



Department of Finance
Bureau of the Budget and Management Research
Andrew Kleine, Chief

City of Baltimore

BBMR Management Research Report

Street Repaving

**A FULL COST AND ACTIVITY BASED COST ANALYSIS OF THE
IN-HOUSE STREET REPAVING OPERATION IN BALTIMORE**

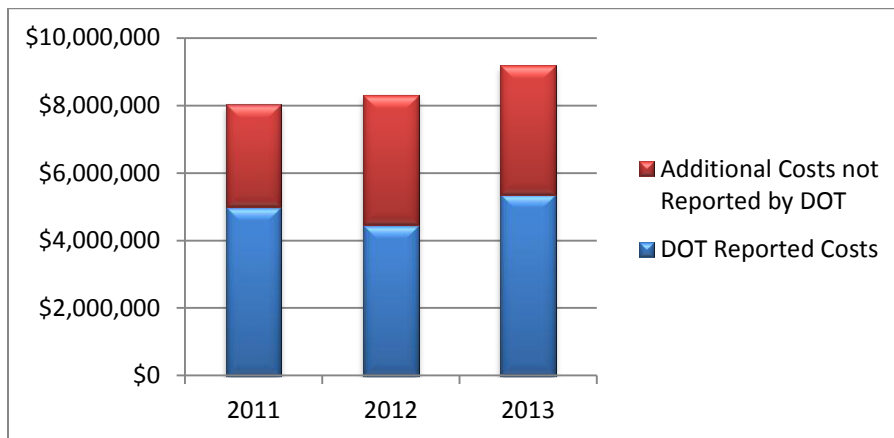


Management Research Report

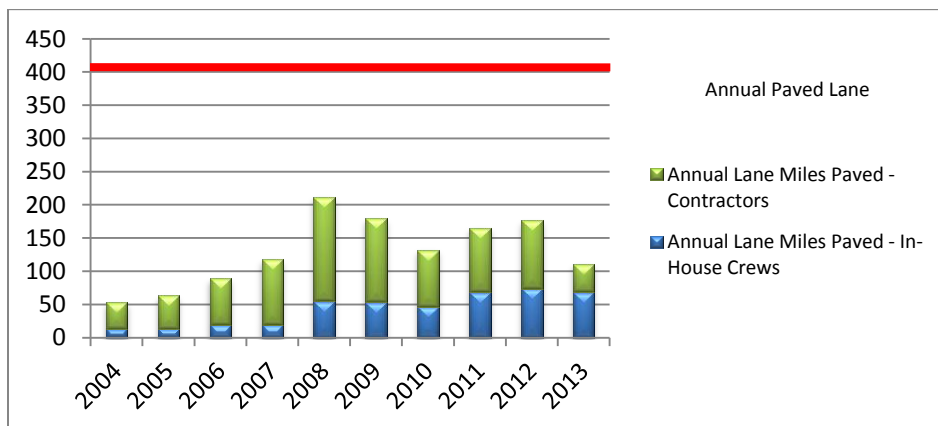
STREET REPAVING: FULL COST AND ACTIVITY BASED COST ANALYSIS OF THE IN-HOUSE STREET REPAVING OPERATION IN BALTIMORE

What BBMR Found

The full cost of in-house street repaving is significantly higher than the Department of Transportation (DOT) has reported. The costs are higher because DOT 1) has understated the costs of the items it has been reporting, 2) has not reported other direct costs that contribute to the operation, and 3) has not taken into account the indirect costs that contribute to the operation.



In addition, after conducting an activity based costing analysis of the in-house repaving operation, BBMR has identified some high cost steps of the process in which efficiency improvements could be realized. This is important because DOT spends millions on repaving each year, but it currently falls between 200 and 300 lane miles short of the repaving necessary each year to keep up with the deterioration of the roads throughout the city. The calculation for lane miles needed to be paved has been made by taking into account the total lane miles of city streets and the projected life span of the pavement being used. Any efforts to increase the efficiency of repaving operations would allow DOT either to get the same amount of repaving done using fewer resources or to use the same resources to pave a greater number of lane miles.



Why BBMR Did This Study

The Department of Transportation runs an in-house repaving operation to mill and pave neighborhood streets throughout the City. The purpose of conducting this study is 1) to determine the full cost of conducting this operation, 2) to conduct an activity based costing analysis of the operation, 3) to identify ways that the operation can be performed more efficiently, and 4) to identify any process improvements that can help ensure that efficiency gains can be maintained.

What BBMR Recommends

To increase efficiency, BBMR recommends the following actions:

1. Reduce use of overtime
2. Determine optimal size for milling and paving teams
3. Reduce tipping fees through a variety of means
4. Seek a lower cost for asphalt
5. Investigate reducing milling time by acquiring more modern milling machines
6. Track in-house street repaving as a separate activity to allow for better tracking of costs, and break this activity into two sub-activities: milling and paving
7. Consider managed competition as a way to increase efficiency
8. Improve tracking of costs at the service delivery level
9. Accurately classify all staff contributing to in-house repaving as part of that activity
10. Keep front line employees informed of fiscal issues
11. Incorporate all direct costs into DOT's accounting of in-house street repaving

To view the full report, go to <http://bbmr.baltimorecity.gov/ManagementResearch.aspx>.

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Department of Finance
Bureau of the Budget and Management Research
Andrew Kleine, Chief

Bureau of the Budget and Management Research
100 N. Holliday Street, Baltimore, MD 21202

October 28, 2014

The Honorable Mayor Rawlings-Blake,

The Department of Transportation (DOT) is responsible for maintaining the streets within Baltimore City. It does this through the use of both contractors and in-house City crews. The in-house street repaving is part of activity 4, Rehabilitation, Maintenance, and Repairs within the service 683, Street Management. With the in-house crews, DOT performs the task of milling approximately three inches of old asphalt off of the street and repaving the street with new asphalt.

This management research project on repaving was conducted upon your request for the purpose of finding ways to better measure the costs of conducting this operation and improving the efficiency of the operation. The authority to conduct this project comes from BBMR's mandate to provide policy and fiscal research and analysis on a variety of administrative, departmental and citywide issues. Key issues examined in this management research project include: 1) the full cost of providing the in-house street repaving activity, 2) the cost of each activity within the milling and paving tasks, 3) alternatives to improve the efficiency of this operation, and 4) process improvements that can ensure that the operation continues to improve efficiency going forward.

To determine the full costs at both the overall level and also at the level of individual activities, and to determine ways in which efficiency may be improved, BBMR analyzed DOT reported expenditures from Fiscal 2004 through 2013 and appropriated funds for Fiscal 2014, examined actual expenditures on this service from the City's general ledger, interviewed officials with operational knowledge of the service, conducted a site visit of a milling and paving job, examined DOT position files and Agency Detail budget books, and consulted external sources for information on equipment and materials options.

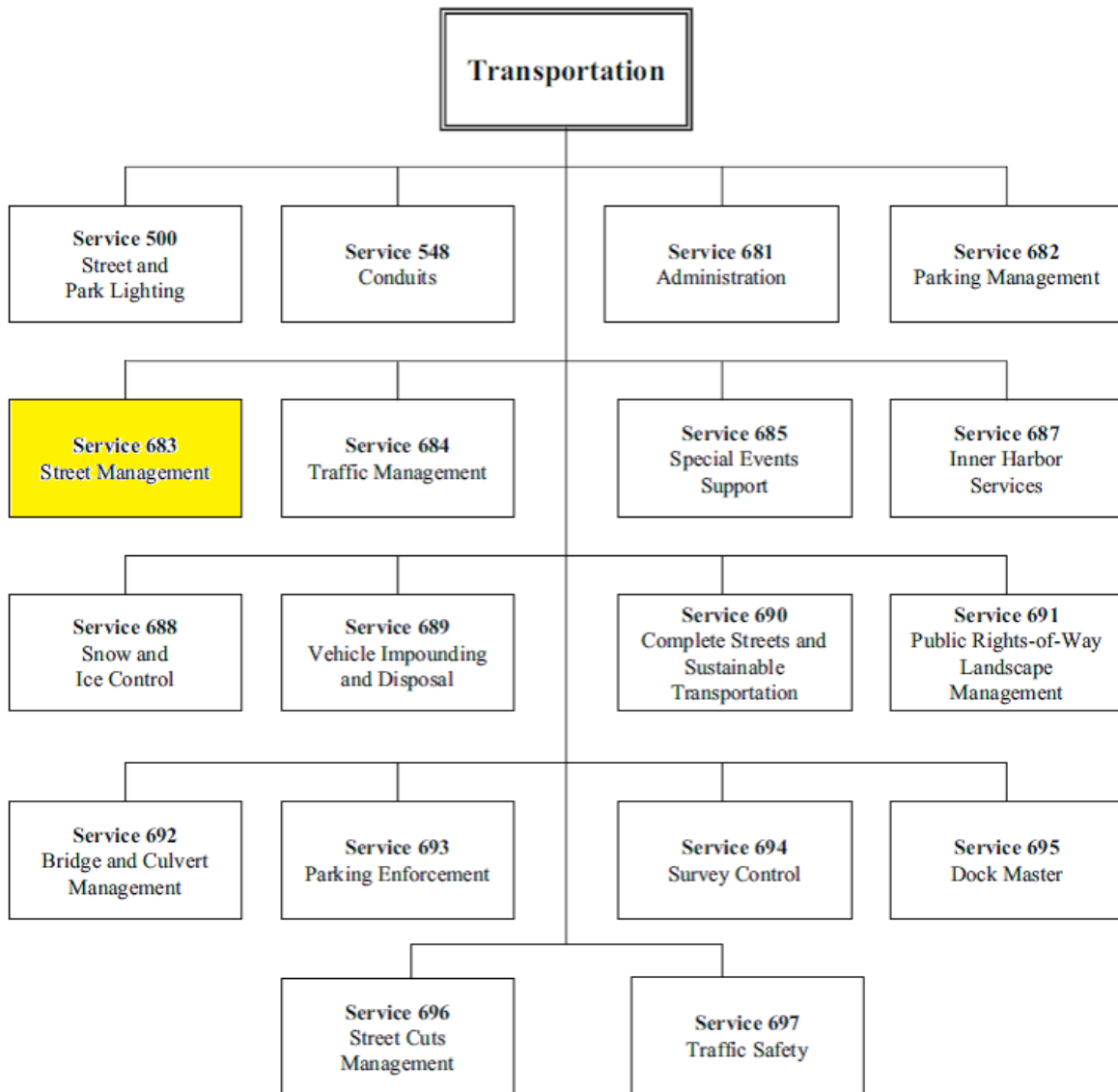
BBMR conducted this management research project from June 2013 to April 2014 in accordance with the standards set forth in the BBMR Project Management Guide and the BBMR Research Protocol. Those standards require that BBMR plan and perform the research project to obtain sufficient and appropriate evidence to provide a basis for the conclusions and recommendations contained in this report. BBMR believes that the evidence obtained provides a reasonable basis for the findings and conclusions in this report and that such findings and conclusions are based on research project objectives.

BACKGROUND

HISTORY AND SERVICE OVERVIEW

The City of Baltimore currently has over 4,300 lane miles of roadways to maintain, as well as over 1,000 miles of alleyways. The City's Department of Transportation (DOT) is responsible for maintaining these roadways. This street maintenance is budgeted under the service Street Management, which is Service Number 683 in the City budget. The organization of DOT, and where Street Management fits within this organization, can be seen in Figure 1 below.

Figure 1: DOT Service Chart – Fiscal Year 2014

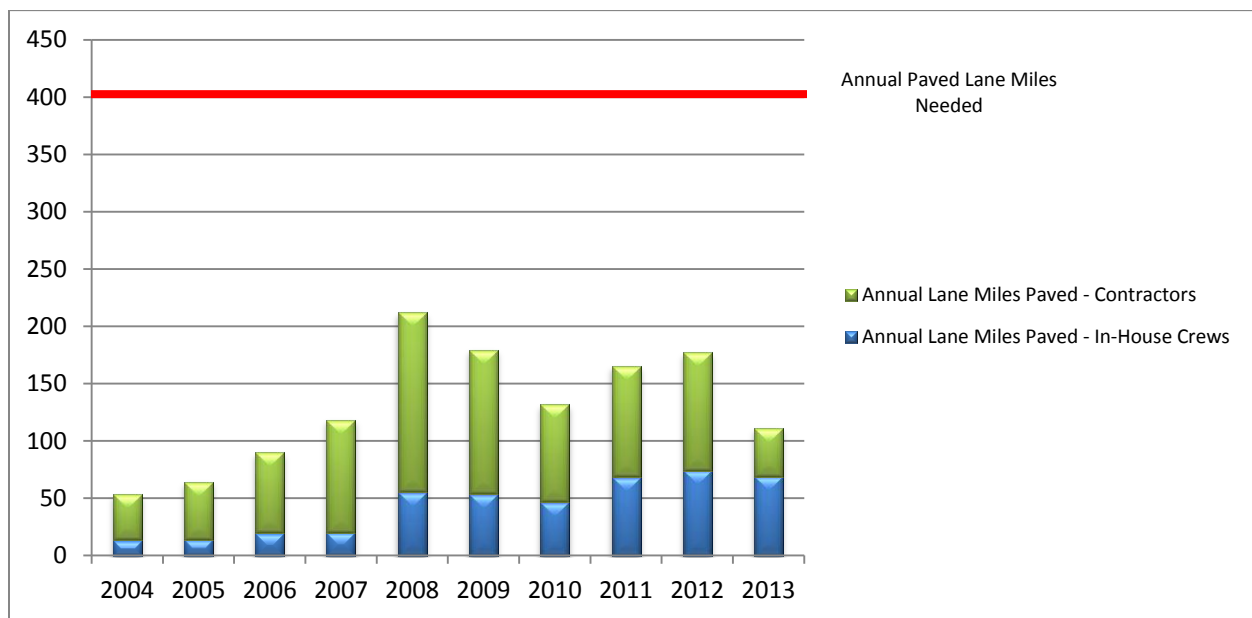


Street Management includes items other than full street repaving, such as pothole repair. The operating budget for Street Management in Fiscal 2014 is \$27,222,944. This repaving is handled by both internal City crews and contractors. This study will focus exclusively on the full street repaving component of Street Management. A key goal of this study is to determine if there are ways the City could improve the efficiency of its repaving operation.

According to DOT, the repaving currently being done by both contractors and in-house crews has a life span of 8 to 12 years. Given the total lane miles of roadway in the city and the expected life span of the pavement on the city’s streets based on the numbers above, DOT would need to repave just over 400 lane miles per year in order to keep pace with the projected life span of its street surfaces. At the current rate of repaving, the City is not keeping up an adequate pace. As such, the City has an incentive to increase the amount of repaving it can conduct each year, and the more efficiently it runs its operation the more it can do.

Chart 1 below shows how much repaving has been done each year since 2004 by both the in-house City crews and the contractor crews, compared to how much repaving would have to be done to keep pace with the deterioration of the asphalt. As can be seen, the current pace of repaving by the combined efforts of the City and contractor crews does not keep pace with the expected pavement life. If the City is going to keep pace with pavement life, it will need to devote more resources to repaving in the future or determine ways to perform repaving more efficiently, or some combination of the two.

Chart 1: Lane Miles Paved versus Lane Miles Needed



In 2007, the City launched Operation Orange Cone. This was a public relations effort to keep people informed about what was happening with street repaving. Through Operation Orange Cone, according to an agency document about this program, the City tried to turn the issue of street maintenance from a negative, in which many citizens thought about how much of the city’s street surface was sub-par, into a positive, in which people could start seeing how much repaving was being done with their tax money.

It was also meant as a motivating tool to get more surface paved each year than had previously been the case. In 2004, the City paved only 53 lane miles between both the in-house and contractor efforts. By 2008, under Operation Orange Cone, the City paved 212 lane miles through combined efforts. Operation Orange Cone was begun as a campaign under the city's previous mayor, Sheila Dixon. Although the program currently still exists, it does not appear to be emphasized now as much as it was previously. However, the elevated repaving goals that were begun under this program remain in effect. For example, in Fiscal 2014 the goal has been to pave 200 lane miles, with 80 being done by the in-house crews and 120 being done by contractors. Below is the logo for the Operation Orange Cone campaign.

Figure 2: Operation Orange Cone *



* Though Sheila Dixon is no longer Mayor of Baltimore, this is still the logo that appears on DOT's Operation Orange Cone web site.

As Chart 1 shows, since 2004 the lane miles paved by the in-house crews have mostly increased. DOT contends that in-house crews pave streets at lower cost than contractor crews. This study will examine those costs.

The jobs being performed by the contractor crews are more complex than the jobs being performed by the in-house crews. The contractor crews make structural improvements to the streets. They install grates, build Americans with Disabilities Act compliant sidewalk ramps, and build sidewalks. About 5% of the time contractors also repave concrete streets. Unlike the in-house crews, they are certified to work on roadways receiving federal funding. As a result, only contractor crews repave streets classified as Interstate Principal Arterial, Freeway and Expressway, Other Principal Arterial, Minor Arterial, and Collector. In recent years, the contractor crews have exclusively worked on these larger, more complex jobs.

For contracted jobs, DOT divides the city into quadrants and bids the work out to vendors by those quadrants. Each quadrant goes to one contractor. Any given contractor can be awarded more than one quadrant, however. As of the writing of this report, the City is using two contractors to cover all four quadrants. Those contractors are Manuel Luis Construction Company and P. Flanigan and Sons.

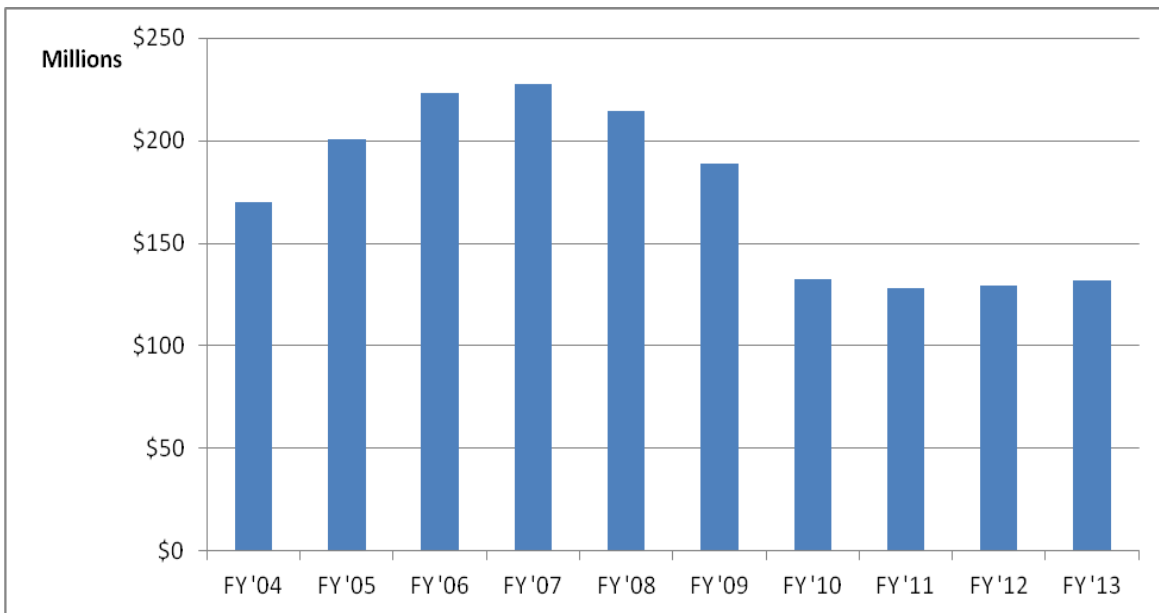
By contrast, in-house crews work only on neighborhood streets, and they perform only two tasks with those jobs: milling and paving. Milling consists of removing about three inches of asphalt from the street with a

milling machine. Paving consists of applying a new three inch layer of asphalt to the surface and rolling it out. The in-house crews do not work with concrete, and they do not conduct the other structural improvements that the contractors perform.

FUNDING FOR STREET REPAVING

Prior to Fiscal 2013, most of the funding used for in-house street maintenance in the city was appropriated from the Motor Vehicle Fund. In Fiscal 2013, this fund was merged into the General Fund. The primary revenue source for street maintenance is State Highway User Revenues (HUR). These revenues are generated from State vehicle fuel taxes, vehicle registration fees, titling taxes, and other sources. As shown in Chart 2 below, HUR had decreased \$95 million through Fiscal 2013, or 42%, since 2007.

Chart 2: State Highway User Revenues



These funds have decreased for a variety of reasons, including a decrease in state gasoline and vehicle sales tax revenue, the move by the state of highway user revenues to the State General fund, and modifications in the formula that allocates the funds.

Most of the funding for the in-house repaving is operating, however some of the money is capital. According to DOT, all of the funds for in-house repaving, whether operating or capital, are general funds, or were previously Motor Vehicle Funds.

As already stated, DOT also performs repaving using contractors. Below is a table showing the various sources of funding for contractor repaving according to DOT.

Table 1: Sources of Capital Funding – Fiscal 2005 through 2013

Year	Motor Vehicle Fund	Federal Revenue	State Construction Revenue	Other Fund Revenue	General Fund Revenue	General Fund HUR Eligible	Total
2005	\$5,073,497	\$6,010,194	\$13,899,012				\$24,982,703
2006	\$11,861,772			\$300,001			\$12,161,772
2007	\$5,569,947	\$2,986,319	\$14,716,865				\$23,183,131
2008	\$3,619,491						\$3,619,491
2009	\$3,778,147		\$5,516,768	\$243,867			\$9,538,783
2010		\$8,623,544	\$1,641,644				\$10,265,187
2011	\$6,199,286	\$10,799,029					\$16,998,315
2012	\$3,207,129	\$9,854,082	\$870,629	\$345,962	\$1,053,012	\$312,754	\$15,643,569
2013		\$950,896				\$1,400,214	\$2,351,109

STAFFING AND EQUIPMENT LEVELS

When the City first began performing in-house repaving, it utilized staff who were not fully dedicated to the paving operation. Within a few years, DOT had identified dedicated staff for the operation. As of 2007, DOT had identified one crew that rotated between milling and paving. In 2008, the City added funding to the operation to allow for there to be one dedicated milling crew and one dedicated paving crew. This addition of a crew is responsible for the large jump in the amount of in-house street repaving done between 2007 and 2008.

Currently, DOT has one dedicated milling team and two dedicated paving teams. This practice began during the 2011 paving season, and is the reason that the amount of resurfacing being done increased dramatically again between 2010 and 2011. DOT has recently discussed adding a second milling team. This could reduce the amount of overtime that would be required in the repaving operation, which will be discussed more below.

The repaving is done between March and November each year, and during these nine months the people on the milling and paving teams are dedicated to this activity. During the other three months of the year staff from the milling and paving crews work on other crews doing things like sidewalk repair and tree pitting. Below is a table showing the types and numbers of staff in both the milling and paving teams, as well as their functions as of Fiscal 2013.

Table 2: Staff of Milling and Paving Crews - 2013

Staff Title	Number of Employees		Description
Milling			
Highway Maintenance Supervisor	1		Oversees all field operations
Heavy Equipment Operators	4		Three operate the milling machine and Low Boy tractor trailer; one operates the skid steer loader/plainer
Motor Vehicle Drivers	4		Transport crews and equipment to the job site and haul away the milling materials; operate street sweeper and water truck; operate tandem dump trucks
Laborers	6		Work as the cut out crew, removing the asphalt from around utility heads and squaring up the street cut ends; work behind the milling machine shoving/loading the roadway milling debris in the skid steer loader, etc.
Laborer Crew Leader	3		These are laborers with additional supervisory responsibility.
Total	18		
Paving			
	Crew 1	Crew 2	
Highway Maintenance Supervisor	1	1	Oversees all field operations
Heavy Equipment Operators	3	4	Operate the asphalt paving machine and the asphalt roller; operate the Low Boy tractor trailer
Motor Vehicle Drivers	4	4	Transport crews and equipment to the job site and haul hot mix asphalt from the patch plants to the work site
Laborers	6	4	Two laborers work alongside the paving machine feeding asphalt from the machine to the side doors and cleaning up and removing the asphalt from in front of the machine tracks/paths; two laborers loop or grade the asphalt for a smooth finished surface and also blend and bond the roadway lane seams together; one laborer directs trucks where and when to back up to the paving machine and cleans up worksite; one laborer shovels and removes excess asphalt that falls between dump truck and paving machine and assists truck

			driver applying tack coat to milled surface before paving starts.
Laborer Crew Leader	1	1	These are laborers with additional supervisory responsibility.
Utility Aide	1	0	This person has operated as a laborer, but was classified as a utility aide prior to joining the paving crew.
Cement Finisher	0	1	This person has operated as a laborer, but was classified as a cement finisher prior to joining the paving crew.
Total	16	15	

Table 3 below shows the history of the total number of staff by crew since the beginning of the program in 2004 according to DOT.

Table 3: History of In-House Repaving Staff Levels

Calendar Year	Milling Crew	Paving Crew 1	Paving Crew 2	Total
2008	19	21	0	40
2009	20	21	0	41
2010	19	15	0	34
2011	17	15	18	50
2012	18	16	15	49
2013	18	16	15	49

These milling and paving crews utilize various pieces of equipment to perform their functions. Below is a list of the equipment used as well as the purposes of this equipment provided to us by DOT.

Table 4: Milling and Paving Equipment - 2013

Equipment	Amount	Description
Milling		
Milling Machine	1	Removes two to three inches of roadway surface. A second milling machine is kept in reserve.
Skid Steer Loader and Plainer	1	Removes the piles of milling from the roadway and loads them on a dump truck
5-Ton Dump Truck	2	Transports the crews and equipment to work site
Ten Wheeler Dump Truck	4	Hauls away milling materials

Water Truck	1	Refills milling machine
Street Sweeper	1	Sweeps up the asphalt debris from the roadway to provide a clean surface
Tag Along Compressor	1	Squares up the end of the street cuts and removes asphalt from around the utility heads
Front End Loader	1	Kept in reserve and is used only if the skid steer loader is unavailable for use
Low Boy Tractor and Trailer	1	Transports milling machine
Paving		
5-Ton Dump Truck	2	Transports the crews and equipment to work site and haul hot mix asphalt from the patch plant to the work site
Ten Wheeler Dump Truck	4	Hauls hot mix asphalt from the patch plant to the work site
Tack Coat Wagon	1	Applies copolymer to the roadway surface so hot mix asphalt can bond with the roadway base
Paving Machine	1	Resurfaces the roadway, applying 2-3 inches of hot mix asphalt on the milled out roadway surface
Asphalt Roller	1	Compacts the hot mix asphalt
Pick Up Truck	1	Used by supervisor
Low Boy Tractor and Trailer	1	Transports paving machine

PRIORITY OUTCOME AND PERFORMANCE MEASURES

Priority Outcome

As indicated earlier, street repaving is part of the service Street Management. This service in turn is part of the Mayor's priority outcome of Stronger Neighborhoods.

Performance Measures

Table 5 shows all of the performance measures highlighted in the Fiscal 2014 budget for service 683, Street Management, which relate to the in-house repaving operation.

Table 5: Fiscal Year 2014 Performance Measures

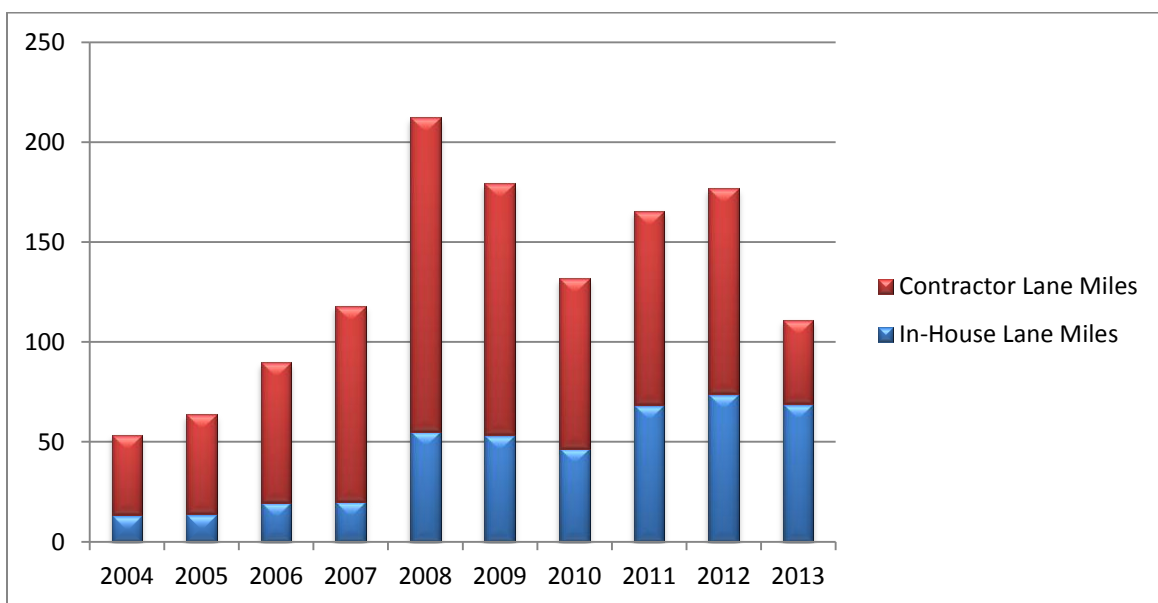
Type	Measure	FY 12 Actual	FY 13 Target	FY 14 Target
Output	Lane Miles resurfaced (internal/contractor crews)	84/104	New Measure	80/120
Efficiency	Cost per lane mile resurfaced (\$ for internal crews)	New Measure	New Measure	\$85,000
Effectiveness	% of streets meeting acceptable pavement condition standard	58%	59%	59%
Outcome	% of citizens rating street and sidewalk maintenance as good or excellent	29%	29%	29%

Lane Miles

Since lane miles are a primary measure of repaving performance, we should define what exactly a lane mile is. A lane mile consists of a mile length of pavement, with an eleven foot width and a few inches of depth. Many of the streets in the city are wider than eleven feet. If a street is wider than eleven feet, then this extra width counts toward the lane mileage. So for instance if a street being repaved is 14 feet across and one mile long, then the lane mileage would be 1 ¼ miles.

Since 2004, the City has increased the amount of repaving being conducted by in-house crews. In 2004 in-house crews repaved only 13 lane miles, but by 2013, the most recent year for which information is available, they repaved 69 lane miles. Chart 3 below shows the change in lane miles paved by in-house crews since 2004. The chart also shows the lane miles paved by contractor crews during that time.

