

City of Warrentville
Public Works Service Levels and Staffing
Study

Project Report

August 2015



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August 7, 2015

Mr. John Coakley
City Administrator
City of Warrenville
28W701 Stafford Place
Warrenville, IL 60555

Dear Mr. Coakley:

We are pleased to provide you with the project report of our organizational assessment for the City of Warrenville Public Works Department. This report includes recommendations designed to improve the overall effectiveness and efficiency of the Public Works Department and prepare the City to effectively respond to future organizational transition.

The recommendations contained in this report are based on the input and information provided by City staff, and identified industry standards and best practices that are appropriate for Warrenville. The City of Warrenville is fortunate to have dedicated employees who are committed to providing excellent services to the community, and their participation in this process was open and constructive. We are confident that these recommendations can serve as a framework for improving operational and managerial performance.

Thank you for the opportunity to work with the City of Warrenville.

Sincerely,

A handwritten signature in black ink that reads "Julia D. Novak". The signature is written in a cursive, flowing style.

Julia D. Novak
President

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Introduction

In October 2014, the City of Warrenville engaged The Novak Consulting Group to conduct a Service Level and Staffing Study of their Public Works Department. The primary purpose of this study was to review operations and develop recommendations that would improve operational efficiency and effectiveness and prepare the City for the eventual retirement of key staff.

The methodology included a review of the workflow processes, organizational structure, staffing levels, policies, and technology utilization in the Department. In order to complete the objectives of the Public Works Service Level and Staffing Study, The Novak Consulting Group conducted a series of interviews with key staff, analyzed data provided by the City, and completed best practice research. Interviews included employees from the Public Works Department as well as other department directors who frequently interact with the Department of Public Works; including Administration, Community Development, Finance, and Police departments. The purpose of the interviews was to learn more about the programs and services provided by the Public Works Department, the Department's strengths and the opportunities that exist for greater efficiency and effectiveness. Significant background information was also provided by the City and reviewed as part of the analysis, including staff documents, organization charts, budget documents, and annual financial reports.

Review and analysis of interview data, background information, and best practices research has resulted in a number of recommendations that are designed to improve management processes, increase efficiency and effectiveness, and prepare for retirements of long-standing employees in leadership positions. A summary of recommendations is included as Attachment A. These recommendations are specific and action-oriented, and are presented in the following categories:

- Asset Management and Work Planning
- System Integration
- Asset Management System Implementation
- Resurfacing Program
- Capital Improvement Program
- Stormwater System
- Water System
- Safety and Training

Organization Summary

The Public Works Department is organized into four divisions: Equipment Maintenance, Utility Maintenance, Street Maintenance, and Facility Maintenance. The Public Works Superintendent manages Department operations and the City Administrator retains the title of acting Public Works Director. The Public Works Director is a budgeted position but the City has opted not to fill the position since 1994 as a cost saving and efficiency measure. The Department is staffed with 16 full time equivalent (FTE) employees as well as an Administrative Assistant who is shared with the Community Development Department and three summer positions who serve in the Streets and Facility Maintenance Divisions. The following figure illustrates the organizational structure of the City of Warrentville's Public Works Department.

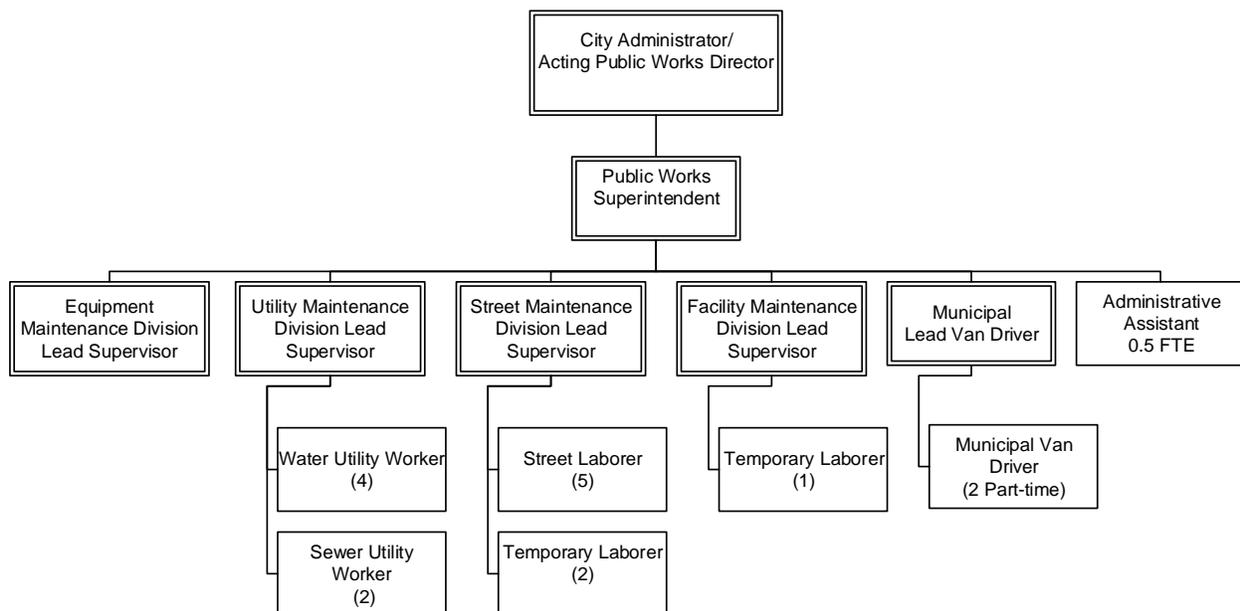


Figure 1: City of Warrentville Public Works Department Organizational Chart

A summary of the areas of responsibility for each division within the Department is as follows:

- The Equipment Maintenance Division is responsible for performing preventative and emergency maintenance on the City's 62 vehicles and 25 pieces of equipment.
- The Utility Division is responsible for operating the water and sanitary sewer utilities, maintaining water and sewer infrastructure, validating and inputting usage data into the billing system, and performing utility locates. The City's water comes from an underground aquifer, which is pumped and chlorinated at City facilities. The City contracts with the City of Naperville for wastewater treatment services, but is responsible for transporting all wastewater to the treatment plant.
- The Street Maintenance Division is responsible for maintaining the City's transportation infrastructure. The services provided by the Street Maintenance Division include: snow removal, road resurfacing, storm sewer system maintenance, catch basin and sidewalk repair and replacement, street sweeping, forestry, brush pickup, right-of-way and park maintenance, sign maintenance, utility locates, and special event assistance.
- The Facility Maintenance Division is responsible for maintaining all five City-owned facilities. Services provided by the Facility Maintenance Division include: conducting

routine and emergency maintenance, facility improvement projects, and management of grounds maintenance, janitorial, roof maintenance, and inspection services contracts.

- The Accessible City Operated Rides Now (ACORN) program is a municipal transportation program for residents with special needs.

The Public Works Department also works closely with the Community Development Department which is responsible for engineering functions such as development plan reviews, infrastructure project design, and stormwater program administration.

The Public Works Department's operating and capital budget has increased by only 0.04% over the last six years. Capital expenditures could not be separated from operating expenditures. Water Operations and Sewer Operations saw the greatest increases, largely due to investments in City infrastructure. The FY 2015 budget includes \$1,264,000 of sewer main improvements and \$1,082,000 in water main improvements. The FY 2015 budget includes \$2,464,500 in road projects.

The City's contractual agreement with the City of Naperville for wastewater treatment services accounts for approximately 57% of the expenditures in the Sewer Operations function. This is a pass-through cost determined by the City of Naperville and not something the City has direct control over. The cost of wastewater treatment services has increased by approximately 20% over the last five years. Fluctuations in the Buildings and Ground function are primarily the result of special one-time projects. The following table summarizes the Public Works Department's expenditures over the last six years.

Table 1: Public Works Department Functions Historical Expenditures, FY 2010-2015¹

Function	2010 Actual	2011 Actual	2012 Actual	2013 Actual	2014 Actual	2015 Projected	Percent Change
Streets	\$5,559,799	\$1,972,940	\$2,601,802	\$3,437,893	\$3,261,7673	\$4,104,757	-26.2%
Road & Bridge	\$99,813	\$103,423	\$105,843	\$111,932	\$109,860	\$111,900	12.1%
Buildings & Grounds	\$176,024	\$214,256	\$204,339	\$196,167	\$195,059	\$228,246	29.7%
Water Operations	\$1,229,173	\$1,137,277	\$1,232,852	\$1,332,950	\$1,393,549	\$1,707,792	38.9%
Sewer Operations	\$1,758,198	\$1,801,395	\$1,823,269	\$1,944,777	\$1,911,856	\$2,702,278	53.7%
Total	\$8,823,007	\$5,229,291	\$5,968,105	\$7,023,719	\$6,872,091	\$8,854,973	0.04%

Public Works Department activities are primarily supported through Enterprise Fund, Capital Maintenance Fund, Motor Fuel Tax Fund, and General Fund revenues. Revenue data specifically linked to the Department of Public Works was not available, but the total revenue for all funds that support the Department increased by 27.9% over the last six years. The Capital Maintenance Fund revenue nearly doubled, due to increased simplified telecomm tax revenue and the addition of dedicated revenues from the electric utility and natural gas taxes in FY 2014. The following table summarizes the City of Warrenville's revenues by fund over the last six years.

¹ Actual figures from the City's Comprehensive Annual Financial Report for each year. Projected figures provided by the Finance Director based on the FY 2016 proposed budget.

