Operational Audit of the Public Works Department

ROCK COUNTY, WISCONSIN

matrix consulting group

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1. EXECUTIVE SUMMARY

The Rock County Public Works Department retained the Matrix Consulting Group to conduct an operational audit and evaluation of the Department. The areas of inquiry for this engagement included service level evaluation, fleet replacement, vehicle maintenance and repairs, timekeeping, administration and billing, staffing and service delivery projections, and facilities right-sizing. The study was structured to address 12 questions which focused on the following specific areas:

- Assessing whether the County should replace its Hot Mix Asphalt Paver or stop providing road paving services;
- Determining cost-effective alternative levels of service delivery to the towns within the County;
- Analyzing staffing and supervisory needs for the Department based on the level of service provided to the towns and the expansion of Interstate 39/90;
- Evaluating fleet composition alternatives to ensure that the mix of vehicles and fleet replacement strategy is efficient for the Department's workload;
- Establishing parts inventory practices and implementing fleet management software applications to increase the consistency and efficiency of vehicle maintenance and repair;
- Determining effective practices and evaluating technology options for timekeeping, job costing, billing, and budget monitoring;
- Assessing facilities needs and establishing parameters for future facilities expansion/relocation.

(1) Study Methodology

The process utilized by the project team for conducting this study and composing recommendations to address the areas of inquiry is outlined in the following points:

- The project team conducted in-person interviews with key staff throughout the department, including the Director, all management staff, administration and billing personnel, operations superintendents, and parts room staff. These

interviews were designed to acquaint the project team with the organizational structure and operations of the Department and identify key issues for inquiry.

- The project team conducted in-person focus group meetings with Department stakeholders, providing representatives from the towns with an opportunity to share their perspective and opinions on the service provided by the Department. These meetings also served to identify potential issues for further analysis.

- The project team collected extensive data from the department, both on-site and electronically, in order to develop a detailed and accurate understanding of the Department's structure, workload, policies, and operational practices. Documentation included:

  – Personnel data such as staffing numbers, organizational charts, pay scales, and job descriptions;
  – Fleet documentation such as the number and types of vehicles, parts inventory, vehicle usage data, and replacement cost;
  – Workload and materials consumption data, including the use of asphalt, the number of lane miles maintained, and the number of hours worked;
  – Financial and administrative information such as budgets, billing rates and schedules, and the use of existing software applications.

- The project team compared the policies, procedures, and operational practices of the Department to "best practices" in order to identify current strengths, weaknesses and opportunities for improvement. The project team used our firm's diagnostic assessment matrix for this effort, comparing the Department's services to qualitative and quantitative benchmarks developed by the Matrix Consulting Group over years of experience with public sector entities.

These process components provided an in-depth understanding of the Department and its key issues, and they served as the foundation for conducting a thorough analysis of the questions presented to the project team.

(2) Strengths

While the focus of this study was to evaluate the Department's operations, identify opportunities for improvement, and provide ideas for implementing efficient solutions, the project team also noted a number of strengths in the Department over the course of the study. Examples of these strengths include the following:

- The Department maintains frequent and open communication with its customers regarding the services provided to them.
- The Department generates and publishes regular financial reports.
- Responsibility for oversight of street and highway maintenance is effectively delegated to superintendents and crew leaders.
- The managerial span of control is appropriate for the size of the Department.
- The Department conducts both deep and surface level street repairs in-house to address structural failure and drivability of roads.
- The Department uses an automated fleet management system to track maintenance and repairs performed on its vehicles.
- Parts room inventory is audited on a regular basis.
- Time and machinery usage are reported and tracked on an ongoing basis, and the WisDOT Uniform Cost Accounting Manual is in use.
- The Department's facilities for fleet storage are appropriate for the size of the fleet, and they do not place undue strain on the Department's operations.

These existing strengths provide a foundation for increasingly sound operational practices and future efficiency improvements in the Department.

(3) Summary of Key Recommendations

The following document contains draft recommendations made by the project team as a result of our data collection, benchmarking, and analysis efforts over the course of the study. The recommendations are arranged topically according to the 12 overarching questions presented by the Public Works Department to the project team.

The following table provides a summary of the recommendations by topic.[1]

[1] Responding to Questions 1-11 formed the framework of our study and recommendations. Question 12 was directed to the project team and concerned the methodology of our study rather than the operations of the Department.

Summary Table of Recommendations		
Recommendation	**Cost/Savings**	**Priority**
Operations and Service Provision (Questions 1-4)		
1. The Public Works Department should discontinue the provision of paving services to the towns.	n/a	High
2. The County should require a supplemental payment from the larger towns that require greater efforts from Public Works staff during snow and ice events.	Unknown	Medium
3. The Public Works Department should develop a menu of four to five options from which towns may choose services. Each of these options would include snow removal, however each would offer varying service levels for paving, sealcoating, mowing frequency, and others.	n/a	Medium
4. The Public Works Department should replace the majority of its pickup truck fleet with single-axle dump trucks.	$622,194 Net Savings $357,264 one time revenue	High
5. County departments should be required to submit their individual projects for consideration by the Public Works Department prior to issuing bid documents to private contractors. If the Department has the capacity to perform these projects, it should bring these to the County for consideration as to whether the Department should be awarded the work, as Wisconsin statutes allow for this alternative.	n/a	Medium
Fleet and Parts (Questions 5-6)		
6. The Department should adopt a nine (9) year replacement cycle for its single axle dump trucks.	n/a	High
7. The Department should adopt the equivalent annual cost (EAC) method of determining the optimum replacement cycles for each unit category.	n/a	Medium
8. The Department should begin calculating depreciation costs of its equipment based on the full value of the initial purchase price until such time that its equipment is placed on a more frequent replacement cycle.	n/a	Medium
9. The DPW's shop should begin utilizing FASTER to establish preventive maintenance intervals for each vehicle and WEX to track their fuel usage, if possible. Automating this function will improve the consistency and proactivity of the shop's PM activities.	*n/a*	High
10. The Department should begin utilizing FASTER to produce regular reports on shop performance and efficiency in order to identify areas of high performance and improvement opportunities. The appropriate training should be obtained as necessary.	Unknown	High

Summary Table of Recommendations		
Recommendation	**Cost/Savings**	**Priority**
11. The Department should prioritize determining the reason for the low parts inventory ratio and take action to either reduce the number of obsolete parts or shrink the volume of slow-moving parts, depending on the determined cause.	n/a	High
12. To maintain security and accountability in the parts room, parts room personnel should be the only staff behind the parts room counter.	n/a	Medium
13. The Department should work with CCG Systems to implement a bar code reader in the parts room to record the stocking and use of parts, and to charge them directly to specific vehicles.	Unknown	High
Technology and Administration (Questions 7-9)		
14. The Department should continue to work with the IT Department to implement an automated timekeeping application that shop and field employees can use to record their time, materials, and vehicle usage electronically.	n/a	High
15. Information gathered in the automated timekeeping system should be aggregated in a format that allows it to be automatically imported into the Department's highway billing and payroll systems with minimal staff time.	n/a	Medium
16. The Department should seek to automatically synchronize its internally-developed automated timekeeping system with its existing billing system, either automatically or through a simplified manual process, in order to access real-time updates on job costing and project/cost pool budgeting.	n/a	High
17. If the Department's internally-developed applications are not adequate for the type of project costing and budgeting functions required by the Department's staff and customers, the Department should select a software application for purchase that meets the data tracking and reporting requirements necessary for setting the Department's operational direction.	Unknown	Medium
18. The Department should develop a manual of billing policies and procedures in order to improve the timeliness and accuracy of bill issuance, serve as a tool for training new staff, and standardize current practice to improve shared understanding of the process.	n/a	Medium
19. The Department should establish a procedural timeline that allows the processing and issuance of municipal bills consistently within 30 days of the conclusion of a monthly billing period and implement its automated timekeeping system to accommodate this goal.	n/a	High

Summary Table of Recommendations		
Recommendation	**Cost/Savings**	**Priority**
20. The Department should reclassify the Account Clerk and Cost Allocation Specialist so that they have the same position title (Cost Allocation Specialist) and job responsibilities. The two staff should be cross-trained to more efficiently handle the workload changes that will result from automation of employee timekeeping and assume responsibility for some of the more routine duties performed by the Accounting Supervisor to free up time for that position to focus on higher level accounting duties.	$5,000	High
Staffing and Facilities (Questions 10-11)		
21. The Department should prepare for a reduction in non-winter maintenance staff and an expansion in the number of winter maintenance staff. The difference should, to the degree possible, be made up by hiring seasonal winter maintenance employees.	n/a	Medium
22. The Department should prepare for night maintenance work to compose a greater percentage of its overall workload in the next 10-15 years as the interstate expansion begins to drive maintenance workload. The Department should be prepared to evaluate the need for a night supervisor when that occurs.	n/a	High
23. The County should move forward with the planned new facility at Beloit in order to provide adequate and appropriately located vehicle storage space for the Department.	n/a	High
24. The Department should locate future facility expansions close to the interstate, which will account for an increasing percentage of the Department's workload over the next 10-15 years.	n/a	High
25. The Department should maintain a single shop and parts room while the fleet shrinks or remains close to its current size. The Department should strive to locate older, more breakdown-prone vehicles close to the shop and use newer vehicles on the outskirts of the County.	n/a	Medium

Details regarding the analysis and specifics of each recommendation are containing the following chapters.

2. OPERATIONS AND SERVICE PROVISION

The following sections and recommendations address the issues raised by Questions 1-4 presented to the project team and issues that the project team identified related to those questions.

(1) The County Should Discontinue the Provision of Asphalt Paving Services and Transition to a Contract Coordination Role for the Towns.

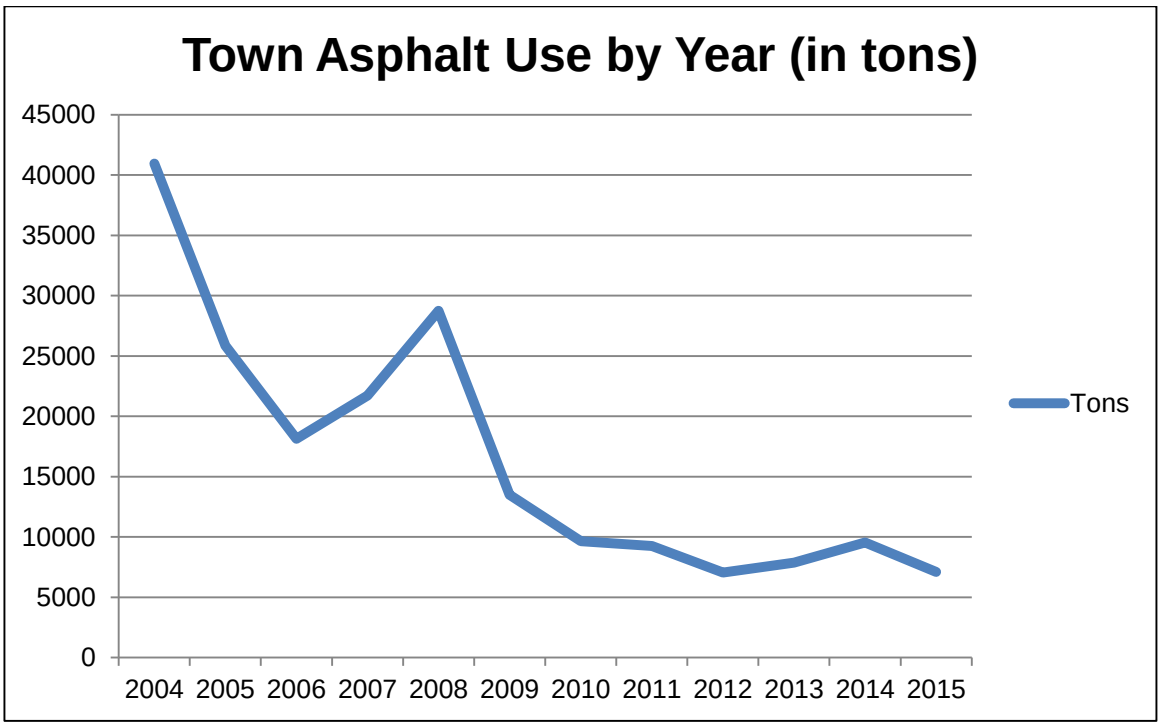
The Rock County Public Works Department has historically provided hot mix asphalt services to its towns, and continues to do so today. The total charges to the towns vary with the cost of materials and the amount of labor required, however the rates charged for the paver are set by the State of Wisconsin, and cannot vary from the current rate schedule. The current established rate is $1.46 per ton of asphalt poured.

County crews accomplish paving activities with a 2005 paver that is beyond its useful life, and the County is faced with the prospect of purchasing a replacement at an estimated cost of $450,000. There are many factors that should be considered in making the decision to replace the paver, and these extend beyond just the substantial cost of the paver. One such consideration is that the towns in the County have been using alternative means to repair roads, and have been decreasing their use of County crews to repave roads. As the table below shows, there has been a substantial drop in asphalt use by towns in recent years.

Town Asphalt Use By Year	
Year	**Tons of Asphalt Used**
2004	40,940.60
2005	25,866.96
2006	18,148.18

Town Asphalt Use By Year	
Year	**Tons of Asphalt Used**
2007	21,717.54
2008	28,758.13
2009	13,498.59
2010	9,639.60
2011	9,259.19
2012	7,049.85
2013	7,881.38
2014	9,548.91
2015	7,104.64

From the years 2004 through 2008, towns used an average of 27,086.3 tons of asphalt. However, from the years 2011 to the present, they have averaged only 8,175.8. The chart below provides a visual illustration of this marked decrease.