Chart 3: Lane Miles Paved Since 2004 – Contractors and In-House Crews

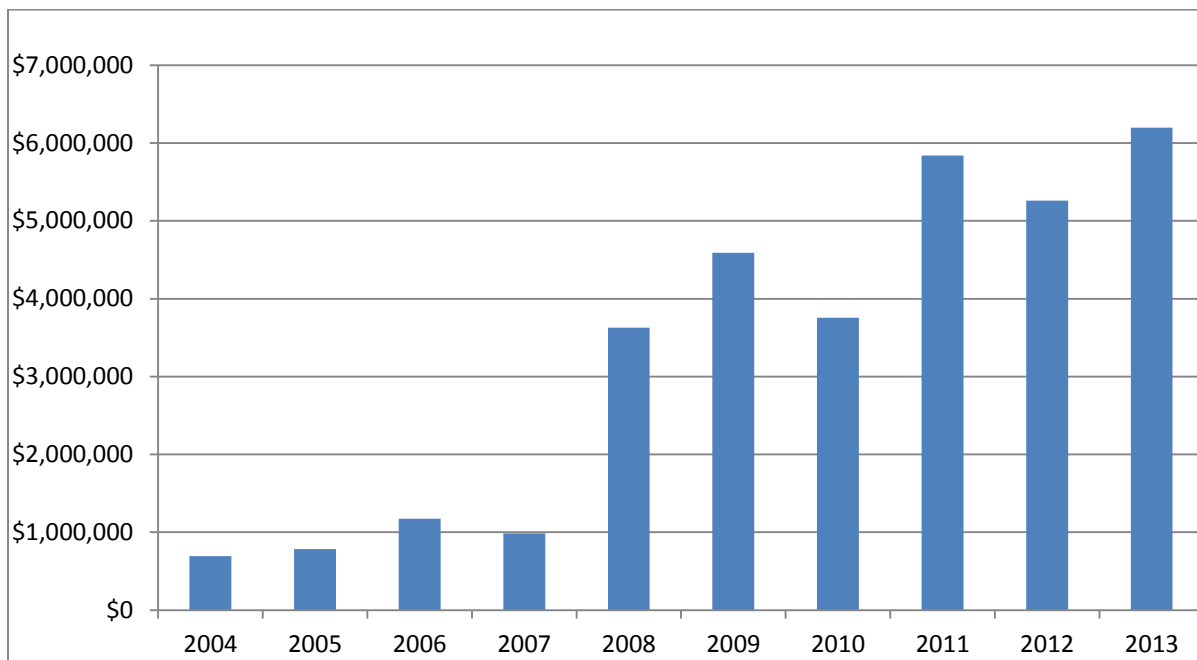


While the City paved approximately 69 lane miles with City crews in 2013, it paved about 42 lane miles using contractors, for a total of 111 lane miles paved in 2013. A list of the actual in-house repaving projects for calendar years 2011 through 2013 is provided in Appendix II. For recent years, the number of individual projects done each year was 158 in 2011, 170 in 2012, and 149 in 2013.

Cost per Lane Mile

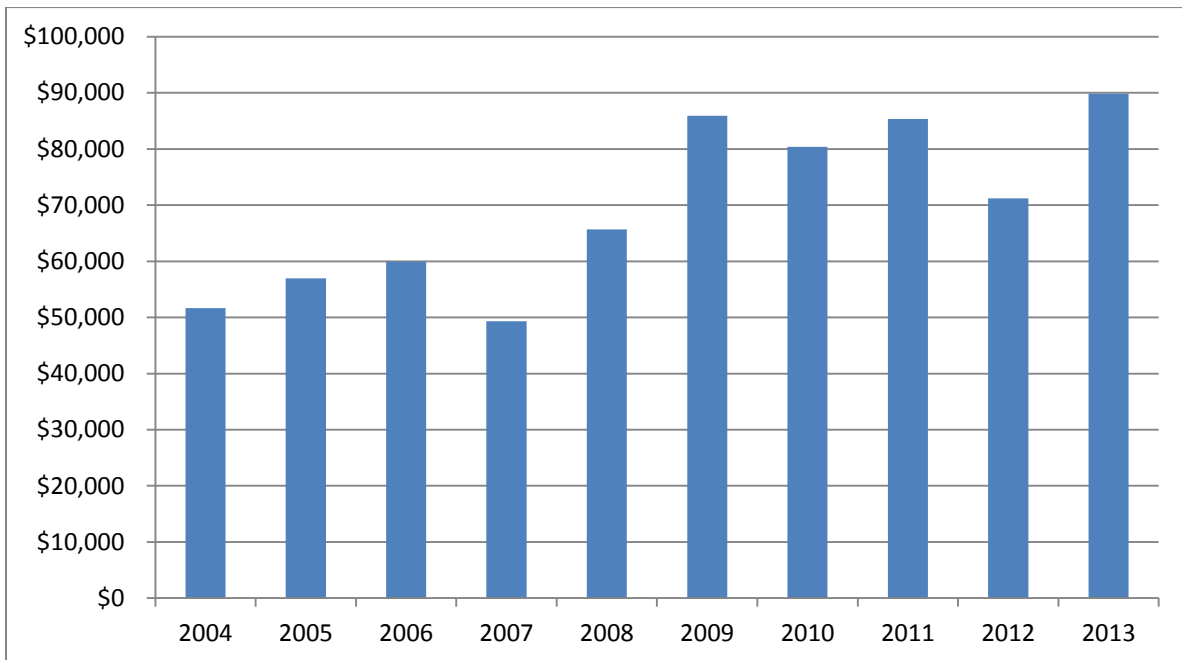
As DOT has increased the amount of in-house repaving being done, the total cost of the operation has risen. DOT reported spending a little under \$700,000 in 2004. By 2013, the department claimed it had spent over \$6 million on this operation. See Chart 4 below for the change in spending reported by DOT for 2004-2013.

Chart 4: Total DOT-Reported Spending on In-House Repaving



Below is a chart showing how the cost per lane mile has changed since 2004. It is interesting to note that for the first five years the cost per lane mile generally increased, from about \$52,000 in 2004 to almost \$90,000 in 2009. However in recent years it dropped a bit, with cost per lane mile down to \$77,000 in 2012. In 2013 the cost per lane mile rose again to almost \$90,000 per lane mile.

Chart 5: DOT-Reported Cost per Lane Mile – In-House Crews

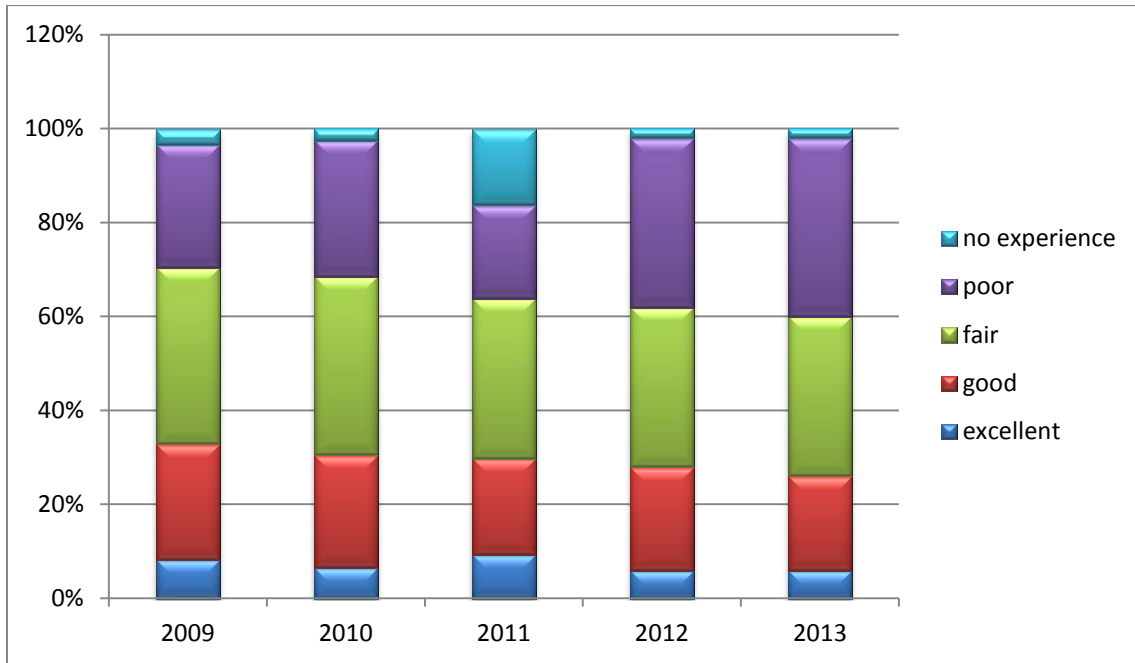


In measuring costs, however, DOT has accounted for only seven cost categories. These areas are: regular wages, overtime wages, other personnel costs, food for people working overtime, equipment, materials, and FICA contributions. This accounting for costs leaves out various other items that should properly be considered costs of these projects. This study is going to determine what other costs should be accounted for by the City when measuring the cost of its in-house repaving activity.

Road Condition

According to recent Citizen Surveys, much improvement is needed with street repaving. In the 2013 Citizen Survey, only 26% of residents responded either good or excellent when asked to rate the service street maintenance during the past 12 months. Chart 6 below shows people’s responses to this question in recent years.

Chart 6: Citizen Survey Ratings of Street Maintenance

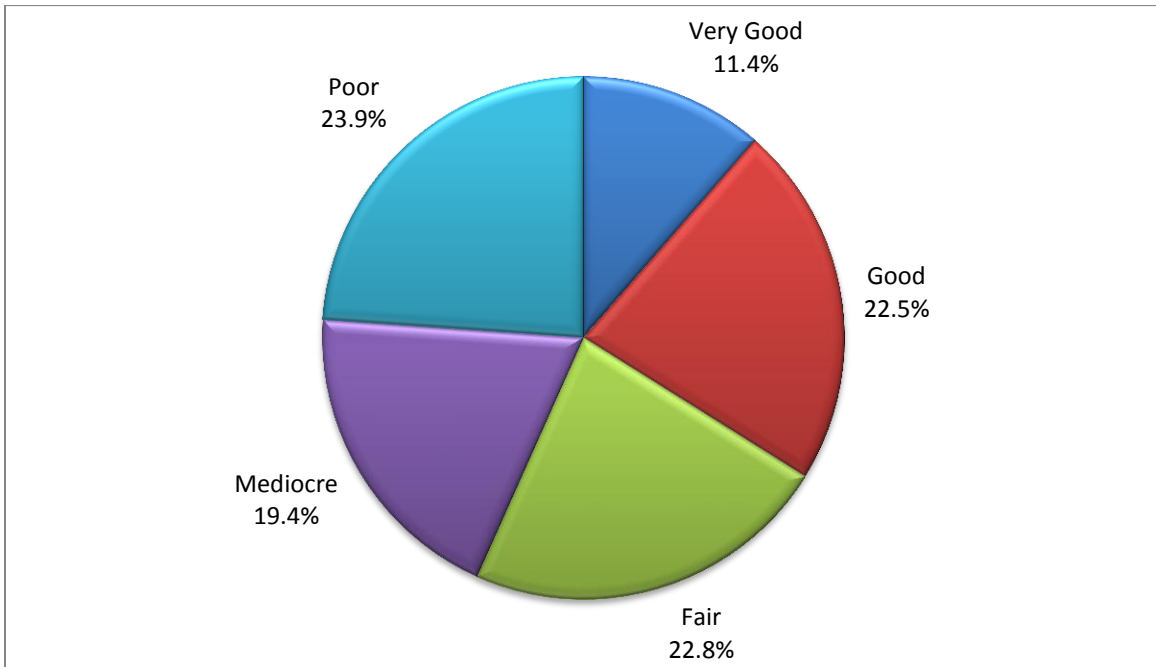


The City itself measures the conditions of the roads. To determine which roads are most in need of repair, the City started in 2008 to conduct a survey of streets and to classify them according to something called a pavement condition index. The first report the City produced on the condition of its roads came out in 2009, though a new report is forthcoming. One can see the executive summary from the 2009 report in Appendix III. As of today the City has received a partial draft report of the updated version. The final report will be arriving later this year.

This index involves scoring each street along a range from 1 to 100, with 100 being the top score. Scores of 90-100 are considered very good, 80 to 90 are good, 70 to 80 are fair, 55 to 70 are mediocre, and less than 55 are poor. Among these scores, excellent, good, and fair are considered acceptable. The other two ranges represent substandard streets.

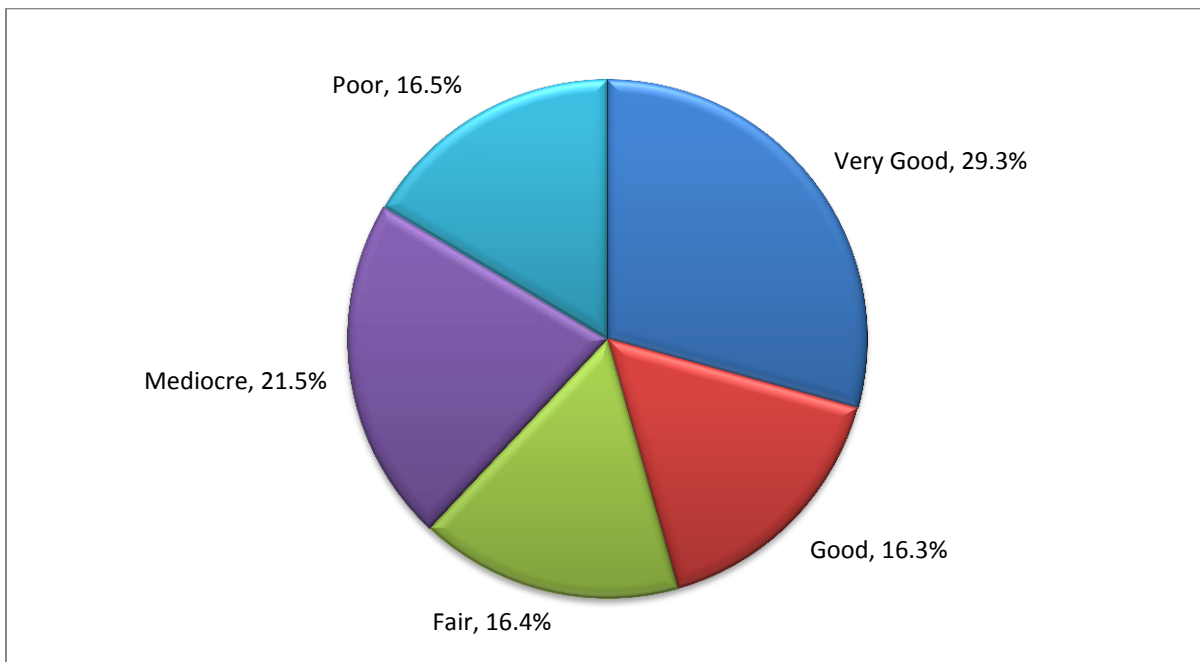
Below in Chart 7 is a breakout of how the city streets scored during the last report in 2009. As one can see from this, over 43% of the city's streets were considered substandard in 2009.

Chart 7: Pavement Condition Index – 2009



The City currently utilizes the assessment of streets from the 2009 report to determine which streets are most in need of repair. According to DOT, the agency will reassess which streets need repair going into the 2014 repaving season using the new report. Below are the condition results from the new report even though the full report is not yet available.

Chart 8: Pavement Condition Index – 2014



FINDINGS

FULL COST ANALYSIS

DOT Reported Costs

Table 6 below shows the costs reported by DOT since 2011 in performing its in-house street repaving. These costs are stated for each year by each of the seven cost categories on which DOT reports. As one can see, the single biggest driver of costs is the materials used for these jobs. Materials tend to make up about 2/3 of total milling and paving costs.

Table 6: Stated Costs for In-House Repaving

	2011	2012	2013
Milling			
Regular Hours	\$389,405	\$297,207	\$327,687
Other Personnel	\$116,822	\$88,620	\$98,306
Overtime	\$308,499	\$227,693	\$259,515
FICA	\$23,600	\$17,238	\$19,853
Meal Money	\$6,905	\$5,060	\$2,950
Equipment	\$102,320	\$74,766	\$302,018
Materials	\$874,759	\$863,040	\$857,643
Totals	\$1,822,310	\$1,573,325	\$1,867,972
Paving			
Regular Hours	\$361,299	\$314,810	\$438,662
Other Personnel	\$108,390	\$94,443	\$131,599
Overtime	\$263,542	\$242,924	\$241,886
FICA	\$20,161	\$18,720	\$18,504
Meal Money	\$8,011	\$7,485	\$5,275
Equipment	\$88,397	\$77,032	\$289,617
Materials	\$3,166,928	\$2,931,610	\$3,202,810
Totals	\$4,016,729	\$3,687,025	\$4,328,353
Total Milling and Paving	\$5,839,039	\$5,260,350	\$6,196,325

This accounting does not cover the full cost of actually performing this operation. In this section, we will identify additional costs that should be accounted for when determining the full cost of the repaving operation. Some of these costs will be direct costs. That is, they are directly related to the amount of repaving being done. Other costs will be classified as indirect. They represent support services that the repaving operation receives. Indirect costs can be classified as “avoidable” or “unavoidable,” depending on the extent to which the costs would still exist if the City were not engaged in street repaving.

Below are two charts that show the three year trend in each of the seven costs areas that DOT has been tracking, first for milling and then for paving. These charts show that the cost of materials comprise on average 50% of the total costs reported by DOT for milling and 79% of the total costs reported for paving.

Chart 9: DOT-Reported Costs of In-house Repaving - Milling

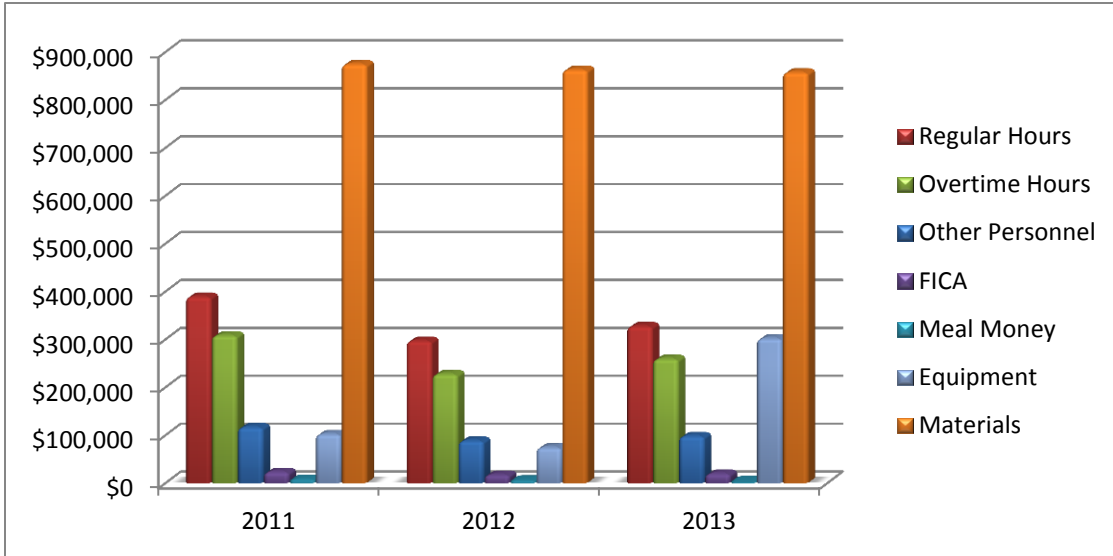


Chart 10: DOT-Reported Costs of In-house Repaving - Paving

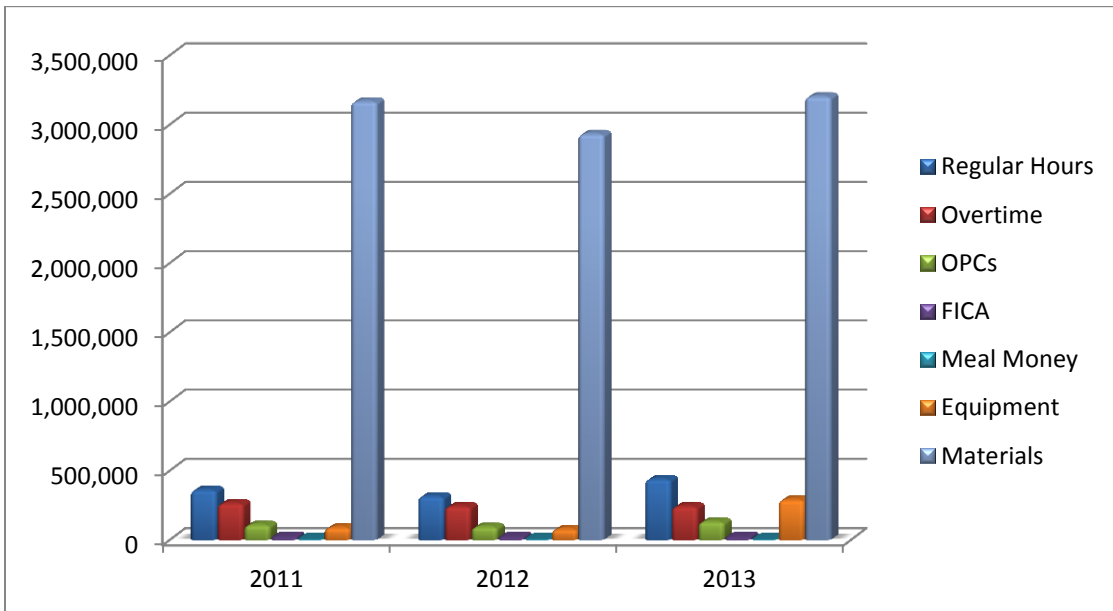


Table 7 below compares the total costs reported by DOT to the total lane miles paved for each of these years and the corresponding cost per lane mile. In developing a full cost model, we will ultimately calculate a more accurate estimate of the cost per lane mile.

Table 7: DOT Reported Cost per Lane Mile

	2011	2012	2013
Total Cost of Milling and Paving	\$5,839,039	\$5,260,350	\$6,196,325
Total Lane Miles	68	74	69
Cost per Lane Mile	\$85,322	\$71,192	\$89,802

Budget and Accounting Structure

Before discussing the other costs that should be accounted for when describing the full costs of in-house street repaving, we should first establish some background regarding the City of Baltimore’s budget and accounting structure. The City budget can be broken down into various sub-categories. Within the Street Management service, which is given the identifying number 683, there are the following activities: Highway Maintenance – Administration, Street Management – Project Development and Engineering, Alleys, Rehabilitation Maintenance and Repairs, Construction Contract Inspection and Testing, Highway Engineering, Facility Support, Night Services, and Transfers. In-house street repaving falls under the activity Rehabilitation Maintenance and Repairs, which is activity number 4.

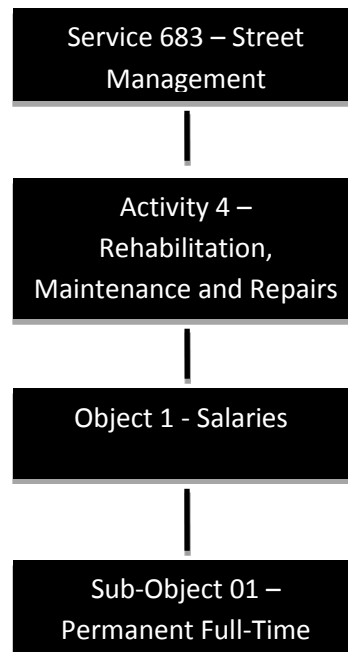
Within each of these activities, costs are further broken down by objects, and then again by sub-objects. The objects the City uses are:

- 0 Transfers
- 1 Salaries
- 2 Other Personnel Costs
- 3 Contractual Services
- 4 Materials and Supplies
- 5 Equipment - \$4,999 or less
- 6 Equipment - \$5,000 and over
- 7 Grants, Subsidies, and Contributions
- 8 Debt Service
- 9 Capital Improvements

For Street Management, objects seven through nine are not used. Among the expenses that DOT tracks for the repaving operation, regular hours and overtime are budgeted as sub-objects in object 1, other personnel costs, FICA, and meal money are sub-objects in object 2, equipment is a sub-object in object 3, and materials is a sub-object of object 4. However, in the budget for Street Management there are numerous costs in these objects that are not accounted for in DOT’s assessment of costs, as well as costs in objects 5 and 6, for which DOT tracks no costs at all. For example, there is no accounting in DOT’s cost assessment for professional services, maintenance and repair of real property, and refuse tipping fees, all of which are in object three. And there is no accounting for things like custodial materials in object four or portable tools and equipment in object five. In the sections that follow we will attempt to account for the costs of these other items that contribute to the completion of the street repaving task.

The figure below provides a representation of the hierarchal organization of the City budget as it applies to the Street Management service.

Figure 3: Budget Hierarchy



Years to Be Analyzed

There are a few items to note regarding the years at which this report is looking. Looking at multiple years is advisable because it minimizes the problem of any one year being an outlier and any conclusions we reach from this one year being misleading.

However, in trying to examine multiple years a significant problem is that in 2011, the organization of services within DOT changed. In-house street repaving is currently housed under service 683, Street Management. Prior to 2011, the activities in this service were split among services 501 Highway Maintenance and 503 Engineering and Construction. But not all activities in these two older services were moved into service 683. Because of the difficulty in ensuring that pre-2011 numbers are comparable with post-2011 numbers, we will be looking at just 2011 through 2013 when developing full costs for the milling and paving operation.

A final note on the years we are examining is that we are looking at calendar years, not fiscal years. This is because each season of repaving goes from approximately March until November, cutting across two fiscal years. When we are discussing financial information in this report, we have taken the average of those particular costs across the two fiscal years over which the paving season overlaps in order to estimate a cost for just the calendar year in question.

Direct Costs

There are numerous costs that are directly attributable to the street repaving process that have not been accounted for in DOT's statement of in-house repaving costs. By not including these costs, DOT has understated what it actually costs to repave streets in the city using the in-house crews. This sub-section will lay out the other direct costs that should be included in a full cost calculation.

Salary Costs not Accounted for by DOT

The regular hours cost for the repaving operation in 2013, or the salary/wage cost, was reported by DOT as \$327,687 for milling and \$438,662 for paving; a total of \$766,349 for the whole operation. This stated cost is for the actual completion of the 149 distinct repaving jobs that were performed that year. That is, this amount represents what DOT reports it spent on salary to carry out all the steps required to mill and repave the 149 street segments that it repaved that year. However, this cost does not include the pay that workers received when they were not directly working on a repaving job.

As established earlier, the repaving season runs from March through November. That means that the repaving teams are operational for a full nine month period. The costs of employing those people should be counted for the entire nine month period, including time that they are not actively engaged in a particular street repaving project. While the teams are assembled and employees are being paid for being on the teams, the cost should be counted. For 2013, the number of people employed at each type of position and their corresponding salaries are stated below.

Table 8: Types of Milling and Paving Crew Members with Salaries - 2013

Position	Number of Employees	Average Salary
<i>Milling</i>		
Highway Maintenance Supervisor	1	\$51,634
Heavy Equipment Operator	4	\$41,977
Motor Vehicle Driver	4	\$31,750
Laborer	6	\$30,091
Laborer Crew Leader	3	\$37,726
Total	18	
<i>Paving Crew 1</i>		
Highway Maintenance Supervisor	1	\$53,017
Heavy Equipment Operator	3	\$41,543
Motor Vehicle Driver	4	\$35,292
Laborer	6	\$29,366
Laborer Crew Leader	1	\$36,026
Utility Aide	1	\$29,627
Total	16	
<i>Paving Crew 2</i>		
Highway Maintenance Supervisor	1	\$50,250

Heavy Equipment Operator	4	\$41,348
Motor Vehicle Driver	4	\$31,508
Laborer	4	\$30,091
Laborer Crew Leader	1	\$32,529
Cement Finisher	1	\$31,341
Total	15	

To calculate how much salary should be counted toward the repaving operation, one first multiplies the number of staff for each position by the average salary of each position. Doing this one gets \$640,260 in total salary for the milling crew and \$1,086,566 for the two paving crews combined. One then needs to multiply these figures by .75, because the milling and paving crews are only constituted for nine months out of the year. Doing this yields \$480,195 in salary for the milling crew and \$814,924 for the paving crews, for a total of \$1,295,119 in total salary for the milling and paving crews through the paving season in 2013.

This cost is greater than the DOT reported cost of \$766,349 by \$528,770. This is an additional cost that should be factored in to the full cost of conducting street repaving. The same calculations can be made for 2011 and 2012. For 2011 and 2012, the total annual salary costs for the milling operation are \$587,423 and \$616,901 respectively. The total costs for the paving operation are \$1,118,362 and \$1,055,228 respectively. The adjusted costs, representing $\frac{3}{4}$ of the annual salary costs, are \$440,567 and \$838,772 in 2011, for a total of \$1,279,339, and \$462,676 and \$791,421 in 2012, for a total of \$1,254,097. These costs are \$528,634 greater than the DOT-stated costs for 2011 and \$642,079 in 2012.

It is possible that this extra salary should not be attributed to the repaving operation. For instance, it would be possible that during the time the crews are not actively engaged in milling and paving they have been assigned to some other task. We have been told by DOT that during the non-paving season crew members are engaged in cutting out tree pits for the Department of Recreation and Parks, as well as other tasks. If they were engaged in similar tasks during the paving season, then these costs should not in fairness be attributed to in-house repaving.

However, according to DOT these crews are not assigned to any other tasks during the paving season. If they are not actively milling or paving, DOT says they are doing things like maintaining equipment, cleaning equipment, hauling debris, or posting no parking signs. As such, the additional salary that has been calculated here should be accounted as an additional cost.

In terms of time, this extra salary represents a significant portion of the paving season. If one divides the additional salary figures by the total salary figures calculated above, one determines that the additional salary represents about 3.7 months of time for 2011, 4.6 months of time for 2012, and 3.7 months for 2013.

However, if one wants to know how much time is really unaccounted for, and therefore how much additional salary to actually count, one must take into consideration the amount of overtime that is done on these jobs. As already established, DOT uses overtime extensively. In addition to the hours the crews spent working for their regular salary, they also spent time working for overtime. DOT reported overtime of \$572,041 in 2011, \$470,617 in 2012, and \$501,401 in 2013.

To translate this overtime pay into the pay that people would have received had they not been working overtime, one can divide these overtime numbers above by 1.5. Doing this one gets \$381,360 for 2011, \$313,745 for 2012, and \$334,267 for 2013. This is the pay these workers would have received for the overtime hours they performed had they been getting paid at their regular rates. In determining how much extra salary to count in addition to the salary reported by DOT, one needs to eliminate these overtime hours because DOT has actually been accounting for these, though at a different rate of pay. One then needs to subtract these figures from the total additional cost figures calculated above. Doing so yields \$147,274 for 2011, \$328,334 for 2012, and \$194,503 for 2013. This is the salary that DOT has not taken into account and that we must take into account here. These figures represent 1.04 months for 2011, 2.36 months for 2012, and 1.35 months for 2013. This is the time that has elapsed during each of the last three paving seasons during which the milling and paving crews have not been working directly on milling and paving projects.

Table 9: Additional Salary Costs

	2011	2012	2013
Total DOT Reported Costs	\$5,839,039	\$5,260,350	\$6,196,325
Additional Costs			
Salary	\$147,274	\$328,334	\$194,503
Total Additional Costs	\$147,274	\$328,334	\$194,503

Other Personnel Costs not accounted for by DOT

Two of the costs provided by DOT for street repaving are regular hours and overtime. In addition to these personnel costs, they account for other personnel costs, or OPCs, and Federal Insurance Contributions Act (FICA) payments. As of the 2014 budget, OPCs for Street Management included the following items:

- FICA – Social Security – City Share
- Medical and Hospital Insurance
- Health Maintenance Organizations
- Meal Allowance
- Prescription Drugs
- Vision Care
- FICA – Medicare Only
- Survivor Benefits
- Dental
- Physical Examination
- Non-Positional 201 – FICA

DOT separately reported the Social Security portion of FICA. The numbers provided by DOT for OPCs for 2013 represent approximately 30% of the regular hours expense they report, while their FICA numbers represent

about 5% of their regular hours expenses, for a total of 35%. However, if one looks at actual expenditures from 2013, it seems as if DOT's reported figures likely underrepresent the amount spent on OPCs. Looking at these numbers for 2013, OPCs minus FICA represented 34% of regular hours expenditures while FICA represented 9% of regular hours expenditures, for a total of 43%. Below we will provide a more accurate accounting of OPCs for the street repaving operation based on the numbers actually budgeted by the agency for the staff performing this task.