Table 2: City of Warrentville Historical Revenues, FY 2010-2015²

Fund	2010 Actual	2011 Actual	2012 Actual	2013 Actual	2014 Actual	2015 Projected	Percent Change
General	\$8,656,502	\$8,369,033	\$10,151,601	\$10,288,610	\$10,491,213	\$10,986,238	26.9%
Capital Maintenance	\$965,673	\$813,367	\$1,390,007	\$1,540,991	\$1,884,879	\$1,874,115	94.1%
Motor Fuel Tax	\$346,762	\$415,873	\$397,725	\$383,151	\$382,582	\$435,469	25.6%
Enterprise	\$3,029,028	\$2,517,795	\$2,738,934	\$3,058,297	\$3,080,024	\$3,333,611	10.1%
Total	\$12,997,965	\$12,116,068	\$14,678,267	\$15,271,049	\$15,838,698	\$16,629,433	27.9%

² Actual figures from the City's Comprehensive Annual Financial Report for each year. Projected figures provided by the Finance Director based on the FY 2016 proposed budget.

Analysis and Recommendations

The City of Warrenville's Public Works Department provides a high level of service to the residents of Warrenville. The Department is staffed with skilled employees who are experienced and capable. Currently, annual work planning and work assignment processes are not systematized, but rather completed on the basis of past practice or situational assessments. The Department is facing retirements of several long-standing employees in leadership roles, and must prepare for upcoming transitions by converting institutional knowledge of tenured employees into systemized processes and procedures.

The Public Works Department is a fiscally prudent organization, focused on meeting service standards as efficiently as possible and without demanding additional resources. While Department leadership has made use of some custom technology tools to maintain service levels, there are several opportunities to leverage technology to improve operational and managerial effectiveness. Additionally, the Department has been slow to upgrade software once a functioning system is established because of the cost associated with system improvements and time required to implement them. While the Department clearly operates at a high level of efficiency, capturing, recording, and analyzing performance data has not been a priority, hindering the ability to make data-based managerial decisions.

The City's infrastructure is relatively new and is in good condition. However, as the City's infrastructure ages, proactive and consistent management of assets will become an essential function of the Department. The following analysis and recommendations outline an approach that serves to address these issues.

Asset Management and Work Planning

Recommendation 1: Implement an electronic work order system to streamline work planning, assignments, and performance measurement data collection.

In the Public Works Department, Division Supervisors are responsible for developing work plans for their crews. In general, the approach to work planning is similar across the Divisions, with work plans being developed based on a combination of: 1) each Supervisor's understanding of the preventative maintenance that must be completed each year, and 2) any service requests or emergencies that arise. The challenge with this approach to work planning is that it relies too heavily on institutional knowledge and it is not systematized or clearly documented. There is a risk that, as personnel changes or responsibilities are transferred, preventative maintenance activities may fall through the cracks. Once work is planned, it is assigned on a daily basis and progress pertaining to work activities is not documented. In addition, each Division maintains some variation in approach.

For example, the Facility Maintenance Division uses a work order management system called ManagerPlus™ that prompts for roof inspections, quarterly inspections, and other preventative maintenance activities. Service requests do not pass through the work order system. Instead, they are received through emails, calls, and paperwork order forms (from the Police Department). Street Maintenance Division crews receive work assignments either verbally or in writing from the Street Maintenance Division Lead Supervisor. Resident calls for service are also fielded by the Community Development Administrative Assistant and forwarded to the applicable supervisor for assignment.

The water crews in the Utility Division complete a significant amount of work related to water meters, including meter reading, meter repair and replacement, and water shut-offs. Since this work directly impacts residents, the Division is careful to keep a record of all activities completed. The Utility Billing Clerk schedules appointments and fields service requests from the public, creating individual Microsoft® Excel® files for each request and saves them into a shared drive that the water unit of the Utility Division can access. The water crews receive assignments on a daily basis through these individual Excel files that have been placed in folders (one for each day) on the shared drive. The crews then print out the work orders and fill them in while out in the field. Once water crews are back at their work stations, they enter the information they captured while in the field into the blank files saved on the shared drive. The primary purpose for this system is to keep a record of the work completed so questions from the public can be answered if necessary.

While this approach to tracking work offers some value as a tool to answer questions from the public, the lack of a consistent and uniform department-wide work order system that provides a functional mechanism to plan and track preventative and compliant-driven work presents operational and administrative limitations.

First, it limits the opportunity to conveniently define preventative work order plans and associated annual work plans and document progress toward those plans. To keep infrastructure operational and to extend the life of valuable assets, maintenance is critical. Maintaining infrastructure assets involves both reactive and scheduled maintenance activities. To ensure assets are sufficiently maintained, organizations must first clarify the routine activities required to keep each asset type functioning. This list of the necessary scheduled activities and the frequency with which they should be completed then becomes the organization's annual preventative maintenance work plan. These plans must then be translated into action and progress must be tracked so that data-based decisions can be made regarding work prioritization and potential contracting of work that cannot be realistically achieved within the context of staffing and seasonal limitations.

Second, the absence of a comprehensive work order system limits the Department's ability to effectively monitor the balance between complaint driven work and preventative maintenance, and make necessary adjustments as that balance becomes unsustainable. While it is critical to respond to resident complaints, especially those with safety implications, as quickly as possible, it is also important to ensure that adequate time is dedicated to the Department's preventive and ongoing maintenance work, as such work has the most significant impact in prolonging the useful life an asset. A functional work order system allows for ongoing monitoring of that balance, enabling the Department to make proactive adjustments as necessary.

Third, without an electronic work order system, the process of identifying and tracking core performance measures must be done manually, which is time consuming and difficult to administer over time. Ultimately, performance measures should be used to document and track core programmatic outcomes which can then be used to inform management decisions. Maintaining a rigorous performance measurement program also allows the Department and the City to track trends over time and to respond to those trends proactively. A consolidated electronic work order system will allow the Department to begin conveniently tracking and reporting core performance measures, such as cycle time, program cost, and program outcomes.

Lastly, implementing an electronic work order system will allow the Department to better utilize existing technologies, such as GIS, and incorporate new technologies, such as smart devices, to streamline the work planning, assignment and reporting processes for daily crew works. This will ultimately lead to increased work crew efficiency.

Work order systems are a tool organizations use to ensure that department work plans are completed in a deliberate manner. These systems issue work orders based on the maintenance cycles/schedules specified in preventative maintenance work plans, providing a method to both assign and track work.

Implementation of an electronic work order system that includes both an inventory of assets and programmed preventative maintenance work plans is one of the best practices that are considered as part of the American Public Works Association (APWA) accreditation process. Implementing an electronic work order system in Warrenville offers a number of advantages, as outlined above, and provides an avenue to document and improve upon existing work processes. Many asset management systems include work order module - in addition to offering other modules, such as fleet and fuel management and pavement management. Appendix A includes the results of a comparative review of asset management systems and their features completed by the Water Finance Research Foundation in 2012.

Recommendation 2: Implement a fleet and fuel management system.

In 2011, the City of Warrenville first developed its Comprehensive Capital Maintenance and Replacement Plan (CMRP). The CMRP is a detailed plan of how the City is going to replace assets; the figures are updated annually and are used in the budget decision process. The CMRP includes a vehicle replacement schedule, which is based on the useful life of the vehicle and includes the estimated replacement value. These figures are used to help the City budget for future vehicle replacement costs. While this is an excellent approach to budgeting for vehicles, maintenance costs are not currently included in the calculation of the annual cost of a vehicle.

In the area of fleet management, reliable data is necessary to make informed decisions about staffing levels, vehicle selection, and surplus vehicle disposal plans. For example, to determine whether it is time to fund the replacement of a given vehicle or piece of equipment, it is necessary to evaluate the total cost of maintaining that equipment in its current state. It is important to not only consider the cost of parts, but the fully burdened labor expenses (in-house and contract) as well.

The Equipment Maintenance Lead Supervisor tracks the maintenance history for each vehicle in an individual spreadsheet; mileage, maintenance and repairs completed, as well as the cost of parts are currently tracked. However, some critical information is not being tracked. The cost of work currently being contracted out and the labor hours required for repairs completed in-house are not monitored. Additionally, employees from other divisions are completing routine maintenance and repairs but are not documenting this time, which needs to be accounted for to calculate the full cost of vehicle maintenance services. It should be noted that this arrangement has resulted in staff possessing a more thorough understanding of taking better care of the Department's equipment.

One of the most commonly applied methods to monitor, analyze, and control fleet expenditures is to implement an electronic fleet and fuel management system that tracks the life cycle costs of maintaining a vehicle. In a 2011 survey conducted by *Government Fleet Magazine*, 87% of public sector fleet managers reported utilizing some sort of electronic fleet management system. An integrated fleet and fuel management system will allow the City to better manage preventative maintenance programs and workload by monitoring vehicle mileage and automatically scheduling preventative maintenance. Implementing a fleet and fuel management system will also help the City gather detailed information on the costs of contracted labor, fuel, parts, tools, and in-house labor as well as annual and seasonal mileage and vehicle downtime. Once data is available, the

City can then evaluate the staffing level of the Equipment Maintenance Division, analyze ownership costs and utilization, and inform decisions regarding contracted fleet maintenance relationships. Fleet and fuel management systems can be purchased separately or as a module of a work order system.

Recommendation 3: Create a vehicle maintenance cost center to centrally track all vehicle maintenance expenditures.

Currently, some Equipment Maintenance Division costs are being charged to different cost centers. The amount being charged to each cost center for fleet maintenance services is based on the cost of parts. In addition, the salary of the Equipment Maintenance Division Lead Supervisor is split between the General Fund, the Water Fund, and the Sewer Fund (80%, 10%, and 10% respectively). While it is a best practice to charge user departments for vehicle maintenance services, the amount charged should reflect the full cost of services provided, which is not the current practice in the City of Warrentville. The following table shows the amount each department is being charged for the cost of parts.