As was noted, the Public Works Department's asphalt paver is ten years old. If the Department is to continue to use its crews to lay hot mix asphalt going forward, it will

need to replace the paver in the very near future. The State allows for a depreciation cycle of eight (8) years for asphalt pavers. Using an estimated purchase price of $450,000, and using an estimated salvage value of 15% of this purchase price, as has been customary in the Department, this results in an annual depreciation cost of $47,812.50, as is shown in the table below.

Paver Depreciation Calculation	
Description	**Amount**
A. Paver Purchase Price (estimated)	$450,000
B. Economic Life (years)	8
C. Projected Salvage Value	15%
D. Annual Depreciation (((1-C)*A)/B)	$47,812.50

As was noted above, the Wisconsin Department of Transportation (WisDOT) establishes rates that may be charged for the use of equipment, and for the paver, this has been established at $1.46 per ton of asphalt poured. If the towns continue to request services that require the use of the paver at the current average of about 8,175.6 tons per year, this would result in revenue of only about $11,936.38, or $35,876.12 less than the annual depreciation amount.

The Public Works Department does utilize the paver to pave County and State roads, so the failure to cover the depreciation cost through town revenues should not, in itself, determine whether the County elects to purchase a new paver. However, it is also true that the use of County crews is somewhat more costly than using private contractors. The 2014 cost of County crews to lay in place one mile of asphalt at a 20 foot width and 2 inch thickness was $89,800. The average 2015 cost of five recent estimates provided by contractors was $85,377.60 for the same one mile, 20 foot width and 2 inch thickness, as the table below shows.

2015 Quoted Cost Per Mile (20' wide, 2" deep)	
Town/Village	**Contractor Quoted Price**
Village of Clinton	$83,893.33
Town of Sharon	$96,800.00
Town of Porter	$82,602.67
Town of Bradford	$77,440.00
Town of Beloit	$86,152.00
Average	**$85,377.60**

If the five recent quotes are reflective of current actual costs by contractors, then their costs are about 5% less than those of internal County crews.

There are risks associated with relying solely on contractors, and in Rock County's case, there is only one viable contractor option. This contractor has reportedly been somewhat unreliable in the past in terms of asphalt production and in its availability to perform work during specified time periods. However, given the trends in paving use by the towns, the cost of the paver, and the relatively higher cost of project work by County crews, the project team recommends, on balance, that the Public Works Department discontinue internally-provided paving services.

During the course of the study, the project team held two open meetings with town representatives. Each representative expressed extreme satisfaction with the services they receive from the County, and the decision to discontinue paving operations, at least with the towns represented in the meetings, will undoubtedly be unpopular. However, the weight of economic circumstances do not favor the continuation of paving services by County crews.

Although the project team recommends discontinuing paving services, the Department of Public Works should serve in a coordinating role for procuring and

scheduling contracted paving services for the towns. The Department should continue its practice of Patrol Supervisors driving all town roads with town representatives to determine the course of action to repair and maintain roads. However, to the extent that the towns elect to re-pave roads, the Department may elect to offer towns an option to develop specifications, obtain quotes for paving services, schedule the services, and inspect the pavement on behalf of the towns. The discontinuation of asphalt paving services to the towns will result in the County's ability to eliminate certain trucks from the fleet.

Recommendation #1: The Public Works Department should discontinue the provision of paving services to the towns.

(2) The Public Works Department Should Restructure Its Contractual Arrangements with the Towns to Address Its Financial Deficits.

The Public Works Department's staffing needs are largely driven by the requirements to ensure that State, County and town roads are cleared during winter snow events. When these events occur, each of the Highway staff members has a role in clearing the 1,100 linear miles of roadways in the County.

During the non-winter months, however, WisDOT and the towns do request some services from the Department of Public Works, but the abilities of these customers to pay for these services has not increased in relation to these requests. This has resulted in the Department either deferring routine maintenance on State roads, or running over budget on town-requested work. This further causes the Department to shift work that would have been performed on a cost-reimbursement basis to work on County roads, creating a further financial burden. However, as these

staff members are needed during the winter to clear snow and ice, they must be retained during the non-winter months.

A further financial consideration is the fact that the County has run deficits in nine (9) of the past 11 years in snow removal activities at the reimbursement rates that are allowable by the State. The inability to recapture these losses for services during the non-winter months is creating an unsustainable financial burden for the County. The Public Works Department has been unsuccessfully attempting to compensate for these deficits by providing an array of customized services to the towns, however, as noted above the towns and the State have been unable to increase their payment for services due to their own financial restrictions.

The County has little flexibility in the provision of snow and ice removal efforts. These must be provided as they occur, and the frequency and severity of the storms have a direct, yet unpredictable effect on the financial performance of the County in abating them. The project team has noted, though, that in some of the more urbanized towns with larger numbers of lane miles, cul-de-sacs and other infrastructure, additional resources are allocated for snow removal, yet the County is reimbursed only on the basis of the number of miles of roads plowed. Therefore, a smaller town requires a single Maintenance Worker and a quad-axle dump truck, but a larger town may require two Maintenance Workers and two trucks for some amount of time during the storm. This is an inequitable balance of resources for which the County receives the same reimbursement per mile plowed, and results in a subsidy from both the County and the smaller towns to finance the plowing of the larger towns' roads.

- The County should require a supplemental payment from the larger towns with greater numbers of subdivisions, cul-de-sacs and other infrastructure that require

greater resources than the single driver and truck to remove snow and ice from their roads.

- The Public Works Department should develop a menu of four to five options from which towns may choose services. Each of these options would include snow removal, however each would offer varying service levels for paving, sealcoating, mowing frequency, and others. Each of the towns would be provided with the menu from which to choose, and each would have an associated "lump sum" payment to the County for the option chosen. Each option should recover the costs associated with service provision. In this manner, the towns are assured a level of service for which costs are known in advance, and the County likewise is assured of minimum utilization levels for labor, equipment and materials and, importantly, a defined level of revenues that should be designed to cover expenses.

Recommendation #2: The County should require a supplemental payment from the larger towns that require greater efforts from Public Works staff during snow and ice events.

Recommendation #3: The Public Works Department should develop a menu of four to five options from which towns may choose services. Each of these options would include snow removal, however each would offer varying service levels for paving, sealcoating, mowing frequency, and others.

(3) The Public Works Department Should Alter the Composition of Its Fleet in Order to Maximize Utility and Minimize Costs.

The Public Works Department conducts its varied operations with a diverse fleet that includes a mix of heavy and light equipment of rolling stock and non-rolling stock. Each of the categories of equipment was purchased to fulfill a specific role in the Department's operations, however, the project team's analysis indicates that certain equipment types could be utilized in a more useful capacity than some others that are currently in the fleet. This section provides the analysis associated with three alternatives for consideration. These alternatives are as follows:

- Should the current fleet of tri-axle dump trucks be replaced with quad-axle dump trucks?

- Should the current fleet of non-RDS tandem axle dump trucks be replaced with quad-axles?

- Should the current fleet of pickup trucks be replaced with single-axle dump trucks?

The following sub-sections provide the analysis and recommendations associated with each of the above alternatives.

(a) Replacing the Current Fleet of Tri-Axle Dump Trucks with Quad-Axles Results in Lower Revenues, and Higher Costs to the County.

The Department currently has six (6) tri-axle dump trucks that it utilizes for paving operations as well as snow and ice removal. It also has a fleet of eight (8) quad-axle dumps. Although tri-axles have a lower payload than the quad-axles, the Department initially made the decision to purchase tri-axles because it was thought that this class of equipment was more maneuverable in the towns which, in places, require a tight turning radius. However, in practice, this has not been the case, as tri-axle and quad-axle dumps exhibit a similar turning radius. Furthermore, the billing rate established by WisDOT for tri-axles is significantly greater than that of a quad-axle ($62.92 and $52.80, respectively), making them more expensive to customers when the County bills for their use.

The project team analyzed the likely financial impact of replacing the current fleet of tri-axle dumps with quad-axles. To accomplish this, it was assumed that the current fleet of tri-axles would be physically replaced with quad-axles, but it was further assumed that the replacement quad-axles would be utilized in the same manner as the tri-axles that they replaced. The project team made two primary assumptions in this calculation:

- Since the quad axles carry a maximum payload of 18 tons compared to the 15 tons carried by a tri-axle, the quad-axle replacements would accumulate only 83.3% (or 15/18) of the hours of use exhibited by the tri-axles.

- Since about 20% of the total usage for Tri-axle dump trucks occurs during the winter months, and thus is unrelated to the payload it is capable of hauling, it was assumed that 20% of each of these units' operating hours would remain the same, but that 80% of these same operating hours would be subject to the variation in the payloads between the Tri-Axle and the Quad Axle. For example, if a Tri-Axle dump truck had been accumulating 500 operating hours each year, it was assumed that 20% of its usage, or 100 hours, would remain the same, and 80%, or 400 hours, would be subject to the variation in the payloads. Therefore, in this example, the 400 operating hours would be reduced by 16.7%, or 66.8 hours, and the total hours accumulated by its replacement Quad-Axle would be 433.2 ((100 hours + (400 hours – 66.8 hours)).

In addition to the above assumption, the costs associated with the operation of these units are assumed to directly related to the number of hours operated. Therefore, for example, if a particular tri-axle had been accumulating 500 annual hours of use, its replacement quad-axle would, as was shown in the example above, accumulate only 433.2 hours, and would exhibit a similar reduction in operating costs associated with lubrication and anti-freeze, fuel, tires, labor (and therefore, overhead), materials, and sundry items. Depreciation of the new quad-axles was assumed to be calculated in the same manner as is currently the case, which is the purchase price less the assumed 15% for salvage value, divided by the WisDOT-dictated economic life cycle of nine (9) years.

To illustrate how the total cost of the replacement quad axles was calculated, the project team assumed that the operating costs associated with fuel, lube/anti-freeze, labor, materials, tires and batteries, and sundry items varied with the number of hours the new quad-axle would be used. To make the calculation for the total cost associated with, for example, sundry items, the project team averaged the current costs for all current quad axles' sundry items (which happened to be $1,651.20), and calculated the sundry item cost for each of the six replacement quad axles as a percentage of the

particular unit's hours of the average for the replacement quad axles. For example, the average number of hours for the replacement quad axles was calculated to be 493.0. The quad axle that replaces the first tri-axle dump truck was estimated to accumulate 315.7 hours, which is 64.0% of the average. Therefore, this unit's sundry item cost was calculated at 64.0% of the average sundry item cost which was $1,651.20, or $1,056.77. Each of the cost elements was calculated in this manner, and the total costs in the second table, below, are summations of these individual costs, plus the depreciation cost, which is calculated in a different manner.

The comparison of the current revenues and costs to the projected revenues and costs from replacing the six tri-axle dumps with quad-axles is summarized in the tables below. Note that in the second column, Class 1118 is a tri-axle dump truck and 1128 refers to a quad-axle dump.

Current Situation Costs and Revenues			
Unit ID	**Class**	**Total Cost**	**Total Revenues**
1024	1118	$17,680.74	$22,921.76
001032	1118	$38,410.04	$33,920.17
001044	1118	$31,494.90	$47,510.89
001045	1118	$47,769.61	$50,958.91
001025	1118	$28,309.89	$29,069.04
001026	1118	$29,032.29	$30,390.36
001052	1128	$54,946.60	$42,002.40
001053	1128	$51,944.35	$37,530.24
001054	1128	$48,003.16	$42,266.40
001063	1128	$52,809.73	$46,252.80
001064	1128	$52,626.94	$44,895.84
001068	1128	$50,233.84	$45,159.84
001069	1128	$49,337.46	$24,567.84
001070	1128	$50,774.24	$26,679.84
Total		**603,373.80**	**$524,126.33**
Net Profit			**($79.247.47)**

As can be seen in the table, above, the Department has a net loss of $79,247.47 under the current situation in which it operates six tri-axle dump trucks and eight quad-axles. However, the projected loss widens when each of the six tri-axles is replaced with a quad-axle, as the table below shows. Note that the first six units in the first column are designated as "New", as these are the new quad-axles to be purchased as replacements for the six current tri-axles.

Replace Tri-Axles with Quad-Axles			
Unit ID	**Class**	**Total Cost**	**Total Revenues**
New	1128	$35,358.49	$16,670.37
New	1128	$45,120.52	$24,669.22
New	1128	$57,183.44	$34,553.38
New	1128	$60,243.85	$37,061.02
New	1128	$40,814.73	$21,141.12
New	1128	$41,987.51	$22,102.08
001052	1128	$54,946.60	$42,002.40
001053	1128	$51,944.35	$37,530.24
001054	1128	$48,003.16	$42,266.40
001063	1128	$52,809.73	$46,252.80
001064	1128	$52,626.94	$44,895.84
001068	1128	$50,233.84	$45,159.84
001069	1128	$49,337.46	$24,567.84
001070	1128	$50,774.24	$26,679.84
Total		**$691,384.85**	**$465,552.38**
Net Profit			**($225,832.46)**

As the table shows, the net projected loss from the replacement of the current fleet of six tri-axles with new quad-axles is $225,832.46, which is $146,584.99 greater than the loss under the current situation. However, an important factor in this analysis is that each of the current six tri-axle dumps is fully depreciated and therefore shows no costs associated with depreciation in the total cost of the current situation. Conversely, all eight of the current quad axles continue to show depreciation costs. This clearly

must be factored into the analysis, as it is not feasible to assume that the current fleet of tri-axles would be retained in the fleet over the full nine years over which the assumed new quad-axle replacements would be depreciated. In fact, if it is assumed that each tri-axle costs $225,000, as is estimated by the Department of Public Works, and has a depreciable life of nine years (as has been established by WisDOT), each unit would incur annual depreciation of $21,250, and the total depreciation cost for all six units would have been $127,500. Had the current fleet of tri-axles not been fully depreciated, then, the total net loss under the current situation would have been $206,747.47 rather than the $79,247.47 shown in the first table, above. This would, therefore, make the difference between the two scenarios only $19,084.99 rather than the $146,584.99 calculated above. This difference is almost entirely explained by the difference in the relatively greater depreciation costs of quad-axles versus those of tri-axles.