Health Care OPCs

For 2013, DOT reported \$229,905 in non-FICA OPCs as well as \$38,357 for FICA expenses, for a total of \$268,262. Looking at the budgeted expenses for the staff assigned to conduct in-house street repaving, one sees that a larger amount of funds have actually gone into OPCs for these crews. According to the position file, the full cost of OPCs including FICA was \$262,989 for the milling crew and \$490,873 for the two paving crews in 2013, for a total of \$753,862. This is \$485,600 greater than what DOT reported in these costs for that year.

The same dynamic exists for 2012. That year, DOT reported total OPC costs as \$183,063. The total costs for OPCs according to the position file were, however, \$716,587. The difference between the position file costs and DOT's reported costs for 2012 is \$497,565. For 2011 the difference is not so great. DOT's reported OPC costs that year were \$225,212, while the costs derived from the position file were \$593,783, for a difference of \$324,810. These additional costs are reflected in Table 10 below.

Employee Retirement

In addition to the costs reported above, DOT has not accounted for retiree health care and pension costs. In Fiscal 2013, the City began budgeting pension costs at the position level. Also, retiree health care costs are not pre-funded by the City, but future benefits are an actuarial cost that should be included in full cost accounting.

With retiree health care, one can calculate a cost that should be assigned to in-house repaving by applying 5.5%, the current percentage used for budgeting purposes, to the total salaries of the milling and repaving crews for the season and then multiplying this again by $\frac{3}{4}$ since we only want the value for the part of the year during which people are conducting repaving. Doing the first calculation yields a cost of \$94,975 and the second calculation yields a final cost of \$71,232 for 2013. Doing the same thing for 2011 and 2012 one gets final costs of \$70,364 and \$68,975 respectively.

Regarding pension costs that should be allocated to this function, the Fiscal 2014 calculation for budgeting purposes has these costs representing 21.5% of regular hours costs. Since the regular hours costs for 2013 have been recalculated as \$1,295,119, the pension costs for that year should be \$278,451. The same calculation can be made for 2011 and 2012, yielding an additional \$275,058 and \$269,631 respectively.

Table 10: Additional OPCs

	2011	2012	2013
Total DOT Reported Costs	\$5,839,039	\$5,260,350	\$6,196,325
Additional Costs			
Salary	\$147,274	\$328,334	\$194,503
Health Care OPCs	\$324,810	\$497,565	\$485,600
Retiree Health	\$70,364	\$68,975	\$71,232
Pensions	\$275,058	\$269,631	\$278,451
Total Additional Costs	\$817,506	\$1,164,505	\$1,029,786

Tipping Fees

After DOT mills streets, it has numerous options for how to handle the removed asphalt. According to DOT, the City reuses approximately 60% of the milled asphalt. Half of this reused asphalt is stored at the 6400 Pulaski Highway yard and is used to cover unimproved alleys and streets, and to cover some roadway shoulders. The other half is used to cover unimproved roads at the City landfill. The milling crew delivers the remaining 40% of asphalt either to the City landfill at Quarantine Road or to Flanigan and Sons, the contractor from which the City obtains its new asphalt.

At each facility DOT must pay a tipping fee. We have uncovered problems regarding the reporting of tipping fees. Using the actuals from Fiscals 2011 through 2013 and the appropriation for Fiscal 2014, we calculated that DOT reported in its tipping fee line under sub-object 397 within the activity Rehabilitation, Maintenance, and Repairs fees of \$1,421,654, \$1,897,100, and \$1,815,363 for calendar years 2011 through 2013.

However, we have determined that some of the tipping fees in the DOT report are for work that should be charged to the Department of Public Works (DPW). We have done this by looking at the vehicle numbers on the vehicles dropping off refuse. In Fiscal 2013, there were \$257,220 in tipping fee charges that should have gone to DPW, not DOT. This represents 14% of the charges being reported that year. If we subtract 14% from the fees we have calculated for calendars years 2011, 2012, and 2013, we get new totals of \$1,220,219, \$1,628,298, and \$1,558,143 in tipping fees for those calendar years.

In addition, according to DOT the tipping fees being reported in Rehabilitation, Maintenance, and Repairs are not all from in-house milling. Only about 90% of the charges here are for the in-house operation. So further revising these figures we get \$1,098,197, \$1,465,468, and \$1,402,328 for calendar years 2011 through 2013.

An additional problem comes from the fact that for calendar year 2013 we have added up all the tickets that DOT assembled for the tipping fees it incurred. This total is \$655,432, which is \$746,897 below, or 47% of the total derived above. Either DOT has misinformed us and less than 90% of the total reported above for the year should be counted toward the in-house operation, or we do not have all the tickets for milled asphalt deposits. We are going to assume that the reported figures are correct. But we do so with the caveat that we are not

completely sure of this given what we have found with the tipping tickets. The tipping fees we are assuming for 2011 through 2013 can be seen in Table 11 below.

Table 11: Tipping Fees

	2011	2012	2013
Total DOT Reported Costs	\$5,839,039	\$5,260,350	\$6,196,325
Additional Costs			
Salary	\$147,274	\$328,334	\$194,503
OPCs	\$670,231	\$836,171	\$835,282
Tipping Fees	\$1,098,197	\$1,465,468	\$1,402,328
Total Additional Costs	\$1,915,702	\$2,629,973	\$2,432,023

Other Direct Agency Costs

As established earlier in this report, the City budgets its expenditures not only by service, like Street Management, but also by activities within services, such as Rehabilitation Maintenance and Repairs. Within each activity, the City further breaks costs down by objects and sub-objects.

There are numerous costs that should be counted as contributing toward providing the street repaving service in Object 3 (contractual services), Object 4 (materials and supplies), and Object 5 (equipment - \$4,999 or less) that DOT does not account for at all. These include:

- ❖ Municipal telephone exchange
- ❖ Gas/electric/steam
- ❖ Other professional services
- ❖ Sewer and water charges
- ❖ Rental of business machines
- ❖ Custodial materials

To determine how much of the costs in these objects to allocate to in-house repaving, we have employed the full time equivalent (FTE) method, which compares the number of FTEs performing the program we are looking at to the number of FTEs within the activity as a whole, and applying that percentage to the costs for which DOT has not already accounted.

The number of FTEs performing street repaving was 49 in 2013, 20.9% of total Rehabilitation Maintenance and Repairs staff that year. The cost of these currently unaccounted for items within Rehabilitation, Maintenance, and Repairs activity for the 2013 repaving season was \$1,454,445. Applying this 20.9% figure to that total cost yields a cost of \$304,563 that should be allocated to repaving in 2013. Using the same method for 2011 and 2012 generates additional costs of \$244,117 and \$303,296 respectively.

Table 12: Other Agency Direct Costs

	2011	2012	2013
Total DOT Reported Costs	\$5,839,039	\$5,260,350	\$6,196,325
Additional Costs			
Salary	\$147,274	\$328,334	\$194,503
OPCs	\$670,231	\$836,171	\$835,282
Tipping Fees	\$1,098,197	\$1,465,468	\$1,402,328
Other Direct Agency Costs	\$244,117	\$303,296	\$304,563
Total	\$2,159,819	\$2,933,269	\$2,736,676

Table 12 above shows the total direct costs of the street repaving operation that are not currently accounted for as part of this operation by DOT. The cost reported by DOT for milling and paving operations in 2013 was \$6,196,325. These new costs represent a 44% increase in the overall costs of the operation over what DOT has stated the costs to be. This represents a more accurate picture of the full costs of in-house street repaving.

However, there is another category of costs that should also be taken into account when determining the full cost of repaving. These are indirect costs, and these will be discussed below.

Internal Indirect Costs

The in-house repaving operation benefits from administrative support from DOT in two ways. This service receives support from the administration within the Street Management service. It also receives support from the DOT Director's Office. Here we will break down the portion of those two administrative offices that should be considered part of the cost of conducting in-house street repaving.

There are two commonly used methods that could be chosen for deciding how much of the administrative expenses from these two offices should be allocated to the street repaving operation. One method would involve comparing the overall stated budget for repaving to the overall budgets of Street Management and DOT as a whole, minus the administration costs of those two entities. The other method would involve comparing the number of full time equivalents (FTEs) of the repaving operation to the full time equivalents of Street Management as a whole and DOT as a whole, not including administrative staff. Typically when determining the amount of administrative expenses to be counted toward a service, the full time equivalent method is used. This method will be used here.

The first step in the process of determining how much administrative cost to apply to the in-house repaving is to determine how much of the DOT Director's Office Administration should be charged to Street Management, within which in-house repaving resides. To do that, one must first look at the number of FTEs in Street Management in relation to DOT as a whole. Below is a table showing the number of positions within each service offered by DOT in Fiscal 2014.

Table 13: DOT Full Time Equivalents by Service – Fiscal Year 2014

Agency	Srv	Service	# of FTEs
Transportation	500	Street and Park Lighting	42
	548	Conduits	63
	681	Administration	63
	682	Parking Management	0
	683	Street Management	390
	684	Traffic Management	133
	685	Special Events Support	11
	687	Inner Harbor Services	12
	689	Vehicle Impounding and Disposal	58
	690	Complete Streets and Sustainable Transportation	23
	691	Public Rights-of-Way Landscape Management	20
	692	Bridge and Culvert Management	44
	693	Parking Enforcement	116
	694	Survey Control	17
	695	Dock Master	4
	696	Street Cuts Management	9
	697	Traffic Safety	423
Total			1,428

Next we determine the percent of staff in this service compared to other services, excluding administration.

Table 14: DOT Full Time Equivalents by Service – Percent of Total – Fiscal Year 2014

Agency	Srv	Service	# of FTEs	% Allocation
Transportation	500	Street and Park Lighting	42	3.08%
	548	Conduits	63	4.62%
	682	Parking Management	0	0.00%
	683	Street Management	390	28.57%
	684	Traffic Management	133	9.74%
	685	Special Events Support	11	.81%
	687	Inner Harbor Services	12	.88%
	689	Vehicle Impounding and Disposal	58	4.25%
	690	Complete Streets and Sustainable Transportation	23	1.68%
	691	Public Rights-of-Way Landscape Management	20	1.47%
	692	Bridge and Culvert Management	44	3.22%
	693	Parking Enforcement	116	8.50%
	694	Survey Control	17	1.25%
	695	Dock Master	4	.29%
	696	Street Cuts Management	9	.66%
		697	Traffic Safety	423
Total			1,365	100.00%

As can be seen from this table, 28.57% of the costs of administration for DOT as a whole, minus DOT Administration, are allocable to Street Management in Fiscal 2014. For calendar year 2013 we have calculated this as 28.81%.

The next step is to calculate the percentage of Street Management devoted to in-house repaving. There were 49 staff on the milling and paving teams in calendar year 2013. Though for Fiscal 2014 there were 390 FTEs devoted to Street Management, we have calculated that for calendar year 2013 there were 398, and there were 368 excluding the Street Management Administration staff. That means the milling and paving staff represented 13.33% of the Street Management total.

Since 28.81% of all non-administrative DOT staff fall within the service Street Management, and 13.33% of non-administrative staff within Street Management are involved with in-house street repaving, one should assign 3.84% ($28.81\% * 13.33\% = 3.84\%$) of DOT administration costs to in-house repaving. Since the average budget for DOT Administration in calendar year 2013 was \$9,390,569, then one should assign \$360,783 in DOT administrative costs to in-house repaving for 2013. Applying this same calculation to total DOT administrative costs for 2011 and 2012, one would derive an additional cost of \$300,481 and \$309,054 to add to the original stated costs of repaving.

Table 15: DOT Administration

	2011	2012	2013
<i>Indirect Costs</i>			
DOT Administration	\$300,481	\$309,054	\$360,783

Next, one needs to account for the administrative support within Street Management that contributes to the functioning of in-house repaving. In 2013 the percentage of FTEs within Street Management, excluding administration, who were working within in-house repaving was 13.33%. Since DOT expended an average of \$3,545,372 on administration within Street Management in calendar year 2013, we can assign \$472,716 of the Street Management administrative costs to in-house street repaving. Utilizing the same methodology yields \$411,660 for calendar year 2011 and \$416,160 in 2012. These costs have been added to the table below.

Table 16: DOT and Street Management Administration

	2011	2012	2013
<i>Indirect Costs</i>			
DOT			
Administration	\$300,481	\$309,054	\$360,783
Street Management			
Administration	\$411,660	\$416,160	\$472,716
Total	\$712,141	\$725,214	\$833,499

External Indirect Costs

In addition to the support that street repaving receives from within DOT, it also receives support from City agencies outside of DOT. For example, when new employees need to be hired to fill the milling and paving crews, or when members of those crews receive disciplinary action, those are not tasks handled only by DOT staff. The Department of Human Resources (HR) also provides assistance. Some costs therefore need to be captured for HR’s efforts.

Similarly, DOT does not put together its annual budget on its own or handle payment of its employees. These are both functions handled by the City’s Department of Finance. Some Finance costs should likewise be assigned to the street repaving operation. In this section we will account for these additional costs.

One should note that most of the external indirect costs cited below are unavoidable. That is, the City is going to continue incurring those costs whether or not it does in-house street repaving. If in-house street repaving were no longer performed, the Law Department, the Department of Human Resources, and the others would probably not experience workload reductions large enough to justify abolishing positions. That said, it is appropriate to allocate these costs to the services they support. OMB Circular A-87 allows such costs to be charged in federal grants.

When determining what costs to assign we have usually used the same method used to assign costs from DOT administration. When we have used a different method we have noted this fact.

Department of Human Resources

The Department of Human Resources handles personnel actions on behalf of all City agencies. To determine how much of the HR budget to assign to the activity of street resurfacing, one must first determine what percentage of the overall City staff the DOT staff represents. In calendar year 2013, the average total staff for the City was 14,661, while the total DOT staff was 1,441. The DOT staff represented 9.83% of the total City staff.

In-house street repaving utilized 49 staff in 2013. This represented 3.4% of the overall DOT staff that year. In order to determine how much of HR’s expenses to assign to street repaving, one must multiply the two percentages above ($9.83\% * 3.4\% = .33\%$), and then apply that percentage to the total budget for HR. Since

HR's average budget in 2013 was \$7,391,754, the total costs to assign to street repaving are \$24,705. One can repeat this same exercise for 2011 and 2012. The results of this are shown in Table 17 below.

Table 17: Department of Human Resources Costs

	2011	2012	2013
Total HR Costs	\$6,875,280	\$7,192,601	\$7,391,754
% of Costs to Apply to HR	.33%	.33%	.33%
HR Costs to Apply	\$22,506	\$23,584	\$24,705

Department of Finance

The Department of Finance handles numerous issues for the street repaving team. Without this assistance the repaving operation could not function. Finance puts together DOT's annual budget. The department handles payroll for DOT. Also, purchases of supplies are handled by this department. As such, some portion of Finance's expenditures should be allocated to street repaving.

As was the case with HR above, one multiplies the percent of the overall City staff represented by DOT (9.83%) by the percent of DOT's staff represented by street repaving (3.4%), or .33%. One then multiplies that by the total budget for the Department of Finance for the year to get the amount of expense that should be added to the repaving cost. One can see in the table below these calculations for 2011 through 2013.

Table 18: Department of Finance Costs

	2011	2012	2013
Total Finance Costs	\$27,321,341	\$30,618,311	\$33,882,203
% of Costs to Apply to Finance	.33%	.33%	.33%
Finance Costs to Apply	\$89,436	\$100,395	\$113,241

Law

The Law Department is available to provide legal advice to agencies when they are in need of this. The department can help them handle any type of legal issue that might arise in their operations. In the case of in-house street repaving, having the law department available could be helpful when dealing with things like contracts for supplies, or possibly with labor issues. Applying the methodology above to the law department yields additional costs of around \$30,000 for each year 2011 through 2013. These costs should be factored into the true cost of the in-house repaving operation.

Table 19: Department of Law Costs

	2011	2012	
Total Law Costs	\$8,748,572	\$9,559,200	\$10,557,342
% of Costs to Apply to Law	.33%	.33%	.33%
Law Costs to Apply	\$28,638	\$31,344	\$35,285

Citistat

The Mayoralty-Related Office of Citistat is a small analytical group charged with improving the performance of certain City agencies. It conducts reviews of each agency under its charge every four weeks. Not every agency in the City has its programs analyzed by Citistat. However, DOT is one of the agencies that Citistat examines, as well as Police, Fire, Department of Public Works, Health, Recreation and Parks, General Services, and Housing. Citistat tracks performance data of many DOT services, including street repaving. Since Citistat devotes some of its resources to figuring out ways to improve the performance of the street repaving operation, some Citistat costs should be allocated to this operation.

Relative to the budgets of other agencies being examined in this section, Citistat's budget is small. Between 2011 and 2013, the City has spent between about \$550,000 and \$950,000 on this agency, and it has had only between 9 and 11 staff.

To determine how much of Citistat's budget to allocate to in-house repaving, we have looked at the total in-house repaving budget relative to the total budgets of the rest of DOT and the other agencies that Citistat examines. The in-house paving budget constitutes just over .5% of the total budgets of all these agencies. Applying this percentage to Citistat's budget, one determines the appropriate allocation is just over \$5,000 in 2013 and somewhat smaller amounts for the four years prior. The results can be seen in the table below.

Table 20: Citistat Costs

	2011	2012	2013
Total Citistat Costs	\$579,388	\$782,052	\$948,890
% of Costs to Apply to Citistat	.58%	.57%	.57%
Citistat Costs to Apply	\$3,386	\$4,459	\$5,455

MOIT

The Mayor's Office of Information Technology (MOIT) provides technical support to all City agencies. Agencies would not be able to fulfill their duties without the assistance provided by this office. DOT, and more specifically, the street repaving operation, benefit from the assistance provide by this office. MOIT's support is not currently accounted for in DOT's stated costs for this service, and it should be.

In determining how much MOIT cost to charge to in-house repaving, we needed to consider how dependent this task is on information technology. Relative to other tasks, in-house repaving is not very dependent on IT. It does use IT services, but not nearly as much as other City activities.

As a result, we have first calculated a cost allocation the same way we have with other support offices, but we have then modified this calculation to account for how much less dependent in-house repaving is on IT. The total costs for MOIT in calendar year 2013 were \$35,305,142. Applying the percentage of the overall staff taken up by street repaving, .33%, to this MOIT cost yields a cost of \$117,997 that should be allocated to this operation. However given what we said above, we have reduced this estimate by 50%. The resulting numbers for 2011 through 2013 are below.

Table 21: Mayor’s Office of Information Technology Costs

	2011	2012	2013
Total MOIT Costs	\$14,142,188	\$23,791,599	\$35,305,142
% of Costs to Apply to MOIT	.16%	.16%	.16%
MOIT Costs to Apply	\$23,147	\$39,005	\$58,998

Total Direct and Indirect Costs

Now that we have determined the additional direct costs that should be applied to the internal street repaving function, as well as the relevant indirect costs that contribute to this function, we can combine the two to get the full cost for in-house street repaving. Below is a table showing the additional costs that really need to be accounted for with in-house repaving for which DOT does not currently account.

Table 22: Total Additional Costs

	2011	2012	2013
<i>Additional Direct Costs</i>			
Salary	\$147,274	\$328,334	\$194,503
Other Personnel Costs	\$670,231	\$836,717	\$835,282
Tipping Fees	\$1,098,197	\$1,465,468	\$1,402,328
Other Direct Agency Costs	\$244,117	\$303,296	\$304,563
Subtotal	\$2,159,819	\$2,933,269	\$2,736,676
<i>Indirect Costs</i>			
DOT Administrative Costs	\$712,141	\$725,214	\$833,499
HR	\$22,506	\$23,584	\$24,705
Finance	\$89,436	\$100,395	\$113,241
Law	\$28,638	\$31,344	\$35,285
Citistat	\$3,386	\$4,459	\$5,455

MOIT	\$23,147	\$39,005	\$58,998
Subtotal	\$879,255	\$923,999	\$1,071,183
Total	\$3,039,074	\$3,857,268	\$3,807,859

As a check on the indirect cost portion of this calculation, the federal Office of Management and Budget assists localities in determining how much they can charge the federal government for administering federal programs. It does this through its OMB Circular A-87.

The City of Baltimore conducted a cost allocation plan for fiscal year 2012 using the Circular A-87. Through this exercise the City determined, using the total operating cost base method, that an appropriate percentage of funds that could be charged for external indirect support was 9.3%. Using an alternative salary/wage based method, the City determined an appropriate percentage was 19.12%. The indirect costs above represent 10.95%, 11.12%, and 11.68% for 2011, 2012, and 2013 respectively. These figures are within the range established by the 2012 OMB exercise.

Now that we have determined all the additional costs that should go into determining the cost of in-house milling and paving, we can combine these additional costs with the costs already reported by DOT to determine the total costs of the milling and paving for 2011 through 2013.

Before we do this, however, we need to acknowledge an issue that appeared as we were conducting our investigation. In working with DOT to determine what constituted the materials costs for the milling operation, we realized that most of what the agency had reported as materials costs for this part of the operation was wrong. According to DOT, the only material that it purchases to assist with milling is replacement milling teeth. The spreadsheet from which DOT has been generating reported amounts of materials for milling has not had anything to do with milling teeth. It appears to have been calculated with no relationship to what has actually been expended on materials. As such, our conclusion is that the amounts that DOT has been reporting for milling materials are inaccurate.

In examining the CitiBuy system, we have been able to identify what we believe are the true milling materials costs by looking at the charges over the past three years for milling teeth. These recalculated costs, as well as the costs reported by DOT, can be seen in Table 23 below.

Table 23: Actual Milling Materials Costs

	2011	2012	2013
DOT Reported Materials			
Cost	\$874,759	\$863,040	\$857,643
Recalculated Materials			
Cost	\$29,920	\$53,050	\$23,750
Difference	\$844,839	\$809,990	\$833,893
New Total DOT Reported			
Cost	\$4,994,199	\$4,450,360	\$5,362,432

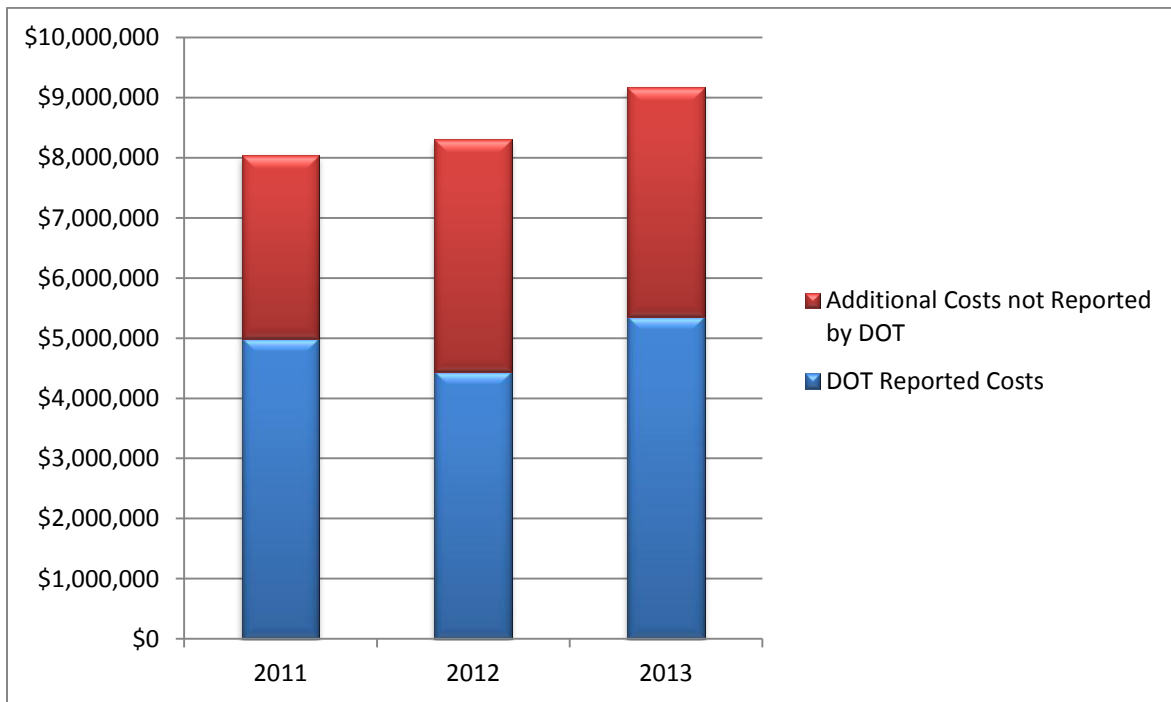
In Table 24 below one can now see what we estimate to be the total costs of the in-house repaving operation.

Table 24: DOT Reported Costs plus Additional Costs

	2011	2012	2013
DOT Reported Costs	\$4,994,199	\$4,450,360	\$5,362,432
Additional Costs	\$3,039,073	\$3,857,270	\$3,807,860
Total Costs	\$8,033,273	\$8,307,269	\$9,170,292

Chart 11 below shows these numbers in graphic form.

Chart 11: DOT-Reported Costs and Additional Costs



Now we need to translate these additional costs into a more accurate measure of the cost per lane mile of performing this service, since cost per lane mile is the key efficiency measure for this service. Table 25 below shows the total cost and cost per lane mile reported by DOT versus the recalculated total cost and cost per lane mile following the exercise above.

Table 25: New Cost per Lane Mile

	2011	2012	2013
Original DOT Reported Costs			
Total Costs	\$5,839,039	\$5,260,350	\$6,196,325
Lane Miles	68	74	69
Cost per Lane Mile	\$85,322	\$71,192	\$89,802
Recalculated Costs			
Total Costs	\$8,033,273	\$8,307,269	\$9,170,292
Lane Miles	68	74	69
Cost per Lane Mile	\$117,384	\$112,433	\$132,903

ACTIVITY BASED COSTING

We have established that the full cost of providing in-house street repaving is considerably higher than the cost reported by DOT. This is important because the costs that DOT reports for this service, in the form of cost per lane mile paved, is used in the City's annual budget documents as an indicator of the service's efficiency. It is important that if this cost is being used as a performance measure that it be as accurate as possible. In the most recent budget documents for Fiscal 2014, the goal was a cost of \$85,000 per lane mile, based on the costs that DOT had been reporting. As can be seen from the full cost accounting above, this \$85,000 figure does not reflect reality. Going forward a more accurate figure, using the methodology outlined in this report, should be used.

There is an additional analysis that can be done to further understand the costs of the repaving task. The preceding analysis has provided the full cost of the operation as a whole. It has shown the items on which DOT expends resources but that it has so far not counted as expenditures. Activity Based Costing (ABC) analysis examines the cost of each distinct step in the overall process of street milling and paving. It is helpful to understand the cost of these individual steps because doing so helps to identify ways to improve the efficiency of street resurfacing.

The Government Finance Officers Association has provided some helpful definitions of ABC. One definition states that ABC is a "methodology for relating actual costs to services provided." Another states that "Activity Based Costing is a means of creating a system that ultimately directs an organization's costs to the products and services that require those costs to be incurred." At root, activity based costing is a method by which an organization can attempt to determine what really drives its overall costs. By looking at the costs of individual steps in a process one can determine which steps are the primary cost drivers.

Below we discuss the results of our activity based costing analysis. This is organized around first the milling operation and then the paving operation. We will highlight the parts of both processes that appear to be the

least and the most expensive. By doing this we will point to some areas in which we believe some efficiency gains might be realized.

Milling

Costs per Step

In order to conduct the activity based costing, we have first split the overall operation into its two main components: milling and paving. Within each of these, we have identified the steps that contribute to the overall component. Below is a breakdown of the steps performed by the milling team. The average individual job performed by these teams has covered .47 of a lane mile between 2011 and 2013, and takes approximately a day and a half to mill on average. We have estimated here the staff we think is involved in each step based on what we have learned from DOT.

1. Evaluate roadway with staff from DOT Maintenance and DOT Engineering and Construction Divisions. These staff determine whether the roadway should be resurfaced by a contractor or in-house crews. A General Superintendent and an Engineer Associate III perform this step.
2. Place no parking notices 72 hours in advance. The Highway Maintenance Supervisor is involved in this step, and is involved in every other step in the milling process. One Motor Vehicle Driver, one Laborer Crew Leader, and one Laborer also perform this step.
3. Transport equipment to worksite. All 18 staff of the milling team are involved in this step.
4. Set up worksite for milling. One Motor Vehicle Driver, one Laborer Crew Leader, and two Laborers perform this step.
5. Mill the street with a milling machine, depositing most of the milled asphalt directly into a dump truck via a conveyor belt. Three Heavy Equipment Operators do this.
6. Remove remaining piles of asphalt with skid steer loader. One Heavy Equipment Operator, one Laborer Crew Leader, and three Laborers do this.
7. Sweep street for any remaining milled asphalt. One Heavy Equipment Operator performs this step.
8. Do touch up milling around obstructions like man hole covers. One Motor Vehicle Driver, one Laborer Crew Leader, and three Laborers are engaged in this step.
9. Transport milled asphalt to drop off site. Four Motor Vehicle Drivers perform this step. Not all of the stripped asphalt is disposed of in the same way. About 60% of the asphalt removed from city streets is recycled. Half of this is stored at the 6400 Pulaski Highway Yard and is used to cover unimproved alleys and streets, as well as some roadway shoulders. The other half of this is used at the City landfill to cover unimproved roads there. The remaining 40% of milled asphalt is brought to either Flanigan and Sons or the City landfill. We estimate that in 2013 the City spent \$1,402,328 in total tipping fees.
10. Dismantle Worksite. One Motor Vehicle Driver, one Laborer Crew Leader, and two Laborers do this.
11. Return equipment to yard located at 2601 Falls Road Yard in Sector 2. All 18 members of the milling team perform this task.

In order to allocate costs to each of these steps, we have started by establishing, with DOT's assistance, what percentage of the total time on the job is spent at each step. For the personnel related items (regular salary, OPCs, overtime, and FICA) we then provided a weight for how much of the step was performed by each

different type of staff person. We did this to account for the fact that people with different salary levels are involved to different degrees at each step. We wanted to make sure that those steps involving on average the higher paid employees display higher salary and other personnel-related costs. We then applied these weighted percentages for each activity to each of the costs that DOT had reported.

Table 26 below shows the break out of DOT reported costs by each step and type of cost for 2013.

Table 26: DOT Stated Costs by Step (Milling) – 2013

	<i>% Total Time Spent on Sub-Step</i>	DOT Reported Amounts							<i>Totals</i>
		<i>Regular Hours</i>	<i>Overtime</i>	<i>OPCs</i>	<i>FICA</i>	<i>Meals</i>	<i>Materials</i>	<i>Equipment</i>	
1. Evaluate Roadway	3%	\$10,375	\$8,217	\$3,113	\$629	\$0	\$0	\$0	\$22,333
2. No Parking Notices	4%	\$13,646	\$10,807	\$4,094	\$827	\$121	\$0	\$9,258	\$38,752
3. Transport Equipment	3%	\$10,375	\$8,217	\$3,113	\$629	\$96	\$0	\$29,626	\$52,056
4. Set up Work Site	3%	\$10,375	\$8,217	\$3,113	\$629	\$96	\$0	\$4,938	\$27,367
5. Mill Street	51%	\$166,005	\$131,469	\$49,801	\$10,057	\$1,543	\$23,750	\$158,004	\$540,630
6. Remove Asphalt Remnants	9%	\$31,126	\$24,651	\$9,338	\$1,886	\$289	\$0	\$22,219	\$89,509
7. Street Sweeping	8%	\$25,938	\$20,542	\$7,781	\$1,571	\$241	\$0	\$18,516	\$74,591
8. Touch Up	8%	\$25,938	\$20,542	\$7,781	\$1,571	\$241	\$0	\$0	\$56,074
9. Transport Milled Asphalt	2%	\$6,052	\$4,793	\$1,816	\$367	\$56	\$0	\$11,521	\$24,605
10. Dismantle Work Site	6%	\$18,157	\$11,387	\$4,314	\$1,100	\$169	\$0	\$18,310	\$53,436
11. Return Equipment to Yard	3%	\$10,375	\$8,217	\$3,113	\$629	\$96	\$0	\$29,626	\$52,056
Totals	100%	\$328,363	\$257,059	\$97,376	\$19,894	\$2,950	\$23,750	\$302,018	\$1,031,409

After examining the break out of costs for DOT reported items, we then allocated the other direct costs that were derived in the preceding section to each step. For the direct costs we calculated in the preceding section, we allocated the costs to each step based just on the percentage of time spent on each of the steps. There were some exceptions to this, such as the fact that we allocated the full tipping fee cost only to step number nine, transport milled asphalt.