Table 3: Costs of Vehicle Maintenance Parts Charged to Other Departments, 2011-2015

Cost Center	2011 Actual	2012 Actual	2013 Actual	2014 Actual	2015 Projected
Buildings & Grounds	\$0	\$228	\$53	\$16	\$275
Community Development	\$433	\$780	\$1,519	\$2,325	\$2,000
ESDA	\$0	\$246	\$264	\$1,565	\$2,500
Muni Van	\$59	\$1,493	\$2,009	\$5	\$336
Police	\$39,206	\$46,077	\$35,372	\$46,711	\$36,700
Sewer O&M Expense	\$401	\$788	\$917	\$750	\$1,000
Streets	\$1,162	\$928	\$1,233	\$968	\$1,000
Water O&M Expense	\$602	\$698	\$917	\$879	\$1,000
Total	\$41,863	\$51,238	\$42,284	\$53,219	\$44,811

The method of accounting for vehicle maintenance costs currently in use makes it difficult to determine the cost of the City's vehicle maintenance operation. For example, the cost of the tools purchased for the Equipment Maintenance Division could not be determined.

The City should create a dedicated cost center to track all fleet maintenance expenditures. This will enable the City to evaluate the full cost of fleet maintenance and ultimately calculate the full cost of vehicle ownership. Once the full cost of vehicle ownership has been established, the City can charge departments for both parts and labor.

At this point, the City may then consider creating a separate internal service fund to charge departments for their use of vehicles, fully funding the Equipment Maintenance Division as well as the vehicle replacement plan in the CMRP. The primary benefit of an internal service fund is that the General Fund could shift the cost of vehicle ownership to programs with non-General Fund sources of revenue, such as water and sewer operations. However, even if an internal service fund is not created, it will be beneficial for the Department to be able to quantify and articulate the amount of service City Departments are receiving.

Recommendation 4: Develop outcome and efficiency performance metrics for each Public Works Department program.

The Public Works Department currently does not have a culture of rigorous data collection or performance measurement. Limited data is available that identifies how efficiently and effectively the Department carries out its work plan. Rather, the success of the Department is measured by anecdotes and perception. It is important to note that the absence of a rigorous performance measurement program does not imply that the Department is performing poorly. On the contrary, The Novak Consulting Group's review of the Department indicates high competency, professionalism, and commitment. However, a rigorous performance measurement program would enable the Department to evaluate service quality and carry successful service forward to the next level.

Performance measurement is a tool that can be used to quantitatively evaluate program performance, make ongoing assessments, and guide regular program improvements that are responsive to evolving conditions or resources. In addition, implementing a performance measurement program in Warrenville will enable the Department to quantify what level of service is provided under current operations. This is the first important step to identifying and developing service standards and evaluating whether additional resources are needed to meet those standards. The development of asset inventories, annual departmental and crew work plans, and an electronic work order system will all support the implementation of a performance measurement program.

The work order system recommended in Recommendation 1 will collect data on the activities planned and completed, enabling the organization to track and assess performance against established performance goals. The Acting Public Works Director and the Public Works Superintendent will be able to make more informed choices about service and staffing levels. Performance metrics also support a dialog between management and employees, ensuring that the work being completed by employees is in line with the expectations set by the City.

Effectively evaluating City programs should include the following elements:

- Provision of clear direction and support from the Acting Public Works Director;
- Inclusion of feedback from constituents and key stakeholders, collected through surveys, interviews, focus groups, and other similar means;
- Identification of information needed for measuring effectiveness and efficiency;
- Determination of criteria for effectiveness; and
- Identification of resources available for collecting information.

The Public Works Superintendent and Division Supervisors should regularly discuss outcome-based performance data for all Public Works Department programs and services. Key information from each Division should be collected on a quarterly basis and presented to the Acting Public Works Director. Any important trends or changes should be discussed so that actions may be taken, as needed, by the Department in response to those trends. Included in Attachment B is a list of suggested performance measures for the Department of Public Works.

The Novak Consulting Group's review of the Public Works Department indicates that the Department does a lot of things well. It has cross-trained its staff and uses them to perform a wide range of duties at a high service level. There are, however, areas of improvement that, if implemented, will further enable the Department to become more efficient and effective.

One of the most significant recommended improvements is to develop an asset management and work order system that allows the Department to document annual work plans and to develop a series of performance measures that allows the Department and City leadership to assess the work plan process and fully understand the resources required to achieve the work plan. The question of resources includes not only budget, but staffing levels and contracting opportunities.

Recommendation 5: Create maintenance work plans, schedules, and service standards to guide the process of determining resource requirements.

The Novak Consulting Group's review of the workload requirements and organization structure of the Public Works Department suggests that the Department is appropriately staffed to meet its workload requirements. However, the absence of core workload, task time, and labor hour data makes it difficult to draw firm conclusions regarding whether the Department is overstaffed or understaffed. In addition, sufficient data is not available to allow the City to consistently evaluate whether contracting for services would be more cost effective than providing the service in-house. This assessment is more complicated than it may appear; reliable data is necessary to make an informed decision.

The evaluation of staffing levels and contracting opportunities in public works departments is driven by two primary factors: 1) service level, and 2) task time. The defined service level for a particular function dictates the frequency of the work to be completed as well as the amount of time required to complete that work. For example, park mowing is a seasonal activity, typically requiring service between the months of April and October. In a hypothetical example, we assume that it takes a crew of two FTEs eight hours to mow the entire park system. This equates to a task time of 16 labor hours per completed task. If the adopted service level is to mow the park system each week, the monthly task time required is 64 hours per month. If the adopted service standard is to mow the park bi-weekly, then the monthly task time required is 32 hours per month. This task time can be applied to a fully burdened labor rate and related non-personnel expenses to determine a cost estimate for service.

To conduct this type of assessment, clear maintenance work plans and service standards must be established to determine what resources are needed to meet the requirements of the work plan. Just as importantly, these standards can serve as an evaluation tool that can be used to determine the ongoing operating and maintenance costs associated with adding new infrastructure. Once service standards for each asset type have been established, the Department should inventory the following assets: water collection and conveyance system, sanitary sewer system, storm water system, streets, signs, traffic signals, trees, and facility equipment. The Department has an inventory of its street lights. The process for inventorying and assessing the condition of the City's streets is included in Recommendation 13. The process for inventorying and assessing the condition of the City's storm water system is included in Recommendation 17.

For example, assuming that the City maintains an inventory of 50 traffic signal mast arms and reflecting anticipated life cycles for a paint job, an acceptable service standard would be to paint each mast arm on a seven year cycle. By identifying the average number of labor hours required to paint a signal mast arm and pole, the City can estimate the total number of annual labor hours and FTEs that would be required to achieve the established service standard and determine the estimated salary and benefit cost associated with completing the activity. This cost data, along with anticipated non-personnel expenses such as paint, equipment use, and fuel, can be used to evaluate the cost effectiveness of maintaining an annual in-house light pole painting program or contracting the service out every five years.

This approach can be applied to many of the Division’s maintenance activities and can be used to evaluate the impact that resource adjustments will have on service standards. Just as importantly, the establishment of target work plans and service standards will further the City’s effort to place greater emphasis on asset maintenance.

The following table provides hypothetical work plan calculations for traffic pole mast arm painting, sanitary sewer line inspections, and pavement crack sealing to further illustrate the methodology.

Table 4: Hypothetical Work Planning and Resource Identification Template

Work Activity	Service Standard	Infrastructure Inventory	Average Labor Hours Required to Complete Work Activity	Annual Labor Hours Required to Meet Service Standard
Traffic Signal Mast Arm Painting	Paint each mast arm every seven years	50 mast arms	3 hours per mast arm painted	21
Sanitary Sewer Line Inspections	Inspect each segment of sanitary sewer line every five years	35 miles of sanitary sewer line	10 hours per mile of line inspected	70
Pavement Crack Sealing	Crack seal 20 center lane miles of pavement per year	40 center lane miles of street	15 hours per center lane mile sealed	300

These work plans and service standards should be incorporated into the recommended work order system and used as a basis for comparison against actual experience to ensure that standards are appropriately assessed, to monitor work plan progress, and make adjustments to staffing levels or assignments as necessary to meet work plan requirements.

Recommendation 6: Utilize a work order system to track labor hours by major task.

The question of how best to approach staffing a function is also driven by other ongoing and seasonal responsibilities. For example, if a road crew is responsible for completing the mowing function, it is important to fully understand what other work might not be getting done, if any (e.g., crack sealing). In the event that some road crew work (crack sealing, for example) is not getting completed as planned, the Department could evaluate whether a seasonal crew is needed, or whether contracting for park mowing is an option. To effectively conduct these assessments, it is necessary to establish clear annual work plans, success in achieving the work plan, and to understand the resource requirements required to effectively complete the work. However, it is also important to document and analyze how crews are spending their time on an ongoing basis.

With the implementation of a work order system and field tablets equipped with access to that system, the Department will be in a position to track labor hours by major activity. This will allow the City to ascertain the time commitment and cost required to provide services. It is important to note, however, that the intention of this recommendation is not to require employees to track their time in a manner consistent with billable professions. Employees would not be expected to document time by specific activity (e.g., oil change, vehicle inspection). Rather, front-line workers, as part of the work order completion and data entry process, should reflect the labor hours spent on major activities.

For example, the City currently implements an annual valve exercising program for its water distribution infrastructure. The annual preventative maintenance program should be included in the work order system. When a crew is assigned to the program, the labor hours required to execute the program should be entered in the work order system. This is typically accomplished through a process of generating preventative maintenance work orders that, when completed and entered into the work order system, allow for entry into the work order data base. This allows Department leadership to conveniently monitor progress on the Department's annual work plan and document the number of hours and corresponding cost required to complete the plan.

Work order systems also help organizations track the time and materials dedicated to completing work orders. Tracking employee time helps organizations understand the distribution of scheduled work and reactive work completed by staff and it also enables organizations to develop activity-based accounting. Activity-based accounting is useful when making service-level decisions or evaluating opportunities to contract out services. Work order systems that are integrated into GIS systems enable organizations to map work orders and associate work orders with assets.

