a special obligation repayable solely from the potential cash flow from new taxes generated by development project that is not yet built, they represent a certain level of risk for investors, which can be reflected in the rate of interest on the bonds or in their stability in general. The use of a NID along with TIF can lower the perceived level of risk, and thus the cost of financing.

Under such a scenario, the initial financing of the project would take place through the NID, with notes or bonds issued by the local government. Because NID obligations are a type of general obligation of the local government (*see* the discussion of the *Fulton* case below), these obligations are more easily sold at a favorable interest rate. Once the NID financing is in place, the improvements are built and begin generating tax revenues. With documented cash flow, the timing is then right to issue TIF bonds, the proceeds of which are used to retire the NID notes or bonds. Thus, the primary benefits of both development vehicles are realized: the favorable rates of NID financing are obtained, but the improvements are ultimately paid for from the increase in tax revenues generated by the development without obligating the municipality's general revenue.

V. SPECIAL CONSIDERATIONS FOR LOCAL GOVERNMENTS

In addition to the general information provided above, local governments should consider the following when contemplating the use of a NID:

City or County Approval. The governing body of the city or county has discretion to approve or disapprove NID projects presented to it. In using that discretion, factors that should be considered include:

- The need for improvements;

- The likelihood of default by property owners;
- The benefit of the NID financing compared to other alternatives.

Interest Rates. Bonds issued in conjunction with a NID are tax-exempt under most circumstances, thus the purchaser of the bonds does not pay state or federal income taxes on the interest earned. As a result, the purchaser of such a bond is willing to accept a lower rate of return on a municipal bond compared to a non-exempt security because the after-tax earnings are comparable. The actual interest rate will vary depending on market conditions and other factors, such as whether the rate is fixed or floating, and whether the bonds are publicly or privately sold. Generally, the interest rate is about 0.5% higher with privately sold bonds, but the issuance costs may be lower. Generally, it may be better to publicly bid the sale of bonds if the project is $500,000 or more.

Cost of Bond Issuance. While the interest paid may be thought of as a "cost" of financing, there are transaction costs independent of interest costs, such as the fees of legal and financial professionals and the cost of printing the bonds. These transaction costs are commonly referred to as "costs of issuance." Costs of issuance for a particular project will depend on several factors, including:

- Size of the bond issue (the larger the project, the smaller the costs of issuance on a percentage basis);
- Public sale or private placement;
- Number of bond purchasers;
- Number of property owners who will be assessed.

Financing Limits. A city or county may issue NID notes or bonds in an amount not to exceed the estimated cost of the improvements and 10% of the assessed valuation of taxable tangible property within the city of county. § 67.475, RSMo. The 10% limitation does not impact limits imposed for other general obligation bonds.

Prevailing Wage Law. State law requires that prevailing wages be paid to an employee of a contractor which uses public funds as payment. Therefore, in most cases, NID projects would be subject to the Prevailing Wage Law.

Bidding Requirements. State law (§ 50.660, RSMo) requires counties to publicly bid any contract in excess of $1,500. By local ordinance, most municipalities require similar procurement procedures.

Multiple Projects. A city or county may group two or more NID projects into one bond issue which would likely result in lower costs. *See* § 67.455, RSMo.

VI. SPECIAL CONSIDERATIONS FOR PROPERTY OWNERS

NIDs Initiated by Property Owners. In addition to the statutory requirements discussed above, the following matters should by considered by property owners desiring to initiate the establishment of a NID:

- Although the governing body makes the ultimate decision, property owners who petition for the creation of a NID are initially responsible for deciding the proposed scope of the project, such as what improvements will be made, how the payments will be assessed (per lot, per square foot, per acre, etc.), and when the project will be started.

- Property owners should engage a professional engineer to draw up a preliminary plan with a cost estimate (an engineer is required under § 327.421, RSMo). The engineer's fees may be paid with bond proceeds, when available.

- While not statutorily required, as a practical matter property owners should .meet with the city or county to advise them of the project and obtain their support prior to soliciting signatures for the petition.

- The property owners should engage an attorney knowledgeable with the NID program who can draft and/or review key documents to insure statutory compliance.