We did not include indirect costs in this calculation because, as was previously established, the indirect costs are mostly unavoidable. As such, the indirect and unavoidable costs are not as critical to our understanding of which steps are the most expensive as the direct costs are, and they have been omitted from the tables below. Table 27 below itemizes the costs for each milling step from 2011 through 2013.

Table 27: Cost per Step for Milling – 2011 through 2013

Step	Cost per Sub-Step		
	2011	2012	2013
1. Evaluate roadway	\$38,119	\$37,117	\$37,998
2. No Parking notices	\$52,990	\$50,184	\$55,881
3. Transport equipment	\$48,381	\$44,587	\$67,720
4. Set up work site	\$40,017	\$38,500	\$43,032
5. Milling street	\$696,962	\$688,526	\$791,264
6. Skid steer loader	\$122,561	\$117,326	\$136,502
7. Street sweeping	\$102,134	\$97,771	\$113,752
8. Touch up	\$95,861	\$93,206	\$95,236
9. Transport milled asphalt	\$1,124,468	\$1,490,057	\$1,436,071
10. Dismantle work site	\$72,958	\$66,266	\$80,849
11. Return equipment to yard	\$48,381	\$44,587	\$67,720
Total	\$2,430,099	\$2,751,134	\$2,909,765

Step Details

There are numerous factors that help determine how much an individual step costs. These factors include the number of staff involved in each step, how long the step takes, the level of pay for the people involved in the step, and the materials and equipment used in each step. What follows is an explanation of each step and its associated costs for calendar year 2013.

- **Step 1 – Evaluating Roadway:** We estimate that step one, evaluating the roadway, costs \$255 per job because it involves only two staff. These staff are actually not part of the milling team, but consist of a General Superintendent and an Engineering Associate III. According to DOT, this step takes on average an hour to complete for each project. As such, it is the least expensive step in the milling process.
- **Step 2 – No Parking Notices:** DOT estimates this step takes very little time to complete with each job – a half an hour per job. In addition, DOT says there are only four staff involved in this task: the Highway Maintenance Supervisor, one Motor Vehicle Driver, one Laborer, and one Laborer Crew Leader. For these reasons, we estimate setting up the no parking notices costs \$375 per job.

- **Step 3 – Transporting Equipment:** Transporting equipment to the site is more expensive than the first two steps. We estimate it costs \$454 per job. DOT estimates that on average it takes an hour to get everything to the site, though of course this would vary in individual cases based on the site’s distance from the Falls Road maintenance yard. But it does involve all the staff within the milling team, which results in higher cost.
- **Step 4 – Setting up Work Site:** Setting up the work site takes a half hour on average according to DOT. It involves the Highway Maintenance Supervisor, a Motor Vehicle Driver, two Laborers, and one Laborer Crew Leader. Since the Laborers and the Laborer Leader are the lowest paid members of the milling team, this step costs less than most of the other steps. Our estimate is that it costs \$289 per job.
- **Step 5 – Milling Street:** Milling the street with a milling machine is the second costliest step of the entire operation. This step involves removing the top two or three inches of asphalt from an existing roadway. We estimate that this step currently costs \$5,310 per job. There are only four people involved in this step according to DOT, though they are among the higher paid members of the crew. The staff for this step consists of the Highway Maintenance Supervisor and three Heavy Equipment Operators. This step is so expensive partly because of how long it takes. According to DOT, half of the time it takes for the full milling operation is taken up by this step. The costliness of this step suggests that it is definitely an area that should be examined for potential savings. We do this in a subsequent section of this report.
- **Step 6 – Skid Steer Loader:** This step involves removing milled asphalt that has not been removed by the dump truck attached to the milling machine with a skid steer loader. This step involves the Highway Maintenance Supervisor, a Heavy Equipment Operator, three Laborers, and one Laborer Crew Leader. Also, DOT estimates this step takes two hours on average to complete per job. We estimate that this step costs \$916 per job.
- **Step 7 – Street Sweeping:** We estimate the seventh step, in which a street sweeper is used to clean up any remaining asphalt that has been missed by both the milling machine and the skid steer loader, to cost \$763 per job. It involves the Highway Maintenance Supervisor and a Heavy Equipment Operator, and takes two hours per job.
- **Step 8 – Touch Up:** This step involves just the Highway Maintenance Supervisor, one Motor Vehicle Driver, three Laborers, and one Laborer Crew Leader. It involves people making sure the asphalt around obstructions like manhole covers has been removed. Since this step only takes two hours on average per job and involves few mostly lower paid staff, it represents a relatively inexpensive part of the process. We estimate it costs \$639 per job.
- **Step 9 – Transporting Milled Asphalt:** Step nine is the most expensive step we have identified with the in-house milling process. We estimate it costs \$9,638 per job. The step involves the Highway Maintenance Supervisor and all four Motor Vehicle Drivers.
 - This step is expensive because we have assigned the full cost of tipping fees to this step. As discussed, over 60% of the milled asphalt is recycled for other use within the city, and 40% is disposed of at either the City landfill or Flanigan and Sons. The fee for dropping off this material is \$60 per ton at the City landfill and \$2.50 per ton at Flanigan’s.
 - Table 28 below shows the annual tipping fee costs based on the tipping tickets we received from DOT. The totals here do not match the totals mentioned above that we derived from the

general ledger. Tipping represents a significant cost of the street repaving process for which DOT has up to now not accounted. Given how expensive this step is, tipping fees is an area that DOT should look at for potential cost savings.

Table 28: Tipping Fees and Tonnage – 2013

Facility	Cost per Ton	Tonnage Dropped off	Total Tipping Fees
Flanigan's	\$2.50	7,502	\$18,755
City Landfill	\$60	10,611	\$636,677
Total		18,113	\$655,432

- **Step 10 – Dismantling Work Site:** Dismantling the work site takes one half hour according to DOT and involves the Highway Maintenance Supervisor, one Motor Vehicle Driver, two Laborers, and one Laborer Crew Leader. As such, this step is one of the least expensive steps of the entire milling process. We estimate it costs \$543 per job. In order to reduce the costs of this step and step four, setting up the work site, the in-house repaving operation tries to work at the same time on various separate street projects that are contiguous. During a site visit we conducted during October 2013, we saw that the in-house crews were working simultaneously on three different contiguous streets.
- **Step 11 – Returning Equipment to Yard:** This step, returning equipment to the yard, is costly because, even though it takes only an hour according to DOT, it involves the entire milling team. We estimate it costs \$454 per job.

Paving

Costs per Step

Below is a breakdown of the tasks performed by the paving team. The average individual job performed by the paving teams has covered .47 of a lane mile between 2011 and 2013 and takes approximately a day and a half to pave on average. We have estimated here the staff we think is involved in each step based on what we have learned from DOT.

1. Transport equipment to worksite. All 15 or 16 members of the paving team engage in this activity. As with the milling team, the Highway Maintenance Supervisor is involved with each step.
2. Transport Hot Mix Asphalt to the site. All four Motor Vehicle Drivers perform this task.
3. Block off street for repaving operation. One Motor Vehicle Driver, one Laborer Crew Leader, and one Laborer do this.
4. Mark off roadway lines with white paint for guidance/appropriate lane width. One Laborer Crew Leader and two Laborers perform this task.
5. Apply copolymer to roadway using a tack coat wagon. This material helps the asphalt bond with the road surface. One Motor Vehicle Driver and one Laborer are engaged in this.
6. Apply two to three inches of Hot Mix Asphalt to road surface using paving machine. Two Heavy Equipment Operators, one Laborer Crew Leader, and all the Laborers perform this step.

7. Compact the asphalt using an asphalt roller. Repeat this step until proper compaction has been achieved. One Heavy Equipment Operator does this.
8. Perform touch up work to make sure the surface is smooth and that the roadway lane seems are properly bonded together. One heavy Equipment Operator, one Laborer Crew Leader, and one Laborer do this.
9. Dismantle worksite. One Motor Vehicle Driver, one Laborer Crew Leader, and two Laborers do this.
10. Return equipment to yard - either 2339 Nevada St./Westport Yard in Sector 3 for one crew or 6400 Pulaski Highway in Sector 4 for the other crew. All members of the paving team perform this task.

As with the milling process, we have first allocated the costs reported by DOT to the various activities of the paving process. The results of that exercise for 2013 are below.

Table 29: DOT Stated Costs by Step (Paving) – 2013

	DOT Reported Amounts								
	<i>% Total Time Spent on Sub-Step</i>	<i>Regular Hours</i>	<i>Overtime</i>	<i>OPCs</i>	<i>FICA</i>	<i>Meals</i>	<i>Materials</i>	<i>Equipment</i>	<i>Totals</i>
1. Transport Equipment	1%	\$6,100	\$3,364	\$1,830	\$257	\$72	\$0	\$4,963	\$16,316
2. Transport Asphalt	2%	\$7,741	\$4,269	\$2,322	\$327	\$93	\$0	\$6,034	\$20,785
3. Block Off Street	1%	\$5,161	\$2,846	\$1,548	\$218	\$62	\$0	\$0	\$9,834
4. Mark Off Roadway	1%	\$2,580	\$1,423	\$774	\$109	\$31	\$0	\$2,011	\$6,928
5. Apply Copolymer	1%	\$3,440	\$1,897	\$1,032	\$145	\$41	\$1,601,405	\$2,682	\$1,610,643
6. Apply Asphalt	38%	\$165,143	\$91,063	\$49,543	\$6,966	\$1,986	\$1,601,405	\$128,719	\$2,044,825
7. Compact Asphalt	38%	\$165,143	\$91,063	\$49,543	\$6,966	\$1,986	\$0	\$128,719	\$443,420
8. Touch Up	14%	\$61,929	\$34,149	\$18,579	\$2,612	\$745	\$0	\$0	\$118,013
9. Dismantle Work Site	3%	\$12,902	\$7,114	\$3,871	\$544	\$155	\$0	\$10,056	\$34,642
10. return Equipment to Yard	2%	\$8,601	\$4,743	\$2,580	\$363	\$103	\$0	\$6,704	\$23,095
Totals	100%	\$438,741	\$241,929	\$131,622	\$18,508	\$5,275	\$3,202,810	\$289,617	\$4,328,503

As with milling, when looking at total costs for each step we have allocated costs for the other direct costs not reported by DOT using the methodology outlined above in the milling section. We have not included indirect costs. The costs for each step of the paving process are indicated in the table below.

Table 30: Cost per Step for Paving – 2011 through 2013

Step	Cost		
	2011	2012	2013
1. Transport equipment	\$21,575	\$23,416	\$27,840
2. Transport Hot Mix asphalt	\$27,561	\$29,913	\$35,602
3. Block off street	\$17,146	\$18,872	\$19,712
4. Mark off roadway lines with white paint for guidance/appropriate width	\$9,187	\$9,971	\$11,867
5. Apply copolymer to roadway using tack coat wagon	\$1,595,714	\$1,479,099	\$1,617,228
6. Apply 2-3 inches of Hot Mix Asphalt to road surface with paving machine	\$2,171,433	\$2,103,941	\$2,360,913
7. Compact asphalt	\$587,968	\$638,136	\$759,508
8. Touch up	\$205,755	\$226,462	\$236,546
9. Dismantle work site	\$45,935	\$49,854	\$59,337
10. Return equipment to yard	\$30,623	\$33,236	\$39,558
Total	\$4,712,897	\$4,612,900	\$5,168,112

Step Details

- **Step 1 – Transport Equipment to Work Site:** The first paving step, transporting equipment to the site, is one of the least expensive steps of the repaving process. We estimate that this step cost \$187 per job in 2013. DOT estimates this step takes less than an hour per job.
- **Step 2 – Transport Hot Mix Asphalt:** Transporting Hot Mix asphalt to the site involves all six Motor Vehicle Drivers and the Highway Maintenance Supervisor. This step takes less than an hour to complete per job according to DOT. We see this step as costing \$239 in 2013.
- **Step 3 – Block off Street:** The next step, blocking off the street for the repaving operation, requires the Highway Maintenance Supervisor, one Motor Vehicle Driver, one Laborer, and one Laborer Crew Leader. DOT has estimated that it takes less than an hour to perform this task on average for each project. Because of how little time this takes and the small number of staff involved, the costs for this step are minor. We estimate it cost \$132 per job in 2013.
- **Step 4 – Mark off Roadway Lines:** In the fourth step, the paving crew marks off the roadway lines with white paint for guidance/appropriate width. According to DOT, this step takes less than an hour to complete for each job. It also requires just the Highway Maintenance Supervisor, two Laborers, and one Laborer Crew Leader. As such, we estimate it costs \$80 per job. It is the least expensive step in the repaving process.

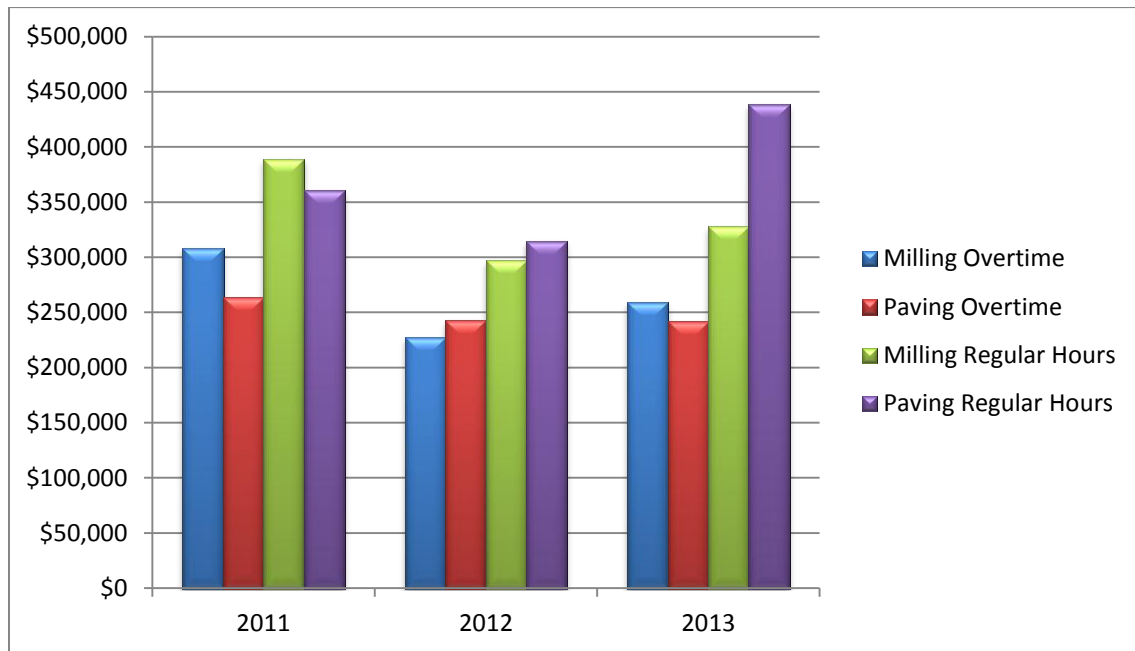
- **Step 5 – Apply Copolymer to Roadway:** During this step, the crew applies a copolymer to the roadway using the tack coating wagon. It takes less than an hour to complete according to DOT. There are also only three staff involved: the Highway Maintenance Supervisor, one Motor Vehicle Driver, and one Laborer. We estimate it costs \$10,854 per job. This is the second most expensive step in the paving process. It is so expensive because of the material involved.
- **Step 6 – Apply Hot Mix Asphalt:** The sixth step is the most expensive step of the paving process by far. This step involves applying 2 to 3 inches of Hot Mix asphalt to the road surface with the paving machine. This step is so expensive for a number of reasons. The step involves as many as nine staff: the Highway Maintenance Supervisor, two Heavy Equipment Operators, four or five Laborers, and one Laborer Crew Leader. It also takes a long time to complete. It can take most of a day to lay down asphalt on a typical job. We have also charged half of the materials cost to this step. We estimate this step costs \$15,845 per job.
- **Step 7 – Compact Asphalt:** The next step, compacting the asphalt with an asphalt roller, involves only the Highway Maintenance Supervisor and a Heavy Equipment Operator. However, it also takes a long time; the bulk of a day according to DOT. As such, this step is also one of the more expensive steps in the paving operation. We estimate it costs \$5,097 per job.
- **Step 8 – Touch up Work:** As with the milling operation, there is a step with repaving in which touch up work is required following the heavy machinery work. Step eight involves touching up the new pavement to ensure the surface is smooth. This step utilizes the Highway Maintenance Supervisor, a Heavy Equipment Operator, one Laborer, and one Laborer Crew Leader. According to DOT, this step takes about six hours for the average job. We estimate this step costs about \$1,588 per job.
- **Step 9 – Dismantle Work Site:** Step nine involves dismantling the work site. The Highway Maintenance Supervisor, one Motor Vehicle Driver, two Laborers, and one Laborer Crew Leader are involved in this step and it takes a little over an hour per job according to DOT. We estimate this costs \$398 per job.
- **Step 10 – Return Equipment to Yard:** The final step, returning the equipment to the yard, takes about 50 minutes on average according to DOT. However, it involves every staff member from the paving crew. We estimate this step costs \$265 per job.

AREAS FOR EFFICIENCY IMPROVEMENT

Overtime

One thing that stands out when looking at the cost numbers that DOT reports is that approximately 9% of the total reported costs and 35% of personnel costs are for overtime. The amount DOT reports it has spent on overtime and regular hours payments during calendar years 2011 through 2013 can be seen in Chart 12 below.

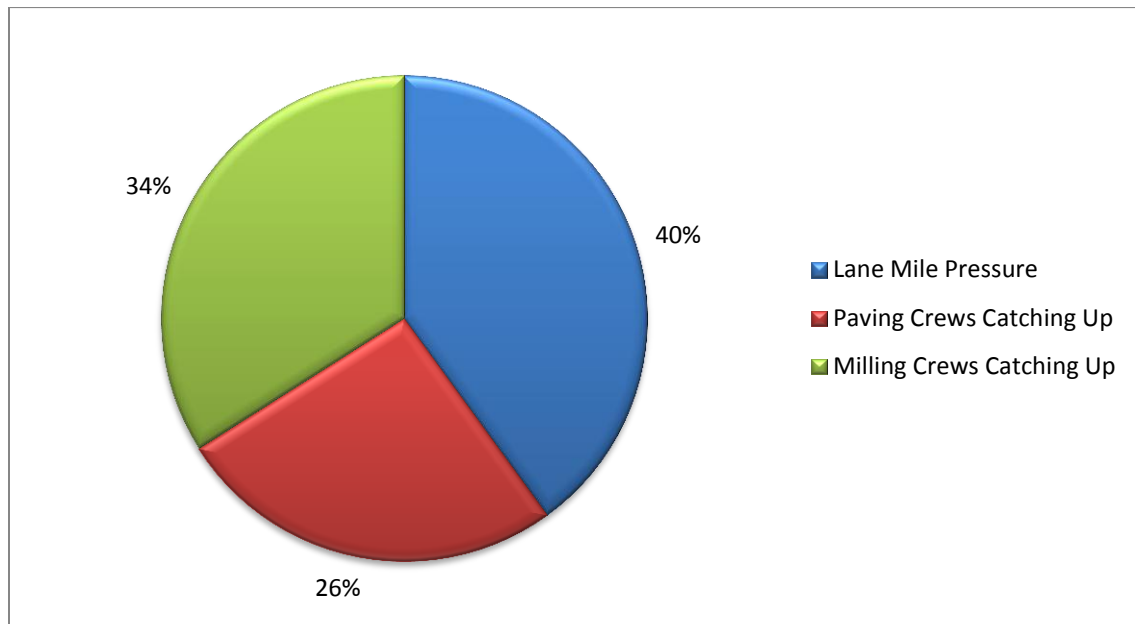
Chart 12: Overtime and Regular Hours



These overtime payments represent a significant portion of the overall reported personnel costs to accomplish the in-house repaving in each year between 2011 and 2013. DOT has provided three main reasons for using overtime:

1. DOT asserts that approximately 40% of its overtime use is because it feels pressure to get a certain amount of lane miles paved in a certain amount of time and the department does not think it can achieve this goal with the resources allocated to it in a standard workday. This suggests that inadequate resources are being devoted to in-house repaving.
2. Sometimes the milling crew gets its work done ahead of the paving crews and to avoid having a glut of milled but unpaved road, they have paving crews put in extra hours while they are already at the sites in order to catch up to the milling crew. According to DOT, 26% of overtime usage is because of this issue.
3. Sometimes, the paving crews get ahead of the milling crew and if the paving crews are going to have anything on which to work they need to press the milling crew into overtime to catch up so that there will be new street surface that can be repaved. According to DOT, 34% of overtime usage is because of this scenario.

Chart 13: Reasons for Overtime



Relying on overtime is not an optimal way to run any operation. It adds a large cost by having to pay people time and a half for the hours they perform. In addition, there is another small cost because the City is required to provide food to people who are working overtime. Ideally, DOT should be employing the right level of people and machinery to complete the milling and paving tasks in sync with each other. It should be able to run at such a pace that the milling team is always just ahead of the paving teams, so that there is no need to rush one of the teams along to catch up.

Given that according to DOT there is a mix of reasons for the use of overtime, as outlined above, we recommend looking at a mix of possible solutions to the current pace of overtime use. These possible solutions are elaborated below.

1. One option would be for DOT to conduct a Lean event for this service. Conducting a Lean event would allow DOT to determine why the crews are not operating in sync, and to establish policies that would get the milling and paving crews operating with better coordination.
2. An additional option would be to change the scheduling of the milling and paving.
 - a. The milling could be started earlier in the week with the paving coming in later in the week to make sure that the milling team is always operating just ahead of the paving teams. According to DOT, this was another option that was seen as a way to reduce overtime in fiscal year 2014.
 - b. According to DOT, the agency started doing this in September 2013. That month, the milling team began working ten hours per day Monday through Thursday, while the paving teams began working ten hour shifts Tuesday through Friday.
3. A key issue is that the teams as currently constituted are not set up in a way that allows them to operate in sync with each other most of the time. DOT should analyze its current team structure to determine a more optimal alignment of its staff resources. It should keep in mind the following items.

- a. To address the degree to which the milling team runs behind the paving teams, DOT could change its use of the milling machines. Currently, the milling team has two milling machines, only one of which is used on a job at one time. The second machine is kept in reserve in case something goes wrong with the primary machine. However, DOT could consider using both machines at once if the milling operation is consistently falling behind the paving teams.
- b. Another option to address the milling team falling behind the paving team would be to establish a new milling team so that there would be two milling teams and two paving teams.
 - i. According to the fiscal year 2014 budget book, there was a goal of reducing overtime in the Street Management service by \$209,630. According to DOT, one of the options looked at for achieving this goal was to add a milling team. As of the writing of this report an additional milling team has not been added, though we have been told that plans are in place for implementing this in calendar year 2014.
 - ii. It's possible that this option could cost more than simply continuing with overtime as it is currently used. In 2013, DOT reported \$259,515 in overtime for its milling operation. If one calculates the average salary for the milling team for nine months out of the year as \$26,395, and then assumes time and a half being used for the overtime calculation above, then the \$259,515 reported for 2013 represents the pay for the equivalent of 6.5 milling staff for nine months. An additional milling team, as the milling team is currently constituted, contains 18 staff. So adding another milling team like the one already being used would represent an additional cost in terms of salary of almost three times the reported overtime cost. In addition to this one would need to account for the additional OPC costs for these workers to see how much more expensive this option would be than the use of overtime.
 - iii. However, if DOT were to determine that the team as it is currently constituted uses more staff than necessary to perform the job in a timely fashion, then it could reduce the number of staff on both its current milling team and the new team. It might be able to create teams that are small enough in size that overall spending would be less than spending currently is with overtime incorporated. In making this determination one would also need to take into account the additional OPC costs from adding crew members, not just their salary costs.
- c. If one wanted to address the degree to which the paving teams run behind the milling team, one solution would be to create a third paving team. There would be additional costs associated with creating a third team, such as the salaries and benefits of the additional staff, and equipment, as has been noted for the additional milling team. But if DOT wants to have its milling and paving teams operating completely in sync without using any overtime this could be a way to do it.
- d. Another option short of creating new milling or paving teams would be to add employees to one of the existing teams to speed up either the milling or paving processes. Doing so could cut down on the time it takes to mill streets with the milling machine or the time it takes to apply the copolymer and the Hot Mix Asphalt, allowing that team to stay at the same pace as its counterpart.

Staffing Levels

Between 2011 and 2013 there have been either 49 or 50 people assigned to the milling and paving crews for the paving season. In Table 2 we outlined what the different functions were for these staff and how many of each type of staff there were in 2013.

One thing DOT should consider doing is studying whether this level of staffing is appropriate. It seems possible that there are more staff on these crews than is necessary for the completion of the milling and paving tasks. Possibly the same level of service could be provided by fewer staff.

For example in 2013, there were six Laborers on the milling team, six Laborers on one of the paving teams, and four Laborers on the second paving team. DOT could examine whether the milling team could successfully conduct the milling operation using fewer than six Laborers. And if one paving team is able to conduct its operation with only four Laborers, then perhaps the other paving team should be able to do the same.

Of course, this only applies if the two teams are performing roughly the same amount of work. If the team with six Laborers is performing more work than the team with only four then the staffing levels may be appropriate given the amount of work they are doing. We were unable to find out from DOT how much paving each team did in 2013 to compare them against each other, and so we were unable to answer the question of whether one team is doing more paving than the other. But if we assume that they are performing roughly equally, then if the first paving team were to reduce its number of Laborers by two, the savings in terms of salary and OPCs would have been \$90,000 in 2013.

Tipping Fees/Recycling of Asphalt

As was established in the full-cost analysis section, tipping fees for milled asphalt constitute a significant expense of the in-house repaving operation, and one that has not up to now been reported by DOT as a cost of this operation. These costs averaged \$1,098,197 for the 2011 paving season, \$1,465,468 for the 2012 season, and \$1,402,328 for the 2013 season. If something could be done to reduce the fees the City is spending for this, then significant savings could be realized by the City. Some options for addressing this are below.

1. The City reuses 60% of the asphalt that it mills. One option would be for the City to start reusing more of its milled asphalt for the uses it already has such as covering unimproved alleys, streets, roadway shoulders, and landfill roads. If DOT reused all the milled asphalt in this way there would be no need for tipping fees on any of the milled asphalt.
 - a. The Agency Detail for the Fiscal 2014 budget highlighted reduction in tipping fees through increased recycling of asphalt and paving materials as a change anticipated during the year. According to the Change Table in the Agency Detail, estimated savings for this were to be \$1,074,542.
 - b. According to DOT there is not enough demand to reuse any more milled asphalt than the agency is already using. Given this, it is unclear how the increased recycling goal was derived. After speaking to in-house operations, we were informed that this goal seems to have been a mistake.

2. Another option would be to recycle milled asphalt for use with the in-house repaving operation. This can either be done through an asphalt vendor or in house.
 - a. According to DOT, the asphalt acquired from Flanigan and Sons already contains up to 20% recycled material. DOT says that this is the limit on the use of recycled material for repaving in Maryland when using a vendor, according to the Maryland Highway Administration's *Standard Specifications for Construction and Materials 2008*. So currently there appears to be no ability to increase the use of recycled material through a vendor.
 - b. However, if Maryland law were to change in the future to allow for more use of recycled material, the City could enjoy considerable savings.
 - i. According to Pavement Technologies International, the cost to recycle asphalt is about \$18 per ton. According to DOT, the cost of obtaining asphalt at Flanigan and Sons is currently \$60.48 per ton. If DOT could ever reach the point where it used 100% recycled materials for its repaving, it could save \$40 per ton in asphalt.
 - ii. There would also be the reduction in tipping fees that would be realized if DOT were no longer dumping off its milled asphalt.
 - iii. Also according to Pavement Technologies International, New York City is the only city currently using 100% recycled materials for repaving. And for now they are only using it for what is considered temporary paving, not permanent. But we have been told they are looking to soon get approval to utilize it for permanent paving as well.
 - c. In the meantime, DOT could consider changing its milling process to recycle milled asphalt in place. According to DOT, the Maryland Highway Administration regulations do not apply to such recycle in place operations.
 - i. We have spoken to Wirtgen America, a milling machine manufacturer, and have been told there are three methods for doing this. One is to use what they call their WR machines. These are designed to do deep milling of around 20 inches. Another method is to use their CR machines, which mill a few inches. The third method is to use a portable plant, in which milling is conducted using a standard milling machine, the milled asphalt is put into the portable plant for processing, and the recycled asphalt is then applied back to the roadway.
 - ii. Wirtgen did indicate that the operation of these machines is extremely complex and requires extensive training to make sure it is being done correctly.
 - iii. A WR machine would not be appropriate for the in-house repaving work being done by DOT. However, either of the other two methods could be appropriate. According to Wirtgen, a CR machine costs approximately \$1.25 million. In addition, Wirtgen indicated that this machine would require use of a different type of paving machine than DOT is currently using, and this machine could cost about \$600,000. Wirtgen indicated that a portable plant costs between \$800,000 and \$900,000.
3. A third option would be to stop bringing any of the milled asphalt to the City landfill since doing so costs \$60 per ton while Flanigan and Sons charges \$2.50 per ton.
 - a. DOT has informed us that various considerations determine where they bring the milled asphalt. Sometimes they use the landfill when Flanigan and Sons indicates it is at capacity. But

sometimes it seems that the decision is made based on which facility is closer to the project on which the milling crew is working.

- b. However, according to DOT, the agency frequently stockpiles some of its milled asphalt at City facilities before bringing it to a drop off location. This is verified by the fact that we obtained tipping tickets from for all twelve months of the year despite the fact that their repaving operation only lasts for nine months. If they are able to stockpile milled asphalt until Flanigan and Sons is able to take it, then there does not seem to be a reason for them to ever bring milled asphalt to the City landfill, which charges DOT 24 times the amount that Flanigan does to drop this asphalt off.
 - c. Another option, if DOT did not want to stockpile its milled asphalt, or if it did not want to stockpile any more than it already does, would be to investigate whether there are other companies at which DOT could dump material. We have heard from DOT that this is an option they are currently investigating.
 - d. We have tipping tickets for both the City landfill and Flanigan and Sons. But we are not sure if all of the asphalt from these tickets is associated with the in-house paving operation. In 2013 DOT paid \$1,402,328 in tipping fees that we are counting as part of the in-house repaving operation. Since it appears from the 2013 tickets we obtained from DOT that about 59% of milled asphalt brought to either of these two places was brought to the City landfill, then the savings that would be realized by bringing all the asphalt to Flanigan and Sons would be just under \$1.3 million.
4. A fourth option would be to look into whether the remaining milled asphalt that the City is not currently reusing could be sold to neighboring municipalities for their own reuse. According to DOT, this has not been explored before by the agency.