The City should develop annual work plans, implement a work order system, and begin tracking use of resources. Implementation of an electronic work order system and associated business processes would better enable the Department to monitor the completion of preventative maintenance work, complaint-driven work, and emergency work. It would allow for regular, holistic analysis of departmental workload and will allow the Department to better quantify whether service expectations are being met and, if not, to respond in a proactive manner. It is important the tracking of employee time not be overly burdensome. Therefore, categories should be relatively broad, focusing on asset type and maintenance type (preventative or reactive) rather than very detailed activities. Approximately 30 to 50 categories may be necessary. The following list includes some examples of possible categories of activities:

- Sewer line emergency repair
- Sewer line inspection/preventative repair
- Inlet repair
- Street sweeping
- Brush collection
- Tree removal/trimming
- Street light maintenance
- Water main repairs
- Road maintenance
- Mowing

The work order completion and data entry task could be the responsibility of front-line employees or Division Lead Supervisors; however, the Department has access to two Administrative Assistants who are shared with Community Development. These individuals may have capacity to take on additional administrative and data entry duties for the department; however as discussed in the Succession Planning and Staffing Levels section of this analysis, additional analytical support is required.

Crew Staffing Levels

Front-line staffing levels are driven primarily by daily and seasonal workload requirements as well as service standards. The data necessary to conduct a workload-driven staffing analysis of front-line staffing levels was largely unavailable. The development of work order systems and associated performance and outcome measurement processes will ultimately generate the data

necessary to conduct workload-based staffing assessments; however, there are general observations concerning staffing levels that should be considered by Department and City management.

Discussions with Department front-line staff indicate that crew size and staffing numbers are generally appropriate in the Street and Utility Maintenance Divisions. However, two Divisions, including the Facility Maintenance Division and the Equipment Maintenance Division, are staffed with only one full-time employee each. In the Facility Maintenance Division, this staffing level is reasonable and appropriate. Significant technical repairs are primarily conducted by a contracted third-party and the Facility Maintenance Division Lead Supervisor has a clear preventative maintenance plan that he is able to implement on a regular basis. In addition, in the event that the Facility Maintenance Division Supervisor is away on leave or otherwise unavailable, other Department crew members can fill in during emergency situations. In the Equipment Maintenance Division, this staffing level presents some limitations.

Having only one employee responsible for all equipment maintenance activities means employees from other divisions must often assist the Equipment Maintenance Division Lead Supervisor, which diverts resources from other activities. While the Equipment Maintenance Division's workload does not warrant additional FTEs, this Division would benefit from contracting out some preventative maintenance activities.

Recommendation 7: Develop a preventative maintenance contract arrangement for equipment maintenance.

The National Fleet Management Association (NFMA) recommends a mechanic to vehicle ratio of between 1:60 and 1:100 depending on the age and condition of the vehicles. The Equipment Maintenance Division Lead Supervisor is responsible for maintaining approximately 62 pieces of rolling stock. The ratio of vehicles to mechanics therefore does not suggest the need to hire an additional full-time mechanic.

However, it is also the case that other department personnel in the Streets and Utilities Divisions are performing some mechanical work on their vehicles. Though data regarding the number of non-mechanic labor hours spent on such activities is not available, it is not optimal to divert front-line maintenance staff from their assigned infrastructure maintenance tasks. It also the case that, regardless of vehicle to mechanic ratios, mechanic capacity must exist to ensure that preventive and emergency repairs are made in a timely manner during periods when the full-time mechanic is unavailable due to leave.

This combination of factors presents a difficult challenge. There does not appear to enough vehicle maintenance workload to justify two full-time positions but there is a clear need for additional equipment maintenance support. In this case, the most prudent option is for the City to develop an agreement to contract for additional basic fleet preventative maintenance work and to provide back-up during periods when the mechanic is unavailable due to leave. For example, the City may choose to contract for vehicle facility maintenance with a local car dealership service center and mechanic shop. That shop would be responsible for coordinating with departments to schedule vehicle preventative maintenance and for executing that maintenance in a timely manner. The in-house mechanic would be assigned some preventative maintenance work as well as incidental unplanned repairs. The contracted mechanic shop would also serve as a backup for unplanned vehicle repairs in the event that the in-house mechanic is unavailable or the workload is such at a given moment in time that additional support is required to complete all repairs in a timely manner. This arrangement, coupled with the existence of sufficient back up

vehicles (e.g., spare police cars) will allow the City to maintain sufficient vehicle maintenance capacity without hiring an additional in-house mechanic.

In addition, the Department should begin to track fleet maintenance task time through the recommended fleet management and work systems and conduct a fleet maintenance staffing analysis at such time as the data is available to develop a workload-based assessment.

System Integration

Recommendation 8: Integrate asset map data maintained by the Public Works Department into GIS software used by the City and begin geolocating assets.

The Public Works Department maintains a comprehensive map of the location of its assets using AutoCAD LT software. The locations of these assets are based on their relation to stationary objects rather than geospatial coordinates. Meanwhile, the Community Development Department maintains an entirely separate system of maps using ArcGIS mapping software. These two systems are not compatible, so the information in each system cannot be accessed by the other system's users. The City adopted a GIS Development and Maintenance Plan in May 2014 and implementation is currently underway.

Maintaining two separate systems is a duplication of effort. Additionally, this approach compartmentalizes information stored in the systems, which means the Community Development Department operates based on one set of information while the Public Works Department operates from another.

The City should integrate the asset data maintained by the Public Works Department into the City's mapping system. Converting the AutoCAD LT asset information into a format compatible with the City's Arc GIS software is a labor-intensive process. The workload of the GIS Technician was not evaluated as part of this study. As a result, the City will need to determine, based on discussions with the GIS Technician, whether this project can be incorporated into existing workload and completed in a timely manner. If it cannot, it may be appropriate to either contract for the project to be completed or bring in temporary staff (e.g., interns) to complete.

In addition to migrating existing data, the City should develop a plan to geolocate all assets maintained by the Public Works Department. Once the location of the City's assets has been captured, the GIS system and the work order system should be linked. Linking the GIS and work order systems enables the City to access the most current asset location information and also to upload new information about assets (as communicated through work orders). It is also critical that, once the infrastructure maintained by the Public Works Department has been geolocated, the City's mapping software be accessible to employees in the field where it is critical that crews have updated information.

Recommendation 9: Equip Division Personnel with mobile devices so they can access the work order system and mapping software in the field.

The Department has two tablets that staff currently use in the field. The tablets are used to view (read-only) asset maps the Superintendent maintains in AutoCAD LT. Beyond viewing maps; crews are not able to complete any other administrative activities in the field. Division personnel must currently return to the Public Works Facility to print or update work orders, update maps, or record time.

To optimize efficiency, personnel should have access to both the work order system and the City's GIS system while in the field. Mobile access to the mapping system will enable Division personnel to find infrastructure and also to update location information when necessary. Mobile access to the work order system will allow work orders to be viewed and updated in the field.

To equip personnel with mobile devices, it is estimated that a total of six tablets (four additional) would be required: two for street crews, two for water crews, one for the sewer crew, and one for the Facility Maintenance Division Lead Supervisor. In addition to the cost of hardware, the Department will need to install mobile versions of all the necessary software including ArcGIS and the electronic work order system.

Recommendation 10: Merge utility location services once infrastructure has been geolocated.

Utility location services for water, sanitary sewer, stormwater, and streetlight infrastructure in the City of Warrenville are provided by different employees. Therefore, when a contractor or homeowner requests utility location services, two employees must separately go out and identify the infrastructure. The Utility Division handles water and sewer locates and the Street Maintenance Division handles streetlight and storm sewer locates. Performing utility locates for all utilities at once reduces costs on a per-location basis.

The City tried combining utility location services in the past, but found it to be less efficient. Combined utility locates were less efficient because the different types of utilities require different location methods and crews doing locates are familiar with only one type of infrastructure. Since City assets are not geolocated, experience working with an infrastructure type is critical in order to find it. However, geolocating the City's assets will remove much of the guesswork, making it more efficient to send only one employee to do utility locates rather than two. Therefore, once the GPS coordinates of infrastructure are recorded, the City should merge utility location services.

Recommendation 11: Upgrade the VTScada system and begin using the mobile interface to monitor and control equipment from smartphones.

Supervisory Control and Data Acquisition (SCADA) systems allow for the analysis of real-time data and provide control of remote equipment. SCADA systems involve both hardware and software components. Many SCADA computer systems now offer remote access for smartphones and tablets so employees can monitor equipment when out in the field. VTScada 9.1.11 is the SCADA system used by the City of Warrenville to monitor its wells and water towers. The City purchased VTScada approximately four years ago, but did not purchase a version that allows remote access for tablets. VTScada version 10.1 introduced the VTScada Mobile Internet Client (MIC), version 10.2 includes map capabilities, and version 11 offers a more robust mobile interface.

As resources allow, the City should upgrade to VTScada version 10.2 or 11.1, which is the first version compatible with the VTScada Mobile Internet Client (MIC) interface. The City should request a quote for upgrading the system keeping in mind that, according to the FY 2015 budget, City spends \$21,400 on VTScada communication mechanisms per year.

Technology Integration

The recommendations detailed above include a number of recommendations to develop new technological systems and integrate existing systems. However, it is important to note that many of the technology solutions recommended above can be included as part of a single technology package. For example, the analysis and recommendations detailed above specify the need for a

work order system, fleet maintenance system, and fuel management system. However, these systems are often discrete modules of a single asset management system. Moreover, the City currently utilizes a work order system called ManagerPlus™ for its facility maintenance work planning. This system could be expanded to include broader work order and fleet and fuel management modules. This broader system could then be integrated to the existing City GIS.

Asset Management System Implementation

Since 1994, the City Administrator has served as the Acting Director of Public Works for the City of Warrentville in lieu of filling the position of Director of Public Works; however, day-to-day operations are managed by the Public Works Superintendent. The City is fortunate to have an experienced Superintendent that effectively manages day to day operations. However, many of the Department's work plans and processes are driven by institutional knowledge and are not clearly documented. As a result, employee transitions and retirements may result in significant knowledge gaps among remaining staff, increasing the likelihood that infrastructure maintenance items will fall through the cracks. However, this risk can be effectively mitigated with a thoughtful and deliberate process to document current practices and work plans in such a way that they can be carried forward, and built upon by remaining City staff.