Replacing the six tri-axles will allow the Department to sell these units at fair market value. The project team utilized the net book values for each of these six units, and assumed that they could be sold for 90% of these values. This would, therefore, result in a one-time revenue of $78,859.23.

(b) Replacing the Department's Fleet of Tandem-Axle Dump Trucks with Quad-Axles Results in Less Revenue and Substantially Greater Costs.

The Department has a fleet of 26 tandem axle dump trucks that are used on State, and some County, roads during winter storms. Ten of these tandem axles have been fitted with RDS bodies that can apply regulated amounts of salt and other materials on the roads. Given that the payloads of tri-axle and quad-axle dump trucks are greater than those of tandem axles, the latter classification of vehicles tend to stay parked at the Public Works complex during the summer months when materials need to

be hauled to construction sites. (The Department estimates that the units fitted with RDS bodies are used 100% in the winter months, and the non-RDS units are utilized about 80% of the time in winter months.) Further, the rates charged for tandem axles ($67.30 per hour) are greater than for either the tri-axles ($62.92) or for quad-axles ($52.80), making the tandem axles an unpopular choice with customers.

The project team analyzed the likely financial impact of replacing the current fleet of 16 non-RDS-fitted tandem-axle dumps with quad-axles. To accomplish this, it was assumed that the current fleet of tandem-axles would be physically replaced with quad-axles, but it was further assumed that the replacement quad-axles would be utilized in the same manner as the tandem-axles that they replaced. The project made two primary assumptions in this calculation:

- Since the quad axles carry a maximum payload of 18 tons compared to the 12 tons carried by a tri-axle, the quad-axle replacements would accumulate only 66.7% (or 12/18) of the hours of use exhibited by the tri-axles.

- Since about 80% of the total usage for non-RDS tandem-axle dump trucks occurs during the winter months, and thus is unrelated to the payload it is capable of hauling, it was assumed that 80% of each of these units' operating hours would remain the same, but that 20% of these same operating hours would be subject to the variation in the payloads between the tandem-axle and the quad axle. For example, if a tandem-axle dump truck had been accumulating 500 operating hours each year, it was assumed that 80% of its usage, or 400 hours, would remain the same, and 20%, or 100 hours, would be subject to the variation in the payloads. Therefore, in this example, the 100 non-winter operating hours would be reduced by 33.3%, or 33.3 hours, and the total hours accumulated by its replacement quad-axle would be 466.7 ((400 hours + (100 hours – 33.3 hours)).

Further, as was the case in the analysis presented in the previous section, the costs associated with the operation of these units is assumed to be directly related to the number of hours used. Therefore, for example, if a particular tandem-axle had been accumulating 500 annual hours of use, its replacement quad-axle would, as the

example above showed accumulate only 466.7 hours, and would exhibit a similar reduction in operating costs associated with lubrication and anti-freeze, fuel, tires, labor (and therefore, overhead), materials, and sundry items. (The cost of these items was calculated in the same manner as was described earlier in the analysis of the replacement of tri-axles with quad-axle dump trucks). Depreciation of the new quad-axles was assumed to be calculated in the same manner as is currently the case, which is the purchase price less the assumed 15% for salvage value, divided by the WisDOT-dictated economic life cycle of nine (9) years.

The comparison of the current revenues and costs to the projected revenues and costs from replacing the 16 tandem-axle dumps with quad-axles is summarized in the tables below. Note that in the second column, Class 118 is a tandem-axle dump truck and 1128 refers to a quad-axle dump.

Current Situation Costs and Revenues			
Unit ID	**Class**	**Total Cost**	**Total Revenues**
001022	118	$37,524.77	$28,299.65
001031	118	$33,482.95	$55,192.73
001033	118	$17,968.17	$24,382.79
001034	118	$4,541.80	$7,571.25
001036	118	$420.45	$4,576.40
001039	118	$9,338.41	$16,831.73
001040	118	$4,671.07	$12,214.95
001043	118	$7,819.84	$18,904.57
001055	118	$49,422.78	$28,858.24
001057	118	$54,549.98	$29,073.60
001058	118	$60,191.89	$27,074.79
001059	118	$11,422.44	$7,167.45
001062	118	$39,623.64	$22,982.95
001065	118	$36,208.50	$19,887.15
001023	118	$53,303.70	$24,308.76
001041	118	$11,027.19	$16,690.40
001052	1128	$54,946.60	$42,002.40

Current Situation Costs and Revenues			
Unit ID	**Class**	**Total Cost**	**Total Revenues**
001053	1128	$51,944.35	$37,530.24
001054	1128	$48,003.16	$42,266.40
001063	1128	$52,809.73	$46,252.80
001064	1128	$52,626.94	$44,895.84
001068	1128	$50,233.84	$45,159.84
001069	1128	$49,337.46	$24,567.84
001070	1128	$50,774.24	$26,679.84
Total		**$842,193.90**	**$653,372.61**
Net Profit			**$(188,821.29)**

As can be seen in the table, above, the Department has a net loss of $188,821.29 under the current situation in which it operates 16 non-RDS-fitted tandem-axle dump trucks and eight quad-axles. However, the projected loss widens considerably when each of the 16 tandem-axles is replaced with a quad-axle, as the table below shows. Note that the first 16 units in the first column are designated as "New", as these are the new quad-axles to be purchased as replacements for the 16 current tri-axles.

Replace Non-RDS-Fitted Tandem-Axles with Quad-Axles			
Unit ID	**Class**	**Total Cost**	**Total Revenues**
New	1128	$59,611.35	$17,786.56
New	1128	$93,774.88	$34,665.66
New	1128	$54,635.58	$15,328.19
New	1128	$33,279.09	$4,776.64
New	1128	$29,474.60	$2,896.96
New	1128	$45,043.11	$10,588.86
New	1128	$39,178.20	$7,691.20
New	1128	$47,676.34	$11,889.86
New	1128	$60,320.95	$18,137.15
New	1128	$60,594.53	$18,272.32
New	1128	$58,055.35	$17,017.79
New	1128	$32,766.13	$4,523.20
New	1128	$52,857.29	$14,449.60

Replace Non-RDS-Fitted Tandem-Axles with Quad-Axles			
Unit ID	**Class**	**Total Cost**	**Total Revenues**
New	1128	$48,924.56	$12,506.56
New	1128	$54,541.53	$15,281.73
New	1128	$44,863.58	$10,500.16
001052	1128	$54,946.60	$42,002.40
001053	1128	$51,944.35	$37,530.24
001054	1128	$48,003.16	$42,266.40
001063	1128	$52,809.73	$46,252.80
001064	1128	$52,626.94	$44,895.84
001068	1128	$50,233.84	$45,159.84
001069	1128	$49,337.46	$24,567.84
001070	1128	$50,774.24	$26,679.84
Total		**$1,226,273.38**	**$525,667.65**
Net Profit			**($700,605.73)**

As can be seen in the table, above, the net loss to the County associated with replacing the non-RDS-fitted tandem-axle dumps with quad-axles is considerably larger than is the case in the current situation. This is primarily due to the much lower rate charged for quad-axles than is the case for tandem-axles, and the fact that there would be fewer operating hours accumulated by the replacement quad-axles as compared to the tandem-axles. As was the case in the previous section, the project team assumed that the Department could sell the 16 tandem-axles for 90% of book value, which would result in a one-time revenue of $523,897.36. However, this one-time revenue would not cover one year of losses incurred due to the transition.

The benefit to customers is clear in this scenario, as their costs (as reflected in the County's revenue) would be lower by $127,704.96, or by an average of $9,823.46 per town. The additional cost to the County, however, is substantial, at $384,079.40, owing primarily to the relatively greater cost associated with depreciation.

(c) Replacing the Majority of Pickup Trucks with Single-Axle Dump Trucks Would Result in Higher Revenues and Lower Overall Costs.

The Department currently has a fleet of 50 pickup trucks (Class 101) that it utilizes to perform routine maintenance on State, County and town roads. Although the pickup trucks are somewhat more maneuverable than larger vehicles, they are limited in the materials and equipment that they can carry, and are of relatively little use to the Department during winter storm events. In this section, the project team analyzes the impact on costs and revenues if the Department made a transition to single-axle dump trucks (Class 106) for most of the routine maintenance currently performed by crew members in pickup trucks.

In performing the analysis, the project team made several assumptions. These are provided in the points below.

- The Department will continue to have a need for a small fleet of six (6) pickup trucks for some routine maintenance and transportation. The project team selected six current pickup trucks for retention in the fleet in the analysis, and assumed that the mileage, costs and revenues currently accumulated by these units would continue in the same manner in the future.

- In making the transition to single-axle dump trucks, the project team assumed that the operating hours accumulated by individual pickup trucks that are eliminated from the fleet would be transferred to an existing single axle dump truck in the fleet. Therefore, if a pickup truck that accumulated 200 hours in the previous year was eliminated, these 200 hours would be transferred to a specific existing single axle dump truck in the fleet.

- In analyzing the data for the existing Class 101 and 106 units, it was evident that several individual units were experiencing very low utilization, and therefore, very low costs and revenues. In order to make the analysis more meaningful, the project team eliminated any unit that had not accumulated at least 100 hours in the previous year. There were seven (7) such pickup trucks, and six (6) single axle dump trucks.

- A large number of both pickup trucks and single axle dump trucks in the current fleet are fully depreciated, and therefore are accumulating no depreciation costs. As it is not reasonable to assume that a fully depreciated unit in the current fleet

will remain in the fleet for another full depreciation cycle (6 years for pickup trucks and 10 years for single axle dump trucks), the project team added half of the calculated depreciation amounts back to the depreciation cost of individual units that are currently fully depreciated. The calculated depreciation amounts for Classes 101 and 106 are, respectively, $3,541.67 and $14,450.00. The project team used 50% of these amounts ($1,770.83 and $7,225.00) to add back to the depreciation totals for individual units that are fully depreciated.

- The payloads for pickup trucks and single axle dump trucks are 1 ton and 6 tons, respectively. However, as the single axle dump trucks will be replacing pickups in routine maintenance activities, they will accumulate hours of usage much as the current pickups do. The project team has assumed that, although the much greater payload of a single axle dump truck will reduce the accumulated hours to some degree, this reduction will not be in proportion to the relative payloads, as has been assumed in other analyses in previous sections of the report. For purposes of this analysis, the project team has assumed that single axle dump trucks will accumulate 75% of the hours of usage that the pickup trucks that they replaced have been accumulating. Therefore, if a single axle dump truck had been accumulating, for example, 500 hours of usage, and it is replacing a pickup truck that had been accumulating 200 annual hours of usage, the total hours for the single axle dump truck, after the replacement of the pickup truck would be 650 operating hours (i.e., the 500 hours it had initially been accumulating, plus 75% of the 200 hours the pickup had been accumulating).

Incorporating these assumptions, the project team calculated the total costs and revenues associated with the transition from pickup trucks to single axle dump trucks, and compared these to the current situation. As has been the case in analyses of scenarios in previous sections of this report, the costs associated with the operation of these units is assumed to be directly related to the number of hours the units are operated. Therefore, costs associated with lubrication and anti-freeze, fuel, tires, labor (and therefore, overhead), materials, and sundry items are assumed to vary with the hours accumulated by the replacement single axle dump trucks. Depreciation of the new single axles was assumed to be calculated in the same manner as is currently the case, which is the purchase price less the assumed 15% for salvage value, divided by

the WisDOT-dictated economic life cycle of 10 years. The following table provides the costs associated with the current fleet of pickup trucks and single axle dump trucks.