Cost of Asphalt

In recent years, DOT's reported cost for materials for the paving operation, which constitutes most of the cost for the entire in-house repaving activity, has been between \$2.9 and \$3.2 million. This represents approximately 1/3 of the overall recalculated cost of the paving operation. This asphalt is currently being purchased from Flanigan and Sons, which charges \$60.48 per ton for the asphalt.

Given how expensive this part of the process is, DOT would be well served by examining ways that costs for this could be reduced. One option would be to rebid the asphalt contract.

- According to DOT, the current asphalt contract was due to expire March 21, 2014, though there is a one year renewal option. (A copy of the approval letter for this contract is in appendix VI). According to DOT, when this contract began on March 22, 2010, Flanigan and Sons was the only company that placed a bid on it, though DOT said it was sent out to 12 total vendors. DOT could try to determine why Flanigan and Sons was the only bidder.
- When this contract expires, DOT should make sure that more than one company responds to the new posting. If there were more competition for the contract, presumably the City could benefit from a lower cost. A 10% reduction in the unit cost would yield approximately \$300,000 in savings.

- After consulting with the Office of Material Technology within Maryland's Transportation Department, it does seem as if the price of \$60.48 per ton may be competitive.

Another option would be to use more recycled material. This option was discussed above in the section on tipping.

Milling Machine

The actual milling of the street with the milling machine is the second most costly part of the overall milling operation. As indicated above, we estimate this step cost \$791,264 in calendar year 2013. This high cost is mostly due to the fact that this step takes up about half of the total project time.

The City's current milling machines are:

- 2005 Wirtgen Large Milling Machine
 - This is a currently discontinued model W 1900
 - This is the machine that primarily gets used.
- 1998 Wirtgen Large Milling Machine
 - This is a currently discontinued model 1900 DC
 - This is the machine used as a backup.

These are both old machines, particularly the backup one. Based on a consultation with Wirtgen, we believe that these machines operate more slowly than more modern machines would. According to Wirtgen, there have been significant advances in milling technology, especially since 2008. If the City were to replace these old machines with newer, faster performing ones, the time to perform this step on each lane mile could be reduced. As a result, either savings could result or more milling could be accomplished in the same amount of time.

To illustrate the difference in speeds between our old machines and those that are available now, we have calculated how quickly we believe the milling machines the City uses are milling asphalt on city streets. According to DOT's reporting, the milling crew spent approximately 790 hours milling with the milling machine in 2013. The crew milled 69 lane miles during this time. That translates to .087 lane mile per hour.

We were told by Wirtgen that the current model W200 would be the one most comparable to what DOT is currently using. According to the specifications of this model, the standard width for this machine is 6' 7", meaning that it would need to make two passes over a road to get the full 11' that goes into a lane mile. Wirtgen's information indicates that to mill three inches of depth, one could mill 52 feet per minute at 6' 7" width. Doubling the time to account for the two passes needed to qualify for a lane mile, one would get 52 feet per two minutes at the full 11' width. This translates to .30 lane miles per hour.

According to our consultation with Wirtgen, the times they provide in their specifications are for milling on open, unobstructed roadways. We were told that we should take about 40% of this when estimating the time

it would take to mill city streets, because of the various obstructions that are encountered. Doing this, one estimates that milling with the W200 would allow for the milling of .118 lane miles an hour.

This is not a huge increase in speed over what is now being done. But if DOT operated at this higher speed, it could mill the same amount of asphalt that it milled in 2013 in just 585 hours rather than 790 hours. Given that this step cost \$987 per hour, according to the ABC information above, these reduced hours would represent \$202,335 in savings. One would have to take into account the cost of the vehicle to determine if this option were worth doing. We consider the vehicle cost below. Of course as indicated above, DOT might choose not to bank this savings but instead to mill more pavement than it has been able to do so far. Even if it did this, the cost per lane mile would be reduced from its current level, although the total money spent would not be reduced.

Another process modification that could save money involves step eight, manually touching up around features like man hole covers. According to DOT, this step takes about two hours on average per job, and we calculate the direct cost of this step across all jobs in 2013 as about \$90,000. Our understanding is that this work is handled manually because the large milling machines cannot maneuver around obstacles like man hole covers.

Wirtgen makes small milling machines with milling widths between 35 centimeters and 1.3 meters explicitly for this type of job. If the City were to start using small milling machines for these tasks rather than handling them manually, the time taken for this step could be reduced. If the time for this step were cut in half, then DOT could save \$45,000 on this step annually. Again as with the discussion of the large milling machine above, one needs to factor in the cost of these machines.

Purchasing more modern equipment would cost the City. However, these costs would be depreciated over a number of years, so they would not all hit the budget in the same year. According to Wirtgen, their small milling machine, model W 35 DCI, currently costs approximately \$210,000. The large milling machine W 200 costs about \$610,000. If DOT were to purchase one small machine and two large machines, for a total of approximately \$1,430,000, and then depreciate this cost over the next ten years, the annual cost to assign to this would be \$143,000. This would be less than the possible savings of \$247,335.

AREAS FOR OPERATIONS PROCESS IMPROVEMENT

BBMR has had difficulty obtaining all the information it has needed while conducting this research. One problem has been that in-house repaving is accounted for within the activity Rehabilitation Maintenance and Repairs, which is activity 4 within the Service 683 Street Management. This activity includes other tasks besides full street repaving, such as pothole repair. In-house repaving is not broken out as a separate sub-activity within this activity. This makes it impossible to know exactly what has been spent on repaving by looking at the expenditures reported by activity. We have had to rely on DOT to break out the costs they have assigned to in-house repaving as opposed to the other Rehabilitation Maintenance and Repairs “sub-activities.”

We have frequently been directed to the front line workers for information. Unfortunately, these front line workers often do not have easy access to fiscal information about the operation. As a result, it has been

difficult for people overseeing the operation to provide answers to many of our questions. They have been able to get us information regarding basic costs of the operation, though as we have discovered that has at times been inaccurate. Below are some issues we have had in conducting this research.

- DOT employees have had difficulty supplying detailed information. For example, it was difficult for them to get our office information on the specific employees on the milling and paving teams, and when we did get this information it only went back to 2011. It was difficult for them even to get year by year totals for the staffing levels prior to 2011, and when they supplied these it was only from 2008 onward. It did not go back to the beginning of the program.
- We have had difficulty obtaining information regarding how much asphalt was deposited at Flanigan and Sons versus how much was dropped off at the City landfill. We eventually did receive tickets from each of these two sites indicating how much had been dropped off in 2013, but we were told by DOT staff that they had no way to know for sure that the tickets they provided us were all for the in-house repaving operation. And the total dollar amounts from these tickets did not equal what was reported in tipping fees in the general ledger.
- We had difficulty obtaining information regarding how much funding for repaving was coming from the capital budget versus how much was coming from the operating budget.
- We could not find out from DOT how much asphalt was obtained in a given year exclusively for in-house repaving.
- Another issue is that we discovered that a number of the people who have been assigned to in-house street repaving teams are actually being budgeted to services other than Street Management. In 2013, we found that of the 49 people assigned to milling and paving crews, eight of them were budgeted to other services. Two were budgeted to 692 Bridge and Culvert Management, two were budgeted to 500 Street and Park Lighting, three were budgeted to 691 Public Rights-of-Way Landscape Management, and one was budgeted to Special Events Support. This is a problem because if one is looking at the actual salary and other personnel costs within the Street Management service to determine costs of this operation, one will miss the costs associated with these eight staff whose costs are being charged to other services.
- As was mentioned earlier, we discovered that DOT's reporting of materials for the milling operation was inaccurate. We discovered that to generate a materials cost number, DOT was making some kind of calculation involving square yards milled. This calculation had nothing to do with milling teeth, the only material that DOT said it needed for milling. And the costs we determined that DOT was incurring for milling teeth from the CitiBuy system were approximately 10% of the costs that DOT was reporting for materials.
- Another process issue regards the assignment of repaving to the in-house crews in the first place, and whether this represents the most efficient allocation of resources. Prior to beginning this research project, it appeared as if the in-house repaving was less expensive than contracted repaving. But this project has shown that the costs of in-house repaving have been significantly understated. In addition, contractors mostly perform jobs that are much more complicated than the jobs performed by the in-house crews, which explains more of the gap between the cost of the in-house operation and contracted jobs. Now that we have a more accurate sense of the true cost of the in-house operation,

we are in a position to conduct a more informed cost comparison between this operation and the repaving done by contractor crews.

In light of these observations, we recommend the following process changes to ensure that DOT can better track the costs of the in-house repaving operation, and in doing so have a better chance to improve the efficiency of providing this service.

1. Track in-house street repaving as its own activity within 683 Street Management.
2. Break this new activity into two sub-activities: milling and paving.
3. Account for the full cost of the operation when reporting on its costs.
4. Track how much asphalt is being dropped off at Flanigan and Sons and how much is being dropped off at the City landfill.
5. Do a better job of tracking operating versus capital costs.
6. Track the actual costs of milling materials.
7. Make sure the people managing the operation on the ground have information regarding the operation's cost in real time.
8. Budget all of the people involved with in-house repaving within this activity.
9. Make sure the operations leadership is keeping track of who is on its milling and paving teams.
10. Implement managed competition to determine whether the in-house operation is the most efficient way to repave small neighborhood streets or whether using contractors may be more efficient.

CONCLUSIONS

The City of Baltimore has been setting goals for the cost per lane mile for its in-house repaving operation. The goal for fiscal year 2014 is \$85,000 per lane mile. However, as has been established by this report, this goal has been based on cost numbers reported by DOT, and these cost numbers do not take into account the full cost of conducting the in-house repaving operation. Going forward, DOT should begin tracking the full cost of in-house repaving. Doing so would allow the agency to make a better cost comparison between this activity and contractor repaving.

Looking deeper behind the full costs, one can see that there are certain activities and practices within the operation that are extremely expensive. These expensive activities and practices include the milling of streets with the milling machine, the disposal of asphalt, the use of overtime, and the materials being purchased. By modifying practices around these activities and practices, DOT could realize significant savings in its conduct of in-house street repaving.

RECOMMENDATIONS

To improve the efficiency of the in-house repaving operation, BBMR recommends the following actions:

1. Reduce the use of overtime with the milling crew and the paving crews by better synchronizing their operations, either through use of a Lean event or through some other means.
2. Determine the optimal size for milling and paving crews.
3. Reduce the tipping fees that DOT is paying by recycling a larger percentage of milled asphalt. This could be accomplished by dumping more milled asphalt at Flanigan and Sons or other sites that recycle asphalt, selling milled asphalt to other jurisdictions, or other measures.
4. Reduce the cost for asphalt by either utilizing more recycled asphalt as mentioned above, especially if the state law is changed regarding how much recycled material can be used by contractors, or rebidding the asphalt supply contract that currently belongs to Flanigan and Sons.
5. Acquire more modern milling machines that could perform the milling process more quickly than is currently being done.
6. Separate out in-house street repaving as a stand-alone activity within service 683 Street Management to allow for better tracking of the operation, and break this new activity into new sub-activities of milling and paving.
7. Consider using managed competition to increase the efficiency of this operation.
8. Track information better within the in-house repaving operation.
9. Budget staff to the appropriate activity.
10. Keep front line employees informed of fiscal issues related to this operation.
11. Incorporate all direct and indirect costs into DOT's accounting of the in-house repaving operation.

AGENCY COMMENTS

Below is the response provided to BBMR by DOT in regards to the version of the report presented to that agency on April 14, 2014.

In follow up to the *Management Research Report* (Report) prepared by the Bureau of the Budget Management and Research (BBMR), the Baltimore City Department of Transportation (DOT) is pleased to provide a written response to each recommendation outlined in the report.

BBMR Recommendation 1: Reduce the use of overtime with the milling crew and the paving crews by better synchronizing their operations, either through use of a Lean event or through some other means.

DOT Response: Beginning with Fiscal 2015, DOT will be conducting regular meetings that will examine spending and performance for each division in the agency. One of the topics that will be examined is overtime for each operation.

DOT has also instituted staggered 4/10 hour shifts for milling and paving to better utilize the work day along with mobilization and demobilization. The schedule is milling Monday, Tuesday, Wednesday, and Thursday and paving Tuesday, Wednesday, Thursday, and Friday. The staggered schedule allows for better coordination between the milling operation and the paving operation. The new schedule has been implemented after negotiation with the labor unions.

DOT also plans to train a number of staff in Lean/Six Sigma principles to work with each division to identify processes that can be improved. The staff members would also serve as facilitators for internal reviews. DOT will utilize these staff members to work with the milling and paving teams to improve efficiencies.

BBMR Recommendation 2: Determine the optimal size for milling and paving crews.

DOT Response: DOT crews are generally in line with contract size crews for both milling and paving. The sizes of trucks used by in-house crews are smaller than those trucks used by contract milling and paving teams meaning that additional staff is needed to haul materials from the site. DOT is working to utilize existing hauling contracts for in-house paving operations in order to remove more material from the site in fewer trips.

BBMR Recommendation 3: Reduce the tipping fees that DOT is paying by recycling a larger percentage of milled asphalt. This could be accomplished by dumping more milled asphalt at Flanigan and Sons or other sites that recycle asphalt, selling milled asphalt to other jurisdictions, or other measures.

DOT Response: DOT has determined through coordination with DPW that the tipping fee expenditures were unnecessarily high due to miscommunication between agencies. DOT vehicles, when coming to the landfill need to call ahead to report that they are coming with cover material. Upon doing so, the vehicles will not be required to drive over the scales. DOT employees were not informing DPW employees that they were there with cover materials. As a result, the vehicles were required to drive over the scales to determine the weight of the load, resulting in an automatic charge. DOT Administration is working with the milling and paving teams to ensure that this new procedure is followed. DOT and DPW are also coordinating on a standard operating procedure for the process.

In addition, DOT has also secured additional vendors to receive recycled milled material at discounted fees. Prior to this, Flanigan and Sons has a storage capacity of 200,000 tons but at any given time they have 180,000 tons stored, limiting DOT's storage capacity with one vendor.

BBMR Recommendation 4: Reduce the cost for asphalt by either utilizing more recycled asphalt as mentioned above, especially if the state law is changed regarding how much recycled material can be used by contractors, or rebidding the asphalt supply contract that currently belongs to Flanigan and Sons.

DOT Response: The price of asphalt is determined by the price of oil. The unit price of asphalt DOT currently pays is competitive based on price indexes prepared by the Maryland State Highway Administration (SHA). In many cases the price of \$60.48 per ton DOT receives from Flanigan and Sons is lower than asphalt prices referenced in the SHA index. DOT will continue to make efforts to receive the most competitive price for asphalt when contracts are renewed or if contracts are rebid.

BBMR Recommendation 5: Acquire more modern milling machines that could perform the milling process more quickly than is currently being done.

DOT Response: DOT is currently working with DGS Fleet operations to acquire a machine that will allow in house crews to simultaneously mill existing asphalt, add emulsifiers, heat the asphalt and then relay on the existing roadway. Although acquiring the machine would be a significant investment in the first year, it would allow DOT reduce the amount of asphalt purchased on an annual basis as materials would be reused on site. In addition, the use of this equipment would allow DOT to reduce the size of the existing in-house teams that could allow for the creation of a third milling and paving team with the existing staff resources.

BBMR Recommendation 6: Separate out in-house street repaving as a stand-alone activity within service 683 Street Management to allow for better tracking of the operation, and break this new activity into new sub-activities of milling and paving.

DOT Response: DOT concurs with this recommendation with regards to tracking street paving. However DOT recommends that given the limitations in the current accounting and budget systems, that milling and paving be broken out into two separate activities rather than sub-activities within one activity. DOT does not receive monthly expenditure data at the sub-activity level and it would make tracking difficult at this time.

BBMR Recommendation 7: Consider using managed competition to increase the efficiency of this operation.

DOT Response: DOT believes it can continue to improve the efficiency of the in-house paving program and does not feel that managed competition is in the best interest of City residents. DOT has the ability to quickly shift priorities based on critical repaving needs as in-house crews can easily be reassigned to a new location.

BBMR Recommendation 8: Track information better within the in-house repaving operation.

DOT Response: DOT will work to develop a method to better track information within the in-house paving operation. DOT would be receptive to any examples for better tracking that BBMR can provide and will also inquire with the Department of Public Works for any tracking methodology they may have for tracking in-house operations they conduct.

BBMR Recommendation 9: Budget staff to the appropriate activity.

DOT Response: DOT Fiscal and Human Resources staff will work with BBMR to move those positions into the newly created activities. DOT requests that BBMR allow DOT to set up distribution fund adjustments to other services within the agency as these individuals do not work on milling and paving the entire year and the full cost of their salaries should not be reflected as such.

BBMR Recommendation 10: Keep front line employees informed of fiscal issues related to this operation.

DOT Response: DOT's fiscal unit and administration will work with division chiefs to relay financial information to those employees in the field. Having regular meetings where fiscal data is examined will help all divisions in the agency have a better understanding of their cost of operations as well as their spending patterns throughout the fiscal year.

BBMR Recommendation 11: Incorporate all direct costs into DOT's accounting of the in-house repaving operation.

DOT Response: DOT Fiscal will work with the DOT Maintenance Division to update tracking sheets to reflect all direct costs related to the in-house repaving operation. This task will be easier to accomplish when milling and paving operations are broken out into separate activities in the operating budget.

This report was sent to William M. Johnson, Director - DOT, and Lindsay Wines, Deputy Director - DOT. We have also made copies available on our website at:

<http://bbmr.baltimorecity.gov/ManagementResearch.aspx>. If you have any questions about this report, please contact Jonathan Morancy at 410-396-4964.

Andrew Kleine, Chief
Bureau of the Budget and Management Research,
Department of Finance

APPENDIX I: SCOPE AND METHODOLOGY

The objectives of this study were to 1) determine the full cost of conducting the in-house repaving operation, 2) conduct an activity based costing analysis of the operation, 3) identify ways that the operation can be performed more efficiently, and 4) identify any process improvements that can help ensure that efficiency gains can be maintained.

To determine the full cost of the in-house repaving operation and to conduct our activity based costing analysis, we used general ledger actuals from Fiscal 2011 through 2013, and adopted budget numbers for Fiscal 2014. We consulted Agency Detail budget books. We examined DOT reported costs. We held extensive discussions with DOT staff, both in person and via e-mail and telephone, in both operations and the fiscal office. We consulted DOT position files. And we conducted a site visit to a milling and paving operation in progress.

To recommend alternatives to increase cost-effectiveness and estimate savings for each alternative, we consulted with numerous outside entities to inform our decisions. We consulted with groups such as the State of Maryland's Office of Material Technology, Wirtgen America, and Pavement Technologies International.

BBMR conducted this management research project from June 2013 to April 2014 in accordance with the standards set forth in the BBMR Project Management Guide and the BBMR Research Protocol. Those standards require that BBMR plans and performs the research project to obtain sufficient and appropriate evidence to provide a basis for the conclusions and recommendations contained in this report. BBMR believes that the evidence obtained provides a reasonable basis for the findings and conclusions in this report and that such findings and conclusions are based on research project objectives.

APPENDIX II: INDIVIDUAL REPAVING PROJECTS

Table 31: Individual Repaving Projects – 2013 *

Sector	Date	Street Number	Street Name	Lane Miles	Total Cost
3	3/19/2013	900	BRIDGEVIEW ROAD	0.11	\$13,688
3	3/23/2013	1900 - 2000	DEERING AVENUE	0.61	\$67,453
	3/24/2013	900 - 1000	JOH AVENUE	0.4	\$29,725
3	3/26/2013	3900 - 4000	BENZINGER RD	0.5	\$49,475
3	3/27/2013	900 - 1000	ARION PARK ROAD	0.54	\$54,816
3	3/27/2013	2800	CARROLL STREET	0.34	\$39,208
3	3/28/2013	900	CALWELL ROAD	0.2	\$21,882
1	3/28/2013	2300 - 2400	PERRING MANOR RD	1.3	\$101,939
1	3/29/2013	2500	WILD PARK AVENUE	0.5	\$41,105
3	3/30/2013	2600	ROUND ROAD	0.3	\$25,997
1	4/1/2013	6400 - 6600	BIRCHWOOD AVE	0.6	\$39,691
1	4/2/2013	5600 - 6100	BIRCHWOOD AVE	0.4	\$43,192
4	4/5/2013	1200 - 1300	BANK STREET	0.4	\$30,369
4	4/5/2013	400	EDEN STREET (S)	0.23	\$19,883
4	4/6/2013	200 - 500	EXETER STREET	0.7	\$56,014
4	4/8/2013	200 - 400	ALBERMARLE STREET	0.4	\$30,581
4	4/9/2013	800 - 1000	STILES STREET	0.5	\$42,503
4	4/11/2013	1200	GOUGH STREET	0.2	\$14,062
4	4/11/2013	200	LLOYD STREET	0.2	\$14,653
1	4/12/2013	6200	CHINQUAPIN PARKWAY	0.2	\$20,519
1	4/13/2013	5700 - 5800	CHINQUAPIN PARKWAY	0.7	\$71,390
1	4/15/2013	1100	CEDARCROFT ROAD	0.4	\$33,610
1	4/16/2013	1100	MERIDENE RD	0.4	\$32,277
1	4/18/2013	4600 - 4700	LUERSSSEN AVE	0.4	\$34,356
1	4/19/2013	4500 - 4700	SCHLEY AVE	0.41	\$46,838
1	4/22/2013	4800 - 4900	WILHOME WAY	0.2	\$25,305
1	4/23/2013	3900 - 4100	GRENTON AVENUE	0.31	\$25,927
1	4/24/2013	4000 - 4100	MARX AVENUE	0.5	\$49,314
1	4/26/2013	4100	KINSWAY	0.22	\$23,726
4	4/27/2013	UNIT BLK	CUSTOM HOUSE	0.12	\$17,618
3	4/28/2013	20	CHARLES STREET (S)	0.1	\$17,523
1	4/29/2013	5500 - 5600	GREENFIELD AVE	0.3	\$21,309
1	4/30/2013	3600 - 3700	GIBBONS AVENUE	0.5	\$38,356
1	5/1/2013	5200	CROSSWOOD ROAD	0.11	\$11,496
1	5/1/2013	5300	PEMBROKE AVENUE	0.21	\$25,751
1	5/3/2013	5400	CRESTON AVENUE	0.22	\$19,547
1	5/4/2013	5400	HILLBURN AVENUE	0.3	\$26,353

2	5/6/2013	2700 - 2900	MT HOLLY	0.43	\$35,920
2	5/7/2013	3700 - 4100	WOODHAVEN	0.83	\$85,517
2	5/10/2013	2900	LYNDHURST AVE	0.1	\$15,300
2	5/11/2013	3400 - 3500	HOWARD PARK AVE	0.3	\$22,424
2	5/13/2013	3000- 3200	OAKFIELD AVE	1	\$72,719
3	5/15/2013	UNIT - 100	WHEELER STREET (N)	0.34	\$37,390
3	5/16/2013	500	STRICKER STREET (N)	0.3	\$23,000
2	5/20/2013	200 - 500	WOODLAWN RD	1.42	\$116,887
2	5/22/2013	UNIT BLK	UPLAND AVENUE	0.74	\$59,096
2	5/23/2013	600 - 800	KENWOOD AVENUE	0.4	\$35,338
2	5/24/2013	4500 - 4600	SCHENLEY ROAD	0.9	\$70,561
3	5/25/2013	2900	EDMONDSON AVE TURN LANE E/B	0.24	\$30,585
3	5/26/2013	100	FAYETTE STREET	0.1	\$11,288
3	5/26/2013	300	SHARPE STREET	0.1	\$9,842
1	5/29/2013	400	ELMHURST AVENUE	0.31	\$27,496
3	5/30/2013	UNIT - 100	MORLEY AVENUE (S)	0.6	\$40,887
3	6/1/2013	100-200	CULVER STREET (N)	0.5	\$55,662
3	6/3/2013	300	LOUDON AVENUE (S)	0.32	\$28,422
3	6/4/2013	700 - 800	GLEN ALLEN DRIVE	1	\$92,830
3	6/4/2013	4600	ROCKEY ROAD	0.21	\$24,458
2	6/7/2013	2000	SULGRAVE ROAD	0.3	\$20,035
4	6/8/2013	1800 - 2000	CHESTER STREET (N)	0.81	\$73,981
4	6/10/2013	1700 - 1800	COLLINGTON AVE (N)	0.7	\$58,272
4	6/12/2013	1200 - 1500	EDEN STREET (N)	1.03	\$83,014
4	6/15/2013	1100 - 1300	ENSOR STREET	0.71	\$67,539
4	6/17/2013	700 - 1100	HOFFMAN STREET	0.9	\$53,346
2	6/19/2013	4900 - 5100	PEMBRIDGE AVENUE	0.4	\$38,874
2	6/20/2013	4800	LANIER AVE	0.33	\$38,561
2	6/22/2013	2500 - 2800	WOODLAND AVENUE	0.9	\$69,039
2	6/24/2013	3500 3700	MANCHESTER AVENUE	0.52	\$41,354
2	6/25/2013	3500 - 3700	OAKMONT AVENUE	0.52	\$42,949
2	6/26/2013	4800	LITCHFIELD AVENUE	0.1	\$8,461
2	6/27/2013	4400 - 4500	FINNEY AVENUE	0.54	\$53,313
2	6/29/2013	3900 - 4000	ANNELLEN ROAD	0.7	\$66,284
2	7/2/2013	4400	LEWIN AVENUE	0.2	\$22,089
2	7/3/2013	3900 - 4000	FORDLEIGH ROAD	0.63	\$48,106
2	7/9/2013	6200 - 6300	FIELDCREST ROAD	0.43	\$36,333
2	7/10/2013	1200	SABINA AVENUE	0.12	\$15,901
4	7/11/2013	800 - 900	LINWOOD AVENUE (N)	0.4	\$39,924
4	7/12/2013	800 - 1000	KENWOOD AVENUE (N)	0.94	\$89,170
4	7/16/2013	2300 - 2400	EAGER STREET (E)	0.3	\$31,730
4	7/16/2013	2700 - 2800	EAGER STREET (E)	0.3	\$26,693

4	7/18/2013	700 - 900	MONTFORD AVENUE	0.44	\$30,839
4	7/20/2013	900	ROSE STREET (N)	0.11	\$14,173
4	7/21/2013	200	MADEIRA STREET (N)	0.1	\$17,842
2	7/22/2013	5500 - 5600	MATTFELDT AVENUE	0.5	\$52,752
3	7/24/2013	100	CLEMENT STREET (W)	0.3	\$22,974
3	7/25/2013	1300 - 1400	RACE STREET	0.5	\$35,851
3	8/2/2013	1100 - 1300	ARGLYE AVENUE	0.72	\$71,423
3	8/2/2013	300 - 400	MOSHER STREET	0.3	\$23,109
3	8/5/2013	300	MCMECHEN STREET	0.33	\$29,428
1	8/7/2013	200	HOMEWOOD TERRACE	0.3	\$19,354
1	8/8/2013	3400	OAKENSHAW PLACE	0.2	\$13,554
1	8/9/2013	3400	GUILFORD TERRACE	0.3	\$21,773
1	8/12/2013	3300	ABELL STREET	0.12	\$18,358
1	8/13/2013	3000	MATHEWS STREET	0.2	\$23,365
4	8/14/2013	2000-2100	HOFFMAN STREET (E)	0.5	\$53,496
1	8/19/2013	5400 - 5600	LOTHIAN ROAD	1	\$92,039
1	8/22/2013	900 - 1000	BRADHURST ROAD	0.31	\$32,649
1	8/26/2013	900 - 1000	43RD STREET (E)	0.4	\$40,794
1	8/28/2013	3600 - 3800	EASTWOOD DRIVE	0.6	\$73,183
1	9/3/2013	3200	MONTEBELLO TERRACE	0.41	\$38,740
1	9/5/2013	3100	GRINDON AVENUE	0.3	\$25,865
1	9/7/2013	6000	EUNICE AVENUE	0.3	\$27,443
1	9/8/2013	6000	EDNA AVENUE	0.2	\$26,328
1	9/9/2013	5500 - 5600	SEWARD AVENUE	0.6	\$52,047
1	9/10/2013	5500 - 5600	DAYWALT AVENUE	0.63	\$56,837
1	9/12/2013	4400	ASHBURY AVENUE	0.13	\$18,978
1	9/13/2013	4200 - 4300	SEIDEL AVENUE	0.52	\$69,914
1	9/17/2013	4300 - 4500	FINDLAY ROAD	0.43	\$44,419
4	9/18/2013	UNIT - 500	CASTLE STREET (S)	0.6	\$42,843
4	9/18/2013	6201	PULASKI HIGHWAY PARKING LOT	0.4	\$37,784
4	9/20/2013	1000	BINNEY STREET (S)	0.13	\$21,899
4	9/21/2013	700	BAYLIS STRET	0.2	\$27,834
4	9/22/2013	UNIT - 100	GLOVER STREET (N)	0.2	\$16,480
2	9/23/2013	2100 - 2200	MT HOLLY STREET	0.4	\$36,199
2	9/24/2013	3900	MT HOLLY STREET		\$22,138
2	9/24/2013	1900 - 2200	PAYSON STREET (N)	0.9	\$70,669
3	9/26/2013	1700	LORMAN STREET	0.21	\$21,131
3	9/26/2013	900 - 1100	WHEELER STREET (N)	0.8	\$51,575
3	9/30/2013	700 - 800	ASHBURTON AVENUE	0.61	\$46,387
3	9/30/2013	2700 - 2800	HARLEM AVENUE	0.44	\$35,267
3	10/1/2013	600	GLENOLDEN AVENUE	0.2	\$19,133
3	10/2/2013	3400 - 3500	4TH STREET	0.7	\$56,260

1	10/4/2013	100-200	TUNBRIDGE ROAD	0.8	\$65,599
1	10/8/2013	100 - 200	ENFIELD ROAD	0.5	\$52,061
1	10/9/2013	5700 - 5800	FENWICK AVENUE	0.6	\$51,060
3	10/9/2013	100	SORRENTO AVENUE (no milling)		\$22,043
2	10/11/2013	6100 - 6200	BILTMORE ROAD	0.53	\$63,530
2	10/15/2013	6500 - 6600	GIST AVENUE	0.41	\$33,708
2	10/16/2013	5900 - 6000	HIGHGATE DRIVE	0.7	\$57,700
2	10/18/2013	5900 - 6000	DOVERDALE ROAD	0.31	\$30,110
2	10/19/2013	3300 - 3400	PARKINGTON AVENUE	0.3	\$37,018
2	10/20/2013	1900	TALBOT STREET	0.1	\$7,265
4	10/21/2013	600	LUZERNE AVENUE (N)	0.24	\$30,501
4	10/21/2013	1000 - 1100	LUZERNE AVENUE (N)	0.71	\$76,229
3	10/23/2013	1800 - 2200	MCHENRY STREET	1.14	\$123,305
3	10/29/2013	1900 - 2000	CHRISTIAN STREET	0.31	\$31,183
3	10/29/2013	1700	COLE STREET	0.21	\$28,243
3	10/31/2013	100 - 300	STRICKER STREET (S)	0.62	\$75,304
3	11/1/2013	100 - 400	CALHOUN STREET (S)	0.8	\$106,267
3	11/3/2013	2000	HANOVER STREET		\$11,316
3	11/5/2013	800 - 1000	JEFFREY STREEET (E)	0.82	\$80,066
3	11/8/2013	800 - 900	JACK STREET	0.6	\$51,875
3	11/9/2013	800 - 900	STOLL STREET	0.6	\$49,316
3	11/11/2013	4300 - 4400	ELDONE ROAD	0.71	\$81,670
3	11/13/2013	600 - 700	BETHNAL ROAD	0.51	\$59,266
3	11/15/2013	700	WOODINGTON ROAD	0.5	\$55,153
3	11/16/2013	600 - 700	LUCIA AVENUE	0.2	\$83,929
3	11/19/2013	1900	LAURETTE AVENUE	0.21	\$23,843
3	11/20/2013	1900	FAIRMOUNT AVENUE	0.13	\$18,304
2	11/21/2013	3300 - 3400	ALTO ROAD	0.5	\$39,296
TOTAL				65.55	\$6,196,325

* - The lane miles on these tables do not completely match the lane miles used elsewhere in the report. Both accountings of lane miles were provided by DOT, but they were provided by different reports. These different reports do not completely agree.