To prepare for employee transitions it is critical to develop internal capacity and to document processes and procedures by inventorying all assets and developing preventative maintenance work plans. Involving staff in this process provides the additional value of engaging and educating employees at all levels, which will further smooth any future transitions.

Recommendation 12: Assign work order and asset management system development to a joint project team with operations and engineering expertise.

As discussed above, the City of Warrentville's Public Works Department is managed by the Public Works Superintendent, under the direction and supervision of the City Administrator, who also serves as the Acting Director of Public Works. The Public Works Superintendent has expressed an intention to retire from service in the next few years and though the Department maintains sound preventative maintenance practices for each of its core infrastructure responsibilities, those practices are not systematized in a work order system and core performance measurement data is not collected. The Novak Consulting Group has recommended the development of a work order system that not only systematizes Public Works Department work order processes, but integrates it with the City's GIS process, which is managed by the Senior Planner, and the capital budgeting processes, which are managed by the Senior Civil Engineer, Public Works Superintendent, and the City Finance Director.

To develop these systems, it will be critically important to tap into the extensive experience and institutional knowledge of the Public Works Superintendent. It will also be important to ensure that staff capacity is augmented through the implementation process so that additional personnel develop detailed knowledge of the City's infrastructure condition and related maintenance work plans.

Given the close relationship between public works operations and infrastructure planning, it is prudent to develop a joint project team consisting of the Senior Civil Engineer and the Public Works Superintendent who are tasked with purchasing, implementing, and developing an asset management system for the City of Warrentville. The team will take responsibility for developing an implementation plan and timeline, executing the plan, and regularly reporting progress to the City Administrator's Office.

Resurfacing Program

Recommendation 13: Utilize a formal pavement condition assessment and pavement management system to build annual preventative maintenance plans and resurfacing plans to prolong the useful life of pavement infrastructure.

Currently, City roadways are inspected annually by the Public Works Superintendent. This informal manual pavement evaluation process provides the basis for the City's annual resurfacing program. The City of Warrenville has a street resurfacing schedule that involves overlay, or mill and overlay, depending on condition, all streets every 15 years. This is a proactive program. The City should seek to extend the life of its transportation infrastructure by developing preventative maintenance plans.

Analysis of pavement deterioration demonstrates that new pavement deteriorates slowly over the first few years after placement and then deteriorates rapidly when the pavement has aged (typically after 7 years). This phenomenon, referred to as the pavement condition to age curve, is consistently observed regardless of pavement type or construction process.³

The key to prolonging the life of pavement infrastructure is targeted maintenance at specific intervals of the pavement life cycle. If maintenance is deferred past the optimal point in the pavement life cycle, then the cost of repairing or reconstructing roads grows considerably. In other words, the pavement rating process is best used as a tool to not only plan for annual reconstruction projects, but to plan for specific road preservation and maintenance activities. An example of an established pavement condition assessment tool is included in Attachment C.

Implementing a pavement management system in Warrenville will allow the City to extend the life of its roads and ultimately save money. Using this consistent and reproducible rating methodology on an annual basis will enable the City to plan and project which roads require preservation/maintenance and which require replacement. Work identified using the PCI can then be used to create the preventative maintenance plan for the next year, which should be linked to the Street Maintenance Division's work planning process, the electronic work order system, and the CMRP budget process.

Capital Improvement Planning

Recommendation 14: Use the building equipment needs identified in the CMRP to develop annual work plans and appropriately allocate funds for the projected repairs/replacements.

The City tracks the value of its facilities and associated equipment in the Building Equipment Value Report in the CMRP. This report inventories facility assets in the following categories: HVAC, Structural, Flooring, Plumbing, Electrical, Paint, and Furniture. The Structural category of assets includes the value of smaller structures, such as the gazebo, playground equipment, and the Public Works salt shed. The purchase date, purchase cost, and estimated years of service are all captured in the report. The total original purchase cost of all facility assets included in the Building Equipment Value Report in the CMRP totals \$2,211,947. Capturing all of this information is helpful in planning for future building equipment needs; however, it is important to project the

³ Stevens, L.B. "Road Surface Management for Local Governments – Resource Notebook." Federal Highway Administration, May 1985.

replacement cost for each individual asset for the period when that asset will need to be replaced and to budget appropriately.

This inventory of building and facility assets does not estimate the actual replacement cost of purchased equipment. Given the historical annual inflation rate in the region of 2%,⁴ the City cannot expect to replace facility assets it purchased 30 years ago for the same price. Additionally, this inventory has not been incorporated into the City’s budget plans, meaning future upgrades to building equipment, such as HVAC system replacements, are not currently being budgeted in the CMRP. It is nearly impossible to evenly space out replacement and repair expenditures over many years. Needs are more likely to come in waves. In fact, given the estimated years of service for each asset included in the CMRP, the City can expect the bulk of the replacement costs for all facility equipment to come due between 2015 and 2025,⁵ The following figure shows the years in which the estimated⁶ building equipment replacement costs will come due.

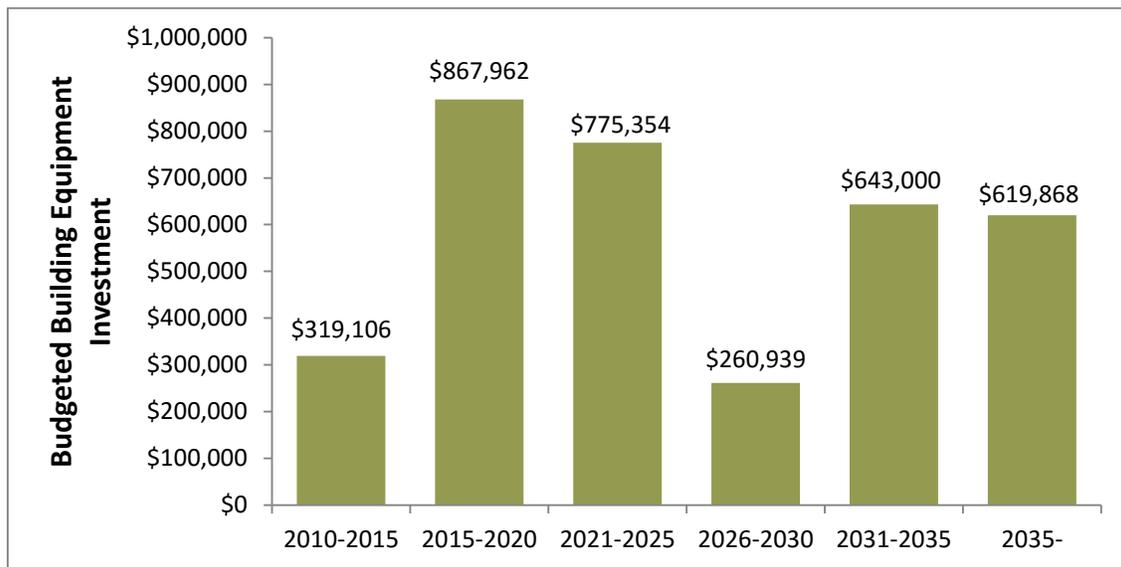


Figure 2: Budgeted Future Investment in Building Equipment, 2010-2074

The City should continue maintaining the Building Equipment Value Report, enhancing it to include estimated costs based on the planned year of purchase and then allocating the necessary funds in the capital budget. The City should put the inventory to use by incorporating planned replacements and repairs into the Facility Maintenance Division’s annual work plans.

Recommendation 15: Increase energy efficiency by continuing the conversion of streetlights to energy-efficient light emitting diode (LED) technology.

In FY 15, the City budgeted \$68,440 for the electrical cost of powering the 746 streetlights in the City, for a cost of \$91.74 per streetlight. Conversion to LED technology would reduce the City’s overall streetlight energy consumption by an estimated 45%. It should be noted that the costs savings vary based on the type of light, and the City has a variety of lights. The estimated cost savings is based on averages. Actual savings will be largely dependent on the City’s specific infrastructure.

⁴ Bureau of Labor Statistics, Consumer Price Index for the Chicago-Gary-Kenosha, IL-IN-WI area

⁵ Based on years of service estimated in the Building Equipment Value Report developed by the City

⁶ Purchase cost from the CMRP adjusted for inflation

The City has already launched a conversion program, budgeting \$59,281 to convert 200 cobra head streetlights in FY 15. This amount includes an Illinois Department of Commerce and Economic Opportunity (DCEO) grant of \$29,729 the City received in 2014. Without the grant assistance, it would cost a total of \$445.05 to purchase LED technology for each streetlight, resulting in a payback period of 10 years. However, with the grant funding, the payback period decreases to seven years. The City should therefore continue to seek grant funding. Assuming a useful life of 10 years, which is a conservative estimate, the City will see an average savings of \$11.64 per streetlight converted to LED technology. This would result in a 13% decrease in the line item for the electrical cost of powering streetlights.

Recommendation 16: Conduct a facility needs assessment.

The Public Works Department is housed in the Public Works Facility, a facility constructed in 2002. The entire building – including garage space – is 38,500 square feet. While this building is relatively new, a review of the facility indicates there may be some areas in need of investment. A needs assessment should be conducted and cost estimates for all identified facility improvements should be developed and prioritized as part of the normal capital budgeting process. Two issues have already been identified, causing either safety or efficiency concerns.

First, when employees wash equipment in the vehicle wash bay, they must often climb up on a portable, rolling ladder. This arrangement raises both safety and efficiency concerns. The Department should install a catwalk in the pressure wash bay so employees can safely wash equipment from above.