Current Situation Costs and Revenues			
Unit ID	**Class**	**Total Cost**	**Total Revenues**
000017	101	$5,800.71	$7,500.42
000020	101	$7,876.17	$6,593.62
000021	101	$4,790.23	$4,223.82
000023	101	$8,632.20	$11,713.78
000024	101	$4,387.19	$3,610.46
000025	101	$4,850.06	$6,279.97
000026	101	$4,100.40	$2,592.84
000028	101	$3,852.65	$4,990.52
000030	101	$3,900.00	$8,865.84
000032	101	$5,318.73	$6,635.44
000033	101	$3,942.39	$5,585.76
000034	101	$5,398.49	$10,187.35
000035	101	$6,765.61	$12,295.08
000036	101	$4,332.44	$9,158.58
000037	101	$1,807.52	$7,131.70
000038	101	$6,305.71	$6,238.15
000041	101	$9,512.38	$9,256.16
000042	101	$7,544.44	$9,915.52
000043	101	$8,851.61	$9,444.35
000046	101	$4,263.68	$4,209.88
000047	101	$6,638.59	$2,885.58
000049	101	$12,751.86	$6,758.11
000050	101	$5,245.30	$6,104.33
000051	101	$6,117.15	$11,862.94
000053	101	$4,101.03	$7,984.14
000054	101	$5,153.51	$10,956.84
000055	101	$13,165.72	$9,602.57
000056	101	$5,640.24	$5,109.01
000057	101	$7,528.61	$5,829.71
000058	101	$15,404.09	$10,974.96
000059	101	$11,894.07	$10,475.91
000064	101	$10,647.34	$13,382.40
000065	101	$9,064.28	$1,477.64
000066	101	$9,324.99	$3,366.51

Current Situation Costs and Revenues			
Unit ID	**Class**	**Total Cost**	**Total Revenues**
000106	101	$18,752.60	$9,360.71
000107	101	$7,660.93	$9,797.03
000108	101	$7,766.36	$5,004.46
000109	101	$2,059.99	$1,445.58
000110	101	$9,037.18	$6,628.47
000112	101	$1,763.28	$4,635.05
000114	101	$20,266.79	$15,569.59
000118	101	$11,302.89	$16,205.25
000120	101	$8,225.52	$14,508.75
000125	106	$5,374.53	$14,958.60
000126	106	$5,059.50	$5,578.02
000129	106	$14,844.18	$10,415.10
000131	106	$14,058.16	$11,300.50
000132	106	$47,547.97	$18,057.50
000133	106	$6,652.08	$13,397.50
000134	106	$42,630.92	$5,689.86
000144	106	$16,364.18	$12,460.84
000145	106	$16,955.92	$7,782.20
000155	106	$24,003.14	$17,698.68
000156	106	$6,718.42	$6,384.20
000163	106	$12,214.60	$11,090.80
000164	106	$36,299.45	$17,917.70
000165	106	$11,132.14	$12,628.60
000166	106	$11,944.76	$13,187.80
000167	106	$21,853.10	$18,598.06
000168	106	$28,388.54	$12,675.20
000169	106	$12,593.88	$8,178.30
000177	106	$2,698.81	$5,242.50
000178	106	$10,660.26	$20,853.50
000179	106	$8,299.22	$4,855.72
000180	106	$10,684.41	$15,154.32
000181	106	$29,687.53	$9,716.10
000182	106	$26,122.89	$7,852.10
000190	106	$12,255.71	$5,219.20
000191	106	$25,214.14	$24,115.50
000192	106	$27,736.57	$23,206.80
000193	106	$25,472.61	$19,012.80
000194	106	$23,456.43	$13,490.70

Current Situation Costs and Revenues			
Unit ID	**Class**	**Total Cost**	**Total Revenues**
000195	106	$23,943.18	$20,876.80
000196	106	$26,870.55	$15,764.78
000197	106	$25,848.10	$20,107.90
000198	106	$25,327.01	$24,469.66
Total		**$960,657.81**	**$784,292.61**
Net Profit			**$(176,365.20)**

As the table shows, the County is currently losing $176,385.20 under the current scenario in which it operates pickups and single axle dump trucks. However, if all but six pickups are eliminated from the fleet and replaced by existing single axle dump trucks, the net profit is $445,829.00, as the table below shows.

Replace All but Six Pickups with Single Axle Dump Trucks & Purchase One New Single Axle Dump Truck			
Unit ID	**Class**	**Total Cost**	**Total Revenues**
000017	101	$5,800.71	$7,500.42
000020	101	$7,876.17	$6,593.62
000021	101	$4,790.23	$4,223.82
000023	101	$8,632.20	$11,713.78
000024	101	$4,387.19	$3,610.46
000025	101	$4,850.06	$6,279.97
000125	106	$12,599.53	$21,459.30
000126	106	$12,284.50	$22,260.82
000129	106	$22,069.18	$40,052.70
000131	106	$21,283.16	$33,482.10
000132	106	$54,772.97	$36,730.12
000133	106	$13,877.08	$47,452.78
000134	106	$49,855.92	$46,791.06
000144	106	$23,589.18	$43,077.04
000145	106	$24,180.92	$31,622.76
000155	106	$31,228.14	$38,552.18
000156	106	$13,943.42	$20,457.40
000163	106	$19,439.60	$20,737.00
000164	106	$43,524.45	$40,509.38
000165	106	$18,357.14	$33,034.74
000166	106	$19,169.76	$52,844.40

Replace All but Six Pickups with Single Axle Dump Trucks & Purchase One New Single Axle Dump Truck			
Unit ID	**Class**	**Total Cost**	**Total Revenues**
000167	106	$29,078.10	$45,288.21
000168	106	$35,613.54	$49,302.80
000169	106	$19,818.88	$40,278.71
000177	106	$9,923.81	$22,321.40
000178	106	$17,885.26	$40,341.62
000179	106	$15,524.22	$41,543.90
000180	106	$17,909.41	$50,174.22
000181	106	$29,687.53	$54,452.10
000182	106	$26,122.89	$12,791.70
000190	106	$12,255.71	$16,473.10
000191	106	$25,214.14	$55,407.40
000192	106	$27,736.57	$55,957.28
000193	106	$25,472.61	$35,742.20
000194	106	$23,456.43	$18,323.12
000195	106	$23,943.18	$43,035.10
000196	106	$26,870.55	$15,494.50
000197	106	$25,848.10	$52,047.54
000198	106	$25,327.01	$54,172.50
New	106	$46,277.31	$54,172.50
Total		**$880,476.75**	**$1,326,305.75**
Net Profit			**$445,829.00**

The conversion of the pickups to single axle dump trucks is a true cost savings in that it converts a truck class (106) that receives very low utilization during non-winter months to one that can be utilized on a year-round basis, replacing a truck class (101) that receives very low utilization during winter months. As has been shown in this analysis, revenues are increased, and costs are lowered through this conversion. An even further benefit is that the conversion allows the elimination of 36 pickup trucks from the fleet, which equate to 54 vehicle equivalent units, thereby reducing the demands on the equipment mechanics in the shop. The addition of three single axle dump trucks will add nine (VEUs) to the fleet, for a net reduction of 45 Vehicle

Equivalent Units. Further, the sale of the 36 pickups at 90% of their current book value would result in a one-time revenue of $357,263.91.

A potential risk in this conversion, however, is that the single axle dump trucks require a greater effort on the parts of crew members to enter and exit the cabs than is the case with pickup trucks. This may result in larger Worker's Compensation claims, and the County's Risk Manager should assess the likely costs associated with this transition prior to making the final decision to convert to single axle dump trucks. Further, this conversion will impact the DPW's customers as well, as the hourly cost of a single axle dump truck is currently $49.04 versus the $14.30 per hour charged for pickups.

(d) In Summary, One of the Three Alternative Scenarios Analyzed by the Project Team Should Be Implemented by the Public Works Department.

The three scenarios analyzed in the previous sections displayed very different results. The first scenario, in which the feasibility of replacing tri-axle dump trucks with quad-axles was analyzed resulted in a small net loss of $19,084.99. However, this loss is offset to some degree by the potential of a $78,859.23 gain on the sale of the tri-axles eliminated from the fleet.

The second alternative scenario, in which the project team analyzed the feasibility of replacing all non-RDS tandem axle dump trucks with quad-axle dumps resulted in a net loss that is much larger than the loss the County is experiencing. Specifically, the current net loss on the current operation of both tandem-axles and quad-axles was calculated at $188,821.29. The net loss associated with the alternate scenario in which the non-RDS tandems are replaced with quad-axles was calculated to be $700,605.73, a loss that is $511,784.44 larger than the current net loss.

The third scenario involved the replacement of all but six of the current pickup trucks in the fleet with single-axle dumps. This scenario resulted in a large net gain for the County due to the relatively larger reimbursement rates for single-axle dump trucks as compared to pickup trucks. The replacement also proved to be even more feasible due to the operating characteristics of the two unit types. Specifically, pickup trucks accumulate the vast majority of their usage in the non-winter months of the year, and the single-axles accumulate the vast majority of their usage in the winter months, thereby resulting in the retention of two fleets of vehicles that could be combined for greater usage throughout the year. The current net loss to the County in the operation of the two separate fleet types was calculated at $176,365.20. The net gain to the County through the elimination of 36 pickup trucks and replacing them with single-axle units was calculated to be $445,829.00, for a net gain of $622,194.20. In addition, the County would realize a one-time revenue of $357,263.91 through the sale of the 36 pickup trucks.

The results of each of these scenarios is summarized in the table below.

Fleet Replacement Scenario Summary			
Scenario	**Replace Tri-Axles with Quads**	**Replace Tandem-axles with Quads**	**Replace Pickups with Single-axles**
Current Net Profit	-$206,744.47	-$188,821.29	-$176,365.20
Alternate Scenario Net Profit	-$225,832.46	-$700,605.73	$445,829.00
One-Time Revenue from Sale of Units	$78,859.23	$523,897.36	$357,263.91
Net Difference for County (Year 1)	**$59,774.24**	**-$12,112.92**	**$979,458.11**

The analysis of these three scenarios indicates that only one, the replacement of pickup trucks with single-axle dump trucks, has clear advantages to the County. One, the replacement of tandem-axle dump trucks with quad-axles, is clearly financially infeasible, notwithstanding the relatively large one-time revenue associated with the

sale of the tandem axles. One scenario, the replacement of tri-axle dump trucks with quad-axles, is essentially an even financial swap, however it has the advantages of reducing the total number of hours of utilization, and also standardizes the fleet somewhat.

One complicating factor in the analysis of the first scenario (replacement of tri-axles with quad-axles), however, is that quad-axles cannot be easily retrofitted to function as snow removal equipment in the winter, as there is no room under a quad-axle truck to install a belly blade for plowing purposes. Further, the length and wheelbase of the quad-axles makes them less maneuverable than the tri-axle units. A potential alternative to making a full transition from quad-axles to tri-axles is for the Department to purchase a limited number of tri-axles in the future with standard dump bodies and lifting rams that can be fully removed, with a V-box spreader of similar length installed on the chassis. This is essentially the approach that the Department has taken with certain of its tandem axle dump trucks, in installing RDS bodies on ten of these units. There is, however, another complicating factor. The project team has recommended that the County terminate its provision of hot mix asphalt services to its customers, which further argues in favor of retaining the tri-axles in the fleet since upgrading the tri-axles to quad-axles would involve the loss of the belly blades on the tri-axles.

The project team recommends that the Public Works Department begin the process of implementing Scenario 3, above. The analysis calculated a net financial gain to the County of approximately $622,194.20, and one-time revenues from the sale of pickups and tri-axles of $357,263.91.

Recommendation #4: The Public Works Department should replace the majority of its pickup truck fleet with single-axle dump trucks. The net financial gain to the County was calculated at $622,194.20, with one-time revenues of $357,263.91 through the sale of pickups.

(4) The Public Works Department Should Perform Certain Work for Other County Departments that is Currently Outsourced to Contractors.

From time to time, County departments have the need for certain functions such as grading playing fields, paving parking lots, etc. The Public Works Department has been prohibited from performing these jobs, as the County has taken the position that State law reserves these jobs for the private sector. However, Wisconsin Statutes, in Section 59.52(29) (a) states:

> "All public work, including any contract for the construction, repair, remodeling or improvement of any public work, building of furnishing of supplies or material of any kind where the estimated cost of such work will exceed $25,000 shall be let by contract to the lowest responsible bidder. Any public work, the estimated cost of which does not exceed $25,000, shall be let as the board may direct…*A contract, the estimated cost of which exceeds $25,000 shall be let and entered into under s.66.0901, except that the board may by a three-fourths vote of all the members entitled to a seat provide that any class of public work or any part thereof may be done directly by the county without submitting the same for bids*." (emphasis added).

Therefore, the statute allows for the County to make decisions regarding the use of Public Works Department crews to perform the work required by County departments. If the work is estimated to cost less than $25,000, the County Board may direct the Public Works Department to perform the work. If the cost is estimated to be in excess of $25,000, the Board must take a vote that requires that at least three-quarters of its members approve.

The number, and dollar volume, of projects that fall into this category are estimated to be limited, and would therefore not have a great impact on staffing needs in the Public Works Department. However, there may be instances in which the Department has the staffing capacity and availability to perform these jobs, and the

project team recommends that departments submit these for consideration by the Public Works Department prior to issuing bid specifications and requests for quotes to private contractors.

Recommendation #5: County departments should be required to submit their individual projects for consideration by the Public Works Department prior to issuing bid documents to private contractors. If the Department has the capacity to perform these projects, it should bring these to the County for consideration as to whether the Department should be awarded the work, as Wisconsin statutes allow for this alternative.

3. FLEET AND INVENTORY EVALUATION

The following sections and recommendations address the issues raised by Questions 5-6 presented to the project team and issues that the project team identified related to those questions.

(1) The Public Works Department Should Commit to a More Frequent Cycle of Equipment Replacement to Reduce Life Cycle Costs.

The Rock County Public Works Department operates and maintains a fleet of 743 vehicles and equipment [2] including cars, pickups, dump trucks, tractors, construction equipment, sweepers and a large number of plow blades, trailers, mowers, and other miscellaneous equipment. An analysis of the composition of the fleet indicates that many vehicles and pieces of equipment are well past their stated depreciable lives, resulting in a high overall fleet age. The following table provides the average fleet ages for many of the major categories of the fleet, along with the WisDOT-recommended depreciable lives for each of these categories.

Fleet Age and Depreciation				
Equipment Class	**Description**	**Number**	**Average Age (Years)**	**WisDOT Depreciable Life**
101	Pickup	25	19.2	6
106	Single-axle Dump	40	18.1	10
118	Tandem Axle Dump	27	13.3	9
1118	Tri-Axle Dump	7	18.7	9
1128	Quad Axle Dump	8	5.6	9
223	Skid Steer Sweepers	21	13.3	10
424 + 426	Spreaders	67	13.0	8

Table compiled based on the vehicles for which classification, age, and expected lifespan data were available. While not comprehensive, it provides a meaningful look at the average age of the fleet's major vehicle classes.