Table 32: Individual Repaving Projects - 2012

Sector	Date	Street Number	Street Name	Lane Miles	Total Cost
	3/21/2012	5200	ELEANORA AVE	0.23	\$4,827
3	3/22/2012	3300	BEECH AVE	0.40	\$30,751
4	3/26/2012	1700 - 2000	HILLENWOOD ROAD	0.80	\$50,142
3	3/27/2012	1500	SHEFFIELD ROAD	0.51	\$27,618
	3/28/2012	1500	STONEWOOD RD	0.51	\$31,403
4	3/30/2012	2700 - 2900	ROASLIE AVE	0.80	\$61,877
3	3/30/2012	1600	ROUNDHILL RD	0.41	\$36,069
4	4/3/2012	2500 - 1600	MOORE AVE	0.50	\$37,021
	4/3/2012	2500 - 2600	MOORE AVE	0.50	\$11,754
4	4/4/2012	4000	EIREMAN AVE	0.30	\$38,470
4	4/9/2012	1100	42ND STREET (w)	0.20	\$13,804
4	4/10/2012	200	31ST STREET (w)	0.50	\$36,619
4	4/15/2012	4200	BONNER ROAD	0.40	\$31,654
4	4/16/2012	4000 - 4100	WESTCHESTER RD	0.71	\$29,380
4	4/17/2012	4200	FAIRFAX RD	0.80	\$41,371
4	4/20/2012	5300	BOSWORTH AVENUE	0.30	\$19,307
3	4/25/2012	4600	CROSSWOOD AVE	0.24	\$26,391
3	4/25/2012	3200	GRENTON ROAD	0.31	\$30,949
4	4/26/2012	3100 - 3300	GOUGH STREET	0.60	\$44,946
4	4/30/2012	600 - 800	GLOVER STREET (s)	0.40	\$31,107
4	5/1/2012	800	PORT STREET (S)	0.14	\$14,888
4	5/2/2012	800	MONTFORD AVENUE (S)	0.30	\$18,254
3	5/3/2012	3000 - 3100	OAKFORD AVE	0.30	\$29,251
4	5/4/2012	2500 - 2600	PARK HEIGHTS TERRACE	0.72	\$61,634
	5/6/2012	2600	ROSEWOOD AVE	0.20	\$8,904
3	5/7/2012	4500 - 4700	HOMER AVE	0.50	\$35,569
3	5/7/2012	3300 - 3400	ROYCE AVE	0.32	\$22,626
4	5/10/2012	2700	FAIT AVE	0.30	\$21,669
3	5/10/2012	800 - 900	LINWOOD AVE	0.40	\$30,072
	5/10/2012	800 - 900	LINWOOD AVE	0.40	\$6,953
4	5/11/2012	1100	EAST STREET (S)	0.23	\$14,555
4	5/12/2012	3800 - 4000	GOUGH STREET	0.44	\$39,889
3	5/14/2012	3600 - 3900	MT PLEASANT ST	0.52	\$35,616
4	5/16/2012	500 - 1000	POTOMAC STREET (S)	1.24	\$96,053
3	5/19/2012	5600	KAVON AVE	0.30	\$25,588
3	5/20/2012	5500 - 5600	BENTON HEIGHTS AV	0.50	\$38,739
4	5/21/2012	4700	HOMEDALE AVENUE	0.50	\$39,535
4	5/23/2012	6100	PARKWAY DRIVE	0.54	\$32,500
3	5/24/2012	5200 - 5300	KENILWORTH AVE	0.50	\$44,466

4	5/25/2012	5100 - 5200	MIDWOOD AVE	0.44	\$34,021
4	5/29/2012	1500	LAFAYETTE AVE (E)	0.30	\$20,534
3	5/29/2012	1900	OAKHILL AVE	0.22	\$17,849
4	5/30/2012	1100 - 1200	BOND STREET (N)	0.50	\$38,096
3	5/31/2012	2300 - 3100	PEIDMONT	0.44	\$36,471
3	6/1/2012	2500	ROSEDALE STREET	0.13	\$22,661
4	6/4/2012	4100 - 4400	COLBORNE ROAD	0.20	\$59,448
4	6/5/2012	4100 - 4400	WOODRIDGE RD	0.80	\$53,719
3	6/5/2012	3800	COLBORNE ROAD	0.20	\$14,706
3	6/6/2012	700	KEVIN AVE	0.14	\$11,244
3	6/7/2012	600 - 800	WHEELER ST (N)	0.81	\$64,773
4	6/8/2012	600	SCHRODER STREET (N)	0.30	\$22,421
4	6/9/2012	500	PULASKI STREET (S)	0.20	\$11,365
3	6/10/2012		PENN STATION/TAXI LANE	0.10	\$9,580
4	6/11/2012	600	BENTALOU STREET (S)	0.20	\$13,934
4	6/13/2012	1500 - 1700	HOMESTEAD AVE	0.72	\$52,447
3	6/13/2012	3600 - 3700	COTTAGE AVE	0.54	\$51,374
4	6/14/2012	2600 - 2700	POLK STREET	0.50	\$30,576
3	6/18/2012	900	LUZERNE AVE (N)	0.21	\$21,736
4	6/19/2012	1300 - 1500	ELLWOOD AVE (N)	0.50	\$40,046
4	6/19/2012	1400 - 1500	DECKER STREET (N)	0.33	\$25,132
3	6/19/2012	900	PORT STREET (N)	0.12	\$13,665
4	6/20/2012	1300 - 1400	POTOMAC STREET	0.50	\$37,497
3	6/22/2012	4100	HAGUE STREET	0.40	\$25,516
3	6/23/2012	4200	DUANE AVE	0.40	\$28,746
4	6/24/2012	1300	EVERETTE STREET	0.40	\$26,330
4	6/25/2012	3900	INNER CIRCLE	0.41	\$30,774
4	6/26/2012	400 - 500	HAWTHORNE RD	0.60	\$44,389
4	6/27/2012	100 - 200	OAKDALE ROAD	0.50	\$30,816
4	6/28/2012	4500 - 4600	WILMSLOW RD	0.60	\$50,576
4	7/2/2012	3300 - 3500	MENLO DRIVE	0.51	\$47,429
4	7/5/2012	3300 - 3500	DEVONSHIRE RD	0.50	\$44,555
4	7/6/2012	3900 - 4000	BROOKHILL RD	0.40	\$33,361
3	7/10/2012	1800	BRUNT STREET	0.10	\$8,878
3	7/10/2012	600	LAURENS ST	0.30	\$29,018
3	7/11/2012	UNIT BLK	WHEELING ST (E)	0.21	\$16,572
3	7/12/2012	1200	NORTHERN PKWY REAR (W)	0.30	\$16,112
3	7/13/2012	2400	BROOK ROAD	0.11	\$24,511
3	7/14/2012	5500	HAMLET AVE	0.24	\$24,078
	7/16/2012	4000 - 4300	CHATHAM ROAD	0.74	\$15,218
4	7/18/2012	1300	MORTON LANE	0.10	\$10,326
3	7/18/2012	4000 - 4100	CHESTERFIELD AVE	0.33	\$29,097

3	7/18/2012	3500	CHESTERFIELD AVE	0.33	\$24,319
	7/19/2012	3600 - 3700	BRENDAN AVE	0.30	\$5,820
	7/20/2012	1200 - 1500	SHERWOOD RD	0.31	\$38,071
4	7/25/2012	1700 - 1900	RAMBLEWOOD RD	0.90	\$53,550
4	7/27/2012	4400	UNDERWOOD ROAD	0.40	\$19,798
4	7/30/2012	2500 - 2600	RUSCOMBE LANE	0.30	\$19,587
3	7/31/2012	3900 - 4000	DUDLEY AVE	0.60	\$50,034
3	7/31/2012	3900	KENYON AVE	0.30	\$22,181
3	8/1/2012	3800	LYNDALE AVE	0.31	\$23,766
4	8/2/2012	3900 - 4000	RAVENWOOD AVE	0.50	\$32,253
4	8/4/2012	5900 - 6000	WAKEHURST WAY	0.30	\$20,357
4	8/6/2012	5900 - 6000	AYLESHIRE ROAD	0.33	\$22,643
4	8/7/2012	5900 - 6000	YORKWOOD ROAD	0.63	\$50,050
3	8/8/2012	2800	RIGGS AVENUE	0.24	\$25,405
3	8/9/2012	900 - 1000	ASHBURTON ST	0.41	\$35,609
4	8/10/2012	3000 - 3200	BAKER STREET	0.70	\$41,413
4	8/14/2012	3000 - 3200	BRIGHTON STREET	0.90	\$50,949
4	8/15/2012	2900 - 3100	PRESSTMAN STREET	0.52	\$40,248
4	8/17/2012	2900	WINCHESTER STREET	0.30	\$18,739
	8/18/2012	1100 - 1200	NORTH LONGWOOD ST	0.30	\$8,541
4	8/19/2012	100 - 300	EATON STREET (S)	0.80	\$37,677
	8/19/2012	2700 - 2800	MOSHER STREET	0.50	\$14,908
3	8/21/2012	3100 - 3200	BELMONT AVENUE	0.50	\$36,392
3	8/21/2012	3200	WESTMONT AVE	0.30	\$23,194
4	8/22/2012	2100 - 2200	CLIFTON AVE	0.50	\$38,745
4	8/23/2012	2100 - 2200	WALBROOK AVE	0.54	\$39,141
4	8/27/2012	1900 - 2100	SMALLWOOD ST	0.72	\$58,220
4	8/31/2012	500	EATON STREET (S)	0.21	\$17,977
4	9/1/2012	1300 - 1400	GORSUCH AVE	0.60	\$46,809
3	9/4/2012	2600	AISQUITH STREET	0.20	\$14,394
3	9/4/2012	2600	ROBB STREET	0.44	\$31,855
4	9/5/2012	3600 - 3700	MARMON AVE	0.80	\$61,753
4	9/7/2012	3600 - 3900	WOODBINE AVE	1.10	\$87,376
3	9/11/2012	400 - 500	WESTGATE ROAD	0.51	\$48,573
4	9/12/2012	4800 - 4900	WOODSIDE AVE	0.20	\$14,717
3	9/13/2012	3700 - 3900	MULBERRY ST (W)	0.54	\$44,284
4	9/17/2012	4300 - 4700	GLEN ARM AVE	1.33	\$84,222
4	9/19/2012	4600 - 4700	HELLWIG AVE	0.60	\$47,178
3	9/20/2012	1300 - 1500	LUZERNE AVE (N)	0.74	\$69,131
3	9/24/2012	100	MILTON AVE (N)	0.50	\$36,526
4	9/25/2012	5900 - 6100	CHINGUAPIN PKWY	0.64	\$108,476
4	9/28/2012	3300 - 3400	DOLFIELD AVE	1.30	\$84,378

3	10/2/2012	4700	ELMDALE AVE	0.24	\$18,191
3	10/2/2012	4000	PENHURST AVE	0.40	\$24,724
3	10/3/2012	2100 - 2200	HOMEWOOD AVE	0.51	\$81,727
4	10/6/2012	400	ROSEBANK AVE	0.33	\$25,265
4	10/7/2012	2800	DRUID PARK DRIVE	0.20	\$17,479
4	10/8/2012	4700	INA AVENUE	0.30	\$22,912
3	10/9/2012	3500	BUENA VISTA AVE	0.23	\$19,234
3	10/9/2012	3500 - 3600	POOLE STREET	0.31	\$17,881
4	10/11/2012	300 - 500	MILLINGTON AVE	0.42	\$35,034
3	10/15/2012	800	EDMONDSON AVE	0.33	\$27,434
3	10/16/2012	1100 - 1200	MYRTLE ST	0.54	\$40,036
4	10/17/2012	2000 - 2100	20TH ST (E)	0.32	\$27,028
3	10/17/2012	1400	MYRTLE STREET	0.23	\$16,262
3	10/18/2012	800	POWERS STREET	0.30	\$22,658
	10/20/2012	1600	OLMSTEAD STREET	0.22	\$6,465
4	10/21/2012	1500 - 1600	POPLAND AVE	0.41	\$36,563
4	10/22/2012	1600	ELMTREE AVENUE	0.24	\$19,933
	10/22/2012	1600	SPUCE STREET	0.22	\$4,455
3	10/23/2012	1700 - 1900	WESTWOOD AVE	0.23	\$47,881
	10/24/2012	1600 - 1800	FAYETTE ST (W)	0.80	\$13,971
	10/25/2012	1600 - 1800	LEXINGTON ST (W)	0.80	\$17,403
	10/27/2012	2100	MADISON AVE	0.23	\$7,080
3	10/28/2012	400	WILSON STREET	0.20	\$19,619
3	11/1/2012	1800	REGISTER ST	0.21	\$16,635
3	11/2/2012	1700	RUTLAND AVE	0.30	\$19,818
	11/4/2012	4400	LAWRENCE STREET	0.20	\$5,537
4	11/6/2012	400 - 500	KINGSTON RD	0.60	\$38,064
4	11/7/2012	5200 - 5300	WENDLEY RD	0.50	\$27,032
3	11/9/2012	5700	LUDDINGTON ST	0.13	\$12,301
3	11/13/2012	300	HIGH STREET (N)	0.20	\$12,309
3	11/14/2012	400	DALLAS STREET (S)	0.10	\$6,679
	11/14/2012	300	EXETER ST	0.20	\$4,266
4	11/15/2012	UNIT BLK	BERNICE AVE	0.30	\$25,900
4	11/17/2012	UNIT BLK	ELLAMONT ST	0.30	\$23,066
4	11/18/2012	UNIT BLK	ABINGTON ST (N/S)	0.30	\$21,718
	11/18/2012	UNIT BLK	ABINGTON AV	0.30	\$5,612
4	11/20/2012	1900	LANVALE STREET (W)	0.60	\$44,239
4	12/4/2012	600 - 700	PAYSON STREET (N)	0.60	\$40,195
4	12/14/2012	6210	PULASKI HWY PARKING LOT	1.00	\$32,734
4		1900 - 2100	WALBROOK AVE	0.54	\$43,351
4		3400 - 3500	LYNCHESTER RD	0.60	\$29,988
4		400 - 500	SCHRODER STREET	0.63	\$30,745

4		5300	BRABANT ROAD	0.31	\$14,207
4			BRIDGE MAINTENANCE YARD	0.20	\$59,220
TOTAL				71.90	\$5,223,932

Table 33: Individual Repaving Projects - 2011

Sector	Date	Street Number	Street Name	Lane Miles	Total Cost
4	3/15/2011	3201	BOSTON STREET		\$38,734.76
4	3/15/2011	UNIT BLK	BOULDER LANE	0.07	\$11,372.62
4	3/15/2011	100	ST MARTIN DRIVE	0.11	\$13,537.76
4	3/18/2011	5700	RIDGEDALE AVENUE	0.65	\$35,123.39
4	3/22/2011	1300 - 1500	BOND STREET (N)	0.78	\$63,374.88
4	3/24/2011	800	DUNCAN STREET (N)	0.08	\$11,576.10
4	3/25/2011	1800	32ND STREET (E)	0.16	\$16,022.68
4	3/30/2011	2300	SULGRAVE AVENUE	0.30	\$28,905.31
4	4/1/2011	5700 - 5800	OAKSHIRE ROAD	0.65	\$57,477.14
	4/1/2011	5600 - 5700	ROCKSPRING ROAD	0.21	\$5,602.46
4	4/2/2011	5600	GREENSPRING AVENUE	0.47	\$39,151.22
4	4/9/2011	3700 - 3800	PINKNEY ROAD	0.40	\$41,321.51
4	4/11/2011	5500	WESLEY AVENUE	0.35	\$26,495.06
4	4/12/2011	5700 - 5800	WOODCREST AVENUE	0.29	\$25,871.55
4	4/14/2011	3300 - 3400	FALLSTAFF ROAD	0.89	\$61,217.21
4	4/14/2011	6200	SAREVA ROAD	0.37	\$31,532.86
4	4/15/2011	3000	STRATHMORE AVENUE	0.00	\$16,115.97
4	4/18/2011	2400	EVERTON AVENUE	0.24	\$36,881.64
4	4/20/2011	6300	GREENMEADOW PARKWAY	0.58	\$51,820.87
4	4/21/2011	6400	EDENVALE ROAD	0.17	\$12,712.46
4	4/22/2011	3000 - 3200	GLENDALE ROAD	0.84	\$84,698.15
4	4/22/2011	2200 - 2300	ROGENE DRIVE	0.91	\$80,524.52
4	4/26/2011	3000 - 3100	HARVIEW AVENUE	0.52	\$43,861.04
4	4/28/2011	7200 - 7400	SHADOWLAWN AVENUE	0.33	\$28,733.90
4	5/5/2011	4300 - 4800	BAYONNE AVENUE	1.12	\$75,554.38
4	5/7/2011	3000 - 3100	CLEARVIEW AVENUE	0.52	\$42,970.02
4	5/11/2011	7200	GLENOAKS AVENUE	0.20	\$16,693.84
4	5/14/2011	4700	RENWICK AVENUE	0.16	\$7,884.70
4	5/16/2011	4500 - 4600	HAZELWOOD AVENUE	1.10	\$81,045.96
4	5/16/2011	3000 - 3100	SPAULDING AVENUE	0.49	\$50,045.90
4	5/18/2011	4900 - 5000	QUEENSBURY ROAD	0.32	\$20,922.65
4	5/21/2011	4700	NEWHOLME AVENUE	0.52	\$47,165.19
4	5/21/2011	5600 - 5700	WHITE AVENUE	0.55	\$38,163.73
4	5/24/2011	2900 - 3100	OAKLEY AVENUE	0.63	\$76,442.22
4	5/26/2011	4900 - 5000	CHARLGROVE AVENUE	0.31	\$25,820.91
4	6/2/2011	500	BENNINGHAUS ROAD	0.20	\$19,246.64
4	6/2/2011	1500 1600	WAGSWORTH WAY	1.40	\$104,192.84
4	6/7/2011	3200 - 3400	ELGIN AVENUE	0.63	\$55,706.58
4	6/7/2011	200	WESTWAY AVENUE	0.20	\$19,576.15

4	6/8/2011	300	HAWTHORNE ROAD	0.55	\$37,316.07
4	6/9/2011	3900 - 4000	BARRINGTON ROAD	0.43	\$37,815.50
4	6/13/2011	4000 - 4100	BATEMAN AVENUE	0.36	\$25,813.82
4	6/16/2011	3500 - 3700	CARSDALE AVENUE	0.50	\$36,851.28
4	6/21/2011	5000 - 5100	LEVINDALE AVENUE	0.44	\$37,962.30
4	6/23/2011	2400	BRENTWOOD AVENUE	0.36	\$36,079.22
4	6/24/2011	400	24TH STREET (E)	0.22	\$17,377.35
4	6/25/2011	400 - 700	21ST STREET (E)	0.63	\$47,996.56
4	6/28/2011	2100 - 2200	GUILFORD AVENUE	0.19	\$19,240.51
4	6/30/2011	1600 - 1800	31ST STREET (E)	0.50	\$43,534.33
4	7/1/2011	1600 - 1800	30TH STREET (E)	0.50	\$48,153.97
3	7/1/2011	2400	WESTPORT STREET	0.34	\$22,933.16
4	7/2/2011	1500 - 1600	GLENEAGLE ROAD	0.77	\$61,951.81
4	7/5/2011	5900	FENWICK AVENUE	0.32	\$26,940.80
3	7/5/2011	2700 - 2800	MAISEL STREET	0.28	\$23,788.70
3	7/6/2011	2400	NEVADA STREET	0.34	\$31,796.96
3	7/7/2011	2300	SIDNEY STREET	0.24	\$27,872.19
3	7/8/2011	1600	FILBERT STREET	0.19	\$20,009.44
4	7/12/2011	1500 - 1600	RAMBLEWOOD ROAD	0.80	\$72,486.24
3	7/13/2011	4100 - 4200	AUDREY AVENUE	0.53	\$51,887.41
3	7/16/2011		QUARANTINE ROAD LANDFILL		\$3,745.79
4	7/16/2011	4100 - 4200	TOWNSEND AVENUE	0.46	\$38,560.12
3	7/18/2011	100	GARRETT STREET (E)	0.08	\$8,486.80
3	7/19/2011	2100 - 2200	BARCLAY STREET	0.47	\$43,022.92
4	7/20/2011	1600 - 1800	BOND STREET (N)	0.59	\$50,088.39
	7/20/2011	3100 - 3200	REMINGTON AVENUE		\$25,481.09
4	7/21/2011	3400 - 3500	ESTHER PLACE	0.29	\$21,428.78
4	7/21/2011	3400 - 3500	HUDSON STREET	0.30	\$33,982.89
3	7/21/2011	500	MILTON AVENUE (S)	0.20	\$26,231.67
4	7/25/2011	3500 - 3800	EDGEWOOD ROAD	0.67	\$51,258.58
4	7/27/2011	3300	GILMAN TERRACE	0.14	\$14,754.23
3	7/27/2011	700	VAN LIL STREET	0.09	\$11,462.08
3	7/28/2011	6100	CHEMICAL ROAD	0.31	\$19,415.58
3	7/30/2011	3500 - 3700	DENNISON ROAD	0.41	\$37,547.11
4	7/30/2011	1100 - 1400	HULL STREET	1.22	\$61,761.14
3	8/2/2011	1300 - 1400	CLEMENT STREET	0.38	\$30,377.98
4	8/3/2011	900 - 1000	BELNORD AVENUE (S)	0.12	\$10,744.43
4	8/3/2011	1400	HAUBERT STREET	0.19	\$14,896.34
3	8/4/2011	1300	APPLEBY ROAD	0.15	\$13,995.57
4	8/4/2011	1300	DECATUR STREET	0.23	\$14,395.24
3	8/5/2011	200	MADEIRA STREET (S)	0.11	\$8,172.24
4	8/6/2011	900	TRINITY STREET	0.18	\$13,094.07

3	8/8/2011	200 - 300	OLDHAM STREET	0.45	\$35,634.97
4	8/8/2011	4300 - 4500	ST THOMAS AVENUE	0.84	\$56,343.57
4	8/11/2011	4800	CARMINE AVENUE	0.67	\$46,388.15
3	8/11/2011	500	DALLAS STREET (S)	0.06	\$7,597.22
4	8/11/2011	2700 - 2900	PARKWOOD AVENUE	0.41	\$36,305.39
3	8/12/2011	700	SINGER AVENUE	0.12	\$11,678.68
3	8/13/2011	6400	PULASKI HIGHWAY	3.13	\$159,513.51
4	8/18/2011	600 - 800	CHAPELGATE LANE	0.65	\$50,031.74
4	8/19/2011	3900 - 4000	GLENHUNT AVENUE	0.48	\$39,088.25
4	8/20/2011	4900 - 5000	LINDSAY ROAD	0.55	\$41,281.36
4	8/24/2011	1500 - 1600	LOCKWOOD AVNUE	0.59	\$42,937.27
4	8/26/2011	1700 - 2000	NORTHBOURNE ROAD	0.58	\$37,093.91
4	8/31/2011	1500 - 2000	BURNWOOD AVENUE	1.65	\$109,534.71
4	9/2/2011	3700	KINGSWOOD SQUARE	0.27	\$17,876.89
4	9/8/2011	7000	FIELDCREST ROAD	0.36	\$29,077.97
4	9/10/2011	1800 - 2000	HARLEM AVENUE	0.77	\$48,709.78
4	9/13/2011	200 - 300	LAFAYETTE AVENUE (W)	0.43	\$32,292.09
4	9/14/2011	UNIT BLK	OLIVER STREET (W)	0.31	\$24,090.85
4	9/14/2011	UNIT - 200	PARKIN STREET	0.61	\$53,111.47
3	9/14/2011	800	STRICKER STREET (N)	0.27	\$24,748.29
3	9/15/2011	1500	LANVALE (W)	0.26	\$25,027.44
3	9/19/2011	1800	AIKENS STREET	0.24	\$22,183.81
4	9/19/2011	2300 - 2400	OLIVER STREET (E)	0.52	\$47,837.86
3	9/20/2011	1800	HOPE STREET	0.19	\$14,374.73
3	9/21/2011	900	LAKEWOOD AVENUE (N)	0.20	\$20,423.95
4	9/21/2011	2300 - 2400	LANVALE (E)	0.49	\$31,058.93
4	9/22/2011	700	ST GEORGES STREET	0.17	\$19,585.01
4	9/23/2011	UNIT BLK	ELMHURST STREET	0.24	\$16,419.69
4	9/24/2011	UNIT BLK	MIDVALE ROAD	0.54	\$28,773.78
3	9/26/2011	1100	42ND STREET (W)	0.18	\$13,783.30
3	9/26/2011	4000	HICKORY AVENUE	0.24	\$15,392.84
4	9/27/2011	300	GOODWOOD GARDENS	0.17	\$17,019.40
3	9/27/2011	1100	WELDON AVENUE	0.16	\$13,460.29
4	9/28/2011	3600 - 3800	ELMORA AVENUE	0.91	\$58,826.52
4	9/30/2011	3600 - 3800	ELMLEY AVENUE	0.91	\$66,626.60
3	10/4/2011	1100	DECKER STREET (S)	0.11	\$11,014.56
3	10/5/2011	1400 - 1500	DECKER STREET (N)	0.33	\$29,906.67
4	10/6/2011	3600 - 3900	CHESTERFIELD AVENUE	0.71	\$50,395.46
3	10/6/2011	1300 - 1400	POTOMAC STREET	0.20	\$49,404.66
3	10/8/2011	1300 - 1500	ELLWOOD STREET (N)	0.50	\$39,469.71
4	10/11/2011	3000 - 3200	FERNDALE AVENUE	0.83	\$69,595.18
4	10/15/2011	3200 - 3300	HOWARD PARK AVENUE	0.48	\$42,092.99

4	10/17/2011	4700 - 4800	NORWOOD AVENUE	0.47	\$44,295.30
4	10/19/2011	2400 - 2600	KEYWORTH AVENUE	0.70	\$50,720.00
4	10/22/2011	3800	DERBY MANOR ROAD	0.30	\$36,707.12
4	10/23/2011	3800	ROLANDVIEW AVENUE	0.32	\$36,692.21
4	10/26/2011	2100 - 2200	BROOKFIELD AVENUE	0.76	\$62,248.61
4	10/26/2011	3800	PALL MALL ROAD	0.31	\$37,380.81
4	10/31/2011	2400 - 2600	SPRING HILL AVENUE	0.62	\$40,760.79
3	11/2/2011	3800 - 3900	COTTAGE AVENUE	0.38	\$35,881.67
4	11/4/2011	700 - 900	NEWINGTON AVENUE	0.81	\$66,129.70
4	11/7/2011	2200 - 2400	CALLOW AVENUE	0.90	\$84,487.07
3	11/7/2011	700	DRUID PARK DRIVE	0.41	\$33,318.08
4	11/7/2011	600 - 800	RESERVOIR STREET	1.34	\$89,511.64
3	11/11/2011	4900	ALSON DRIVE	0.25	\$23,762.84
4	11/14/2011	4900 - 5000	ST GEMMA ROAD	0.40	\$34,395.98
4	11/14/2011	800 - 1100	STAMFORD ROAD	0.58	\$57,265.19
4	11/18/2011	1000 - 1100	WEDGEWOOD AVENUE	0.53	\$39,830.22
3	11/19/2011	1500	BELT STREET	0.17	\$18,772.79
3	11/19/2011	1500	HENRY STREET	0.23	\$21,205.92
4	11/21/2011	4900 - 5000	VALLEYBROOK ROAD	0.53	\$33,839.04
4	11/28/2011	1500 - 1700	JACKSON STREET	0.49	\$42,254.51
4	11/29/2011	1500 - 1700	COVINGTON STREET	0.74	\$61,135.50
4	11/30/2011	500 - 700	BARNEY LANE	0.40	\$35,187.95
4	12/1/2011	1600 -1800	PARKMAN AVENUE	0.97	\$75,472.39
4	12/2/2011	500 - 700	HEATH STREET	0.59	\$49,272.79
4	12/3/2011	1600 - 1800	INVERNESS AVE	0.76	\$54,149.16
4	12/5/2011	2900 - 3000	JAMES STREET	0.31	\$22,446.96
4	12/6/2011	2900 - 3100	HERKIMER STREET	0.66	\$51,137.75
3	12/10/2011	1600	ELLAMONT STREET (S)	0.41	\$19,164.14
4	12/10/2011	4900	STAFFORD STREET	0.40	\$27,190.47
4	12/12/2011	400 - 600	WICKHAM ROAD (S)	0.51	\$33,395.83
4	12/13/2011	4900	CEDAR GARDEN LANE	0.30	\$15,201.88
4	12/14/2011	5100	WILLISTON STREET	0.43	\$31,399.41
4	12/17/2011	500 - 600	AIRY HILL AVENUE	0.38	\$29,737.43
	12/20/2011	300 - 400	TAYLOR AVENUE	0.25	\$5,565.90
3	12/21/2011	UNIT BLK	ROSEDALE STREET	0.18	\$8,304.75
TOTAL				72.39	\$5,839,039

APPENDIX III – PAVEMENT MANAGEMENT SYSTEM PRESERVATION REPORT - 2009

Executive Summary

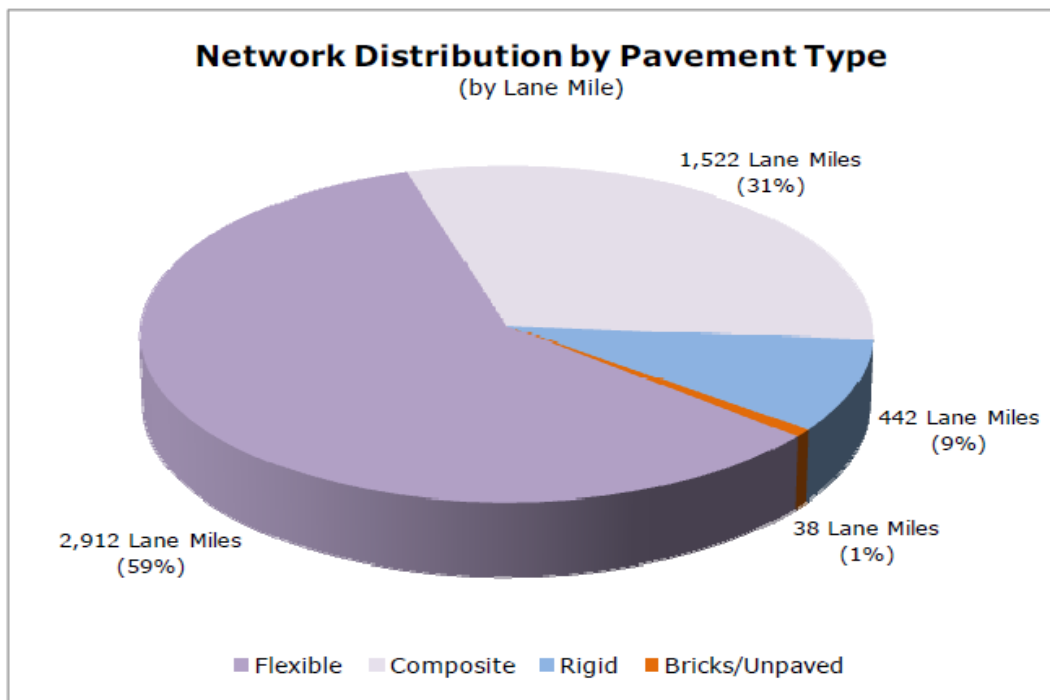
“If I had one dollar, where would I spend it to get the best return on my investment?”