Second, the garage space in the Public Works facility is too small for the amount of equipment, which requires that some equipment is stored outside, exposed to the elements, impacting the useful life of vehicles and equipment. Employees noted that they often must move multiple pieces of equipment in order to access the equipment they need that day. Once the City has reliable vehicle maintenance data from its fleet management system, it can identify underutilized equipment and develop equipment disposal plans accordingly. If, once the amount of equipment has been justified, the garage space is still too small given the current amount of equipment; the City should explore acquiring additional warm storage space where seasonal equipment could be stored when not in use.

The Department should conduct a facility needs assessment to identify all potential needs before prioritizing and budgeting to address them.

Stormwater System

Recommendation 17: Develop an inventory and assess the condition of the storm sewer system.

As stated in Recommendation 1, maintaining a comprehensive inventory of all infrastructure is critical in order to properly manage assets. While the City maintains an inventory of its sanitary sewer infrastructure, it does not maintain records of the same caliber for its storm sewer system. In addition to maintaining an inventory of sanitary sewer infrastructure, the Department has a proactive condition assessment program, which has resulted in the entire sanitary sewer system being televised and regularly inspected. The sanitary sewer inspection program has not expanded to include storm sewers.

The Department currently inspects storm inlets prior to resurfacing projects. Very little televising of the City's storm sewers has been completed. The Department should develop an inventory of its storm sewer system, complete with GPS coordinates. The Department should also begin assessing the condition of the storm sewer system in conjunction with the PCI. As part of this assessment, inlets, catch basins, and manholes should be inspected. Additionally, the storm sewers should be televised one year in advance of the resurfacing program. This condition assessment schedule should be linked to the work order system and problem areas should be inspected on a more frequent basis.

Water System

Recommendation 18: Evaluate shifting to a water shutoff policy based on elapsed time rather than delinquent amount.

In the City of Warrentville, water customers are billed for water services bi-monthly. The City's informal policy is to shut off water once the delinquent amount of a customer's account reaches \$135. The City sends customers a late notice if they have not paid within one month. A review of water shut-off policies in surrounding cities indicates that the City of Warrentville is relatively unique in its approach to addressing delinquent payments.

All surrounding cities for which the shutoff policy is codified base account delinquency on elapsed time. In the City of Naperville, water can be shut off if charges are not paid within 15 days after the due date of the current bill; customers are billed monthly in the City of Naperville. In the City of Aurora, water can be shut off 30 days after a bill has become delinquent, which is defined as unpaid 30 days after billing; customers are billed bi-monthly in the City of Aurora. In the City of Wheaton, water can be shut off 15 days after a bill has become delinquent, which is defined as unpaid 30 days after billing; customers are billed monthly in the City of Wheaton.

The City of Warrentville should evaluate the impact on customers of shifting to an elapsed time-based approach rather than an outstanding value-based approach.

Recommendation 19: Monitor system leakage and prepare to establish a large water meter testing program.

Based on pump records and metered water sales, approximately 7.1% of total water production in the City of Warrentville is unaccounted for; a total of 0.9% of this loss is attributable to sewer cleaning activities such as flushing. This is a low percentage, particularly in regions of the country with seasonal cold weather extremes, and reflects well on the Department's management and maintenance of the water system. The Illinois Department of Natural Resources LMO-2 annual water use audit form provides "unavoidable" loss calculations based on the age and length of water main in a system. The Public Works Department calculation of this number results in an estimate of 6% being attributable to these factors.

Meter age and usage affect meter accuracy. As the water system and the meters age, the City can expect increasing system leakage compounded by loss of meter accuracy affecting customer sales. The current procedure in the City involves testing meters after they have been in service for 20 years. This schedule is not uncommon for residential meters but is unusual for larger meters.

The American Water Works Association (AWWA) has established recommended testing frequencies for water meters with increasing frequency for larger meters, recommending that

meters four inches and larger be tested annually. According to the AWWA, cities that implement testing programs for large water meters tend to see increased revenues. This tendency occurs for a number of factors including:

- Large water meter customers often make up a significant portion of a utility's revenue and increasing the accuracy of large meters decreases the amount of unbilled water.
- Meters generally tend to read low as they wear.
- Large meters may not record low flows accurately and as customer demand varies (often through conscious conservation efforts) they may end up with an oversized meter.

While water loss does not appear to currently justify establishing a large meter testing program, the City should continue to monitor water loss as well as large customer billing records and be prepared to establish a testing program in the future. This would become particularly important if the City ever contracted to receive Lake Michigan water as the cost of water would likely increase considerably.

Large meter testing can be expensive. Testing requires meters be removed from service and sent out for testing, maintenance, and possibly recalibration. When it becomes necessary for the City to establish a testing program, the City should evaluate the cost of the equipment necessary to test in place (TIP). Another option might be to contract with a City that has TIP equipment.

Safety and Training

Recommendation 20: Develop a safety training policy that outlines required training for each position, and maintain training records for each employee.

The Public Works Department does not keep a formal record of all training administered to its employees. Some certificates are kept in individual personnel files, but there is not a comprehensive tracking system for completed training. The Department should develop a safety training policy in order to ensure uniformity and safe operations.

The safety training policy should include the following elements:

- Definitions of the responsibilities of management, supervisors, employees, and Safety Committee members
- Safety rules and regulations
- Details of proper job instruction
- New employee safety training checklist
- Job-related safety training (and required frequency) for each position
- Reporting requirements

Job-related safety training necessary Department-wide as well as for specific positions should be included in the safety training policy. Job-related training may include instructions on handling hazardous chemicals, rescue drills, first aid, driver proficiency training, trench shoring, use of personal protective equipment, introduction to safe operations of new tools, safe working conditions in excavations and confined spaces, electrical safety, fall prevention, hearing conservation, respiratory protection, lock out tag out procedures, and work zone safety. The loss control consultant provided by the City's workers' compensation carrier may be able to provide training systems and record keeping as well as a list of required and recommended training.

APWA recommends organizations implement individualized training reports that identify the training and document the date. Once the Department has determined what training is necessary for each position, training received should be tracked. Responsibility for safety training should be formally assigned to Division Supervisors, with an annual audit conducted by the Assistant City Administrator. Attachment D includes a sample of a new employee safety training checklist. Once the checklist has been completed, a copy should be forwarded to the Assistant City Administrator.

Recommendation 21: Adopt a policy requiring operators to perform and log pre- and post-trip inspections of equipment.

Pre- and post-trip inspections are mandated by the United States Department of Transportation and the State of Illinois for any driver holding a Commercial Driver's License (CDL). During these inspections, equipment operators check every safety aspect of the vehicle. In addition to keeping drivers safe, inspections encourage a sense of ownership. As a result, employees learn more about the equipment and take better care of it. Needed repairs are also spotted earlier. Currently, Public Works Department employees are not documenting any pre- and post-trip inspections. Most asset management systems include pre- and post-trip inspection checklists. However, if the City selects a system that does not include these activities, inspections could easily be manually incorporated using existing paper-based checklists.

APWA recommends operators inspect the following: tire pressure and condition; brake, power steering, transmission, battery, cooling system, windshield wiper and washer fluid levels; oil level and condition; belts and hoses; headlights, brake lights and signals; windows, mirrors and seat belts.

Executive Succession Planning

The process, planning and technology improvements recommended above will represent an additional level of project work that must be completed alongside the regularly recurring programmatic work of the Department. In addition, the recommended development of new management and technology systems will require an ongoing commitment of time that the City is not fully staffed to absorb. This issue is compounded by the potential retirement of the Public Works Superintendent within the next few of years. It is therefore important to develop these systems in such a way as to capture the extensive operations and process knowledge possessed by the Public Works Superintendent, and to build a succession plan that both limits the loss of institutional knowledge associated with retirements and equips the department to implement and advance these initiatives well into the future.

The first step in this process is for the Department to develop the systems necessary to formalize the Department's current practices and begin tracking additional performance measurement data. This will not only require dedicated staff time to develop but also time to maintain the systems going forward. This capacity does not exist in the Department today. Second, it will require a thoughtful approach to succession planning designed to replace the significant experience and skills that will be lost through retirements.

Recommendation 22: Establish, budget and fill the position of Public Works Management Analyst.

The development of work order systems and performance measurement systems will require dedicated attention during the project planning and implementation phase as well as ongoing attention from the Department once the systems are implemented. The process will also require

extensive coordination with Department leadership, supervisors and front-line employees to develop the data collection and system utilization processes necessary to ensure that the investments in asset management systems are maximized. This work also must be completed while the Department continues to provide its ongoing services. Given the current programmatic and managerial requirements in the Department, it is not reasonable to assume that the implementation of a new asset management system linked with City GIS can be effectively taken on by the Public Works Superintendent alone.

Also, the Department currently has access to one administrative assistant who is intended to spend half of their time on Public Works Department administrative activities and half of their time on Community Development Department activities. However, while this administrative assistant can be utilized for administrative support and data entry for a new asset management system, the work required to develop and administer these systems will require a more nuanced understanding of local government operations, technology, and targeted outcomes. These factors indicate that it is appropriate and necessary to add additional analytical capacity to the Department in the form of a Management Analyst.

The Management Analyst position would report to the City Administrator/Acting Public Works Director, but would have responsibility for working with the Public Works Superintendent and Senior Civil Engineer, as well as other Department supervisors and leadership, to build an asset management system that captures existing work plans and tracks core performance metric data. This data can then be used to make workload-based decisions regarding work planning, contracting opportunities, and staffing levels. In addition, the Management Analyst position will also be available, as a direct report to the City Administrator/Acting Public Works Director, to complete city-wide special projects and programs, further enhancing the utility of this position.

Recommendation 23: Develop a Succession Plan for the Public Works Superintendent position.

One of the challenging things to plan for in a local government is the retirement of highly valued, long-time employees. The eventual retirement of the Public Works Superintendent is one such challenge. The Public Works Superintendent is expected to retire within the next few years. Fortunately, there is sufficient time for the City to develop and implement a plan that will allow for a smooth transition. One of the most significant things that the City can do to ease this transition is to convert the incumbent's extensive institutional knowledge into documented work processes and management systems that can be carried forward by future managers. Many of the recommendations offered in this report serve to contribute toward that goal. However, it is also important to consider how best to staff the vacated position to meet the strategic goals of the City and the department going forward. The City has three primary options available for consideration.