[2] Equipment inventory spreadsheet (10.6.15)

As the table shows, the average vehicle in most of the major vehicle classes is well beyond its recommended depreciable life. Some categories, such as single-axle and tri-axle dumps, have an average vehicle age of close to twice the recommended lifespan. The table shows that the quad axle dump truck classification is the lone exception to the general statement that equipment classes are beyond their economic lives. However, it should also be noted that this classification of equipment is a relatively new addition to the fleet, and as such, does not have as many units that could have been retained far past their useful lives.

The age of the fleet greatly impacts its downtime which, in turn, impedes the work of field crews who depend upon the availability of the equipment for such activities as transporting asphalt, spreading sand and salt, removing snow, and others. The calculated downtime of the entire fleet of Public Works equipment is 10.8%, which is above the more typical 5% to 7% for a heavy equipment fleet. Given that there are more than 900,000 possible up-time hours for the fleet in a year, reducing downtime to 7% would equate to an additional 33,900 hours of availability per year.

In addition to the impact on fleet downtime, the age of the fleet also has cost ramifications for the County. To calculate this impact, the project team analyzed the actual maintenance costs of the single axle dump truck class (106). This classification was selected because of the relatively large number of units in the class, and because of the relatively wide distribution of model years available for analysis. The analysis utilized the "Equivalent Annual Cost" (EAC) method that allows a determination of the optimum replacement cycle for a classification of equipment that is based on the following:

- Actual maintenance, materials and supplies costs for each year. This involved the classification of maintenance costs by the number of years a particular unit had been in the fleet in order to determine the average maintenance, materials and supplies costs of all units after they had been in the fleet one year, two years, three years, and so on. The project team had access to these actual costs for the years 2007 through 2014. Therefore, a 1997 model year single axle dump truck's costs for 2007 would have been placed in the 10th year in the analysis. In 2008, the same unit would have been 11 years old, and its total costs would have been entered in that year. This same method was followed for all units in the class.

- Projected replacement cost. This involved the assumption that a single axle dump truck costs $170,000 in the present year. The projected replacement cost was escalated by an inflation factor. In this analysis, the factor of 5% was selected.

- Projected sales, or salvage, values of each piece of equipment were projected after one year, two years, three, and so on. The project team did not have access to comprehensive sales information for each piece of equipment and could not base the projected sales values on the actual experience of the Department when it auctions equipment. It was assumed that the probable sales values declined more rapidly in earlier years, with the decline leveling off in later years. This is somewhat in contrast with the straight-line depreciation that is currently assumed by the Department of Public Works in determining depreciated values of its equipment.

The EAC method of calculating the optimum replacement cycle assumes that an asset, in this case a single axle dump truck, is replaced on a routine cycle and that the total costs associated with the asset's life are minimized at a definable point in its life. Again, as was noted above, these costs are the maintenance, materials and supplies costs, and the probable replacement cost. These costs are reduced by the projected salvage value received at the end of each year. Once all costs are known for each year in the asset's life (or at least estimated with some precision), the costs are "discounted" back to the present time to ascertain the present value of all of the costs for each year.[3]

[3] Present value is calculated as C/(1+k)^n, where C is the future value (e.g., the maintenance, materials and supplies cost of, say, the third year of the life of the asset); k is the discount rate (which is the rate the County receives on invested funds); and n is the particular year in question – year 3, in the example used here.

All of the years in the analysis are "discounted" back to the present time (or, year zero), so that all of the replacement costs, maintenance materials and supplies costs, and the projected salvage values are stated in terms of today's dollars. Once all of these present values for each year are known, they are added together to calculate a "net present value", or NPV, for each year in the analysis. The example in the following table illustrates the calculations to this point. Note that although the example shows the calculations for year 8 in an asset's life, this calculation is performed for each of the years in the analysis. (In the case that will be described subsequently for the County's single axle dump trucks, there were 17 years in the analysis.). For the calculations in the example, the following assumptions were made:

- The current replacement cost of a single axle dump truck is $170,000.
- The rate of return on the County's invested funds is 1.5%.
- The annual rate of inflation associated with single axle dump truck replacements costs is 5%.

Using these assumptions, the following table provides the calculation of net present values for year 8 of the dump truck's life.

Net Present Values – Single Axle Dumps		
Factor	**Actual Cost – Year 8**	**Present Value of Year 8 Costs**
Replacement Cost	$251,167.43	$222,964.12
Accumulated Maintenance, Materials, Supplies Costs	$138,400	$128,315.96
Salvage Value	($40,000)	($35,508.44)
Total	**$349.567.43**	**$315,771.64**

As can be seen in the table, each of the three elements of costs (Replacement cost and accumulated maintenance, materials and supplies costs) and revenues (salvage value) have been discounted back to the present time to obtain a present

value. The total undiscounted costs of in Year 8 are $349,567.43. However, to calculate what these dollars are worth in today's terms, they are discounted back to the present time, at a rate of 1.5%. So, to determine the present value of the projected replacement cost in Year 8, the cost of $251,167.43 is divided by the present value factor of (1+.015)^8, or 1.126. Therefore, $251,167.43/1.12649 = $222,964.12 (rounding accounts for the small mathematical difference). The interpretation of this figure is that holding $222,964.12 in today's dollars is the same as being given $251,167.43 in eight (8) years, if we assume that we can receive a 1.5% return on the invested funds.

The next step in the determination of the equivalent annual cost of operating an asset is the application of the present interest factor of an annuity to the NPV that was calculated in the previous step. The theory of the EAC methodology is that an asset will be replaced in perpetuity once it is purchased. In order to determine the optimum cycle on which this repetitive replacement will be made, it is assumed that the total operational costs will go on in perpetuity, but that these costs will be discounted back to the present time. To accomplish this, the NPVs that were calculated for each year of operation of the asset are divided by the present value interest factor of an annuity (PVIA).[4] To carry the previous example forward, recall that the present value calculated for the costs associated with the operation of a single axle dump truck were $315,771.64. The calculation of a PVIA for Year 8 is 7.4859 (1/1.015-(1/.015*(1+.015)^8)). Dividing the NPV of Year 8 ($315,771.64) by the PVIA (7.4859) yields an equivalent annual cost (EAC) of $42,182.05. The interpretation of this figure is

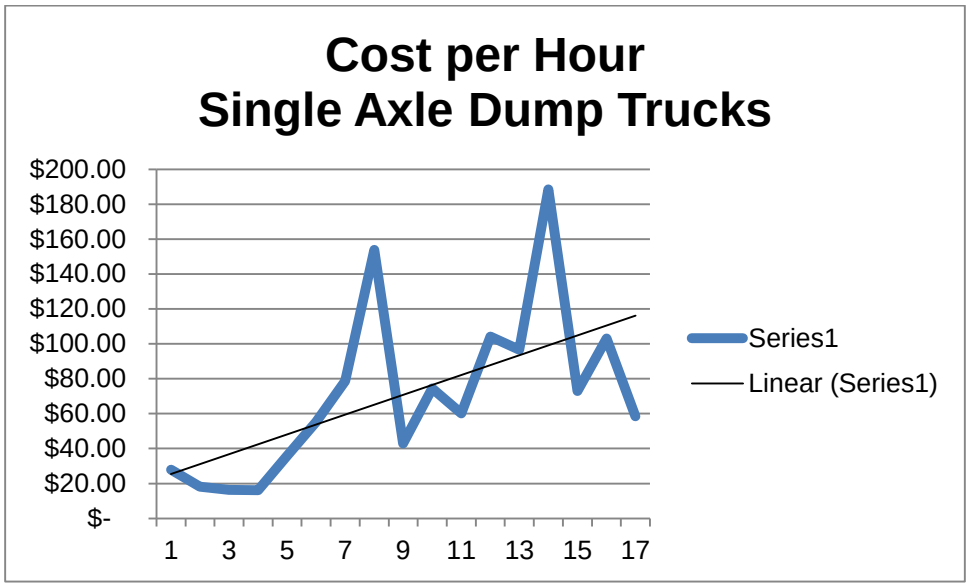
[4] The calculation of the PVIA is calculated as 1/k-(k*(1+k)^n)), where k is the rate on the County's invested funds, and n is the particular year in question (each of 17 years is calculated in the later analysis of the EAC of single axle dump trucks.)

that if a single axle dump truck is replaced by the County every eight (8) years for perpetuity, the annual cost is equivalent, in today's dollars, to $42,182.05, with the assumptions made regarding inflation, rate of return on invested funds, projected replacement costs of the single axle dump truck, and the projected salvage values in Year 8. The objective, then, is to determine in which year these equivalent annual costs are minimized.

To accomplish this, the project team accumulated the actual costs of each of the single axle dump trucks that incurred costs during the period for which we possessed cost data (i.e., the years 2007 through 2014), and determined in which year of the assets' lives the costs occurred. Therefore, a unit that had been in the fleet for five years in 2007 (i.e., a unit placed in service in 2002) would see its maintenance, materials and supplies costs placed in the "Year 5" category of the analysis. Similarly, a unit that had been in the fleet for five years in 2013 (i.e., a unit placed in service in 2008) would also see its maintenance, materials and supplies costs placed in the "Year 5" category. In the following year of their respective lives, their costs would appear in the "Year 6" category of the analysis, and so on.

At this point, it is important to describe the manner in which the maintenance, materials and supplies data were "normalized" in order to provide meaningful data for the analysis. In analyzing actual costs for the single axle dump truck fleet in the County, it was clear that these costs reflect some seemingly contradictory results. For example, it is counter-intuitive that, for example, a five-year-old dump truck would display higher maintenance costs than, say, a 12-year-old unit, yet this occurs routinely in the fleet. This can be explained by the fact that the five-year-old unit is utilized to a much greater

degree than the 12-year-old unit and, therefore, exhibits higher costs associated with its maintenance. The project team, therefore, divided each year's maintenance cost by the number of operating hours it accumulated that year, to derive a cost-per-hour figure. These data provided more meaningful results. The cost-per-hour data were graphed, with a line-of-best-fit applied to the actual data. This graph is provided below:

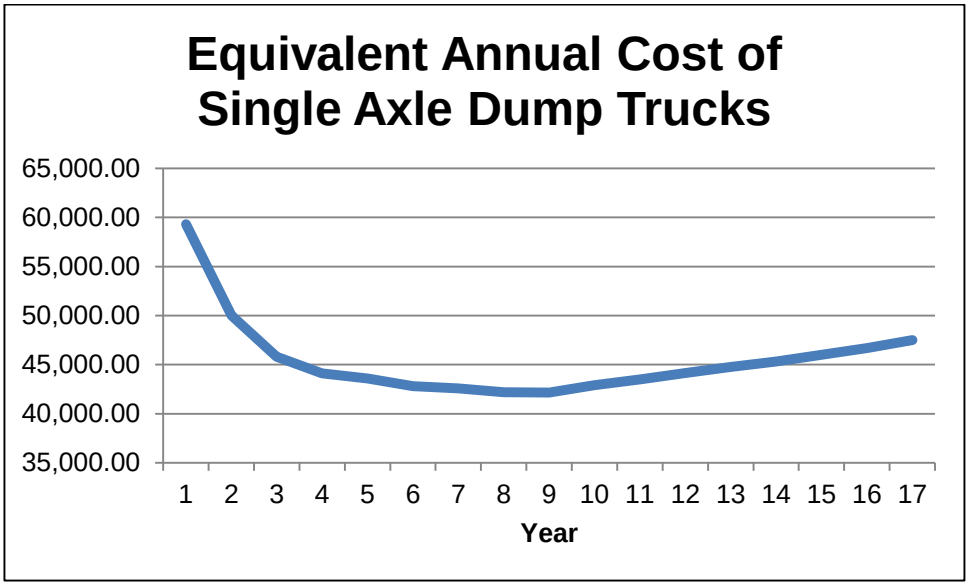


\As can be seen, there were some relatively wide fluctuations in the data, particularly in years 8 and 14, however, there were some unusually high repair costs in these years, which influenced the results. Overall, though, it is clear that the overall trend in cost per hour data is upward as the unit ages (the age of the unit is displayed on the horizontal axis). The project team utilized the "normalized" results as displayed by the line of best fit (i.e., the straight dark line in the graph) to calculate results. To further normalize the data, it was assumed that each dump truck in the fleet is operated for the same number of hours of usage each year, in order to avoid producing skewed results older units being driven fewer miles.

In applying the methodology described above to each of 17 years in the EAC analysis produced the following equivalent annual costs.

17 Year EAC Analysis	
Year	**Equivalent Annual Cost**
1	$59,300.00
2	$50,018.36
3	$45,812.27
4	$44,125.75
5	$43,602.97
6	$42,794.87
7	$42,576.89
8	$42,182.05
9	**$42,162.05**
10	$42,908.90
11	$43,495.42
12	$44,151.12
13	$44,763.21
14	$45,318.30
15	$45,998.81
16	$46,703.16
17	$47,501.54

As the table shows, the total costs are minimized in Year 9, with a cost of $42,162.05. However, it is also clear that there is very little distinction between the total costs of operation between years 8 and 10, and the assumptions made in the model may be manipulated so that any one of these three years is shown to be the optimum replacement period. The following graph illustrates the results of the EAC calculation for single axle dump trucks.



The graph shows the inverted parabola shape that indicates that the costs associated with very early replacements and very late replacements are extremely sub-optimal. The importance of this finding for Rock County is that the current average replacement cycle for single axle dump trucks has been 17.2 years, which is far beyond the optimum replacement cycle of nine years. In fact, with 40 single axle dump trucks in the fleet, the total equivalent annual cost associated with operating these units, on average, for 17 years is $1,900,061.68 (40 units times the calculated EAC of $47,501.54 at 17 years). The total equivalent annual cost associated with replacing these units at the optimal nine-year mark is $1,686,481.83, or $213,579.85 less than the costs associated with operating a 17-year old fleet. The $213,579.85 does not equate to an actual cost savings, as the Public Works Department does not utilize the older dump trucks to the same degree that it utilizes the newer ones. However, the analysis has shown that older units are far more costly to operate per hour of usage than the newer trucks. Additionally, though, placing the fleet on a more frequent replacement cycle would allow the Public Works Department to distribute the utilization among a

greater number of trucks that are in better condition and less costly to operate, thereby lowering the overall cost of operation.