Mary Peters, FHWA Administrator 2001 - 2005

With continued budget constraints and the scrutiny that all agencies are experiencing, Baltimore City chose to implement in 2008, with the assistance of its engineering consulting firm Axiom Decision Systems (Axiom), a modern comprehensive pavement management program to ensure that the dollars available will be spent in the best possible way. In addition, implementing the pavement management program established a mechanism to regularly evaluate the relative health of the pavement network to provide City decision makers with better information about the benefits and consequences of budget decisions and their effect on the pavement network for both today and the future.

This advanced approach comprises various processes, methodologies and engineering tools designed to supply the City with the latest data management and analysis information to be used in preserving and optimizing the maintenance of the pavement network.

The first step in the process is to collect the current condition for all of the streets in the City (the Pavement Network). Axiom conducted a windshield survey for every segment in the pavement network of **4,914** lane miles. The following chart displays the breakdown of lane miles by pavement type.



- Distribution of Pavement Network by Pavement Type -

The survey was conducted by a survey team of a driver and a surveyor driving every road segment at a slow speed. The surveyor visually examined the road segment to determine what, if any, pavement distresses such as cracking and rutting existed and if observed determined their severity and extent. Once the segments have been surveyed, a pavement condition index (PCI) was calculated from all of the distresses using an industry accepted process also used by the Federal Highway Administration (FHWA) as well as many states, counties and cities. The PCI is a single number from 0 to 100 that is used to report, in a comparable way, the relative condition of a pavement segment. Ranges of PCI's are grouped together to report the condition state of the segment. For Baltimore, the condition states are grouped as follows:

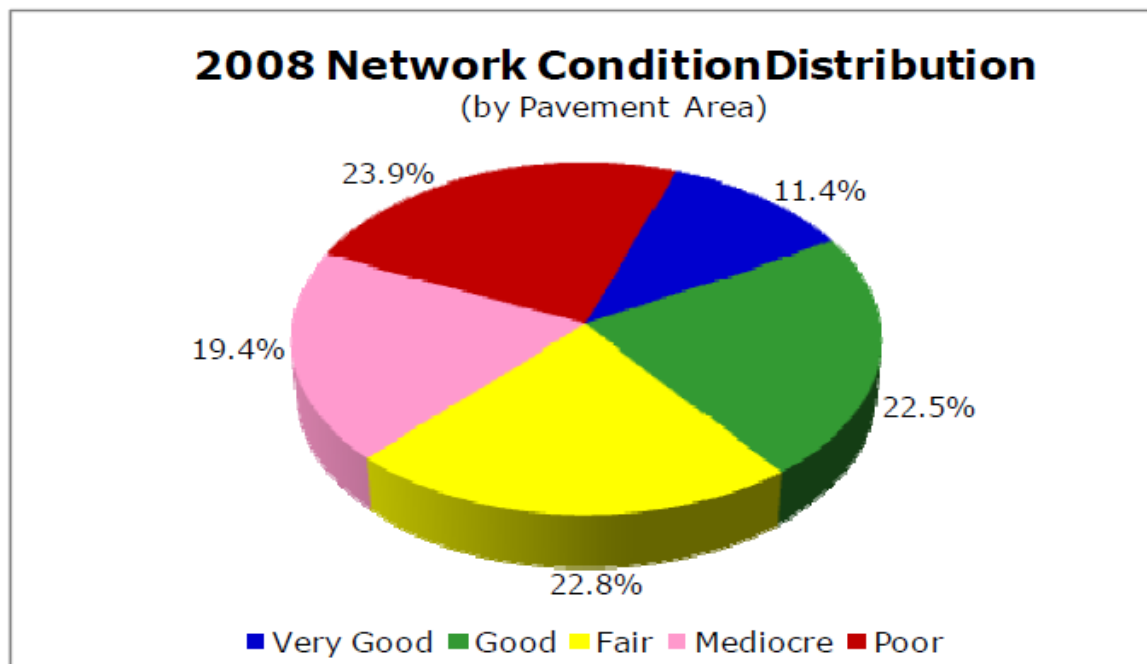
Condition State	PCI
Very Good	90 - 100
Good	80 - 90
Fair	70 - 80
Mediocre	55 - 70
Poor	< 55

Acceptable (bracketed around Very Good, Good, Fair)

Substandard (bracketed around Mediocre, Poor)

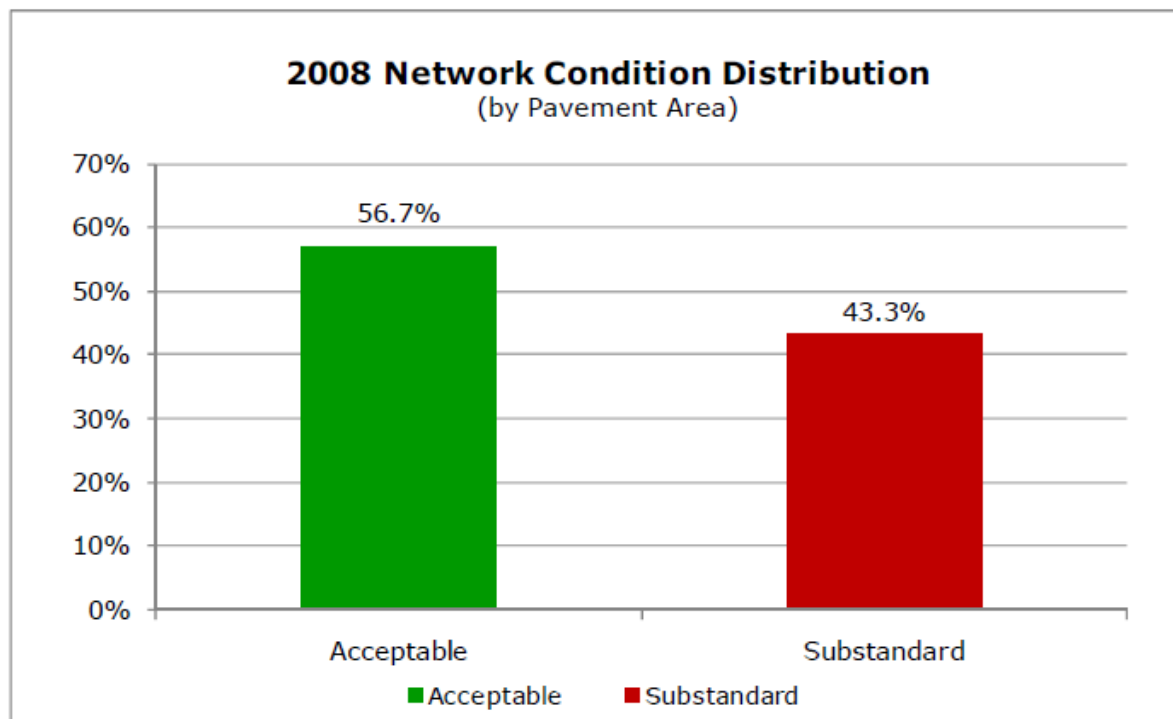
- Baltimore Condition State Table -

The following chart displays the percentages of Baltimore's pavement network by condition state:



- 2008 Network Condition Distribution -

Given the condition state, as the Baltimore condition table above shows, Very Good, Good and Fair are categorized as "Acceptable" and Mediocre and Poor are categorized as "Substandard". The following chart shows the current distribution of Acceptable versus Substandard for Baltimore.



- Baltimore Acceptable vs. Substandard -

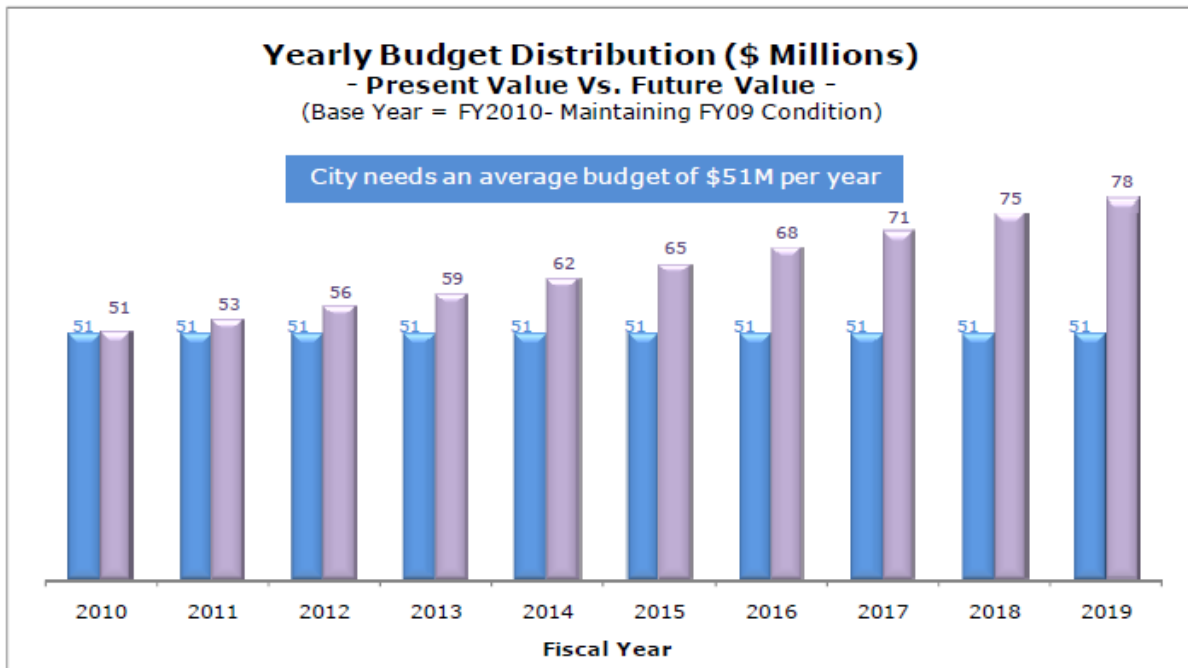
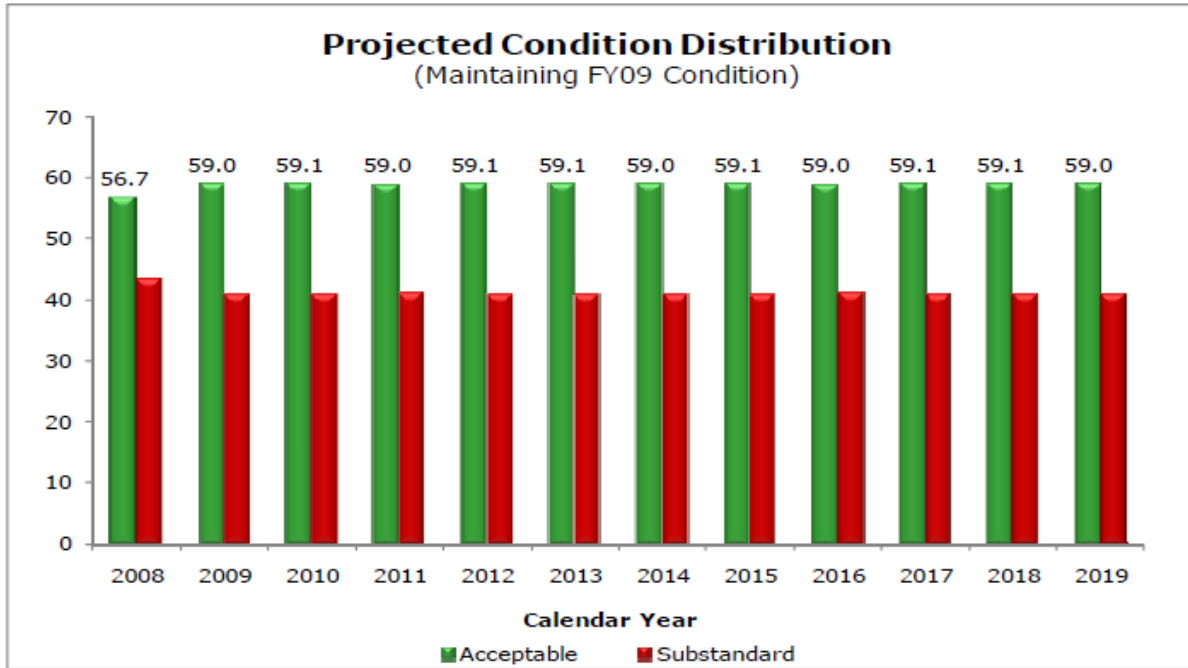
The City plans to spend 77 million dollars in FY09 on pavement maintenance and rehabilitation projects. With this FY09 investment the percentage of acceptable roads will improve from the current 56.7% as shown in the graph above to 59.0%. This is a significant increase given the size of the City's pavement network.

For future planning, Axiom completed analysis with a 10 year projection for two scenarios.

The analysis uses:

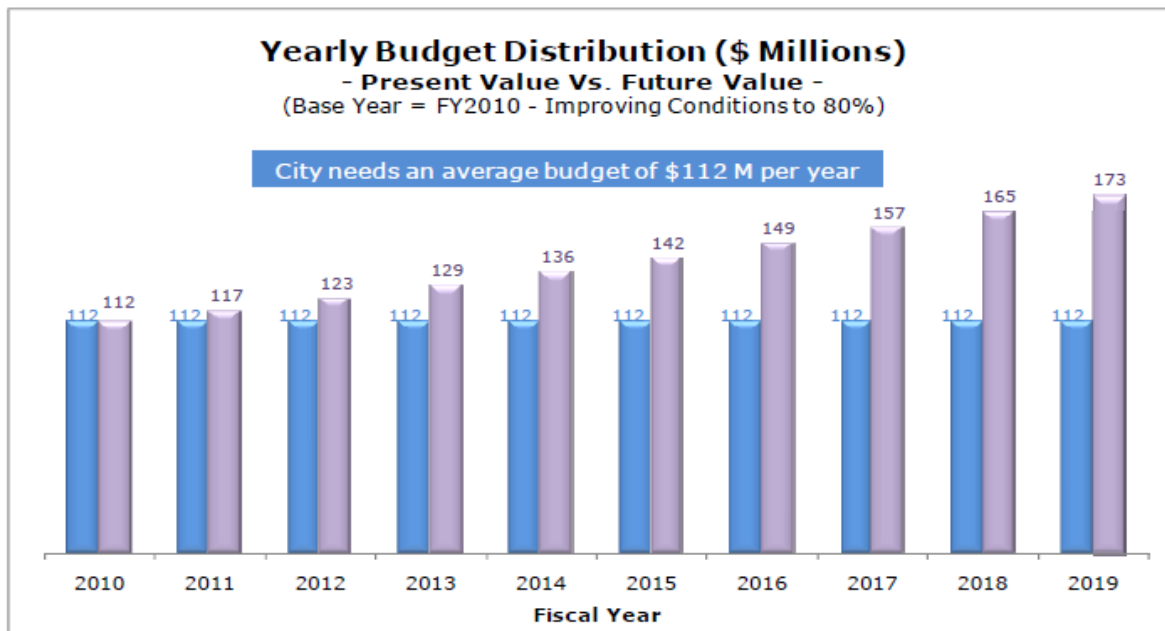
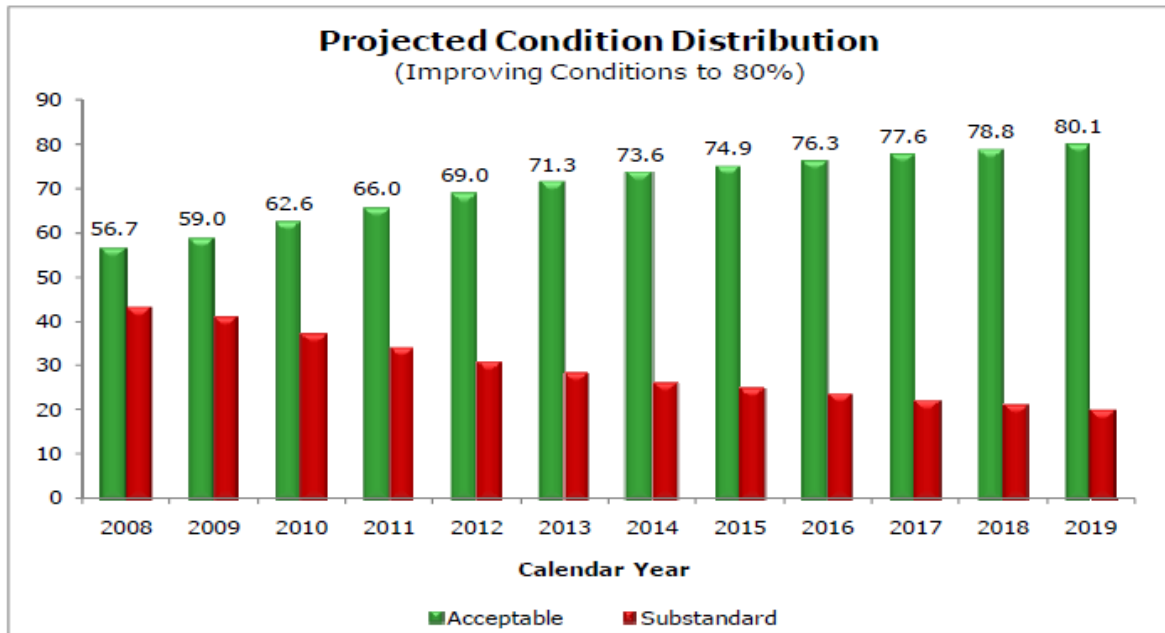
- ✚ the current condition data
- ✚ established mathematical models to forecast pavement deterioration given pavement type, road classification and construction history,
- ✚ decision trees to select the appropriate maintenance or rehabilitation treatment given the pavement distresses, their severity and extent
- ✚ cost and benefit data for each maintenance treatment
- ✚ tools from the field of operations research to conduct an exhaustive search considering every possible combination of maintenance treatment comparing the cost/benefit and selecting the optimum pavement preservation strategies

Scenario 1 determined the budget requirements to maintain the road conditions at the projected FY09 condition levels of 59%. The next two graphs show the results of the analysis. The first graph depicts the yearly condition of the pavement network given the annual investment depicted in the second graph. This shows the City's needs to maintain the condition improvement achieved in FY09.



Scenario 2 determined the budget requirements to improve the road network from FY 09 condition level of 59% to 80% within a period of 10 years. Currently, the Maryland State Highway Administration (SHA) maintains its roads in the mid 80s, Frederick County roads are at 84% level, and the City of Portland, Oregon is at 81%.

The next two graphs show the result of the analysis. The first graph depicts the yearly improvement in the condition of the pavement network given the annual investments depicted in the second graph. This shows the City’s needs to improve the network condition level to 80%.



Baltimore City Pavement Management

A base line and a beginning to implement a system preservation process have been established for the City including all of the components required by a comprehensive pavement management program.

These include:

- ✚ Condition data
- ✚ Construction History
- ✚ Pavement Performance Models
- ✚ Decision Tree Matrices
- ✚ Cost Data
- ✚ Benefit Quantification Process
- ✚ Funding Categories
- ✚ Maintenance Treatment Rules
- ✚ Traffic/Road Class Information
- ✚ Optimization Models

The ongoing challenge is to continue to gather, refine and update all of the data items and other components on a continuing and regular basis to fuel the pavement management program with the latest and most accurate data needed for analysis, planning, and forecasting.

Collecting the condition data next in 2010 and every other year thereafter will support the ongoing validation of the models and program and provide the feedback to refine and calibrate the tools and programs if needed.

The City, in continuing to commit to this program, will benefit from better and more accurate analysis and forecasting, yielding higher quality information, upon which to base the City's decisions for pavement preservation planning.

This powerful program enables the City to select the right maintenance treatment, for the right road, at the right time, for the minimum possible dollars, and the maximum benefit.

The City of Baltimore can now answer Mary Peters question.

APPENDIX IV – BUDGET DETAIL FOR STREET MANAGEMENT 683

Fiscal 2014

Service 683: Street Management

Priority Outcome: Stronger Neighborhoods

Agency: Transportation

Service Description: This service provides the preventive maintenance, resurfacing, reconstruction, and streetscaping of more than 4,300 lane miles of City roadways, as well as more than 1,100 lane miles of alleys throughout the City. The service utilizes in-house forces to resurface neighborhood streets.

Fund	Fiscal 2012 Actual		Fiscal 2013 Budget		Fiscal 2014 Recommended	
	Dollars	Positions	Dollars	Positions	Dollars	Positions
General	\$1,653,020	40	\$29,025,668	405	\$27,222,944	390
Motor Vehicle	\$25,617,796	360	-	-	-	-
TOTAL	\$27,270,816	400	\$29,025,668	405	\$27,222,944	390

PERFORMANCE MEASURES

Type	Measure	FY12 Actual	FY13 Target	FY14 Target
Output	Lane Miles Resurfaced (internal / contractor crews)	84 / 104	New Measure	80 / 120
Efficiency	Cost per lane mile resurfaced (\$ for internal crews)	New Measure	New Measure	\$85,000
Efficiency	% of potholes repaired within 48 hours of reporting	100%	90%	100%
Effectiveness	% of streets meeting acceptable pavement condition standard	58%	59%	59%
Outcome	% of citizens rating street and sidewalk maintenance as good or excellent	29%	29%	29%

MAJOR BUDGET ITEMS

- In addition to operating support, as part of the Mayor's Ten Year Financial Plan, this service will receive a \$10 million one-time infusion of capital funds to support road resurfacing.
- The recommendation realigns the budget to reflect actual expenditures by abolishing vacant positions and increasing funding for seasonal workers.

CHANGE TABLE-GENERAL FUND

FISCAL 2013 ADOPTED BUDGET	\$29,025,668
Changes with service impacts	
Increase funding for seasonal maintenance workers	566,748
Reduction in refuse tipping fees due to increased recycling of asphalt and paving materials	(1,074,542)
Reduction in overtime	(209,630)
Transfer two Engineering Associate II positions from Service 694 - Survey Control	88,220
Adjustments with no service impact	
Reduction in maintenance and repair costs based on prior expenditures	(642,075)
Abolishment of fourteen vacant positions	(441,416)
Elimination of pending personnel and increase in turnover savings	(476,022)
2% pay increase for employees	307,180
Adjustment for pension cost allocation	156,219
Annualization of health benefit reform savings (budgeted for half-year in FY13)	(291,797)
Adjustment for agency energy costs	(27,782)
Adjustment for City fleet rental and repair charges	379,818
Change in inter-agency transfer credits	7,335
Increase in employee compensation and benefits	(18,666)
Decrease in contractual services expenses	(75,506)
Decrease in operating supplies and equipment	(50,808)
FISCAL 2014 RECOMMENDED BUDGET	\$27,222,944

This reduction in tipping fees has not been realized in FY 2014. The budget for the year was \$231,018. As of December 31, 2013, there had been \$967,253 in tipping fees.

AGENCY: 7000 Transportation
 SERVICE: 683 Street Management

SERVICE BUDGET SUMMARY

	Actual FY 2012	Budgeted FY 2013	Recommended FY 2014	Change In Budget
EXPENDITURES BY OBJECT:				
0 Transfers	-4,625,076	-7,220,127	-7,212,792	7,335
1 Salaries	14,354,231	16,315,466	16,092,469	-222,997
2 Other Personnel Costs	4,603,299	8,186,427	8,090,260	-96,167
3 Contractual Services	8,094,420	7,640,696	6,842,684	-798,012
4 Materials and Supplies	4,800,276	3,884,386	3,371,561	-512,825
5 Equipment - \$4,999 or less	36,538	38,020	38,762	742
6 Equipment - \$5,000 and over	7,128	180,800	0	-180,800
TOTAL OBJECTS	\$27,270,816	\$29,025,668	\$27,222,944	\$-1,802,724
EXPENDITURES BY ACTIVITY:				
1 Highway Maintenance - Administration	2,796,876	3,521,955	3,568,789	46,834
2 Street Management - Project Development and Engineering	79,538	84,485	95,297	10,812
3 Alleys	376,226	72,396	89,352	16,956
4 Rehab. Maintenance & Repairs	20,640,608	22,064,633	20,111,810	-1,952,823
6 Construction Contract Inspection & Testing	4,630,650	5,830,888	6,061,824	230,936
7 Highway Engineering	296,701	1,837,756	1,844,516	6,760
9 Facility support	1,688,196	1,917,857	1,768,878	-148,979
11 Night Services	503,619	851,043	837,355	-13,688
26 Transfers	-3,741,598	-7,179,345	-7,179,345	0
889 Emergency Preparedness	0	24,000	24,468	468
TOTAL ACTIVITIES	\$27,270,816	\$29,025,668	\$27,222,944	\$-1,802,724
EXPENDITURES BY FUND:				
General	1,653,020	29,025,668	27,222,944	-1,802,724
Motor Vehicle	25,617,796	0	0	0
TOTAL FUNDS	\$27,270,816	\$29,025,668	\$27,222,944	\$-1,802,724

AGENCY: 7000 Transportation
 SERVICE: 683 Street Management

SERVICE SALARIES AND WAGES FOR PERMANENT FULL-TIME FUNDED POSITIONS

Class Code	Position Class Title	Grade	FY 2013	B of E	FY 2014		Additional Changes		Recommended FY 2014 Budget	
			Budget	Changes	Total Projected	Number	Amount	Number	Amount	Number
General Fund										
101	Permanent Full-time									
10173	DIVISION CHIEF III	955	2	0	2	185,600	0	0	2	185,600
72125	ENGINEER SUPERVISOR (PE)	120	2	0	2	164,900	0	0	2	164,900
72133	BRIDGE PROJECT ENGINEER	119	1	0	1	87,100	0	0	1	87,100
42222	CONSTRUCTION PROJECT SUPV II	118	4	0	4	313,300	0	0	4	313,300
72123	ENGINEER III (PE)	117	3	0	3	218,400	0	0	3	218,400
72113	ENGINEER III	116	1	0	1	72,000	0	0	1	72,000
53335	GENL SUPT TRANSPORTATION MAINT	116	2	0	2	127,000	0	0	2	127,000
74138	CITY PLANNER III	115	1	0	1	63,400	0	0	1	63,400
42221	CONSTRUCTION PROJECT SUPV I	115	6	0	6	405,100	0	0	6	405,100
10210	OIG AGENT	115	0	1	1	52,000	0	0	1	52,000
72112	ENGINEER II	113	3	0	3	165,100	0	0	3	165,100
53332	SUPERINTENDENT OF TRANSPORTATI	113	5	0	5	314,300	0	0	5	314,300
72713	ENGINEERING ASSOCIATE III	092	4	0	4	256,575	1	46,889	5	303,464
42213	PUBLIC WORKS INSPECTOR III	092	23	0	23	1,428,733	0	0	23	1,428,733
31101	ADMINISTRATIVE OFFICER I	111	1	0	1	58,700	0	0	1	58,700
72722	TRANSPORTATION ASSOC II	089	1	-1	0	0	0	0	0	0
72712	ENGINEERING ASSOCIATE II	089	6	0	6	327,331	1	41,331	7	368,662
53425	ELECTRICAL MECH SUPV ST LIGHTG	087	1	0	1	51,634	0	0	1	51,634
53331	HIGHWAY MAINTENANCE SUPERVISOR	087	12	0	12	608,636	0	0	12	608,636
52995	EVENTS MANAGER	087	0	1	1	40,249	0	0	1	40,249
52225	MASON SUPERVISOR	087	1	0	1	49,097	0	0	1	49,097
42212	PUBLIC WORKS INSPECTOR II	087	32	0	32	1,480,472	0	0	32	1,480,472
33189	GIS TECHNICIAN	087	1	0	1	47,483	0	0	1	47,483
31100	ADMINISTRATIVE COORDINATOR	087	1	0	1	51,634	0	0	1	51,634
54432	HEAVY EQUIPMENT OPERATOR II	433	22	-1	21	847,486	-5	-173,540	16	673,946
53221	BUILDING OPERATIONS SUPERVISOR	084	1	0	1	34,163	-1	-34,163	0	0
42211	PUBLIC WORKS INSPECTOR I	084	3	0	3	118,494	0	0	3	118,494
33215	OFFICE SUPERVISOR	084	7	0	7	320,793	0	0	7	320,793
53312	STREET MASON	432	2	0	2	83,030	0	0	2	83,030
52222	MASON II	432	2	0	2	80,305	0	0	2	80,305
72512	CIVIL ENG DRAFTING TECH II	083	2	0	2	83,749	0	0	2	83,749
42241	MATERIALS INSPECTOR I	082	1	0	1	33,095	0	0	1	33,095
54431	HEAVY EQUIPMENT OPERATOR I	429	1	0	1	30,852	-1	-30,852	0	0
53111	BUILDING REPAIRER	429	2	-1	1	37,046	0	0	1	37,046
52943	LABORER CREW LEADER II	429	18	0	18	662,669	-1	-30,852	17	631,817
52242	CARPENTER II	429	2	0	2	61,704	-1	-30,852	1	30,852
52221	MASON I	429	2	0	2	68,917	0	0	2	68,917
33113	DATA ENTRY OPERATOR III	081	0	1	1	28,503	0	0	1	28,503
33562	STOREKEEPER II	080	1	0	1	37,304	0	0	1	37,304
52241	CARPENTER I	426	2	0	2	65,215	-1	-29,216	1	35,999
42412	TRAFFIC INVESTIGATOR II	079	4	0	4	139,046	0	0	4	139,046
33258	WORD PROCESSING OPERATOR III	078	3	-2	1	36,813	0	0	1	36,813
33253	TYPIST III	078	1	0	1	32,870	0	0	1	32,870
33213	OFFICE ASSISTANT III	078	10	0	10	343,093	0	0	10	343,093
33112	DATA ENTRY OPERATOR II	078	1	0	1	34,841	0	0	1	34,841
54437	DRIVER I	424	3	0	3	93,615	0	0	3	93,615
53122	CUSTODIAL WORKER II	423	1	0	1	32,674	0	0	1	32,674
52951	UTILITY AIDE	422	1	0	1	28,764	0	0	1	28,764
33212	OFFICE ASSISTANT II	075	16	0	16	464,564	0	0	16	464,564
53121	CUSTODIAL WORKER I	420	3	-1	2	56,418	0	0	2	56,418

AGENCY: 7000 Transportation
 SERVICE: 683 Street Management

SERVICE SALARIES AND WAGES FOR PERMANENT FULL-TIME FUNDED POSITIONS

Class Code	Position Class Title	Grade	FY 2013 Budget	B of E Changes	FY 2014 Total Projected		Additional Changes		Recommended FY 2014 Budget	
			Number	Number	Number	Amount	Number	Amount	Number	Amount
41521	GUARD I	072	1	0	1	25,563	-1	-25,563	0	0
54412	MOTOR VEHICLE DRIVER II (HRLY)	490	6	0	6	223,168	0	0	6	223,168
54411	MOTOR VEHICLE DRIVER I	487	46	0	46	1,448,818	0	0	46	1,448,818
53311	CEMENT FINISHER	487	9	0	9	295,667	0	0	9	295,667
52932	LABORER CREW LEADER I	486	10	0	10	318,098	-1	-29,370	9	288,728
52931	LABORER (HOURLY)	482	109	0	109	3,288,783	-2	-62,500	107	3,226,283
Total 101 Permanent Full-time			405	-3	402	16,024,864	-12	-358,688	390	15,666,176
Total All Funds			405	-3	402	16,024,864	-12	-358,688	390	15,666,176

Fiscal 2013

683. Street Management

Service Description

This service provides the preventive maintenance, resurfacing, reconstruction, and street-scaping of more than 4,300 lane miles of City roadways, as well as more than 1,100 lane miles of alleys throughout the City.