First, the City can choose to conduct a hiring process upon the retirement of the Public Works Superintendent and fill the position with an operating superintendent who would then take on responsibility for the day-to-day management of the department and report directly to the City Administrator/Acting Public Works Director. This would replicate the current model. The positive attributes of this approach are that it will not require a budget increase over standard inflation. It will also continue to emphasize the importance of daily operations management as a cultural characteristic of the Department. The primary downside of this approach relates to the daily maintenance and management requirements of the asset management, technology, and workload systems recommended throughout this report. Though the current Public Works Superintendent is equipped with the skill set necessary to carry these systems forward into functional standard operating procedures, this skill set is rare among operations superintendents and recruiting a candidate who could effectively perform the role may be difficult. The following

figure summarizes the proposed organization chart for option one. Recommended new positions are highlighted in grey.

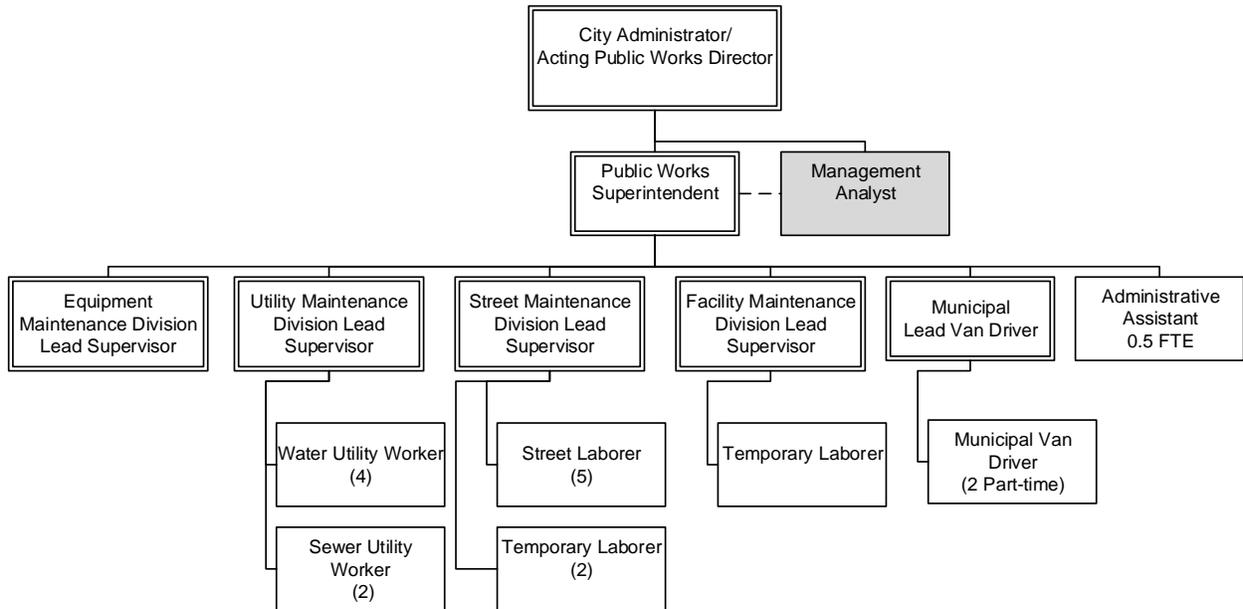


Figure 3: Proposed Organization Structure Option 1⁷

The second option is to fill the Public Works Superintendent position and create a Deputy Public Works Director position. This option, though requiring an FTE and budget increase for the Department, would result in a few important positive outcomes. It would ensure a continued emphasis in operations and daily, on-the-ground management, by ensuring that an operations superintendent is still responsible for overseeing the daily activities and outcomes of the Department’s work crews. However, it would also create a new managerial position with responsibility for overseeing broader work planning, management system development, and outcome management. The Deputy Public Works Director would provide direct supervision to the Public Works Superintendent, and would report directly to the City Administrator/Acting Public Works Director. In addition, the Senior Civil Engineer position could be moved as a direct report to the Deputy Director of Public Works which would better integrate capital planning with regular preventative maintenance planning. The following figure summarizes the proposed organization chart for option two. Recommended new positions are highlighted in grey.

⁷ New positions are highlighted in grey.

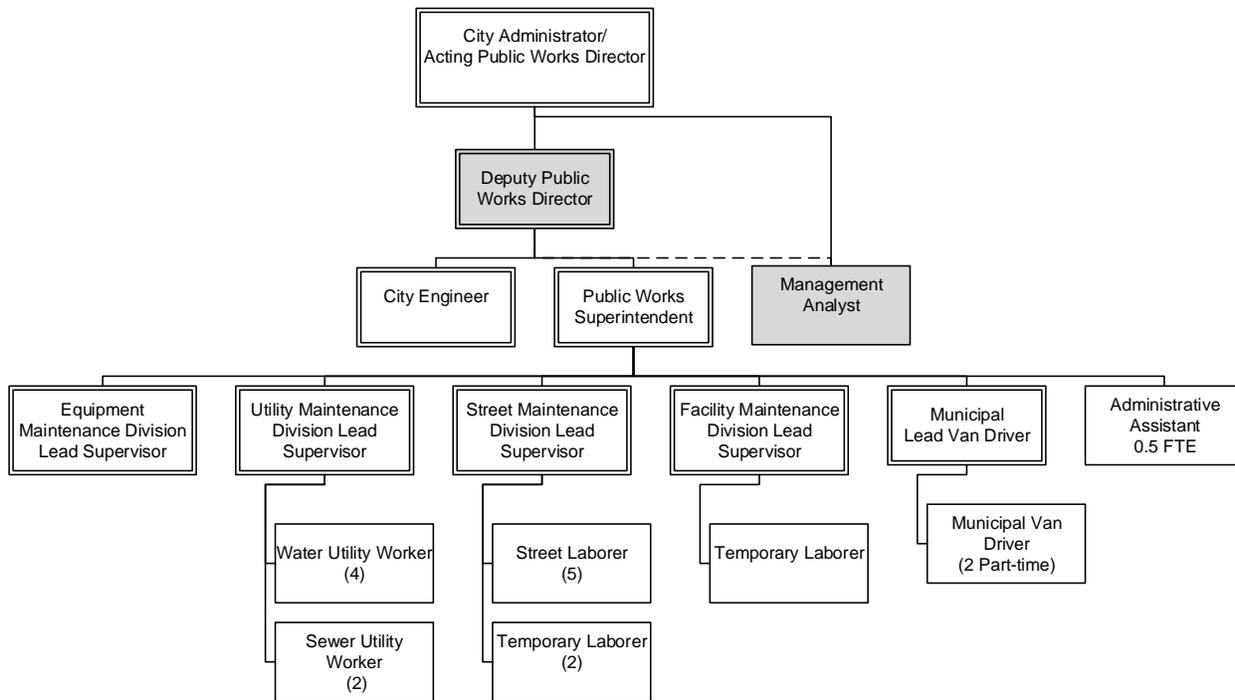


Figure 4: Proposed Organization Structure Option 2⁸

The third option would also call for filling the Public Works Superintendent position upon the retirement of the incumbent, but would also call for creating a Deputy Public Works Director/City Engineer position. This option is therefore similar to option two, with the exception that it converts the existing position of Senior Civil Engineer into a combination Deputy Public Works Director/City Engineer position. This option offers the value of limiting potential budget increases but there are also limitations to consider. A Deputy Public Works Director/City Engineer position would require a diverse skill set reflecting an operations, management, and engineering background. Though such position titles (e.g., Deputy Public Works Director/City Engineer) are not uncommon in the field, a candidate with the right balance of expertise and experience in each of these functional areas is relatively rare. In addition, the current Senior Civil Engineer also serves as the stormwater program manager. This work would need to be absorbed by other staff as the envisioned position of Deputy Public Works Director/City Engineer would require a dedicated, full time commitment to departmental and infrastructure maintenance. The following figure summarizes the proposed organization chart for option three. Recommended new positions are highlighted in grey.

⁸ New positions are highlighted in grey.

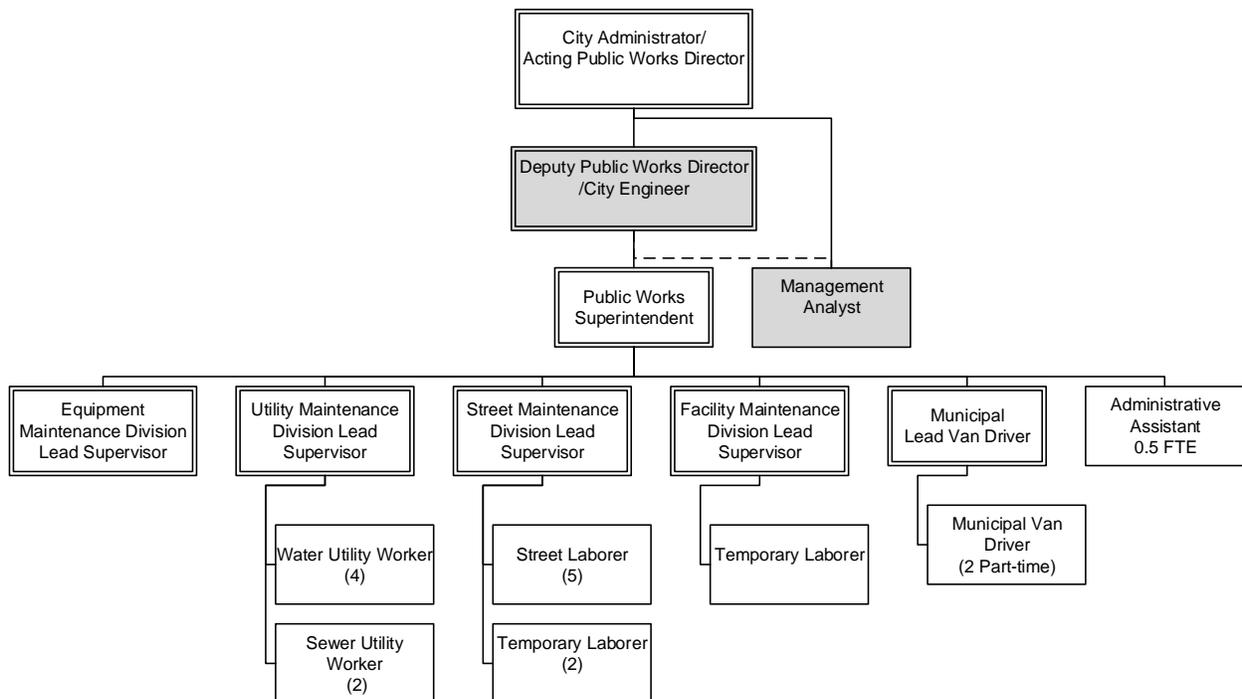


Figure 5: Proposed Organization Structure Option 3⁹

Ultimately, the decision of which option to implement will depend on policy discussions and budget implications. However, of the options detailed above, option two, which calls for the creation of a new Deputy Public Works Director position while maintaining the Public Works Superintendent and Senior Civil Engineer as separate positions, offers the greatest utility and value added to the City.