Recommendation #6: The County should adopt a nine (9) year replacement cycle for its single axle dump trucks.

(1) The Public Works Department should adopt the equivalent annual cost (EAC) method of determining the optimum replacement cycles for each unit category.

Although the project team had access to the costs for other unit types in the fleet (e.g., tandem axle, tri-axle and quad axle dump trucks), there were insufficient numbers of units in each of these categories to make meaningful inferences regarding the maintenance data. For example, in the analysis, above, of the costs associated with single axles, there were 40 such units in the fleet. However, of these, only 22 displayed sufficient and reliable cost data to enable a statistically-valid analysis. Given that single-axle dump trucks constitute the single largest category in the overall fleet, the analysis of other categories would not, in the view of the project team, produce statistically-valid results. However, as was shown in the table at the beginning of this report section, most of these other categories display average ages similar to those of the single axle dump truck fleet that was analyzed above. And although the project team cannot quantify the savings to the County by adopting a more aggressive replacement cycle for these units due to the scarcity of data, it is logical to infer that similar savings could accrue to the County by doing so.

The Public Works Department accumulates a commendable amount of data on its fleet, and the associated maintenance and repair costs. It is very possible, therefore, for the Department's administrative staff to implement the EAC method for all categories

of the fleet as it accumulates more repair and maintenance history on the fleet. It is therefore recommended that the Public Works Department adopt the equivalent annual cost method of determining the optimum replacement cycles for all fleet categories. In the interim period, however, the County should adopt a more aggressive schedule in replacing its fleet if equipment, as a significant percentage of its fleet is well beyond even WisDOT-recommended guidelines. This accelerated replacement strategy will allow the Department to eliminate higher-cost units from the fleet at a more rapid pace, which will, in part, offset the higher costs associated with the accelerated replacement schedule.

Recommendation #7: The Public Works Department should adopt the equivalent annual cost (EAC) method of determining the optimum replacement cycles for each unit category. In the interim period, the County should adopt a more aggressive replacement schedule that will allow it to eliminate many higher-cost units from the current fleet, thereby partially offsetting the additional costs associated with the accelerated replacement plan.

(3) The Public Works Department is Under-stating the Total Cost of Operations by Utilizing Its Current Equipment Depreciation Method.

The method of depreciation utilized by the Public Works Department is resulting in an under-statement of annual costs. This current method utilizes a straight-line depreciation scale (i.e., the depreciation amount is constant throughout the unit's life), and assumes that the unit will be sold at auction for 15% of its initial purchase price, so that only 85% of the price of the piece of equipment is depreciated. Therefore, a piece of equipment with an initial purchase price of, for example, $100,000, and with a WisDOT-recommended economic life of 10 years, would show depreciation costs of only $8,500 per year (85% of 100,000, divided by the 10-year depreciation period).

As was discussed in the previous section, the County operates a relatively aged fleet, which results in the inclusion of many fully-depreciated units, indicating that many, if not most, units are removed from the fleet well after their recommended replacement life cycles. Further, it is highly unlikely that any significant portion of the units that are removed from the fleet each year are fetching 15% of their initial purchase prices given their advanced ages.

The project team recommends that the Department begin calculating depreciation costs on the full value of units until such time that it makes a commitment to replacing its equipment on a more routine, and optimal, cycle in order to provide a more accurate reflection of operational costs.

Recommendation #8: The Public Works Department should begin calculating depreciation costs of its equipment based on the full value of the initial purchase price until such time that its equipment is placed on a more frequent replacement cycle.

(4) The Public Works Department Should Utilize FASTER to Proactively Manage Preventive Maintenance for Its Fleet.

The DPW's shop conducts preventive maintenance (PM) and repairs for all of the Department's vehicles and equipment. In the current method, shop staff conclude preventive maintenance by placing a sticker in the windshield of each piece of equipment that indicates when PM should be conducted next for that piece of equipment. While the current system is generally effective for ensuring that each piece of equipment receives the necessary preventive maintenance, the use of FASTER offers a more formal and reliable method of conducting and tracking PM for the Department's vehicles. A preventive maintenance interval should be established in the FASTER profile of each vehicle to indicate the frequency with which PM will be

conducted on that vehicle. If fuel usage data gathered from WEX (the County's fuel management program) for each vehicle can be imported into FASTER automatically, then automatic reminders can be used to notify the Department's staff when a specific vehicle is due for preventive maintenance based on its recorded mileage. This may require some training for vehicle drivers, but if the County chooses to pursue this as a means of scheduling preventive maintenance, it would be worth it to equip drivers to track the fuel usage of their vehicles. The reminders generated with this data can also include a summary of services performed at the last PM check and a list of services that are due to be performed according to manufacturer's suggestions. By automating reminders for preventive maintenance, the Department can ensure that PM is consistently performed at the recommended level and that staff are reminded of key PM services for each vehicle.

In a proactive and efficient shop, preventive maintenance should compose at least 50% of activity. Currently, the DPW shop in Rock County spends about 1/3 of its time on PM. This is partly due to the fact that many of the County's vehicles are beyond their suggested life and require more repairs as a result. However, the establishment of automated PM intervals and reminders should help the shop adopt a more proactive and PM-focused approach to fleet management.

Recommendation #9: The DPW's shop should begin utilizing FASTER to establish preventive maintenance intervals for each vehicle and WEX to track their fuel usage, if possible. Automating this function will improve the consistency and proactivity of the shop's PM activities.

(5) The Public Works Department Should Utilize FASTER's Reporting Function to Track Shop Performance and Efficiency.

FASTER has the ability to generate a number of reports that the Department can use to monitor the performance and efficiency of the fleet, shop, and parts room. These reports can serve as a tool for identifying areas where the Department has opportunity for improvement so that management staff can take steps to boost performance in those areas.

Each vehicle has a profile in the Department's FASTER system, which can be used to establish preventive maintenance intervals, as mentioned above. In addition, the working mechanic, the parts used, and the time required for PM and repairs can be tracked for a vehicle each time it comes into the shop. Gathering and aggregating this information for each mechanic, vehicle, and vehicle type allows the Department to generate a number of reports for tracking performance and efficiency. Suggestions for report types include:

- A quarterly vehicle downtime report broken out by vehicle class would provide the Department with a view of the percentage of time that each vehicle class is in the shop rather than available for work. The department can use this report to identify vehicles or vehicle classes that have too much downtime. This determination can also be made for the fleet as a whole. Shifting to a more frequent/regular vehicle replacement schedule will reduce the percentage of downtime, but the department may also identify where repairs for a critical vehicle type should be prioritized in order to complete them more quickly and reduce downtime.

- A monthly mechanic productivity report would allow the Department to view the PM and repairs conducted by each mechanic. By assessing the time required for preventive maintenance, repairs on various vehicle types, and various types of repairs, the Department may be able to identify areas where mechanics are high-performing and where they could benefit from additional training. A report of this type, while helpful, should only serve as one part a larger mechanism for evaluating mechanic performance and establishing incentives.

- A quarterly re-work report would allow the Department to view the number of instances of a vehicle returning to the shop for a repair within 2 weeks (or a period established by the Department) of having the same repair done. These instances could be aggregated and broken out by vehicle type, mechanic, or repair type in order to help the Department identify areas where there is opportunity for improvement.

- An annual parts turnover report would allow the Department to view the ratio of parts purchased to parts in inventory. The ratio should be at least 4:1 for the year in order to ensure that parts ordering and the utilization parts room space is efficient. The Department's current status on this measure is addressed below.

The Department's use of FASTER currently allows them to track the parts, time, and expense associated with vehicles and vehicle repairs. As the use of FASTER expands, the establishment of preventive maintenance intervals and production of regular performance/efficiency reports will allow the DPW to use the system to a greater advantage.

Developing the Department's ability to extract meaningful reporting data from Faster may require training in the software for administrative and managerial staff. If this is the case, the Department should coordinate the necessary training with CCG.

Recommendation #10: The DPW should begin utilizing FASTER to produce regular reports on shop performance and efficiency in order to identify areas of high performance and improvement opportunities. The appropriate training should be obtained as necessary.

(6) The Public Works Department Should Determine the Reason for the Parts Room's Low Parts Turnover Ratio and Take Action to Raise it to a More Efficient Level.

The efficiency of the Department's parts room can be gauged in part by comparing the value of the parts purchased over the course of the last year with the value of the parts currently in inventory. This parts turnover ratio should be at least 4:1. A ratio lower than this indicates that the parts room may be stocking more parts than necessary or keeping them for longer than is necessary to maintain a high fill rate. In

Rock County, the value of parts purchased over the last year was not readily available, so the project team used the value of parts issued from inventory instead. This number still provides a useful reflection of the efficiency of space usage in the parts room.

The value of parts issued in the last year was $708,000, while the value of parts in inventory stood at $723,000. This parts turnover ratio is less than 1:1, indicating that the parts room has too much inventory for the number of parts used by the shop over the course of the year. Ideally for the value of parts issued to be $708,000, the parts inventory should be less than $180,000.

This low ratio could be present because the shop is stocking parts that are unlikely to be used within the course of a year, particularly in the upstairs loft of the parts room. If this is the case, the Department should adopt a new strategy for obtaining infrequently used parts so that they do not have to store them for extended periods of time. This would likely consist of ordering these parts on an as-needed basis or arranging a pre-paid storage and shipping agreement with distributors.

While not entirely responsible for the low ratio of part utilization to inventory, the fact that the Department maintains separate trucks for summer and winter road maintenance is a contributing factor. Because the shop works on two groups of vehicles, neither of which are in use year-round, different types of maintenance and repairs occur at different times during the year. This requires the parts room to stock a wider variety of parts, and it slows the parts utilization rate because many vehicles are only receiving wear and tear 6 months out of the year. If the Department moves to consolidate its fleet, some of this will be alleviated. If not, the parts room should seek to stock parts for the necessary maintenance and repairs according to an anticipatory

seasonal cycle so that parts for the winter fleet, for example, do not sit in inventory through the spring and summer.

Recommendation #11: The Department should prioritize determining the reason for the low parts inventory ratio and take action to either reduce the number of obsolete parts or shrink the volume of slow-moving parts, depending on the determined cause.

(7) To Maintain Security and Accountability in the Parts Room, Parts Room Personnel Should be the Only Staff Behind the Counter.

The shop's mechanics come into the parts room from time to time to speak with the storekeeper and stock clerk and look for parts when assistance is not immediately available. The mechanics should instead remain outside the parts room at all times, and all parts should be pulled and checked out by the parts room staff. This will ensure that all parts are accounted for and the proper checkout procedure is applied to each one. While the parts room staff, not the mechanics, are currently assigned the role of pulling and checking out parts, the informal enforcement of these roles allows mechanics to regularly get parts for their repairs themselves, and adherence to the proper parts handling procedures is not ensured.

Recommendation #12: To maintain security and accountability in the parts room, parts room personnel should be the only staff behind the parts room counter.

(8) A Bar Code Reader Should be Implemented to Automatically Scan Parts Into and Out of FASTER.

The parts room currently uses part numbers to account for the various parts in stock. When parts come in, they are entered in FASTER according to their number as they hit the shelves, and when they are needed for a repair or maintenance job, they are taken out of inventory and charged to the job in FASTER according to their number. This process occurs manually, but it can be done more efficiently by using an electronic

barcode scanner to automate the process of receiving and charging out parts. When parts arrive to be stocked in inventory, they would be scanned into the electronic inventory using a handheld barcode scanner, and the same scanner would be used when they are needed for maintenance and repairs to remove them from inventory and charge them to specific jobs. The parts room does currently have bar codes on their parts, but they only use the number below the bar code in order to manually place the parts in inventory and charge them out.

The Department has attempted to implement automatic bar code scanning in the past, but has been unable to create a solution along with CCG Systems, the manufacturer of FASTER, that provides the necessary functionality for improving the efficiency of the parts room operation as described. Parts room barcode scanners have been implemented successfully in other towns, however, and the project team recommends that the Department renew efforts to partner with CCG in order to implement such a system.

Recommendation #13: The Department should work with CCG Systems to implement a bar code reader in the parts room to record the stocking and use of parts, and to charge them directly to specific vehicles.

4. TECHNOLOGY AND ADMINISTRATION

The following sections and recommendations address the issues raised by Questions 7-9 presented to the project team and issues that the project team identified related to those questions.

(1) The Public Works Department Should Implement an Electronically Integrated Timekeeping System with A Simplified Project Code Structure And A User-Friendly Interface.

In the County's current timekeeping system, shop and field staff use physical time cards to record their time and the use of vehicles and materials. Foremen sometimes use a 'gang sheet' to record time for multiple employees, which is also a physical recording mechanism. From there, office staff enter time into the County's payroll system and billing system. They also manually enter vehicle usage and materials consumption into the county billing system. This process is time-consuming and duplicative, and inaccuracies in time sheets must be corrected before the Department can run payroll or generate bills. In order to save time and reduce the need for duplicative data entry, the Department is working with the IT Department to develop an automated timekeeping system that field and shop staff can use in place of the current paper time sheet system.

- The Department currently uses several job codes to record time and materials usage. In order to allow field staff to enter their own time and materials usage, a simplified project code should be used for each common route in order to make it easier for staff to remember and enter the appropriate code for their work performed.