Recommendation vs. CLS

The General Fund recommendation for Fiscal 2013 is \$29,025,668, a decrease of \$1,683,126 or 5.5% below the current level of service. The Fiscal 2013 recommendation will allow for maintenance of the current level of service. In Fiscal 2013, the service expects to resurface or reconstruct 200 lane miles as well as repair 90% of potholes within 48 hours.

Recommendation vs. Fiscal 2012

The following table details the budget changes for the General and Motor Vehicle Funds.

FISCAL 2012 ADOPTED BUDGET	\$26,817,861
Adjustments with no service impact	
Capital budget project support	(941,776)
Removal of payment to Service 681 - DOT Administration	(156,000)
Reduction in Real Property Maintenance and Repair Supplies	(135,184)
Elimination of funding for prior year projects	(336,552)
Elimination of employee furloughs	218,432
Allocation of pension costs to employee level (budgeted centrally in FY12)	3,197,671
Savings from Health Benefit reforms	(225,263)
Adjustment for City fleet rental and repair charges	645,188
Change in inter-agency transfer credits	5,923
Decrease in employee compensation and benefits	(35,414)
Decrease in contractual services expenses	(41,403)
Increase in operating supplies and equipment	12,185
FISCAL 2013 RECOMMENDED BUDGET	\$29,025,668

Performance Measures

Type	Measure	FY11 Actual	FY12 Target	FY13 Target
Output	Lane Miles Resurfaced or Reconstructed (internal + contractor forces)	175	235	200
Efficiency	Resurfacing cost per lane mile	\$115,000	\$115,800	\$120,000
Efficiency	% of potholes repaired within 48 hours of reporting	90%	100%	90%
Effectiveness	% of streets meeting acceptable pavement condition standard	58%	58%	59%
Outcome	% of citizens rating street and sidewalk maintenance as good or excellent	29%	29%	29%

AGENCY: 7000 Transportation
 SERVICE: 683 Street Management

SERVICE BUDGET SUMMARY

	Budgeted FY 2012	Current Svc FY 2013	Recommended FY 2013	Change In Budget
EXPENDITURES BY OBJECT:				
0 Transfers	-6,128,274	-6,119,855	-7,220,127	-1,091,853
1 Salaries	15,803,390	16,508,719	16,315,466	512,076
2 Other Personnel Costs	5,543,077	7,865,204	8,186,427	2,643,350
3 Contractual Services	7,373,463	8,079,416	7,640,696	267,233
4 Materials and Supplies	4,010,831	4,156,490	3,884,386	-126,445
5 Equipment - \$4,999 or less	37,421	38,020	38,020	599
6 Equipment - \$5,000 and over	177,953	180,800	180,800	2,847
TOTAL OBJECTS	\$26,817,861	\$30,708,794	\$29,025,668	\$2,207,807
EXPENDITURES BY ACTIVITY:				
1 Highway Maintenance - Administration	2,767,974	3,523,114	3,521,955	753,981
2 Street Management - Project Development and Engine	72,243	84,624	84,485	12,242
3 Alleys	167,999	230,989	72,396	-95,603
4 Rehab. Maintenance & Repairs	20,857,823	22,547,085	22,064,633	1,206,810
6 Construction Contract Inspection & Testing	4,985,700	5,862,946	5,830,888	845,188
7 Highway Engineering	1,641,350	1,858,560	1,837,756	196,406
9 Facility support	1,771,935	1,960,852	1,917,857	145,922
11 Night Services	766,406	854,193	851,043	84,637
26 Transfers	-6,237,569	-6,237,569	-7,179,345	-941,776
889 Emergency Preparedness	24,000	24,000	24,000	0
TOTAL ACTIVITIES	\$26,817,861	\$30,708,794	\$29,025,668	\$2,207,807
EXPENDITURES BY FUND:				
General	2,462,494	30,708,794	29,025,668	26,563,174
Motor Vehicle	24,355,367	0	0	-24,355,367
TOTAL FUNDS	\$26,817,861	\$30,708,794	\$29,025,668	\$2,207,807

AGENCY: 7000 Transportation
 SERVICE: 683 Street Management

SERVICE SALARIES AND WAGES FOR PERMANENT FULL-TIME FUNDED POSITIONS

Class Code	Position Class Title	Grade	FY 2012	B of E	FY 2013		Additional Changes		Recommended	
			Budget	Changes	Total Projected	Number	Amount	FY 2013 Budget	Number	Amount
			Number	Number	Number	Amount	Number	Amount	Number	Amount
General Fund										
101	Permanent Full-time									
10173	DIVISION CHIEF III	955	0	0	0	0	2	182,100	2	182,100
72125	ENGINEER SUPERVISOR (PE)	120	0	0	0	0	2	161,100	2	161,100
72133	BRIDGE PROJECT ENGINEER	119	0	1	1	61,900	0	0	1	61,900
42222	CONSTRUCTION PROJECT SUPV II	118	0	0	0	0	4	290,000	4	290,000
72123	ENGINEER III (PE)	117	0	1	1	53,900	2	134,600	3	188,500
72113	ENGINEER III	116	0	0	0	0	1	68,900	1	68,900
53335	GENL SUPT TRANSPORTATION MAINT	116	0	0	0	0	2	143,000	2	143,000
74138	CITY PLANNER III	115	0	1	1	56,500	0	0	1	56,500
42221	CONSTRUCTION PROJECT SUPV I	115	0	1	1	51,000	5	328,800	6	379,800
72112	ENGINEER II	113	0	0	0	0	3	162,500	3	162,500
53332	SUPERINTENDENT OF TRANSPORTATI	113	1	0	1	46,700	4	247,700	5	294,400
72713	ENGINEERING ASSOCIATE III	092	1	1	2	110,396	2	125,448	4	235,844
42213	PUBLIC WORKS INSPECTOR III	092	1	2	3	156,388	20	1,231,308	23	1,387,696
31101	ADMINISTRATIVE OFFICER I	111	0	0	0	0	1	57,600	1	57,600
72722	TRANSPORTATION ASSOC II	089	0	0	0	0	1	55,745	1	55,745
72712	ENGINEERING ASSOCIATE II	089	1	0	1	56,607	5	259,336	6	315,943
53425	ELECTRICAL MECH SUPV ST LIGHTG	087	0	0	0	0	1	50,646	1	50,646
53331	HIGHWAY MAINTENANCE SUPERVISOR	087	1	0	1	49,289	11	560,622	12	609,911
52225	MASON SUPERVISOR	087	0	0	0	0	1	47,932	1	47,932
42212	PUBLIC WORKS INSPECTOR II	087	2	0	2	104,006	30	1,424,415	32	1,528,421
33189	GIS TECHNICIAN	087	0	0	0	0	1	46,575	1	46,575
31100	ADMINISTRATIVE COORDINATOR	087	0	0	0	0	1	50,533	1	50,533
54432	HEAVY EQUIPMENT OPERATOR II	433	3	2	5	184,394	17	686,767	22	871,161
53221	BUILDING OPERATIONS SUPERVISOR	084	1	0	1	33,510	0	0	1	33,510
42211	PUBLIC WORKS INSPECTOR I	084	0	0	0	0	3	117,319	3	117,319
33215	OFFICE SUPERVISOR	084	1	0	1	40,254	6	271,724	7	311,978
53312	STREET MASON	432	0	0	0	0	2	80,705	2	80,705
52222	MASON II	432	0	0	0	0	2	77,295	2	77,295
72512	CIVIL ENG DRAFTING TECH II	083	1	0	1	33,554	1	39,584	2	73,138
42241	MATERIALS INSPECTOR I	082	0	0	0	0	1	31,534	1	31,534
54431	HEAVY EQUIPMENT OPERATOR I	429	0	0	0	0	1	30,262	1	30,262
53111	BUILDING REPAIRER	429	2	0	2	66,599	0	0	2	66,599
52943	LABORER CREW LEADER II	429	1	2	3	110,011	15	546,147	18	656,158
52242	CARPENTER II	429	2	0	2	67,599	0	0	2	67,599
52221	MASON I	429	0	0	0	0	2	67,599	2	67,599
33562	STOREKEEPER II	080	0	0	0	0	1	36,590	1	36,590
52241	CARPENTER I	426	3	0	3	92,624	-1	-28,657	2	63,967
42412	TRAFFIC INVESTIGATOR II	079	0	0	0	0	4	120,555	4	120,555
33258	WORD PROCESSING OPERATOR III	078	1	0	1	27,958	2	72,218	3	100,176
33253	TYPIST III	078	0	0	0	0	1	32,241	1	32,241
33213	OFFICE ASSISTANT III	078	0	1	1	27,958	9	307,764	10	335,722
33112	DATA ENTRY OPERATOR II	078	0	0	0	0	1	33,933	1	33,933
54437	DRIVER I	424	0	0	0	0	3	95,285	3	95,285
53122	CUSTODIAL WORKER II	423	0	0	0	0	1	31,331	1	31,331
52951	UTILITY AIDE	422	1	0	1	28,214	0	0	1	28,214
33212	OFFICE ASSISTANT II	075	2	1	3	83,045	13	374,822	16	457,867
53121	CUSTODIAL WORKER I	420	1	0	1	26,214	2	54,656	3	80,870
41521	GUARD I	072	0	0	0	0	1	30,656	1	30,656
54412	MOTOR VEHICLE DRIVER II (HRLY)	490	0	0	0	0	6	212,991	6	212,991
54411	MOTOR VEHICLE DRIVER I	487	4	0	4	125,002	42	1,284,594	46	1,409,596

AGENCY: 7000 Transportation
 SERVICE: 683 Street Management

SERVICE SALARIES AND WAGES FOR PERMANENT FULL-TIME FUNDED POSITIONS

Class Code	Position Class Title	Grade	FY 2012	B of E	FY 2013		Additional Changes		Recommended	
			Budget	Changes	Total Projected		Number	Amount	FY 2013 Budget	Amount
			Number	Number	Number	Amount	Number	Amount	Number	Amount
53311	CEMENT FINISHER	487	0	0	0	0	9	288,599	9	288,599
52932	LABORER CREW LEADER I	486	0	0	0	0	10	319,627	10	319,627
52931	LABORER (HOURLY)	482	10	0	10	291,256	99	2,941,821	109	3,233,077
Total 101 Permanent Full-time			40	13	53	1,984,878	352	13,786,822	405	15,771,700
Motor Vehicle Fund										
101	Permanent Full-time									
10173	DIVISION CHIEF III	955	2	0	2	182,100	-2	-182,100	0	0
72125	ENGINEER SUPERVISOR (PE)	120	2	0	2	161,100	-2	-161,100	0	0
42222	CONSTRUCTION PROJECT SUPV II	118	4	0	4	290,000	-4	-290,000	0	0
72123	ENGINEER III (PE)	117	2	0	2	134,600	-2	-134,600	0	0
72113	ENGINEER III	116	2	0	2	122,800	-2	-122,800	0	0
53335	GENL SUPT TRANSPORTATION MAINT	116	2	0	2	143,000	-2	-143,000	0	0
42221	CONSTRUCTION PROJECT SUPV I	115	5	0	5	328,800	-5	-328,800	0	0
74137	CITY PLANNER II	113	1	-1	0	0	0	0	0	0
72112	ENGINEER II	113	3	0	3	162,500	-3	-162,500	0	0
53332	SUPERINTENDENT OF TRANSPORTATI	113	4	0	4	247,700	-4	-247,700	0	0
72713	ENGINEERING ASSOCIATE III	092	2	0	2	125,448	-2	-125,448	0	0
42213	PUBLIC WORKS INSPECTOR III	092	20	0	20	1,231,308	-20	-1,231,308	0	0
31101	ADMINISTRATIVE OFFICER I	111	1	0	1	57,600	-1	-57,600	0	0
72722	TRANSPORTATION ASSOC II	089	1	0	1	55,745	-1	-55,745	0	0
72712	ENGINEERING ASSOCIATE II	089	5	0	5	259,336	-5	-259,336	0	0
53425	ELECTRICAL MECH SUPV ST LIGHTG	087	1	0	1	50,646	-1	-50,646	0	0
53331	HIGHWAY MAINTENANCE SUPERVISOR	087	11	0	11	560,622	-11	-560,622	0	0
52225	MASON SUPERVISOR	087	1	0	1	47,932	-1	-47,932	0	0
42212	PUBLIC WORKS INSPECTOR II	087	30	0	30	1,424,415	-30	-1,424,415	0	0
33189	GIS TECHNICIAN	087	1	0	1	46,575	-1	-46,575	0	0
31100	ADMINISTRATIVE COORDINATOR	087	1	0	1	50,533	-1	-50,533	0	0
54432	HEAVY EQUIPMENT OPERATOR II	433	17	0	17	686,767	-17	-686,767	0	0
42211	PUBLIC WORKS INSPECTOR I	084	11	-8	3	117,319	-3	-117,319	0	0
33215	OFFICE SUPERVISOR	084	6	0	6	271,724	-6	-271,724	0	0
53312	STREET MASON	432	2	0	2	80,705	-2	-80,705	0	0
52222	MASON II	432	2	0	2	77,295	-2	-77,295	0	0
72512	CIVIL ENG DRAFTING TECH II	083	1	0	1	39,584	-1	-39,584	0	0
42241	MATERIALS INSPECTOR I	082	1	0	1	31,534	-1	-31,534	0	0
54431	HEAVY EQUIPMENT OPERATOR I	429	1	0	1	30,262	-1	-30,262	0	0
52943	LABORER CREW LEADER II	429	15	0	15	546,147	-15	-546,147	0	0
52221	MASON I	429	1	0	1	37,337	-1	-37,337	0	0
33562	STOREKEEPER II	080	1	0	1	36,590	-1	-36,590	0	0
42412	TRAFFIC INVESTIGATOR II	079	4	0	4	120,555	-4	-120,555	0	0
33258	WORD PROCESSING OPERATOR III	078	2	0	2	72,218	-4	-72,218	0	0
33253	TYPIST III	078	1	0	1	32,241	-1	-32,241	0	0
33213	OFFICE ASSISTANT III	078	9	0	9	307,764	-9	-307,764	0	0
33112	DATA ENTRY OPERATOR II	078	1	0	1	33,933	-1	-33,933	0	0
54437	DRIVER I	424	3	0	3	95,285	-3	-95,285	0	0
53122	CUSTODIAL WORKER II	423	1	0	1	31,331	-1	-31,331	0	0
33212	OFFICE ASSISTANT II	075	13	0	13	374,822	-13	-374,822	0	0
53121	CUSTODIAL WORKER I	420	2	0	2	54,656	-2	-54,656	0	0

AGENCY: 7000 Transportation
 SERVICE: 683 Street Management

SERVICE SALARIES AND WAGES FOR PERMANENT FULL-TIME FUNDED POSITIONS

Class Code	Position Class Title	Grade	FY 2012	B of E	FY 2013		Additional Changes		Recommended	
			Budget	Changes	Total Projected	Number	Amount	Number	Amount	FY 2013 Budget
41521	GUARD I	072	1	0	1	30,656	-1	-30,656	0	0
54412	MOTOR VEHICLE DRIVER II (HRLY)	490	6	0	6	212,991	-6	-212,991	0	0
54411	MOTOR VEHICLE DRIVER I	487	42	0	42	1,284,594	-42	-1,284,594	0	0
53311	CEMENT FINISHER	487	9	0	9	288,599	-9	-288,599	0	0
52932	LABORER CREW LEADER I	486	12	-2	10	319,627	-10	-319,627	0	0
52931	LABORER (HOURLY)	482	95	0	95	2,822,055	-95	-2,822,055	0	0
Total 101 Permanent Full-time			360	-11	349	13,719,351	-351	-13,719,351	0	0
Total All Funds			400	2	402	15,704,229	1	67,471	405	15,771,700

Fiscal 2012

683. Street Management

Service Description

This service provides the preventive maintenance, resurfacing, reconstruction, and street-scaping of more than 4,300 lane miles of City roadways, as well as more than 1,100 lane miles of alleys throughout the City.

Budget Summary

The General and Motor Vehicles Funds recommendation is \$468,221 (1.8%) above the Fiscal 2011 level of appropriation. The number of lane miles resurfaced will increase from 200 to 235, 100% of potholes will be repaired on time, and other standards for basic services (salt boxes, bench repairs, curb repairs) will be maintained.

Budget Changes

The following table details the budget changes for the General and Motor Vehicle Funds. Please note that the change in employee benefits and compensation line includes a 2% COLA for most unions plus savings from new health benefit management measures:

FISCAL 2011 ADOPTED BUDGET	\$26,349,640
<u>Changes with service impacts</u>	
Increased funding for two new resurfacing crew positions	96,497
Increase in maintenance supplies to resurface 30 additional lane miles	1,758,900
<u>Adjustments with no service impact</u>	
Eliminate funding for two vacant Carpenter positions	(58,873)
Change in internal agency transfer credits	(1,690,010)
Adjustment for employee furlough savings (budgeted centrally in FY11)	(218,432)
Adjustment for employee levels, longevity, and sick leave conversion (unbudgeted in FY11)	117,502
Increase in employee compensation and benefits	531,599
Decrease in contractual services expenses	(41,003)
Increase in operating supplies and equipment	(27,959)
FISCAL 2012 RECOMMENDED BUDGET	\$26,817,861

Performance Measures

Type	Measure	FY10 Actual	FY11 Target	FY12 Target
Output	Lane Miles Resurfaced or Reconstructed (internal + contractor forces)	200	200	235
Efficiency	% of potholes repaired within 48 hours of reporting	100%	100%	100%
Effectiveness	% of streets meeting acceptable pavement condition standard	62.6%	59%	57.9%
Outcome	% of citizens rating street and sidewalk maintenance as good or excellent	31%	29%	29%

AGENCY: 7000 Transportation
 SERVICE: 683 Street Management

SERVICE BUDGET SUMMARY

	Budgeted FY 2011	Current Svc FY 2012	Recommended FY 2012	Change In Budget
EXPENDITURES BY OBJECT:				
0 Transfers	-4,438,264	-4,438,264	-6,128,274	-1,690,010
1 Salaries	15,813,061	16,189,339	15,845,673	32,612
2 Other Personnel Costs	5,065,113	5,192,615	5,500,794	435,681
3 Contractual Services	7,414,466	7,550,381	7,373,463	-41,003
4 Materials and Supplies	2,196,843	2,217,931	4,010,831	1,813,988
5 Equipment - \$4,999 or less	37,421	37,421	37,421	0
6 Equipment - \$5,000 and over	261,000	261,000	177,953	-83,047
TOTAL OBJECTS	\$26,349,640	\$27,010,423	\$26,817,861	\$468,221
EXPENDITURES BY ACTIVITY:				
1 Highway Maintenance - Administration	2,713,021	2,789,771	2,767,974	54,953
2 Street Management - Project Development and Engine	65,098	74,614	72,243	7,145
3 Alleys	156,000	174,013	167,999	11,999
4 Rehab. Maintenance & Repairs	18,499,745	18,861,670	20,857,823	2,358,078
6 Construction Contract Inspection & Testing	4,878,311	5,001,862	4,985,700	107,389
7 Highway Engineering	1,608,740	1,661,944	1,641,350	32,610
9 Facility support	1,863,433	1,853,173	1,771,935	-91,498
11 Night Services	732,851	760,935	766,406	33,555
26 Transfers	-4,191,559	-4,191,559	-6,237,569	-2,046,010
889 Emergency Preparedness	24,000	24,000	24,000	0
TOTAL ACTIVITIES	\$26,349,640	\$27,010,423	\$26,817,861	\$468,221
EXPENDITURES BY FUND:				
General	3,588,000	3,612,799	2,462,494	-1,125,506
Motor Vehicle	22,761,640	23,397,624	24,355,367	1,593,727
TOTAL FUNDS	\$26,349,640	\$27,010,423	\$26,817,861	\$468,221

AGENCY: 7000 Transportation
 SERVICE: 683 Street Management

SERVICE SALARIES AND WAGES FOR PERMANENT FULL-TIME POSITIONS

Class Code	Position Class Title	Grade	FY 2011	B of E	FY 2012		Additional Changes		Recommended	
			Budget	Changes	Total Projected	Number	Amount	Number	Amount	FY 2012 Budget
General Fund										
101	Permanent Full-time									
53332	SUPERINTENDENT OF TRANSPORTATI	113	1	0	1	60,800	0	0	1	60,800
72713	ENGINEERING ASSOCIATE III	092	1	0	1	64,404	0	0	1	64,404
42213	PUBLIC WORKS INSPECTOR III	092	1	0	1	64,404	0	0	1	64,404
72712	ENGINEERING ASSOCIATE II	089	1	0	1	55,868	0	0	1	55,868
53331	HIGHWAY MAINTENANCE SUPERVISOR	087	1	0	1	48,556	0	0	1	48,556
42212	PUBLIC WORKS INSPECTOR II	087	2	0	2	104,002	0	0	2	104,002
54432	HEAVY EQUIPMENT OPERATOR II	433	3	0	3	126,259	0	0	3	126,259
53221	BUILDING OPERATIONS SUPERVISOR	084	1	0	1	33,510	0	0	1	33,510
33215	OFFICE SUPERVISOR	084	1	0	1	39,354	0	0	1	39,354
72512	CIVIL ENG DRAFTING TECH II	083	1	0	1	32,315	0	0	1	32,315
53111	BUILDING REPAIRER	429	2	0	2	66,590	0	0	2	66,590
52943	LABORER CREW LEADER II	429	1	0	1	40,301	0	0	1	40,301
52242	CARPENTER II	429	4	0	4	137,262	-2	-63,592	2	73,670
52241	CARPENTER I	426	4	0	4	120,627	-1	-28,618	3	92,009
33258	WORD PROCESSING OPERATOR III	078	1	0	1	27,958	0	0	1	27,958
52951	UTILITY AIDE	422	1	0	1	28,166	0	0	1	28,166
33212	OFFICE ASSISTANT II	075	2	0	2	56,229	0	0	2	56,229
53121	CUSTODIAL WORKER I	420	1	0	1	26,126	0	0	1	26,126
54411	MOTOR VEHICLE DRIVER I	487	4	0	4	123,752	0	0	4	123,752
52931	LABORER	482	10	0	10	283,362	0	0	10	283,362
Total 101 Permanent Full-time			43	0	43	1,539,845	-3	-92,210	40	1,447,635
Motor Vehicle Fund										
101	Permanent Full-time									
10173	DIVISION CHIEF III	955	2	0	2	168,600	0	0	2	168,600
72125	ENGINEER SUPERVISOR (PE)	120	2	0	2	129,600	0	0	2	129,600
42222	CONSTRUCTION PROJECT SUPV II	118	4	0	4	291,400	0	0	4	291,400
72123	ENGINEER III (PE)	117	2	0	2	149,200	0	0	2	149,200
72113	ENGINEER III	116	2	0	2	137,800	0	0	2	137,800
53335	GENL SUPT TRANSPORTATION MAINT	116	2	0	2	142,900	0	0	2	142,900
42221	CONSTRUCTION PROJECT SUPV I	115	5	0	5	323,300	0	0	5	323,300
74137	CITY PLANNER II	113	1	0	1	55,700	0	0	1	55,700
72112	ENGINEER II	113	3	0	3	172,300	0	0	3	172,300
53332	SUPERINTENDENT OF TRANSPORTATI	113	4	0	4	246,200	0	0	4	246,200
72713	ENGINEERING ASSOCIATE III	092	2	0	2	125,448	0	0	2	125,448
42213	PUBLIC WORKS INSPECTOR III	092	20	0	20	1,244,611	0	0	20	1,244,611
31101	ADMINISTRATIVE OFFICER I	111	1	0	1	57,600	0	0	1	57,600
72722	TRANSPORTATION ASSOC II	089	1	0	1	55,130	0	0	1	55,130
72712	ENGINEERING ASSOCIATE II	089	5	0	5	270,357	0	0	5	270,357
53425	ELECTRICAL MECH SUPV ST LIGHTG	087	1	0	1	50,079	0	0	1	50,079
53331	HIGHWAY MAINTENANCE SUPERVISOR	087	12	0	12	572,840	-1	-47,199	11	525,641
52225	MASON SUPERVISOR	087	1	0	1	47,931	0	0	1	47,931
42212	PUBLIC WORKS INSPECTOR II	087	30	0	30	1,347,962	0	0	30	1,347,962
33189	GIS TECHNICIAN	087	1	0	1	45,218	0	0	1	45,218
31100	ADMINISTRATIVE COORDINATOR	087	1	0	1	49,287	0	0	1	49,287
54432	HEAVY EQUIPMENT OPERATOR II	433	17	0	17	703,600	0	0	17	703,600
42211	PUBLIC WORKS INSPECTOR I	084	11	0	11	388,886	0	0	11	388,886
33215	OFFICE SUPERVISOR	084	6	0	6	270,613	0	0	6	270,613
53312	STREET MASON	432	2	0	2	80,333	0	0	2	80,333
52222	MASON II	432	2	0	2	77,017	0	0	2	77,017

AGENCY: 7000 Transportation
 SERVICE: 683 Street Management

SERVICE SALARIES AND WAGES FOR PERMANENT FULL-TIME POSITIONS

Class Code	Position Class Title	Grade	FY 2011	B of E	FY 2012		Additional Changes		Recommended	
			Budget	Changes	Total Projected	Amount	Number	Amount	FY 2012 Budget	Amount
			Number	Number	Number	Amount	Number	Amount	Number	Amount
72512	CIVIL ENG DRAFTING TECH II	083	1	0	1	39,583	0	0	1	39,583
42241	MATERIALS INSPECTOR I	082	1	0	1	31,225	0	0	1	31,225
54431	HEAVY EQUIPMENT OPERATOR I	429	1	0	1	30,255	0	0	1	30,255
52943	LABORER CREW LEADER II	429	14	0	14	512,695	1	33,337	15	546,032
52221	MASON I	429	2	0	2	66,840	0	0	2	66,840
33562	STOREKEEPER II	080	1	0	1	36,588	0	0	1	36,588
42412	TRAFFIC INVESTIGATOR II	079	4	0	4	142,221	0	0	4	142,221
33258	WORD PROCESSING OPERATOR III	078	4	0	4	126,362	0	0	4	126,362
33253	TYPIST III	078	1	0	1	32,241	0	0	1	32,241
33213	OFFICE ASSISTANT III	078	9	0	9	308,525	0	0	9	308,525
33112	DATA ENTRY OPERATOR II	078	1	0	1	33,208	0	0	1	33,208
54437	DRIVER I	424	3	0	3	95,180	0	0	3	95,180
53122	CUSTODIAL WORKER II	423	1	0	1	31,291	0	0	1	31,291
33252	TYPIST II	075	1	-1	0	0	0	0	0	0
33212	OFFICE ASSISTANT II	075	15	0	15	444,023	-2	-60,717	13	383,306
53121	CUSTODIAL WORKER I	420	2	0	2	54,526	0	0	2	54,526
41521	GUARD I	072	1	0	1	30,655	0	0	1	30,655
54412	MOTOR VEHICLE DRIVER II	490	6	0	6	203,547	0	0	6	203,547
54411	MOTOR VEHICLE DRIVER I	487	42	0	42	1,274,219	0	0	42	1,274,219
53311	CEMENT FINISHER	487	9	0	9	285,547	0	0	9	285,547
52932	LABORER CREW LEADER I	486	12	0	12	378,305	0	0	12	378,305
52931	LABORER	482	96	0	96	2,816,767	-1	-27,581	95	2,789,186
Total 101 Permanent Full-time			367	-1	366	14,177,715	-3	-102,160	363	14,075,555
Total All Funds			410	-1	409	15,717,560	-6	-194,370	403	15,523,190


APPENDIX V – MILLING AND PAVING PRESS EVENT – MAY 13, 2013







APPENDIX VI – FLANIGAN AND SONS ASPHALT CONTRACT APPROVAL LETTER – JANUARY 15, 2013

FROM	NAME & TITLE	Timothy M. Krus, CPPO, City Purchasing Agent	CITY of BALTIMORE MEMO 
	AGENCY NAME & ADDRESS	Bureau of Purchases (410) 396-5700 231 East Baltimore Street, Suite 300	
	SUBJECT	Informal – Renewal	

TO

Honorable President and Members of the Board of Estimates

DATE: January 15, 2013

Dear President and Members:

ACTION REQUESTED OF B/E:

The Board is requested to approve a renewal of the award for **Solicitation Number B50001348 – Paving Materials (Hot and Cold Patch)** to P. Flanigan & Sons, Incorporated, 2444 Loch Raven Road, Baltimore, MD 21218. Period covered is March 22, 2013 through March 21, 2014, with one one-year renewal option remaining.

AMOUNT OF MONEY AND SOURCE OF FUNDS:

\$5,000,000.00

Account Nos.: Various

BACKGROUND/EXPLANATION:

On March 10, 2010, the Board approved the initial award with subsequent actions as shown in the Contract Value Summary below. This is the first of two one-year renewal options.

The above amount is the City's estimated requirement; however, the vendor shall supply the City's entire requirement, be it more or less.

CONTRACT VALUE SUMMARY:

1. Initial award by the Board on 3/10/2010	\$ 6,003,250.00
2. Increase of award approved by the Board 11/23/2011	\$ 6,000,000.00
3. Renewal pending approval	<u>\$ 5,000,000.00</u>
4. Total contract value	\$17,003,250.00

P.O. No.: P512618

Agencies: Various

MBE/WBE PARTICIPATION:

On January 6, 2010, it was determined that no goals would be set because of no opportunity to segment the contract.

BALTIMORE CITY RESIDENTS FIRST:

Applicable

LIVING WAGE:

Not Applicable.

Attachments: MWBOO Form

APPROVED BY BOARD OF ESTIMATES

Bernice H. Taylor

 CLERK

~~JAN 23 2013~~
 DATE

TMK: BGO

#0345

APPENDIX VII – BBMR CONTACT INFORMATION

Primary BBMR Contact

Jonathan Morancy
Jonathan.Morancy@baltimorecity.gov
410-396-4964

BBMR Mission

The Bureau of the Budget and Management Research is an essential fiscal steward for the City of Baltimore. Our mission is to promote economy and efficiency in the use of City resources and help the Mayor and City agencies achieve positive outcomes for the citizens of Baltimore. We do this by planning for sustainability, exercising fiscal oversight, and performing analysis of resource management and service performance. We value integrity, learning and innovating, excellent customer service, and team spirit.

Obtaining Copies of BBMR Reports

All BBMR reports are made available at no charge at our website:
<http://bbmr.baltimorecity.gov/ManagementResearch.aspx>.

Contacting BBMR

Please contact us by phone at 410-396-4941 or by fax at 410-396-4236.