⁹ New positions are highlighted in grey.

Conclusion

This organizational assessment was undertaken to evaluate the efficiency and effectiveness of the Public Works Department operations and to determine what actions can be implemented to improve operations and help the City effectively plan for upcoming retirements. The Novak Consulting Group's analysis indicates that the Department is staffed with highly qualified, well-trained personnel who possess a noteworthy commitment to the community. Department managers, supervisors, and front-line employees are proactive in their work and have adopted sound practices to maintain and repair the City's public infrastructure.

The recommendations offered in this report outline an approach designed to convert the considerable institutional experience and knowledge that exists into work processes and systems that can be leveraged to enhance efficiency and effectiveness.

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Attachment A – Summary of Recommendations

Recommendation 1: Implement an electronic work order system to streamline work planning, assignments, and performance measurement data collection.

Recommendation 2: Implement a fleet and fuel management system.

Recommendation 3: Create a vehicle maintenance cost center to centrally track all vehicle maintenance expenditures.

Recommendation 4: Develop outcome and efficiency performance metrics for each Public Works Department program.

Recommendation 5: Create maintenance work plans, schedules, and service standards to guide the process of determining resource requirements.

Recommendation 6: Utilize a work order system to track labor hours by major task.

Recommendation 7: Develop a preventative maintenance contract arrangement for equipment maintenance.

Recommendation 8: Integrate asset map data maintained by the Public Works Department into GIS software used by the City and begin geolocating assets.

Recommendation 9: Equip front-line workers with mobile devices so they can access the work order system and mapping software in the field.

Recommendation 10: Merge utility location services once infrastructure has been geolocated.

Recommendation 11: Upgrade the VTScada system and begin using the mobile interface to monitor and control equipment from smartphones.

Recommendation 12: Assign work order and asset management system development to a joint project team with operations and engineering expertise.

Recommendation 13: Utilize a formal pavement condition assessment and pavement management system to build annual preventative maintenance plans and resurfacing plans to prolong the useful life of pavement infrastructure.

Recommendation 14: Use the building equipment needs identified in the CMRP to develop annual work plans and appropriately allocate funds for the projected repairs/replacements.

Recommendation 15: Increase energy efficiency by continuing the conversion of streetlights to energy-efficient light emitting diode (LED) technology.

Recommendation 16: Conduct a facility needs assessment.

Recommendation 17: Develop an inventory and assess the condition of the storm sewer system.

Recommendation 18: Evaluate shifting to a water shutoff policy based on elapsed time rather than delinquent amount.

Recommendation 19: Monitor system leakage and prepare to establish a large water meter testing program.

Recommendation 20: Develop a safety training policy that outlines required training for each position and maintain training records for each employee.

Recommendation 21: Adopt a policy requiring operators to perform and log pre- and post-trip inspections of equipment.

Recommendation 22: Establish, budget and fill the position of Public Works Management Analyst.

Recommendation 23: Develop a Succession Plan for the Public Works Superintendent position.

Attachment B – Public Works Department Suggested Performance Measures

Equipment Maintenance Division

- Percent of preventative maintenance completed as scheduled
- Average wrenching time per mechanic
- Percent of mechanic hours that are billable to customer departments
- Average maintenance cost per 1,000 miles driven (by type of vehicle)
- Average operating and maintenance cost (by type of vehicle)
- Average number of days to complete a vehicle maintenance work order (by type of vehicle)
- Percent of vehicle maintenance expenditures contracted out

Street Maintenance Division

- Cost per lane mile maintained
- Percent of pavement rated as good or better in the PCI
- Number of work orders completed per FTE
- Percent of preventative maintenance completed as scheduled
- Street sweeping expenditures per linear mile swept
- Percent change in the tons of debris collected through street sweeping
- Percent of work orders completed within 3 working days
- Average number of calendar days required to complete work (by type)
- Number of staff hours per snow event worked
- Percent of streets cleared within 24 hours of a snow event
- Percent of preventative maintenance completed as scheduled (storm water infrastructure)
- Cost per acre maintained (parks and rights-of-way)

Utility Maintenance Division

- Average number of calendar days required to complete work (by type)
- Cost per linear foot of pipe maintained (by type)
- Percent of inspections completed as scheduled (by type)
- Percent of preventative maintenance work completed as scheduled (by type)
- Percent of work orders completed within 3 working days
- Percent of emergency calls responded to within 4 hours
- Percent of emergencies mitigated within 24 hours

Facility Maintenance Division

- Percent of facilities maintenance work orders completed within 3 working days
- Percent of preventative maintenance completed as scheduled

Attachment C – Example Pavement Condition Assessment Tool

Most pavement management systems rely heavily on a rating of the physical condition of a street called the Pavement Condition Index (PCI). This PCI is obtained from a field inspection of every square yard of street surface by the technician who measures both the quantity and the type (severity) of distresses in the pavement. This evaluation is done in accordance with a uniform rating manual. Pavement rating programs then compute these field measurements and establish a PCI number (0-100), which is a comparative rating to new pavement (100). The following figure illustrates the pavement condition to age curve and the relative impact of preventative maintenance as a tool to extend the life of City roads.¹⁰

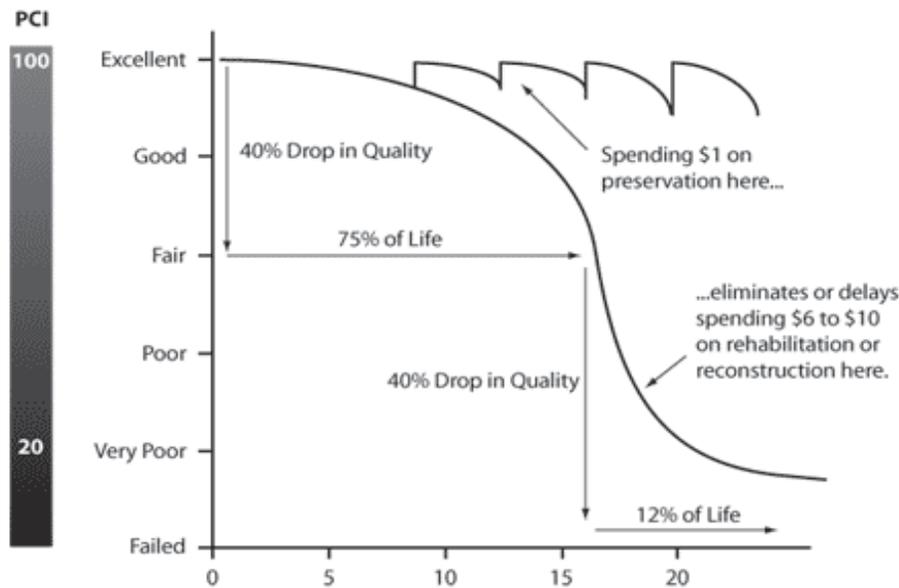


Figure 2: Pavement Condition to Age Curve¹¹

¹⁰ Stevens, L.B. "Road Surface Management for Local Governments – Resource Notebook." Federal Highway Administration, May 1985.

¹¹ USDOT Pavement Preservation Compendium II, Principles of Pavement Preservation: Definitions, Benefits, Issues, and Barriers

Attachment D – Sample Safety Inspection Checklist

Sample Safety Training Checklist for New Public Works Department Employees¹²

Subjects to be reviewed with employee:

General Subjects (*applies to all new employees, including temporary and seasonal*)

1. Safety and Health Policy Statement
2. General Safety Rules and Enforcement Procedures
3. Safety Suggestions
4. Reporting Unsafe Conditions
5. Substance Abuse Awareness
6. Emergency Action Plan (fire, medical, weather and threats to personnel)
7. Work-Related Accident Reporting Procedures
8. Vehicle Accident Policy
9. Lifting Techniques

Maintenance-Specific Subjects

1. Safe Operation of Vehicles
2. Housekeeping
3. Material Handling and Storage
4. Personal Protective Equipment
5. Hand Tools and Power Tools
6. Ladders
7. Machine Guarding
8. Power Lines
9. Hazardous Chemicals and Materials
10. Compressed Gases
11. Flammable Liquids
12. Welding and Cutting
13. Digging and Excavations
14. Traffic Safety
15. Winter Operations
16. Confined Spaces
17. Lockout Tagout
18. Electrical Safety

Job-Specific Subjects

1. Job-specific hazards
2. Job-specific safety precautions and rules
3. Required PPE

Employee Signature

Date

Supervisor Signature

Date

¹² Based on the Allegheny County, PA Public Works Department New Employee Checklist

Appendix A – Comparative Review of Asset Management Systems