- For less common jobs when simply entering a project code for a job or route will not suffice, the system should prompt shop and field staff to enter all of the data required to run payroll and generate bills for the State and the Towns. This could consist of an interface that prompts staff to enter the required information in a step-by-step fashion:

- The first step would ask staff to indicate each of the different jobs they worked on during the day, and the number of hours worked on each job.

- For each job, staff would fill out a set of fields/pages indicating the jurisdiction (state, town, or county), the location of the work performed, the type of work (routine maintenance, seal coating, grader patching, etc.) the vehicle miles/hours used, and the amount of materials used.

- If staff do not know part of a field, they should be able to leave it blank and submit after filling out required fields (hours, location, and type of work).

- Foremen should be required to verify time submitted in the system before it is finalized. They should receive a notification when time must be approved (or when portions must be filled in, if a worker was unable to fill in a field/page) in order to submit time before the established deadline.

The responsibility for indicating the equipment and materials used for a given work activity could be assumed by the worker entering time or the supervisor of the job. This system of entry would ensure that administrative staff have access to the information needed for payroll and billing functions as soon as it is recorded by field or shop staff.

Recommendation #14: The Department should continue to work with the IT Department to implement an automated timekeeping application that shop and field employees can use to record their time, materials, and vehicle usage electronically.

(2) The Public Works Department Should Ensure That Data From the Timekeeping System Can Be Easily Imported Into the Payroll and Billing Systems, Either Through Automatic Transfer or a Manual Data Import Requiring Minimal Staff Time.

In addition to recording time electronically, the Department should work with the IT Department to integrate the automated timekeeping application with the County's existing payroll and billing systems, as discussed in the next recommendation. This would eliminate the need for administrative staff to manually enter and re-enter employees' time sheets into the highway billing system and payroll system. This

automatic data transfer is the preferred method of the Department and the goal toward which IT staff are developing the system.

If automatic transfer is not a possibility, manual importing of billing and payroll data could be simplified if the data gathered in the timekeeping system is aggregated in a format that allows it to be easily sorted and entered as a whole by the accounting staff. For example, a spreadsheet could be generated that would allow the Department to sort, pivot, and tally time by employee, by date, by activity, and perhaps most importantly, by customer. While automatic data transfer is the preferred method, an easily manipulated output such as this one would allow the accounting staff to easily import data into the payroll and highway billing systems and provide timely budget updates to the Department's customers.

Recommendation #15: Information gathered in the automated timekeeping system should be aggregated in a format that allows it to be automatically imported into the Department's highway billing and payroll systems with minimal staff time.

(3) The Department Should Pilot Their Internally-Developed Timekeeping System to Determine Whether It Can Provide Real-Time Job Costing and Budgeting Functions.

The Department is in the process of developing an automated timekeeping system for recording employees' time and allocating it to specific projects and/or budget pools. In addition to timekeeping, the system may also be used to track vehicle usage and the consumption of materials and assign them to projects and/or budget pools. This real-time job costing function is vital to keep management and customers apprised of the Department's spending and progress on each of their projects. The system is internally developed, and its implementation is intended to eliminate some of the workload currently associated with running payroll and billing the Department's

customers. The project team's recommendations for specific data to be gathered using the system are outlined in the first recommendation of this section.

If the internally developed timekeeping system is able to automatically transfer information on employee hours, vehicle miles, and material usage into the existing highway billing system, it will allow the highway billing system to manage job costing more effectively, giving a real-time snapshot of the costs allocated to each job and the budget consumed for each project and/or budget pool. If the system does not automatically transfer data into highway billing, it may still be useful as a job costing and budgeting tool if the data is aggregated in a format that can be manually imported into highway billing with more ease than the current method. Ideally, the Department should endeavor to synchronize the two systems so that data transfer will occur automatically, but formatting the data gathered so that it can be easily imported is a viable secondary approach.

Recommendation #16: The Department should seek to automatically synchronize its internally-developed automated timekeeping system with its existing billing system in order to access real-time updates on job costing and project/cost pool budgeting.

(4) If the Implementation of an Automatic Timekeeping System Does Not Significantly Improve Job Costing and Budgeting Functions, The Public Works Department Should Seek Project Management Software With Those Abilities.

If the Department implements its automated timekeeping system and finds that it is not able to provide improved job costing and budgeting functionality, either by automatically transferring data into the County's highway billing system or by generating a report which can easily be manually transferred, then the County should seek to

purchase a project management software package through a formal bidding process that will allow them to track project budgets and incurred costs in real time.

- The selected software application must be able to import the data collected from the Department's automated timekeeping system, either automatically or through a process requiring minimal time on the part of the accounting staff, and allocate it to the appropriate project or budget. This may require specialized configuration of the software application or the timekeeping system.

- The selected software application must give department staff the ability to create budgets for the various cost pools and activity codes that the Department uses for accounting, as well as for the various towns and municipalities that are customers of the Department. The budgets for each of these areas must be automatically updated and accessible as soon as staff hours, vehicle usage, and materials consumption are imported.

- The selected software application must provide authorized accounting staff with the ability to access project and/or cost pool budgets and make adjustments when necessary.

- The selected software application must be able to generate reports on the costs incurred and costs remaining for given budgets or budget subsets over a given period of time. The application should also be able to provide this type of report as a snapshot of current totals or from dates in the past. These reports will be useful for informing staff and customers on the status of the Department's budgets and will allow them to set more informed priorities for resource allocation.

Recommendation #17: If the Department's internally-developed applications are not adequate for the type of project costing and budgeting functions required by the Department's staff and customers, the Department should select a software application for purchase that meets the data tracking and reporting requirements necessary for setting the Department's operational direction.

(5) The Public Works Department Should Develop a Formal Policies and Procedures Manual for Billing Highway Maintenance to Customers.

The highway department issues bills to both the State of Wisconsin and the towns within the County on a monthly basis for work completed against their established contract. The billing process requires the incorporation of labor costs (in the form of time sheets from field staff), vehicle usage, and materials consumption in order to generate

bills for the department's customers. While the department's financial division is currently staffed with experienced employees who are familiar with the process, it would be beneficial for the department to develop a manual of policies and procedures regarding the billing process. This will provide a point of reference for new staff in the future and a means of standardizing the billing process for the benefit of customers' understanding. The policies and procedures included in the manual should be designed to enable the department to meet its goals for billing timeliness and accuracy.

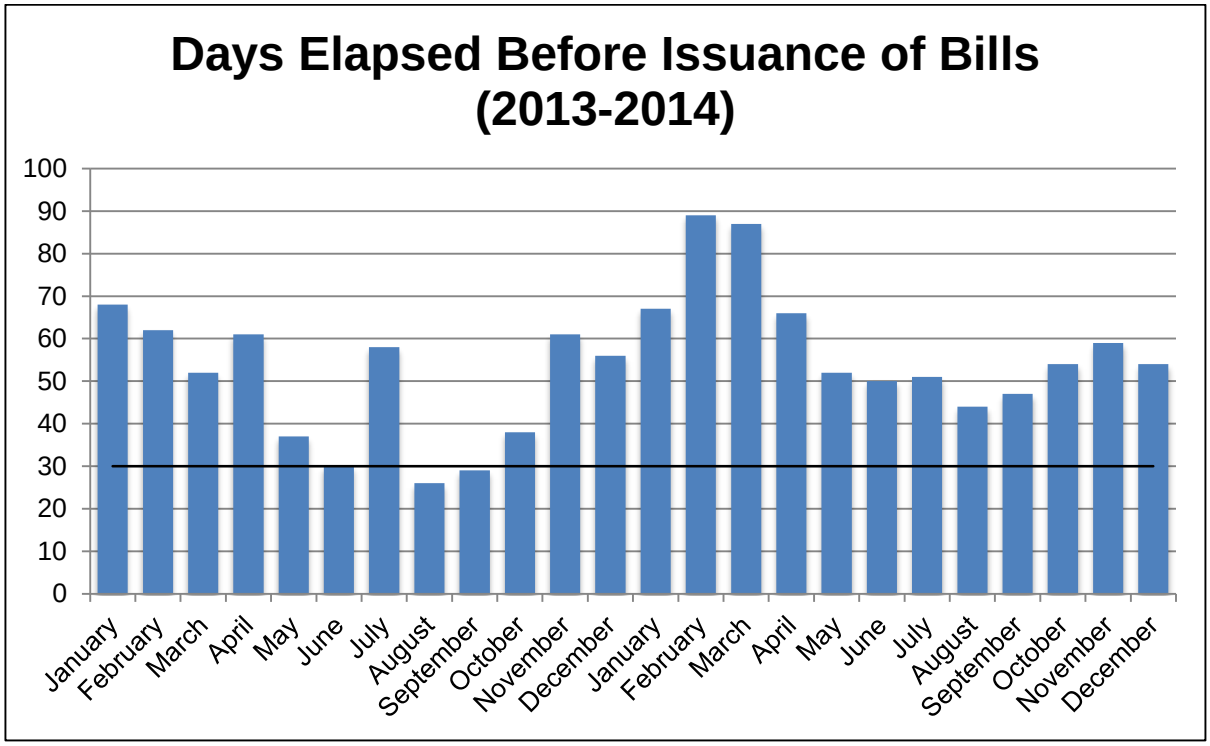
Items contained in the manual may include instructions for maintaining data integrity when importing from the department's timekeeping system to the payroll and highway billing systems, procedures for checking and verifying automated timekeeping entries, protocols for incorporating vehicle usage and depreciation data at the standardized rate to calculate costs passed on to clients, and the department's established timelines and process deadlines.

Recommendation #18: The Department should develop a manual of billing policies and procedures in order to improve the timeliness and accuracy of bill issuance, serve as a tool for training new staff, and standardize current practice to improve shared understanding of the process.

(6) The Department Should Bill Customer Towns for Work Completed on a Monthly Basis Within 30 days of the End of the Billing Period.

Bills issued to the towns typically do not go out until a month and a half past the conclusion of the billing period. In 2013, the average time elapsed from the end of the billing period to the issuing of bills to the towns was 48 days. In 2014, the average time was 60 days, and there have been instances of more than 80 days passing before bills are issued. This delay creates frustration for the towns and uncertainty in their accounting for the time between the completion of the work and the bill arriving. In order

to reduce this frustration and provide a consistent, predictable pattern of billing for the towns, the department should commit to sending out bills within 30 days of the end of a billing period (e.g. bills for the period ending Sep. 25th would go out by Oct. 25th). This will require the establishment of a consistent procedural timeline and accurate, timely submittal of materials required for billing from department staff. 30 days is a feasible span of time for bills issuance – the department has achieved this turnaround time twice previously, in August and September of 2013.



In order to successfully issue bills within 30 days of the close of the billing period, the Department could adhere to a set of monthly process deadlines such as the following:

- Tuesday of first full week: Review all electronic timekeeping entries from previous month. Approve complete entries, and issue reminders to staff regarding entries that require completion or revision. Begin importing data from complete entries into payroll and highway billing systems.

- Thursday of first full week: Collect and review completed/revised time entries. Issue reminders/warnings to staff regarding incomplete entries. Continue importing data from complete entries into payroll and highway billing systems.

- Tuesday of second full week: Collect and review completed/revised time entries. Investigate any remaining entries that are incomplete or in need of revision. Continue importing data from complete entries into payroll and highway billing systems. Clean and correct data as necessary, and ensure that the proper code/client is indicated for each entry.

- Tuesday of third full week: All timekeeping entries have been collected and imported into the County's payroll and highway billing systems. Any corrections of previous month's bills have been made and re-issued.

- Friday of third full week: Bills have been drafted for municipalities and the state using data from automated timekeeping system and standard rates for vehicle usage.

- Wednesday of fourth full week: Bills have been reviewed internally and corrected as necessary.

- Thursday of fourth full week: Bills are issued to clients.

In order to accomplish this, the automated timekeeping system currently in development by the Department should be implemented in a way that accommodates this goal. When staff record their hours, vehicle usage, and materials consumption in the timekeeping system, it should be imported directly into highway billing and the County payroll system in order to save the accounting staff the time required to manually input the data into both systems. If it cannot be automatically imported, the data should be aggregated in a format that allows it to be easily imported manually. The previous recommendations address this in more detail.

In addition to ensuring that the transfer of data from the timekeeping system into highway billing does not require excessive time on the part of the Department's accounting staff, highway crew leaders should receive reminder notifications when they need to verify or approve data entered into the timekeeping system such as employee

hours, jobs/projects worked, or vehicles/materials used. The completeness of required billing data depends on timely approval by crew leaders, which can be encouraged by reminding them when they need to complete an action in the timekeeping system.

Recommendation #19: The Department should establish a procedural timeline that allows the processing and issuance of municipal bills consistently within 30 days of the conclusion of a monthly billing period and implement its automated timekeeping system to accommodate this goal.

(7) The Department Should Modify the Positions Responsible for Front-Line Financial Functions.

Currently, the DPW's Cost Allocation Specialist and Account Clerk share responsibility for assisting the Accounting Supervisor with time reporting, billing, and payroll functions. As the financial and time reporting functions of the Department become increasingly automated, the duties of each of these positions will become more similar and some of the workload associated with them will be eliminated. The data entry of timesheets is the primary example of this, since employees will enter their time directly as the automated timekeeping system is implemented across the Department. The project team recommends that these two positions be reclassified to hold the same title with the same duties, and that both staff members be fully cross-trained to accomplish the range of duties that the new hybrid position requires. This standardization will allow the two front-line financial staff to share all of their duties, thus handling the remaining workload associated with billing and payroll more efficiently. It is the expectation of the project team that the duties assigned would be at the higher end of the classification focused on billing activities (preparation and reconciliation of invoices), and should be able to assume many of the routine duties that are currently performed by the Accounting Supervisor position. This in turn will enable the

Accounting Supervisor to focus on higher level (and more critical) accounting duties assigned to that position.