- The petition may also provide for an annual assessment for the cost of maintaining the improvements in each year after the bonds issued for the original improvements are paid in full. *See* § 67.457.4, RSMo.

Tax Deductibility. The IRS has determined that special assessments cannot be deducted from a property owner's income taxes, as can real and personal property taxes.

VII. THE FUTURE OF NID

The use of any new development vehicle involves a certain amount of uncertainty until the courts have had the opportunity to sort out any ambiguities and inconsistencies in the authorizing statute. With respect to the NID Act, that opportunity has been recently seized by the Missouri Supreme Court, with an outcome favorable for the future of NIDS.

The Fulton Case. In *Spradlin v. City of Fulton,* 924 S.W.2d 259 (Mo. banc 1996), the Missouri Supreme Court considered an apparent inconsistency between the language contained in the NID Amendment to the Missouri Constitution and the Hancock Amendment. The NID Amendment (Mo. CONST. Art. III, § 38(c))

permits the issuance of general obligation bonds without expressly requiring a vote of the general electorate. Under this authority, the General Assembly enacted the NID Act, expressly authorizing the issuance of general obligation bonds without a vote of the general electorate. The Hancock Amendment (Mo. CONST. Art. X, § 16; *see also* Art. VI, § 26), however, requires a vote of the general electorate before any tax can be increased. This created the possibility that a local government unable to collect adequate assessments to make the bond payments might raise taxes to make payments on a bond issue the electorate did not authorize, an apparent violation of the Hancock Amendment.

With a 4-3 majority, the Missouri Supreme Court resolved this apparent conflict in favor of upholding the constitutionality of the NID Act. *Fulton*, 924 S.W.2d at 264. The court held that the NID bonds constitute the "full faith and credit" guarantee of the issuing municipality that such bonds will be repaid even if special assessments are not sufficient to fund repayment. *Id.* Unlike traditional concepts of "full faith and credit," however, a municipality cannot increase taxes to pay this debt without approval by the general electorate. *Id.* at 265. In order to meet the obligations created by this hybrid guarantee, a municipality can either request public approval of a new tax through a city-wide or county-wide election (and thus satisfy the Hancock Amendment), or rely on existing revenues and surpluses as a source of payment. *Id.*

The *Fulton* decision secures the credit worthiness of NID bonds and insures that NIDs will be a viable alternative to TIFs and other more traditional financing vehicles. One question remains which might further have an impact on the credit worthiness of NID bonds. The court did not decide whether a court enforcing the collection of sums due under a defaulted NID bond could order the imposition of a tax to satisfy the municipality's obligation to repay the bonds. Thus it remains an open question what priority NID obligations will be assigned, i.e., whether NID bonds will be considered by the courts to be backed by the taxing power of the issuing municipality, or merely have the same priority as other ordinary contractual obligations.

Increasing Use of NIDS. With the *Fulton* decision, NIDs are now on a level playing field with other judicially-approved development vehicles. Since *Fulton*, there has been a clear increase in the number of NIDs established or under consideration. As the public finance market gains familiarity and comfort with this new financing vehicle, that trend should continue into the foreseeable future.

APPENDIX I

Private Streets within Kirkwood not Assessed:

Green Glen	Green Point	Hillcrest Place
Hoffman Avenue	Krauswood	Lacquer Drive
Oak Timber	Barrington Square	Bent Oak
Bishops Gate	Brooksgate Manor	Candleberry
Carriage Circle	Chancellor Square	Charmers Court
Claybine Drive	Cloisters	Colony Woods
Cork Elm	Cragknob Court	Creekfield Walk
Dickson Court	Douglas Lane	Eastview Drive
Fieldmont Drive	Finlay Road	Larkspur Lane
Pinegate	Provincial	Rayner
Reedway	Rockbridge	School Lane
Sommet Place	Stonecrest	Stoneridge
Stoneridge Trails	Limestone Place	Maryhurst
Middleton	Monclay	North Taylor Glen
Sugar Creek Ridge	Thursby	Sugar Creek Trail
Taylor Young	Wealowood	Woodland Trail
Sunny Drive (off Ballas Road)		