Recommendation #20: The Department should reclassify the Account Clerk and Cost Allocation Specialist so that they have the same position title (Cost Allocation Specialist) and job responsibilities. The two staff should be cross-trained to more efficiently handle the workload changes that will result from automation of employee timekeeping and assume responsibility for some of the more routine duties performed by the Accounting Supervisor to free up time for that position to focus on higher level accounting duties.

5. STAFFING AND FACILITIES

The following sections and recommendations address the issues raised by Questions 10-11 presented to the project team and issues that the project team identified related to those questions.

(1) The Public Works Department's Current Staff is Sufficient and Appropriate for the Department's Existing Workload.

In general, the Department's staffing is adequate for current workloads, and it fluctuates as necessary to accommodate seasonal workload changes. Likewise, the number of supervisory positions is appropriate for the number of staff supervised. As outlined in the following sections, the project team anticipates that future changes to the County's workload will require the Department to adjust its staffing mix.

(2) The Public Works Department Will Be Required to Make Staffing Changes in the Coming Years Due to Changes in Service Provision and the Expansion of the Interstate.

A number of factors are likely to affect the Department's staffing needs in the coming years. The subsections below detail these factors and their impact.

(2.1) Elimination Of Town Paving Work

The project team is recommending that the Department eliminate its construction/blacktopping function for the towns, and instead act as a project coordinator to manage contracted paving services. The following table shows the Department's tally of employee hours dedicated to paving Town roads in each of the last 3 years:

Year	Hours
2013	1,476
2014	1,859
2015	1,718

As the table shows, the annual number of hours required for the paving function in the Towns has varied over the last 3 years, ranging from 1,476 hours to 1,859 hours.

The table below outlines the estimated hours available by a current highway worker for road work – with assumptions made regarding leave time, and staff meetings.

Element	Hours
Total Annual Hours	2,080
Holidays	88
Vacation	80
Sick Leave	80
Training	80
Staff Meetings (8 hours per month)	96
Total Annual Available Hours Per FTE for Road Work	**1,656**

As the table shows, highway workers have approximately 1,656 hours available per year for field work. In light of the fact that paving and highway construction are only conducted during the non-winter months, however, only about half (828) of those hours are available for paving work.

The following table shows the number of FTE's that would be occupied by the Town paving function in each of the last 3 years, assuming that the average highway worker has 828 hours available for non-winter road maintenance and construction each year.

Year	Hours	FTE's (Hours ÷ 828)
2013	1,476	1.78
2014	1,859	2.24
2015	1,718	2.08
Average	**1,684**	**2.03**

As the table shows, an average of approximately 2.03 FTE's have been occupied with Town paving work in each of the last three summers. The Department's elimination of this function should result in a small staffing re-allocation of about 2 FTE in the public works division during the non-winter months. These staff may be re-allocated to handle expanded non-winter workload associated with the expansion of Interstate 39/90, as outlined below.

(2.2) Expansion Of Interstate 39/90

Over the next seven years, the State of Wisconsin will expand Interstate 39/90 through the entire north-south length of Rock County. According to WisDOT[5], the project will involve widening the highway over the full 45-mile length from the state line to Madison, with multiple lane miles added in each direction along certain high-traffic stretches. For the portion of the project that will be located within Rock County, this approximates 65 additional lane miles and a significant number of additional mileage added in side roads, shoulders, and reconfigured ramps and interchanges. While an exact accounting of the project's impact will not be known until all of the details of the new highway configuration have been finalized, the highway expansion will have considerable implications for staffing and workload in both summer and winter.

As Interstate 39/90 is expanded in the coming years, it will generate an increase in non-winter workload as the Department assumes responsibility for sweeping and maintenance of the road surface. This maintenance work is unlikely to be intensive at first because the road will be newly constructed and will not require extensive paving or re-sealing work. The Department should re-allocate the 2 FTE's from the Town paving

[5] http://projects.511wi.gov/i-39-90/full-project-overview/ (10.6.15)

function during non-winter months to ensure that the additional workload associated with the interstate expansion can be handled adequately.

The highway expansion will also have an immediate impact on the Department's winter maintenance staffing needs. Assuming that crews can plow the highway at an average of 20-25 miles per hour, the addition of 65 lane miles would add 3 hours to the amount of time required to plow the length of interstate in Rock County. Ramps, shoulders, and interchanges, however, will present additional complications for clearing snow and ice. Additionally, some plow routes will need to be reconfigured in order to maximize their efficiency and accommodate the necessity of plowing some widened highway stretches with two or more trucks at a time.

As a result of these complexities, the project team anticipates that the interchange expansion will add more than 3 hours to the amount of time required to plow the interstate. While the actual amount of winter clearing time required will not be known until the expansion plans are complete and new snow routes are configured, the Department should plan on hiring approximately one additional winter maintenance staff for every hour added to the highway clearing route times by the highway expansion.

For example, assume that the interstate expansion adds 6 hours (rather than 3) to the amount of time required to plow the interstate. Since interstate lanes must be cleared every 2 hours during a snowstorm, the additional six (6) hours of plowing could be completed by the equivalent of three (3) new plow routes. During a snowstorm, interstate pavement must be cleared around the clock in shifts of 12 hours on, 12 hours off. Thus, the 3 new plowing routes would require six (6) additional winter maintenance staff.

The increases in winter maintenance staffing may be addressed by hiring seasonal staff (see next section).

(3) The Public Works Department Should Prepare to Hire Seasonal Winter Maintenance Staff In Order to Align Its Workforce with Increased Winter Workload and Decreased Non-Winter Workload.

The reduction of approximately six (6) non-winter FTE's and the addition of four (4) winter maintenance staff suggests that the Department will need to rely increasingly on the hiring of seasonal employees in order to handle the projected growth in winter workload and elimination of non-winter construction/paving. While full-time employees are preferable, the significantly reduced non-winter workload that is likely to result from the elimination of road construction/paving activities will not be sufficient to justify retaining (or expanding) the Department's entire complement of full-time staff.

Recommendation #21: The Department should prepare for a reduction in non-winter maintenance staff and an expansion in the number of winter maintenance staff. The difference should, to the degree possible, be made up by hiring seasonal winter maintenance employees.

(4) The Public Works Department Should Prepare For Night Maintenance Work to Compose a Greater Percentage of Its Workload in Coming Years and Prepare to Evaluate the Need for a Night Supervisor When That Shift Begins to Occur.

The Department occasionally uses night road maintenance during the non-winter months to repair roads at off-peak hours as a means of minimizing the traffic impact of roadwork. As the planned interstate expansion increases the number of high-traffic lane miles maintained by the Department, the demand for night work is likely to increase. A greater portion of the Department's remaining road maintenance work will be concentrated on interstate 39/90, a high-traffic thoroughfare where traffic impact must be carefully managed. As this highway is expanded and the new lanes begin to age in

the coming years, the Department's maintenance workload associated with the interstate will grow, and along with it, pressure to complete work during low-traffic hours as well.

With this in mind, the project team anticipates that the need for night maintenance work will grow at a faster rate than the need for daytime work as the high traffic interstate expansion begins to drive growth in the Department's workload. As this occurs over the course of the next 2-5 years, the growing number of night road maintenance hours may justify hiring a night crew leader or shifting a crew leader from daytime to night maintenance.

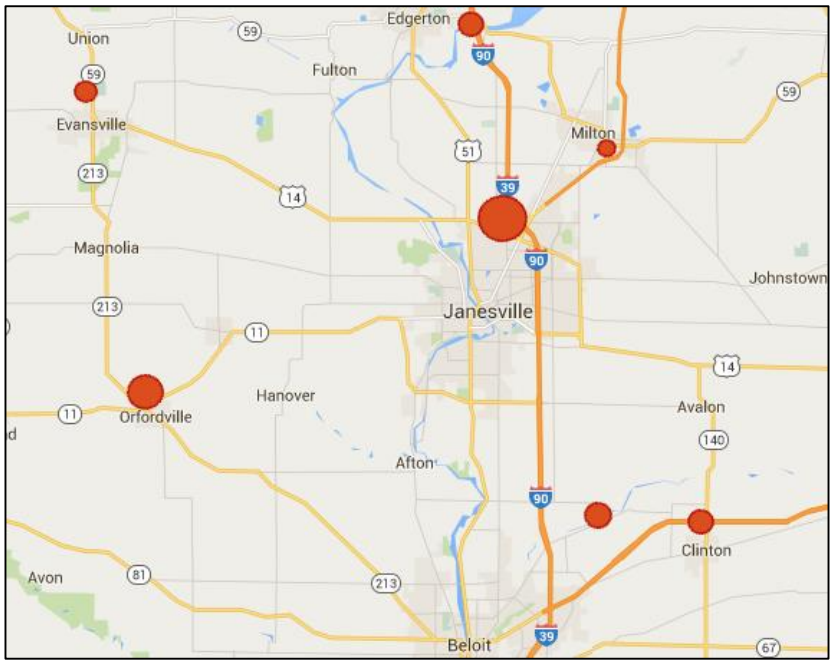
Recommendation #22: The Department should prepare for night maintenance work to compose a greater percentage of its overall workload in the next 2-5 years as the interstate expansion begins to drive maintenance workload. The Department should also be prepared to evaluate the need for a night supervisor when that occurs.

(5) The Public Works Department's Current Facilities and Locations Will Need to Expand In Order to Accommodate Changing Fleet and Staff Needs.

The Department's current facilities include the headquarters in Janesville and three outlying locations with a handful of staff assigned to them. Additionally, the Department has three salt sheds (in Shopiere, Milton, and Evansville). The following table shows some basic specifications for each facility.

Facilities Summary		
Facility	**Square Footage**	**Function**
Janesville	103,545 s.f.	Headquarters
Orfordville	27,730 s.f.	Satellite Shop
Clinton	4,129 s.f.	Satellite Shop
Edgerton (Hwy 59)	3,200 s.f.	Satellite Shop
Shopiere	2,400 s.f.	Salt Shed
Evansville	1,440 s.f.	Salt Shed
Milton	320 s.f.	Salt Shed

The dots on the map below depict the locations of the Department's current facilities.



The facility in Clinton is now closed, and a new garage in Beloit may be opened within the next 2-3 years. Modifications have been made to the small facility in Shopiere to provide some additional capacity there in the meantime. Since the primary driver of the Department's workload increases over the coming years will be the expansion of Highway 39/90, the opening of a facility in Beloit is strategically sound because it will place resources closer to the location of the increased demand.

The Department's current facilities present difficulties for housing their existing fleet. Most notably, the amount of covered space at the Janesville location is not large enough to park the entire fleet under a roof at once. As a result, some vehicles and equipment are stored outside throughout the year, and the Department packs non-winter vehicles into a close parking arrangement when they are not being used during

the snowy months in order to fit more of them in the garage. This process is time consuming and is not enough to ensure that all vehicles are covered during the winter.

The project team is recommending that the Department eliminate all but six of their small pickups and begin to use single-axle dump trucks on a year-round basis. This reduction in fleet size will outweigh some of the increases necessitated by the expansion of Highway 39/90, but the project team anticipates that the Department's existing facilities will not be sufficient for the County's needs in the coming years until the construction of the planned garage in Beloit.

Recommendation #24: The County should move forward with the planned new facility at Beloit in order to provide adequate and appropriately located vehicle storage space for the Department.

(6) The Public Works Department Should Keep a Few General Parameters in Mind When Planning Future Facility Expansions.

In addition to the space constraints presented by existing facilities, the County should give consideration to a number of parameters for building any new facilities in the coming years would be driven primarily by staffing and fleet size changes associated with three factors:

- Whether the County continues to directly provide highway and road construction. The project team recommends that it does not, which would result in decreased need for construction equipment/vehicles and a reduced summertime staff.

- Whether the County continues to use pickups in the summer and single-axle dump trucks in the winter. The project team recommends that the Department begin using the single-axle dumps for the functions currently executed by pickups and eliminate 35-40 existing pickup trucks, thus reducing some need for vehicle storage space.

- The impact of the planned highway expansion. The added lane miles will require increases in the number of snowplows and winter maintenance staff. The expansion will also create an increased need for summer maintenance staff, although that impact will likely be smaller initially since the highway lanes will be new.

With this in mind, the use of vehicles throughout the County will be increasingly concentrated along Highway 39/90. The project team anticipates that the County's facilities will be sufficient to accommodate this shift in required capacity as long as the planned facility is constructed in Beloit. As mentioned above, storage needs will also be more manageable if the Department opts to leave the town paving construction business and use single-axle dump trucks for most of the workload currently handled by pickups, as recommended by the project team.

In planning future additions, should they become necessary, the project team recommends the following:

- Expand capacity near the locations at which vehicle usage is the highest. The Janesville, Beloit, and Edgerton facilities are closest to the highway, which will generate a larger percentage of the Department's workload in the coming years, especially if the County implements the project team's recommendation to discontinue the provision of town road construction. If capacity is added, it would be best to focus on those locations.

- Maintain a single shop and parts room. The Department's fleet is small enough (and may become somewhat smaller) that the benefit of performing repairs in a new location such as Orfordville would be outweighed by the cost of equipping and opening repair bays, shipping parts between locations, and assigning mechanics to a new location.

Recommendation #25: The Department should locate future facility expansions close to the interstate, which will account for an increasing percentage of the Department's workload over the next 2-5 years.